SAW Section 603 Report

September 30, 2020

Click “edit” and “find” in Adobe Reader to search by Grantee Name

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date October 17, 2019
(no later than 3 years from executed grant date)

The Village of Holly *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1002-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 7, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Brian Klaassen at 248-634-1750 bklaassen@hollyvillage.org
Name Phone Number Email

B Klaassen 10-17-19
Signature of Authorized Representative (Original Signature Required) Date

Brian Klaassen, DPW Director
Print Name and Title of Authorized Representative

April 2017

Village of Holly

Asset Management Plan
Sanitary Sewer Collection System

December 2019

17C0097

Prepared By:

ROWE PROFESSIONAL SERVICES COMPANY

Utility Information

Utility Name: Holly Wastewater Treatment Plant
Address: 402 Airport Drive
Holly, MI 48442
Phone Number: (248) 634-1750
Email: hollywastewater@comcast.net

NPDES Number: M1002184
Number of Connections: 2,420
Number of Customers: 2,240

Personnel

Contact Person: Jerry Walker
Title: Village Manager
Email: jwalker@hollyvillage.org

Contact Person: Brian Klaassen
Title: Department of Public Works Director
Email: bklaassen@h@hollyvillage.org

Contact Person: Douglas A. Scott, P.E.
Title: Village Engineer (Consultant – ROWE Professional Services Company)
Email: dscott@rowepsc.com

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2. Exhibit 2 – Sanitary Sewer System Manhole Inventory Map

ACRONYMS

AMP	Asset Management Plan
CCTV	Closed Circuit Television
CIP	Capital Improvement Plan
DPW	Department of Public Works
EGLE	Michigan Department of Environment, Great Lakes, and Energy
GIS	Geospatial Information System
gpd	gallons per day
GPS	Global Positioning System
MACP	Manhole Assessment and Certification Program
MDEQ	Michigan Department of Environmental Quality
NASSCO	National Association of Sewer Service Companies
PLC	Programable Logic Controller
RBC	Rotating Biological Contactor
SAW	Stormwater, Asset management, and Wastewater
VFD	Variable Frequency Drive
WWTP	wastewater treatment plant

I. INTRODUCTION

In accordance with the requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE), formerly Michigan Department of Environmental Quality (MDEQ), the Village of Holly has prepared an Asset Management Plan (AMP) for their sanitary sewer system. The purpose of the AMP is to define a method of cataloging, evaluating, and maintaining the system.

The Village of Holly is committed to improving and maintaining the public health, protection, and performance of their sanitary sewer system, while minimizing the long-term cost of operating these assets. The village strives to select the most cost-effective renewal and replacement options and provide the highest quality customer service possible. A map of the sanitary sewer pipes and manholes are provided in Appendix A.

II. ASSET INVENTORY

The life expectancy of an average sanitary sewer pipe is typically 80 to 100 years. The main objective for preparing an AMP is for the village to develop an understanding of the condition of their aging sanitary sewer collection and treatment systems. Part of the AMP scope included televising the sanitary sewer collection system to document the condition of the pipes and identify problem areas. Unfortunately, the grant amount budgeted for televising was not sufficient to clean and televise the entire collection system. Therefore, televising efforts focused on older areas of collection system and areas identified by Department of Public Works (DPW) personnel having historical maintenance issues in the past.

The village's sanitary collection system was independently investigated through a Closed-Circuit Television (CCTV) survey conducted in accordance with the NASSCO pipe rating system and a Level 1 criteria inventory on their manholes. In addition, all 14 lift stations and the wastewater treatment plant (WWTP) where reviewed and evaluated by the DPW and ROWE Professional Services Company. The reports generated during these investigations were used to develop an inventory/condition survey of the village's sanitary collection and treatment assets.

A. Collection

The village's sanitary sewer collection system includes approximately 149,000 feet of pipe which is composed of the following list of assets:

- 189 feet of 6-inch gravity sewer pipe
- 94,828 feet of 8-inch gravity sewer pipe
- 6,504 feet of 10-inch gravity sewer pipe
- 9,585 feet of 12-inch gravity sewer pipe
- 18,724 feet of 15-inch gravity sewer pipe
- 4,164 feet of 18-inch gravity sewer pipe
- 1,716 feet of 24-inch gravity sewer pipe

- 2,171 feet of 30-inch gravity sewer pipe
- 531 manholes
- 14 lift stations
- 11,171 feet force main

1. Sewer

The independent survey televised 57,382 feet (40%) of sanitary collection system piping. The balance of pipe not included in the televising was either newer, not identified as a problem area by DPW personnel, or force main. A detailed examination was performed on each gravity pipe segment televised. The examination included assigning an overall condition rating and documenting/rating any defects identified.

A review of the sanitary sewer reports generated from the video survey suggests the majority of the system is in good, working order. However, the survey identified several segments that will require maintenance in the near future. These issues include minor deposits or encrustations on pipe joints and walls to breaks in pipes. Once these issues are addressed, the system should continue to provide reliable service for the village assuming that regular maintenance and planned improvements continue.

2. Manholes

Prior to performing the sewer televising, 523 (99%) of the village's sanitary manholes were evaluated in general conformance with the NASSCO's Manhole Assessment and Certification Program (MACP) Level 1 inspection standards. As part of the evaluation, all sanitary manholes were Global Positioning System (GPS) located and assigned structure numbers corresponding to collection areas developed by Village of Holly DPW personnel. The balance of manholes not inspected were inaccessible.

Most of the sanitary manholes throughout the village were found to be in sound condition. The primary maintenance needed for manholes includes the repair of deteriorating chimneys. Other minor issues identified were root intrusion, weeping, infiltration around joints, and debris that has entered the structures. A sanitary sewer system manhole inventory map (Exhibit 2) is provided in Appendix A.

Due to unforeseen circumstances, periodic structures may have to be repaired and replaced as needed. However, considering the current condition and maintenance being performed on the structures, a majority of them should be operational for an additional 50+ years.

3. Lift Stations

The majority of the collection system consists of gravity sewers. Due to the terrain within the village, the gravity sewers require pump stations and force mains to transport the sewage from the gravity sewer to a gravity sewer at a higher elevation. The system currently includes 14 lift stations which are owned and maintained by the Village of Holly.

Each of the lift stations were evaluated by ROWE Professional Services Company in October 2017 to document the current conditions and identify any maintenance concerns that should be addressed.

Lagrande Lift Station: This station is located at the corner of Lagrande Street and Church Street. This pump station is nearing the end of its service life. The existing valve chamber/wet well is showing rust and floor deterioration, the pumps are approximately 10 years old, the electrical panel is very rusty, and the hangers for the wet well are corroded. There are new check valves and portions of the electrical panel are newer. It should be noted that there is plenty of room for the replacement of this station.

Morrison Lift Station: This station is located on the north side of Academy Street and at the intersection of Emily Street. This lift station is nearing the end of its service life for the structure. The existing wet well is a steel structure that has significant rust and corrosion. The existing slide rails and brackets all need to be replaced as well. The existing piping is galvanized and should be replaced. One of the pumps dates to 1977 while the other one is much newer. The remaining equipment seems to be in average to good condition. This station is in a very tight location that has extensive landscaping.

Deer Lake Lift Station: This station is located on the west side of the cul-de-sac at the end of Canyon Creek Drive. This lift station is fairly new and appears to be in good working condition. It is built on the side of a hill and has very limited access. Issues noted were grease problems, problems with the motor starters, and rag issues. The existing concrete pad for the parking area is sloping towards the control panel.

Winifred Lift Station: This station is located at the water treatment plant and pumps backwash water from the water treatment plant into the sanitary sewer. The station was constructed in 2006 and is in good condition.

Riverside Lift Station: This station is located along Riverside Drive in the currently undeveloped area. The station was constructed around 2005 and sees very little flow. Overall, the station is in “like new” condition. There is moisture collecting in the bottom of the valve vault that drains back to the wet well. The only improvement that is being suggested is to repaint some of the components.

Sunset Lift Station: This station is located at the south end of Sunset Drive. This lift station was constructed around 2000 and is in overall good condition. The only issues that were found include some grease buildup and a joint leaking in the valve chamber.

Apollo Lift Station: This station is located on Apollo Court within the Hawaiian Village Mobile Home Park. The station is in overall poor condition and needs to be considered for replacement. Unfortunately, the existing location is very tight and impacted by adjacent mobile homes. The valve chamber is in poor condition, leaking at the bottom letting ground water into the chamber. There are about 6 inches of water in the chamber. The chains and rails are corroded. Due to the corrosion, the chains need to be replaced. The rails do not extend to the top of the wet well making removal of the pumps difficult. The mechanical piping and valves are very rusted and need replacement. There is no bypass. This station is very old and has a deep wet well with very inaccessible valve vault piping.

Quick Road Lift Station: This station is located at the north end of the village on the south side of Quick Road. The pumps in this station are approximately 15 years old but are in good condition. The overall condition of the station is acceptable. The only issue reported is that the valve vault is half full of water.

Stone Bridge Lift Station: This station is located in the Stone Bridge Condominium Complex on the north side of the village. Overall, the station is in excellent condition with the exception of impeller issues every couple of years.

Holly Bush Lift Station: This station is located on Holly Bush Drive just north of Bush Lake. This station is nearing the end of its service life. The existing steel wet well and valve vaults have significant rust/corrosion. The existing panel is rusty and outdated.

Elm Street Lift Station: This station is located on Elm Street just east of Park Street. The station is nearing the end of its service life. The station consists of a steel wet well and valve vault that are both rusted and corroded. The existing pumps are only about eight years old.

Maple Street Lift Station: This station is located on the south side of Maple Street near Corbin Street. Overall, this station is in average condition. One pump is original, the other two years old. The electrical panel has heaved due to frost but, overall, the station is in good, working condition.

E. Holly Street Lift Station: This station is located outside the village at the Holly High School. Overall, this station is in average condition. The existing structures do not appear to have any visible leaks and the electrical components are in average condition. One of the pumps are new while the other is an original.

Baird Street Lift Station: This station is located on Baird Street just south of Cyclone Park. The station was completely replaced in 2017. Everything for this pump station is in new condition.

B. Wastewater Treatment System

The existing WWTP has been regularly maintained over the years. Since the WWTP operator has maintained extensive service records and recommendations for improvements, an extensive evaluation of the WWTP was not performed as part of the AMP. The WWTP was originally constructed in 1981. In 2007, the village upgraded the plant capacity by adding a Grit Building, Sludge Holding Tank, and Digester Building with tank. The village understands the importance of the WWTP. Assuming the scheduled maintenance and proactive upgrades to the WWTP continue, the facility should provide reliable service to the community for the foreseeable future.

Based on the Engineer’s opinion of probable construction costs to replace the WWTP with 2019 pricing, Holly’s sanitary system is valued at approximately $90,000,000. This amount includes the unanticipated replacement cost of all the existing pump stations of $7,100,000. The sanitary system value of $37,000,000 represents the collection system for gravity and force main and $47,000,000 for the treatment plant. A replacement cost of $220 per foot was assumed for all sanitary lines, $8,800 per manhole, $150 per foot was assumed for force mains, and $35 per gpd was assumed for the WWTP.

III. CAPITAL IMPROVEMENT PROJECT PLAN

Maintaining a municipal system should include planning for future needs. The sanitary sewer system is no exception. The planning should consider the growing and/or changing needs of the population they serve, and the constant wear and tear imposed on the system over time.

A. 5-Year CIP

Evaluated assets with a consequence of failure rating of 17 or greater typically make up the bulk of projects proposed for the five-year Capital Improvement Plan (CIP). Based on the current ratings, the sanitary system contains some pipes with a consequence of failure ratings above 16. The following costs are based upon average estimated sewer replacement costs and should be used for budgetary purposes only.

1. Collection System Cost Breakdown by Street

Beaver Run between Beaver Run and south cul-de-sac (8”)	$285,000
Airport Drive between Sherwood Street and Saginaw Street (30”)	$441,000
West city limits (approximately 325 feet south of Fairfield Street) to WWTP (18”)	$156,000
North Street from Sherwood Street to Michigan Street (24”)	$279,000
Saginaw Street from Elm Street one manhole south	$64,500
Collection System Subtotal	**$1,225,500**

The following is a list of WWTP improvements and the anticipated costs associated with each item. Some of these improvements are planned with funding already saved and specifically allocated over the next five years. These projects were already on in the five-year CIP for the WWTP.

2. Treatment Plant Improvements Cost Breakdown

South Sludge Storage tank (coat)	$16,500
Influent #3 Rebuild	$16,000
Master Control Panel PLC	$8,400
Sec. Clarifier Flight Board	$7,500
Filter Feed Pumps	$8,500
Filter Backwash Pumps	$7,500
Emergency Generator	$134,500
Digester #1 (N) Floating Cover	$36,000
Pump Building PLC CP-100	$8,400
Digester #2 Inspection/Clean	$13,000
Primary Clarifier Flight Boards	$7,500
Raw Sewage VFDs	$32,000
Trickling Filter Pumps	$28,900
Sludge Recirculation Pumps	$26,500

Digester Building PLC CP-700	$4,500
Chemical Feed Pumps	$3,500
Treatment Plant Subtotal	**$359,200**

5-YEAR CIP SANITARY SYSTEM IMPROVEMENT TOTAL	**$1,584,700**

B. 20-Year Plan

A consequence of failure between 9 and 16 qualifies an asset for the 20-year CIP. These assets are important to the system’s operations that have fallen out of their prime condition. These can vary from more deteriorated assets playing less critical roles in the system to minor deteriorated assets in critical roles. As assets fall into this category, the village has time to make improvements, but needs to begin budgeting for them before they reach a higher criticality. Due to there being areas of pipe that were considered new or in a condition that made them a lower priority, a maintenance plan is being put into place to continue televising the system. Starting in year 10 of the 20-year CIP, it is suggested to do $10,000 per year in televising.

1. Collection System Cost Breakdown by Street

Maple Street between Washington and College Streets (15”)	$289,200
Easement area between Hidden River Drive and Janice Drive from Fairfield Street continuing north 650 feet (18”)	$195,000
North Street between Michigan Street to Saginaw Street (24”)	$187,500
S. Saginaw Street between Oakland and North Streets (24”)	$138,000
S. Saginaw Street between Thomas Street and Airport Street (15”)	$100,500
Otter Run from Beaver Run 380 feet to the east	$114,000
Televising addition sewer lines ($10,000/year)	$100,000
Collection System Subtotal	**$1,124,200**

2. Treatment Plant Improvements Cost Breakdown

Automated Bar Screen	$500,000
Media Replacement Trickling Towers	$1,050,000
Removal of RBCs	$205,000
Additional Storage	$2,750,000
Treatment Plant Subtotal	**$4,505,000**

20-YEAR CIP SANITARY SYSTEM IMPROVEMENT TOTAL	**$5,629,200**

Developing a financial strategy to accommodate all short- and long-term needs of the sewer collection system is a priority of the village. The 5- and 20-year capital improvement budgets are summarized in Table 1.

Table 1: Capital Improvement Plan (CIP)

Project	Cost	Years Until Project Begins
WWTP Upgrades	$4,864,200	Ongoing
Sanitary Sewer Improvements	$2,349,700	Ongoing

It is recommended that the village evaluate their rate structure on an annual basis and make adjustments in advance of future capital improvements to establish revenue needs for financing the proposed work.

IV. REVENUE STRUCTURE

It is important for the Village of Holly to maintain and improve their assets. The village's sanitary sewer system is no exception. To do this, the costs associated to own and operate the sanitary sewer system, both collection and treatment, must be fully understood. To cover the costs of maintenance and improvements, rates must be structured to meet current and future expenditures. Although the future cannot be entirely predicted, goals should be set and plans put into place to prepare for the village's anticipated future needs.

V. GIS AND ASSET MANAGEMENT PROGRAMS

As part of the SAW grant, the Village of Holly acquired Geospatial Information System (GIS) and Asset Management programs in 2019. The purpose of these programs is to develop an overall map of the village's infrastructure and allow for easy management and workflow. These programs include ArcGIS Online and Cityworks Online. Both programs are hosted online solutions which minimize the system maintenance and the cost of the programs while maximizing the accessibility.

ArcGIS Online is a cloud platform that hosts the village's infrastructure maps to provide remote accessibility at any time. The initial focus of the GIS program is the sanitary sewer system which includes attribute information gathered during the AMP such as location, material, size, and condition of pipes and manholes. In the future, the village plans to expand their system by adding WWTP assets along with storm sewer and water main assets.

Cityworks Online is also a cloud-based platform that leverages the system GIS maps from ArcGIS Online and allows the village to manage their assets and infrastructure as well as automate the workflow process. The initial focus of the Cityworks program is to manage workflow and assets for village's sanitary sewer system. In the future, the village plans to expand their system by adding WWTP assets along with storm sewer and water main assets.

VI. CONCLUSION

Evaluation and inventory of the Village of Holly's sanitary system assets lays the groundwork for the successful management of these assets. Assessment of these assets has allowed the village to assemble a plan to maintain and budget for expenses related to the investigation, maintenance, and replacement of the sanitary system in the future. This framework will allow Holly to cost-effectively provide sanitary sewer service to the residents and businesses.

Extensive investigation and analysis show the village's system to be in good condition overall. In addition, deficiencies throughout both systems have been identified as short- and long-term needs.

The village’s rate structure needs to be evaluated to determine if they are adequate to address the future improvements that have been identified.

The village has always strived to provide reliable and cost-effective sanitary sewer service for its users. This AMP establishes a framework for the DPW to continue its work and provide the system users with the service and reliability they expect in the most cost-effective manner.

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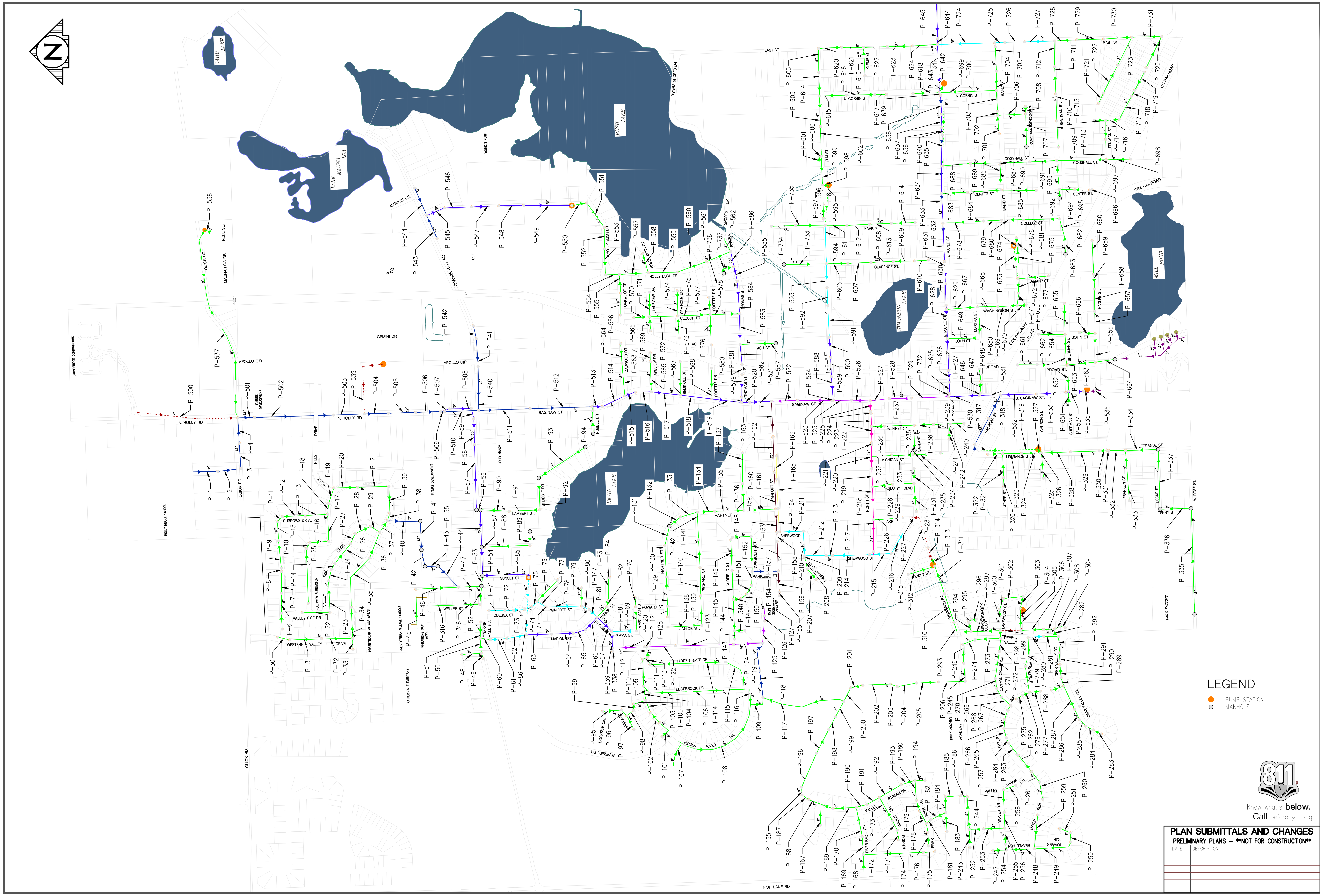
Appendix A

1. Exhibit 1 – Sanitary Sewer System Pipe Inventory Map
2. Exhibit 2 – Sanitary Sewer System Manhole Inventory Map



Know what's **below.**
Call before you dig.

PLAN SUBMITTALS AND CHANGES

PRELIMINARY PLANS - **NOT FOR CONSTRUCTION**

DATE	DESCRIPTION

PREPARED FOR

VILLAGE OF HOLLY
HOLLY SAW GRANT

EXHIBIT 1 - PIPE INVENTORY MAP
SANITARY SEWER SYSTEM MAP

ROWE PROFESSIONAL SERVICES COMPANY

The Rowe Building
540 S. Saginaw St., Suite 200
Flint, MI 48502

O: (810) 341-7500
F: (810) 341-7573
www.rowepsc.com

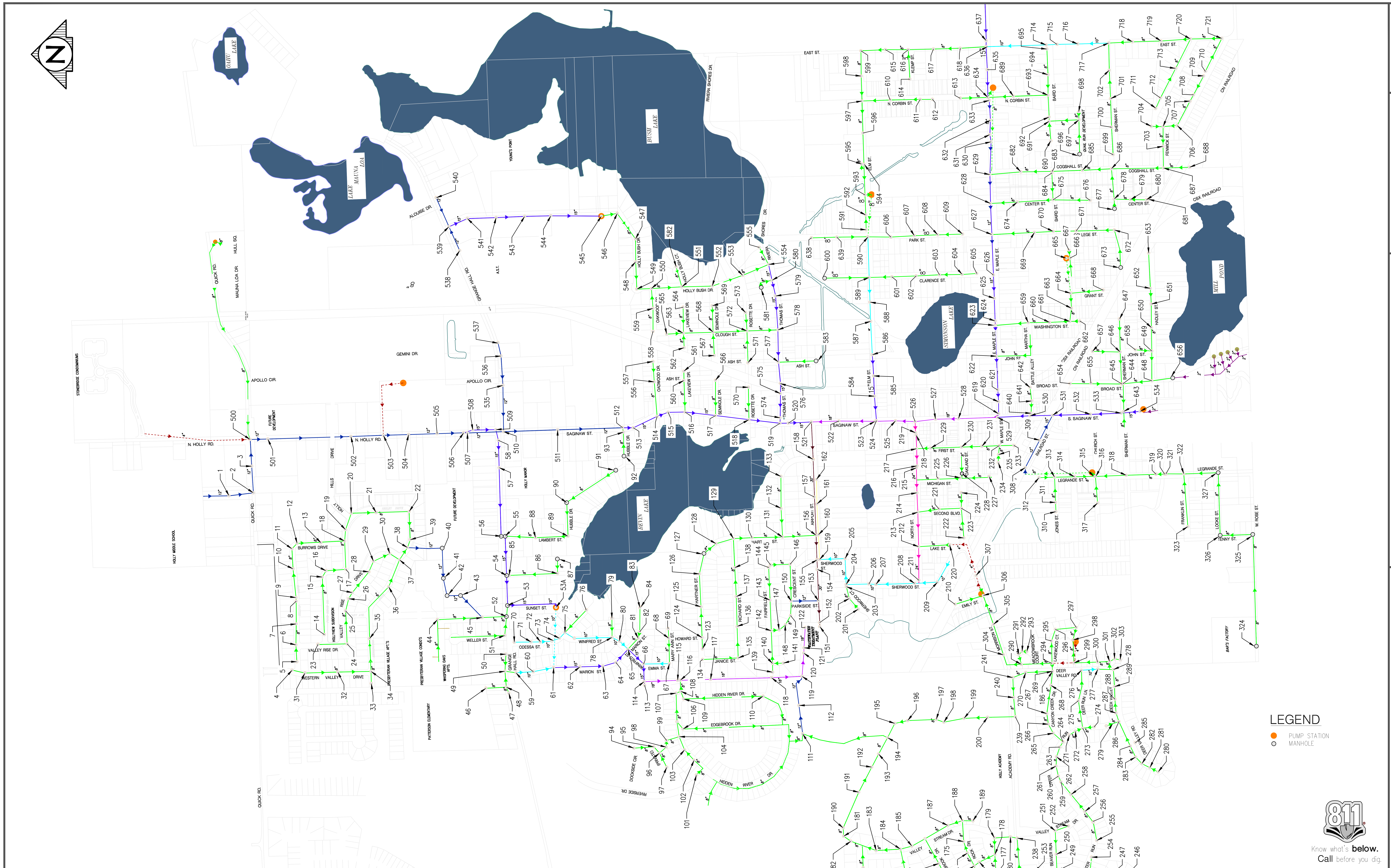
PLAN DATE: AUGUST 2019
PROJECT MGR: DAO
REVIEWER: DAS
SCALE: NOT TO SCALE

REV:

SHT# 1 OF 2

JOB No: 17C0097

PLOTTED: 7/30/2019 11:24 AM R:\Projects\17C0097\Dwg\Construction Drawings\AMP MAPS\Overall System Map.dwg



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Know what's **below.**
Call before you dig.

PLAN SUBMITTALS AND CHANGES

PRELIMINARY PLANS – **NOT FOR CONSTRUCTION**

DATE	DESCRIPTION

PREPARED FOR

VILLAGE OF HOLLY
HOLLY SAW GRANT

EXHIBIT 2 - MANHOLE INVENTORY MAP
SANITARY SEWER SYSTEM MAP

ROWE PROFESSIONAL SERVICES COMPANY
The Rowe Building
540 S. Saginaw St., Suite 200
Flint, MI 48502
O: (810) 341-7500
F: (810) 341-7573
www.rowepsc.com

PLAN DATE: AUGUST 2019
PROJECT MGR: DAO
REVIEWER: DAS
SCALE: NOT TO SCALE

REV:

SHT# 2 OF 2

JOB No: 17C0097

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PLOTTED: 7/30/2019 11:24 AM

OHM
Advancing Communities®

January 17, 2020

Amy Handley
Project Manager
Revolving Loan Section
EGLE – Drinking Water and Municipal Assistance Division
PO Box 30241
Lansing, MI 48909-7741

RE: Charter Township of Canton SAW - Wastewater AMP
SAW Deliverable Submittal for SAW Grant No. 1003-01

Dear Ms. Steiner-Zehender:

Enclosed you will find the deliverables for the Charter Township of Canton SAW grant deliverables, including the signed Certificate of Project Completeness and an AMP summary. The AMP will be available to EGLE upon request, and a copy will be available to the public (by request, at the Township offices, or on the Township website).

Contact Information:
Charter Township of Canton
1150 S. Canton Center Road
Canton, MI 48188
Contact Person: Brad Lear, Public Works Manager – 734/397-1011

Please inform us if you have comments on this AMP document, or have any other questions related to this SAW grant.

Sincerely,
OHM Advisors

G. John Tanner

G. John Tanner, P.E.
Project Manager

Encl: SAW Wastewater Asset Management Plan
cc: Brad Lear – Public Works Manager

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OHM
Advancing Communities®

December 18, 2019

Leni Steiner-Zehender
Project Manager
Revolving Loan Section
EGLE – Drinking Water and Municipal Assistance Division
PO Box 30241
Lansing, MI 48909-7741

RE: Charter Township of Canton SAW - Wastewater AMP
SAW Deliverable Submittal for SAW Grant No. 1003-01

Dear Ms. Steiner-Zehender:

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Please inform us if you have comments on this AMP document, or have any other questions related to this SAW grant.

Sincerely,
OHM Advisors

G. John Tanner

G. John Tanner, P.E.
Project Manager

Encl: SAW Wastewater Asset Management Plan
cc: Brad Lear – Public Works Manager

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EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/17/2019
(no later than 3 years from executed grant date)

The Charter Township of Canton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1003-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes [✓ or No]
   If No - Date of the rate methodology approval letter: 10/28/2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
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4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Brad Lear	at 734-397-1011	brad.lear@canton-mi.org
Name	Phone Number	Email

	12-17-2019
Signature of Authorized Representative (Original Signature Required)	Date

Brad Lear - Public Works Manager
Print Name and Title of Authorized Representative

May 2019

Canton Michigan Sanitary Sewer System Asset Management Plan – May 2019 Executive Summary by OHM Advisors

The wastewater infrastructure system of the Charter Township of Canton (henceforth referred to as Canton) provides the collection and conveyance of wastewater from its residents and businesses in a manner that aims to protect the local streams and Rouge River watershed. Wastewater generated in Canton is ultimately discharged to Western Township Utilities Authority (WTUA) wastewater treatment facility. Recognizing the importance of this wastewater collection system, Canton initiated an assessment of its wastewater collection infrastructure.

This Asset Management Plan (AMP) summarizes this assessment along with a summary of findings, observations, as well as a capital improvement plan. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program, SAW GRANT 1003-01, with a total budget of $2,400,000 that includes a $433,333 local match required by Canton.

The AMP was intended to accomplish the following key goals:

- Provide Canton with an update to their existing framework for collecting, organizing, and storing data for their wastewater collection system.
- Update asset information for sewer material type, size, and depth to the existing GIS database as necessary.
- Physically evaluate the structural condition of grant eligible, publicly owned system components, including wastewater sewer pipes and manholes.
- Identify long-term strategies for continued system operation and maintenance
- Provide recommendations for developing a prioritized Capital Improvement Plan (CIP).

Mission Statement

The mission of the Municipal Services Department in Canton can be summarized as an ongoing effort to support and maintain the safety and quality of life for Canton's residents, businesses, and visitors.

Asset Management Team Leaders

The Asset Management Team consisted of William Serchak, Canton Engineering Services Manger, and Bob Belair, Canton Public Work Manager, and they were committed to the asset management mission and were instrumental in the progress made and findings outlined in this report. Further questions on the AMP can be directed to these team members by calling the Engineering Services building at 734-394-5150 or the Public Works Building at 734-397-1011.

Infrastructure Technology & Know-How

Canton has a robust GIS database, which has been updated as a result of the recent inspection plan. In addition, investments were made as part of the asset management program to update information for sewer material type and size, as appropriate

Asset Inventory

An asset inventory is a list of Canton's wastewater sewers and manholes and their attributes. The majority of the wastewater sewer infrastructure were previously inventoried and digitized prior to their Stormwater, Asset Management, and Wastewater (SAW) grant initiation. Updates to this inventory were made as necessary as part of this project.

Condition Assessment

With the intent of assessing the wastewater system, Canton's wastewater sewer infrastructure (wastewater sewer pipes and manholes) have been evaluated. The condition of the infrastructure is based on the National Association of Sewer Service Companies (NASSCO) condition grading system, which uses a scale of zero (0) to five (5) to code features and defects observed in the asset. A Grade 1 defect is the most minor and a Grade 5 is the most significant defect. A Grade of 0 indicates the presence of a non-defect feature such as the water level in the pipe or the location where a lateral service line taps the sewer. About 6% of the 6,227 eligible structures in the manhole network and about 53% of the approximately 254 miles of eligible wastewater sewer pipe infrastructure has been condition assessed. Eligible assets, as per the SAW requirements require the pipe in question to be more than 20 years of age or indicating a suspected problem area.
(source: https://www.michigan.gov/documents/deq/deq-ess-mfs-SAW-_FAQ_411303_7.pdf)

It was observed that:

- Manhole infrastructure has an average structural rating index of approximately 0.64 and an average O&M rating index of 2.05.
- Within the inspected manhole infrastructure only one structural grade 5 defect was observed, equating to approximately 0.30% of the inspected system and only seven structural grade 4 defects were observed, equating to approximately 2% of the inspected system.
- The most severe defects within the manhole infrastructure were related to cracks or fractures but observed to be easily repaired.
- Within the sewer infrastructure, over 80% of the inspected length was found to be without structural defects; the most frequently observed structural defect was surface damage such as aggregate visible or projecting.

- Within the sewer infrastructure, approximately 78% of the inspected length was found to be without O&M defects; the most frequently observed O&M defect was Grade 2 deposits.
- A small percent of the infrastructure was found to have a condition rating of 5; this was addressed promptly during the analysis phase of the condition assessment. An example of a level 5 defect included a deformation of a PVC sewer in a neighborhood.

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the evaluation of Business Risk Exposure (BRE), which is determined by the combination of the Probability of Failure (PoF) and the Consequence of Failure (CoF).

The PoF is related to the physical condition of an asset, which is derived from inspection reports. The CoF focuses on the economic losses, environmental impacts, and impacts to society due to an asset's failure. The following factors were combined to determine the consequence of failure for wastewater sewers.

- Diameter/Size – the relative size of the asset with respect to the rest of the system, i.e. larger diameter pipes carry larger flow volumes, service larger areas, and thus their failure would have a greater consequence
- Proximity to Critical Users – Higher consequence is assigned to pipes nearest to critical users identified throughout Canton, e.g. Medical, Government, Health, and Educational facilities

Level of Service

Canton, in line with its mission outlined earlier, adopted Level of Service (LOS) criteria, which it plans to use as guidelines to manage the wastewater sewer system. These LOS criteria are as follows:

- Collection System Inspections: perform PACP and MACP standard condition assessment for 20% of the systems manholes per year and 20% of the systems wastewater sewer pipes per year.
- Asset Inventory: Update the GIS data when pipes are repaired or replaced.
- Regulatory Compliance: Continue to comply with the EGLE Sanitary Sewer Overflow (SSO) policy and The Clean Water Act.
- Service Delivery: Response to sanitary sewer complaints and respond on-sit to sanitary sewer collection system back-ups within 3 hours.
- O & M Optimization: Operate and maintain system in accordance with Part 41 of PA 451, clean manholes as needed based on inspection findings, and clean sewer pipes as needed based on inspection findings.

O&M Strategies

Canton's Operation and Maintenance Strategies are directly tied to their Target LOS criteria which is to inspect a minimum of 20% of the manholes and sewers in the wastewater system annually. By inspecting 20% of the sewers and manholes per year, the entire system will be inspected on a five-year cycle. The cleaning schedule depends on the needs found during televised inspections.

Revenue Structure and Capital Improvement Plan

The condition assessment helped identify capital improvement needs, which are summarized below, and costs include time, material, labor, admin and engineering costs:

- Remove and replace sanitary sewers: $44,800
- Full liner for sanitary sewers: $206,500
- Spot liner(s) and possible cleaning of sanitary sewers: $619,100
- Grouting and cleaning of sanitary sewers: $1,844,500
- Lateral cutting of sanitary sewers: $4,800
- Clean or Heavy Cleaning of sanitary sewers: $178,400
- Sending letters to customers: $2,500
- Major point repairs in sanitary sewers: $20,800
- Total CIP cost for sanitary sewers: $2,921,400

Canton's first true cost-of-service study for both water and sewer rates were adopted in 2005. In 2019, an update to that study was prepared, which incorporates the CIP and O&M strategies recommended in this AMP. The objective of the initial and subsequent update studies has been to ensure long-term, sustainable funding for the operation and maintenance of the water and sewer systems, by identifying the revenue required and adjusting service rates accordingly.

Canton's rate structure incorporates both fixed and commodity-based components to cover the costs involved in sanitary sewer treatment. Customers' fixed charges are scaled based on the size of their sewer connection and whether or not they have a footing drain directly connected to the sanitary sewer system. For commodity charges, the study determined a rate of $5.28 per 1,000 gallons of sewage treated is necessary to generate the required revenue for the 2019 Sanitary Sewer budget. This is a decrease from the previous rate of $5.80 per 1,000 gallons of sewage treated.

There currently is no gap between revenue and required expenses. In terms of planning for long-term funding, the rate study has projected the annual target cash balance out to the year 2028 at 3% inflation rate. Canton will adjust rates when necessary.

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

EGLE

GRETCHEN WHITMER
GOVERNOR

LIESL EICHLER CLARK
DIRECTOR

October 28, 2019

Mr. Tim Faas
Charter Township of Canton
1150 South Canton Center Road
Canton, Michigan 48188

Dear Mr. Faas:

SUBJECT: Stormwater, Asset Management, Wastewater (SAW)
Charter Township of Canton
SAW Grant Project Number 1003-01

We have reviewed the information contained in the rate methodology dated August 13, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404, or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Mr. Jonathan Berman, EGLE

CONSTITUTION HALL • 525 WEST ALLEGAN STREET • P.O. BOX 30473 • LANSING, MICHIGAN 48909-7973
Michigan.gov/EGLE • 800-662-9278

Department of Environmental Quality
SAW Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 5/28/2020
(no later than 3 years from executed grant date)

The Charter Township of Shelby *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1006-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant. The Department of Environmental Quality (DEQ) defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gap in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.

Attached to this certification is a summary of the AMP that identifies major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Richard Stathakis at 586-731-5154 rstathakis@shelbytwp.org
Name Phone Number Email

Rate Methodology was submitted to DEQ on: 10/7/2019
(within 2 ½ years from date of executed grant)

An initial rate increase of 0 % of a $ 0 gap was adopted on 0

5/28/2020
Signature of Authorized Representative (Original Signature Required) Date

Richard Stathakis , Township Supervisor
Print Name and Title of Authorized Representative

June 2014

CHARTER TOWNSHIP OF SHELBY

2020 SHELBY ASSET MANAGEMENT PLAN REPORT

SAW Grant Project No. 1006-01

AEW NO. 0132-1211

MAY 2020

Charter Township of Shelby
52700 Van Dyke Road
Shelby Township, Michigan 48316

Contact Name (Authorized Representative):

Richard Stathakis, Township Supervisor / 586-731-5154

PREPARED BY:

ANDERSON, ECKSTEIN & WESTRICK, INC.
CIVIL ENGINEERS SURVEYORS ARCHITECTS

51301 SCHOENHERR RD. SHELBY TOWNSHIP, MI 48315
www.aewinc.com p(586)726-1234

Executive Summary

Managing existing infrastructure and growth, while preserving a quality of life consistent with serving the public health and welfare is a primary objective of the Charter Township of Shelby. Shelby Township DPW staff have always provided high quality service and effectively managed their Sanitary Sewer System and other infrastructure assets. In keeping with this practice and taking a proactive position in protecting the valued resources of the community, residents and property owners the Township initiated an application to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program. Shelby Township's SAW grant award of $1,738,112 required a local match of $357,148 for a total of $2,095,260.

The purpose of this SAW Grant was to compile a Wastewater Asset Management Plan (AMP) which included conducting an asset inventory and asset condition assessment to determine the level of service of the district, evaluating capacity requirements for unsewered areas or areas currently being served by individual septic fields, evaluating the condition of existing pump stations, developing a Sanitary Sewer Master Plan, reviewing their FOG (fats, oils and grease) procedures, designating criticality of assets, analyzing both short and long-term operation and maintenance (O&M) strategies, considering long-term capital improvement planning, and recommending an implementation schedule for the Asset Management Program.

In compiling the AMP, an asset inventory was performed by means of examining construction plans, GPS location, televising (CCTV) and rating sewers and visual observation. The inventory verified that Shelby Township's existing sanitary sewer system is comprised of approximately 219.1 miles of gravity sewer, 0.43 miles of forcemain, 3 Township owned pump stations, private pump stations and 6,222 sanitary manholes. The assets have been cataloged and stored in the Shelby Township GIS mapping and database system. This database serves as the data repository for all Township owned sanitary sewer information, providing efficient and accurate means of maintaining and updating asset inventory and information, as well as providing for improved data dissemination across the organization. Database schemas have been reviewed and revised as part of this project, ensuring that the most relevant data pertaining to these sanitary system assets is accounted for in the database and readily assessable.

Under the SAW Grant program, the Township was authorized to perform more detailed investigation for approximately 432,000 lineal feet (LF) of sanitary sewer that were over 20 years old and 4,624 sanitary manholes. Observed assets were analyzed to determine their Probability of Failure (POF) and Consequence of Failure (COF). The POF is based on the Structural and Operation & Maintenance (O&M) scores indicated by visual and CCTV inspection of the assets. These ratings range from 1 to 5 whereby 1 indicates new or excellent condition and 5 indicates failure or imminent failure. The COF is based on discussion with the Township's DPW Director and staff and was comprised of a weighted system that included an assets distance to or from critical essential facilities and environmental features, adjacent road size, financial impact and the asset's diameter and depth.

Recognizing that immediate correction of all deficiencies identified in a comprehensive asset evaluation is not practical a scoring system was developed consistent with the criteria authorized by EGLE. The POF and COF scores are placed in a matrix and multiplied together resulting in the Criticality Score or the Business Risk Exposure (BRE) Score. The BRE score is used to prioritize what assets are most critically in need of repair. Table 1 shows minimum, maximum and average scores of rated assets. EGLE guidelines state that any asset with a BRE score of 16 or greater is considered critical.

Table 1. BRE Score Summary

Asset	Business Risk Exposure Score		
	Minimum	Maximum	Average
Pipes	2.50	22.50	10.52
Manholes	4.00	16.00	8.25

Only about 37% of the Township's pipes and three quarters of the Township's manholes were inspected through the SAW grant. Manholes approved through SAW were inspected, structures not inspected are newer and were deemed to be in good condition, until they are inspected. Based on the percentage of the manholes and pipes that were inspected it is reasonable to expect that the entire system's actual requirements for rehabilitation is going to be higher than identified in this report due to the unknown condition of the 63% of the system that was not inspected. Due to the varied age, condition and physical location/environment of the remaining, uninspected, assets it was not appropriate to assign an arbitrary default score to these pipes and manholes. That being said, it is important to understand that maintenance of existing infrastructure is an ongoing and dynamic process, these assets are in an aggressive environment and need to be regularly inspected and evaluated. As part of the Township's regular O&M program these assets shall be inspected on a regular basis and the AMP updated when actual information becomes available.

The impact of fats, oils and grease on a sanitary system can be very detrimental to its proper operation and if not managed properly results in capacity restrictions or blockages with consequences negatively impacting the utility and its customers. As part of the SAW grant, Shelby reviewed their existing wastewater pretreatment procedures for potential updates to strengthen the efforts to prevent FOG buildup and potential discharges.

In accordance with the SAW grant requirements Shelby Township submitted a Rate Methodology report and evaluation, dated August 13 2019, to EGLE for review and approval. On October 7, 2019 EGLE replied to Shelby Township's Supervisor indicating that they had reviewed it and that "the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended."

This AMP contains a Capital Improvement Plan (CIP) that consists of four (4) components planned up to the year 2025. The Ashford Crossing Pump Station was determined to need upgrading, it is the one of Shelby's three (3) publicly owned and operated pump stations. As stated above a regular program of CCTV investigation of the sewer system is necessary and the remaining 63% of the system that was not televised as part of the SAW program is included in the CIP in order to better understand the condition of the areas and pipes not inspected under this current AMP. Future capacity improvement projects have been identified in the CIP. Regular O&M of the sanitary system is another component of properly managing a system and providing the level of service Shelby Township's customers expect and deserve.

Each of these undertakings serve to promote good system management and improve the operation of the assets and the system as a whole while providing for implementation of a well thought out Sanitary Master Plan. The estimated budget for the CIP, exclusive of DPW annual operating costs is $ 6,976,000. It is important to point out that the vast majority of the estimated budget, $ 5,900,000, is not assigned to problems or concerns identified in the evaluation and condition assessment but is predicated on implementing a program that performs CCTV investigation of the remainder of the sewer system and assumes this program will identify future repairs and their associated costs. Since the capital improvement plan is a fluid document it needs to be updated regularly to assess the Township's sanitary system needs.

With a focus on providing a quality program with a high level of service to property owners, continuous investigation and updating of the Capital Improvement Plan is essential. Continuation of the sanitary sewer investigation program is recommended for areas not covered by the SAW Grant as well as those that were in future programs. Any issues or concerns identified by the continued investigation should be added to the CIP and AMP to ensure proper operation, management and system reliability.

This Wastewater Asset Management Plan, in conjunction with the Township's Geodatabase will serve as a valuable tool in understanding, managing and operating Shelby's sanitary sewer system. The initial insight gained strengthens understanding, policy and management of this system's assets and infrastructure. A more comprehensive discussion with supporting documentation follows in the report.

1.0 Introduction

1.1 Community Overview

The Charter Township of Shelby is a unique, progressive and forward-thinking community with vibrant and active business centers, alluring neighborhoods and an extensive park system. The Township adopted and encourages a sustainable philosophy that promotes long-term balance of economic assets, natural features and social priorities for this diverse and proactive community. Consistent with this philosophy the Township approach to development of a Wastewater Asset Management Plan is predicated on well thought-out, efficient and effective approaches understanding, investigating, inventorying and managing their sanitary sewer system infrastructure.

Shelby Township is located along the western edge of Macomb County and is bordered by Washington Township, Macomb Township and the Cities of Utica, Sterling Heights, Rochester Hills, and Rochester. The Southeast Michigan Council of Governments (SEMCOG) indicates a population of 73,804 people in 2010 and was estimated at 78,426 in 2016. By SEMCOG's estimates, the population is expected to increase to be over 85,000 people by the year 2030. If the Township grows as predicted, roughly 1,000,000 gallons of wastewater could be added to the system on a daily basis. This additional flow will require upgrades and management of the sanitary sewer infrastructure to assure the system's level of service stays consistent with the expectations of the community.

The Township's land use is diverse containing primarily moderate density single family and multi-family residential areas with industrial, commercial and institutional development along several major roads. Future development will expand into the undeveloped portions of the Township, including residential, commercial and industrial areas converting this from its present undeveloped condition. Additionally, sanitary will extend into developed areas that are currently severed by septic field systems, when requested by the homeowners.

Rolling topography with elevations ranging from over 880 in the northwesterly portions to 600 in the southeasterly and along the Clinton River sections of the Township coupled with continuing growth and aging systems provide challenges for keeping Shelby's sewer operating at the level of service their customers expect. There are also large sections of the Township that are not connected to the public sanitary sewer system. Since the Township's topography has considerable changes in elevation, many of Shelby's sewers were constructed with varied slopes ranging from steep to minimum allowable slope and three (3) Township owned pump stations were installed.

Shelby's potential for growth and connecting the Township's developing and unsewered land to the public sewer system will continue to increase flow in existing sewers and will require properly routing and sizing the existing and proposed sewers, where appropriate, as well as the construction of new sewers. This AMP in conjunction with the Sanitary Sewer Master Plan considers both current conditions and future development potential. Creating the Asset Management Plan is a significant step towards understanding and managing the wastewater system in a proactive manner and affords the Township the ability to take initiatives to assure the long-term sustainability of its infrastructure while assuring the future needs of the community, residents and property owners are met and managed effectively.

1.2 Historic Service Overview

Efficient, reliable and cost-effective sanitary sewer conveyance and service to Township residents and property owners is a primary focus of Shelby Township. The sanitary sewer system must be operated and maintained in a manner which protects the property owners and the environment. Currently the Township has over one million feet of sanitary sewer, which increase over the years with the growth of the Township. In order to better understand the system, this AMP was developed to evaluate the level of service and criticality of assets, update previous master plan studies and identify capital needs to incorporate into current planning and direction of the Township's wastewater assets.

The previous Sanitary Sewer Master Plan, for the Township, was developed in 2006. This plan identified potential sewer sub-districts along with routing and capacity requirements based on existing conditions and future development considering allowable densities based on approved zoning. Generally, where possible the community has focused on installation of gravity sewers for providing sanitary sewer capacity and transportation for each sub-district and the larger districts within the community. In keeping with the previous Master Plan the 2020 Sanitary Sewer Master Plan analyzes each of the three (3) Metered Districts and the individual sub-districts within them. This investigative planning process focuses on determining if each outlet sewer has sufficient capacity and whether the tributary connecting sewers are sized appropriately to convey the sewage to the outlets. Assuring sufficient capacity and logical routing of flow is necessary to accommodate the Township's sanitary needs, through a buildout scenario.

1.3 Service District Overview

Shelby's general topography slopes from the highest area at the northwest corner of the township with an elevation of approximately 880 feet, near the Stony Creek Metropark entrance to Hayes and Hall Road (M-59) at the southeast corner of the Township where the elevation is close to 600 feet. The rolling topography coupled with the natural features such as the Clinton River have resulted in three (3) separate Sanitary Sewer Service Districts; the Southwest District, the Northwest and the Southeast District.

All wastewater from the Northwest District of the Township flows south into the 96-inch Oakland-Macomb Interceptor District (OMID), owned by the OMID. The Southwest District of the Township flows south into a 60-inch sewer, also owned by the OMID. The largest is the Southeast District which flows to 21 and Hayes then easterly along 21 Mile Road, through Macomb Township, to the Garfield Interceptor, which is owned and operated by the Macomb Interceptor Drain (MID).

The natural and manmade features in conjunction with the Township's historic development has divided the Township into three (3) separate Sewer Districts, as described above. The sanitary sewers in the Southwest District are a tributary for Meter SY-S-1, the sanitary sewers in the

Northwest District are a tributary for Meter SY-S-2, and the sanitary sewers in the Southeast District are a tributary for Meter SY-S-3.

1.4 SAW Grant

By taking a proactive position in protecting the valued resources of the community, residents and property owners the Township initiated an application to EGLE and in October 2013, was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program.

In addition to the Sanitary Sewer Master Plan discussed in this report the purpose of this SAW Grant was to compile a Wastewater Asset Management Plan (AMP) which included conducting an asset inventory and asset condition assessment to determine the level of service of the district, designating criticality of assets, analyzing long-term operation and maintenance (O&M) strategies, consider long-term capital improvement planning, development of a Sanitary Sewer Master Plan, and recommending an implementation schedule for the asset management program.

In compiling the AMP an asset inventory was performed by means of examining construction plans, GPS location, and visual observation. The inventory verified that Shelby's existing sanitary sewer system is composed of approximately 219.1 miles of gravity sewer, 0.43 miles of forcemain, three (3) Township owned pump stations, private pump stations, and 6,222 sanitary manholes. The assets have been cataloged and stored in the Shelby Township GIS mapping and database. This database serves as the data repository for all Township owned sanitary sewer information, providing efficient and accurate means of maintaining and updating asset inventory and information, as well as providing for improved data dissemination across the organization. Database schemas have been reviewed and revised as part of this project, ensuring that the most relevant data pertaining to these sanitary system assets is accounted for in the database and readily assessable.

1.5 Asset Management Plan

Shelby Township has created an Asset Management Plan (AMP) for their wastewater system to ensure all portions of the system are funded, repaired, and maintained as necessary and in accordance with good system management.

Asset management, is defined in the International Infrastructure Management Manual, as

> “Meeting a required level of service in the most cost-effective way through the creation, acquisition, operation, maintenance, rehabilitation, and disposal of assets to provide for present and future customers.”

The AMP starts with an inventory and assessment of all assets which can then be prioritized for repair or replacement, as needed. The goal of the AMP is to keep the wastewater system fully funded in the future by identifying any gaps that may currently exist between funding and expenses. In addition to the inventory and assessment of all assets, the AMP will complete the following items:

1.) Determine the desired level of service for each of Shelby Township’s wastewater assets.
2.) Designate the criticality of all assets.
3.) Analyze costs associated with long-term O&M strategies and support for the AMP.
4.) Consider long-term funding and capital improvement planning for wastewater assets.
5.) Recommend an implementation schedule for the asset management program.

Since the Township’s sanitary sewer system will always require repairs, upgrades, and expansions it is important to ensure there is a plan for uninterrupted service to the Townships residents, property owners and visitors.

2.0 System Characteristics

2.1 Software

A portion of the SAW Grant funds have been used to purchase software, hardware and training of staff. These programs will work in conjunction with the GIS database that is in place to help the Township with planning projects and maintaining the sewer system. The following is a brief discussion of several of the programs which will be integral tools in the management and understanding of Shelby’s sanitary sewer system:

The Township has expanded its asset management capabilities with the purchase of state of the art GIS software, setting the stage for a complete and robust Enterprise GIS environment. The purchase of ArcGIS Desktop software allows City personnel to create, manage and edit their own GIS databases. ArcGIS Server software provides the Township with the ability to host their own

GIS data on premise, greatly improving Township wide access to a wealth of GIS information. The newly purchased ArcGIS Online subscription empowers field crews to perform asset inspections and add visuals from the field directly to the Township's GIS databases. Comprehensive training classes for City personnel are also being performed, ensuring that the highest value possible is derived from Shelby's GIS investment.

3.0 Asset Registry

Collecting asset data started with programs to gather data on the Township's manholes, pipes, and lift stations. All pump stations were inspected, but pipes and manholes were only inspected if they were located within areas specified for the SAW grant. The areas selected were limited to areas not investigated for several years and meeting EGLE SAW requirement of being more than 20 years old for pipe. Three quarters of the Township's manholes were inspected and maps and condition assessments of manholes can be found in Appendix A and Appendix B, respectively.

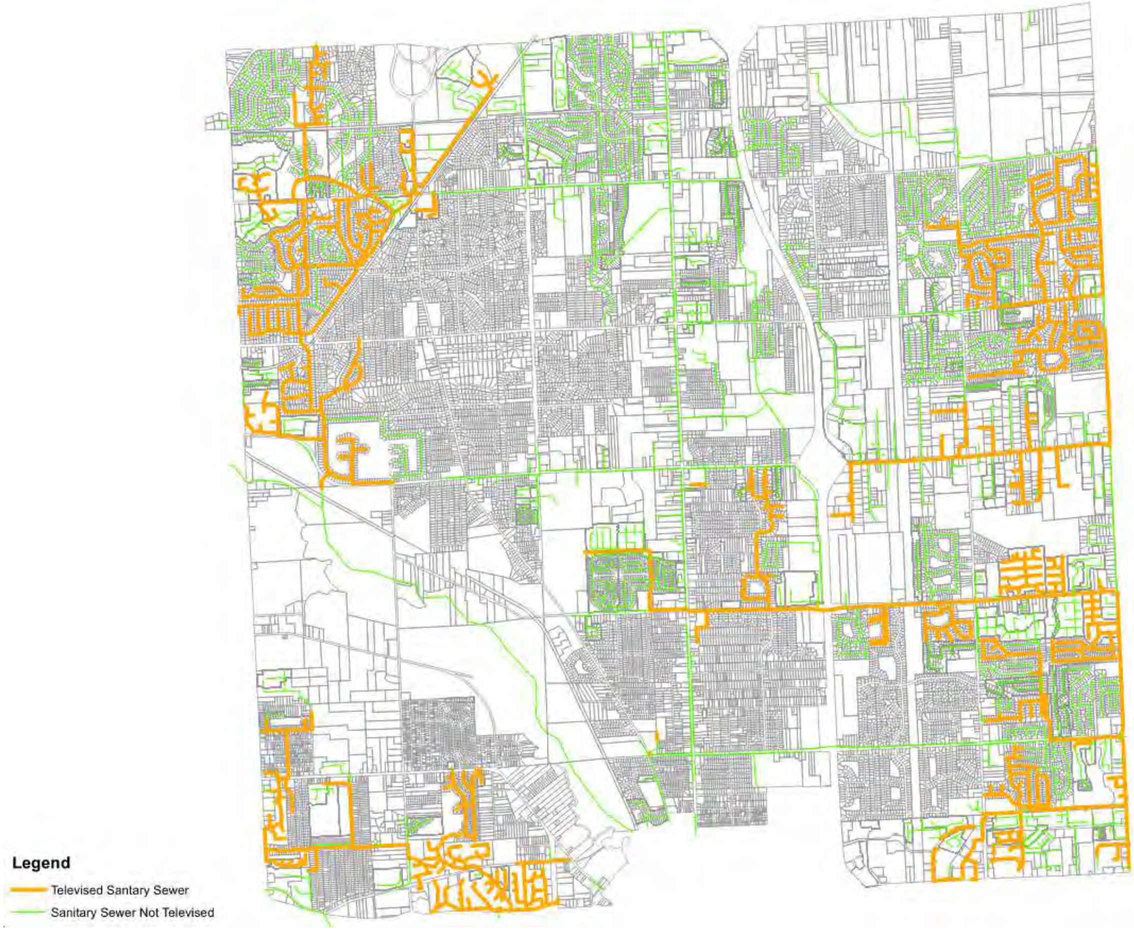


Figure 1. Map of Televised Sanitary Sewers

All of these assets have been cataloged using a Graphical Information System (GIS), which provides a more efficient and accurate record keeping process. The GIS System serves two functions, acting both as a mapping system and a database. Inspection reports, pictures, CCTV and asset history were directly linked to the assets that were inspected.

3.1 Sanitary Sewer Lines

3.1.1 Condition Assessment

Shelby Township currently owns 219.1 miles of sanitary sewer pipes. As previously mentioned, only a limited sewer pipes that were older than 20 years were inspected. Therefore, only 82 miles, or 37%, of gravity sewer was televised. Analysis of these pipes was completed through a cleaning and CCTV program, which generated a Pipeline Assessment and Certification Program (PACP) rating for each segment of pipe investigated. The PACP rating system assigns a 1 to 5 rating for each defect, where 5 indicates failure or imminent failure and 1 indicates new or excellent condition. Defects are divided into two categories, Structural defects and Operation and Maintenance (O&M) defects. Structural defects include cracks, deformation, and pipe collapse while O&M defects include deposits, defective taps, and infiltration. Tables 2 and 3 summarize the ratings based on defects found in the inspected pipes. The complete CCTV review report can be found in Appendix C and the resulting defect rating maps can be found in Appendix D. All CCTV videos were reviewed and a CCTV review report of all sewers with a PACP rating of 4 or greater or those sewers that have specific defect of 4 or greater were given repair recommendations.

Table 2. Pipe Structural PACP Ratings

Diameter	Structural Rating				
	1	2	3	4	5
6" to 12"	743	490	138	96	25
15" to 21"	89	148	61	13	1
24" to 30"	18	106	24	3	0
36" to 48"	8	41	0	1	0
Total	**858**	**785**	**223**	**113**	**26**

Table 3. Pipe O&M PACP Ratings

Diameter	O&M Rating				
	1	2	3	4	5
6" to 12"	582	806	56	36	12
15" to 21"	129	125	43	12	3
24" to 30"	72	42	26	11	0
36" to 48"	29	11	7	2	1
Total	**812**	**984**	**132**	**61**	**16**

3.1.2 Sewer Line Rehabilitation/Replacement

Rehabilitation or replacement is eventually necessary for each pipe in order to keep the system running efficiently. Several methods were analyzed for the rehabilitation and replacement of pipes including grouting, cured in place pipe (CIPP), dig-ups for point repairs, and complete replacement. Grouting is a method used to fill small cracks, primarily stopping infiltration. Grouting does not add significant structural integrity, and is therefore preferred only for O&M repairs. CIPP is used to line the pipes and can repair both structural and O&M defects. The two forms of CIPP are sectional (SCIPP) which is used when only a small segment of pipe needs to be repaired, and full (FCIPP) which is used when the majority or entire line needs to be repaired. The CIPP is installed by threading the lining through an existing manhole or access point, requiring little to no excavation. Grouting and Lining are the least intrusive methods of repair but they are not always the most appropriate depending on the nature, type and extent of the deficiency. Dig-ups at spot locations may be needed if CIPP cannot be accomplished and if the pipe does not warrant full replacement. If the pipe cannot be rehabilitated using one of these methods, a complete replacement is necessary. Replacing a pipe consists of fully excavating the existing pipe, removing it, and installing a new pipe. While complete replacement provides the longest future service life, it is generally the most expensive and disruptive option. Tables 4,5,6 and 7 provide the typical unit cost for each repair and the total cost to rehabilitate or replace the system. The resulting costs can be found in Section 9.0 Capital Improvement Plan.

Table 4. Sewer Sectional Liner Unit Costs

Pipe Size (in.)	Liner Length (ft)	Cost	Unit
8	3	$3,000	Ea
	6	$3,200	Ea
	10	$3,500	Ea
	15	$3,500	Ea
	20	$3,700	Ea
	25	$3,800	Ea
10	3	$3,000	Ea
	6	$3,200	Ea
	10	$3,500	Ea
	15	$3,500	Ea
	20	$3,700	Ea
	25	$3,800	Ea
12	3	$3,500	Ea
	6	$3,800	Ea
	10	$4,000	Ea
	15	$4,100	Ea
	20	$4,200	Ea
	25	$4,300	Ea
15	3	$3,700	Ea
	6	$3,900	Ea
	10	$4,100	Ea
	15	$4,200	Ea
	20	$4,300	Ea
	25	$4,400	Ea
18	3	$4,000	Ea
	6	$4,100	Ea
	10	$4,200	Ea
	15	$4,300	Ea
	20	$4,400	Ea
	25	$4,500	Ea
21	3	$4,500	Ea
	6	$4,600	Ea
	10	$4,700	Ea
	15	$4,800	Ea
	20	$4,900	Ea
	25	$5,000	Ea
24	3	$5,000	Ea
	6	$5,100	Ea
	10	$5,200	Ea
	15	$5,300	Ea
	20	$5,400	Ea
	25	$5,500	Ea
27	3	$5,500	Ea
	6	$5,600	Ea
	10	$5,700	Ea
	15	$5,800	Ea
	20	$5,900	Ea
	25	$6,000	Ea

Table 5. Sewer Full-Length Liner Unit Costs

Pipe Size (in.)	Cost	Unit
8	$40	Ft
10	$40	Ft
12	$45	Ft
15	$55	Ft
18	$65	Ft
21	$85	Ft
24	$110	Ft
27	$110	Ft

Table 6. Sewer Grouting Costs

Work Item	Cost	Unit
Grout Main Line Sewer	$120	Ea
Grout Lateral Sewer	$500	Ea

Table 7. Sewer Dig-Up Costs

Work Item	Location	Cost	Unit
Dig Main Line Sewer	Pavement	$14,000	Ea 6 ft Segment
	Easement	$10,000	Ea 6 ft Segment
Dig Lateral Sewer	Front Yard	$10,000	Ea 6 ft Segment
	Rear Yard	$7,500	Ea 6 ft Segment

3.2 Sanitary Sewer Structures

3.2.1 Condition Assessment

The Township currently owns 6,222 wastewater manhole structures, 4,624 manholes, or 74%, of sanitary sewer structures were inspected. Inspection of these structures resulted in a Manhole Assessment and Certification Program (MACP) rating for each structure. The MACP rating system assigns a 1 to 5 rating for each structure, where 5 indicates failure or imminent failure and 1 indicates new or excellent condition. Defects include cracks, infiltration, broken covers, misaligned pipes, and debris. Table 8 summarizes the structural rating based on the observed physical condition found in the inspected structures. The resulting rating map and a spreadsheet containing all of the data collected in the field can be found in Appendix E and F, respectively.

Table 8. Structural MACP Ratings

Rating	Number of Manholes
1	327
2	3027
3	1214
4	29
5	27
Total	**4624**

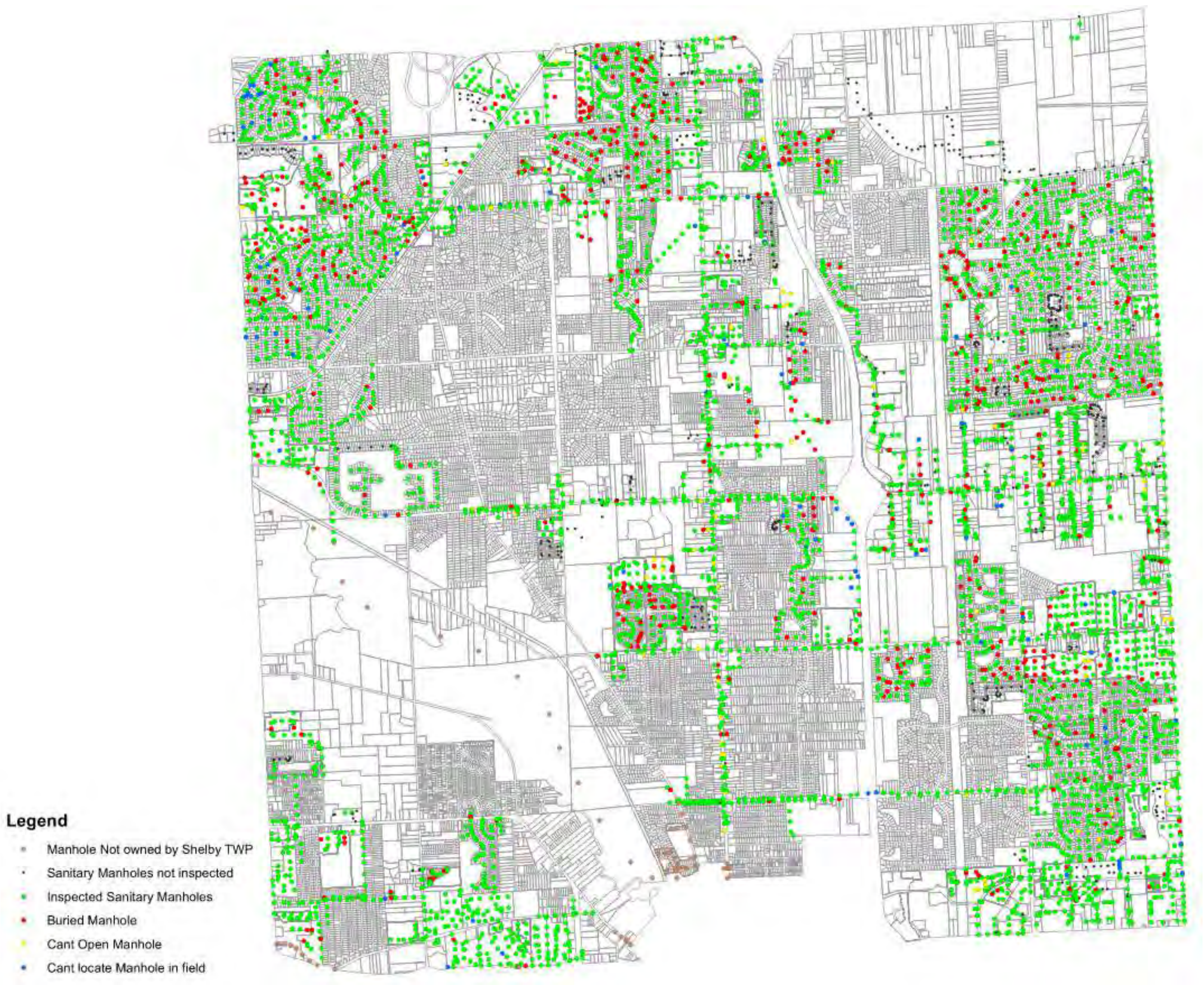


Figure 2. Map of Inspected Manholes

3.2.2 Manhole Rehabilitation/Replacement

In order to provide an acceptable level of service, to keep the system functioning properly, and to protect the valued resources of the Township, all manholes must be repaired or replaced when defects do or potentially could interrupt service and safety. Multiple options exist for fixing a damaged or inoperable structure, including internal and external seals, mortar seals, structure wraps, spot repairs and complete replacement. Internal and external seals, mortar seals and structure wraps increase structural integrity while providing protection against infiltration and inflow issues. If the structure cannot be rehabilitated using one of these methods, spot repairs or a complete replacement is necessary. Spot repairs include replacing and adjusting rims and covers as well as placing structure wrap to provide long-term integrity. Spot repairs also include pointing or filling around pipe or manhole section joints or intrusions. Replacing a structure consists of fully excavating the existing structure, removing it, and installing a new structure. While complete replacement provides the longest future service life, it is generally the most expensive and disruptive option. In addition to these rehabilitation and replacement methods, a comprehensive FOG program and regularly scheduled debris removal and cleaning aid in increasing the efficiency and extending the life span of the system. Table 8 provides the typical unit cost for each repair, the total cost for manholes which warrant rehabilitation or replacement can be found in Section 9.0 Capital Improvement Plan. Table 9 below shows the costs associated with each type of manhole repair.

Table 9. Manhole Rehabilitation Unit Costs

Work Item	Location	Cost	Unit
Reconstruct Chimney	Pavement	$4,000	Ea
	Front Yard	$900	Ea
	Rear Yard	$1,000	Ea
Reconstruct Cone	Pavement	$4,200	Ea
	Front Yard	$1,000	Ea
	Rear Yard	$1,200	Ea
Grout Joints and Lift Holes	Pavement	$300	Ea
	Front Yard	$300	Ea
	Rear Yard	$400	Ea
Grout Pipe Seal	Pavement	$300	Ea
	Front Yard	$300	Ea
	Rear Yard	$400	Ea
Abandon Manhole/Bulkhead Pipes	Pavement	N/A	Ea
	Front Yard	$400	Ea
	Rear Yard	N/A	Ea
Install Drop Connection	Pavement	N/A	Ea
	Front Yard	$500	Ea
	Rear Yard	N/A	Ea
Interior Manhole Lining	Pavement	$400	Vf
	Front Yard	$400	Vf
	Rear Yard	$400	Vf
Reset Frame and Cover	Pavement	N/A	Ea
	Front Yard	$450	Ea
	Rear Yard	$500	Ea
Cut Roots	Pavement	$200	Ea
	Front Yard	$200	Ea
	Rear Yard	$300	Ea
External Chimney Seal	Pavement	$4,000	Ea
	Front Yard	$900	Ea
	Rear Yard	$1,000	Ea

The preliminary estimated cost to repair all manhole structures having a single structural or O&M MACP defect of a 4 or 5, is $50,000. Based on this assessment there are 57 structures with a defect rating of 4 or 5. From a budgeting perspective and considering the random spacing of these manholes we recommend that the budget used for CIP consideration is $ 2000 per manhole or $ 114,000, These manholes should be repaired within the next three (3) years. The remaining manholes were rated a weighted scoring system to determine the overall condition of the manholes. The manhole weighted ratings are as follows:

❖ Frame Condition	9%
❖ Chimney Condition	16%
❖ Cone Condition	16%
❖ Wall Condition	16%
❖ Bench Condition	6%
❖ Channel Condition	6%
❖ Pipe Seal Condition	13%
❖ Overall Field Rating Component	19%

The recommendation is for the Shelby DPW to proceed with repairing a majority of the defects scored as a 4 or 5 within the next three (3) years and can be performed by contactors specializing in manhole rehabilitation. The remaining manholes can be repaired utilizing outside contractors and/or existing staff as the Township's budget allows.

3.3 Pump Stations

3.3.1 Condition Assessment

As part of Shelby Township's SAW Grant, the Township's active sanitary pump stations were assessed for incorporation into the AMP. Field assessment of the three (3) active public sanitary pump stations were conducted by AEW with the assistance of the Shelby Township Department of Public Works (DPW). In addition to the field assessment, review of engineering drawing records of the pump stations, operation and maintenance records, current conditions and any operational issues were evaluated. Figure 3 and Table 10 gives the location and details for each of the three (3) Township owned pump stations and one (1) private pump station.

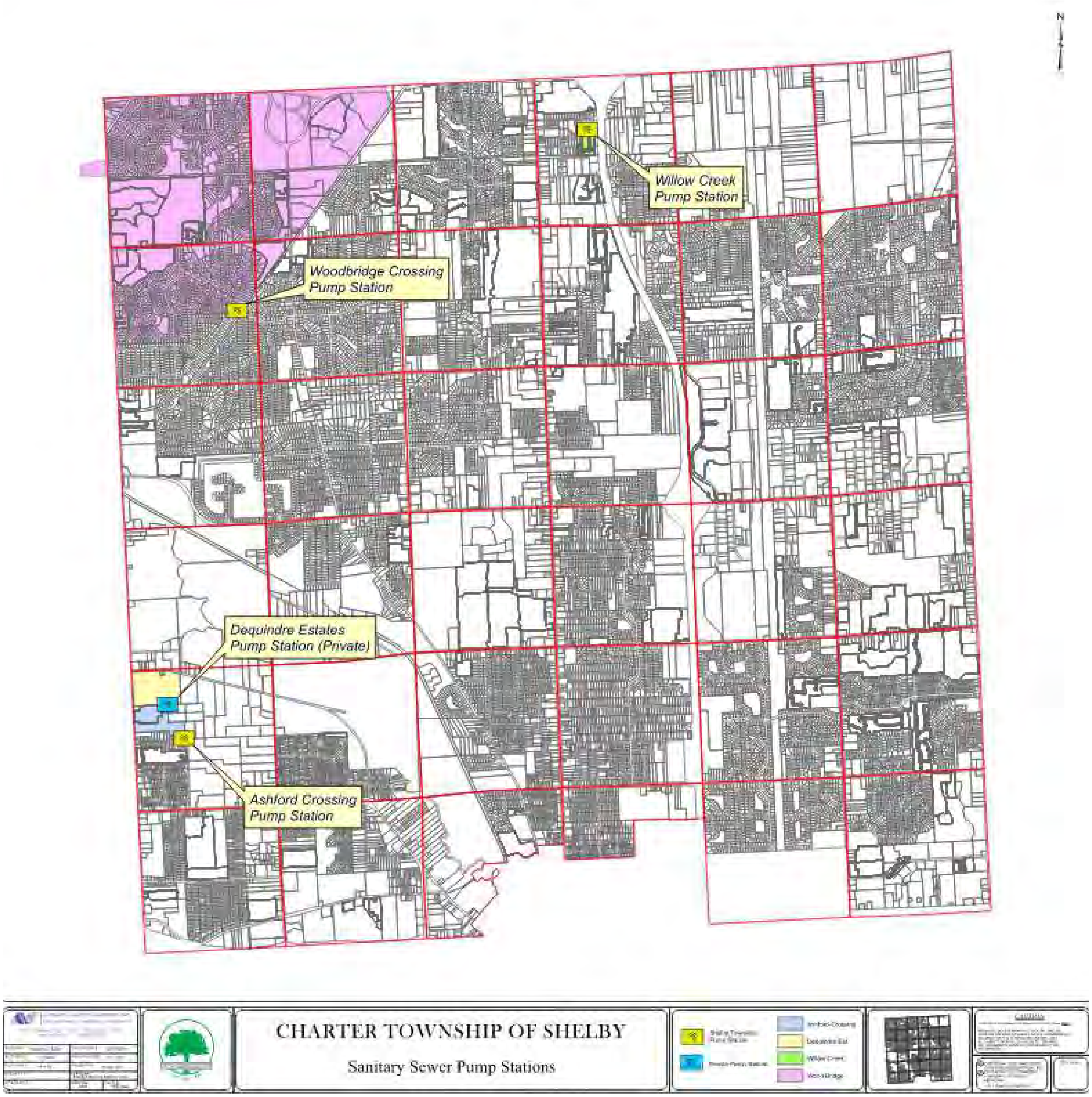


Figure 3. Pump Station Locations and Districts

(Maps included in Appendix G)

Table 10. Pump Station Summary

No.	LOCATION	STATION DETAILS		
PS1	2663 Durham (Ashford Crossing)	2 Pumps Submersible	5 H.P./pump 256 gpm/pump at 23.5 ft TDH	Constructed in 2006
PS2	5400 Woodbridge (Woodbridge)	3 Pumps Submersible	15 H.P./pump 1102 gpm /pump at 31.8 ft TDH	Renovated in 2006
PS3	8655 Willow Creek (8741 Shadow Creek for DTE) (Willow Creek)	2 Pumps, Submersible	3 H.P./pump 150 gpm/pump at 19.9 ft TDH	Constructed in 2006

Pump Station site visit photos and pump station inventory forms can be found in Appendix H. Findings at each of the three (3) public pump stations are briefly summarized below.

Ashford Crossing Pump Station (2663 Durham Road)

Ashford Crossing Pump Station is located at the northwest corner of Durham Road and Hixson which is the southeast corner of the pump station's service district. This station was originally constructed in 2006, and remains intact with its original design. The pump station district (PSD) has approximately 35.69 acres of coverage consisting of a 276 unit condominium complex. Key factors associated with this pump station are as follows:

- Duplex submersible pump design
- Two (2) operational Flygt Pump, Model 3102.090, 5 HP
- 6 ft diameter reinforced concrete wet well and valve chamber (Good condition)
- Ductile iron discharge piping (Signs of obvious external corrosion within wet well) and force main outlet piping to truss sanitary
- Steel electrical panel, three phase, 480 V (good condition) with existing onsite natural gas fired standby power generator
- Aluminum hatch w/ automatic hold open device & padlock and safety grating on wet well (good condition). Valve chamber hatch does not include safety grating.

Woodbridge Pump Station (5400 Woodbridge)

The Woodbridge (or Northwest) Pump Station is located on Woodbridge Drive, southeast of the intersection with Birchfield Drive in the Shelby Hills Subdivision No.1. This station was originally constructed in 1985, and has been renovated and reconfigured based on AEW construction plans dated October 25, 2006 (AEW# 0132-0300 (included in Appendix H)). The PSD has approximately 1,587 acres of coverage consisting of primarily residential. Key factors associated with this pump station are as follows:

- The original construction consisted of a triplex dry-pit pump design with separate wet well.
- The station has been retrofitted with three (3) submersible Flygt Pumps, Model 3153.091, 15 HP.
- 14 ft diameter reinforced concrete (RCP) wet well (good condition) discharging to 10 ft. diameter RCP valve chamber.
- ductile iron discharge piping, ductile iron outlet piping
- Steel electrical panel, three phase, 480 V (poor condition)
- Original pump station wet well retrofit with submersible pumps. Hatch with padlock, automatic hold open device (good condition)
- Standby power generator with automatic transfer switch (ATS)

Willow Creek Pump Station (8655 Willow Creek)

Willow Creek Pump Station is located within the Willow Creek Condominium development. This station was originally constructed in 2005. The PSD is limited to the condominium development and is approximately 15 acres of coverage consisting of 27 residential units. It is understood that the pump station is operated and maintained by the homeowners' association (HOA) which hires a maintenance and repair contractor (i.e. Jett Pump & Valve, LLC). The station and site appeared to be well maintained. Key factors associated with this pump station are as follows:

- The original construction consisted of a triplex dry-pit pump design with separate wet well.
- The station was constructed with two Submersible Flygt Pump, Model 3085.091, 3 Hp.

- 6 ft diameter reinforced concrete wet well (fair condition). Foam concrete form under hatch should be removed to verify slab condition at hatch frame.
- Ductile iron discharge piping in 6 ft. diameter valve chamber.
- Ductile iron outlet piping to gravity sanitary.
- Steel electrical panel, three phase, 480 V (Good condition)

<u>Overall Pump Station Assessment</u>

It is important to note that in the following POF factor descriptions, “acceptable” refers to materials and/or equipment which meets current construction standards while “unacceptable” refers to materials and/or equipment which does not meet current construction standards. Both stations were given a cumulative POF score based on four equally weighted factors as follows:

1.) Electric and Control Panel Condition – The electric and control panel condition was determined based on a good/fair/poor (1/3/5) rating where good indicated acceptable electrical equipment in good working condition protected by good or new outdoor-rated material panel enclosure with no rusting or deterioration. Fair indicated functional electrical equipment protected by unacceptable material panel enclosure with early signs of deterioration. Poor indicated unacceptable or non-functional electrical equipment protected by unacceptable material panel enclosure with clear signs of rusting and deterioration with a high risk of weather infiltration.

2.) Wet Well Structure Condition – The wet well structure condition was determined based on a good/fair/poor (1/3/5) rating where good indicated a pump station wet well with acceptable materials and no signs of defects. Fair indicated wet well with unacceptable materials in good condition with early signs of defects or wet well with acceptable materials with minimal signs of defects. Poor indicated wet well with unacceptable materials and clear signs of deterioration including cracking or rusting.

3.) Hatch Condition – The hatch condition was determined based on a good/fair/poor (1/3/5) rating where good indicated wet well and valve vault hatch systems with acceptable outdoor-rated materials having no signs of defects, equipped with an automatic hold-open device and fall protection. Fair indicated wet well and valve vault hatch systems not having fall protection, either with unacceptable materials having early signs of deterioration or acceptable materials having minimal signs of defects.

Poor indicated wet well and valve vault hatch systems not having fall protection, with unacceptable materials having clear signs of heavy rusting and deterioration.

4.) Pipe Condition – The discharge piping condition was determined based on a good/fair/poor (1/3/5) rating where good indicated a fully functional discharge pipe system with acceptable materials with no signs of defects. Fair indicated a discharge pipe system with unacceptable materials in good condition with early signs of deterioration or acceptable materials with minimal signs of defects. Poor indicated a discharge pipe system with unacceptable materials and clear signs of heavy rusting and deterioration, and/or being equipped with non-functional components.

5.) Redundancy Condition – The redundancy condition was determined based on if a pump station contained a second pump. This leaves stations without redundancy, increasing the potential of failure for the station. Pump stations with redundancy received a rating of 2.5 whereas pumps with no redundancy received rating of 5.

All four (4) POF factors were added together and proportioned to grant each station a POF score on a scale of 1 to 5, where 1 indicates good or excellent condition and 5 indicates failure or severe structural condition.

The existing pump stations are all of the submersible pump type with separate concrete wet wells and valve chambers. Each is functional and operating as designed with non-critical exceptions as noted in the findings for the individual pump stations. In general the findings from the Pump Station Assessment Report are summarized as follows:

1. All active stations are fully operational with no observed or pending failures. In addition this provides for low potential of future failure.
2. Recommended or suggested modifications include safety, maintenance programs and system monitoring and are generally considered non-critical for continued pump station functionality.
3. The three (3) public pump stations are generally of the same date of either new construction or complete overhaul in the case of Woodbridge (i.e. 2006-2007). At 12 to 13 years old, the mechanical and electrical components are half-way through an average 25-year service life (EPA Wastewater Technology Fact Sheet, See Appendix H).
4. Submersible pumps commonly have a 5 year prorated warranty from new.

It is currently understood that the long-term plan requires the maintenance of the existing operational pump stations. A significant and required improvement includes real-time monitoring and data retrieval for the stations by means of an upgrade of the Sensaphone Sentinel Supervisory Control and Data Acquisition (SCADA) system shown in Figures 4 and 5. This is a "Cloud" based system that allows real-time monitoring on a smart phone or similar smart device. This system is recommended to be implemented in at the Willow Creek Pump Station.

Figure 4: Sensaphone Sentinel Pro System at the Woodbridge Pump Station

Figure 5: SCADA Control Board at the Ashford Pump Station

3.3.2 Criticality

The consequence of failure was determined based on three (3) factors as follows:

1.) Pump Station Service District Size – The service district size was determined based on each pump station's approximate coverage or drainage area in acres. The drainage area is rated on a scale from 0.2 to 1 scale as shown in Table 11.

Table 11. Service District COF Factor Score Criteria for Pump Stations

Service Area (REUs)	Score
0-300	0.2
300-1000	0.6
>1000	2.0

2.) Service Life - Equipment – The service life for wastewater pumping station equipment is 20 to 30 years (EPA Wastewater Technology Fact Sheet). This service life is for pump stations which are well maintained with the impact of poor maintenance and operating conditions being directly proportional to a decrease in service life. Pump stations utilizing concrete structures generally have a structural service life of 50 years. This can be increased through the use of corrosion resistant materials and coatings. Pump stations with newer equipment and maintenance received a rating of 0.5 whereas older pumps and equipment in proportion to a 20 year service life (per SRF criteria) received a rating of 1.

3.) Structure Depth – The greater the depth of structure, the more costly it will be to replace or rehabilitate the structure. In addition, the time it will take to repair or replace the structure will be greater, and will create a greater inconvenience to the general public and potentially cause street level flooding during wet weather events. Each structure depth was assigned a factor score as shown in Table 12.

Table 12. Structure Depth COF Factor Score Criteria for Pump Stations

Structure Depth	Score
depth < 10'	0.2
10' ≤ depth < 15'	0.4
15' ≤ depth < 20'	0.6
20' ≤ depth < 25'	0.8
depth ≥ 25'	1

The criticality score is then determined by multiplying the POF and COF scores. Criticality score may range from 1 to 25, where 25 indicates highest criticality for repair, rehabilitation, or replacement. Shelby Township sanitary pump stations yielded a minimum criticality score of 3.34, a maximum score of 5.38, and an average criticality score of 3.85. Table 13 shows the criticality score of each pump station. Of the three (3) sanitary pump stations evaluated none received a criticality rating greater than 16. The full criticality analysis can be found in Appendix H.

Table 13. Pump Station Criticality Ratings

Pump Station	Criticality (BRE) Score
Ashford Crossing	4.36
Willow Creek	3.34
Woodbridge	5.38

4.0 Criticality of Assets

Some assets are extremely critical to the system, requiring immediate attention to avoid severe consequences, while others are not as critical, allowing for maintenance or repair to be delayed as necessary. That being said it is important to understand that maintenance of existing infrastructure is an ongoing and dynamic process, these assets are in an aggressive environment and need to be regularly inspected and evaluated. To best understand the assets that do not meet the desired level of service, each asset must be assessed and analyzed to determine replacement costs and criticality. To determine criticality there are two questions which must be answered:

1.) How likely is it that an asset will fail?
2.) What is the consequence of failure?

In order to determine how likely an asset is to fail, or the assets probability of failure (POF), there are many factors that must be considered including age, condition, failure history, historical data, experience with the type of asset, maintenance records, and most likely modes of failure. The consequence of failure (COF) is also dependent on many factors including cost of repair, social cost, costs associated with damage caused by failure, and environmental costs created by the failure. Designating critically allows the Township to prioritize what assets should be rehabilitated or replaced and when.

Assigning criticality is the result of examining both the POF and COF. Assets which have the greatest POF and COF will be the assets that are most critical. The criticality score is ultimately determined by multiplying the POF and COF scores. The criticality scores can range from 1 to 25; the EGLE SAW guidelines state that any asset with a criticality score above 16 is considered to be critical and corrective action planned.

As previously stated in this report, 37% of the gravity sewer lines, 74% of the manholes, and all three (3) Township owned pump stations were inspected and evaluated. The subsequent sections will discuss how the condition assessment was performed, how the POF and COF were calculated, and the resulting criticality score, or Business Risk Evaluation (BRE) score for each asset. Appendix I and J contain the complete BRE analysis spreadsheets of the inspected sewer lines and manholes, respectively.

4.1 Probability of Failure

The probability of failure was ultimately determined to be the overall condition for pipes and manholes. These ratings were from analysis of manhole inspections and the CCTV investigation of the pipes. The current values reported, herein, are based off of the MACP and PACP ratings given to each inspected asset. After the assets were initially rated in the field, all ratings were reviewed in the office to confirm the field rating of these assets.

When appropriate, if the Office Review/Evaluation determined the field contractors initial rating was incorrect the Engineer corrected the pipe ratings to reflect the the proper structural and/or O&M defect PACP score. For example, asset SGM2244 was given an in-field overall rating of 2.0 based on the PACP Grading System. This pipe had a hole with soil visible, which was given a structural rating of 5.0; the pipe also had one (1) other structural defect with a rating of 2.0 and four (4) defects with O&M ratings of 2.0. Since the pipe only had an overall PACP rating of 2.0 the hole may have been overlooked. This is why all pipe ratings were reviewed and altered as needed. The hole in the pipe in this example was changed to a rating of 5.0 to indicate that it has a significant defect which needs to be addressed.

As previously stated only a percentage of the manholes and pipes were inspected therefore actual requirements for rehabilitation is going to be higher when the remaining percentage of the system is inspected. Due to the varied age, condition and physical location/environment of the remaining, uninspected, assets it was not appropriate to assign an arbitrary default score to these pipes and manholes. As part of the Township's regular O&M program these assets shall be inspected and the AMP updated when actual information becomes available.

4.2 Consequence of Failure

Shelby uses critical facilities, environmental features, impact on community, the asset's diameter and financial impact to rate an asset's consequence of failure (COF). Each of these criteria is used to score the asset. The COF is determined by a weighted scoring system for the five (5) aforementioned criteria.

Critical facilities are essential to the operation of the Township, particularly in the case of an emergency. Assets within 600 feet (average distance of 2 manholes) of these facilities were determined to be more critical, since at least two (2) manholes are required for bypass pumping. Broken pipes can cause backups, spills, or collapses that could block the entrance to a facility or impede the facility from functioning properly. Assets near essential facilities such as police departments, fire departments, and medical facilities were rated 5 due to their high importance to the Township's safety. Assets near schools, the Township Office, and the Department of Public Works were given a rating of 4, since they are also important facilities to the safety, management and communication within the Township. Assets near nursing homes or senior care facilities and mobile home parks were given a rating of 3 since these may require emergency and or have high density traffic traveling to and from these facilities. All other assets were given a rating of 2.

Environmental features are extremely important to Shelby Township, Shelby values environmental features that enhance and protect the environment and the quality of life of the community. The distance to any natural lake, river or drain was considered in the criticality using the scoring shown in Table 14.

Table 14. Environmental & Regulatory Impact of Failure

Criticality Score	Distance from Environmental Feature
5	0 ft to 500 ft
4	501 ft to 1000 ft
3	1001 ft to 1,500 ft
2	1,501 ft or more
1	-

When sewer pipes are close to environmental features response time and potential impact associate with breaks and loss of service can have a greater impact. Even a small break could have a large impact if not fixed quickly, either by letting large amounts of water into the sewers or by letting sewage out. The impact and consequences of sewer failures are all severe but distance, response time and proximity to sensitive environmental features were considered to increase the consequence of failure. The further away, the higher potential for containment and minimizing harmful impacts.

Keeping roads operating is important to citizens and emergency services. A sewer main break near or under a major road has the potential to cause long term closures. The bigger the road, the higher traffic volume the larger the impact to the community. Table 15 relates the roads within Shelby Township to the assigned criticality scoring.

Table 15. Disruption to Community

Criticality Score	Roadway Classification or Name
5	M-53, M-59, 23 Mile Road
4	Van Dyke Ave, Shelby Pkwy
3	21, 22, 24, and 25 Mile Roads, Shelby Road, Ryan Road, Dequindre, Schoenherr, Hayes, Mound
2	All Other Roads
1	-

A break under any of the roads listed as 5 would not only disrupt Shelby, but the neighboring communities as well. In comparison, any issues on a minor local road would disrupt a few homes but with proper response the potential for surface discharge and basement flooding can be managed effectively. Considering the impact on traffic allows the Township to ensure areas with the largest potential for disruption are given priority.

The size of an asset indicates the service area, number of customers – people / businesses / capacity requirements, served by that section of the sewer. The larger the sewer the greater regional affect resulting from disruption of service associated with a failure of the sewer. Additionally, larger sewers carry greater flows, in the event of a sewer failure it is common to setup by-pass pumping to avoid surface discharges. The size and complexity of by-pass pumping operations are typically more manageable for smaller diameter sewers with lower flows. Table 16 shows the criticality score for both structures and pipes based on their diameters.

Table 16. Diameter of Asset & Tributary Area

Criticality Score	Pipe Diameter
5	30” or Larger
4	18” to 24”
3	10” to 15”
2	Less than 10”
1	-

The final factor considered in the COF evaluation is the asset’s financial impact. As the depth of a pipe or manhole increases the cost to replace it increases as well. The location of an asset also impacts the cost of replacement, an asset located in pavement will cost more to replace than one located in a front yard or field, similarly, an asset located in a front yard would cost less to replace than an asset in a rear yard since it easier to access. Another financial impact to take into account is the local economy. An asset failure located in the proximity of a popular business will prevent people from using the facility thus impacting the economy of Shelby Township and their property owners. Table 17 shows the critically score for both structures and pipes based on their depth, location, and proximity to popular local businesses.

Table 17. Financial Impact of Failure

Criticality Score	Location and Depth
5	Lifetime Fitness, Shelby Nursing and Senior Homes, Greater than 30’ Deep
4	20’ – 30’ Deep
3	In Road, In Major Road ROW, Rear Yard, 15’ – 20’ Deep
2	In Parking Lot, 10’ – 15’ Deep
1	In Front Yard, In Local Road ROW, Less than 10’ Deep

Once the assets were assigned a value for critical facilities, environmental features, roads, and size, they were given an overall COF rating. This was determined by taking the weighted average of the individual ratings based on the following percentages.

❖ Diameter of Sewer and Tributary Service Area	40%
❖ Environmental & Regulatory Impact of Failure	30%
❖ Impact to Essential Service Facilities	10%
❖ Financial Impact of Failure	10%
❖ Disruption to Community	10%

As an example, look at the following asset (SGM3405).

The asset is an 18 inch pipe. It is not near any critical facilities or popular businesses. The pipe is located within the ROW of 24 Mile Road and is 720 feet from the Harris Drain. It is also buried 14 feet. The associated factors are as follows:

Critical Facility (10%):	2	Road (10%):	3
Environmental Feature (30%):	4	Size (40%):	4

Financial Impact (max. of 3 factors) (10%)	Proximity to Popular Business	1
	Depth	**3**
	Location	3

$$COF = (2 * 10\%) + (3 * 10\%) + (4 * 30\%) + (4 * 40\%) + (3 * 10\%) = 3.6$$

The pipe has a 3.6 Consequence of Failure rating. Even though the pipe is located on 24 Mile Road and is in relatively close proximity to a drain, the other criteria affect ratings, weighting the COF rating is considered appropriate. For example, if there is a pipe with a POF of 3 and it was by an essential facility such as the police department, if we didn't weight the COF it would have a BRE score of 15 which is very close to mandating corrective measures, when the likelihood of failure within several years is low.

4.3 BRE Calculations

Once the Probability of Failure and Consequence of Failure scores were calculated, the BRE or Criticality score is determined by multiplying the POF and COF. The EGLE guidelines for determining criticality state that an asset with a Criticality Score above 16 is deemed critical and in need of immediate attention. Tables 18 and 19 demonstrates the BRE Matrix and what each color on the scale represents.

Table 18. Business Risk Exposure Score Matrix

			Consequence of Failure				
	Risk Rating		**Insignificant**	**Minor**	**Moderate**	**Major**	**Catastrophic**
			1	**2**	**3**	**4**	**5**
Probability of Failure	**Rare**	**1**	1	2	3	4	5
	Unlikely	**2**	2	4	6	8	10
	Possible	**3**	3	6	9	12	15
	Probable	**4**	4	8	12	16	20
	Certain	**5**	5	10	15	20	25

Table 19. Business Risk Exposure Scale

BRE	**Risk**	**Definition**
0.00 – 4.99	Low Risk	COF or POF is Acceptable/Low
5.00 – 9.99	Medium Risk	Failure Consequences are Tolerable, Managed Through Design Redundancy, Spares, and Condition Monitoring
10.00 – 15.99	High Risk	Aggressive Monitoring and Management
16.00 – 25.00	Critical Risk	Intolerable Condition

Once the BRE score is determined, it can be used to rank assets in order of importance. The need to repair assets given high criticalities take precedence over assets with lower criticality scores when establishing program for repairs. A general rule of thumb is everything ranked 16 and above should be a priority, this is the standard used by EGLE. If an asset gets a BRE of less than 16 this does not mean it does not need rehabilitation or attention. All assets are considered in an AMP, dependent on the availability of funding and other concurrent programs in the vicinity it may be prudent to address lesser rated issues earlier. If the Township has additional funds, repairs can be made to assets with lower scores too. However, it is not feasible to fix all defects found within the system or in the assets. The BRE scoring system is a tool that helps the Township use their funds wisely to have the greatest impact and to provide logical and continuous management and upkeep of their system.

Additionally, the BRE program is and ongoing program which is updated as information becomes available to assist the Township in ranking and prioritizing assets management both today and in the future. Any time assets are inspected their criticalities can be determined and inserted into the ranking, ensuring that the assets more in need of repair or maintenance are fixed first. This system will ensure assets that have not been recently inspected will not be forgotten and importance rather than inspection order ultimately decides what is the most critical for repair.

Only manholes that were given a condition score of 4 or 5 and manholes in the proximity of popular businesses or critical facilities were evaluated for a BRE score. The remaining manholes not receiving a BRE score will continue to be monitored and will be evaluated in the future in the case of them deteriorating further.

Only one (1) of the manholes inspected scored a criticality rating of 16 that would rank them as an immediate priority for rehabilitation or repair. The minimum and maximum BRE scores of the manholes evaluated were 4.00 and 16.00, respectively, with an average of 8.25. One of the highest rated manholes had a heavily gushing pipe seal that was in need of immediate repair. The Township is proactive and strives to manage its system competently and efficiently, once this situation was noted they moved forward with a program for sealing the pipe which was grouted, soon after the infiltration was discovered.

One of the highest scoring manholes is located at the end of Summer Place in a rear yard. The manhole is in poor condition with a condition rating of 4.0. The manhole is located approximately 100 feet from Newland Drain. The manhole is 12.8 feet deep.

Based on the criteria given in Section 4.2, the information gathered about manhole MH08-007:

$$POF = Evaluated\ MACP\ rating = 4.0$$

Critical Facility (20%):	2	Road (20%):	2
Environmental Feature (40%):	5	Size (0%):	N/A*

Financial Impact (max. of 3 factors) (20%)	Proximity to Popular Business	1
	Depth	2
	Location	**3**

$$COF = (2 * 20\%) + (2 * 20\%) + (5 * 40\%) + (3 * 20\%) = 3.40$$

$$BRE = POF * COF = 4.0 * 3.40 = 13.60$$

- $*$ Manhole size was not included in the COF calculation since all manholes inspected were 48 or 60 inches in diameter. The COF factor weight for size was 40% so each remaining criteria weight had 10% added onto it.

An overview map of BRE scores for all manholes inspected can be found in Appendix K.

The minimum and maximum BRE scores for the inspected pipes with a POF of 4 or 5 are 2.50 and 22.50, respectively, with 10.52 as an average score. Fourteen (14) of the pipes evaluated received a BRE score of 16 or higher.

As stated earlier, the Township operates and manages its system with competence and integrity, they recognize and respond to system needs quickly and take appropriate action. Through the CCTV program they discovered a 36-inch pipe appears to have sheared. As stated this is a large diameter pipe, it is within 50 feet of a large County Drain, it is along 21 Mile Road and it currently is estimated to carry 20 – 25 cfs of flow. The Township authorized design and bidding of the project, contacted EGLE, MCPWO and MCDR and coordinated and received immediate response and permitting from all of these agencies. Shelby Township understands and encourages quick and decisive action along with open lines of communication to protect our valued resources. This pipe is located along 21 Mile Road west of Hayes Road, was recognized designed and permitted as a high priority with a BRE score of 22.50 and is expected to be completely removed and replaced by May 1, 2020.

Figure 6. Location of Critical Sewer Repair

Another pipe with a BRE score of 16 or greater is located on 25 Mile Road near the Corner of Shelby Road. The 12-inch pipe received a PACP structural rating of 2.1, but was revised to a 5.0 based on the internal Engineer’s Office review process, due to it having a deformation defect called Deformed Flexible Bulging Inverse Curvature (see Figure 7) which is given a Structural Defect Rating of 5. This pipe is located in the Right-of-Way of 25 Mile Road. The pipe is not near a critical facility, but it is approximately 770 feet from the Newland Drain.

Figure 7. Defect Example: Deformed Flexible Inverse Curvature.

Figure 7 above is an example of the defect deformed flexible inverse curvature. Note, this is not a photo from the segment in the example below. This photo was taken of another sanitary sewer pipe in Shelby Township. This figure shows the defect located at 8 o'clock and the recommendation to repair this type of defect is to dig up and replace the pipe segment.

Based on the criteria given in Section 4.2, the BRE analysis for pipe SGM5062 is as follows:

$$POF = Evaluated\ PACP\ rating = 5.0$$

Critical Facility (10%):	2	Road (10%):	3
Environmental Feature (30%):	4	Size (40%):	3

Financial Impact (max. of 3 factors) (10%)	Proximity to Popular Business	1
	Depth	**4**
	Location	1

$$COF = (2 * 10\%) + (3 * 10\%) + (4 * 30\%) + (3 * 40\%) + (4 * 10\%) \ = \ 3.30$$

$$BRE = POF * COF = 5 * 3.30 = 16.50$$

An overview map of the BRE scores for all pipes inspected can be found in Appendix K

5.0 Level of Service

To reasonably serve Shelby Township, a desired level of service must be established. Level of Service (LOS) was defined in the 2011 International Infrastructure Management Manual as,

> “The outputs a customer receives from the organization”.

The LOS for the Township would be the satisfaction of the residents, businesses and the property owners within the Township along with protection of the environment and the health, safety and welfare of the community as a whole. There are many factors that can affect the perceived LOS of the system including disruption of service, sewer backups, odor, communication, customer interaction, etc.

Currently, Shelby’s sanitary sewer system is operating at an acceptable level of service. There are effectively managing all of the above noted factors for their sewer system. Concerns or complaints by property owners are responded to and resolve quickly.

Shelby Township DPW staff understand the importance of minimizing disruption to critical services such as the sanitary sewer system. As such, the staff responds quickly to determine the source of problems such as backups, power outages at pump stations, clogged lines etc. Quick response time and feedback to the affected customers has resulted in a high Level of Service provided to and received by the customer.

6.0 Fats, Oils, and Grease (FOG) Program

The blockage of sewer facilities, resulting from FOG discharges are detrimental to the level of service desired by the Township. FOG discharges are directly linked to food service preparation establishments. FOG’s are a byproduct of cooking, food and drink preparation, and meat cutting. It enters sewer pipes through restaurant, residential, and commercial sink drains.

Shelby Township has considered a maintenance program to reduce to the amount of FOG discharges to their sewer system and eventually into the Great Lakes Water Authority’s (GLWA) system. There are many factors to consider in implementing such as program. For a start, wastewater discharge prohibitions and limitations must be enforced, this can be achieved by requiring food service establishment owners to apply for a discharge permit. By issuance of a permit, new and existing food service establishments which are expected or which have in the past contributed significant FOG to the sewer system could be required to install a grease interceptor.

Reduction of FOG discharges can also be achieved through education. Educational flyers outlining the potential problems and remedies of FOG in the sewer system could be handed out to food service establishment owners and private homeowners alike. Installation of grease interceptors could also be enforced through Township construction specifications and Ordinance requirements. The Township may consider updating the existing wastewater pretreatment ordinance to strengthen the efforts to prevent FOG discharges.

The Township currently has 105 manhole structures that Township employees use to monitor the amount of FOG discharged into the public sewer system. A list of these structures can be found in Appendix M. Through inspections of these structures it was discovered that some food service establishments were contributing a significant amount of FOG into the sewer system. One solution to prevent this discharge it to require the offending establishments to install an exterior grease interceptor. A map of exterior grease interceptor can be found in Appendix L.

Another thing to consider is the implementation of a strict inspection schedule. As was mentioned, Shelby Township DPW employees do occasionally inspect manholes for FOG discharges. However, in order to ensure that FOG discharges are monitored sufficiently the following questions should be asked:

- How often are monitoring manholes inspected? Who is responsible for the inspection?
- Is there a standard rotation for manhole inspection throughout the Township?
- Is there an official inspection procedure? Is there an inspection form that is followed?
- If significant FOG discharge evidence is discovered, what actions are taken? How will the offender be held responsible?

7.0 Master Plan

As part of the SAW grant, the Township's Sanitary Sewer Master Plan has been updated. The Master Plan includes discussions, calculations and plans for sanitary sewer system expansion to accommodate future needs and identifies areas which need to be studied further due to theoretical capacity concerns. Since the methodology used is a theoretical calculation and the associated costs for system upgrades are high it is recommended that the flow metering program be considered for many of the areas considered to be critical. The full Master Plan can be found in Appendix N.

8.0 Rate Methodology

In accordance with the SAW grant requirements Shelby Township submitted a Rate Methodology report and evaluation, dated August 13 2019, to EGLE for review and approval (Appendix O). On October 7, 2019 EGLE replied to Shelby Township's Supervisor indicating that they had reviewed it and that "the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended." Based on the rate methodology analysis and the EGLE approval letter (Appendix P), it has been determined that the funding structure necessary to implement the SAW program.

Shelby Township should continue to monitor their Water/Sewer Enterprise Fund Balances to evaluate the adequacy of its revenues in the Enterprise Fund for Changes in operating revenues, operating expenses, and capital spending.

9.0 Capital Improvement Plan

A sewer repair estimate was put together after the CCTV videos were reviewed. Only sewers and manholes with defects that were rated a 4 or greater were considered due to the limited funds that can be used by the Township. Tables 20 and 21 shows the preliminary estimated cost for each type of remedy required to repair sewers with critical structural and O&M defects. The repairs noted are for all POF defects observed with PACP ratings of 4 & 5.

Table 20. Estimated Sewer Repair Cost

Repair Type	Cost
Full-Length CIPP	$ 130,000.00
Sectional CIPP	$ 396,000.00
Grouting	$ 15,000.00
Dig-ups	$ 120,000.00
Lateral Reinstate	$ 4,500.00
Sewer Cleaning and Televising	$ 253,000.00
Mobilization and Traffic Control	$ 43,000.00
Total	**$ 961,500.00**

Table 21. Estimated Manhole Repair Cost

Repair Type	Cost
Clean Manhole	$2,500.00
Reconstruct Chimney	$10,400.00
Reconstruct Cone	$1,000.00
Grout Joints and Lift Holes	$2,900.00
Grout Pipe Seal	$3,700.00
Abandon Manhole/ Bulkhead Pipe	$800.00
Install Drop Connection	$1,000.00
Interior Manhole Lining	$2,000.00
Reset Frame and Cover	$4,750.00
Cut Roots	$900.00
External Chimney Seal	$3,700.00
Mobilization and Traffic Control	$12,000.00
Total	$45,650.00
Recommended Budget Total	**$114,000.00**

Detailed associated cost breakdowns for manholes and sewers can be found in Appendix Q and R.

To prioritize and fund future projects a capital improvement plan (CIP) was created as part of this grant. The plan includes estimates for planned projects and an associated timeline for implementation. With a clear idea of the expenses required for capital improvements, the Township can budget accordingly. Table 22 shows a summary of the total costs for capital improvements planned up to the year 2025.

Table 22. CIP Summary

Project	Cost
Critical Sewer Repairs	$962,000
Manhole Repairs	$ 114,000
Future CCTV and Repairs (Next Five Years)	$5,900,000
Total	**$ 6,976,000**

CCTV Investigation

The cleaning and televising of older sewers in the Township is essential to assessing the condition of the sewer lines and developing a maintenance plan to maintain the expected level of service and extend the sewer life. The remaining sewer system, not televised as part of the SAW program are planned to be included in an annual CCTV program over the next five (5) years. After the initial CCTV programs, all sewer lines should be inspected on a rotational basis with an eight (8) to ten (10) year cycle. From each round of televising, additional projects will likely be identified for repair and maintenance and incorporated into the AMP. The total CCTV budget for the approximate remaining 730,225 feet of sanitary sewer assuming a $6 per foot CCTV fee is estimated at $4,400,000 and should be spread over the next five (5) years.

The Township plans on dividing up the remaining 60% of the sewer into three (3) sections as shown in Figure 8 below. Beginning in year 2020 Section 1 on the Figure above will be cleaned and televised and in the following year (2021) the defects found in the 2020 videos will be repaired. This pattern will continue in 2022 through 2025 until all of the remaining sewers are inspected.

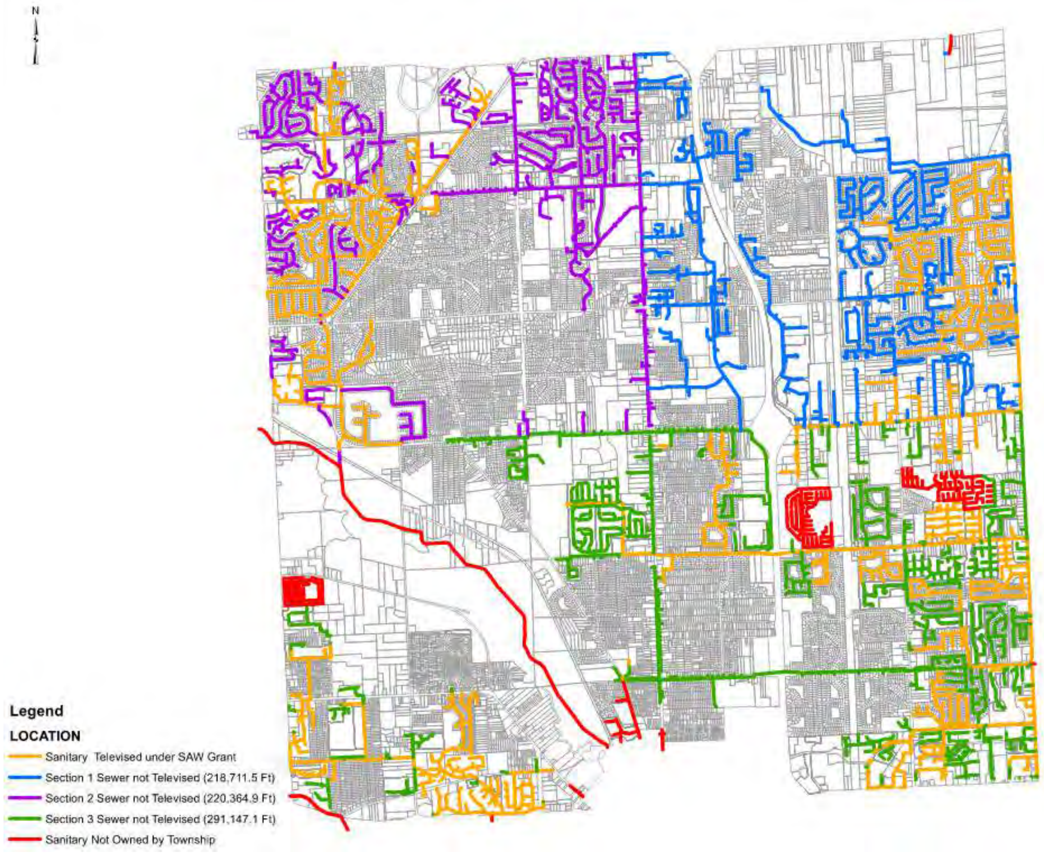


Figure 8. Future CCTV Locations from the Year 2020 to 2025

(See Appendix S)

Table 23 and Figure 9 below shows the budget allocated for each year for future CCTV programs and repairs of defects rated 4 and 5. As mentioned earlier $6.00 per foot is estimated for cleaning and CCTV. Each repair year (2021, 2023, and 2025) the Township will allocate $500,000 for expected repairs. The full amount of this budget may or may not be used, the actual cost will be determined after sewer evaluation.

Table 23. Capital Improvement Plan Cost per Year – Future CCTV

Work Type	Year	Section	Footage	CCTV/Clean Cost ($6/ft)	Repair Cost Estimate
Clean/CCTV	2020	Section 1	218,711.50	$1,312,269.00	-
Repair	2021	Section 2		-	$500,000.00
Clean/CCTV	2022	Section 2	220,364.90	$1,322,189.40	-
Repair	2023	Section 2		-	$500,000.00
Clean/CCTV	2024	Section 3	291,147.10	$1,746,882.60	-
Repair	2025	Section 3		-	$500,000.00
Total			**730,223.50**	**$4,381,341.00**	**$1,500,000.00**

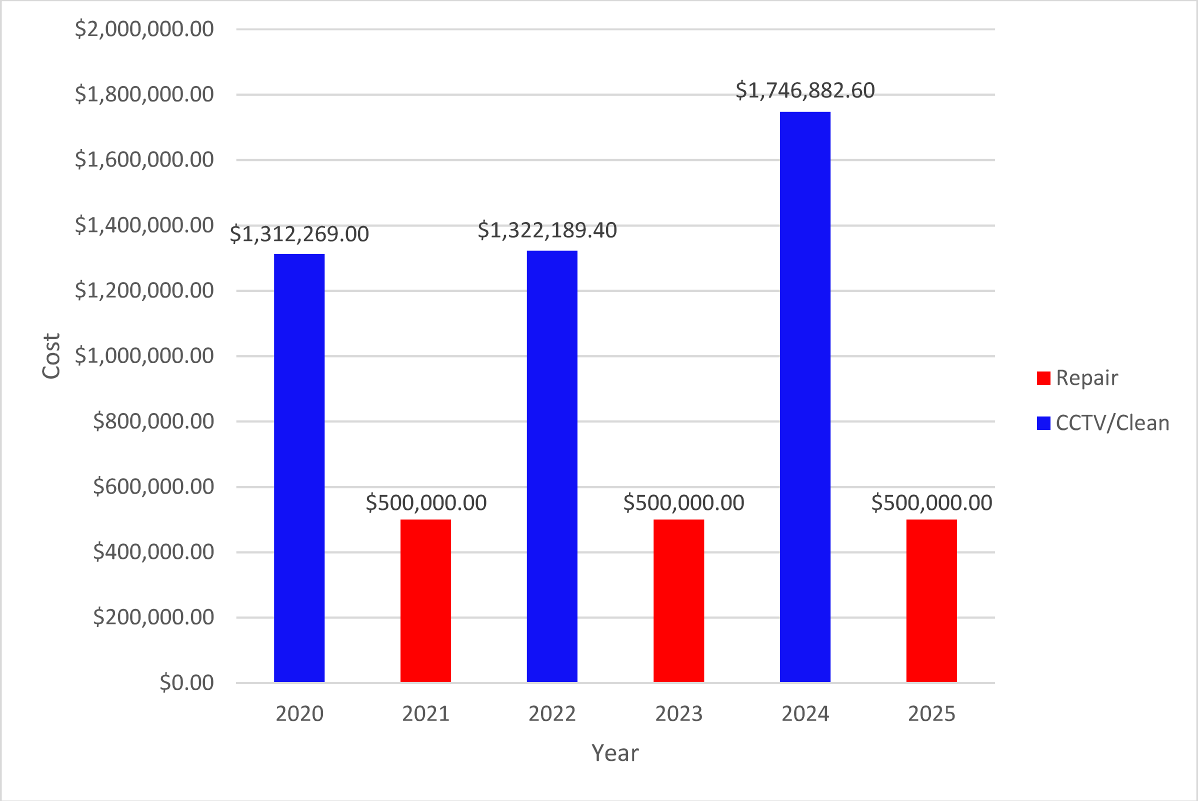


Figure 9. Capital Improvement Program Cost per Year – Future CCTV

Manhole Repairs

The manhole assessment identified approximately sixty-eight (68) individual defects that rated a 4 or 5 or that exist in a manhole that has defects of 4 or 5. If it was determined that a manhole had one defect of 4 or 5 all major defects will be repaired at once. Although none of the structures are in jeopardy of failing, the individual defects should be addressed to minimize infiltration and to prevent system failure due to clogged channels. A capital improvement budget for the manhole repairs is estimated at $46,000, but due to the random spacing and to allow for the purchase of materials associated with repairs we have increased the budget to $ 114,000.

Full Cured in Place Pipe and Dig-ups

The pipe assessment identified nineteen (19) segments of pipe in need of full length cured in place pipe (FCIPP), one of these identified pipes are considered critical. Most of these segments are not in need of immediate repair however the segment with a BRE score of 16 is considered a critical priority. This critical segment is recommended for repair in the next calendar year budget at an estimated cost of $4,000. One (1) other pipe in critical condition requires a repair by means of open-cut. This repair is estimated to cost $38,000

Rehabilitating these sections of pipe will improve their structural stability and help reduce groundwater infiltration into the sewer system. Rehabilitating the remaining high priority segments is estimated at $51,000.00 and should occur within the next 3 to 5 years.

Future Capacity Improvements

The Shelby Township Sanitary Sewer Master Plan was updated to account for ongoing developments, Macomb County sewer improvements and to provide for future system extensions to undeveloped portions of the township. Utilizing the Master Plan flow predictions, the existing sanitary sewer lines were analyzed for their ability to transport the predicted flows. Several areas were identified as having potential future capacity restrictions.

However, the capacity concern is based on theoretical flows and assumed densities. Prior to planning and implementation of replacement of the pipe, the recommendation is to monitor the flows to determine if and when the work is required. Using these measured flows, it can then be evaluated for available capacity and better predictions can be made for a timeline to replace the sewer.

10.0 Conclusion

This Sanitary Sewer Asset Management Plan presents the methodology and findings of the condition assessment for a portion of the Shelby Township's sanitary sewer assets, including the five (5) criteria set forth as part of the Michigan Department of Environmental Quality SAW Grant as follows:

1. Developed an inventory and condition assessment of the system assets
2. Determined the level of service for the sanitary sewer system.
3. Designated the criticality for the assets evaluated
4. Developed a long-term funding and financial management plan for maintenance and system improvement.
5. Developed an implementation schedule for the asset management program and capital improvements.

Based on the Asset Management Plan and system evaluation, the existing sanitary sewer system is in an overall sound condition. There are only a few recommended improvements, most of which will be performed by the DPW staff and outside Contractors, as time and conditions warrant the improvements. All critical repairs will be performed within the next 5 years, by outside Contractors.

As funding becomes available, Shelby Township should proceed with implementing projects as outlined in the Asset Management Plan. Based on the AMP, the following improvements or efforts are recommended:

Years 1 through 5:

- Continue with the sanitary sewer Cleaning and Televising program and update the AMP with the collected data,
- Continue with the manhole assessment program in conjunction with the CCTV program,
- Revise wastewater pretreatment procedures to strengthen the Fats, Oils, and Grease sections.
- Proceed with a Full and Sectional pipe repair program to address the critical structural repairs noted in the AMP.

- Proceed with the Open Cut, or dig up, pipe repairs, identified under the POF analysis.
- Proceed with Manhole repairs of 4 and 5 POF, identified in the analysis.
- Replacement of currently existing pump station pumps will eventually be required in the future. The recommendation is to observe and properly maintain and to replace when conditions warrant.
- Pump Stations shall be re-evaluated every 5 years to identify future improvement needs and projects.
- Continued operation and maintenance of the system.

Years 6 through 10:

- Perform flow monitoring and study of sanitary sewer lines with potential capacity restrictions where identified in the Sanitary Master Plan.
- Based on flow and pipe capacity studies, prioritize system improvements to alleviate restrictions
- Continue with annual Pump Station O&M and monitoring program.
- Continue with the sanitary sewer Cleaning and Televising program and update the AMP with the collected data,
- Continue with the manhole assessment program in conjunction with the CCTV program,
- Proceed with repairs identified in the CCTV and manhole assessment programs,

In addition to the rehabilitation of assets determined in the Capital Improvement Plan, the following are recommended:

- Continue with a CCTV program for the remainder of the sanitary sewer system. The program should organized such that the entire system can be viewed over a 10-year cycle.

- Continue with a manhole assessment program concurrent with the CCTV of the sanitary sewers.
- Update the Asset Management Plan on a regular basis, incorporating newly collected data and yearly improvements.
- Continue monitoring sewer lined suspected of capacity restrictions and plan for upgrades where necessary.
- Rehabilitate manholes on a regular basis.

Shelby Township's Wastewater Asset Management Plan, in conjunction with the Township's Geodatabase will serve as a valuable tool in understanding, managing and operating Shelby's sanitary sewer system. The initial insight gained strengthens understanding, policy and management of this system's assets and infrastructure. A more comprehensive discussion with supporting documentation follows in the report.

This Asset Management Plan is intended as a guide and the GIS system, database, tables, spread sheets and documentation utilized to develop and support the recommendations and conclusions contained herein are setup to be easily modified, to incorporate future investigations and studies implemented by the Township. We recommend that this Asset Management Plan and the is used in conjunction with the Sanitary Sewer Master Plan and the GIS System, and collectively they will serve to implement and prioritize programs to the benefit of the sanitary assets, their management and the community as a whole.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December, 2019
(no later than 3 years from executed grant date)

The Michigan Department of Natural Resources *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1007-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Amanda Treadwell at 313.269.7430 treadwella@michigan.gov
Name Phone Number Email

Amanda Treadwell 12/20/2019
Signature of Authorized Representative (Original Signature Required) Date

Amanda Treadwell, Urban Area Field Planner, DNR-PRD
Print Name and Title of Authorized Representative

Belle Isle Park

Stormwater Asset Management Plan
Executive Summary

Michigan Department of Natural Resources

99 Pleasure Drive, Detroit, MI 48207

SAW Grant # 1007-01

Contacts: Amanda Treadwell

treadwella@michigan.gov

313-264-6359

Prepared by:

AECOM, Great Lakes, Inc.

1. Executive Summary

The Michigan Department of Natural Resources (MDNR) was awarded a $187,863 grant, including a $18,786 grant match, to develop a Stormwater Asset Management Plan (AMP) for Belle Isle Park, located in Detroit, MI. Per Section 603 of Public Act 840 of 2015, this AMP Executive Summary has been prepared, detailing the efforts by MDNR to implement such a plan. MDNR utilized the grant funds to update Belle Isle Park's GIS based stormwater asset inventory, perform condition assessments, assign Probability of Failure (PoF) scores, Consequence of Failure (CoF) scores, and Risk scores, as well as develop Level of Service goals and a Capital Improvement Plan (CIP).

2. Stormwater Asset Inventory and Condition Assessment

The Belle Isle Park GIS contains roughly 80% of the stormwater collection system assets located on the island. The GIS was updated using record drawings and field data collected during condition assessment activities. Each of these assets have been assigned a unique identifier based on the standards used by the Detroit Water and Sewerage Department (DWSD). The remaining assets are captured on record drawings that have yet to be incorporated into GIS.

A portion of the grant funds were used to perform Closed Circuit Televising (CCTV) inspection and condition assessments for approximately 30% of the system's sewers and manholes/catch basins. The condition of these assets were assessed based on the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP).

The PoF for an asset is calculated based on the likelihood that it will fail, structurally or hydraulically. Therefore, condition score from the CCTV inspections and the results from a cursory hydraulic model provided by DWSD were used to determine PoF. For those assets not inspected, the condition scores from similar assets were applied. The PoF score has a range of one (1) through ten (10). A score of one (1) indicates an asset is in very good condition and has a low probability of failure. A score of ten (10) indicates an asset is in extremely poor condition and has a high probability of failure. **Table 1** illustrates the distribution of the Belle Isle Park PoF scores.

Table 1: Percentage of Assets in each PoF Score Category

1	2	3	4	5	6	7	8	9	10
53.9%	14.0%	23.6%	4.2%	44.3%	0%	0%	0%	0%	0%

3. Criticality of Assets

CoF scores are assigned to assets using weighted criteria representing economic/operational, environmental, and social aspects of consequence of failure. The CoF score has a range of one (1) through ten (10). A score of one (1) indicates an asset's failure has a low consequence. A score of ten (10) indicates an asset's failure has a high consequence. **Table 2** illustrates the distribution of the Belle Isle Park CoF scores.

Table 2: Percentage of Assets in each CoF Score Category

1	2	3	4	5	6	7	8	9	10
0%	0%	0%	0%	72.2%	25.9%	2.0%	0%	0%	0%

MDNR defines Risk as the product of PoF and CoF. Table 3 provides a breakdown of the Belle Isle Park Risk scores. Currently, low risk assets have a Risk score below 10. High risk assets have a Risk score above 20.

Table 3: Percentage of Assets in each Risk Score Category

Low	Medium	High
79.1%	18.4%	2.5%

4. Level of Service

MDNR has chosen LoS goals defined to meet customer expectations and relate to the following:

- Environmental protection
- System reliability
- System capacity
- Economic efficiency
- Safety

The LoS Goals are formalized and supported through quantifiable metrics. The objective of the LoS goals are to assess if the existing infrastructure and funding are available to meet the desired LoS over the planning period, or identify where actions are needed to enable the assets to provide the desired LoS.

5. Revenue Structure

Through a 30-year lease executed in 2014, the MDNR-PRD manages Belle Isle Park as a State Park. The City of Detroit General Services Department (GSD) is the owner of the park. Conditions of the lease provide for GSD as the responsible party for maintaining the water and sewer infrastructure within Belle Isle. There is currently no dedicated funding for the stormwater collection system. However, with the implementation of this Stormwater AMP, MDNR and Detroit GSD are working together to develop an annual budget dedicated to the O&M of stormwater assets.

6. Capital Improvement Plan

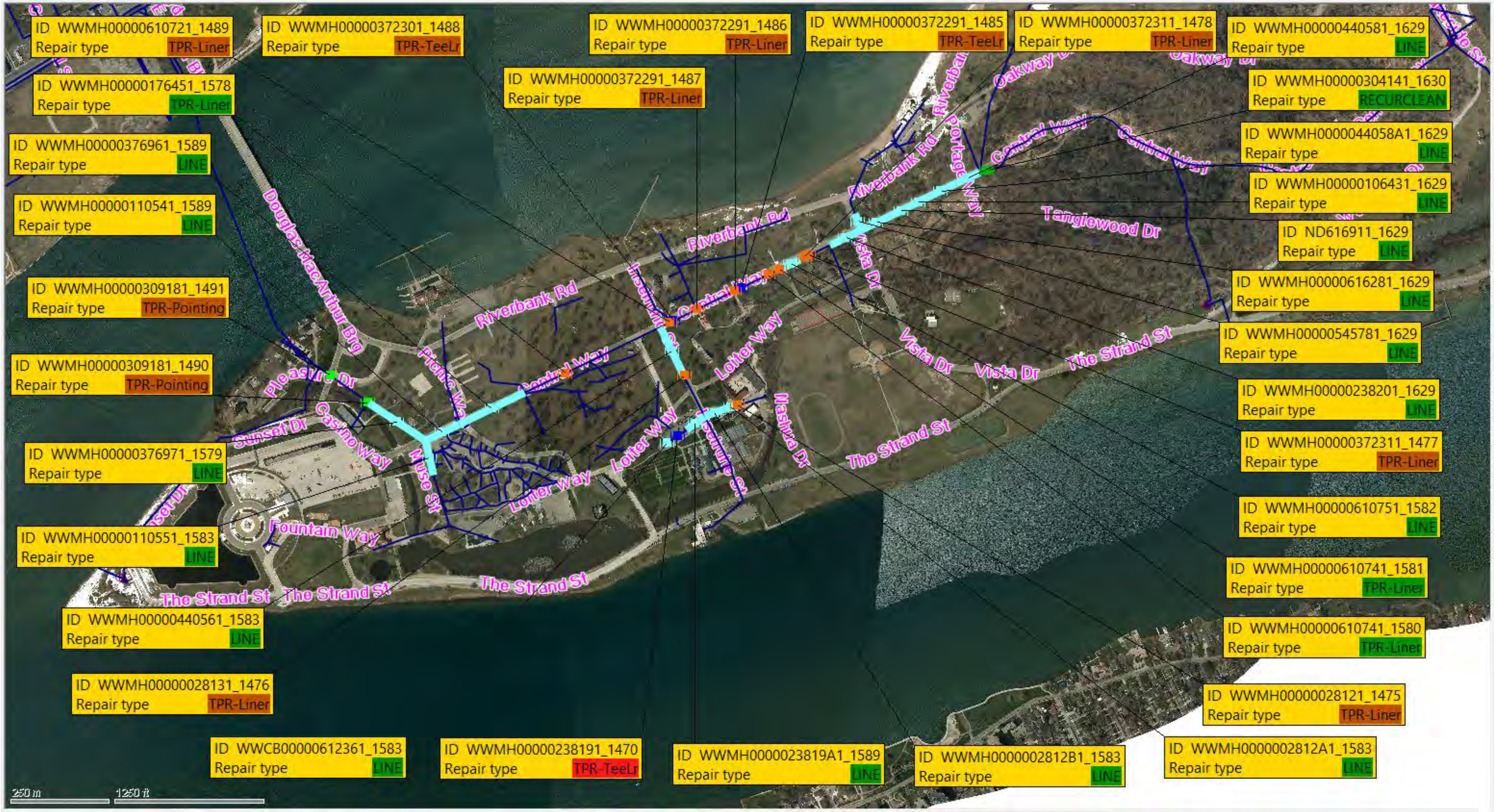
Based on the condition assessments performed, several capital improvements have been recommended. The plan identified approximately $1.3 million of capital repairs, including $879,000 of immediate sewer repair. Although none of the assets are on the brink of failure, those identified for immediate repair have been recognized as more critical. Therefore, it is recommended these repairs be completed within five years. The remaining repairs should be made within the next 15 years. MDNR and Detroit GSD should review projected budgets for park maintenance to see if there will be sufficient funds for these capital improvements. A map of the proposed Belle Isle Park Storm Sewer CIP projects can be found in **Appendix A**.

7. List of Major Assets

- 41,899 LF of gravity main
- 14,276 LF of force main
- 158 manholes
- 387 catch basins
- 8 pump stations

Appendix A – Belle Isle Park

Storm Sewer CIP Map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Riverbank Rd
Central Way
Central Way
Central Way
Oakway Dr
Portage Way
Tanglewood Dr
Vista Dr
Vista Dr
Vista Dr
The Strand St
The Strand St
The Strand St
The Strand St
The Strand St
Nashua Dr
Loiter Way
Loiter Way
Loiter Way
Picnic Way
Pleasure Dr
Sunset Dr
Casino Way
Muse St
Fountain Way
250 m
1250 ft

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Pinconning

SAW Project No. 1028-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September of 2016, the City of Pinconning received a Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1028-01, to provide financial assistance for the development of a stormwater asset management plan (AMP) for the City's publicly owned stirnwater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Pinconning AMP is:
Dawn Hoder, City Manager
208 Manitou Street, Pinconning, MI 48650
Phone number: (989) 879-2360
Email: pinconningtreasurer@yahoo.com

ASSET INVENTORY AND CONDITION ASSESSMENT

The Stormwater collection system assets consist of approximately 39,811 feet (7.54 miles) of storm sewers and 495 stormwater manholes and catch basins connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

Asset Identification and Location

A comprehensive Stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping and further evaluation purpose.

Condition Assessment and Expected Useful Life

For the City of Pinconning, a comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on 438 structures, 88% of the total system.

The collection system pipe and manhole assets were generally found to be in fair to good condition. Structural defects such as cracks, fractures, and offset pipe joints were identified. The manhole assessments identified a number of structures with signs of infiltration of varying degree. Based on the assessments completed, recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. Maintenance recommendations include continuing to clean and televise the stormwarter collection system. As additional assessments are completed they will be used to further evaluate structural and O&M defects in the system and refine the short and long term maintenance and capital improvement plan.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service (LOS)

The LOS for the City of Pinconning Stormwater system is stated as follows:

STORMWATER- LEVEL OF SERVICE STATEMENT

To provide appropriate Stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the City of Pinconning:

- Provide adequate Stormwater collection system and conveyance capacity for all service areas.
- Actively maintain Stormwater collection and conveyance system assets in reliable working conditions.
- Provide rapid and effective emergency response services to customers.
- Ensure maintenance and operations staff are to be properly trained.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

MEASURING PERFORMANCE

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

DETERMINING CRITICALITY

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors: 1) Likelihood (Probability) of Failure, and 2) Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utility's ability to respond, convey and treat stormwater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset

The pump station categories for CoF are:

- Financial Impact

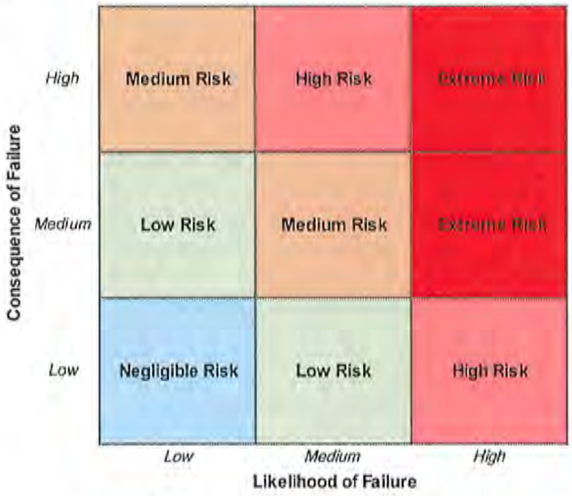
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

CRITICALITY RESULTS

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and aids in developing a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Assets with the greatest consequence of failure and the greatest likelihood of failure will be assets that are the most critical. Assets with the highest business risk score are likely candidates for near-term rehabilitation and replacement. Assets with lower scores should be monitored and analyzed to develop the best life cycle strategy. Over time as more of the stormwater collection system is assessed and re-assessed, the likelihood of failure scores will continue to develop.

A 3x3 Business Risk Matrix identifies the relative "Criticality" of each asset based on their CoF and LoF scores to establish a "Risk Rating" for each asset. Asset rating categories range from *Negligible* to *Extreme* criticality based on position within the matrix and are color coded to better identify significance. Upper and lower CoF and LoF score "boundaries" are set for each matrix box to establish the Risk Rating for each asset and place each asset in the proper rating category. Business Risk is depicted visually in the risk matrix shown in Figure 1, and the Business Risk of each asset determines the appropriate strategy for risk management as shown in Table 1.



Consequence of Failure	Low	Medium	High
High	**Medium Risk**	**High Risk**	**Extreme Risk**
Medium	**Low Risk**	**Medium Risk**	**Extreme Risk**
Low	**Negligible Risk**	**Low Risk**	**High Risk**

Likelihood of Failure

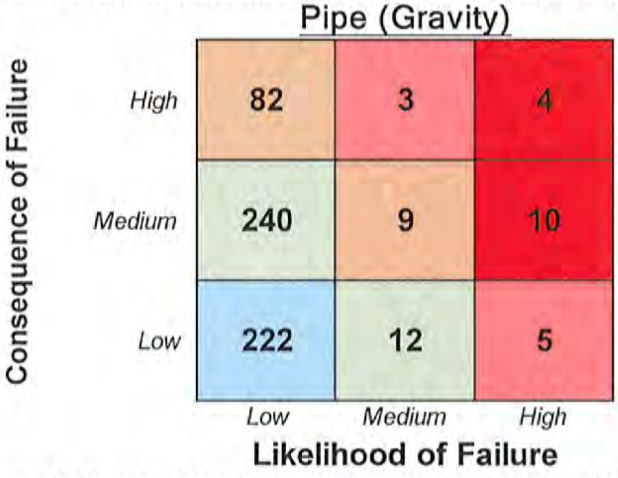
Figure 1: Business Risk Matrix (Risk Rating)

Table 1. Strategies for Asset Rehabilitation and Replacement	
Risk Rating	**Strategies for Asset Rehabilitation or Replacement**
Extreme	Inspect immediately and develop 1-2 year rehabilitation plan
High	Inspect immediately and develop short to medium term rehabilitation plan
Medium	Inspect immediately and develop long term rehabilitation plan
Low	Develop short term inspection strategy and develop long term rehabilitation plan
Negligible	Develop long term inspection strategy

Risk ratings can also be thought of as priorities since they are only relevant to in the City of Pinconning. An extreme risk in one community could be a low risk in another depending on the overall condition of their infrastructure. Below is a simple correlation between risk rating and priority.

Risk Rating	Priority
High / Extreme	Essential
Medium	Desirable
Low	Acceptable
Negligible	Deferrable

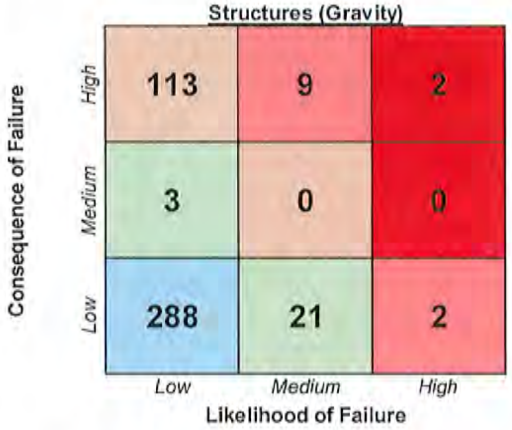
Figure 2 below provides the risk rating for gravity and force main pipe in the City of Pinconning by number of pipe segments. Pipes not televised and assessed use only age and material as a preliminary likelihood of failure score since the condition of the pipe is unknown. Most of these pipes received an initial risk rating of negligible based on their remaining service life and the known condition of other pipes in the collection system. This risk rating will be further evaluated as more pipe segments are cleaned and assessed.



Consequence of Failure	Low	Medium	High
High	82	3	4
Medium	240	9	10
Low	222	12	5

Figure 2: Business Risk Matrix (Risk Rating) By Number of Gravity Pipe

Figure 3 provides the risk rating for the collection system manholes in the City of Pinconning. The majority of the manholes have a medium, low, or negligible risk rating and are indicative of manholes in relatively good condition. The manholes identified as high and extreme risk primarily showed signs of infiltration and are recommended to be further evaluated for consideration of rehabilitation in the short term.



Structures (Gravity)

Consequence of Failure	Low	Medium	High
High	113	9	2
Medium	3	0	0
Low	288	21	2

Likelihood of Failure

Figure 3: Business Risk Matrix (Risk Rating) by Number of Storm Structures

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the Stormwater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's stormwater collection utility assets based on the Business Risk evaluation which prioritized the capital improvement projects. The CIP consists of short-term (1-5 year) and long-term (6-20 year) improvements to address the needs of the utility.

Table 2 below summarizes the recommended improvements in the short-term CIP. Detailed asset identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 2. 5-Year Capital Improvement Plan Summary

Rehabilitation Action
Pipe Lining
Pipe Point Repair
Manhole Repairs

OPERATIONS AND MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

A preventative maintenance program to systematically clean and assess pipelines to NASSCO-certified standards is critical for a sound stormwater collection system. The process of cleaning and CCTV assessment of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation and replacement. Once the entire system has been cleaned and televised, it is recommended that a maintenance schedule be set for future cleaning and televising. The required frequency of cleaning and televising over the next 20 years may depend on what is discovered in the initial assessment. The City may desire to clean and televise certain areas more than others.

Detailed asset identification, maintenance measures, and costs of the recommended preventative maintenance program are provided in the AMP.

REVENUE STRUCTURE

The revenue that will be necessary for making the recommended capital improvements will have to be budgeted thru the city's local and major street funds, city general fund, short term or long-term bonding programs.

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The **City of Essexville** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1046-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SW AMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Dawn Hoder at 989-879-2360 manager@cityofpinconning.org
Name Phone Number Email

12/24/19
Signature of Authorized Representative (Original Signature Required) Date

Ms. Dawn Hoder – City Manager
Print Name and Title of Authorized Representative

June 2014

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

City of Pinconning

SAW Project No. 1028-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September of 2016, the City of Pinconning received a Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1028-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Pinconning AMP is:

Dawn Hoder, City Manager
208 Manitou Street, Pinconning, MI 48650
Phone number: (989) 879-2360
Email: pinconningtreasurer@yahoo.com

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the City's wastewater system, described further below, include:

- Collection system piping and manholes
- Sanitary sewer lift stations
- Wastewater Treatment Facility (WWTF)

The wastewater collection system assets include approximately 48,182 feet (9.13 miles) of sanitary sewers (gravity pipe and force mains) and 183 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The WWTF currently includes the following treatment processes:

- Grit Removal
- Fine Screening (3/16")
- Biological Treatment using Oxidation Ditches
- Secondary Clarification
- UV Disinfection
- Aerobic Digestion
- Sludge Storage
- Chemical Feed (Alum) for Phosphorus Control
- Surface Water Discharge (NPDES Permit No. MI0020711)

Treated effluent is discharged to the Pinconning River in accordance with NPDES permit No. MI0020711. The design capacity of the WWTF is 0.5 million gallons per day (mgd) with a peak capacity of 1.2 mgd. The current annual average flow received by the facility is approximately 0.28 mgd.

There are 47,373 (8.97 miles) of gravity pipe, 809 feet (0.15 miles) of forcemain, 183 wastewater manholes connecting the gravity pipelines, 0 manholes at air release valves on the forcemain, and 3 lift stations in the collection system. The stations are all submersible stations with above grade prefabricated enclosures.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 80 WWTF assets, 66 Lift Station Assets, and 389 Collection System Assets.

Information was obtained from record drawings, field notes, and staff knowledge.

Condition Assessment & Expected Useful Life

NASSCO-MACP manhole field-based assessments were completed on 138 manhole structures, which represents 75% of manholes in the collection system. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 90% of the gravity pipe.

The collection system pipe and manhole assets were generally found to be in fair to good condition. Structural defects such as cracks, fractures, and offset pipe joints were identified. The manhole assessments identified a number of structures with signs of infiltration of varying degree. Based on the assessments completed, recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. Maintenance recommendations include continuing to clean and televise the wastewater collection system. As additional assessments are completed they will be used to further evaluate structural and O&M defects in the system and refine the short and long term maintenance and capital improvement plan.

The condition of the assets at the WWTF range from poor to good. Ongoing maintenance has maintained the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems. The recommendations for short- and long-term improvements are relatively extensive.

The condition of the assets at the lift stations range from poor to good. Ongoing maintenance has maintained the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems. The recommendations for short- and long-term improvements are relatively extensive.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with Pinconning staff to develop the following LOS statement and goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the City of Pinconning is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Actively maintain collection and treatment system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of treatment facility.
- Provide rapid and effective emergency response services to its customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score + Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

The lift station categories for CoF are:

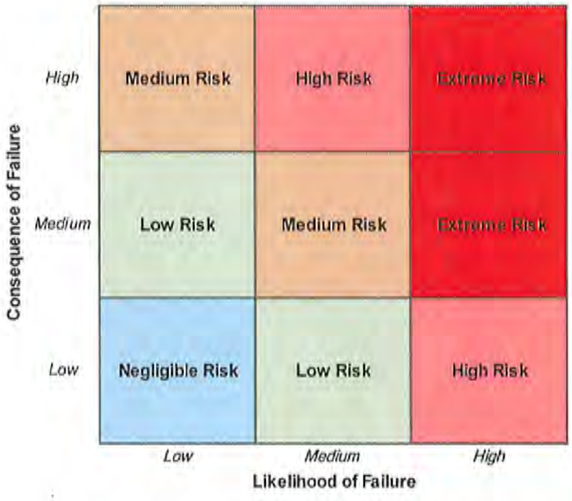
- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software and an excel database that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Assets with the greatest consequence of failure and the greatest likelihood of failure will be assets that are the most critical. Assets with the highest business risk score are likely candidates for near-term rehabilitation and replacement. Assets with lower scores should be monitored and analyzed to develop the best life cycle strategy. Over time as more of the stormwater collection system is assessed and re-assessed, the likelihood of failure scores will continue to develop.

A 3x3 Business Risk Matrix identifies the relative "Criticality" of each asset based on their CoF and LoF scores to establish a "Risk Rating" for each asset. Asset rating categories range from *Negligible* to *Extreme* criticality based on position within the matrix and are color coded to better identify significance. Upper and lower CoF and LoF score "boundaries" are set for each matrix box to establish the Risk Rating for each asset and place each asset in the proper rating category. Business Risk is depicted visually in the risk matrix shown in Figure 1, and the Business Risk of each asset determines the appropriate strategy for risk management as shown in Table 1.



Consequence of Failure	Low	Medium	High
High	Medium Risk	High Risk	Extreme Risk
Medium	Low Risk	Medium Risk	Extreme Risk
Low	Negligible Risk	Low Risk	High Risk
	Likelihood of Failure		

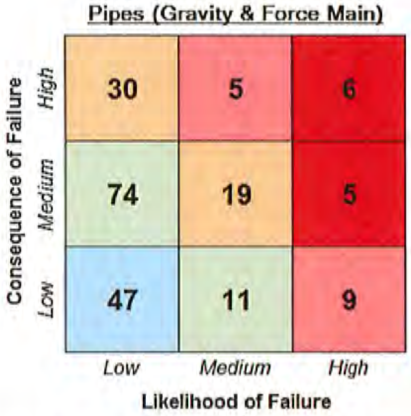
Figure 1: Business Risk Matrix (Risk Rating)

Table 1. Strategies for Asset Rehabilitation and Replacement

Risk Rating	Strategies for Asset Rehabilitation or Replacement
Extreme	Inspect immediately and develop 1-2 year rehabilitation plan
High	Inspect immediately and develop short to medium term rehabilitation plan
Medium	Inspect immediately and develop long term rehabilitation plan
Low	Develop short term inspection strategy and develop long term rehabilitation plan
Negligible	Develop long term inspection strategy

Risk ratings can also be thought of as priorities since they are only relevant to in the City of Pinconning. An extreme risk in one community could be a low risk in another depending on the overall condition of their infrastructure. Below is a simple correlation between risk rating and priority.

Figure 2 provides the risk rating for gravity and force main pipe by number of pipe segments. 11 pipe segments in the collection system has an extreme risk rating. Defects for these pipe segments include: holes, cracks, roots, drippers, angular joints, and offset joints. Rehabilitation recommendations for these pipes include replacements, point repairs, and lining.



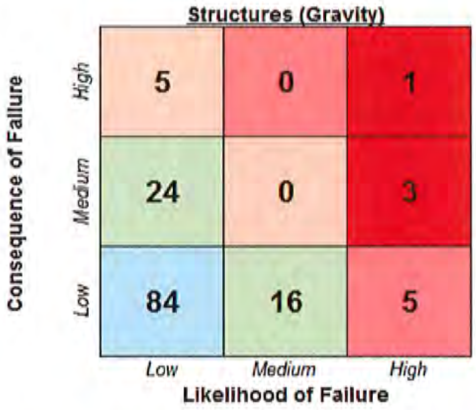
Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	30	5	6
Medium	74	19	5
Low	47	11	9

Likelihood of Failure

Figure 2. Business Risk Matric (Risk Rating) by Number of Gravity

Figure 3 provides the risk rating for the collection system manholes. There are 4 manholes that have been identified as an extreme risk and are in need of some rehabilitation. All of these structures needs the frame and cover replaced. This work will be scheduled over the next 5 years as funding becomes available. 90 percent of the collection system's manholes, as shown in Figure 3, have a low to negligible risk rating and are indicative of manholes in good condition.



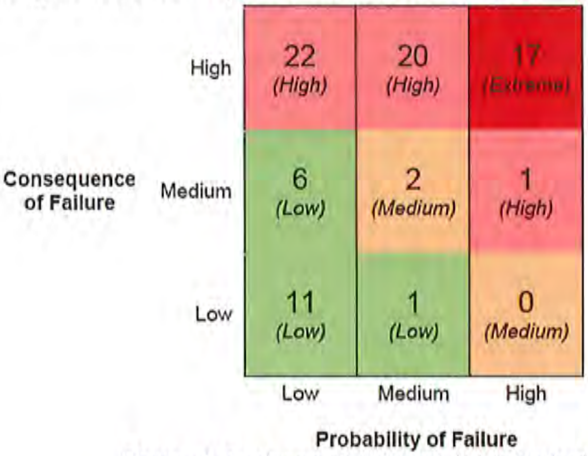
Structures (Gravity)

Consequence of Failure	Low	Medium	High
High	5	0	1
Medium	24	0	3
Low	84	16	5

Likelihood of Failure

Figure 3. Business Risk Matrix (Risk Rating) by Number of Manholes

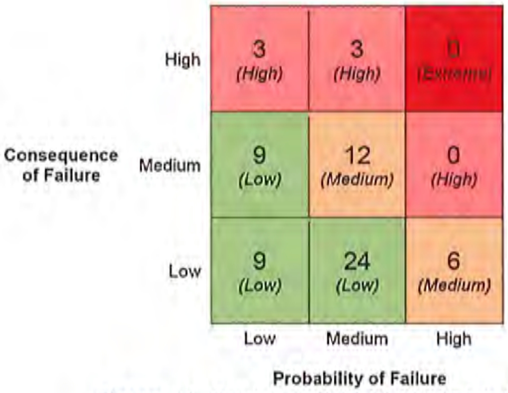
Figure 4 provides the risk ratings for the WWTF assets. 17 assets are identified as extreme risk. The 43 assets with high risk ratings should be inspected at regular intervals.



	Probability of Failure		
Consequence of Failure	Low	Medium	High
High	22 *(High)*	20 *(High)*	17 *(Extreme)*
Medium	6 *(Low)*	2 *(Medium)*	1 *(High)*
Low	11 *(Low)*	1 *(Low)*	0 *(Medium)*

Figure 4. Business Risk Matrix (Risk Rating) by Number of WWTF Assets

Figure 4A provides the risk ratings for the lift station assets. 0 assets are identified as extreme risk. The 6 assets with high risk ratings should be inspected at regular intervals.



	Probability of Failure		
Consequence of Failure	Low	Medium	High
High	3 *(High)*	3 *(High)*	0 *(Extreme)*
Medium	9 *(Low)*	12 *(Medium)*	0 *(High)*
Low	9 *(Low)*	24 *(Low)*	6 *(Medium)*

Figure 4A. Business Risk Matrix (Risk Rating) by Number of Lift Station Assets

A detailed spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection system, wastewater treatment plant and lift stations.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's wastewater collection utility assets based on the Business Risk evaluation which prioritized the capital improvement projects. The CIP consists of short-term (1-5 year) and long-term (6-20 year) improvements to address the needs of the utility. Based upon the CIP needs for the City, it is recommended that the City consider financing the 1-20 year Capital Improvement needs thru a USDA grant and loan.

Table 1 below summarizes the recommended improvements in the short-term CIP for the collection system. Detailed assed identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 1. 5-Year Collection System Capital Improvement Plan Summary
Rehabilitation Action
Pipe Replacement
Pipe Lining
Pipe Upsize
Pipe Point Repair
Replace Manhole Frame and Cover

Table 2 below summarizes the recommended improvements in the short-term CIP for lift stations and the WWTF. Detailed assed identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 2. 5-Year Lift Station and WWTF Capital Improvement Plan Summary
Rehabilitation Action
Administration Building and Clarifier Upgrades
Disinfection and Sludge Management System Upgrades
Grit Removal System Upgrades

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

A preventative maintenance program to systematically clean and assess pipelines to NASSCO-certified standards is critical for a sound wastewater collection system. The process of cleaning and CCTV assessment of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation and replacement. The City has been proactive in the maintenance of its infrastructure and the benefits of this preventative maintenance program are evident in the low risk ratings determined for the majority of the City's infrastructure. Once the entire system has been cleaned and televised, it is recommended that a maintenance schedule be set for future cleaning and televising. The required frequency of cleaning and televising over the next 20 years may depend on what is discovered in the initial assessment. The City may desire to clean and televise certain areas more than others.

Table 3 below summarizes the recommended preventative maintenance in the short-term (1-5 years). Detailed asset identification, maintenance measures, and costs of the recommended preventative maintenance program are provided in the AMP.

Table 3. 5-Year Maintenance Summary
Maintenance Action
CCTV and Pipe Cleaning
Manhole Assessments

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by DPW staff without bringing in an outside contractor. Existing disposable materials include wear parts in pumps and motors, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

The rate methodology required by the MDEQ for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed by the City Manager and City Treasurer shows no revenue gap.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Pinconning *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1028-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: November 21, 2019.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ms. Dawn Hoder at (989) 879-2360 and at manager@cityofpinconning.org
Name Phone Number Email

12/26/19

Signature of Authorized Representative (Original Signature Required) Date

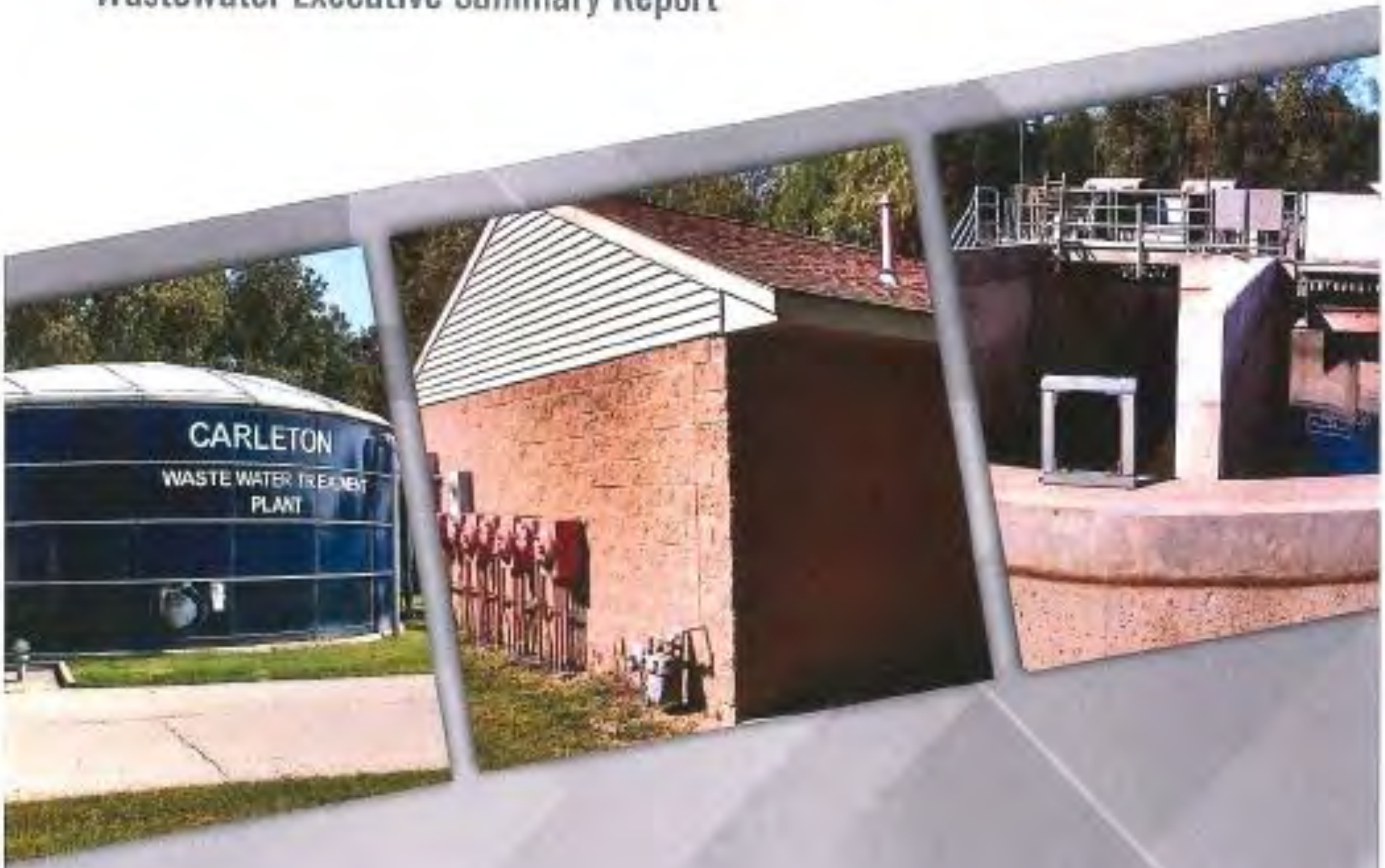
Dawn Hoder, Pinconning City Mgr

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

Village of Carleton

SAW Project No. 1032-01

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

October 2019

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In November 2016, The Village of Carleton received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) now known as the Michigan Department of Environment, Great Lakes, and Energy (EGLE), project no. 1032-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Village's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Village of Carleton AMP is:

Larry Buckingham, Village President
1230 Monroe Street
Carleton, Michigan 48117
Phone number: 734.654.6255
Email: president@carletonmi.org

ASSET INVENTORY AND CONDITION ASSESSMENT

A list of the major assets in the Village's wastewater system, described further below, include:

- Collection system piping system and manholes
- Wastewater Treatment Facility (WWTF)
- Sanitary sewer lift stations in the collection system

The wastewater collection system assets consist of approximately 48,917 feet (9.26 miles) of sanitary sewers (gravity pipe and force mains) and 164 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The WWTF currently includes the following treatment processes:

- headworks with mechanical screen and grit removal
- flow equalization
- oxidation ditches
- secondary clarifiers with polymer addition
- tertiary sand filters
- UV disinfection
- effluent reaeration

Treated effluent is seasonally discharged to the mitigated wetland (formerly lagoon cell #6) and then to the tributary to the Swan Creek in accordance with NPDES permit No. MI0022543. The design capacity of the WWTF is 0.74 million gallons per day (mgd). The current annual average flow received by the facility is approximately 0.53 mgd.

There are two sanitary sewer lift stations located throughout the wastewater collection system, including the Main Lift Station located on Grafton Road east of the WWTF. The stations are all wet well/dry well style stations. The second lift station on Ford Road collects flow in the southeast quadrant of the Village and discharges flow to the gravity sewer at the southern end of Grafton Road at the Ford Road intersection.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance manuals included a review of existing record drawings, field notes, staff knowledge through FVOP Operations, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed-Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity and force main system. This information was organized into a new GIS database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 195 WWTF assets, 38 Lift Station Assets, and 323 Collection System Assets.

Condition Assessment and Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field-based assessments were completed on 164 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 99% of the gravity pipe. Smoke Testing was previously performed on 99% of system to disclose location of inflow or infiltration I&I). Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance, with 1% of the system tagged for additional inspection and/or cleaning. Rehabilitation accounted for 72% of the existing sanitary structures and 76% of the sanitary sewer pipe system identified as needing point repairs and lining. The remaining assets were placed in the 20+ year category.

Overall, the condition of the assets at the WWTF range from good to poor. Repair needs over the last 20 years when identified, have helped to maintain the condition of many assets and successfully keep up with sewage treatment demands in the system, however with an increase of I&I and aging collection and treatment assets, there are key assets identified that require future upgrades or replacement due to age or deterioration caused by harsh conditions associated with wastewater treatment.

The condition of the assets at the lift stations range from good to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems. The recommendations for short- and long-term improvements are relatively extensive for both the WWTF and the two lift stations.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

Throughout the development of this AMP, F&V worked with the Village President, Council, DPW and Sewer Committee to develop the following LOS statement and goals. The Village and community stakeholders are proactively pursuing future steps to improve the collection system and WWTF from findings of the AMP and routinely held discussions and updates with the Sewer Committee and at monthly Council meetings.

The overall objective of the Village Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this, the following Level of Service (LOS) goals are proposed:

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Stockbridge Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with all local, state and federal regulations at all times for treated effluent from the WWTF.
- Actively maintain collection and treatment system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of treatment plant.
- Provide rapid and effective emergency response services to customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Village from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

In order to assure that LOS goals are met, performance measurements are recommended. Performance measurements are specific metrics designed to assess whether the Level of Service objectives are being met. If implemented, an evaluation of goals should be completed annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements and technology. During the LOS review with the community the need for performance measurements was reviewed and prompted discussions for future system rehabilitation and capital improvement plan needs.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size and location of asset within the utility network
- Type of asset.

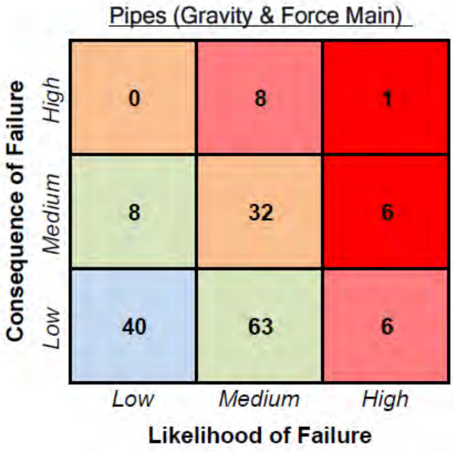
The WWTF and Lift Station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Seven pipe segments in the collection system have an extreme structural risk rating and are recommended to be replaced, lined or point repairs. Additionally, Inflow and Infiltration (I/I) has been identified in many other segments that are within the medium risk and have been identified within the 1-5 year rehabilitation to assist and alleviate some of the additional I/I flow effecting the ability to process sewage at the WWTF. and Approximately 1/4 (24%) of the collection system's gravity pipes as shown in Figure 1, have a lesser negligible risk rating and are indicative of pipes or manholes in relatively good condition.

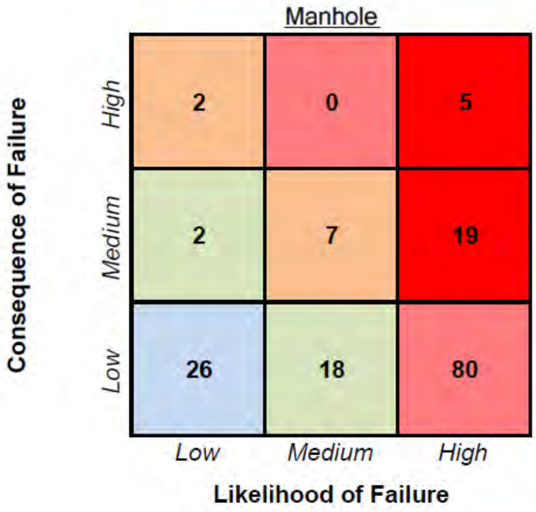


Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	0	8	1
Medium	8	32	6
Low	40	63	6
	Likelihood of Failure		

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. Twenty-four manholes are identified as extreme risk, and are recommended for replacement or to be cleaned, lined and repaired. Approximately 1/3 of the system manholes are at low to medium risk and recommended to be included in a long-term 6-20-year rehabilitation strategy (35 percent).

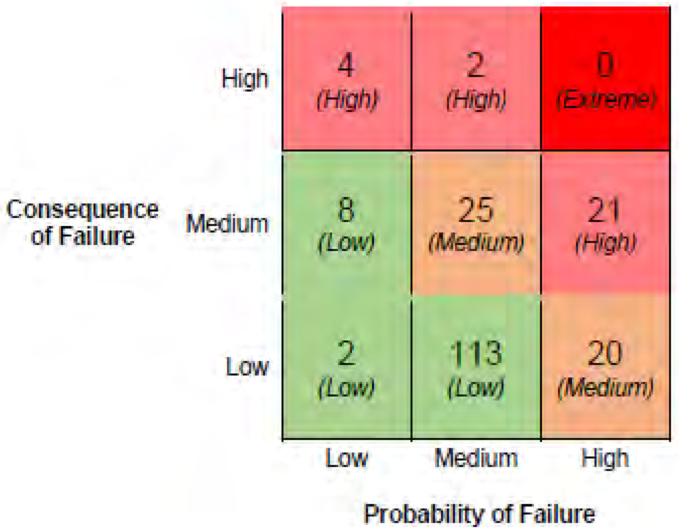


Manhole

Consequence of Failure	Low	Medium	High
High	2	0	5
Medium	2	7	19
Low	26	18	80
	Likelihood of Failure		

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTF assets. No assets are identified as extreme risk. The twenty-seven assets with high risk ratings should be inspected at regular intervals.

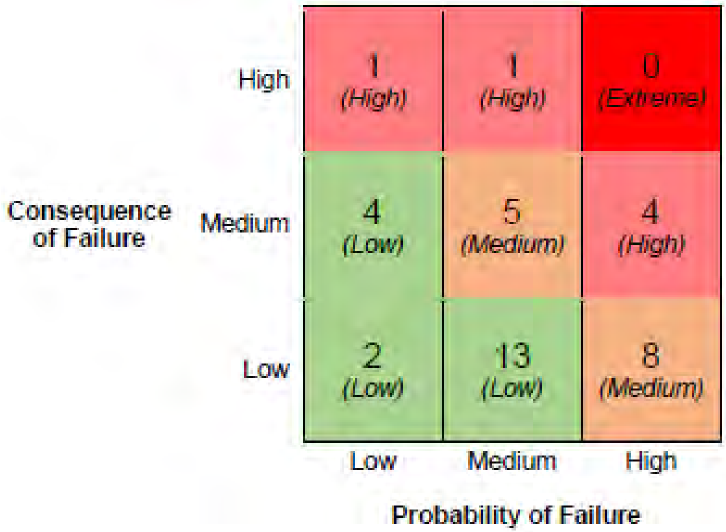


Consequence of Failure				
	High	4 *(High)*	2 *(High)*	0 *(Extreme)*
	Medium	8 *(Low)*	25 *(Medium)*	21 *(High)*
	Low	2 *(Low)*	113 *(Low)*	20 *(Medium)*
		Low	Medium	High

Probability of Failure

Figure 3. Business Risk Matrix (Risk Rating) for WWTF assets

Figure 4 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The six assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure				
	High	1 *(High)*	1 *(High)*	0 *(Extreme)*
	Medium	4 *(Low)*	5 *(Medium)*	4 *(High)*
	Low	2 *(Low)*	13 *(Low)*	8 *(Medium)*
		Low	Medium	High

Probability of Failure

Figure 4. Business Risk Matrix (Risk Rating) for the Lift Station assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and treatment systems.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Village's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, wastewater treatment facility and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility.

Table 4 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

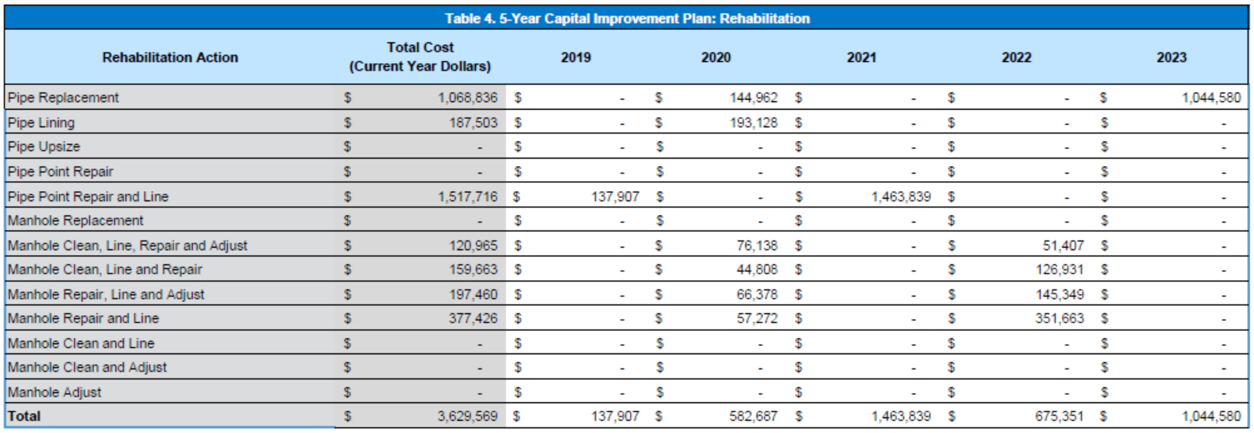


Table 4. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2019	2020	2021	2022	2023
Pipe Replacement	$ 1,068,836	$ -	$ 144,962	$ -	$ -	$ 1,044,580
Pipe Lining	$ 187,503	$ -	$ 193,128	$ -	$ -	$ -
Pipe Upsize	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Point Repair	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Point Repair and Line	$ 1,517,716	$ 137,907	$ -	$ 1,463,839	$ -	$ -
Manhole Replacement	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Clean, Line, Repair and Adjust	$ 120,965	$ -	$ 76,138	$ -	$ 51,407	$ -
Manhole Clean, Line and Repair	$ 159,663	$ -	$ 44,808	$ -	$ 126,931	$ -
Manhole Repair, Line and Adjust	$ 197,460	$ -	$ 66,378	$ -	$ 145,349	$ -
Manhole Repair and Line	$ 377,426	$ -	$ 57,272	$ -	$ 351,663	$ -
Manhole Clean and Line	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Clean and Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Total	$ 3,629,569	$ 137,907	$ 582,687	$ 1,463,839	$ 675,351	$ 1,044,580

Table 5 shows a detailed recommendation for the WWTF assets needing rehabilitation in the short-term CIP.

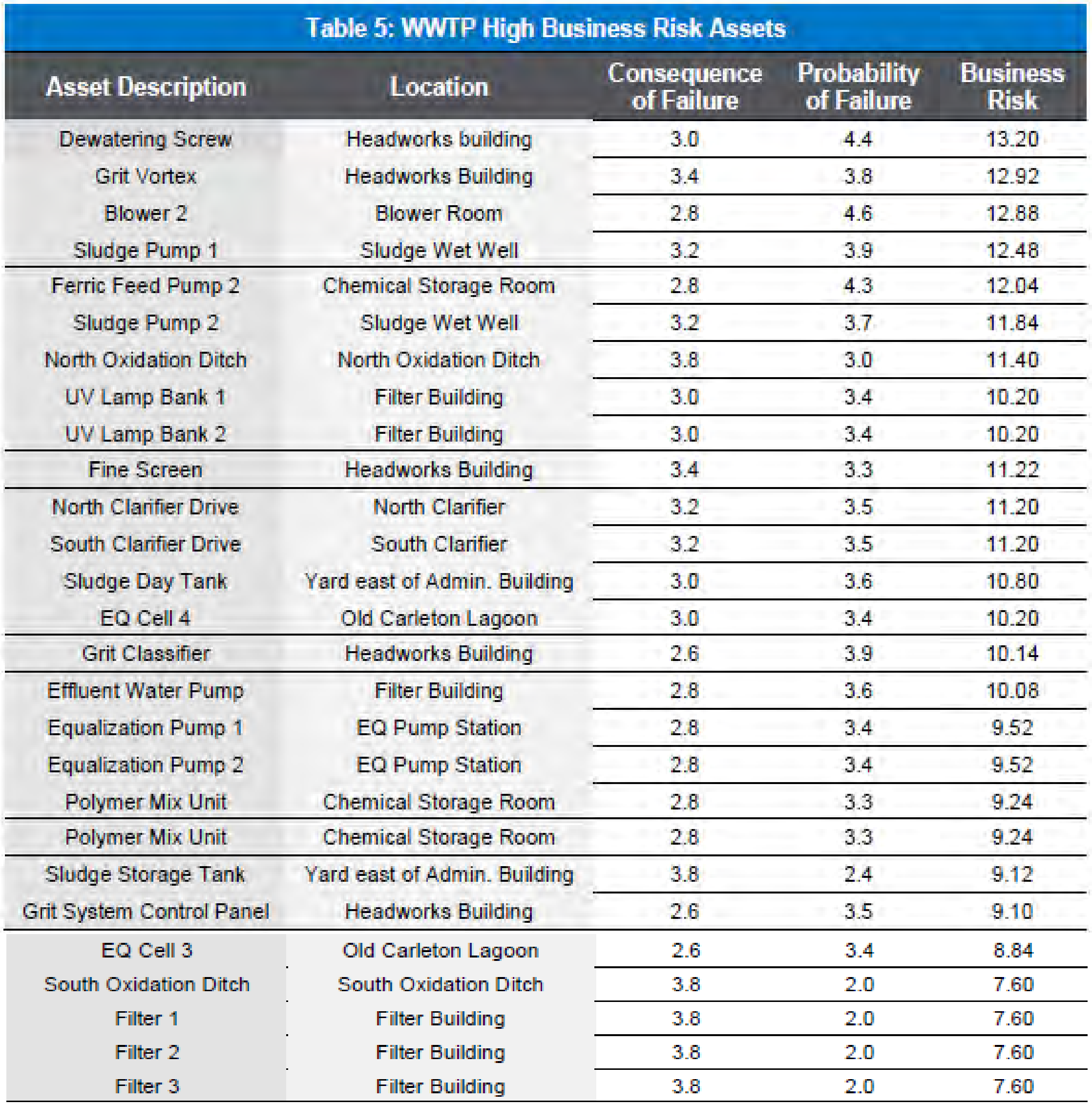


Table 5: WWTP High Business Risk Assets

Asset Description	Location	Consequence of Failure	Probability of Failure	Business Risk
Dewatering Screw	Headworks building	3.0	4.4	13.20
Grit Vortex	Headworks Building	3.4	3.8	12.92
Blower 2	Blower Room	2.8	4.6	12.88
Sludge Pump 1	Sludge Wet Well	3.2	3.9	12.48
Ferric Feed Pump 2	Chemical Storage Room	2.8	4.3	12.04
Sludge Pump 2	Sludge Wet Well	3.2	3.7	11.84
North Oxidation Ditch	North Oxidation Ditch	3.8	3.0	11.40
UV Lamp Bank 1	Filter Building	3.0	3.4	10.20
UV Lamp Bank 2	Filter Building	3.0	3.4	10.20
Fine Screen	Headworks Building	3.4	3.3	11.22
North Clarifier Drive	North Clarifier	3.2	3.5	11.20
South Clarifier Drive	South Clarifier	3.2	3.5	11.20
Sludge Day Tank	Yard east of Admin. Building	3.0	3.6	10.80
EQ Cell 4	Old Carleton Lagoon	3.0	3.4	10.20
Grit Classifier	Headworks Building	2.6	3.9	10.14
Effluent Water Pump	Filter Building	2.8	3.6	10.08
Equalization Pump 1	EQ Pump Station	2.8	3.4	9.52
Equalization Pump 2	EQ Pump Station	2.8	3.4	9.52
Polymer Mix Unit	Chemical Storage Room	2.8	3.3	9.24
Polymer Mix Unit	Chemical Storage Room	2.8	3.3	9.24
Sludge Storage Tank	Yard east of Admin. Building	3.8	2.4	9.12
Grit System Control Panel	Headworks Building	2.6	3.5	9.10
EQ Cell 3	Old Carleton Lagoon	2.6	3.4	8.84
South Oxidation Ditch	South Oxidation Ditch	3.8	2.0	7.60
Filter 1	Filter Building	3.8	2.0	7.60
Filter 2	Filter Building	3.8	2.0	7.60
Filter 3	Filter Building	3.8	2.0	7.60

Table 6 shows a detailed recommendation for the lift station system assets needing rehabilitation in the short-term CIP

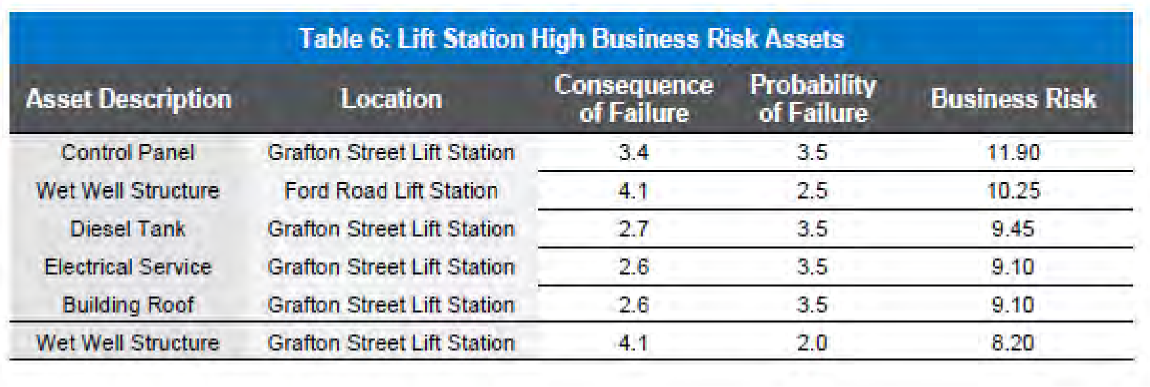


Table 6: Lift Station High Business Risk Assets

Asset Description	Location	Consequence of Failure	Probability of Failure	Business Risk
Control Panel	Grafton Street Lift Station	3.4	3.5	11.90
Wet Well Structure	Ford Road Lift Station	4.1	2.5	10.25
Diesel Tank	Grafton Street Lift Station	2.7	3.5	9.45
Electrical Service	Grafton Street Lift Station	2.6	3.5	9.10
Building Roof	Grafton Street Lift Station	2.6	3.5	9.10
Wet Well Structure	Grafton Street Lift Station	4.1	2.0	8.20

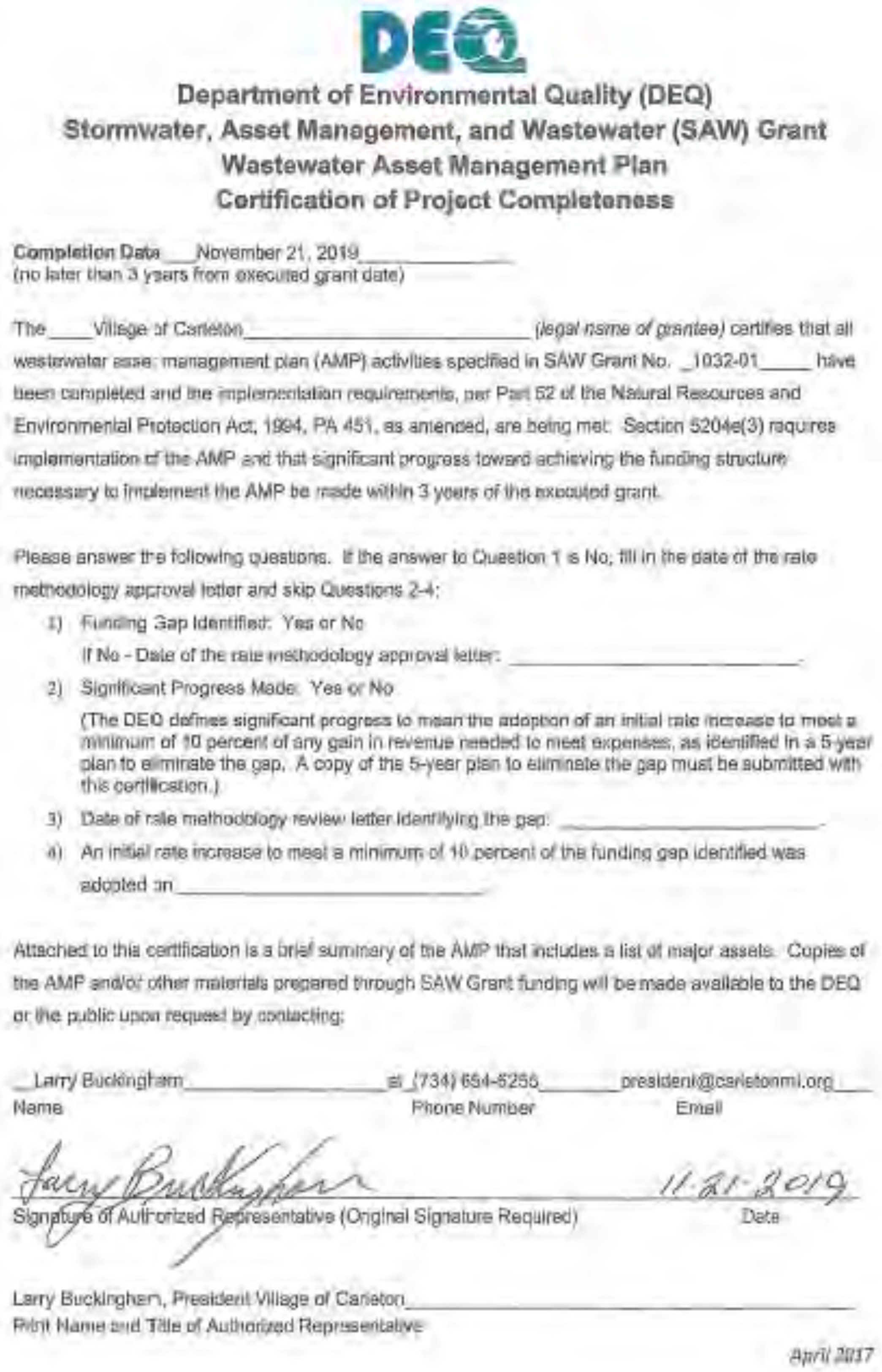
OPERATIONS, MAINTENANCE AND REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The MDEQ (EGLE) requires that a rate study be performed to assure that there is sufficient revenue to cover current operation, maintenance and replacement costs of the wastewater utility. For the Village of Carleton, the rate study report was prepared by Bakertilly Municipal Advisors and approved by the MDEQ (EGLE) on June 27, 2019.



Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date ___November 21, 2019______________
(no later than 3 years from executed grant date)

The ____Village of Carleton___________________________ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. _1032-01_____ have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or No
   If No - Date of the rate methodology approval letter: ____________________________.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: __________________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

__Larry Buckingham____________________at_(734) 654-6255________president@carletonmi.org____
Name Phone Number Email

Larry Buckingham 11-21-2019
Signature of Authorized Representative (Original Signature Required) Date

Larry Buckingham, President Village of Carleton_____________________________________
Print Name and Title of Authorized Representative

April 2017

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Charter Township of Portsmouth

SAW Project No. 1037-01

Portsmouth TWP
FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September of 2016, Portsmouth Township received a Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1037-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Township's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Portsmouth Township AMP is:

Robert Pawlak, Supervisor
1711 Cass Avenue Rd. Bay City, MI 48708
Phone Number: (989) 892-7221
Email: supervisor@portsmouthtwp.com.

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the Township's wastewater system, described further below, include:

- Collection system piping and manholes
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 68,584 feet (13.0 miles) of sanitary sewers (gravity pipe and force mains) and 182 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The collection system is owned by Portsmouth Township, but is maintained by the Bay County Department of Water and Sewer (BCDWS).

There are 62,061 feet (11.75 miles) of gravity pipe, 6,523 feet (1.24 miles) of forcemain, 182 wastewater manholes connecting the gravity pipelines, and 2 lift stations in the collection system. The stations are submersible style stations.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into an updated (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes 39 Lift Station Assets and 369 Collection System Assets.

Information was obtained from record drawings, field notes, staff knowledge, and a kmz.file provided by the Bay County Department of Water and Sewer.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on all but 15 manhole structures. 3 of these manhole structures were buried, 1 was under HMA, and 9 could not be found due to either being buried or in heavy brush areas. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 95% of the gravity pipe. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 100% of the system tagged for inspection and/or cleaning. Rehabilitation accounted for 17% of the system identifying the need for replacement, point repairs and lining. The remaining 83% of assets were placed in the 20+ year category.

The condition of the assets at the lift stations range from good to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the Township and the Bay County Department of Water and Sewer to develop the following LOS statement and goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Township of Portsmouth Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Actively maintain collection and treatment system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of treatment facility.
- Provide rapid and effective emergency response services to customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Township from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score + Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
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Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

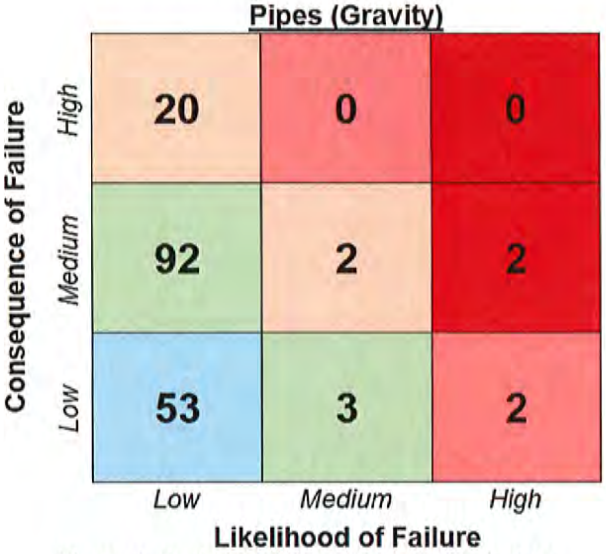
Lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using an excel database that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity pipe by number of pipe segments. 2 pipe segments in the collection system have an extreme risk rating with repairs recommended in the next 1-3 years. 1 of these pipe segments needs a point repair. 1 pipe segment with a high risk rating has a sag, which will be scheduled for replacement within the next 2-3 years.

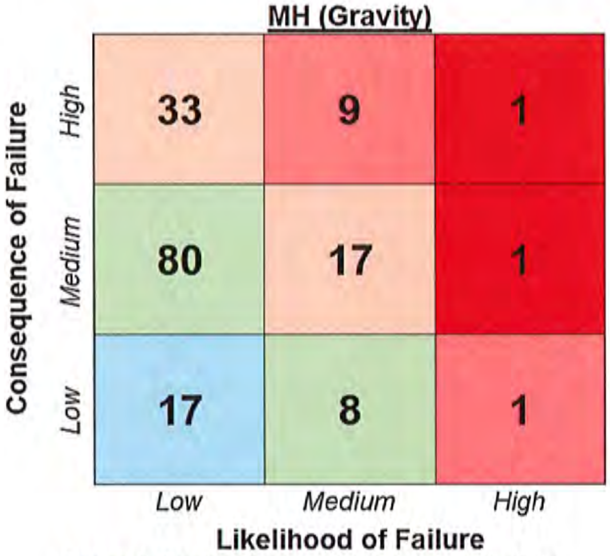


Pipes (Gravity)

Consequence of Failure	Low	Medium	High
High	20	0	0
Medium	92	2	2
Low	53	3	2

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the collection system manholes. There are 2 manholes that have been identified as an extreme risk and need rehabilitation. One of these structures needs the adjustment ring replaced and one needs the cover replaced. This work will be scheduled over the next 1-5 years. 63 percent of the collection system's manholes, as shown in Figure 9, have a low to negligible risk rating and are indicative of manholes in good condition. 3 manholes are buried and require the rims to be raised. This work is scheduled in the 6-20 year CIP.

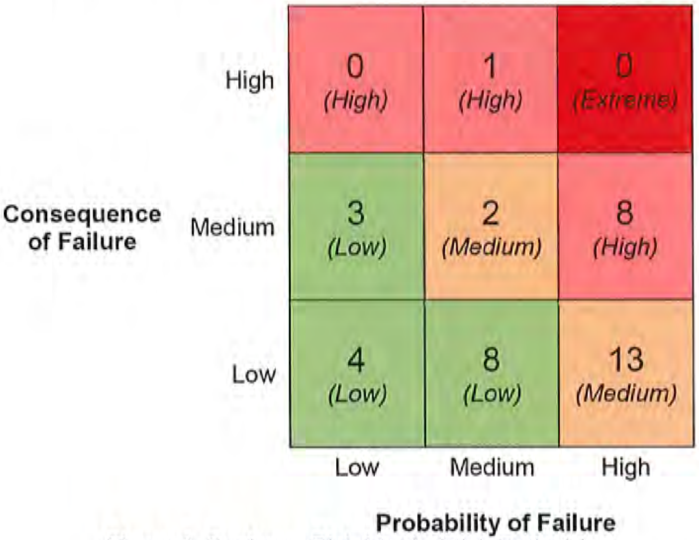


MH (Gravity)

Consequence of Failure	Low	Medium	High
High	33	9	1
Medium	80	17	1
Low	17	8	1

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The nine assets with high risk ratings should be inspected at regular intervals. The nine assets with high risk ratings include: Lift Station #32 Pump 1, Lift Station #32 Pump 2, Lift Station #32 Telemetry Panel, Lift Station #32 Control Panel, Lift Station #33 Pump 1, Lift Station #33 Pump 2, Lift Station #33 Wet Well Structure, and Lift Station #33 Telemetry Panel.



Consequence of Failure	Low	Medium	High
High	0 *(High)*	1 *(High)*	0 *(Extreme)*
Medium	3 *(Low)*	2 *(Medium)*	8 *(High)*
Low	4 *(Low)*	8 *(Low)*	13 *(Medium)*

Probability of Failure

Figure 3. Business Risk Matrix (Risk Rating) by Number of Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and treatment systems.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Township's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility. Table 1 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

Table 1: 1-5 Year Capital Improvement Plan: Rehabilitation

Project Description	Rehabilitation Fiscal Year					Total
	2020	2021	2022	2023	2024	
Gravity Sewer Point Repair	$ -	$ -	$ 7,935.53	$ -	$ -	$ 7,935.53
Gravity Sewer Replace Pipe (Approximately 140')	$ -	$ 19,003.50	$ -	$ -	$ -	$ 19,003.50
Gravity Sewer Grout Injection	$ -	$ 1,545.00	$ -	$ -	$ -	$ 1,545.00
Manhole Cover Replacement	$ 1,000.00	$ -	$ -	$ -	$ -	$ 1,000.00
Manhole Adjustment Ring Replacement	$ 550.00	$ -	$ -	$ -	$ -	$ 550.00
Manhole Mortar Chimney and/or Seal	$ -	$ -	$ -	$ -	$ 2,082.20	$ 2,082.20
Manhole Epoxy Joints	$ -	$ -	$ -	$ -	$ 562.75	$ 562.75
Manhole Raise Rim	$ -	$ -	$ -	$ -	$ 1,125.50	$ 1,125.50
Total Collection System Improvements	***$ 1,550.00***	***$ 20,548.50***	***$ 7,935.53***	***$ -***	***$ 3,770.45***	***$ 33,804.48***

Assumes 3% Inflation per Year

Table 2 shows detailed recommendations for the lift station assets needing rehabilitation in the short-term CIP.

Table 9. Recommended Capital Improvements for Lift Stations

Asset Description	Anticipated Year of Replacement	Budget (2019 Dollars)	Budget (Replacement Year)
1-5 YEAR CIP PROJECTS			
Lift Station #32 Rehabilitation	2022	$184,800	$190,300
6-20 YEAR CIP PROJECTS			
Lift Station #33 Rehabilitation	2026	$159,800	$190,800

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 3: 1-5 Year Capital Improvement Plan: Maintanance

Project Description	Total	Maintenace Fiscal Year				
		2020	2021	2022	2023	2024
Structure Inspection (26/yr)	$ 1,040.00	$ -	$ 260.00	$ 260.00	$ 260.00	$ 260.00
Pipe Cleaning (8,866'/yr)	$ 42,556.80	$ -	$ 10,639.20	$ 10,639.20	$ 10,639.20	$ 10,639.20
CCTV (100% of Pipe Cleaning)	$ 63,835.20	$ -	$ 15,958.80	$ 15,958.80	$ 15,958.80	$ 15,958.80
Total Collection System Improvements	***$ 107,432.00***	***$ -***	***$ 26,858.00***	***$ 26,858.00***	***$ 26,858.00***	***$ 26,858.00***

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

The rate methodology required by the MDEQ for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed by Bay County DWS Financial Department shows no revenue gap.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Chart Township of Portsmouth *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1037-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: November 5, 2019.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Robert Pawlak at (989) 892-7221 and at supervisor@portsmouthtwp.com
Name Phone Number Email

____

Signature of Authorized Representative (Original Signature Required) Date

____

Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Chart Township of Portsmouth *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1037-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

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   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No N/A
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
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Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Robert Pawlak at (989) 892-7221 and at supervisor@portsmouthtwp.com
Name Phone Number Email

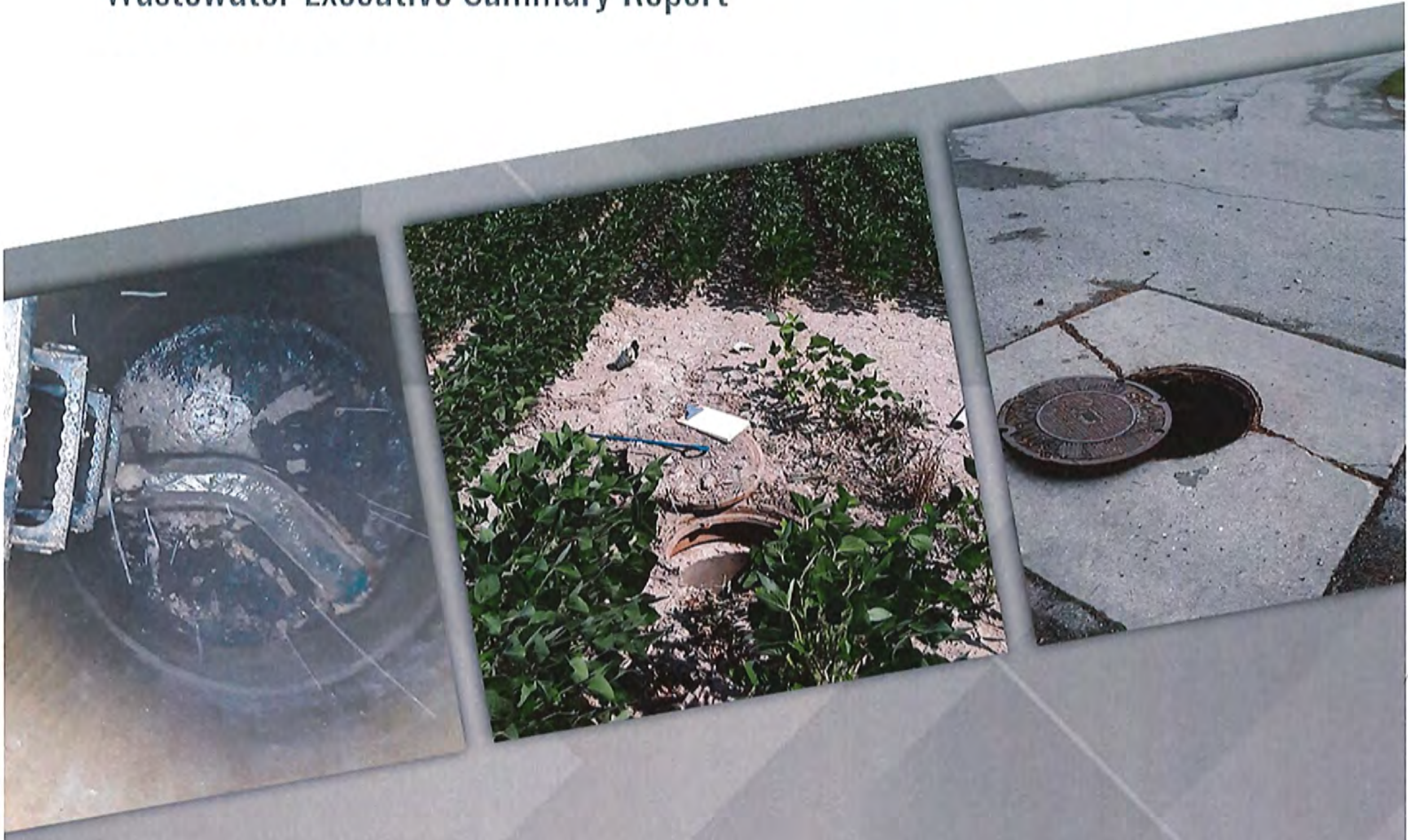
Robert J Pawlak 12/26/19
Signature of Authorized Representative (Original Signature Required) Date

ROBERT J PAWLAK
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

Williams Township

SAW Project No. 1045-01

Williams Charter Township
Preparing today for tomorrow.

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September of 2016, Williams Township received a Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1045-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Township's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Williams Township AMP is:

Paul Wasek, Supervisor
1080 W Midland Rd. Auburn, MI
Phone number: (989) 662-4241
Email: supervisor@williamstwp.com.

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the Township's wastewater system, described further below, include:

- Collection system piping and manholes
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 102,439 feet (19.4 miles) of sanitary sewers (gravity pipe and force mains) and 307 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The collection system is owned by Williams Township, but is maintained by the Bay County Department of Water and Sewer (BCDWS). Williams Township utilizes the West Bay County WWTP for wastewater treatment.

There are 93,015 feet (17.62 miles) of gravity pipe, 9,424 feet (1.78 miles) of forcemain, 301 wastewater manholes connecting the gravity pipelines, 6 manholes at air release valves on the forcemain, and 6 lift stations in the collection system. The lift stations are submersible style stations.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new, or updated (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 103 Lift Station Assets and 613 Collection System Assets.

Information was obtained from record drawings, field notes, staff knowledge, and a kmz.file provided by the Bay County Department of Water and Sewer.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on 219 manhole structures. 9 structures are buried, 4 are air release valves, 22 could not be located due to either being buried or in heavy brush areas, 7 could not be opened, 1 is under a driveway, and 42 were installed within the last 20 years and did not require assessment. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 75% of the gravity pipe. 19% of gravity pipes were not televised due to being installed within the last 20 years. Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 100% of the system tagged for inspection and/or cleaning. Rehabilitation accounted for 19% of the system identifying the need for point repairs and lining. The remaining 81% of assets were placed in the 20+ year category.

The condition of the assets at the lift stations range from excellent to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the Township and the Bay County Department of Water and Sewer to develop the following LOS statement and goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of Williams Township is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system capacity for all service areas.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of the regional treatment facility.
- Provide rapid and effective emergency response services to its customers.
- Ensure staff that maintains the system are properly certified.
- Regularly review with the Bay County Department of Water and Sewer its health and safety procedures in order to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Township from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score + Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

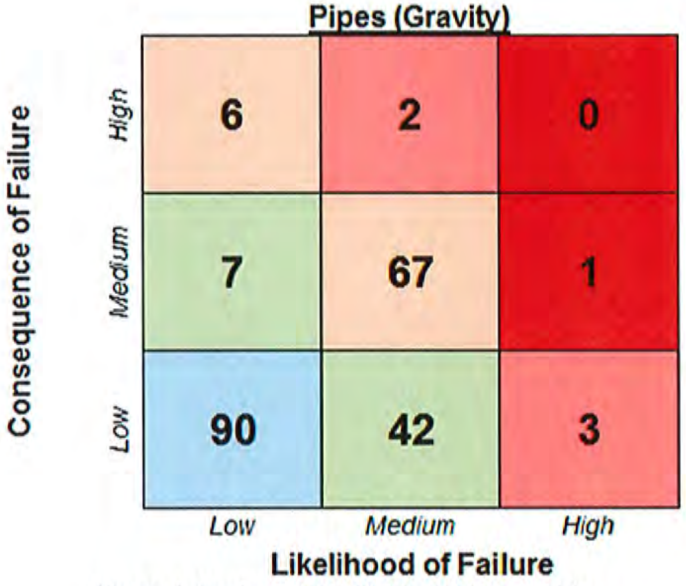
The lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using an excel database that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity pipe by number of pipe segments. 1 pipe segment in the collection system has an extreme risk rating. This pipe segment has deposits and a sag in the pipe. It is part of the original system that was installed in 1981 and is located on 11 Mile Road, near a commercial building, and shows signs of infiltration. Due to the sag, the Township will perform regular maintenance on this section of pipe.



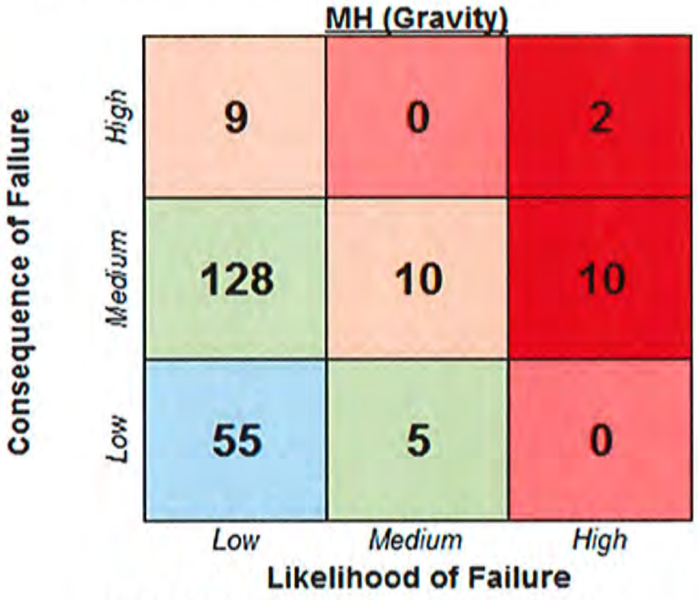
Pipes (Gravity)

Consequence of Failure	Low	Medium	High
High	6	2	0
Medium	7	67	1
Low	90	42	3

Likelihood of Failure

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity

Figure 2 provides the risk rating for the collection system manholes. There are 12 manholes that have been identified as an extreme risk and need some rehabilitation. These structures need mortared chimneys, the cover and frame replaced, or the cover replaced. This work will be scheduled over the next 5 years as funding becomes available. 95 percent of the collection system's manholes, as shown in Figure 9, have a low to negligible risk rating and are indicative of manholes in good condition.



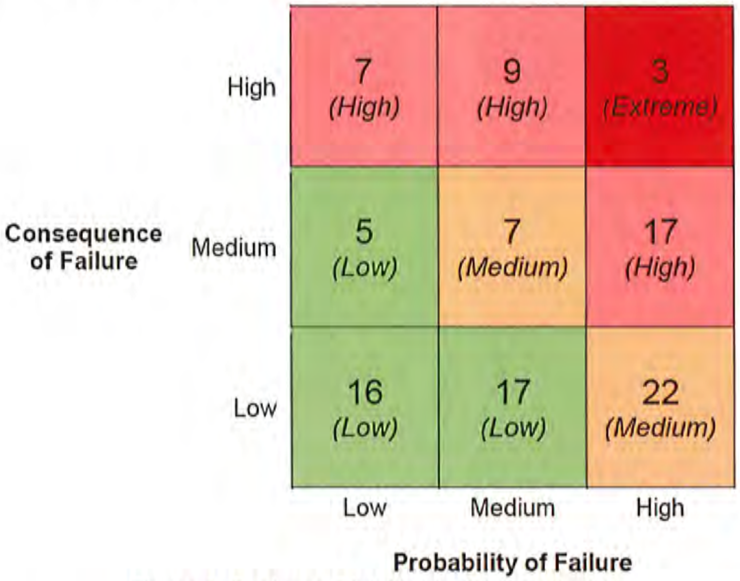
MH (Gravity)

Consequence of Failure	Low	Medium	High
High	9	0	2
Medium	128	10	10
Low	55	5	0

Likelihood of Failure

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. 3 assets are identified as extreme risk. The 33 assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure	Low	Medium	High
High	7 *(High)*	9 *(High)*	3 *(Extreme)*
Medium	5 *(Low)*	7 *(Medium)*	17 *(High)*
Low	16 *(Low)*	17 *(Low)*	22 *(Medium)*

Probability of Failure

Figure 3. Business Risk Matrix (Risk Rating) by Number of Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and treatment systems.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Township's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility. Table 1 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP (1-5 year).

Table 1: Capital Improvement Plan: Rehabilitation

Project Description	Fiscal Year					Total
	2020	2021	2022	2023	2024	
Collection System Improvements						
Gravity Sewer Point Repair (5 Areas)	$ -	$ -	$ 21,005.82	$ 16,347.20	$ 17,828.06	$ 55,181.08
Manhole Cover Replacement	$ -	$ 1,030.00	$ -	$ -	$ -	$ 1,030.00
Manhole Cover and Frame Replacement	$ -	$ 6,180.00	$ 6,365.40	$ -	$ -	$ 12,545.40
Manhole Replace Frame and Cover - Mortar Chimney	$ -	$ 3,296.00	$ 3,394.88	$ -	$ 1,800.81	$ 8,491.69
Total Collection System Improvements	***$ -***	***$ 10,506.00***	***$ 30,766.10***	***$ 16,347.20***	***$ 19,628.87***	***$ 77,248.17***

Assumes 3% Inflation per Year

Table 2 shows detailed recommendations for the lift station assets needing rehabilitation in the short-term CIP.

Recommended Capital Improvements for Lift Stations			
Asset Description	**Anticipated Year of Replacement**	**Budget (2019 Dollars)**	**Budget (Replacement Year)**
1-5 YEAR CIP PROJECTS			
Lift Station #25 Rehabilitation	2021	$206,800	$219,400
Lift Station #24 Rehabilitation	2024	$172,000	$199,400
6-20 YEAR CIP PROJECTS			
Lift Station #26 Rehabilitation	2027	$175,000	$221,700
Lift Station #34 Rehabilitation	2030	$175,000	$242,200
Lift Station #30 Rehabilitation	2031	$195,300	$278,500
Lift Station #28 Rehabilitation	2035	$104,800	$168,200
Standby Generator and Automatic Transfer Switch	2039	$417,000	$753,100

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system. It is recommended that the Township budget funds to clean and televise one-seventh of the collection system each year.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 3: Capital Improvement Plan: Maintenance

Project Description	Fiscal Year					Total
	2020	2021	2022	2023	2024	
Collection System Improvements						
Structure Inspection (44/yr)	$ -	$ 440.00	$ 440.00	$ 440.00	$ 440.00	$ 1,760.00
Pipe Cleaning (13,300'/yr)	$ -	$ 23,940.00	$ 23,940.00	$ 23,940.00	$ 23,940.00	$ 95,760.00
CCTV (100% of Pipe Cleaning)	$ -	$ 15,960.00	$ 15,960.00	$ 15,960.00	$ 15,960.00	$ 63,840.00
Total Collection System Improvements	***$ -***	***$ 40,340.00***	***$ 40,340.00***	***$ 40,340.00***	***$ 40,340.00***	***$ 161,360.00***

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

The rate methodology required by the MDEQ for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed shows no revenue gap.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Williams Charter Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1045-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No N/A
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Paul Wasek, Supervisor, at (989) 662-4091 and supervisor@williamstwp.com
Name Phone Number Email

Paul Wasek 12-23-19
Signature of Authorized Representative (Original Signature Required) Date

PAUL WASEK Township Supervisor
Print Name and Title of Authorized Representative

April 2017

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Essexville

SAW Project No. 1046-01

ESSEXVILLE
Gateway To The Bay

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2016, the City of Essexville received a SAW Grant (Project No. 1046-01) from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the City's publicly owned stormwater utility. Working with City staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Essexville AMP is:

Dan Hansford, City Manager
1107 Woodside Avenue Essexville, MI 48732
Phone number: (989) 893-0772
Email: cmanager@essexville.org

ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 40,339 feet (7.64 miles) of storm sewers and 440 stormwater manholes and catch basins connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed-Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping, and further evaluation purposes.

Information was obtained from the record drawings, field notes, and staff knowledge.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field-based assessments were completed on 98% of the 440 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 43% of the gravity pipe footage.

The collection system pipe and manhole assets were generally found to be in fair to good condition. Structural defects such as cracks, fractures, and offset pipe joints were identified. The manhole assessments identified a number of structures with signs of infiltration of varying degree. Based on the assessments completed, recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. Maintenance recommendations include continuing to clean and televise the stormwarter collection system. As additional assessments are completed they will be used to further evaluate structural and O&M defects in the system and refine the short and long term maintenance and capital improvement plan.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City of Essexville staff to develop the following LOS statement and goals.

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

The overall objective of the City of Essexville is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the City of Essexville:

- Provide adequate stormwater collection system and conveyance capacity for all service areas
- Actively maintain stormwater collection and conveyance system assets in reliable working condition.
- Provide rapid and effective emergency response services to its customers.
- Ensure maintenance and operations staff are properly trained.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, and evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula.

Business Risk = Consequence of Failure Score + Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using an excel database and a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Assets with the greatest consequence of failure and the greatest likelihood of failure will be assets that are the most critical. Assets with the highest business risk score are likely candidates for near-term rehabilitation and replacement. Assets with lower scores should be monitored and analyzed to develop the best life cycle strategy. Over time as more of the stormwater collection system is assessed and re-assessed, the likelihood of failure scores will continue to develop.

A 3x3 Business Risk Matrix identifies the relative "Criticality" of each asset based on their CoF and LoF scores to establish a "Risk Rating" for each asset. Asset rating categories range from *Negligible* to *Extreme* criticality based on position within the matrix and are color coded to better identify significance. Upper and lower CoF and LoF score "boundaries" are set for each matrix box to establish the Risk Rating for each asset and place each asset in the proper rating category. Business Risk is depicted visually in the risk matrix shown in Figure 1, and the Business Risk of each asset determines the appropriate strategy for risk management as shown in Table 1.

Consequence of Failure	Low	Medium	High
High	Medium Risk	High Risk	Extreme Risk
Medium	Low Risk	Medium Risk	Extreme Risk
Low	Negligible Risk	Low Risk	High Risk

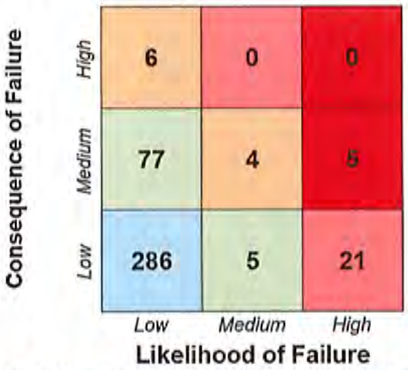
Likelihood of Failure

Figure 1: Business Risk Matrix (Risk Rating)

Table 1. Strategies for Asset Rehabilitation and Replacement	
Risk Rating	**Strategies for Asset Rehabilitation or Replacement**
Extreme	Inspect immediately and develop 1-2 year rehabilitation plan
High	Inspect immediately and develop short to medium term rehabilitation plan
Medium	Inspect immediately and develop long term rehabilitation plan
Low	Develop short term inspection strategy and develop long term rehabilitation plan
Negligible	Develop long term inspection strategy

Risk ratings can also be thought of as priorities since they are only relevant to in the City of Pinconning. An extreme risk in one community could be a low risk in another depending on the overall condition of their infrastructure. Below is a simple correlation between risk rating and priority.

Figure 2 provides the risk rating for storm sewer pipes by number of pipe segments. Five pipe segments in the stormwater collection system have an extreme risk rating due to multiple cracks and fractures and are recommended to be lined. These pipes were located on Woodside west of Prairie, Borton west of Oak, and Hart south of Borton.



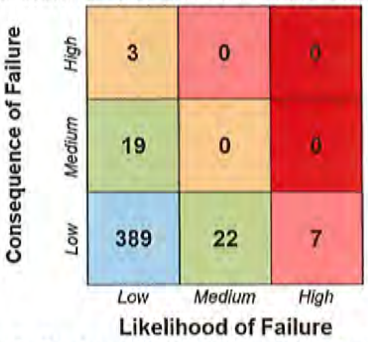
Consequence of Failure	Low	Medium	High
High	6	0	0
Medium	77	4	5
Low	286	5	21

Likelihood of Failure

Figure 2: Business Risk Matrix (Risk Rating) by

Number of Gravity Pipes

Figure 3 provides the risk rating for the storm sewer structures. No structures are identified as extreme risk.



Consequence of Failure	Low	Medium	High
High	3	0	0
Medium	19	0	0
Low	389	22	7

Likelihood of Failure

Figure 3: Business Risk Matrix (Risk Rating) by Number of Structures

A spreadsheet providing asset criticality for each utility asset is included in the AMP detailed report for the stormwater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's stormwater utility assets based on the Business Risk evaluation. From the BRE, a short-term (1-5 year CIP) and long-term (6-20-year CIP) were developed for the utility.Table 2 below summarizes the recommended improvements in the short-term CIP. Detailed asset identification, rehabilitation measures, and costs of the recommended short- and long-term capital improvements are provided in the AMP.

Table 2. 5-Year Capital Improvement Plan: Rehabilitation
Rehabilitation Action
Pipe Replacement
Pipe Lining
Pipe Point Repair
Pipe Point Repair and Line
Structure Replacement

OPERATIONS & MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short-term CIP. Detailed asset identification, rehabilitation measures, and costs of the recommended short- and long-term capital improvements are provided in the AMP.

Table 3. 5-Year Capital Improvement Plan: Maintenance
Maintenece Action
Structure Inspection
Structure Cleaning
Pipe CCTV and Cleaning

REVENUE STRUCTURE

The revenue that will be necessary for making the recommended capital improvements will have to be budgeted thru the City's local and major street funds, City general fund, and short- and long-term bonding programs

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The **City of Essexville** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1046-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SW AMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Sarah Wilcox	at	989-893-7192	cmanager@essexville.org
Name		Phone Number	Email

Sarah Wilcox
Signature of Authorized Representative (Original Signature Required)

12/23/19
Date

Ms. Sarah Wilcox – City Clerk
Print Name and Title of Authorized Representative

June 2014

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

City of Essexville

SAW Project No. 1046-01

ESSEXVILLE
Gateway To The Bay

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September of 2016, the City of Essexville received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1046-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Essexville's AMP is:
Daniel J. Hansford, City Manager
1107 Woodside Avenue Essexville, MI 48732
Phone number: (989) 893-7192
Email: cmanager@essexville.org

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the City's wastewater system, described further below, include:

- Collection system piping and structures
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 110,620 feet (20.95 miles) of sanitary sewers (gravity pipe and force mains) and 634 wastewater structures connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

There are 5 sanitary sewer lift stations located throughout the wastewater collection system. The stations are a combination of submersible style stations, one can station and a dry/wet well style station. The City of Essexville utilizes the West Bay County WWTP for wastewater treatment.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed-Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 100 Lift Station Assets and 1,310 Collection System Assets.

Information was obtained from record drawings, field notes, and staff knowledge.

Condition Assessment & Expected Useful Life

NASSCO-MACP structure field based assessments were completed on approximately 98% of the structures in the collection system. Pipeline cleaning and NASSCO-PACP CCTV field based assessments were also conducted on 82% of the gravity pipe.

The collection system pipe and structure assets were generally found to be in fair to good condition. Structural defects such as cracks, fractures, and offset pipe joints were identified. The structure assessments identified a number of structures with signs of infiltration of varying degree. Based on the assessments completed, recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. Maintenance recommendations include continuing to clean and televise the wastewater collection system. As additional assessments are completed they will be used to further evaluate structural and O&M defects in the system and refine the short and long term maintenance and capital improvement plan.

The condition of the assets at the lift stations range from fair to good. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems. The recommendations for short term and long term improvements are relatively extensive.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City of Essexville staff to develop the following LOS statement and goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the City of Essexville is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system capacity for all service areas.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of the regional treatment facility.
- Provide rapid and effective emergency response services to its customers.
- Ensure staff that maintains the system are properly certified.
- Regularly review with the Bay County Department of Water and Sewer its health and safety procedures in order to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score + Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

Lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

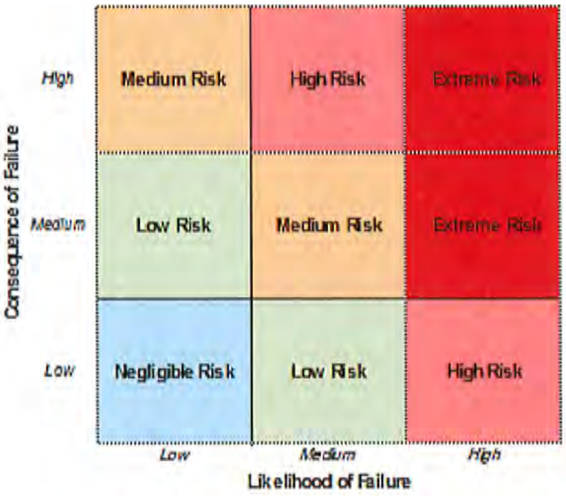
Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using an excel spreadsheet and a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Assets with the greatest consequence of failure and the greatest likelihood of failure will be assets that are the most critical. Assets with the highest business risk score are likely candidates for near-term rehabilitation and replacement. Assets with lower scores should be monitored and analyzed to develop the best life cycle strategy.

Over time as more of the wastewater collection system is assessed and re-assessed, the likelihood of failure scores will continue to develop.

A 3x3 Business Risk Matrix identifies the relative "Criticality" of each asset based on their CoF and LoF scores to establish a "Risk Rating" for each asset. Asset rating categories range from Negligible to Extreme criticality based on position within the matrix and are color coded to better identify significance. Upper and lower CoF and LoF score "boundaries" are set for each matrix box to establish the Risk Rating for each asset and place each asset in the proper rating category. Business Risk is depicted visually in the risk matrix shown in Figure 1, and the Business Risk of each asset determines the appropriate strategy for risk management as shown in Table 1.



Consequence of Failure	Low	Medium	High
High	Medium Risk	High Risk	Extreme Risk
Medium	Low Risk	Medium Risk	Extreme Risk
Low	Negligible Risk	Low Risk	High Risk

Likelihood of Failure

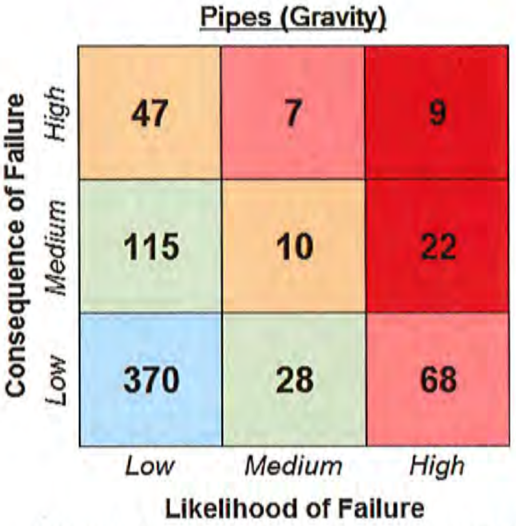
Figure 1. Business Risk Matrix (Risk Rating)

Table 1. Strategies for Asset Rehabilitation and Replacement	
Risk Rating	**Strategies for Asset Rehabilitation or Replacement**
Extreme	Inspect immediately and develop 1-2 year rehabilitation plan
High	Inspect immediately and develop short to medium term rehabilitation plan
Medium	Inspect immediately and develop long term rehabilitation plan
Low	Develop short term inspection strategy and develop long term rehabilitation plan
Negligible	Develop long term inspection strategy

Risk ratings can also be thought of as priorities since they are only relevant to the City of Essexville. An extreme risk in one community could be a low risk in another depending on the overall condition of their infrastructure. Below is a simple correlation between risk rating and priority.

Risk Rating	Priority
High / Extreme	Essential
Medium	Desirable
Low	Acceptable
Negligible	Deferrable

Figure 2 provides the risk rating for gravity and force main pipe by number of pipe segments. 31 pipe segments in the collection system have an extreme risk rating. It is recommended that 8 of these pipe segments have full lining, 9 have a point repair, and 14 are replaced. Recommendations for repairs due to a variety of defects are addressed in the detailed AMP. Much of the collection system's gravity pipes, 76 percent as shown in Figure 2, have a low to negligible risk rating and are indicative of pipes in relatively good condition.

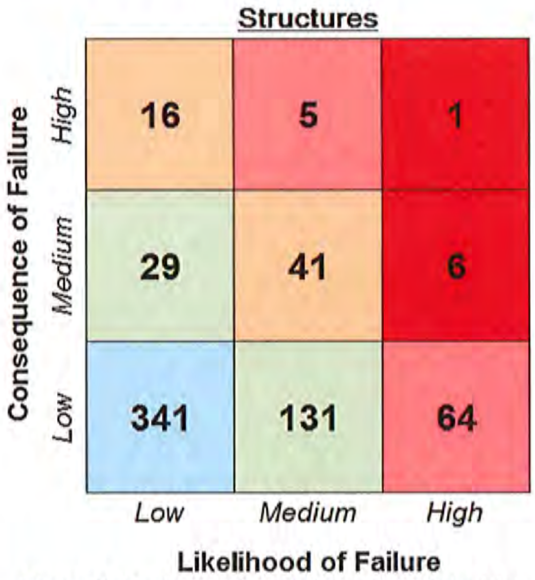


Pipes (Gravity)

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	47	7	9
Medium	115	10	22
Low	370	28	68

Figure 2. Business Risk Matric (Risk Rating) by Number of Gravity Pipes

Figure 3 provides the risk rating for the collection system structures. 7 structures are identified as extreme risk, and are recommended for replacement or repair. One is recommended for replacement due to being brick and having a broken bench. The remaining are recommended for repair due to a variety of defects, which are addressed in the detailed AMP. Many structures, 79 percent, are at low to negligible risk and are indicative of pipes or structures in relatively good condition.

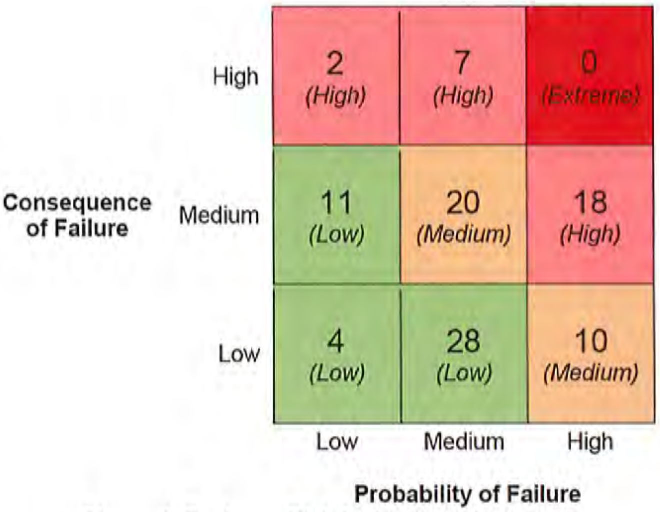


Structures

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	16	5	1
Medium	29	41	6
Low	341	131	64

Figure 3. Business Risk Matrix (Risk Rating) by Number of Structures

Figure 4 provides the risk ratings for the lift station assets. 0 assets are identified as extreme risk. The 27 assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure	Low	Medium	High
High	2 *(High)*	7 *(High)*	0 *(Extreme)*
Medium	11 *(Low)*	20 *(Medium)*	18 *(High)*
Low	4 *(Low)*	28 *(Low)*	10 *(Medium)*

Probability of Failure

Figure 4. Business Risk Matrix (Risk Rating) by Number of Lift Station Assets

A detailed spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection system, collection system structures and lift stations.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's wastewater collection utility assets based on the Business Risk evaluation which prioritized the capital improvement projects. The CIP consists of short-term (1-5 year) and long-term (6-20 year) improvements to address the needs of the utility.

Table 2 below summarizes the recommended improvements in the short-term CIP for the gravity system. Detailed asset identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 2. 5-Year Collection System Capital Improvement Plan Summary
Rehabilitation Action
Pipe Replacement
Pipe Lining
Pipe Point Repair
Manhole Replacement
Manhole Repair

Table 3 below summarizes the recommended improvements in the short-term CIP for lift stations. Detailed asset identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 3. 5-Year Lift Station Capital Improvement Plan Summary
Rehabilitation Action
Borton at Main Rehabilitation
Pipe Street Replacement
Main and Stormwater Short Term Improvements

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance, infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated, preserving the substantial investment the community has in its collection system.

A preventative maintenance program to systematically clean and assess pipelines to NASSCO-certified standards is critical for a sound wastewater collection system. The process of cleaning and CCTV assessment of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation and replacement. The City has been proactive in the maintenance of its infrastructure and the benefits of this preventative maintenance program are evident in the low risk ratings determined for the majority of the City's infrastructure. Once the entire system has been cleaned and televised, it is recommended that a maintenance schedule be set for future cleaning and televising. The required frequency of cleaning and televising over the next 20 years may depend on what is discovered in the initial assessment. The City may desire to clean and televise certain areas more than others

Table 4 below summarizes the recommended preventative maintenance in the short-term (1-5 years). Detailed asset identification, maintenance measures, and costs of the recommended preventative maintenance program are provided in the AMP.

Table 4. 5-Year Maintenance Summary
Maintenance Action
CCTV and Pipe Cleaning
Manhole Assessments

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by DPW staff without bringing in an outside contractor. Existing disposable materials include wear parts in pumps and motors associated with the pump stations. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

The rate methodology required by the MDEQ for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed by the City Manager and City Treasurer shows no revenue gap.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Essexville *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1046-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ms. Sarah Wilcox at (989) 893-7192 and at cmanager@essexville.org
Name Phone Number Email

Sarah Wilcox 12/23/19
Signature of Authorized Representative (Original Signature Required) Date

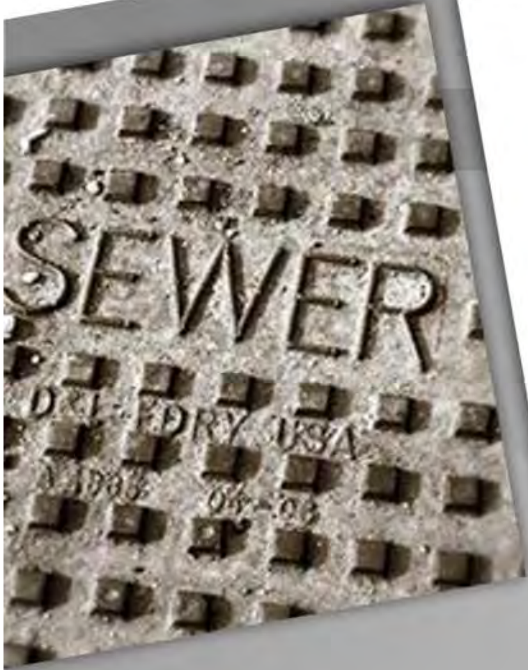
Sarah J. Wilcox City Clerk
Print Name and Title of Authorized Representative

April 2017

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

Davison Township

SAW Project No. 1052-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized funding for a Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In November 2016, Davison Township received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), previously the Department of Environmental Quality (DEQ), Project No. 1052-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Township's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Davison Township AMP is:
Tim W. Elkins, Supervisor
1280 N. Irish Road, Davison, MI 48423
Phone Number: 810.653.4156 x7601
Email: telkins@davisontwp-mi.org

MAJOR ASSET INVENTORY & CONDITION ASSESSMENT

Below is a list of the major assets in the Township's wastewater collection system identified in the AMP:

List of Major Assets

- Gravity Sewer (8" to 30" diameter)…….. 403,733 feet
- Force Main (1.25" to 12" diameter)……. 12,724 feet
- Manholes…………………………………. 1,699
- Pump (Lift) Stations……………………… 12

These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The Township's wastewater collection system discharges at various locations to the Genesee County Drain Commissioner – Water & Waste Services (GCDC-WWS) trunk sewer, which transports the wastewater to the County's wastewater treatment facility.

Asset Identification & Location

A comprehensive wastewater system asset inventory was developed from existing record drawings, field notes, staff knowledge, site visits, and field survey work. Asset material, size, and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Manhole and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new GIS database for efficient management of the collection system assets.

Condition Assessment & Expected Useful Life

NASSCO-MACP manhole field based assessments were completed on approximately 1381 manhole structures, which represents over 80% of the manholes in the collection system. Pipeline cleaning and NASSCO-PACP CCTV field based assessments were conducted on 68% of the gravity pipe.

The collection system pipe and manhole assets were generally found to be in good condition with only a few minor defects. Structural defects such as cracks, fractures, and offset pipe joints were limited. O&M defects such as encrustation, root balls, and infiltration were more prominent with a few areas being recommended for rehabilitation. The manhole assessments identified a number of structures with signs of infiltration of varying degree. Based on the assessments completed, recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. Maintenance recommendations include continuing to clean and televise the wastewater collection system. As additional assessments are completed they will be used to further evaluate structural and O&M defects in the system and refine the short and long term maintenance and capital improvement plan.

The condition of the assets at the pump stations were generally found to be in good condition. This is a result of regular maintenance and proactive rehabilitation and replacement of equipment.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

The overall objective of the Township is to provide reliable wastewater collection services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this, the following Level of Service (LOS) goals have been established:

LEVEL OF SERVICE STATEMENT

- Provide adequate collection system capacity for all service areas.
- Maintain capacity for community development and redevelopment.
- Comply with regulatory requirements.
- Provide for the health and safety of all employees and customers.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows.
- Provide rapid and effective emergency response services to customers.
- Regularly review projected O&M and capital expenditures.
- Maintain sound financial management to generate sufficient revenue and adequate financial reserves for O&M and capital improvements. Adjust user rates as necessary.
- Provide efficient operations to keep user costs as low as possible while maintaining level of service desired.
- Utilize GIS and CMMS software to provide efficient and sustainable management of the wastewater collection infrastructure.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Township from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors: 1) Likelihood (Probability) of Failure, and 2) Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utility's ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset

The pump station categories for CoF are:

- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

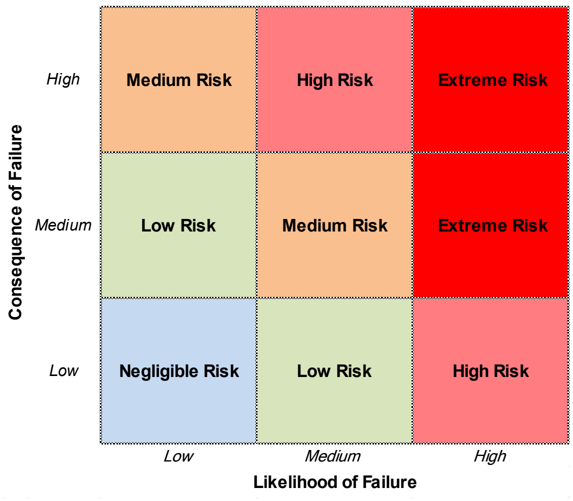
Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and aids in developing a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Assets with the greatest consequence of failure and the greatest likelihood of failure will be assets that are the most critical. Assets with the highest business risk score are likely candidates for near-term rehabilitation and replacement. Assets with lower scores should be monitored and analyzed to develop the best life cycle strategy.

Over time as more of the wastewater collection system is assessed and re-assessed, the likelihood of failure scores will continue to develop.

A 3x3 Business Risk Matrix identifies the relative “Criticality” of each asset based on their CoF and LoF scores to establish a “Risk Rating” for each asset. Asset rating categories range from *Negligible* to *Extreme* criticality based on position within the matrix and are color coded to better identify significance. Upper and lower CoF and LoF score “boundaries” are set for each matrix box to establish the Risk Rating for each asset and place each asset in the proper rating category. Business Risk is depicted visually in the risk matrix shown in Figure 1, and the Business Risk of each asset determines the appropriate strategy for risk management as shown in Table 1.



Consequence of Failure	*Low*	*Medium*	*High*
High	**Medium Risk**	**High Risk**	**Extreme Risk**
Medium	**Low Risk**	**Medium Risk**	**Extreme Risk**
Low	**Negligible Risk**	**Low Risk**	**High Risk**

Likelihood of Failure

Figure 1. Business Risk Matrix (Risk Rating)

Table 1. Strategies for Asset Rehabilitation and Replacement

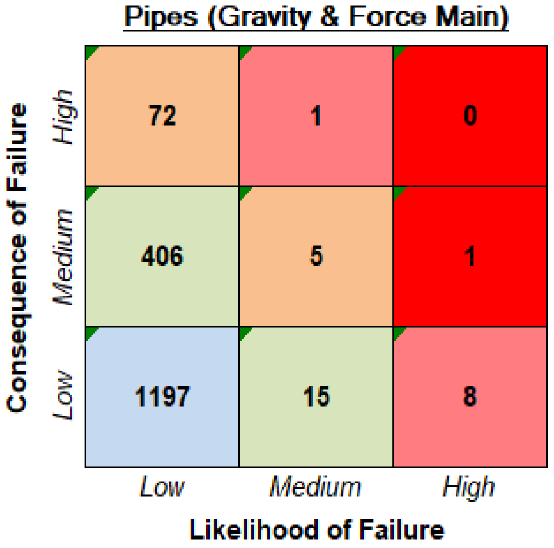
Risk Rating	**Strategies for Asset Rehabilitation or Replacement**
Extreme	Inspect immediately and develop 1-2 year rehabilitation plan
High	Inspect immediately and develop short to medium term rehabilitation plan
Medium	Inspect immediately and develop long term rehabilitation plan
Low	Develop short term inspection strategy and develop long term rehabilitation plan
Negligible	Develop long term inspection strategy

Risk ratings can also be thought of as priorities since they are only relevant to Davison Township. An extreme risk in one community could be a low risk in another depending on the overall condition of their infrastructure. Below is a simple correlation between risk rating and priority.

Risk Rating	**Priority**
High / Extreme	Essential
Medium	Desirable
Low	Acceptable
Negligible	Deferrable

Figure 2 below provides the risk rating for gravity and force main pipe in Davison Township by number of pipe segments. Pipes not televised and assessed use only age and material as a preliminary likelihood of failure score since the condition of the pipe is unknown. Most of these pipes received an initial risk rating of negligible based on their remaining service life and the known condition of other pipes in the collection system. This risk rating will be further evaluated as more pipe segments are cleaned and assessed.

The majority of the pipes have a low or negligible risk rating and are indicative of pipes in relatively good condition. The few pipe segments with a high or extreme risk rating are recommended for rehabilitation in the short term.

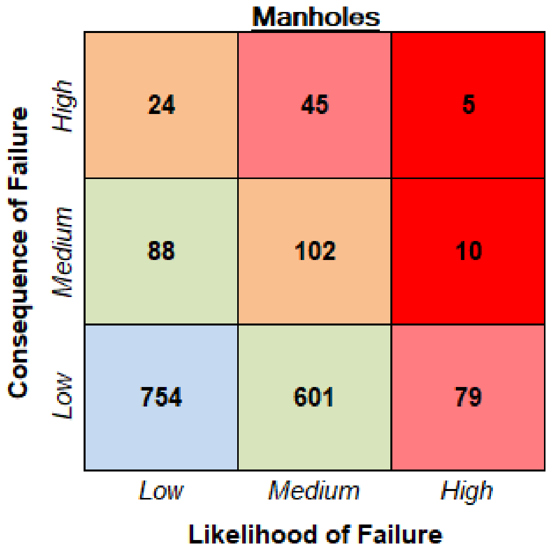


Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	72	1	0
Medium	406	5	1
Low	1197	15	8
	Likelihood of Failure		

Figure 2. Business Risk Matric (Risk Rating)
By Number of Gravity and Force Main Pipes

Figure 3 provides the risk rating for the collection system manholes in Davison Township. The majority of the manholes have a medium, low, or negligible risk rating and are indicative of manholes in relatively good condition. The manholes identified as high and extreme risk primarily showed signs of infiltration and are recommended to be further evaluated for consideration of rehabilitation in the short term.



Manholes

Consequence of Failure	Low	Medium	High
High	24	45	5
Medium	88	102	10
Low	754	601	79
	Likelihood of Failure		

Figure 3. Business Risk Matrix (Risk Rating)
By Number of Manholes

The Township's pump station major assets (pumps, control panel, etc.) were determined to have a low to medium risk rating and are in good condition as a result of regular maintenance and proactive rehabilitation and replacement of equipment.

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the wastewater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Township's wastewater collection utility assets based on the Business Risk evaluation which prioritized the capital improvement projects. The CIP consists of short-term (1-5 year) and long-term (6-20 year) improvements to address the needs of the utility.

Table 2 below summarizes the recommended improvements in the short-term CIP. Detailed asset identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 2. 5-Year Capital Improvement Plan Summary

Rehabilitation Action
Pipe Lining
Pipe Point Repair
Manhole Lining and Repairs

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance, infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated, preserving the substantial investment the community has in its collection system.

A preventative maintenance program to systematically clean and assess pipelines to NASSCO-certified standards is critical for a sound wastewater collection system. The process of cleaning and CCTV assessment of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation and replacement. The Township has initiated a program where approximately 20% of the system is cleaned and televised annually. The benefits of this preventative maintenance program are evident in the low risk ratings determined for the majority of the Township's infrastructure. Once the entire system has been cleaned and televised, it is recommended that a maintenance schedule be set for future cleaning and televising. The required frequency of cleaning and televising over the next 20 years may depend on what is discovered in the initial assessment. The Township may desire to clean and televise certain areas more than others.

Table 3 below summarizes the recommended preventative maintenance in the short-term (1-5 years). Detailed asset identification, maintenance measures, and costs of the recommended preventative maintenance program are provided in the AMP.

Table 3. 5-Year Maintenance Summary

Maintenance Action
CCTV and Pipe Cleaning
Manhole Assessments
Manhole Cleaning

An annual equipment replacement fund should be maintained to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds. Existing disposable materials include wear parts in pumps and motors associated with the pump stations. The Township's existing OM&R fund is sufficient for the current OM&R needs.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs. A rate methodology dated July 26, 2019 was completed and it was determined that the existing rates provide sufficient funds for the day-to-day maintenance and operations of the wastewater system. EGLE reviewed the information contained in the rate methodology and determined in a letter dated October 14, 2019 that significant progress has been made toward achieving the funding structure necessary to implement the program.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Township of Davison *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1052-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No
   If No - Date of the rate methodology approval letter: October 14, 2019
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jeremy Smith	at 810.653.4156	jsmith@davisontwp-mi.org
Name	Phone Number	Email

Jeremy Smith — 1-9-2020
Signature of Authorized Representative (Original Signature Required) — Date

Jeremy Smith, Planning/Zoning Administrator
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 18, 2019
(no later than 3 years from executed grant date)

The Marquette County *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1057-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 28, 2019.
2) Significant Progress Made[redacted]o [✓ NA]
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: [redacted].
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Scott Erbisch at 906-225-8151 serbisch@mqtco.org
Name Phone Number Email

11/13/2020
Signature of Authorized Representative (Original Signature Required) Date

Scott Erbisch, County Administrator
Print Name and Title of Authorized Representative

Marquette County - SAWYER
SAW Grant Asset Management Project
Asset Management Plan Summary

Marquette County - Sawyer
SAW Grant Asset Management Plan
Grant No. 1057-01
Duane DuRay, Director of Operations
125 G Avenue
Gwinn, Michigan 49841
906.346.3308 x221

Executive Summary

This Sanitary Sewer Asset Management Plan (AMP) is intended to provide an assessment of routine maintenance staffing requirements, and to provide an opinion of asset conditions and future needs. Operating, maintenance, and replacement costs are reviewed for all system assets, to provide a defined level of service for the utility.

The goal of an asset management plan is to use system-wide information to determine the lowest life cycle cost for maintenance, repair, and replacements to maintain that level of service. By performing pre-emptive maintenance on the system, and timing repairs before they become emergencies, Sawyer can make the most of their funds over the long term.

A summary of the sanitary sewer system assets is listed in Table 1.1 below:

Table 1.1: Sanitary Sewer System Asset Summary

Total Sanitary Gravity Sewer	111,588	LFT
Total Forcemain Piping	21,939	LFT
Total Forcemain Structures	12	EACH
Total Cleanout Manholes	12	EACH
Total Manholes	455	EACH
Active Submersible Lift Stations	10	EACH
Inactive Submersible Lift Stations	6	EACH
Active Non-submersible Lift Stations	2	EACH
Inactive Non-submersible Lift Stations	0	EACH
On-Site Treatment Systems		EACH
Inactive Wastewater Treatment Lagoon	0.37	ACRE-FEET
Wastewater Treatment Lagoon Structures		EACH
Inactive Wastewater Treatment Lagoon Piping	755	LFT

The County's sanitary sewer gravity main system was installed in 1960 and is comprised of 4-inch, 6-inch, 8-inch, 10-inch, and 12-inch diameters that are either polyvinyl chloride (PVC), ductile iron pipe (D.I.), vitrified clay pipe (VCP), concrete pipe (non-reinforced) (CP), reinforced concrete pipe (RCP), and asbestos cement (AC).

As part of the sanitary sewer system study, a risk assessment was performed for each of the system assets. This risk assessment was completed using a combination of the asset's condition, criticality, and consequence of failure. This number will vary between 1 and 5 with 1 being a minor defect grade and 5 being the most significant defect grade. The resulting condition rating allows Sawyer to prioritize those items where both condition and consequence make it expedient to perform proactive maintenance of the asset. Condition assessments were performed where possible by manual and televising inspections and ratings were performed. For those assets which were not televised or not reachable from the surface, assessments of probable condition were made based on material, age, and history of the asset, or assigned the same ratings as adjacent assets that could be assessed.

Table 1.2 summarizes the condition range of system assets:

Table 1.2: Condition Ratings - System Assets

Asset Type	Rated Condition				
	1	2	3	4	5
Sanitary Gravity Sewer (LFT)	24,530	19,190	14,001	46,827	7,040
Forcemain (LFT)	N/A	889	1,430	19,620	N/A
Manholes	N/A	124	247	64	10
Forcemain Structures	N/A	2	8	2	N/A
Active Lift Stations	N/A	1	9	2	N/A
Inactive Lift Stations	N/A	N/A	1	2	3
On-Site Treatment Systems					
Wastewater Treatment Lagoon					
Wastewater Treatment Lagoon Structures					
Inactive Wastewater Treatment Lagoon Piping	N/A	N/A	N/A	755	N/A

As the table above shows, the majority of Sawyer's sewer system assets are in average to below average condition. Assets that have been rated at 4 and above will be the focus of Sawyer over the next 20 years to address and included in the County's 20-year Capital Improvements Plan.

Wastewater Asset Inventory

A system-wide inventory and condition assessment of most of the components of Sawyer's Sanitary Sewer System was conducted to gather information on the assets of the system. These assets are broken down into seven (7) categories: manholes, pipes, forcemain, active lift stations, inactive lift stations, a wastewater stabilization lagoon, and onsite treatment system. The inventory and condition assessments were performed through multiple methods, including Level 1 Manhole Assessment and Certification Program (MACP) inspection, Level 1 Manhole Assessment and Certification Program (MACP) inspection, visual inspections, and historic record evaluation. Records research was performed on existing drawings to get a general idea of system layout and asset locations, and manual surveys were performed on each of the visible assets as feasible.

Table 1.3 below is a summary of the condition ratings that were used for all assets. After the asset was evaluated a condition rating was assigned to each asset. The Asset Inventory Tables: Table B-1: Sanitary Sewer Manhole Inventory, Table B-2: Sanitary Gravity Sewer Inventory, Table B-3: Sanitary Sewer Lift Station Inventory, Table B-4: Sanitary Forcemain Pipe Inventory, Table B-5: Lift Station Forcemain Structure Inventory are enclosed with this summary include the condition ratings that were assigned to each asset.

Table 1.3: Condition Assessment Ratings

Condition Rating	Description
5	Asset Unserviceable - Over 50% of asset requires replacement
4	Significant deterioration - Significant renewal/upgrade required (20 -40%)
3	Moderate deterioration - Significant maintenance required (10 -20%)
2	Minor Deterioration - Minor maintenance required (5%)
1	New or Excellent Condition - Only normal maintenance required

Criticality of Assets

Sawyer's Sewer System was evaluated, and a criticality rating was given to all sections of the system. The Criticality Ratings are based on a scale of 1 to 5, with 5 being the most critical. High criticality indicates that the system component is essential to the operation of the system and/or serves a critical customer or part of the system. Low criticality ratings indicate that the system component would cause minor disruptions if something were to happen and service was interrupted.

Table 1.4 Criticality of Asset description:

Table 1.4: Criticality of Asset	
Performance Rating	Description
5	Catastrophic disruption
4	Major disruption
3	Moderate disruption
2	Minor disruption
1	Insignificant disruption

The most critical sections of Sawyer's system are its Lift Stations, Forcemain piping, and wastewater treatment systems as disruptions to these components typically are more expensive and difficult to repair, and failures could result in permit violations. The main collector sewer lines located on the downstream sections of the system, and sewer mains serving larger commercial customers also have a higher criticality rating. As you progress from the farther outstretches of the system towards the main collectors, there is typically more wastewater flow due to large portions of the system draining to these areas. Therefore, a disruption to sewer mains in these areas are likely to cause more significant disruptions and affect more customers. Areas of this system that were rated with lower criticality ratings are typically located on the outer edges and serve fewer customers and disruptions to these areas would affect less people.

Level of Service Determination

The minimum level of service for Sawyer's Sanitary Sewer System has been set at being able to provide functional wastewater collection for flows from the Township's residents without disruption, overflow, discharge events, or violations of standard wastewater collection treatment practices. Potential violations include sewer backups that cause wastewater to either come to surface or to back up into individual service lines and basements. In order to prevent sewer backups, Sawyer must maintain their lines in a minimum condition by repairing collapsed pipes, jetting and cleaning lines that pose additional risk due to sizing, slope, or condition concerns. In addition, lift stations must be kept operational and be capable of pumping the necessary flows to avoid backups. Proper provisions for backup power or bypass pumping must be maintained to avoid backups during extensive power outages. Sawyer must also provide functional wastewater treatment for flows in the sewer system without disruption, overflow or discharge events, or violations of any terms of their wastewater treatment permits. Violations of treatment permit requirements include, but not limited to violations of constituent parameters tested at the monitoring wells and violations of discharge volumes as outlined in their NPDES Permits.

Revenue Structure

The County's current sanitary sewer rate as of August 2019 is a minimum monthly fee of $12.40 per month (includes 1000 gallons) and usage over 1000 gallons (per 1000 gallons) of $12.40.

As can be seen by the County’s current budget and past audits, the Sewer Fund Rates have been sufficient to cover the costs of operating and maintaining their sewer system and to cover the current bond debt. The County typically increases the sanitary sewer rates by 3% annually to account for inflation.

Table 1.5: Annual User Revenue Calculations

Established EDU Rate ➔		**4000 gal/month**			
Proposed Customer Info - Users					
Customer Type	*Users*	*EDU's*			
Residential	1156	1156			
Other	63	522			
	1219	**1678**			
Existing Rate Structure	*Monthly Rate*	*EDU's*	*Monthly Gallons*	*Monthly Revenue*	*Annual Revenue*
Residential	$ 49.60	1156	3,601,988	$ 57,337.60	$ 688,100
Commercial	$ 49.60	522	2,088,398	$ 25,896.14	$ 310,800
	Totals ➔	**1678**	**5,690,386**	**$ 83,233.74**	**$ 998,900**

Capital Improvements Plan

The improvements listed above are suggested likely repairs or replacements that may be required to the County’s Sanitary Sewer System. More detailed cost estimates for each of these improvements can be found in Appendix D. Table 1.6 below provides a summary of the improvements planned for 2020-2029 and 2030-2039.

This table is a summary of the capital improvements that Sawyer should plan to complete over the next 20 years:

Table 1.6: Capital Improvements Summary

10-Year Capital Improvements Summary	
Location	Estimated Construction Cost
Lift Station Replacement	$ 400,600
Sawyer Onsite Treatment System Improvements	$ 2,000,000
1-10 Year Total ➔	**$ 2,400,600**
20-Year Capital Improvements Summary	
Location	Estimated Construction Cost
Manhole Replacement	$ 800,000
Sewer Main Replacement	$ 7,000,000
11-20 Year Total ➔	**$ 7,800,000**
Total ➔	**$ 10,200,600**

Summary and Recommendations

In general, the County's Sanitary Sewer System is in poor condition. Sixty-one percent (61%) of the gravity sewer pipe is below average to average condition, and 72% of the sanitary sewer manholes in below average to average condition. The wastewater treatment plant is in good condition and functioning properly with repairs on some of the structures being recommended for replacement or improvements. The sanitary sewer lift station and forcemains are in poor condition with 72% of the forcemain sewer being in below average to average condition. The 20-Year Capital Improvements plan detailed in Section 6.4 identifies $10,200,000 in system improvements recommended to be completed by the County over the next 20 years.

It is recommended the County review past and future expenses when examining potential rate increases to determine if they are sufficient to meet the expected future expenditures.

This Asset Management Plan should be considered a working plan and updated annually to reflect changes in the County's Sewer System, rate structures, budgets, or other facets of the plan.

List of Major Assets

See the following enclosed tables for a list of the County's major assets:

- Table B-1: Sanitary Sewer Manhole Inventory
- Table B-2: Sanitary Gravity Sewer Inventory
- Table B-3: Sanitary Sewer Lift Station Inventory
- Table B-4: Sanitary Forcemain Pipe Inventory
- Table B-5: Lift Station Forcemain Structure Inventory

TETRA TECH

710 Avis Drive, Ann Arbor, MI 48108
Telephone: 734.665.6000

TRANSMITTAL

Date: December 20, 2019

To: Eric Pocan
Water Infrastructure Financing Section
Department of Environment, Great Lakes, and Energy
P.O. Box 30817
Lansing, MI 48909-8311

Re: City of Richmond, Michigan
SAW Grant No. 1069-01
SAW Grant Certification of Project Completeness

Project No.: 200-12751-14003

We are enclosing: SAW Grant Certification of Project Completeness and AMP Executive Summary

Remarks: On behalf of the City of Richmond, Tetra Tech is submitting the enclosed signed SAW Grant Certification of Project Completeness and AMP Executive Summary. The submittal of the form fulfills the terms of SAW Grant No. 1069-01.

If you have any questions or comments, please contact me at 734-213-5016 or Jonathan Moore with the City of Richmond at 586-727-7571.

copy:
Jonathan Moore, City of Richmond
James Goetzinger, City of Richmond
Kenneth Kingsley, Tetra Tech

Krista M. Takacs
Krista M. Takacs, P.E.

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Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019

The City of Richmond certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1069-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No

   If No - Date of the rate methodology approval letter: October 7, 2019.

2) Significant Progress Made: Not Applicable

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: Not Applicable.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on Not Applicable.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jonathan P. Moore at 586-727-7571 jmoore@cityofrichmond.net

Name Phone Number Email

Jonathan P. Moore 12/19/19

Signature of Authorized Representative (Original Signature Required) Date

Jon Moore, City Manager

Print Name and Title of Authorized Representative

City of Richmond
36725 Division Road
Richmond, MI 48062
cityofrichmond.net
Jonathan Moore, 586-727-7571
SAW Grant No. 1069-01

EXECUTIVE SUMMARY

Introduction

The City of Richmond is located in the northeast corner of Macomb County with the eastern most portion of the City extending into St. Clair County. The city is adjacent to Richmond Township and Lenox Township in Macomb County, although it is administratively autonomous. It is also adjacent to St. Clair County's Columbus Township and Casco Township.The City is defined by approximately 2.9 square miles of land and has a population of 5,789 (SEMCOG, July 2019). Wastewater collection and treatment service is provided to properties west of County Line Road, within the City limits. The City serves approximately 2,800 sewer customers, including residential units and commercial businesses. There are six pump stations within the service area, as follows:

- Swan Creek Pump Station
- Division Road Pump Station
- Rosewood Pump Station
- Richwood Pump Station
- Heritage Drive Pump Station
- Kmart Pump Station

The wastewater is treated at the Richmond Wastewater Treatment Plant located south of the City, north of 31 Mile Road and west of South Forest Road. A wet weather pump station is located at the WWTP.

In 2016, the City of Richmond was awarded Stormwater, Asset Management, and Wastewater (SAW) Grant No. 1069-01 by the Michigan Department of Environmental Quality (MDEQ), which is now the Michigan Department of Environment, Great Lakes, and Energy (EGLE), to develop an Asset Management Plan (AMP) for the sanitary sewer system and wastewater treatment plant (WWTP). The grant amount was $454,739 with a local match of $50,527, for a total cost of $505,266. The grant allows reimbursements to be requested for expenses incurred between January 2, 2013 and December 31, 2019.

As a condition of accepting the SAW Grant, the City has agreed that AMP requirements will be incorporated into the WWTP's National Pollutant Discharge Elimination System (NPDES) Permit upon reissuance. NPDES Permit No. MI0023906 for the Richmond WWTP went into effect on November 1, 2017 and expires on October 1, 2022. Tetra Tech was engaged by Richmond to prepare an AMP for the sanitary collection system, WWTP, and pump stations. This AMP report includes information on the assets owned and operated by the City.

Organization

Five primary elements are highlighted by the AMP approach:

1. Asset Inventory
2. Level of Service
3. Asset Criticality
4. Revenue Structure
5. Capital Improvement Plan

The following sections provide an overview of these five elements.

Asset Inventory

The asset inventory develops a list of assets that the City owns, so that the costs associated with the asset can be tracked. Linear assets (sewer collection system) and vertical assets (pump stations and WWTP) were evaluated as part of this AMP. These two elements of the system were inventoried separately due to the difference in organizing the information in the inventories.

The collection system asset group has three subsets: manholes, gravity sewers, and force mains. The WWTP inventory has been grouped by building for non-process components. The process components have been grouped by treatment process (i.e., Aeration Rotors are located in the Oxidation Ditches). The pump stations contain assets similar to the WWTP.

Inspection of the entire collection system was not deemed cost effective, so areas with the oldest sewers were targeted for televising. The City performed CCTV inspections on approximately 25% of the gravity mains in the system, covering 164 unique pipe reaches totaling approximately 36,864 feet of pipe. In addition, 623 manholes were inspected. National Association of Sewer Service Companies (NASSCO) scores for the sewers and manholes were developed. The six force mains in the City of Richmond discharge flow from the six sanitary sewer pump stations to various points in the gravity sewer system.

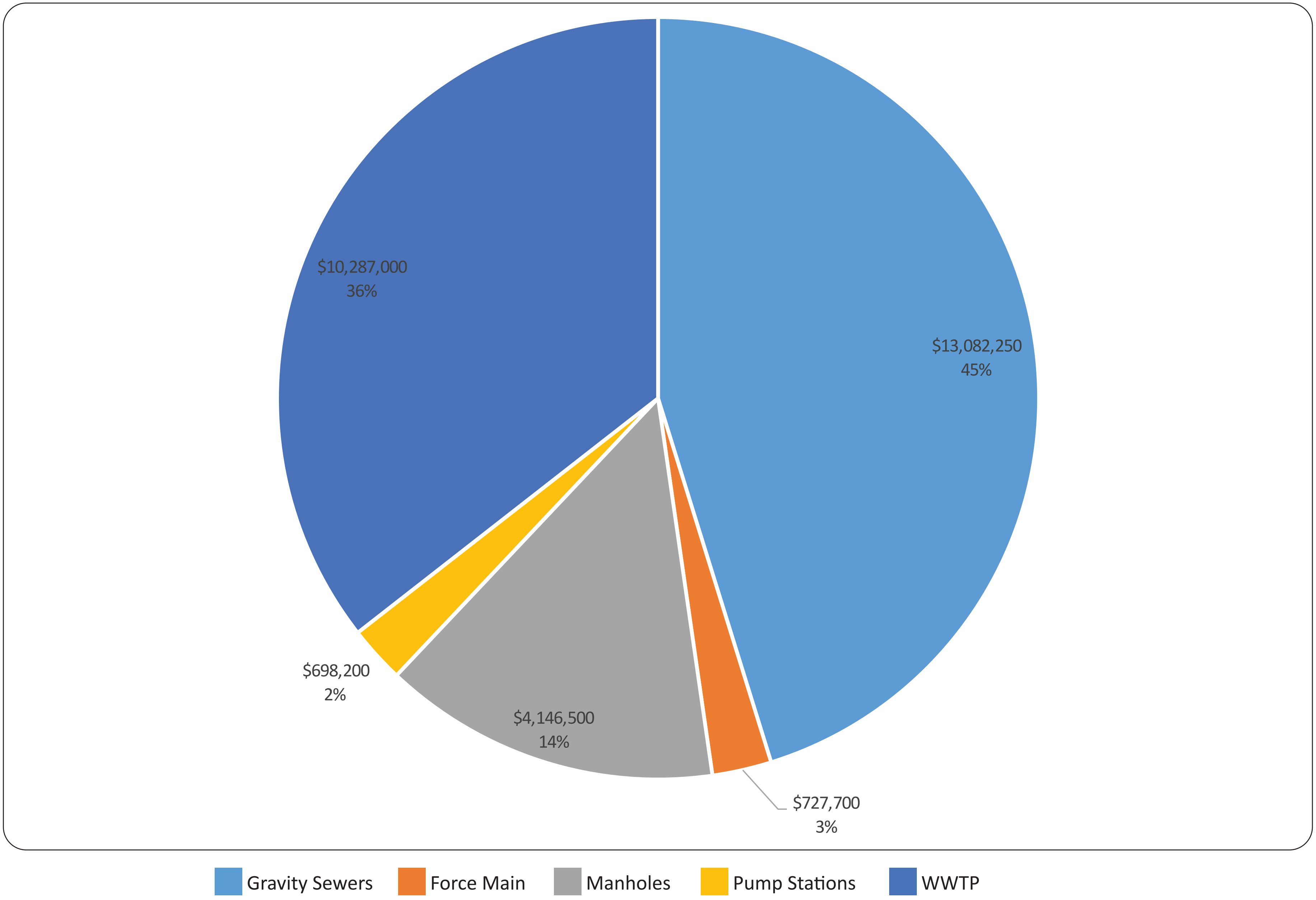
The City of Richmond’s six pump stations and WWTP were inventoried by Tetra Tech using a discipline-based approach. That is, a team was selected comprised of electrical, mechanical, and process engineers. Tetra Tech performed a condition assessment of the pump stations and WWTP by visually inspecting all visible assets.

At the WWTP, all large equipment was included in the analysis including pumps, blowers, and other equipment. All gates were included as individual assets. The Operations and Maintenance Manual and WWTP drawings were consulted to enter the installation date of the equipment, size information, manufacturer, and motor information. The anticipated useful life of the equipment was entered, and replacement costs were developed.

The replacement value for the City of Richmond wastewater system is over $28 million. Figure ES-1 summarizes the replacement value for the wastewater collection and treatment system within the City of Richmond limits.

Figure ES-1

Total Replacement Cost for Wastewater Collection System and Treatment Plant Assets



Level of Service

The Level of Service is a measure of the performance of a system with respect to stated goals/targets for system operation. The City has not experienced sewer backups or surcharging within the sanitary sewer system.

The City's goals for the AMP are to continue operating the collection system without overflows and basement backups. The City also has an exemplary track record of meeting NPDES permit limits for the WWTP. Continuing to meet the permit limits is also a goal of the City. The Level of Service goals are listed in Table ES-1.

Table ES-*Error! No text of specified style in document.****-1.*** Sanitary Sewer System Current Level of Service

Level of Service Key Performance Indicators
Proposed
No basement backups
Reduce infiltration rates and volumes
Capacity to convey EGLE design storm
No odor complaints
Meet requirements of NPDES permit

In general, the City's collection system is meeting the proposed indicators. Therefore, the City can focus primarily on rehabilitating infrastructure based on need with no new infrastructure required to improve service. The WWTP consistently meets the NPDES permit requirements with no odor complaints. Therefore, the wastewater treatment system is also considered to be operating at level of service goals.

The SAW grant helped the City convert the collection system information using the ESRI® ArcGIS software. Asset lists and maps were given to the City of Richmond that they plan to use to keep track of current and future projects for their system. Any collection system assets inspected were assigned a condition rating and criticality assessment, which were entered into the ArcGIS system

Asset information for the pump stations and WWTP will be tracked using logs and spreadsheets.

Asset Criticality

Criticality of assets is used to prioritize future improvements so that funds are spent wisely. Criticality is measured by use of a numerical score called the Business Risk Exposure (BRE). The BRE for each asset was calculated using the following formula:

Business Risk Exposure = Consequence of Failure * Probability of Failure

The Consequence of Failure (CoF) is based on the consequence to the utility, public, and environment of the asset failing. In addition, it takes into consideration the level of redundancy provided for a given set of assets. If redundancy is provided, then the consequence of failure for one of the units is less than if it is the only unit performing that function in the wastewater system. Numerical scores were assigned to each asset based on these factors.

The Probability of Failure (PoF) is based on the condition of the asset. For this project, the age of the asset was identified and evaluated with additional information, such as staff observations and field condition analysis.

A BRE score was calculated for each asset. These BRE scores, combined with City and Tetra Tech staff experience, were used to develop a capital improvement plan (CIP).

Revenue Structure

The City of Richmond completed a revenue structure report that demonstrated the City's rates generated sufficient revenue to fund the operation, maintenance, and replacement (OM&R) of the sanitary sewer collection system, pump stations, and WWTP. This report was approved by EGLE in October 2019.

Capital Improvement Plan

As part of this AMP, a 20-year CIP was developed. The CIP projects are shown in Table ES-2. The project numbers are designated either as CS, indicating the project is part of the sanitary collection system or WWTP, indicating the project is at the WWTP. The pump stations are currently in good condition and will continue to be maintained. Most pump station maintenance activities will be completed under the operation and maintenance budget. The first two digits in the project number indicate the calendar year when the project is scheduled to occur. The number following the dash is the project number in that calendar year. For example, CS 20-1 is the first collection system project anticipated to occur in 2020. A brief description of the project can be found in the second column. The project year represents the calendar year when the project is anticipated to occur. The project costs, in the fourth column, are all shown at an ENR index value of 11,293 from December 2019.

Table ES-2. Capital Improvement Plan

Project No.	Description	Project Year	Project Cost
CS 20-1	Grade 5 Sewer Repairs	2020-2024	$585,000
WWTP 20-1	Grit Dewatering System Replacement	2020	$100,000
WWTP 20-2	WAS Pump Replacement	2020	$24,000
WWTP 20-3	Thickened Sludge Pumps Replacement	2020	$43,000
WWTP 20-4	Chlorination System – Sodium Hypochlorite	2020	$35,000
WWTP 24-1	Raw Influent Pumps Replacement	2024	$342,000
WWTP 24-2	RAS Pumps Replacement	2024	$150,000
WWTP 24-3	Facility Power Distribution Upgrades	2024	$75,000
CS 25-1	Grade 4 Sewer Repairs	2025-2030	$1,226,000
WWTP 29-1	Service Building Pump Room Assets	2029	$253,000
WWTP 29-2	Grit Tank Rehabilitation	2029	$148,000
WWTP 29-3	Oxidation Ditch No. 1 Rehabilitation	2029	$363,000
WWTP 30-1	WWTP Diesel Generator Replacement	2030	$140,000
WWTP 34-1	Oxidation Ditch No. 2 Rehabilitation	2034	$363,000
WWTP 34-2	Final Settling Tank Sludge Mechanisms Replacement	2034	$167,000
CS 35-1	Grove Submain	2035	$385,000
WWTP 35-1	Wet Weather Pump Station Electrical Assets	2035	$127,000
WWTP 35-2	Wet Weather Pump Station Generator Replacement	2035	$142,000
WWTP 39-1	Final Settling Tanks Rehabilitation	2039	$214,000
WWTP 39-2	Pre-thickener Holding Tank Mixer	2039	$89,000
WWTP 39-3	Sludge Tank Blowers	2039	$270,000
	Total Cost of Projects in First Five Years	**2020-2024**	**$1,354,000**
	Total		**$5,241,000**

List of Major Assets

The collection system contains the following assets:

- 162,757 feet of gravity mains
- 4,544 feet of force main
- 623 manholes

The pump stations assets are organized by location, as follows:

- Swan Creek Pump Station
- Division Road Pump Station
- Rosewood Pump Station
- Richwood Pump Station
- Heritage Drive Pump Station
- Kmart Pump Station

WWTP assets are organized by building or treatment process. The buildings or tanks included in the inventory are designated as follows:

- Wet Weather Pump Station (Located at the WWTP)
- Administration Building
- Influent Pump Station
- Grit and Screen Building
- Service Building
- Oxidation Ditches
- Final Settling Tanks
- Return Sludge Pump Station
- Chlorine Contact Tanks
- Sludge Building
- Sludge Holding Tanks
- Solids Drying Beds

EGLE

MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Department of Environmental, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 11/07/2019
(no later than 3 years from executed grant date)

The City of Stephenson *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1077-1 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: 11/05/2019

2) Significant Progress Made: Yes or No N/A

   (The EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: N/A.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on N/A.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the EGLE or the public upon request by contacting:

City of Stephenson	at	(906) 753-6228	cosclerk@stephenson-mi.com
Name		Phone Number	Email

Connie Westrich — 11/7/2019

Signature of Authorized Representative (Original Signature Required) — Date

Connie Westrich, City Mayor

Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)

Asset Management Plan Executive Summary

SAW Grant No. 1077-01

City of Stephenson
W628 Samuel Street
Stephenson, MI 49887
Connie Westrich, City Mayor
(906) 753-6228

Executive Summary

City of Stephenson was awarded the SAW Grant in 2016. The City of Stephenson System consists of sewer collection mains, one siphon, one treatment facility and maintenance equipment. Maintenance is performed by the City of Stephenson Waste Water Treatment Plant Operators & the Department of Public Works personnel. The City of Stephenson was established in 1898, but did not become a home rule city until 1969. Some of the existing sewer collection system is around 100 years old. The bulk of the existing system was constructed as a combined sewer/storm collection system discharging directly to the Little Cedar River prior to development of wastewater treatment facilities.

Standard operation and maintenance efforts have been made to improve the sanitary sewer collection & treatment systems and to reduce inflow and infiltration (I&I) into the City of Stephenson sewer collection system. However, due to the age & construction of the system, there is continual I&I from ground water levels, and building drain connections, into the sewer collection system.

This SAW Grant includes compiling an inventory of all sewer system assets and developing an Asset Management Plan (AMP) and developing a Geographical Information System (GIS). The AMP provides proposed 20-year capital improvements, maintenance recording platform, system replacement budgeting, and financial budget planning.

The City of Stephenson sewer system consists of approximately 34,000’ of sewer main and 145 man holes. Sewer mains that were not previously televised in the last 15 years and were older than 20 years of age were televised. All manholes were televised within the system. All manholes were surveyed and this survey data was used to create the master mapping. All of this information was gathered and put into ESRI mapping/GIS system.

The final project total was $230,906.57, of which $207,815.91 was grant and $23,090.66 was local share.

Wastewater and/or Stormwater Asset Inventory

The system components included in the asset management include the 34,000’ of sanitary sewer, 145 man holes, and the treatment facility. It also includes the sewer maintenance equipment owned and operated by the City of Stephenson DPW. All system components locations were gathered in the field using topographic surveying methods. That information was then imported into the GIS mapping system to compile a complete map of the sanitary sewer. Pipeline televising and manhole inspection information is linked to the various components in the master sewer system GIS program.

The GIS mapping system is then linked to the Asset Management database, a program developed by UPEA to meet the specific needs of the City of Stephenson. The program is easily updated and modified by City of Stephenson staff when changes are made within the system. The database also includes budget information, replacement plans, capital improvement plans, and maintenance plans.

Condition Assessment

The condition assessment was completed by applying the condition rating per the PACP/ MACP standard pipeline reviewing protocol for coding defects and construction features. This information was sufficient to assess the condition of the system components. Analysis was then performed on the location and criticality of the components so a failure criticality rating could be designated for each component. Overall the system is in fair condition with the following percentages of component conditions; good (45%), fair (35%) and poor (20%).

Level of Service Determination

The City of Stephenson desires to meet all EGLE requirements in regards to level of service expected from a Municipal Sewer Collection and Treatment System. The goal is to provide a system that effectively transmits all of the sewage within the system by maintaining/upgrading assets that become deficient. This prevents direct discharges of untreated sewage into the environment. By completing past improvements to their system, and planning future sewer improvement projects, they have taken the appropriate steps toward ensuring this goal is maintained to sustain a high level of service.

Criticality of Assets

The criticality level of the assets was determined by reviewing the entire collection system and determining the severity of defects to each pipe segment. The televising and grading by the PACP/ MACP standard provided an initial rating for structural condition and maintenance condition. This rating was further refined based on reviewing the televising video and adjusting for severity of defect, taking into account the sewer operators first-hand accounts of known issues, and also by applying the City of Stephenson's priority level on various areas of the system.

This review/rating process required a strong understanding of the existing sewer system, which was developed during the review of the system information throughout the course of the SAW grant project.

Revenue Structure

Rates, charges, expenditures, capital improvements, replacement costs, maintenance cost and debt payments are all taken into consideration in the asset management database that was developed by UPEA. This information was then shared with Baker Tilly Municipal Advisors, LLC, a financial consultant who reviewed and prepared the required GAP analysis, along with the financial forecasting analysis, which projected necessary revenues to maintain a healthy financial accounting of the sewer system. The financial forecasting analysis is an attachment to this report.

Capital Improvement Plan

The City of Stephenson intends to undertake a series of improvement projects over the next 20 years to address deficiencies in their sewer collection and treatment system. These projects can be primarily funded by USDA RD loan/ grant funding, EGLE SRF funding and/or local funds.

The following is a summary of the capital improvement plan over the next 20 years in five year increments. The detailed capital improvement plan with specific projects outlined is an attachment to this report

Phase 1:

Proposed Construction 2019-2024
Miscellaneous sewer segment repairs throughout the collection system primarily on the Western half of the collection system & Plant Repairs.

Construction:	$	615,000
Contingency:	$	60,000
Engineering/ Administration:	$	70,000
Bonding/ Legal:	$	10,000
Total:	$	755,000

Phase 2:

Proposed Construction 2025-2029:
Miscellaneous sewer segment repairs throughout the system at the plant, and mainline sewer.

Construction:	$	815,000
Contingency:	$	80,000
Engineering/ Administration:	$	85,000
Bonding/ Legal:	$	10,000
Total:	$	990,000

Phase 3:

Proposed Construction 2030-2034:
Miscellaneous sewer segment repairs throughout the system Primarily the Eastern half of the collection system and a few items at the Treatment Facility.

Construction:	$	720,000
Contingency:	$	70,000
Engineering/ Administration:	$	75,000
Bonding/ Legal:	$	10,000
Total:	$	875,000

Phase 4:

Proposed Construction 2035-2039:
Miscellaneous sewer segment repairs throughout the system, Collection and Treatment Facility.

Construction:	$	670,000
Contingency:	$	60,000
Engineering/ Administration:	$	65,000
Bonding/ Legal:	$	10,000
Total:	$	805,000

Recommendations:

We recommend the continued use of the GIS mapping and Asset Management Database. These items should be useful tools for everyone involved with the sewer system. The systems should be updated as aspects of the sewer system changes.

List of Major Assets

Below is a general list of the major assets identified in the AMP.

- Approx. 34,000 *feet Sanitary Sewer Main, Sizes ranging from 6 - 15 inch pipe*
- Approx. 145 *manholes*
- 1 *treatment facility*
- Approx. 419 *sewer service lines/customers.*

Attachments:

- Financial Report, prepared by Baker Tilly
- Detailed Capital Improvement Plan (CIP), prepared by UPEA

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date __**November 30, 2019**________________
(no later than 3 years from executed grant date)

The Smith Consolidated Drain Drainage District *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1082-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Patrick Lindemann, Drain Commissioner at	(517) 676-8395	patricklindemann@me.com
Name	Phone Number	Email

Pat E Lindemann 11-27-19
Signature of Authorized Representative (Original Signature Required) Date

PATRICK E LINDEMANN INGHAM COUNTY DRAIN COMMISSIONER
Print Name and Title of Authorized Representative

SMITH CONSOLIDATED DRAIN DRAINAGE DISTRICT
SAW Grant Project No. 1082-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
1595 W Lake Lansing Road, Suite 200
East Lansing, MI 48823
(517) 325-9977
Max Clever, P.E., P.S., Project Manager

Owner: **SMITH CONSOLIDATED DRAIN DRAINAGE DISTRICT**
707 Buhl Ave.
Mason, MI 48854
(517) 676-8395
Patrick Lindemann, Drain Commissioner

On November 28th, 2016, the Smith Consolidated Drain Drainage District entered into an agreement with the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. The District received the follow grant:

Stormwater Asset Management Plan (SWAMP) – 90% Grant	***$672,862***
Eligible Cost Subtotal	$672,862
LESS Local Match	($67,286)
Total Grant Amount	$605,576

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Part 1: Stormwater Asset Inventory and Condition Assessment

For the District's stormwater collection system, Spicer Group, Inc. first set vertical and horizontal control throughout the Drainage District using a combination of real time kinematic GPS and digital leveling. Spicer Group then completed a mobile mapping LiDAR survey of the entire drainage district area. In addition, an EOS Arrow Gold RTK GNSS receiver was supplied as part of the SAW grant project and was used to gather supplemental survey information of the collection systems assets. The survey information was used to develop a comprehensive Geographic Information System (GIS) including all stormwater assets (manholes, catchbasins, culvert outlets, etc.). The GIS information is utilized via iPads and desktop computers in the Drain Office, and is a detailed "smart" mapping system, using the ArcMap and ArcGIS Pro software by ESRI. This system can be accessed and updated in the field by ICDC staff from new iPads supplied as part of the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspections, ownership information etc. can be accessed. This information can also be queried to provide specific lists, maps, and reports. It is updated easily when future improvements are made.

The county drain storm sewer collection system within the Smith Consolidated Drain Drainage District is approximately 22.9 miles in length and includes approximately 16.78 miles of storm sewer pipes ranging in diameter size from 6"- 96". The collection system consists of mainline sewer, catchbasin leads, and culverts. In addition, the District has approximately 925 structures consisting of manholes, catchbasins, cleanouts, outlets, and a pump wet well and lift station. The District's storm sewers discharge into several detention basins and designed wetlands that flow to the main open channel before ultimately discharging into the Red Cedar River. Summary tables are listed below for District owned and operated pipes and structures.

Table 1: PIPE DIAMETER BY LENGTH

Diameter	Length (ft)	Percent	Length (miles)
6"	913	1.03%	0.17
8"	1,741	1.97%	0.33
10"	115	0.13%	0.02
12"	38,575	43.57%	7.31
15"	11,962	13.51%	2.27
18"	9,056	10.22%	1.72
21"	540	0.61%	0.10
24"	13,112	14.81%	2.48
30"	436	0.49%	0.08
36"	9,959	11.25%	1.89
48"	612	0.69%	0.12
60"	458	0.52%	0.09
72"	205	0.23%	0.04
80"	317	0.36%	0.06
84"	200	0.23%	0.04
96"	53	0.06%	0.01
Unknown	288	0.33%	0.05
TOTAL	**88,543**	**100%**	**16.78**

Table 2: STRUCTURE TYPES

Structure Type	Number
Catchbasins	521
Manholes	270
Outlets	102
Other	30
Lift Station	1
Wet Well	1
TOTAL	925

Not every pipe and structure owned and operated by the District could be investigated/inventoried due to perpetual water in the system, access limitations, and more sewer cleaning than was budgeted. Emphasis was placed on performing condition assessments for the mainline sewers and mainline manholes and catchbasins.

Cleaning and televising operations were performed by the Ingham County Drain Office maintenance staff, in cooperation with Spicer Group and Plummers Environmental Services, on 480 of the storm pipe segments in the collection system. Spicer Group performed comprehensive inspection for all the District's mainline stormwater manholes and catchbasins. The NASSCO Manhole/Pipeline Assessment Certification Program (MACP/PACP) version 7.0.2 standards were used to identify and code defects and apply standardized grading/scoring to provide overall condition ratings of the stormwater assets.

In addition to the cleaning and televising performed on the storm sewers, the lift station and attached wet well structure were inspected and scored in a manner that could be integrated into the overall capital improvement plan.

Part 2: Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of stormwater service does the Drain Office want to provide to its customers? How are projects going to be prioritized and included in the CIP? What cost is the District willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan.

The Drain Commissioner has published *Rules of the Ingham County Drain Commissioner*, which provide the standards required for engineering of storm sewer systems. The following rules are key requirements in the rulebook for evaluating the enclosed drainage systems:

- Enclosed storm drain systems will be sized to accommodate the 10-year storm, with the hydraulic gradient kept below the top of the pipe.
- For residential developments and commercial projects smaller than 10 acres in size, a time of concentration of 15 minutes shall be used. Other situations may require that the time of concentration be calculated using TR-55 or equivalent method.

Part 3: Criticality (Risk)

For each asset in the District's stormwater collection system, a criticality/risk analysis was performed to determine and prioritize the District's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for assets; including pipes, manholes, and drainage structures, etc. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic and hydraulic impacts. Finally, the Criticality (Risk) score was calculated using:

RISK = LoF x CoF

For the District's stormwater collection system, no pipe or structure locations were identified with a high risk score. A total of 18 pipes and 9 structures had defects and risk scores that will require repair in the first five years of the schedule. These scores were evaluated and incorporated into the resulting Capital Improvement Plan.

Part 4: Revenue Structure

Yearly Maintenance Budget

The yearly maintenance budget of county drains is established from Section 280.196 Subsection 4 of the Drain Code of 1956 as $5,000 per mile of drain. Through the process to consolidate the drain, the Smith Consolidated Drain Drainage District now contains a total of 23 maintenance miles of county drains. Therefore, the Drainage Districts within the Smith Consolidated Drain Drainage District can assess a maximum of $115,000 annually to the assessment rolls on record for work defined as maintenance under said section of the Drain Code.

Equipment Costs

Non-personnel related costs are recorded on a per unit basis of use during maintenance and inspection activities in order to recoup costs. This includes vehicles, excavators, cleaning trucks and televising equipment.

Part 5: Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the stormwater system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. The Drain Office is limited to maintenance and inspection activities by the Drain Code of 1956. The bulk of the cost estimates listed in the capital improvement plan were based on the Ingham County Drain maintenance personnel performing the repairs.

This results in the CIP plan over the next 5 years are summarized as follows:

1. Pump Station Check Valve and Force Main Repair - $13,000
2. Misc. Structure Cleaning and Patching - $4,500
3. Misc. Sewer Repairs, Root removals, Spot Liners Projects - $38,735
4. Additional Cleaning and Televising - $64,060

The full 5-year capital improvement plan from Appendix M of the Asset Management Plan and its associated map is attached to this summary.

Conclusion

The Smith Consolidated Drain Drainage District stormwater system is relatively new with an average remaining life of approximately 30 years on most of the storm sewer. Since its establishment it has been regularly maintained and therefore most pipes and structures in the system are in good condition outside of the short list of pipes in the capital improvement plan.

In accordance with the SAW Grant requirements, the District’s Stormwater Asset Management Plan (SWAMP) needs to be kept available for citizen review for 15 years. The SWAMP should be reviewed annually, and the components updated and included in the District’s annual budget process.

Appendix M - Capital Improvement Plan - 5 Year

Structures

ID Number	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
301	2020	Sunwind Pump Station	Discharge check valve inoperable	Replace check valve	$ 3,000.00
10990	2020	Sower Blvd, Okemos	Cracks and Deposits	Clean and Patch	$ 500.00
11440	2020	Sower Blvd, Okemos – Near Hydrant	Cracks and Deposits	Clean and Patch	$ 500.00
12010	2020	Dayspring Ct.	Cracks and Deposits	Clean and Patch	$ 500.00
12130	2020	Windy Heights Dr.	Cracks and Deposits	Clean and Patch	$ 500.00
225	2020	Sun Rapids Dr., East of Windy Heights East	Cracks and Deposits	Clean and Patch	$ 500.00
232	2020	Sun Rapids Dr., South of Bennet Rd.	Cracks and Deposits	Clean and Patch	$ 500.00
236	2020	Sun Rapids Dr., North of Aeolian Dr.	Cracks and Deposits	Clean and Patch	$ 500.00
244	2020	Sun Rapids Dr.	Cracks and Deposits	Clean and Patch	$ 500.00
5063	2020	Taos Trl.	Cracks and Deposits	Clean and Patch	$ 500.00

Total: **$7,500**

Pipes

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
7150	2020	Sunwind Pump Station Force Main	Broken	Open Cut Spot Repair	$ 10,000.00
180	2020	See Map	Unknown	Clean and Televise	$ 434.57
840	2020	See Map	Unknown	Clean and Televise	$ 720.73
890	2020	See Map	Unknown	Clean and Televise	$ 550.44
940	2020	See Map	Unknown	Clean and Televise	$ 1,583.81
1080	2020	See Map	Unknown	Clean and Televise	$ 1,237.21
1120	2020	See Map	Unknown	Clean and Televise	$ 290.05
1140	2020	See Map	Unknown	Clean and Televise	$ 560.01
1680	2020	See Map	Unknown	Clean and Televise	$ 509.33
6880	2020	See Map	Unknown	Clean and Televise	$ 491.51
6890	2020	See Map	Unknown	Clean and Televise	$ 1,070.50
6910	2020	See Map	Unknown	Clean and Televise	$ 929.38
7350	2020	See Map	Unknown	Clean and Televise	$ 603.90
7610	2020	See Map	Unknown	Clean and Televise	$ 446.05
8600	2020	See Map	Unknown	Clean and Televise	$ 1,842.74
8920	2020	See Map	Unknown	Clean and Televise	$ 874.21
7571	2020	See Map	Unknown	Clean and Televise	$ 492.54
1682	2020	See Map	Unknown	Clean and Televise	$ 238.54
6760	2020	See Map	Unknown	Clean and Televise	$ 314.86
1750	2020	See Map	Unknown	Clean and Televise	$ 73.53
9250	2020	See Map	Unknown	Clean and Televise	$ 319.40
10200	2020	See Map	Unknown	Clean and Televise	$ 154.71
10650	2020	See Map	Unknown	Clean and Televise	$ 83.73
1830	2020	See Map	Unknown	Clean and Televise	$ 101.06
2050	2020	See Map	Unknown	Clean and Televise	$ 124.25
2090	2020	See Map	Unknown	Clean and Televise	$ 809.71
2140	2020	See Map	Unknown	Clean and Televise	$ 420.02
2600	2020	See Map	Unknown	Clean and Televise	$ 103.23
3620	2020	See Map	Unknown	Clean and Televise	$ 526.03
4610	2020	See Map	Unknown	Clean and Televise	$ 699.63
110	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
150	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
1550	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
7380	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
8820	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
9260	2021	See Map	Severe Separated and Offset Joint	Replace	$ 13,734.50
60	2021	See Map	Unknown	Televise	$ 222.61
70	2021	See Map	Unknown	Televise	$ 259.16
80	2021	See Map	Unknown	Televise	$ 305.56
90	2021	See Map	Unknown	Televise	$ 156.34
120	2021	See Map	Unknown	Televise	$ 223.00
130	2021	See Map	Unknown	Televise	$ 267.74
140	2021	See Map	Unknown	Televise	$ 199.28
200	2021	See Map	Unknown	Televise	$ 320.55
250	2021	See Map	Unknown	Televise	$ 111.46
260	2021	See Map	Unknown	Televise	$ 95.28
270	2021	See Map	Unknown	Televise	$ 56.51
280	2021	See Map	Unknown	Televise	$ 55.34
290	2021	See Map	Unknown	Televise	$ 119.18
310	2021	See Map	Unknown	Televise	$ 120.79
320	2021	See Map	Unknown	Televise	$ 297.55
350	2021	See Map	Unknown	Televise	$ 325.95
360	2021	See Map	Unknown	Televise	$ 328.27
380	2021	See Map	Unknown	Televise	$ 541.72
420	2021	See Map	Unknown	Televise	$ 326.11
500	2022	See Map	Unknown	Televise	$ 32.90
510	2022	See Map	Unknown	Televise	$ 60.60
540	2022	See Map	Unknown	Televise	$ 188.51
560	2022	See Map	Unknown	Televise	$ 65.52
580	2022	See Map	Unknown	Televise	$ 237.38
590	2022	See Map	Unknown	Televise	$ 185.67
600	2022	See Map	Unknown	Televise	$ 314.08
620	2022	See Map	Unknown	Televise	$ 345.17
630	2022	See Map	Unknown	Televise	$ 302.81
640	2022	See Map	Unknown	Televise	$ 223.18
670	2022	See Map	Unknown	Televise	$ 116.72
680	2022	See Map	Unknown	Televise	$ 135.65
780	2022	See Map	Unknown	Televise	$ 179.24
800	2022	See Map	Unknown	Televise	$ 281.56
830	2022	See Map	Unknown	Televise	$ 139.25
850	2022	See Map	Unknown	Televise	$ 167.78
860	2022	See Map	Unknown	Televise	$ 175.31
880	2022	See Map	Unknown	Televise	$ 125.39
910	2022	See Map	Unknown	Televise	$ 237.29
920	2022	See Map	Unknown	Televise	$ 231.11
931	2022	See Map	Unknown	Televise	$ 477.06
950	2022	See Map	Unknown	Televise	$ 264.14

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
960	2022	See Map	Unknown	Televise	$ 222.26
970	2022	See Map	Unknown	Televise	$ 171.68
980	2022	See Map	Unknown	Televise	$ 288.43
990	2022	See Map	Unknown	Televise	$ 147.87
1000	2022	See Map	Unknown	Televise	$ 265.95
1010	2022	See Map	Unknown	Televise	$ 197.13
1020	2022	See Map	Unknown	Televise	$ 157.35
1040	2022	See Map	Unknown	Televise	$ 283.86
1090	2022	See Map	Unknown	Televise	$ 30.93
1110	2022	See Map	Unknown	Televise	$ 267.97
1130	2022	See Map	Unknown	Televise	$ 46.32
1150	2022	See Map	Unknown	Televise	$ 187.09
1160	2022	See Map	Unknown	Televise	$ 218.41
1170	2022	See Map	Unknown	Televise	$ 150.31
1200	2022	See Map	Unknown	Televise	$ 156.86
1240	2022	See Map	Unknown	Televise	$ 254.72
1250	2022	See Map	Unknown	Televise	$ 272.01
1280	2022	See Map	Unknown	Televise	$ 130.12
1640	2022	See Map	Unknown	Televise	$ 287.12
1820	2022	See Map	Unknown	Televise	$ 176.30
1840	2022	See Map	Unknown	Televise	$ 191.05
1860	2022	See Map	Unknown	Televise	$ 24.39
1870	2022	See Map	Unknown	Televise	$ 56.56
1880	2022	See Map	Unknown	Televise	$ 299.60
1910	2022	See Map	Unknown	Televise	$ 149.31
1970	2022	See Map	Unknown	Televise	$ 300.21
2120	2022	See Map	Unknown	Televise	$ 235.15
2130	2022	See Map	Unknown	Televise	$ 117.92
2270	2022	See Map	Unknown	Televise	$ 378.40
2460	2022	See Map	Unknown	Televise	$ 75.91
2480	2022	See Map	Unknown	Televise	$ 23.75
2490	2022	See Map	Unknown	Televise	$ 20.89
2510	2022	See Map	Unknown	Televise	$ 105.40
2620	2022	See Map	Unknown	Televise	$ 235.86
2660	2022	See Map	Unknown	Televise	$ 9.49
2670	2022	See Map	Unknown	Televise	$ 108.78
2700	2022	See Map	Unknown	Televise	$ 13.40
2730	2022	See Map	Unknown	Televise	$ 37.39
2750	2022	See Map	Unknown	Televise	$ 197.76
2790	2022	See Map	Unknown	Televise	$ 236.73
2800	2022	See Map	Unknown	Televise	$ 102.61
2830	2022	See Map	Unknown	Televise	$ 22.96
2880	2022	See Map	Unknown	Televise	$ 50.95
2900	2022	See Map	Unknown	Televise	$ 101.26
2970	2022	See Map	Unknown	Televise	$ 115.36
2980	2022	See Map	Unknown	Televise	$ 101.24

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
2990	2022	See Map	Unknown	Televise	$ 25.26
3000	2022	See Map	Unknown	Televise	$ 19.07
3010	2022	See Map	Unknown	Televise	$ 8.34
3020	2022	See Map	Unknown	Televise	$ 72.16
3030	2022	See Map	Unknown	Televise	$ 82.69
3050	2022	See Map	Unknown	Televise	$ 275.05
3080	2022	See Map	Unknown	Televise	$ 268.98
3110	2022	See Map	Unknown	Televise	$ 238.80
3140	2022	See Map	Unknown	Televise	$ 292.16
3170	2022	See Map	Unknown	Televise	$ 274.39
3210	2022	See Map	Unknown	Televise	$ 292.33
3240	2022	See Map	Unknown	Televise	$ 284.05
3250	2022	See Map	Unknown	Televise	$ 297.99
3280	2022	See Map	Unknown	Televise	$ 287.82
3310	2022	See Map	Unknown	Televise	$ 19.52
3320	2022	See Map	Unknown	Televise	$ 240.90
3340	2022	See Map	Unknown	Televise	$ 50.97
3350	2022	See Map	Unknown	Televise	$ 65.28
3360	2022	See Map	Unknown	Televise	$ 53.86
3370	2022	See Map	Unknown	Televise	$ 27.79
3450	2022	See Map	Unknown	Televise	$ 9.93
3460	2022	See Map	Unknown	Televise	$ 61.43
3470	2022	See Map	Unknown	Televise	$ 242.21
3490	2022	See Map	Unknown	Televise	$ 276.86
3510	2022	See Map	Unknown	Televise	$ 22.98
3520	2022	See Map	Unknown	Televise	$ 6.53
3540	2022	See Map	Unknown	Televise	$ 229.44
3550	2022	See Map	Unknown	Televise	$ 88.46
3560	2022	See Map	Unknown	Televise	$ 57.83
3710	2022	See Map	Unknown	Televise	$ 58.00
3720	2022	See Map	Unknown	Televise	$ 79.74
3730	2022	See Map	Unknown	Televise	$ 46.55
3850	2022	See Map	Unknown	Televise	$ 85.83
4170	2022	See Map	Unknown	Televise	$ 81.77
4220	2022	See Map	Unknown	Televise	$ 117.25
4250	2022	See Map	Unknown	Televise	$ 49.19
4270	2022	See Map	Unknown	Televise	$ 81.02
4280	2022	See Map	Unknown	Televise	$ 58.05
4290	2022	See Map	Unknown	Televise	$ 8.74
4300	2022	See Map	Unknown	Televise	$ 405.06
4320	2022	See Map	Unknown	Televise	$ 472.86
4370	2022	See Map	Unknown	Televise	$ 65.97
4380	2022	See Map	Unknown	Televise	$ 35.95
4440	2022	See Map	Unknown	Televise	$ 206.01
4450	2022	See Map	Unknown	Televise	$ 326.05
4460	2022	See Map	Unknown	Televise	$ 219.53

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
4480	2022	See Map	Unknown	Televise	$ 48.94
4490	2022	See Map	Unknown	Televise	$ 59.39
4500	2022	See Map	Unknown	Televise	$ 207.23
4510	2022	See Map	Unknown	Televise	$ 59.91
4520	2022	See Map	Unknown	Televise	$ 180.32
4530	2022	See Map	Unknown	Televise	$ 98.19
4570	2022	See Map	Unknown	Televise	$ 218.23
4620	2022	See Map	Unknown	Televise	$ 319.35
4630	2022	See Map	Unknown	Televise	$ 105.06
4640	2022	See Map	Unknown	Televise	$ 252.72
4650	2022	See Map	Unknown	Televise	$ 93.54
4690	2022	See Map	Unknown	Televise	$ 71.79
4710	2022	See Map	Unknown	Televise	$ 22.19
4760	2022	See Map	Unknown	Televise	$ 80.46
4790	2022	See Map	Unknown	Televise	$ 180.57
4830	2022	See Map	Unknown	Televise	$ 238.02
4840	2022	See Map	Unknown	Televise	$ 168.01
4860	2022	See Map	Unknown	Televise	$ 45.85
4870	2022	See Map	Unknown	Televise	$ 9.67
5020	2022	See Map	Unknown	Televise	$ 157.72
5030	2022	See Map	Unknown	Televise	$ 118.75
5040	2022	See Map	Unknown	Televise	$ 219.69
5080	2022	See Map	Unknown	Televise	$ 102.69
5100	2022	See Map	Unknown	Televise	$ 42.72
5130	2022	See Map	Unknown	Televise	$ 275.21
5140	2022	See Map	Unknown	Televise	$ 119.80
5600	2022	See Map	Unknown	Televise	$ 61.31
6030	2022	See Map	Unknown	Televise	$ 40.63
6040	2022	See Map	Unknown	Televise	$ 35.73
6350	2022	See Map	Unknown	Televise	$ 95.41
6430	2022	See Map	Unknown	Televise	$ 19.10
6800	2022	See Map	Unknown	Televise	$ 133.64
6810	2022	See Map	Unknown	Televise	$ 179.61
6840	2022	See Map	Unknown	Televise	$ 275.22
6920	2022	See Map	Unknown	Televise	$ 368.55
6990	2022	See Map	Unknown	Televise	$ 109.94
7040	2022	See Map	Unknown	Televise	$ 195.18
7050	2022	See Map	Unknown	Televise	$ 52.71
7060	2022	See Map	Unknown	Televise	$ 124.89
7070	2022	See Map	Unknown	Televise	$ 33.86
7100	2022	See Map	Unknown	Televise	$ 200.47
7160	2023	See Map	Unknown	Televise	$ 55.46
7170	2023	See Map	Unknown	Televise	$ 45.55
7190	2023	See Map	Unknown	Televise	$ 79.10
7220	2023	See Map	Unknown	Televise	$ 135.06
7280	2023	See Map	Unknown	Televise	$ 44.50

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
7310	2023	See Map	Unknown	Televise	$ 256.65
7320	2023	See Map	Unknown	Televise	$ 144.10
7330	2023	See Map	Unknown	Televise	$ 140.13
7360	2023	See Map	Unknown	Televise	$ 94.67
7410	2023	See Map	Unknown	Televise	$ 269.08
7430	2023	See Map	Unknown	Televise	$ 79.23
7460	2023	See Map	Unknown	Televise	$ 121.33
7500	2023	See Map	Unknown	Televise	$ 466.77
7510	2023	See Map	Unknown	Televise	$ 145.95
7540	2023	See Map	Unknown	Televise	$ 11.40
7550	2023	See Map	Unknown	Televise	$ 140.26
7570	2023	See Map	Unknown	Televise	$ 375.25
7580	2023	See Map	Unknown	Televise	$ 19.12
7600	2023	See Map	Unknown	Televise	$ 48.32
7650	2023	See Map	Unknown	Televise	$ 189.05
7680	2023	See Map	Unknown	Televise	$ 268.65
7750	2023	See Map	Unknown	Televise	$ 114.29
7790	2023	See Map	Unknown	Televise	$ 142.77
7810	2023	See Map	Unknown	Televise	$ 38.28
7820	2023	See Map	Unknown	Televise	$ 116.09
7860	2023	See Map	Unknown	Televise	$ 209.21
7900	2023	See Map	Unknown	Televise	$ 130.36
8000	2023	See Map	Unknown	Televise	$ 234.95
8020	2023	See Map	Unknown	Televise	$ 214.83
8160	2023	See Map	Unknown	Televise	$ 59.04
8190	2023	See Map	Unknown	Televise	$ 99.87
8220	2023	See Map	Unknown	Televise	$ 100.05
8230	2023	See Map	Unknown	Televise	$ 79.45
8520	2023	See Map	Unknown	Televise	$ 141.19
8570	2023	See Map	Unknown	Televise	$ 97.45
8590	2023	See Map	Unknown	Televise	$ 156.02
8610	2023	See Map	Unknown	Televise	$ 132.52
8620	2023	See Map	Unknown	Televise	$ 191.15
8720	2023	See Map	Unknown	Televise	$ 147.88
8730	2023	See Map	Unknown	Televise	$ 104.32
8750	2023	See Map	Unknown	Televise	$ 132.55
8760	2023	See Map	Unknown	Televise	$ 156.01
8770	2023	See Map	Unknown	Televise	$ 29.95
8780	2023	See Map	Unknown	Televise	$ 14.58
8810	2023	See Map	Unknown	Televise	$ 154.12
8880	2023	See Map	Unknown	Televise	$ 126.33
8930	2023	See Map	Unknown	Televise	$ 29.96
8960	2023	See Map	Unknown	Televise	$ 216.66
8990	2023	See Map	Unknown	Televise	$ 217.91
9000	2023	See Map	Unknown	Televise	$ 164.48
9010	2023	See Map	Unknown	Televise	$ 169.21

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
9030	2023	See Map	Unknown	Televise	$ 26.79
9080	2023	See Map	Unknown	Televise	$ 218.30
9090	2023	See Map	Unknown	Televise	$ 77.74
9100	2023	See Map	Unknown	Televise	$ 169.41
9120	2023	See Map	Unknown	Televise	$ 110.29
9130	2023	See Map	Unknown	Televise	$ 179.50
9140	2023	See Map	Unknown	Televise	$ 7.89
9170	2023	See Map	Unknown	Televise	$ 48.56
9330	2023	See Map	Unknown	Televise	$ 232.85
9340	2023	See Map	Unknown	Televise	$ 72.36
9350	2023	See Map	Unknown	Televise	$ 164.07
9360	2023	See Map	Unknown	Televise	$ 222.96
9370	2023	See Map	Unknown	Televise	$ 95.60
9400	2023	See Map	Unknown	Televise	$ 328.45
9410	2023	See Map	Unknown	Televise	$ 375.15
9450	2023	See Map	Unknown	Televise	$ 72.12
9460	2023	See Map	Unknown	Televise	$ 102.24
9470	2023	See Map	Unknown	Televise	$ 88.94
9480	2023	See Map	Unknown	Televise	$ 37.25
9510	2023	See Map	Unknown	Televise	$ 47.89
9530	2023	See Map	Unknown	Televise	$ 11.43
9540	2023	See Map	Unknown	Televise	$ 365.91
9550	2023	See Map	Unknown	Televise	$ 85.77
9560	2023	See Map	Unknown	Televise	$ 11.04
9570	2023	See Map	Unknown	Televise	$ 47.38
9580	2023	See Map	Unknown	Televise	$ 23.71
9590	2023	See Map	Unknown	Televise	$ 219.63
9620	2023	See Map	Unknown	Televise	$ 473.59
9630	2023	See Map	Unknown	Televise	$ 61.50
9660	2023	See Map	Unknown	Televise	$ 157.50
9700	2023	See Map	Unknown	Televise	$ 196.45
9720	2023	See Map	Unknown	Televise	$ 185.15
9760	2023	See Map	Unknown	Televise	$ 188.96
9820	2023	See Map	Unknown	Televise	$ 28.03
9830	2023	See Map	Unknown	Televise	$ 40.43
9840	2023	See Map	Unknown	Televise	$ 71.41
9890	2023	See Map	Unknown	Televise	$ 133.56
9900	2023	See Map	Unknown	Televise	$ 246.17
9940	2023	See Map	Unknown	Televise	$ 65.89
9970	2023	See Map	Unknown	Televise	$ 56.24
9990	2023	See Map	Unknown	Televise	$ 213.19
10030	2023	See Map	Unknown	Televise	$ 318.32
10040	2023	See Map	Unknown	Televise	$ 284.93
10160	2023	See Map	Unknown	Televise	$ 87.66
10220	2023	See Map	Unknown	Televise	$ 133.24
10260	2023	See Map	Unknown	Televise	$ 185.53

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
10290	2023	See Map	Unknown	Televise	$ 183.40
10300	2023	See Map	Unknown	Televise	$ 72.79
10310	2023	See Map	Unknown	Televise	$ 137.50
10320	2023	See Map	Unknown	Televise	$ 50.69
10330	2023	See Map	Unknown	Televise	$ 21.88
10340	2023	See Map	Unknown	Televise	$ 76.67
10350	2023	See Map	Unknown	Televise	$ 126.11
10360	2023	See Map	Unknown	Televise	$ 99.78
10370	2023	See Map	Unknown	Televise	$ 84.00
10480	2023	See Map	Unknown	Televise	$ 80.39
10490	2023	See Map	Unknown	Televise	$ 100.85
10500	2023	See Map	Unknown	Televise	$ 49.38
10510	2023	See Map	Unknown	Televise	$ 54.51
10520	2023	See Map	Unknown	Televise	$ 103.53
10530	2023	See Map	Unknown	Televise	$ 118.54
1041	2023	See Map	Unknown	Televise	$ 128.29
781	2023	See Map	Unknown	Televise	$ 29.49
7501	2023	See Map	Unknown	Televise	$ 59.04
91	2023	See Map	Unknown	Televise	$ 59.64
10371	2023	See Map	Unknown	Televise	$ 75.29
10372	2023	See Map	Unknown	Televise	$ 27.45
10590	2023	See Map	Unknown	Televise	$ 27.67
10610	2023	See Map	Unknown	Televise	$ 32.63
10640	2023	See Map	Unknown	Televise	$ 227.95
10660	2023	See Map	Unknown	Televise	$ 8.66
10670	2023	See Map	Unknown	Televise	$ 24.55
10680	2023	See Map	Unknown	Televise	$ 27.52
10690	2023	See Map	Unknown	Televise	$ 78.71
10720	2023	See Map	Unknown	Televise	$ 193.32
10730	2023	See Map	Unknown	Televise	$ 49.59
10740	2023	See Map	Unknown	Televise	$ 19.44
10760	2023	See Map	Unknown	Televise	$ 504.66
10770	2023	See Map	Unknown	Televise	$ 40.91
10780	2023	See Map	Unknown	Televise	$ 80.34
10790	2023	See Map	Unknown	Televise	$ 78.31
10540	2023	See Map	Unknown	Televise	$ 96.78
10800	2023	See Map	Unknown	Televise	$ 196.03
10860	2023	See Map	Unknown	Televise	$ 35.02
1091	2023	See Map	Unknown	Televise	$ 33.45
782	2023	See Map	Unknown	Televise	$ 134.15
783	2023	See Map	Unknown	Televise	$ 19.02
10830	2023	See Map	Unknown	Televise	$ 12.70
10820	2023	See Map	Unknown	Televise	$ 17.48
230	2023	See Map	Unknown	Televise	$ 60.93
521	2023	See Map	Unknown	Televise	$ 191.62
8570	2023	See Map	Unknown	Televise	$ 151.60

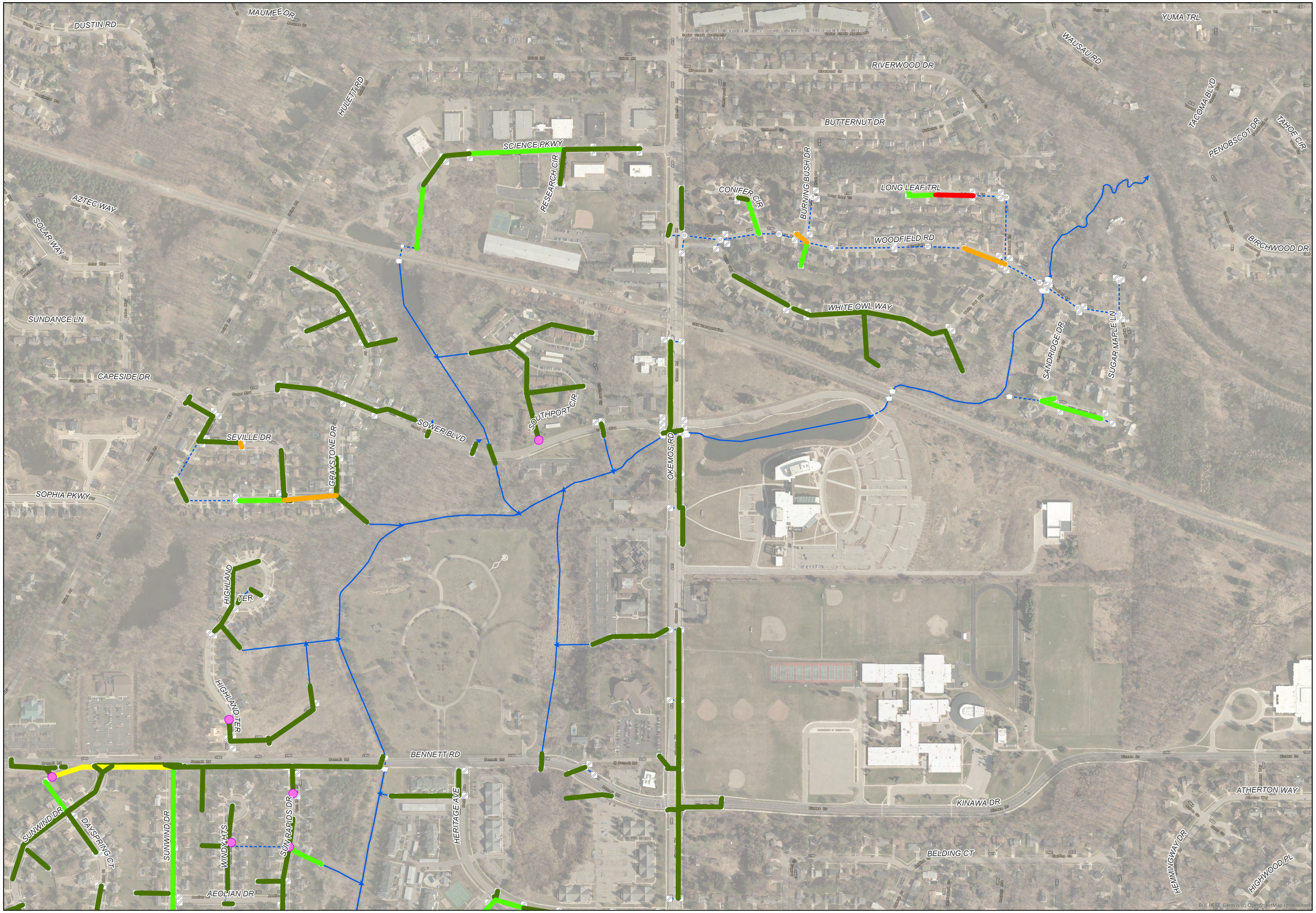
Appendix M - Capital Improvement Plan - 5 Year

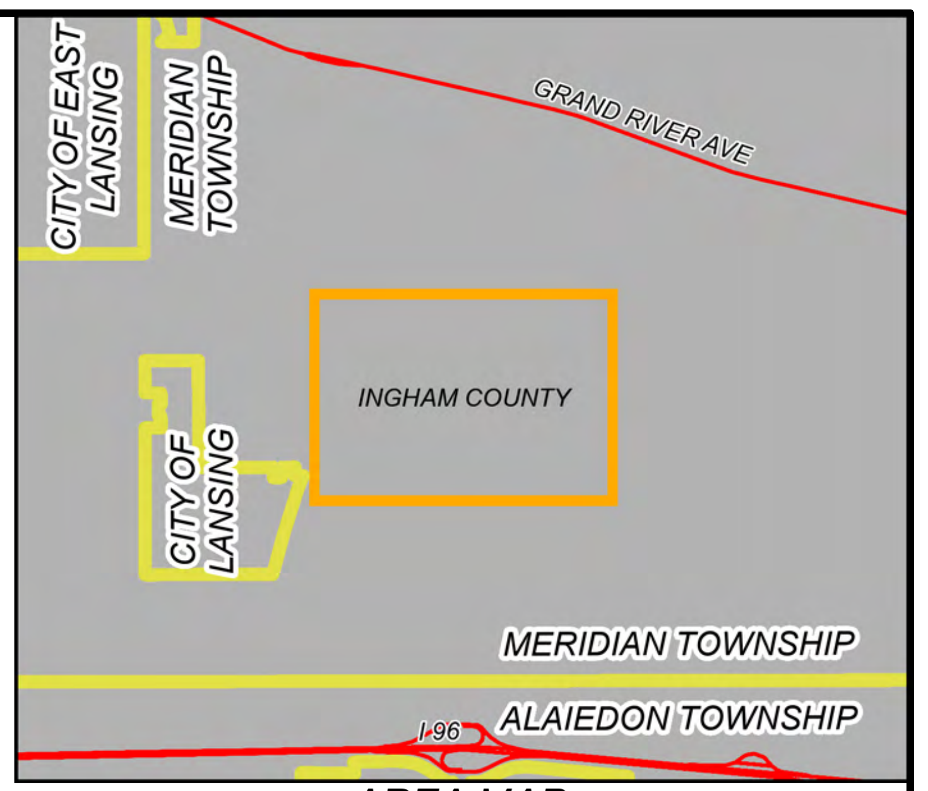
Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
10870	2023	See Map	Unknown	Televise	$ 58.85
92	2023	See Map	Unknown	Televise	$ 95.20
10300	2023	See Map	Unknown	Televise	$ 45.56
10300	2023	See Map	Unknown	Televise	$ 34.80
10291	2023	See Map	Unknown	Televise	$ 35.16
10310	2023	See Map	Unknown	Televise	$ 38.53
10310	2023	See Map	Unknown	Televise	$ 56.78
10990	2023	See Map	Unknown	Televise	$ 4.55
11000	2023	See Map	Unknown	Televise	$ 59.89
11220	2023	See Map	Unknown	Televise	$ 58.72
11240	2023	See Map	Unknown	Televise	$ 28.04
930	2023	See Map	Unknown	Televise	$ 158.12
11260	2023	See Map	Unknown	Televise	$ 5.01
11270	2023	See Map	Unknown	Televise	$ 40.45
5170	2023	See Map	Unknown	Televise	$ 94.88
11290	2023	See Map	Unknown	Televise	$ 20.58
11300	2023	See Map	Unknown	Televise	$ 31.96
11310	2023	See Map	Unknown	Televise	$ 21.46
11320	2023	See Map	Unknown	Televise	$ 33.33
1930	2023	See Map	Unknown	Televise	$ 68.02
1960	2023	See Map	Unknown	Televise	$ 24.54
2210	2023	See Map	Unknown	Televise	$ 216.01
10890	2023	See Map	Unknown	Televise	$ 105.28
10900	2023	See Map	Unknown	Televise	$ 96.30
10930	2023	See Map	Unknown	Televise	$ 29.48
10940	2023	See Map	Unknown	Televise	$ 37.38
10950	2023	See Map	Unknown	Televise	$ 81.25
10960	2023	See Map	Unknown	Televise	$ 29.47
11330	2023	See Map	Unknown	Televise	$ 25.32
7572	2023	See Map	Unknown	Televise	$ 29.61
10470	2023	See Map	Unknown	Televise	$ 48.12
Total					**$ 112,793.79**

INGHAM COUNTY CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

APPENDIX M: CAPITAL IMPROVEMENT PLAN
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER





AREA MAP
NOT TO SCALE

N

0 125 250 500 FEET

LEGEND

- ● STRUCTURE REPAIRS
- 🟥 REPLACE PIPE
- 🟧 CLEAN AND TRENCHLESS SPOT REPAIR
- 🟨 OPEN CUT SPOT REPAIR
- 🟩 CLEAN AND TELEVISE
- 🟩 TELEVISE
- Ⓢ MANHOLE
- ▨ CATCHBASIN
- ⬠ END SECTION
- ⬠ END SECTION
- ○ OTHER/UNKNOWN
- ○ ALL OTHER VALUES
- ← OPEN DRAIN
- - - - STORM SEWER
- ⌜⌟ DRAINAGE DISTRICT
- ▭ MUNICIPALITY BOUNDARY

BY	MARK	REVISIONS	DATE

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

SMITH CONSOLIDATED DRAIN
INGHAM COUNTY, MICHIGAN

CAPITAL IMPROVEMENT PLAN

Spicer group

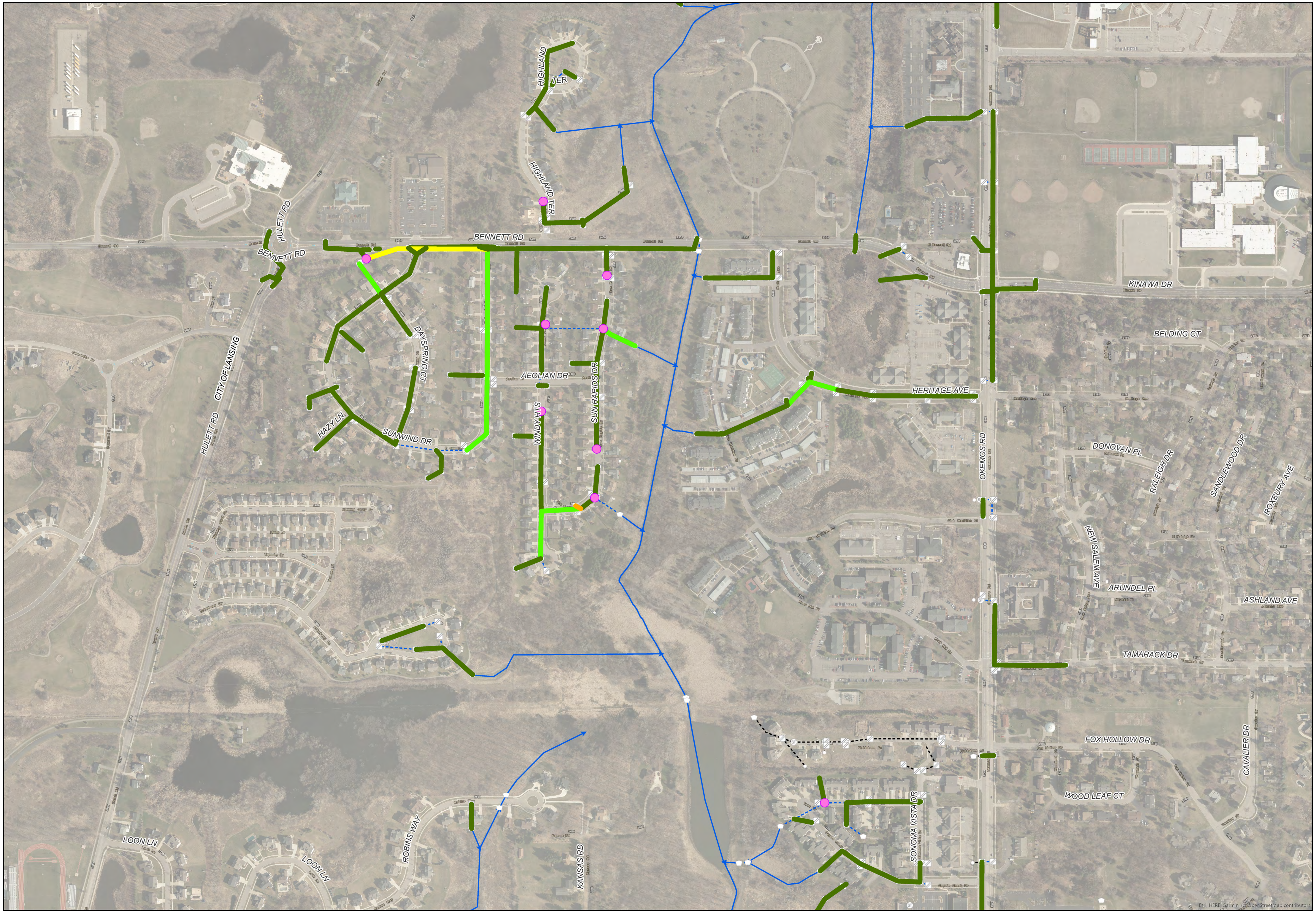
LANSING OFFICE
1595 W Lake Lansing Rd St. 200
East Lansing, MI 48823
Tel. 517-325-9977
www.SpicerGroup.com

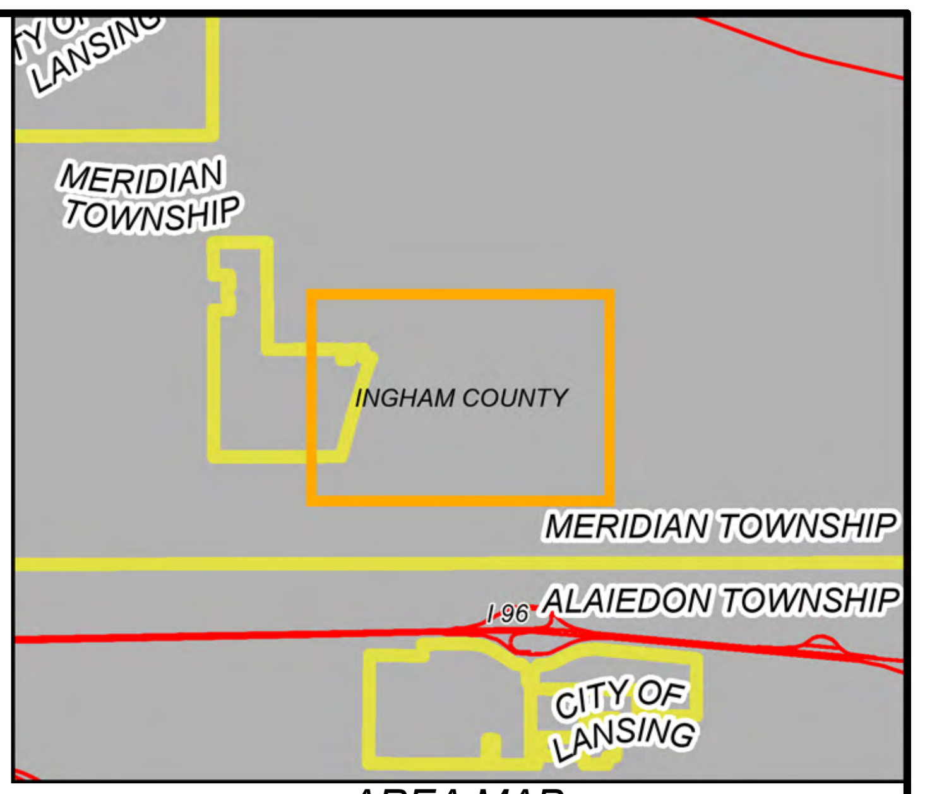
DE. BY: RTB
DR. BY: RTB
CH. BY: MMC
APP. BY: TAI
PROJECT NO. 122377SG2015
STDS.
SHEET 1 OF 5
DATE: NOVEMBER 2019
SCALE: 1":250'
FILE NO. JDR-3362
DR 1

INGHAM COUNTY CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

APPENDIX M: CAPITAL IMPROVEMENT PLAN
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER





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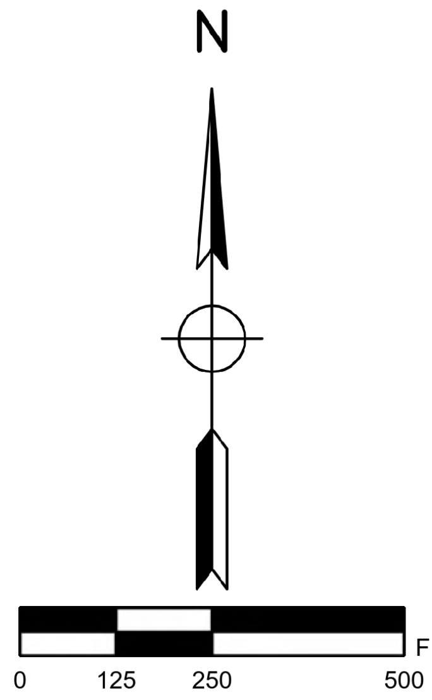

LEGEND

- ● STRUCTURE REPAIRS
- 🟥 REPLACE PIPE
- 🟧 CLEAN AND TRENCHLESS SPOT REPAIR
- 🟨 OPEN CUT SPOT REPAIR
- 🟩 CLEAN AND TELEVISE
- 🟩 TELEVISE
- ST MANHOLE
- ▨ CATCHBASIN
- ⬠ END SECTION
- ⬠ END SECTION
- ○ OTHER/UNKNOWN
- ○ ALL OTHER VALUES
- ← OPEN DRAIN
- - - STORM SEWER
- ⌜⌟ DRAINAGE DISTRICT
- 🟨 MUNICIPALITY BOUNDARY

BY	MARK	REVISIONS	DATE

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SMITH CONSOLIDATED DRAIN
INGHAM COUNTY, MICHIGAN

CAPITAL IMPROVEMENT PLAN

Spicer group

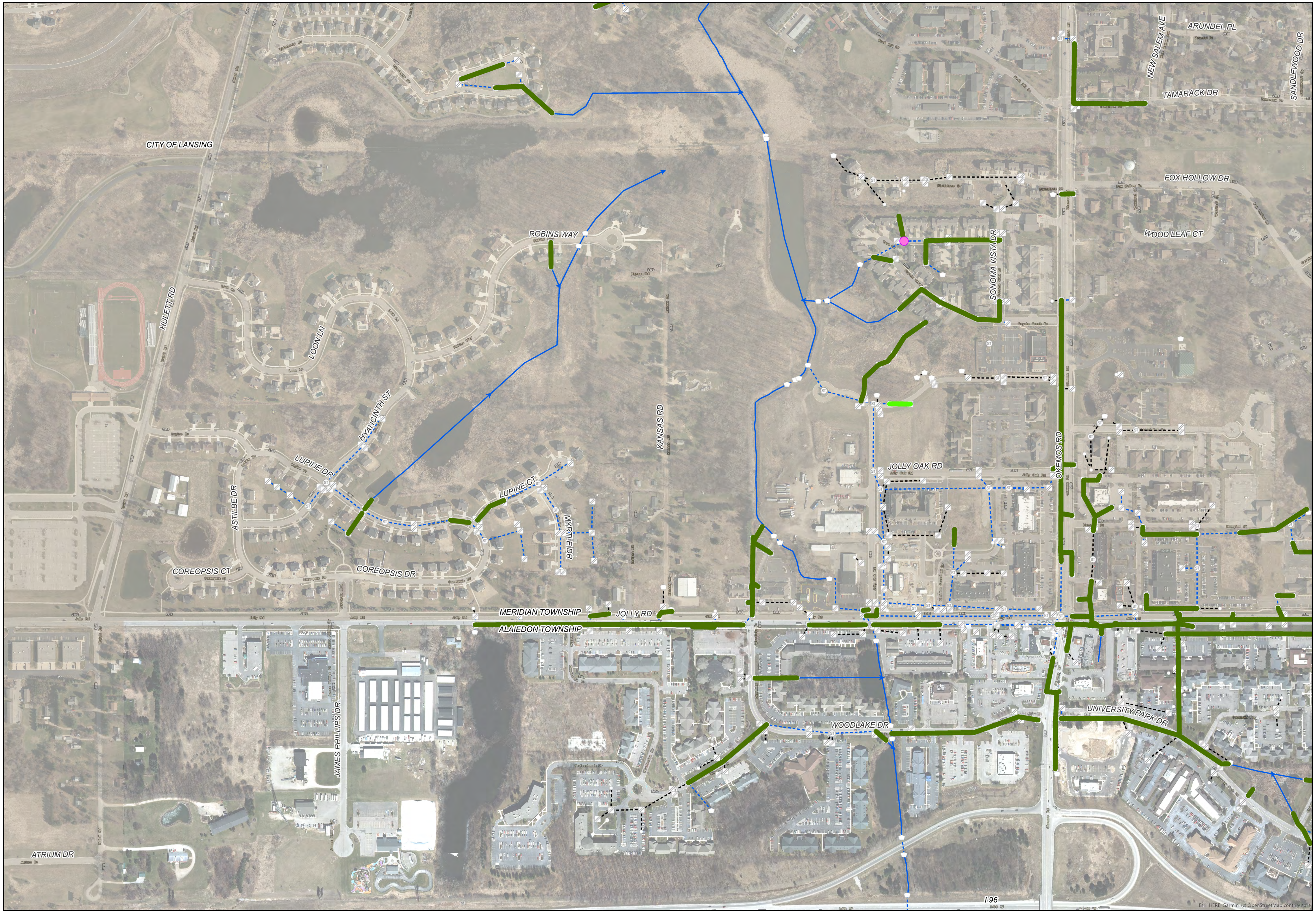
LANSING OFFICE
1595 W Lake Lansing Rd St. 200
East Lansing, MI 48823
Tel. 517-325-9977
www.SpicerGroup.com

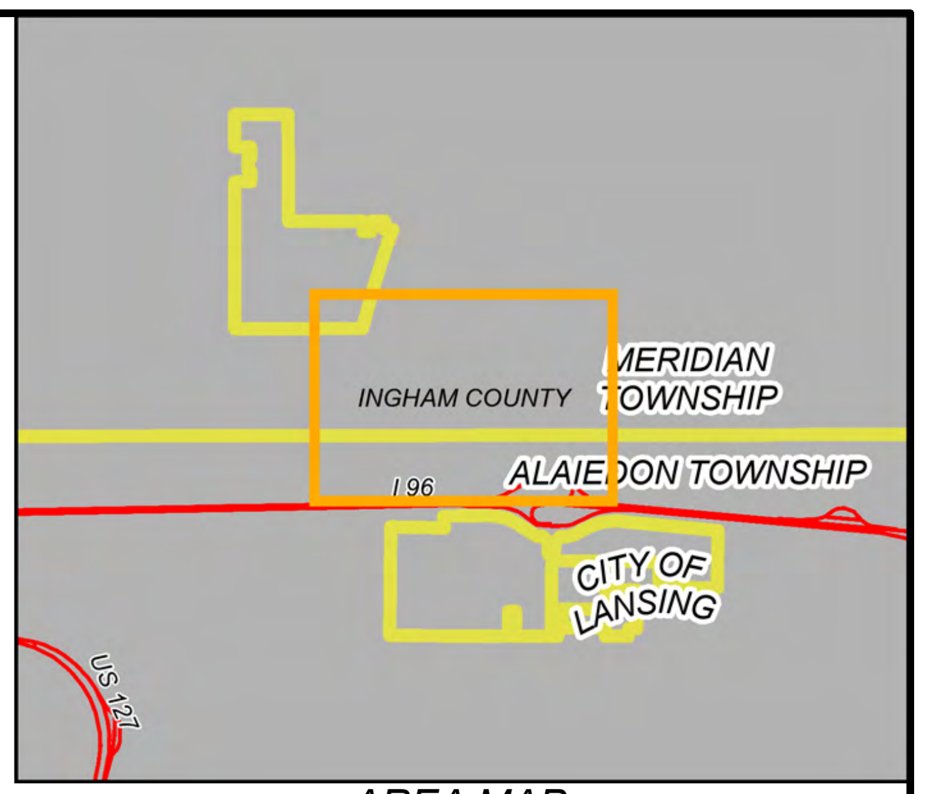
DE. BY: RTB DR. BY: RTB	CH. BY: MMC APP. BY: TAI	PROJECT NO. 122377SG2015
STDS.	SHEET 2 OF 5	DR 2
DATE: NOVEMBER 2019 SCALE: 1":250'	FILE NO. JDR-3362	

INGHAM COUNTY
CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

APPENDIX M: CAPITAL IMPROVEMENT PLAN
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER





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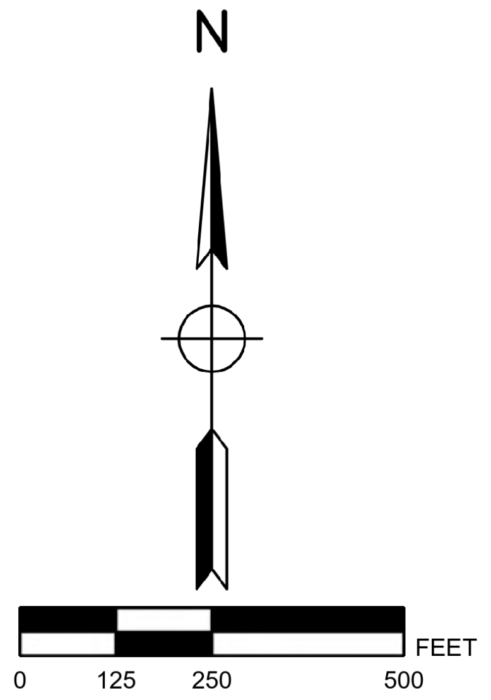

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STDS.	SHEET 3 OF 5	DR 3
DATE: *NOVEMBER 2019* SCALE: *1":250'*	FILE NO. *JDR-3362*	

INGHAM COUNTY CLEAN WATER
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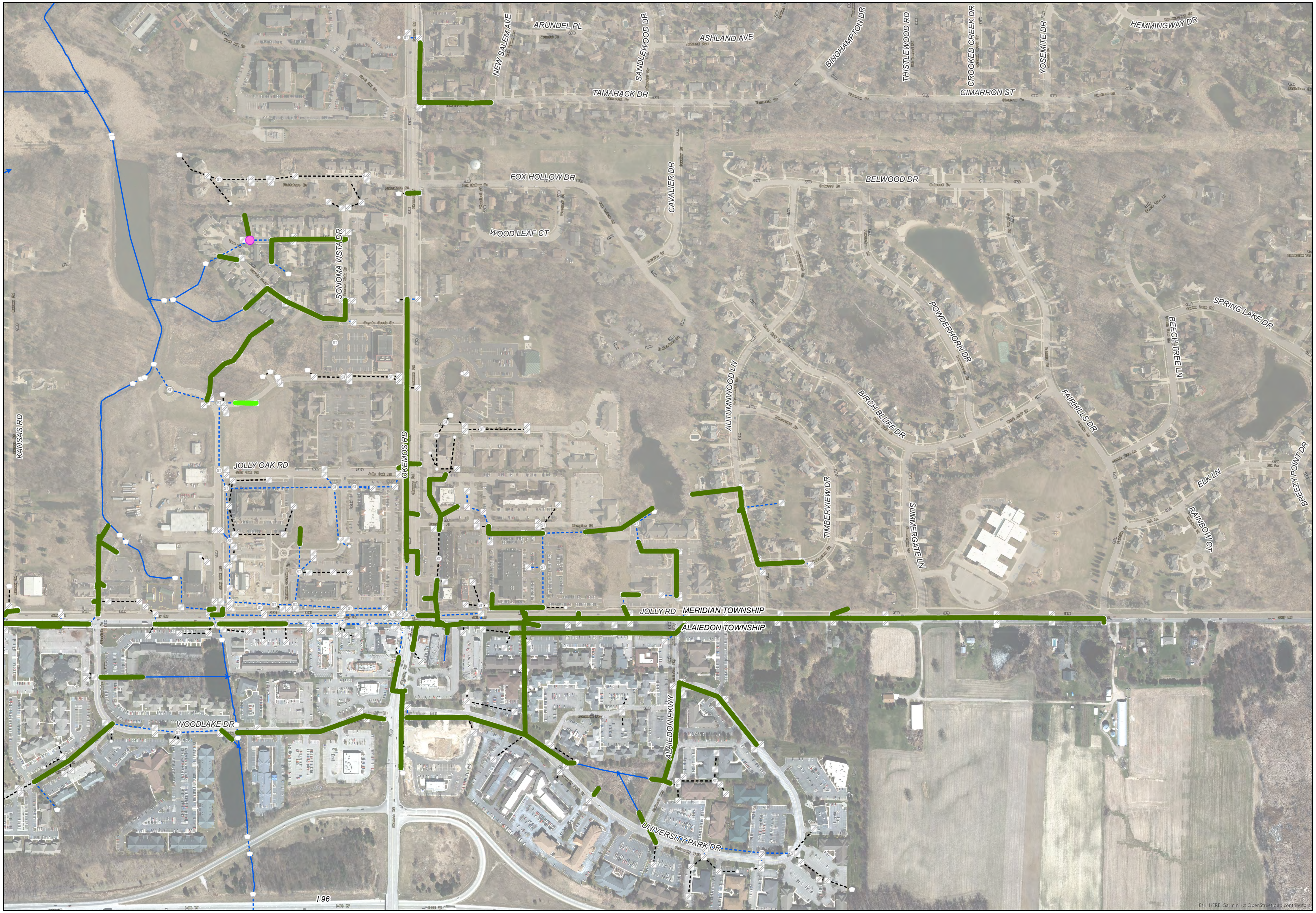

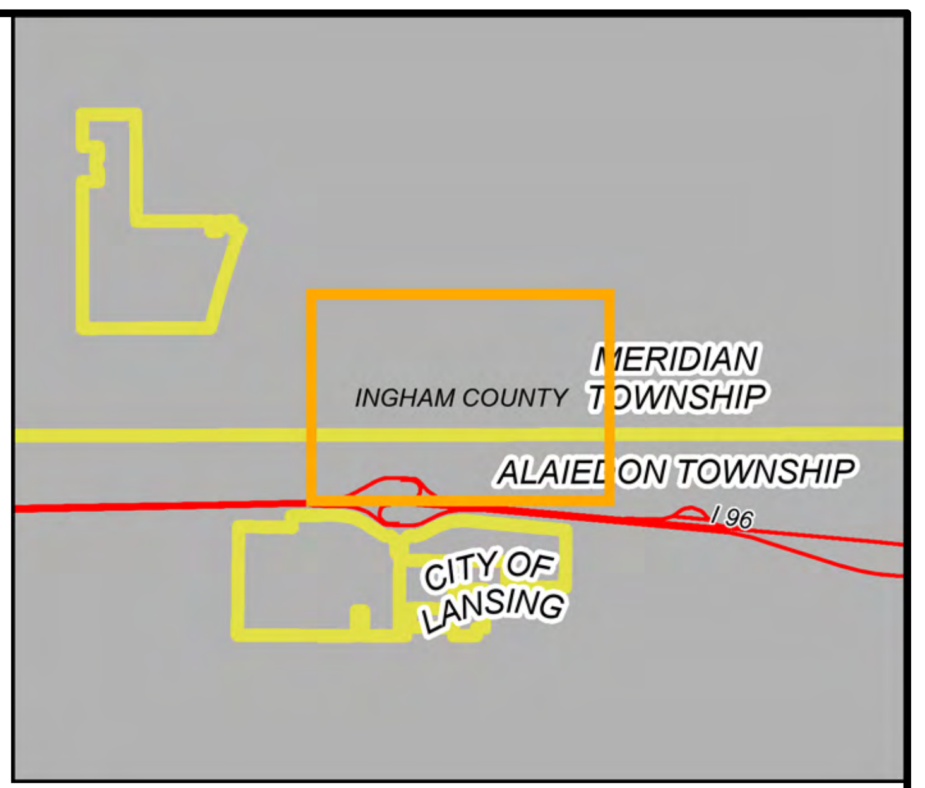

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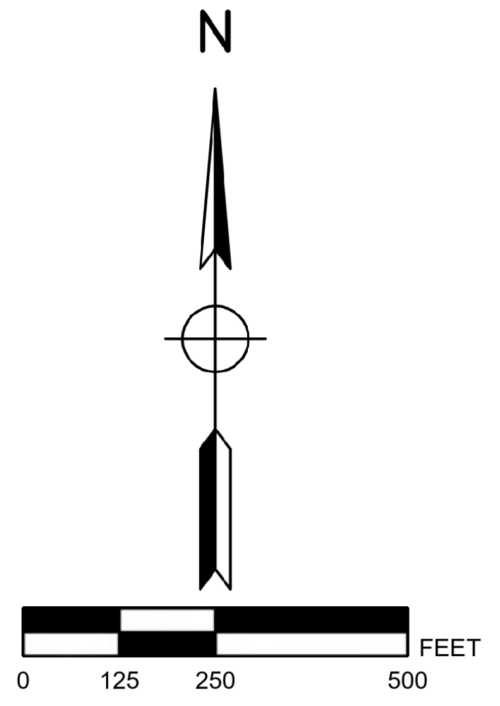

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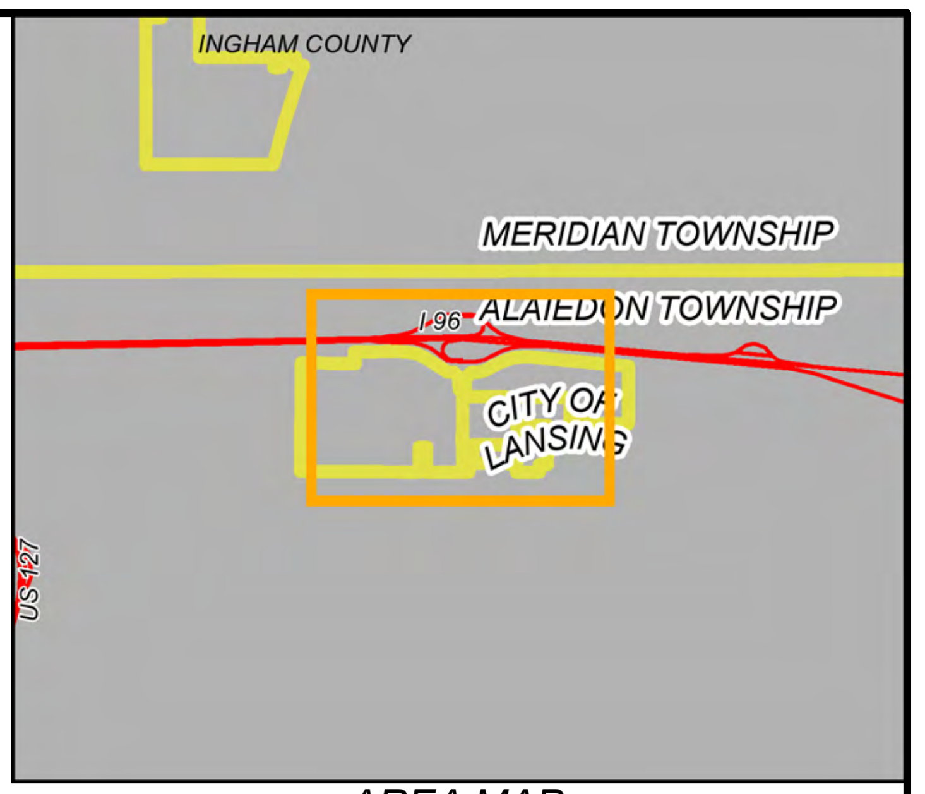

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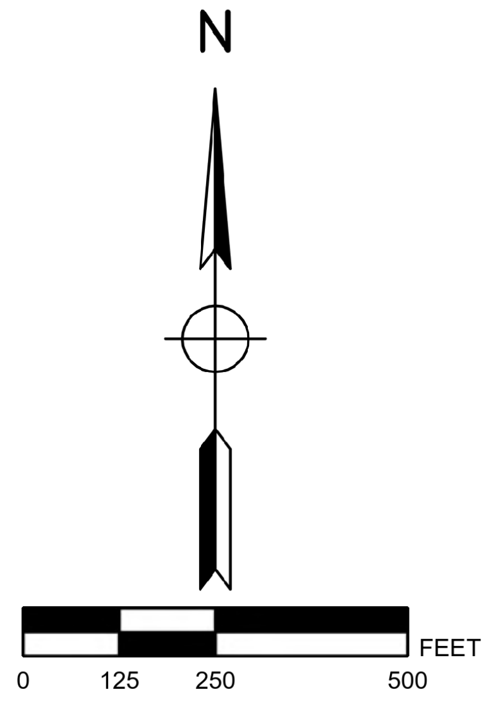

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SHEET *5* OF *5*
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FILE NO. *JDR-3362*
DR 5

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date __**November 30, 2019**________________
(no later than 3 years from executed grant date)

The Smith Consolidated Drain Drainage District *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1082-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Patrick Lindemann, Drain Commissioner at (517) 676-8395 patricklindemann@me.com
Name Phone Number Email

Pat E Lindemann 11-27-19
Signature of Authorized Representative (Original Signature Required) Date

PATRICK E LINDEMANN INCHAM COUNTY DRAIN COMMISSIONER
Print Name and Title of Authorized Representative

SMITH CONSOLIDATED DRAIN DRAINAGE DISTRICT
SAW Grant Project No. 1082-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
1595 W Lake Lansing Road, Suite 200
East Lansing, MI 48823
(517) 325-9977
Max Clever, P.E., P.S., Project Manager

Owner: **SMITH CONSOLIDATED DRAIN DRAINAGE DISTRICT**
707 Buhl Ave.
Mason, MI 48854
(517) 676-8395
Patrick Lindemann, Drain Commissioner

On November 28th, 2016, the Smith Consolidated Drain Drainage District entered into an agreement with the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. The District received the follow grant:

Stormwater Asset Management Plan (SWAMP) – 90% Grant	***$672,862***
Eligible Cost Subtotal	$672,862
LESS Local Match	($67,286)
Total Grant Amount	$605,576

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Part 1: Stormwater Asset Inventory and Condition Assessment

For the District's stormwater collection system, Spicer Group, Inc. first set vertical and horizontal control throughout the Drainage District using a combination of real time kinematic GPS and digital leveling. Spicer Group then completed a mobile mapping LiDAR survey of the entire drainage district area. In addition, an EOS Arrow Gold RTK GNSS receiver was supplied as part of the SAW grant project and was used to gather supplemental survey information of the collection systems assets. The survey information was used to develop a comprehensive Geographic Information System (GIS) including all stormwater assets (manholes, catchbasins, culvert outlets, etc.). The GIS information is utilized via iPads and desktop computers in the Drain Office, and is a detailed "smart" mapping system, using the ArcMap and ArcGIS Pro software by ESRI. This system can be accessed and updated in the field by ICDC staff from new iPads supplied as part of the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspections, ownership information etc. can be accessed. This information can also be queried to provide specific lists, maps, and reports. It is updated easily when future improvements are made.

The county drain storm sewer collection system within the Smith Consolidated Drain Drainage District is approximately 22.9 miles in length and includes approximately 16.78 miles of storm sewer pipes ranging in diameter size from 6"- 96". The collection system consists of mainline sewer, catchbasin leads, and culverts. In addition, the District has approximately 925 structures consisting of manholes, catchbasins, cleanouts, outlets, and a pump wet well and lift station. The District's storm sewers discharge into several detention basins and designed wetlands that flow to the main open channel before ultimately discharging into the Red Cedar River. Summary tables are listed below for District owned and operated pipes and structures.

Table 1: PIPE DIAMETER BY LENGTH

Diameter	Length (ft)	Percent	Length (miles)
6"	913	1.03%	0.17
8"	1,741	1.97%	0.33
10"	115	0.13%	0.02
12"	38,575	43.57%	7.31
15"	11,962	13.51%	2.27
18"	9,056	10.22%	1.72
21"	540	0.61%	0.10
24"	13,112	14.81%	2.48
30"	436	0.49%	0.08
36"	9,959	11.25%	1.89
48"	612	0.69%	0.12
60"	458	0.52%	0.09
72"	205	0.23%	0.04
80"	317	0.36%	0.06
84"	200	0.23%	0.04
96"	53	0.06%	0.01
Unknown	288	0.33%	0.05
TOTAL	**88,543**	**100%**	**16.78**

Table 2: STRUCTURE TYPES

Structure Type	Number
Catchbasins	521
Manholes	270
Outlets	102
Other	30
Lift Station	1
Wet Well	1
TOTAL	925

Not every pipe and structure owned and operated by the District could be investigated/inventoried due to perpetual water in the system, access limitations, and more sewer cleaning than was budgeted. Emphasis was placed on performing condition assessments for the mainline sewers and mainline manholes and catchbasins.

Cleaning and televising operations were performed by the Ingham County Drain Office maintenance staff, in cooperation with Spicer Group and Plummers Environmental Services, on 480 of the storm pipe segments in the collection system. Spicer Group performed comprehensive inspection for all the District's mainline stormwater manholes and catchbasins. The NASSCO Manhole/Pipeline Assessment Certification Program (MACP/PACP) version 7.0.2 standards were used to identify and code defects and apply standardized grading/scoring to provide overall condition ratings of the stormwater assets.

In addition to the cleaning and televising performed on the storm sewers, the lift station and attached wet well structure were inspected and scored in a manner that could be integrated into the overall capital improvement plan.

Part 2: Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of stormwater service does the Drain Office want to provide to its customers? How are projects going to be prioritized and included in the CIP? What cost is the District willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan.

The Drain Commissioner has published *Rules of the Ingham County Drain Commissioner*, which provide the standards required for engineering of storm sewer systems. The following rules are key requirements in the rulebook for evaluating the enclosed drainage systems:

- Enclosed storm drain systems will be sized to accommodate the 10-year storm, with the hydraulic gradient kept below the top of the pipe.
- For residential developments and commercial projects smaller than 10 acres in size, a time of concentration of 15 minutes shall be used. Other situations may require that the time of concentration be calculated using TR-55 or equivalent method.

Part 3: Criticality (Risk)

For each asset in the District's stormwater collection system, a criticality/risk analysis was performed to determine and prioritize the District's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for assets; including pipes, manholes, and drainage structures, etc. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic and hydraulic impacts. Finally, the Criticality (Risk) score was calculated using:

$$\textbf{RISK = LoF x CoF}$$

For the District's stormwater collection system, no pipe or structure locations were identified with a high risk score. A total of 18 pipes and 9 structures had defects and risk scores that will require repair in the first five years of the schedule. These scores were evaluated and incorporated into the resulting Capital Improvement Plan.

Part 4: Revenue Structure

Yearly Maintenance Budget

The yearly maintenance budget of county drains is established from Section 280.196 Subsection 4 of the Drain Code of 1956 as $5,000 per mile of drain. Through the process to consolidate the drain, the Smith Consolidated Drain Drainage District now contains a total of 23 maintenance miles of county drains. Therefore, the Drainage Districts within the Smith Consolidated Drain Drainage District can assess a maximum of $115,000 annually to the assessment rolls on record for work defined as maintenance under said section of the Drain Code.

Equipment Costs

Non-personnel related costs are recorded on a per unit basis of use during maintenance and inspection activities in order to recoup costs. This includes vehicles, excavators, cleaning trucks and televising equipment.

Part 5: Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the stormwater system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. The Drain Office is limited to maintenance and inspection activities by the Drain Code of 1956. The bulk of the cost estimates listed in the capital improvement plan were based on the Ingham County Drain maintenance personnel performing the repairs.

This results in the CIP plan over the next 5 years are summarized as follows:

1. Pump Station Check Valve and Force Main Repair - $13,000
2. Misc. Structure Cleaning and Patching - $4,500
3. Misc. Sewer Repairs, Root removals, Spot Liners Projects - $38,735
4. Additional Cleaning and Televising - $64,060

The full 5-year capital improvement plan from Appendix M of the Asset Management Plan and its associated map is attached to this summary.

Conclusion

The Smith Consolidated Drain Drainage District stormwater system is relatively new with an average remaining life of approximately 30 years on most of the storm sewer. Since its establishment it has been regularly maintained and therefore most pipes and structures in the system are in good condition outside of the short list of pipes in the capital improvement plan.

In accordance with the SAW Grant requirements, the District's Stormwater Asset Management Plan (SWAMP) needs to be kept available for citizen review for 15 years. The SWAMP should be reviewed annually, and the components updated and included in the District's annual budget process.

Appendix M - Capital Improvement Plan - 5 Year

Structures

ID Number	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
301	2020	Sunwind Pump Station	Discharge check valve inoperable	Replace check valve	$ 3,000.00
10990	2020	Sower Blvd, Okemos	Cracks and Deposits	Clean and Patch	$ 500.00
11440	2020	Sower Blvd, Okemos – Near Hydrant	Cracks and Deposits	Clean and Patch	$ 500.00
12010	2020	Dayspring Ct.	Cracks and Deposits	Clean and Patch	$ 500.00
12130	2020	Windy Heights Dr.	Cracks and Deposits	Clean and Patch	$ 500.00
225	2020	Sun Rapids Dr., East of Windy Heights East	Cracks and Deposits	Clean and Patch	$ 500.00
232	2020	Sun Rapids Dr., South of Bennet Rd.	Cracks and Deposits	Clean and Patch	$ 500.00
236	2020	Sun Rapids Dr., North of Aeolian Dr.	Cracks and Deposits	Clean and Patch	$ 500.00
244	2020	Sun Rapids Dr.	Cracks and Deposits	Clean and Patch	$ 500.00
5063	2020	Taos Trl.	Cracks and Deposits	Clean and Patch	$ 500.00

Total: **$7,500**

Pipes

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
7150	2020	Sunwind Pump Station Force Main	Broken	Open Cut Spot Repair	$ 10,000.00
180	2020	See Map	Unknown	Clean and Televise	$ 434.57
840	2020	See Map	Unknown	Clean and Televise	$ 720.73
890	2020	See Map	Unknown	Clean and Televise	$ 550.44
940	2020	See Map	Unknown	Clean and Televise	$ 1,583.81
1080	2020	See Map	Unknown	Clean and Televise	$ 1,237.21
1120	2020	See Map	Unknown	Clean and Televise	$ 290.05
1140	2020	See Map	Unknown	Clean and Televise	$ 560.01
1680	2020	See Map	Unknown	Clean and Televise	$ 509.33
6880	2020	See Map	Unknown	Clean and Televise	$ 491.51
6890	2020	See Map	Unknown	Clean and Televise	$ 1,070.50
6910	2020	See Map	Unknown	Clean and Televise	$ 929.38
7350	2020	See Map	Unknown	Clean and Televise	$ 603.90
7610	2020	See Map	Unknown	Clean and Televise	$ 446.05
8600	2020	See Map	Unknown	Clean and Televise	$ 1,842.74
8920	2020	See Map	Unknown	Clean and Televise	$ 874.21
7571	2020	See Map	Unknown	Clean and Televise	$ 492.54
1682	2020	See Map	Unknown	Clean and Televise	$ 238.54
6760	2020	See Map	Unknown	Clean and Televise	$ 314.86
1750	2020	See Map	Unknown	Clean and Televise	$ 73.53
9250	2020	See Map	Unknown	Clean and Televise	$ 319.40
10200	2020	See Map	Unknown	Clean and Televise	$ 154.71
10650	2020	See Map	Unknown	Clean and Televise	$ 83.73
1830	2020	See Map	Unknown	Clean and Televise	$ 101.06
2050	2020	See Map	Unknown	Clean and Televise	$ 124.25
2090	2020	See Map	Unknown	Clean and Televise	$ 809.71
2140	2020	See Map	Unknown	Clean and Televise	$ 420.02
2600	2020	See Map	Unknown	Clean and Televise	$ 103.23
3620	2020	See Map	Unknown	Clean and Televise	$ 526.03
4610	2020	See Map	Unknown	Clean and Televise	$ 699.63
110	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
150	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
1550	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
7380	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
8820	2021	See Map	Cracks and Holes	Clean and Trenchless Spot Repair	$ 5,000.00
9260	2021	See Map	Severe Separated and Offset Joint	Replace	$ 13,734.50
60	2021	See Map	Unknown	Televise	$ 222.61
70	2021	See Map	Unknown	Televise	$ 259.16
80	2021	See Map	Unknown	Televise	$ 305.56
90	2021	See Map	Unknown	Televise	$ 156.34
120	2021	See Map	Unknown	Televise	$ 223.00
130	2021	See Map	Unknown	Televise	$ 267.74
140	2021	See Map	Unknown	Televise	$ 199.28
200	2021	See Map	Unknown	Televise	$ 320.55
250	2021	See Map	Unknown	Televise	$ 111.46
260	2021	See Map	Unknown	Televise	$ 95.28
270	2021	See Map	Unknown	Televise	$ 56.51
280	2021	See Map	Unknown	Televise	$ 55.34
290	2021	See Map	Unknown	Televise	$ 119.18
310	2021	See Map	Unknown	Televise	$ 120.79
320	2021	See Map	Unknown	Televise	$ 297.55
350	2021	See Map	Unknown	Televise	$ 325.95
360	2021	See Map	Unknown	Televise	$ 328.27
380	2021	See Map	Unknown	Televise	$ 541.72
420	2021	See Map	Unknown	Televise	$ 326.11
500	2022	See Map	Unknown	Televise	$ 32.90
510	2022	See Map	Unknown	Televise	$ 60.60
540	2022	See Map	Unknown	Televise	$ 188.51
560	2022	See Map	Unknown	Televise	$ 65.52
580	2022	See Map	Unknown	Televise	$ 237.38
590	2022	See Map	Unknown	Televise	$ 185.67
600	2022	See Map	Unknown	Televise	$ 314.08
620	2022	See Map	Unknown	Televise	$ 345.17
630	2022	See Map	Unknown	Televise	$ 302.81
640	2022	See Map	Unknown	Televise	$ 223.18
670	2022	See Map	Unknown	Televise	$ 116.72
680	2022	See Map	Unknown	Televise	$ 135.65
780	2022	See Map	Unknown	Televise	$ 179.24
800	2022	See Map	Unknown	Televise	$ 281.56
830	2022	See Map	Unknown	Televise	$ 139.25
850	2022	See Map	Unknown	Televise	$ 167.78
860	2022	See Map	Unknown	Televise	$ 175.31
880	2022	See Map	Unknown	Televise	$ 125.39
910	2022	See Map	Unknown	Televise	$ 237.29
920	2022	See Map	Unknown	Televise	$ 231.11
931	2022	See Map	Unknown	Televise	$ 477.06
950	2022	See Map	Unknown	Televise	$ 264.14

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
960	2022	See Map	Unknown	Televise	$ 222.26
970	2022	See Map	Unknown	Televise	$ 171.68
980	2022	See Map	Unknown	Televise	$ 288.43
990	2022	See Map	Unknown	Televise	$ 147.87
1000	2022	See Map	Unknown	Televise	$ 265.95
1010	2022	See Map	Unknown	Televise	$ 197.13
1020	2022	See Map	Unknown	Televise	$ 157.35
1040	2022	See Map	Unknown	Televise	$ 283.86
1090	2022	See Map	Unknown	Televise	$ 30.93
1110	2022	See Map	Unknown	Televise	$ 267.97
1130	2022	See Map	Unknown	Televise	$ 46.32
1150	2022	See Map	Unknown	Televise	$ 187.09
1160	2022	See Map	Unknown	Televise	$ 218.41
1170	2022	See Map	Unknown	Televise	$ 150.31
1200	2022	See Map	Unknown	Televise	$ 156.86
1240	2022	See Map	Unknown	Televise	$ 254.72
1250	2022	See Map	Unknown	Televise	$ 272.01
1280	2022	See Map	Unknown	Televise	$ 130.12
1640	2022	See Map	Unknown	Televise	$ 287.12
1820	2022	See Map	Unknown	Televise	$ 176.30
1840	2022	See Map	Unknown	Televise	$ 191.05
1860	2022	See Map	Unknown	Televise	$ 24.39
1870	2022	See Map	Unknown	Televise	$ 56.56
1880	2022	See Map	Unknown	Televise	$ 299.60
1910	2022	See Map	Unknown	Televise	$ 149.31
1970	2022	See Map	Unknown	Televise	$ 300.21
2120	2022	See Map	Unknown	Televise	$ 235.15
2130	2022	See Map	Unknown	Televise	$ 117.92
2270	2022	See Map	Unknown	Televise	$ 378.40
2460	2022	See Map	Unknown	Televise	$ 75.91
2480	2022	See Map	Unknown	Televise	$ 23.75
2490	2022	See Map	Unknown	Televise	$ 20.89
2510	2022	See Map	Unknown	Televise	$ 105.40
2620	2022	See Map	Unknown	Televise	$ 235.86
2660	2022	See Map	Unknown	Televise	$ 9.49
2670	2022	See Map	Unknown	Televise	$ 108.78
2700	2022	See Map	Unknown	Televise	$ 13.40
2730	2022	See Map	Unknown	Televise	$ 37.39
2750	2022	See Map	Unknown	Televise	$ 197.76
2790	2022	See Map	Unknown	Televise	$ 236.73
2800	2022	See Map	Unknown	Televise	$ 102.61
2830	2022	See Map	Unknown	Televise	$ 22.96
2880	2022	See Map	Unknown	Televise	$ 50.95
2900	2022	See Map	Unknown	Televise	$ 101.26
2970	2022	See Map	Unknown	Televise	$ 115.36
2980	2022	See Map	Unknown	Televise	$ 101.24

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
2990	2022	See Map	Unknown	Televise	$ 25.26
3000	2022	See Map	Unknown	Televise	$ 19.07
3010	2022	See Map	Unknown	Televise	$ 8.34
3020	2022	See Map	Unknown	Televise	$ 72.16
3030	2022	See Map	Unknown	Televise	$ 82.69
3050	2022	See Map	Unknown	Televise	$ 275.05
3080	2022	See Map	Unknown	Televise	$ 268.98
3110	2022	See Map	Unknown	Televise	$ 238.80
3140	2022	See Map	Unknown	Televise	$ 292.16
3170	2022	See Map	Unknown	Televise	$ 274.39
3210	2022	See Map	Unknown	Televise	$ 292.33
3240	2022	See Map	Unknown	Televise	$ 284.05
3250	2022	See Map	Unknown	Televise	$ 297.99
3280	2022	See Map	Unknown	Televise	$ 287.82
3310	2022	See Map	Unknown	Televise	$ 19.52
3320	2022	See Map	Unknown	Televise	$ 240.90
3340	2022	See Map	Unknown	Televise	$ 50.97
3350	2022	See Map	Unknown	Televise	$ 65.28
3360	2022	See Map	Unknown	Televise	$ 53.86
3370	2022	See Map	Unknown	Televise	$ 27.79
3450	2022	See Map	Unknown	Televise	$ 9.93
3460	2022	See Map	Unknown	Televise	$ 61.43
3470	2022	See Map	Unknown	Televise	$ 242.21
3490	2022	See Map	Unknown	Televise	$ 276.86
3510	2022	See Map	Unknown	Televise	$ 22.98
3520	2022	See Map	Unknown	Televise	$ 6.53
3540	2022	See Map	Unknown	Televise	$ 229.44
3550	2022	See Map	Unknown	Televise	$ 88.46
3560	2022	See Map	Unknown	Televise	$ 57.83
3710	2022	See Map	Unknown	Televise	$ 58.00
3720	2022	See Map	Unknown	Televise	$ 79.74
3730	2022	See Map	Unknown	Televise	$ 46.55
3850	2022	See Map	Unknown	Televise	$ 85.83
4170	2022	See Map	Unknown	Televise	$ 81.77
4220	2022	See Map	Unknown	Televise	$ 117.25
4250	2022	See Map	Unknown	Televise	$ 49.19
4270	2022	See Map	Unknown	Televise	$ 81.02
4280	2022	See Map	Unknown	Televise	$ 58.05
4290	2022	See Map	Unknown	Televise	$ 8.74
4300	2022	See Map	Unknown	Televise	$ 405.06
4320	2022	See Map	Unknown	Televise	$ 472.86
4370	2022	See Map	Unknown	Televise	$ 65.97
4380	2022	See Map	Unknown	Televise	$ 35.95
4440	2022	See Map	Unknown	Televise	$ 206.01
4450	2022	See Map	Unknown	Televise	$ 326.05
4460	2022	See Map	Unknown	Televise	$ 219.53

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
4480	2022	See Map	Unknown	Televise	$ 48.94
4490	2022	See Map	Unknown	Televise	$ 59.39
4500	2022	See Map	Unknown	Televise	$ 207.23
4510	2022	See Map	Unknown	Televise	$ 59.91
4520	2022	See Map	Unknown	Televise	$ 180.32
4530	2022	See Map	Unknown	Televise	$ 98.19
4570	2022	See Map	Unknown	Televise	$ 218.23
4620	2022	See Map	Unknown	Televise	$ 319.35
4630	2022	See Map	Unknown	Televise	$ 105.06
4640	2022	See Map	Unknown	Televise	$ 252.72
4650	2022	See Map	Unknown	Televise	$ 93.54
4690	2022	See Map	Unknown	Televise	$ 71.79
4710	2022	See Map	Unknown	Televise	$ 22.19
4760	2022	See Map	Unknown	Televise	$ 80.46
4790	2022	See Map	Unknown	Televise	$ 180.57
4830	2022	See Map	Unknown	Televise	$ 238.02
4840	2022	See Map	Unknown	Televise	$ 168.01
4860	2022	See Map	Unknown	Televise	$ 45.85
4870	2022	See Map	Unknown	Televise	$ 9.67
5020	2022	See Map	Unknown	Televise	$ 157.72
5030	2022	See Map	Unknown	Televise	$ 118.75
5040	2022	See Map	Unknown	Televise	$ 219.69
5080	2022	See Map	Unknown	Televise	$ 102.69
5100	2022	See Map	Unknown	Televise	$ 42.72
5130	2022	See Map	Unknown	Televise	$ 275.21
5140	2022	See Map	Unknown	Televise	$ 119.80
5600	2022	See Map	Unknown	Televise	$ 61.31
6030	2022	See Map	Unknown	Televise	$ 40.63
6040	2022	See Map	Unknown	Televise	$ 35.73
6350	2022	See Map	Unknown	Televise	$ 95.41
6430	2022	See Map	Unknown	Televise	$ 19.10
6800	2022	See Map	Unknown	Televise	$ 133.64
6810	2022	See Map	Unknown	Televise	$ 179.61
6840	2022	See Map	Unknown	Televise	$ 275.22
6920	2022	See Map	Unknown	Televise	$ 368.55
6990	2022	See Map	Unknown	Televise	$ 109.94
7040	2022	See Map	Unknown	Televise	$ 195.18
7050	2022	See Map	Unknown	Televise	$ 52.71
7060	2022	See Map	Unknown	Televise	$ 124.89
7070	2022	See Map	Unknown	Televise	$ 33.86
7100	2022	See Map	Unknown	Televise	$ 200.47
7160	2023	See Map	Unknown	Televise	$ 55.46
7170	2023	See Map	Unknown	Televise	$ 45.55
7190	2023	See Map	Unknown	Televise	$ 79.10
7220	2023	See Map	Unknown	Televise	$ 135.06
7280	2023	See Map	Unknown	Televise	$ 44.50

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
7310	2023	See Map	Unknown	Televise	$ 256.65
7320	2023	See Map	Unknown	Televise	$ 144.10
7330	2023	See Map	Unknown	Televise	$ 140.13
7360	2023	See Map	Unknown	Televise	$ 94.67
7410	2023	See Map	Unknown	Televise	$ 269.08
7430	2023	See Map	Unknown	Televise	$ 79.23
7460	2023	See Map	Unknown	Televise	$ 121.33
7500	2023	See Map	Unknown	Televise	$ 466.77
7510	2023	See Map	Unknown	Televise	$ 145.95
7540	2023	See Map	Unknown	Televise	$ 11.40
7550	2023	See Map	Unknown	Televise	$ 140.26
7570	2023	See Map	Unknown	Televise	$ 375.25
7580	2023	See Map	Unknown	Televise	$ 19.12
7600	2023	See Map	Unknown	Televise	$ 48.32
7650	2023	See Map	Unknown	Televise	$ 189.05
7680	2023	See Map	Unknown	Televise	$ 268.65
7750	2023	See Map	Unknown	Televise	$ 114.29
7790	2023	See Map	Unknown	Televise	$ 142.77
7810	2023	See Map	Unknown	Televise	$ 38.28
7820	2023	See Map	Unknown	Televise	$ 116.09
7860	2023	See Map	Unknown	Televise	$ 209.21
7900	2023	See Map	Unknown	Televise	$ 130.36
8000	2023	See Map	Unknown	Televise	$ 234.95
8020	2023	See Map	Unknown	Televise	$ 214.83
8160	2023	See Map	Unknown	Televise	$ 59.04
8190	2023	See Map	Unknown	Televise	$ 99.87
8220	2023	See Map	Unknown	Televise	$ 100.05
8230	2023	See Map	Unknown	Televise	$ 79.45
8520	2023	See Map	Unknown	Televise	$ 141.19
8570	2023	See Map	Unknown	Televise	$ 97.45
8590	2023	See Map	Unknown	Televise	$ 156.02
8610	2023	See Map	Unknown	Televise	$ 132.52
8620	2023	See Map	Unknown	Televise	$ 191.15
8720	2023	See Map	Unknown	Televise	$ 147.88
8730	2023	See Map	Unknown	Televise	$ 104.32
8750	2023	See Map	Unknown	Televise	$ 132.55
8760	2023	See Map	Unknown	Televise	$ 156.01
8770	2023	See Map	Unknown	Televise	$ 29.95
8780	2023	See Map	Unknown	Televise	$ 14.58
8810	2023	See Map	Unknown	Televise	$ 154.12
8880	2023	See Map	Unknown	Televise	$ 126.33
8930	2023	See Map	Unknown	Televise	$ 29.96
8960	2023	See Map	Unknown	Televise	$ 216.66
8990	2023	See Map	Unknown	Televise	$ 217.91
9000	2023	See Map	Unknown	Televise	$ 164.48
9010	2023	See Map	Unknown	Televise	$ 169.21

Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
9030	2023	See Map	Unknown	Televise	$ 26.79
9080	2023	See Map	Unknown	Televise	$ 218.30
9090	2023	See Map	Unknown	Televise	$ 77.74
9100	2023	See Map	Unknown	Televise	$ 169.41
9120	2023	See Map	Unknown	Televise	$ 110.29
9130	2023	See Map	Unknown	Televise	$ 179.50
9140	2023	See Map	Unknown	Televise	$ 7.89
9170	2023	See Map	Unknown	Televise	$ 48.56
9330	2023	See Map	Unknown	Televise	$ 232.85
9340	2023	See Map	Unknown	Televise	$ 72.36
9350	2023	See Map	Unknown	Televise	$ 164.07
9360	2023	See Map	Unknown	Televise	$ 222.96
9370	2023	See Map	Unknown	Televise	$ 95.60
9400	2023	See Map	Unknown	Televise	$ 328.45
9410	2023	See Map	Unknown	Televise	$ 375.15
9450	2023	See Map	Unknown	Televise	$ 72.12
9460	2023	See Map	Unknown	Televise	$ 102.24
9470	2023	See Map	Unknown	Televise	$ 88.94
9480	2023	See Map	Unknown	Televise	$ 37.25
9510	2023	See Map	Unknown	Televise	$ 47.89
9530	2023	See Map	Unknown	Televise	$ 11.43
9540	2023	See Map	Unknown	Televise	$ 365.91
9550	2023	See Map	Unknown	Televise	$ 85.77
9560	2023	See Map	Unknown	Televise	$ 11.04
9570	2023	See Map	Unknown	Televise	$ 47.38
9580	2023	See Map	Unknown	Televise	$ 23.71
9590	2023	See Map	Unknown	Televise	$ 219.63
9620	2023	See Map	Unknown	Televise	$ 473.59
9630	2023	See Map	Unknown	Televise	$ 61.50
9660	2023	See Map	Unknown	Televise	$ 157.50
9700	2023	See Map	Unknown	Televise	$ 196.45
9720	2023	See Map	Unknown	Televise	$ 185.15
9760	2023	See Map	Unknown	Televise	$ 188.96
9820	2023	See Map	Unknown	Televise	$ 28.03
9830	2023	See Map	Unknown	Televise	$ 40.43
9840	2023	See Map	Unknown	Televise	$ 71.41
9890	2023	See Map	Unknown	Televise	$ 133.56
9900	2023	See Map	Unknown	Televise	$ 246.17
9940	2023	See Map	Unknown	Televise	$ 65.89
9970	2023	See Map	Unknown	Televise	$ 56.24
9990	2023	See Map	Unknown	Televise	$ 213.19
10030	2023	See Map	Unknown	Televise	$ 318.32
10040	2023	See Map	Unknown	Televise	$ 284.93
10160	2023	See Map	Unknown	Televise	$ 87.66
10220	2023	See Map	Unknown	Televise	$ 133.24
10260	2023	See Map	Unknown	Televise	$ 185.53

Appendix M - Capital Improvement Plan - 5 Year

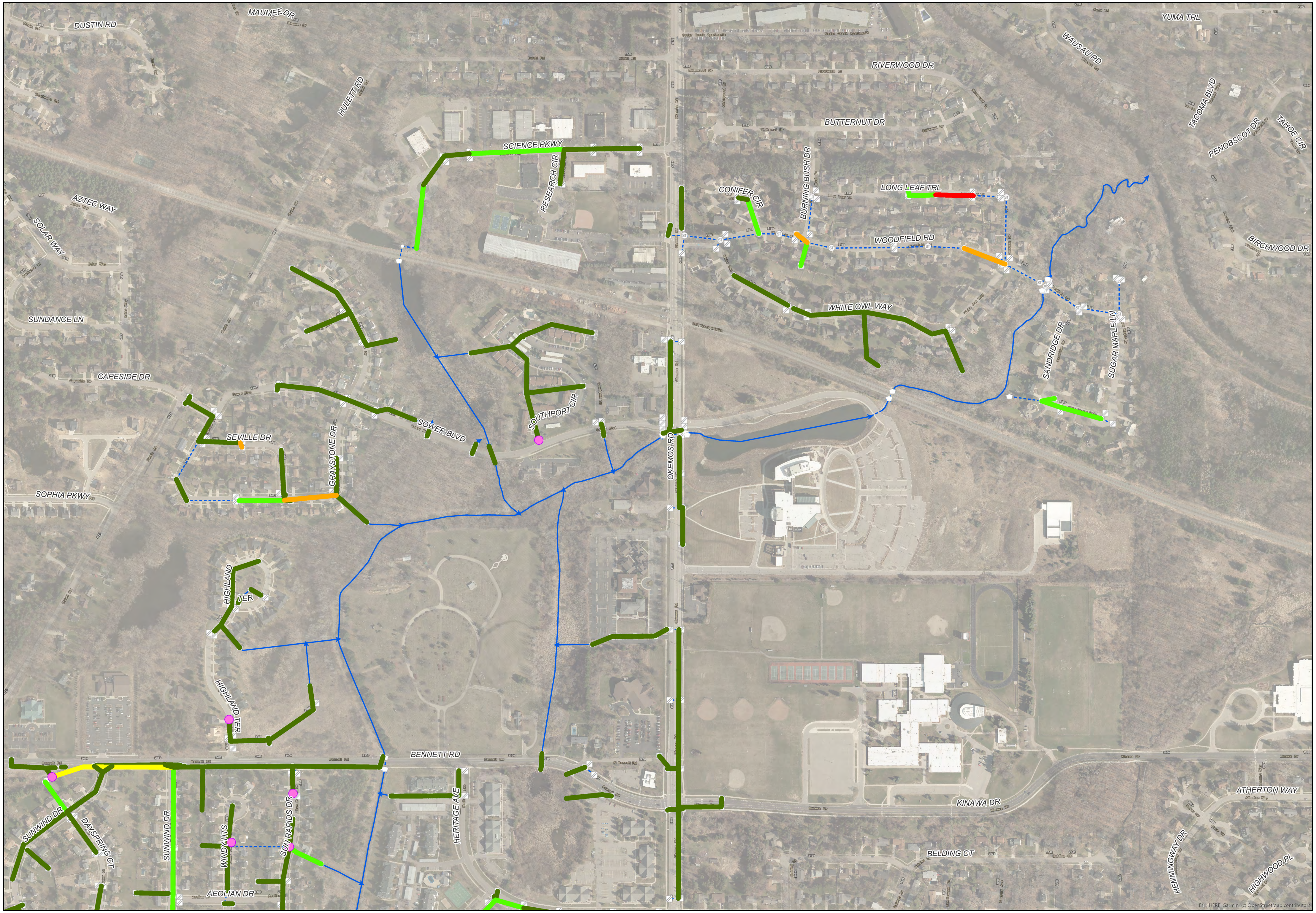
Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
10290	2023	See Map	Unknown	Televise	$ 183.40
10300	2023	See Map	Unknown	Televise	$ 72.79
10310	2023	See Map	Unknown	Televise	$ 137.50
10320	2023	See Map	Unknown	Televise	$ 50.69
10330	2023	See Map	Unknown	Televise	$ 21.88
10340	2023	See Map	Unknown	Televise	$ 76.67
10350	2023	See Map	Unknown	Televise	$ 126.11
10360	2023	See Map	Unknown	Televise	$ 99.78
10370	2023	See Map	Unknown	Televise	$ 84.00
10480	2023	See Map	Unknown	Televise	$ 80.39
10490	2023	See Map	Unknown	Televise	$ 100.85
10500	2023	See Map	Unknown	Televise	$ 49.38
10510	2023	See Map	Unknown	Televise	$ 54.51
10520	2023	See Map	Unknown	Televise	$ 103.53
10530	2023	See Map	Unknown	Televise	$ 118.54
1041	2023	See Map	Unknown	Televise	$ 128.29
781	2023	See Map	Unknown	Televise	$ 29.49
7501	2023	See Map	Unknown	Televise	$ 59.04
91	2023	See Map	Unknown	Televise	$ 59.64
10371	2023	See Map	Unknown	Televise	$ 75.29
10372	2023	See Map	Unknown	Televise	$ 27.45
10590	2023	See Map	Unknown	Televise	$ 27.67
10610	2023	See Map	Unknown	Televise	$ 32.63
10640	2023	See Map	Unknown	Televise	$ 227.95
10660	2023	See Map	Unknown	Televise	$ 8.66
10670	2023	See Map	Unknown	Televise	$ 24.55
10680	2023	See Map	Unknown	Televise	$ 27.52
10690	2023	See Map	Unknown	Televise	$ 78.71
10720	2023	See Map	Unknown	Televise	$ 193.32
10730	2023	See Map	Unknown	Televise	$ 49.59
10740	2023	See Map	Unknown	Televise	$ 19.44
10760	2023	See Map	Unknown	Televise	$ 504.66
10770	2023	See Map	Unknown	Televise	$ 40.91
10780	2023	See Map	Unknown	Televise	$ 80.34
10790	2023	See Map	Unknown	Televise	$ 78.31
10540	2023	See Map	Unknown	Televise	$ 96.78
10800	2023	See Map	Unknown	Televise	$ 196.03
10860	2023	See Map	Unknown	Televise	$ 35.02
1091	2023	See Map	Unknown	Televise	$ 33.45
782	2023	See Map	Unknown	Televise	$ 134.15
783	2023	See Map	Unknown	Televise	$ 19.02
10830	2023	See Map	Unknown	Televise	$ 12.70
10820	2023	See Map	Unknown	Televise	$ 17.48
230	2023	See Map	Unknown	Televise	$ 60.93
521	2023	See Map	Unknown	Televise	$ 191.62
8570	2023	See Map	Unknown	Televise	$ 151.60

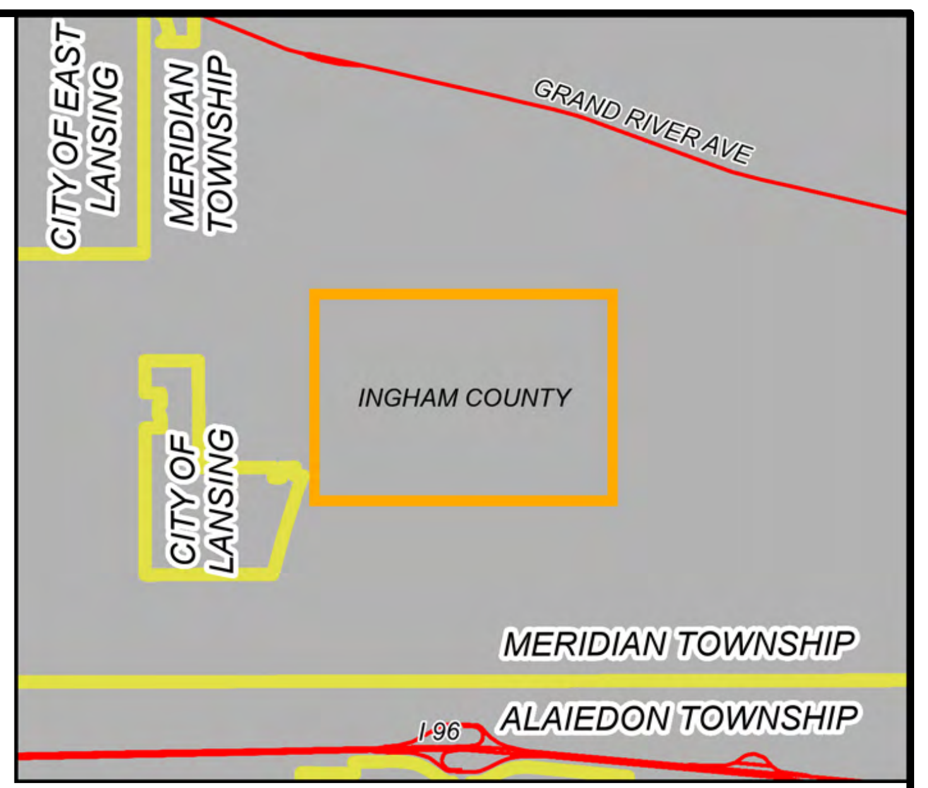
Appendix M - Capital Improvement Plan - 5 Year

Pipe ID	Proposed Year	Location	Deficiency	Corrective Action	Cost Estimate
10870	2023	See Map	Unknown	Televise	$ 58.85
92	2023	See Map	Unknown	Televise	$ 95.20
10300	2023	See Map	Unknown	Televise	$ 45.56
10300	2023	See Map	Unknown	Televise	$ 34.80
10291	2023	See Map	Unknown	Televise	$ 35.16
10310	2023	See Map	Unknown	Televise	$ 38.53
10310	2023	See Map	Unknown	Televise	$ 56.78
10990	2023	See Map	Unknown	Televise	$ 4.55
11000	2023	See Map	Unknown	Televise	$ 59.89
11220	2023	See Map	Unknown	Televise	$ 58.72
11240	2023	See Map	Unknown	Televise	$ 28.04
930	2023	See Map	Unknown	Televise	$ 158.12
11260	2023	See Map	Unknown	Televise	$ 5.01
11270	2023	See Map	Unknown	Televise	$ 40.45
5170	2023	See Map	Unknown	Televise	$ 94.88
11290	2023	See Map	Unknown	Televise	$ 20.58
11300	2023	See Map	Unknown	Televise	$ 31.96
11310	2023	See Map	Unknown	Televise	$ 21.46
11320	2023	See Map	Unknown	Televise	$ 33.33
1930	2023	See Map	Unknown	Televise	$ 68.02
1960	2023	See Map	Unknown	Televise	$ 24.54
2210	2023	See Map	Unknown	Televise	$ 216.01
10890	2023	See Map	Unknown	Televise	$ 105.28
10900	2023	See Map	Unknown	Televise	$ 96.30
10930	2023	See Map	Unknown	Televise	$ 29.48
10940	2023	See Map	Unknown	Televise	$ 37.38
10950	2023	See Map	Unknown	Televise	$ 81.25
10960	2023	See Map	Unknown	Televise	$ 29.47
11330	2023	See Map	Unknown	Televise	$ 25.32
7572	2023	See Map	Unknown	Televise	$ 29.61
10470	2023	See Map	Unknown	Televise	$ 48.12
Total					**$ 112,793.79**

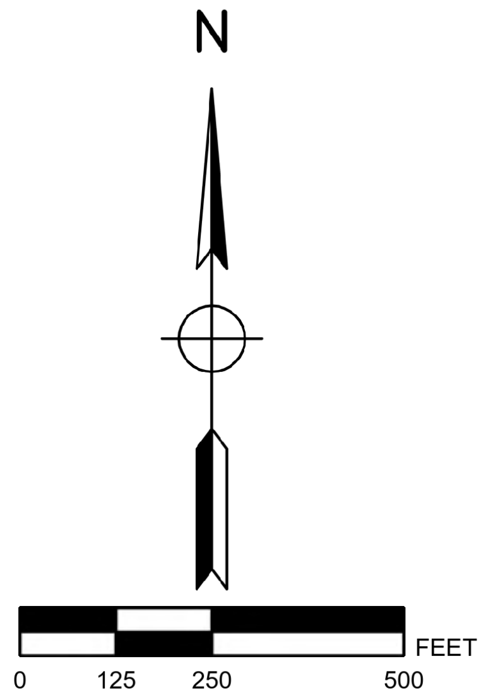
APPENDIX M: CAPITAL IMPROVEMENT PLAN
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER





AREA MAP
NOT TO SCALE



LEGEND

- 🟣 STRUCTURE REPAIRS
- 🟥 REPLACE PIPE
- 🟧 CLEAN AND TRENCHLESS SPOT REPAIR
- 🟨 OPEN CUT SPOT REPAIR
- 🟩 CLEAN AND TELEVISE
- 🟩 TELEVISE
- Ⓢ MANHOLE
- ▨ CATCHBASIN
- ⬠ END SECTION
- ⬠ END SECTION
- ○ OTHER/UNKNOWN
- ○ ALL OTHER VALUES
- ← OPEN DRAIN
- - - - STORM SEWER
- ⌐ DRAINAGE DISTRICT
- ▢ MUNICIPALITY BOUNDARY

BY	MARK	REVISIONS	DATE

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

SMITH CONSOLIDATED DRAIN
INGHAM COUNTY, MICHIGAN

CAPITAL IMPROVEMENT PLAN

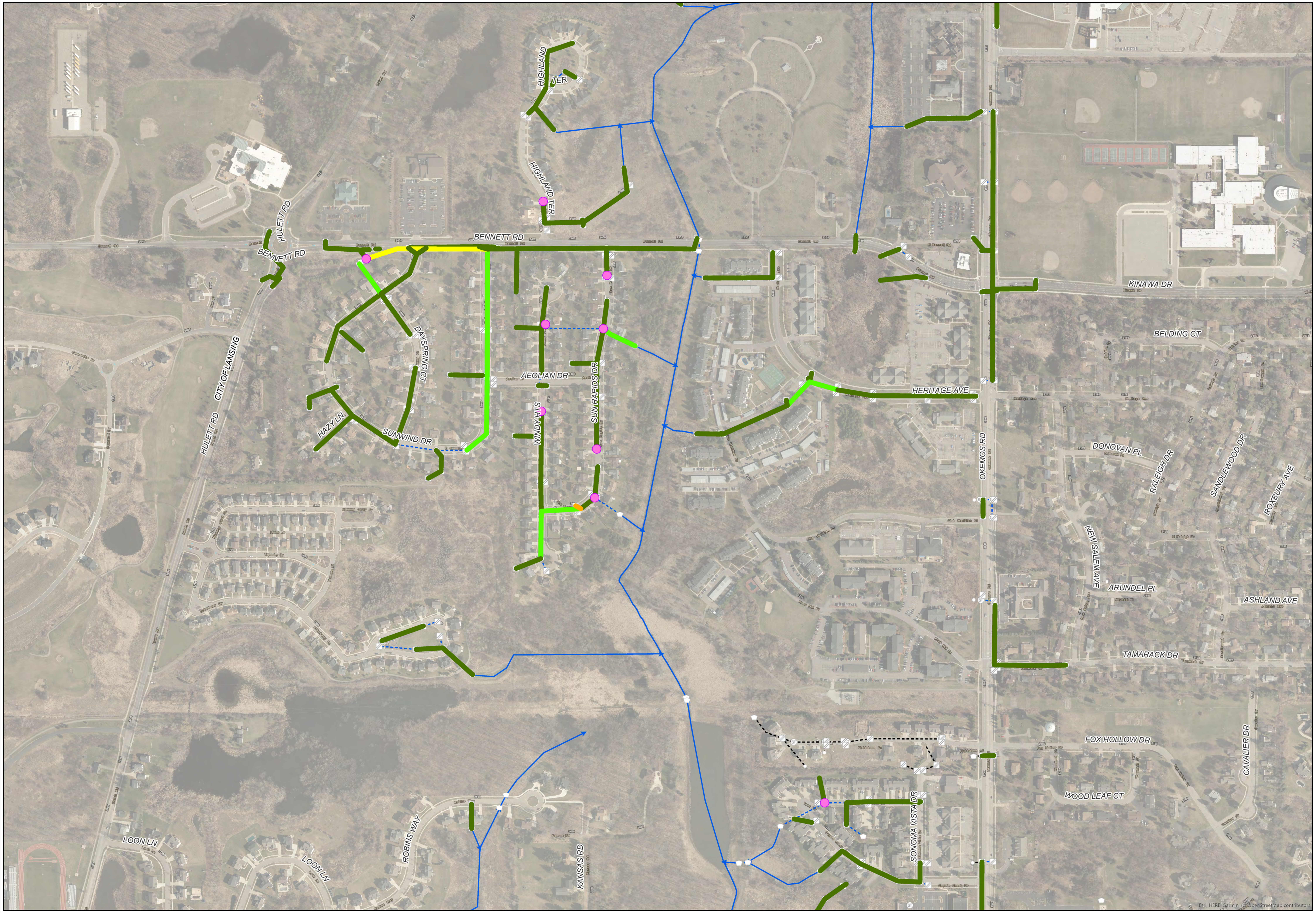
LANSING OFFICE
1595 W Lake Lansing Rd St. 200
East Lansing, MI 48823
Tel. 517-325-9977
www.SpicerGroup.com

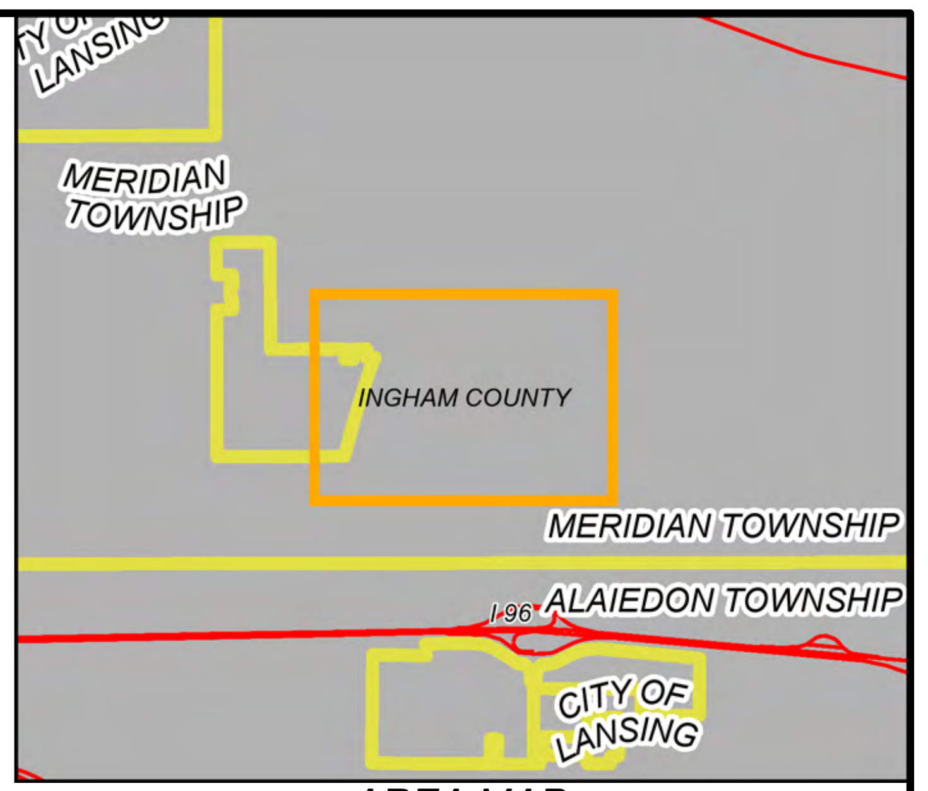
DE. BY: RTB
DR. BY: RTB
CH. BY: MMC
APP. BY: TAI
PROJECT NO. 122377SG2015
STDS.
SHEET 1 OF 5
DATE: NOVEMBER 2019
SCALE: 1":250'
FILE NO. JDR-3362
DR 1

INGHAM COUNTY CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

APPENDIX M: CAPITAL IMPROVEMENT PLAN
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER





AREA MAP
NOT TO SCALE

N

0 125 250 500 FEET

LEGEND

- ● STRUCTURE REPAIRS
- 🟥 REPLACE PIPE
- 🟧 CLEAN AND TRENCHLESS SPOT REPAIR
- 🟨 OPEN CUT SPOT REPAIR
- 🟩 CLEAN AND TELEVISE
- 🟩 TELEVISE
- Ⓢ MANHOLE
- ▨ CATCHBASIN
- ⬠ END SECTION
- ⬠ END SECTION
- ○ OTHER/UNKNOWN
- ○ ALL OTHER VALUES
- ← OPEN DRAIN
- - - STORM SEWER
- ⌐┘ DRAINAGE DISTRICT
- 🟨 MUNICIPALITY BOUNDARY

BY	MARK	REVISIONS	DATE

SMITH CONSOLIDATED DRAIN
INGHAM COUNTY, MICHIGAN

CAPITAL IMPROVEMENT PLAN

Spicer group
LANSING OFFICE
1595 W Lake Lansing Rd St. 200
East Lansing, MI 48823
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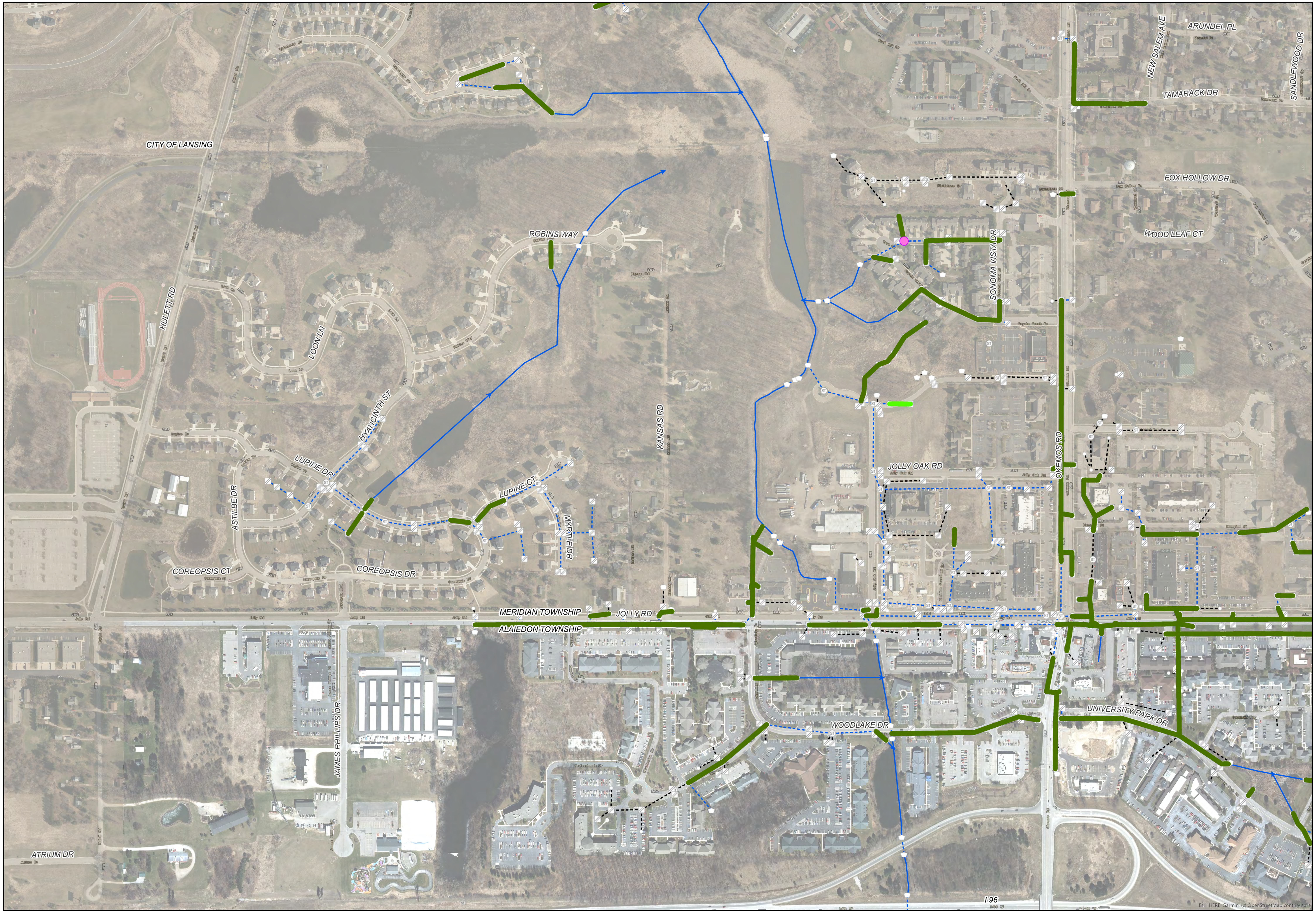
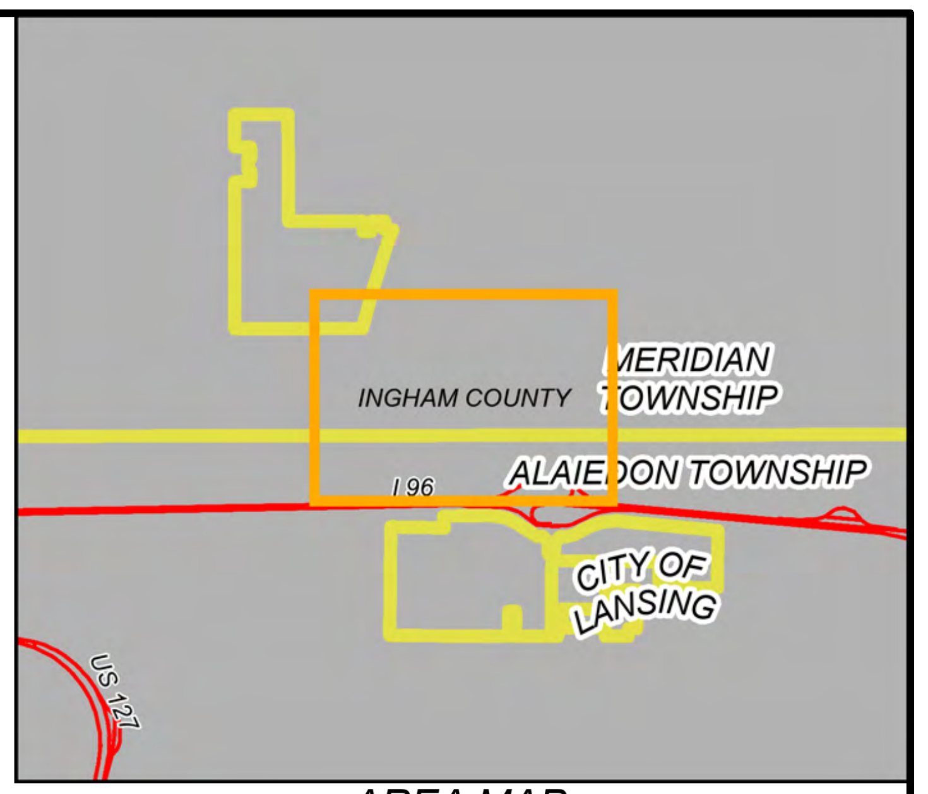
DE. BY: RTB
DR. BY: RTB
CH. BY: MMC
APP. BY: TAI
PROJECT NO. 122377SG2015
STDS.
SHEET 2 OF 5
DATE: NOVEMBER 2019
SCALE: 1":250'
FILE NO. JDR-3362
DR 2

INGHAM COUNTY CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

APPENDIX M: CAPITAL IMPROVEMENT PLAN
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER





AREA MAP
NOT TO SCALE

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0 125 250 500 FEET

LEGEND

- ● STRUCTURE REPAIRS
- 🟥 REPLACE PIPE
- 🟧 CLEAN AND TRENCHLESS SPOT REPAIR
- 🟨 OPEN CUT SPOT REPAIR
- 🟩 CLEAN AND TELEVISE
- 🟩 TELEVISE
- ST MANHOLE
- ▨ CATCHBASIN
- ⬠ END SECTION
- ⬠ END SECTION
- ○ OTHER/UNKNOWN
- ○ ALL OTHER VALUES
- ← OPEN DRAIN
- - - - STORM SEWER
- DRAINAGE DISTRICT
- 🟨 MUNICIPALITY BOUNDARY

BY	MARK	REVISIONS	DATE

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SMITH CONSOLIDATED DRAIN
INGHAM COUNTY, MICHIGAN

CAPITAL IMPROVEMENT PLAN

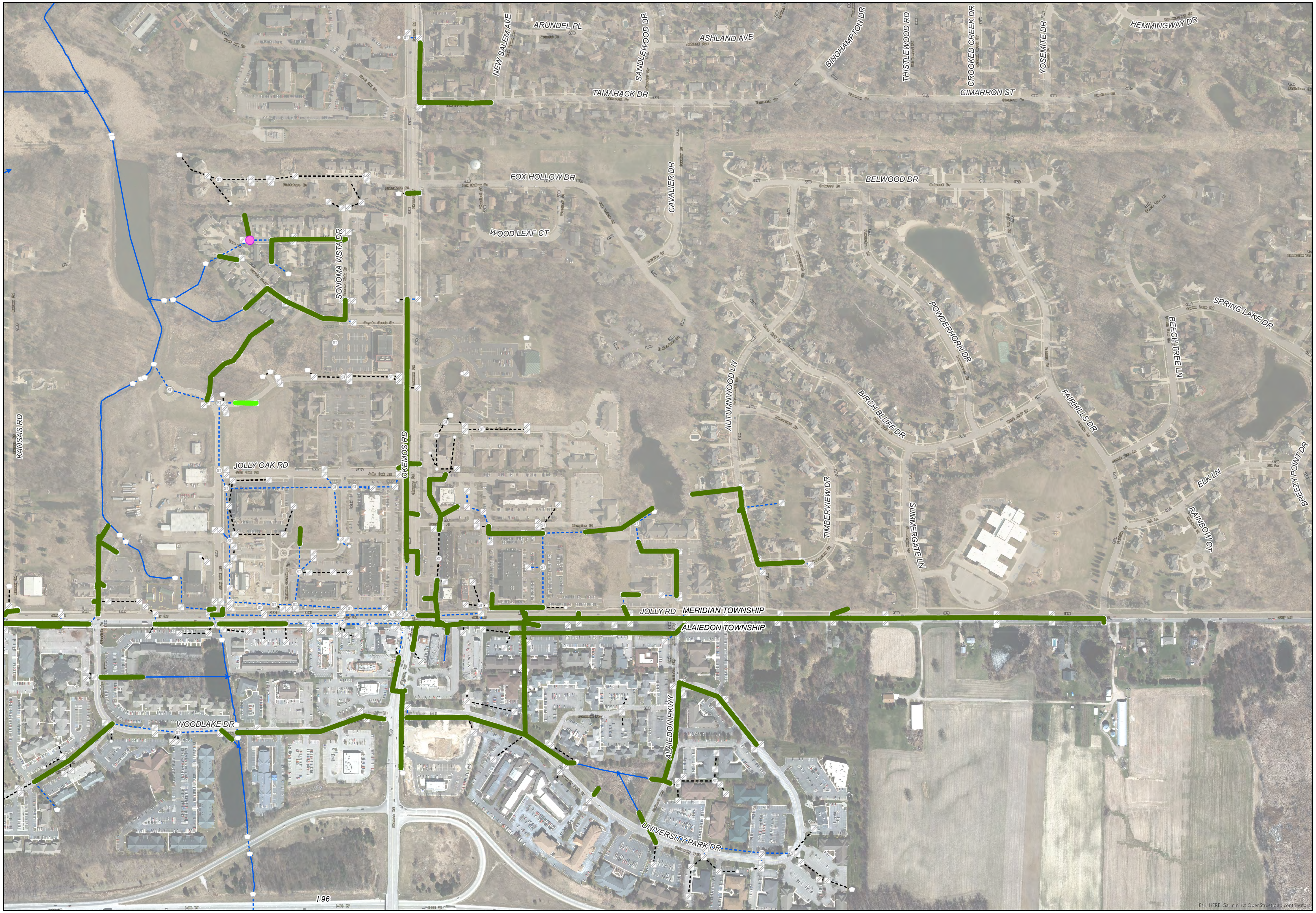
Spicer group

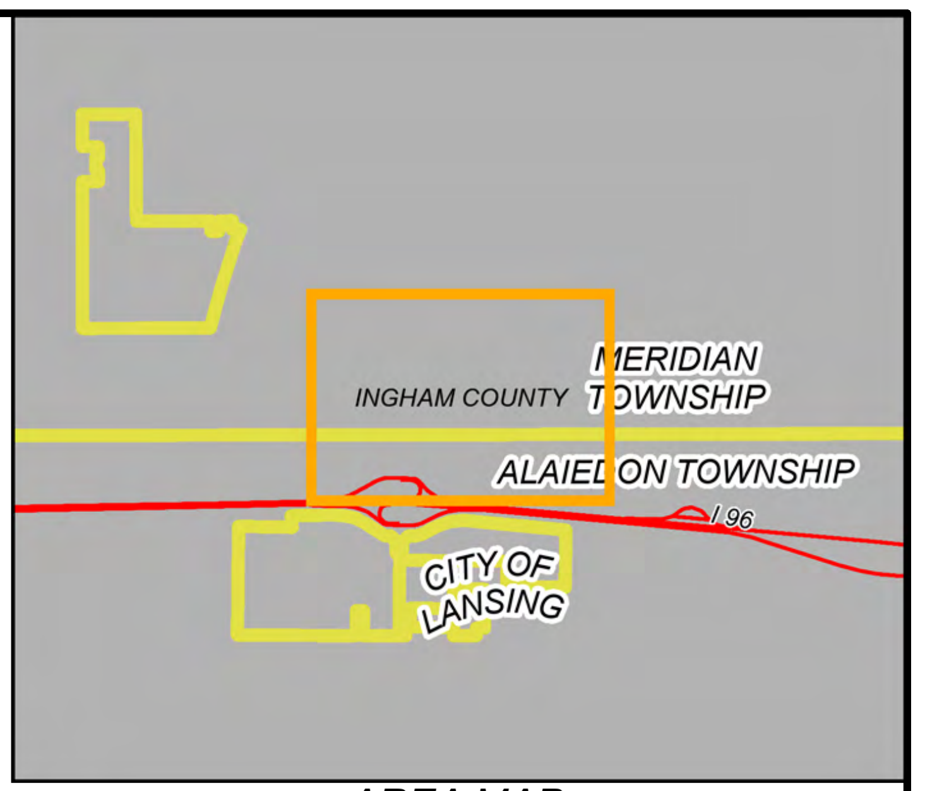
LANSING OFFICE
1595 W Lake Lansing Rd St. 200
East Lansing, MI 48823
Tel. 517-325-9977
www.SpicerGroup.com

DE. BY: RTB DR. BY: RTB	CH. BY: MMC APP. BY: TAI	PROJECT NO. 122377SG2015
STDS.	SHEET 3 OF 5	DR 3
DATE: NOVEMBER 2019 SCALE: 1":250'	FILE NO. JDR-3362	

APPENDIX M: CAPITAL IMPROVEMENT PLAN
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER





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PROJECT NO. *122377SG2015*
STDS.
SHEET *4* OF *5*
DATE: *NOVEMBER 2019*
SCALE: *1":250'*
FILE NO. *JDR-3362*
DR 4

INGHAM COUNTY CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

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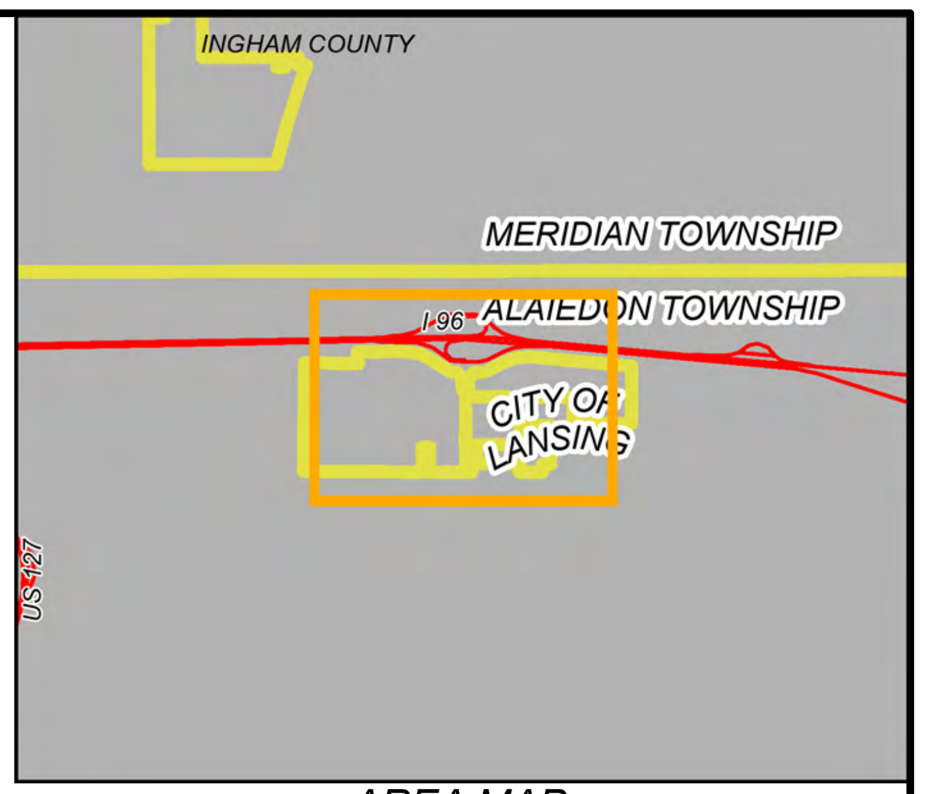
SMITH CONSOLIDATED DRAIN INGHAM COUNTY, MICHIGAN

PATRICK E. LINDEMAN - INGHAM COUNTY DRAIN COMMISSIONER

Esri, HERE, Garmin, (c) OpenStreetMap contributors



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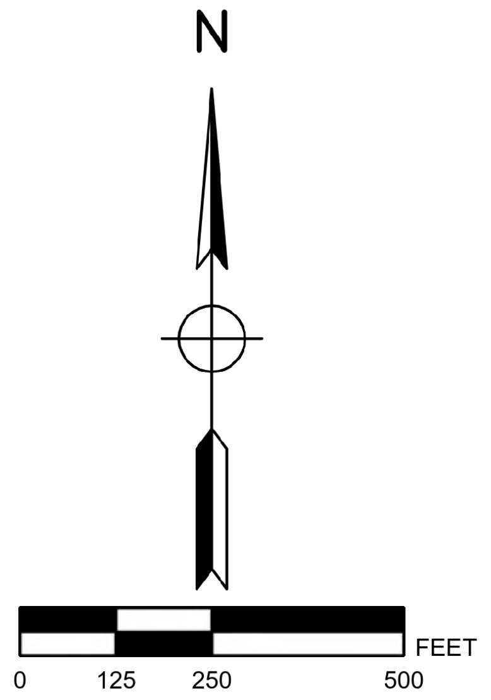

LEGEND

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FILE NO. JDR-3362
DR 5

1211 Ludington St.
Escanaba, MI 49829
O: 906.233.9360
www.c2ae.com

CITY OF ONAWAY
ASSET MANAGEMENT PROGRAM SUMMARY

Grantee Information

City of Onaway SAW Grant
20774 State Street, Onawa, MI 49765
www.onawaymi.com

Contact Information for the Grantee

Ms. Kelli Stockwell
Address: 20774 State Street, Onawa, MI 49765
Phone: 989-733-8313
Email: onawaych@src-milp.com

SAW Grant Project Number: 1089-01

Executive Summary

The City of Onaway Asset Management Program (AMP) was created through funding from the Michigan Department of Environmental Quality's SAW Program.

The applicant has formed a SAW team which is composed of City officials and members of the public. The purpose of the team is to develop a mission statement and to discuss and decide upon the Level of Service the system should provide, this impacts cost. The team will meet annually before the City's budget process begins.

The program is GIS based which provides a digital map background of the Onaway sanitary and storm collection systems. The City treats its own sewage and the treatment facility is also included.

The other major components of the program include the asset management spreadsheet (AMS), financial advice recommendations, and filing system; the filing system is accessed through the GIS system.

The AMS utilizes the MDEQ/WEF recommended spreadsheet, which is the master compilation tool for the program. It includes (worksheet ordered as follows):

1. System information and personnel worksheet
2. Summary- worksheet; listing all assets and calculating the business risk
3. Asset Rating Definitions- worksheet
4. Level of Service Statement- worksheet
5. Criticality Calculation – worksheet
6. Probability of Failure - worksheet

7. Budget and Rate formulation worksheet
8. Replacement - worksheet
9. Timing - worksheet
10. Capital Improvement Project – worksheet
11. Ten Year Forecast – worksheet

A. The System Information and Personnel worksheet contains system basic data.
B. The Summary worksheet lists all system assets, with accompanying data related to asset type, location, capacity or size, material type, estimate of original installation year and costs, expected remaining life and value, the cost of replacement in today's dollars, and data from items E and F above, plus redundancy due to number of units, which leads to a calculation of business risk observation.
C. The 1-5 rating scales for condition, probability of failure and criticality of asset is found in the asset rating definitions.
D. Level of service statement for the system is developed by the SAW team committee and along with the mission statement is on D. above.
E. Worksheets E and F are the calculator worksheets for criticality and probability of failure of a particular asset. These worksheets were only used for major assets where additional documentation was felt necessary. Most cases utilize engineering judgment for the rating decision.
G. The budget and rate sheet is another calculator which includes the operating budget for the system as well as required capital commitment. It makes an assessment of needed operating reserves based on the planned short term replacements needs as well as future capital needs. It also indicates what is being put away to satisfy these requirements.
H. The replacement worksheet derives the depreciated value of the system as well as a calculation of the replacement value.
I. The timing worksheet attempts to identify whether an asset needs replacing and when to consider and formulate future capital improvement projects.
J. Capital Improvement Plan indicating future possible projects. This is a forecast based on current data, debt retirement, and typical funding agency grouping of project value
K. Ten-year budget worksheet attempts to identify the work of inflation on the plan over "10 years".
L. A twenty-year cash flow forecast is included to assist in the formulation of utility rates. It also includes the detailed level of service statement and detailed capital improvement forecast.

Finally is the data filing system which will include items such as, the system televising data, the hydraulic model, easements, user information and other relevant data.

The City of Onaway received third round grants as follows:

WAMP

Grant	Local Share	Total
$329,650	$0	$329,650

SAMP

Grant	Local Share	Total
$173,800	$29,210	$203,010

The asset management development procedure generally followed this path:

A. Identifying and numbering all the assets before field efforts begin.
B. A survey team gathered all GPS coordinates of items such as manholes in the field.
C. A digital orthographic photo was developed using aerial photography to create a GIS system background.
D. A Sewer system layer was created in the GIS system to locate the various assets.
E. A field team inspected and using the NASSCO rating system inventoried and detailed the in-ground assets. Field inspections, records research, capacity testing where needed, and management/staff interviews were used to inventory pump stations and treatment facility components.
F. The inventory data is used in the construction of a production data base which helps populate the Asset Management Data Base and subsequent Spreadsheet (AMS) as described above.
G. The AMS is the calculating tool for assessing the future viability of the delineated assets and the criticality and future impact on the system overall.
H. The criteria of Business Risk and remaining useful life are used to determine what assets need attention and the cost impact of that attention.
I. This data also leads to the formulation of future capital improvement projects.
J. The data is combined into the system's current operating budget to determine whether sufficient financial reserves are being collected.
K. Rate impacts are then considered.
L. The system operators are then trained by IGI in the GIS system use and maintenance
M. The process is to be revisited annually.

Wastewater and Stormwater Asset Inventory

The program included two components under different grant offers. The Wastewater Asset Management Program is call the WAMP and the corresponding Stormwater Asset Management Program is called the SAMP.

The WAMP includes:

A. All collection system components

The SAMP includes all assets making up

A. The stormwater collection system
B. The ditches, culverts, and drainage structures

The inventory was performed by records research, field visitation, and inspection. Briefly it included;

Collection systems both sanitary and storm

a) Name and label all manholes
b) Acquire GPS coordinates of all these structures

c) Visually inspect all manholes structures as per NASSCO dictated methodology.
d) Televise selected portions of the collection piping and rate per NASSCO
e) Acquire the age (installation year) of all the elements as close as possible.

The decision was made to utilize the MDEQ offered spreadsheet for compiling and analyzing the data.

The manholes condition assessment was gleaned from the field inventories. The NASSCO rating system was utilized to develop a quick rating of the components. In some circumstances engineering judgement was necessary. The process evaluation for the Wastewater Treatment Facility went a step further determining whether the equipment in place was functioning as is needed to maintain regulatory compliance.

The results of the Onaway WAMP and SAMP assessments were as follows:

General

WAMP
In ground (559 assets)
 98% were considered low business risk
 2% were considered average business risk
 0% were considered in need of effort

SAMP
In ground (347 assets)
 68% were considered low business risk
 15% were considered average business risk
 17% were considered in need of effort

Criticality of Assets

The criticality of assets was determined based on the following factors;

Collection System (WAMP & SAMP)

Highly Critical (5 rating)
 Failure of an asset would result in flooding, severe adverse environmental impact, or impede an activity.

Moderately Critical (3-4 rating)
 Failure of an asset would damage properties in high value areas or a large number of users

Slightly Critical (1-2 rating)
 Failure will develop slowly and can be dealt with when personnel are available.

The ranking of an asset has a component of criticality involved but it is only one factor in determining business risk, the other two being redundancy (i.e. back up of the asset) and probability of failure (the condition) of the asset. Our methodology utilizes business risk (ranking 1 to 25) and depreciation (age) of the asset to rank its need for attention and subsequent budget set aside for maintenance or replacement.

Level of Service Determination

The level of services that the system is to offer was determined by the SAW Team to prioritize what the system should offer and how it should respond. Typically four or five major goals were determined and then subdivided into items that should be or not be pursued to meet the goals. These items are placed in a level of service statement with reference in the asset management database.

Revenue Structure

The MDEQ spreadsheet was utilized to list and prioritize items, which required short term or long-term capital infusion. The long-term items were grouped into project groups and targeted as future projects under the Capital Improvement Plan, which follows. The intent for these projects is future borrowing with monies being added to the current operating budget for future borrowing applications.

The short-term capital needs were identified for operating budget inclusion annually. They may include annual maintenance needs or small replacement items along with large project needs in the first seven years after the project is created.

We found that set aside reserves are slightly below what the annual budget should reflect, and are recommending a five-year budget increase as follows beginning in the 2020/21 budget year.

Readiness to Serve (RTS)
Commodity 5,000-25,000 category (cc)

	Current	2020/21	2021/22	2022/23	2023/24	2024/25
RTS	$45.45	$45.50	$45.61	$45.72	$45.83	$45.95
CC/1,000 gal	$9.04	$9.07	$9.13	$9.20	$9.26	$9.30

The SAMP identified budget considerations, which have been delivered to the City's management to determine what should be done and when to align with other possible future utility or street improvements.

A twenty-year cash flow statement is attached.

Capital Improvement Plan

Onaway's future capital improvement project scheduling is as follows:

Project 1 (2044)	
Wastewater Treatment Plant Improvements	$1,800,000
Project 2 (2065)	
Sanitary Pipe and Manholes	$5,000,000

The SAMP has identified three priority project areas. The City will attempt to pursue these improvements with other utility and street projects.

Project 1 (2029)	
Storm Pipe and Manholes	$350,000
Project 2 (2048)	
Storm Pipe and Manholes	$460,000
Project 3 (2058)	
Storm Pipe and Manholes	$900,000
Project 4 (2078)	
Storm Pipe and Manholes	$800,000

List of Major Assets

Wastewater:

The City of Onaway's wastewater system includes:

Treatment

2	1.75 Ac aerated lagoons
6	Slow sand filters
	UV disinfection
	Ferric chloride metering equipment
	Service building including laboratory
3	wetland treatment cells

Pump Stations

9	System pump stations

Force main	5,970 ft.

Mainline Gravity Sewer

1 inch	34 feet
6 inch	554 feet
8 inch	50,521 feet
10 inch	5,080 feet
15 inch	595 feet
Total	67,754 feet

System Value: $6,623,665
Replacement Value: $15,365,836

Stormwater:
Sewer & Culverts

2 inch	25 feet
4 inch	62 feet
6 inch	614 feet
8 inch	513 feet
9 inch	35 feet
10 inch	508 feet
12 inch	7,117 feet
15 inch	4,189 feet
18 inch	602 feet
48 inch	50 feet
Total	13,715 feet

System Value: $760,030
Replacement Value: $2,622,733

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 20, 2019
(no later than 3 years from executed grant date)

The City of Onaway *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1089-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Kelli Stockwell at 989-733-8313 Onawaych@src-milp.com
Name Phone Number Email

Kelli Stockwell 12/20/2019
Signature of Authorized Representative (Original Signature Required) Date

Kelli Stockwell – City Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date __December 20, 2019__
(no later than 3 years from executed grant date)

The ___City of Onaway___ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1089-01__ have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes~~ or No

   If No - Date of the rate methodology approval letter: ________.

2) Significant Progress Made: ~~Yes~~ or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue neded to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: __July 26, 2019__.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __October 21, 2019__.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

_Kelli Stockwell___ at 989-733-8313 Onawaych@src-milp.com
Name Phone Number Email

Kelli Stockwell ___ 12/20/2019__
Signature of Authorized Representative (Original Signature Required) Date

__Kelli Stockwell – City Manager__
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Environment, Great Lakes & Energy (EGLE) - State of Michigan
Revolving Loan Section
Attn: Jonathan Berman

From: Hubbell, Roth and Clark, Inc.

CC: Village of Romeo

Date: October 30, 2019

Re: Village of Romeo
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1094-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) SAW Grant by the Village of Romeo for their Stormwater Asset Management Plan. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount, match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows EGLE guidance.

GRANTEE INFORMATION

Village of Romeo
121 W. St. Clair, Romeo, MI 48065

SAW Grant Project #1094-01

Project Grant Amount: $511,111

Applicant Match Amount $111,111

Authorized Representative:
Kathryn Trapp - Village Clerk
clerk@villageofromeo.org
Phone: 586-752-3565

Christine Malzahn - President
Village Hall: 121 W. St. Clair, Romeo, MI 48065
president@villageofromeo.org
Phone: 586-752-3565

Consultant Contact:
Helen Davis, PE, LEED AP BD+C
Hubbell, Roth & Clark, Inc.
hdavis@hrcengr.com
Phone: 248-454-6330

DPW Contact:
Tim Metz – Department of Public Works Supervisor
70350 Powell
Armada, MI 48005
dpw@villageofromeo.org
Phone: 586-752-2684

EXECUTIVE SUMMARY

The Village of Romeo applied for and received a grant to further develop an Asset Management Plan (AMP) for its storm sewer system through the Michigan Department of Environment, Great Lakes & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Village owns, operates and maintains the storm sewer system and has various tools used to manage the assets, including a Geographic Information System (GIS) geodatabase, condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated on a regular basis, which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan’s major identified assets, and contact information for the grant. The Village’s AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the Village Hall for at least 15 years.

STORMWATER INVENTORY

The Village uses its existing GIS geodatabase for horizontal assets, which includes sewers, detention ponds, and structures. The GIS includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through grant efforts, the Village populated the information necessary to more effectively use the GIS, and participated in training.

GIS has been used in the Village for the past decade; however, the Village did not have an active Esri GIS subscription; the data has been kept at Hubbell, Roth & Clark, Inc. Through the grant, the Village purchased an online subscription to Esri software and computers allowing staff to use the GIS. Using a Lidar Scan, GPS, and observations made during condition assessment, the data in the GIS was expanded and accuracy greatly improved.

The next page includes a table of the asset inventory in GIS.

Asset Type	Amount
6-inch sewer	20 pipes, 566 feet
8-inch sewer	46 pipes, 2363 feet
10-inch sewer	6 pipes, 416 feet
12-inch sewer	312 pipes, 19,537 feet
15-inch sewer	42 pipes, 3596 feet
18 and 19-inch sewer	55 pipes, 7282 feet
21-inch sewer	17 pipes, 3530 feet
24-inch sewer	24 pipes, 4892 feet
27 and 30-inch sewer	4 pipes, 1438 feet
36 to 60-inch sewer	19 pipes, 5045 feet
Outfalls	5
Catch Basins	411
Manholes	137
Detention Ponds	2

Condition assessment tools and protocols were developed by the Village to allow for efficient and consistent recording of asset condition. For storm sewer pipes, the NASSCO-compliant inspection information was collected during limited sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 4,740 of the 59,600 lineal feet of storm sewers underwent condition assessment via cleaning and televising. Approximately 527 of the 548 structures were evaluated through manhole inspections.

CRITICALITY OF ASSETS

The Village developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of storm gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score and remaining useful life are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material. The COF for horizontal assets was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

Below is a list of BRE scores for the horizontal assets in the Villages system:

- Storm Pipes:
    - 93% BRE 1-5
    - 6% BRE 6-10
    - 1% BRE 11-15
    - 0% BRE 16-20
    - 0% BRE 21-25
- Storm Structures:
    - 85% BRE 1-5
    - 14% BRE 6-10
    - 1% BRE 11-15
    - 0% BRE 16-20
    - 0% BRE 21-25

LEVEL OF SERVICE DETERMINATION

The Village reviewed a list of questions related to level of service and developed the following mission statement as part of the AMP:

> *The Village of Romeo strives to cost effectively maintain its storm sewer system to prevent flooding and ensure the longevity of the roadways. The Village will budget for capital improvements to make sure that the system continues to operate in a cost-effective manner, as well as doing routine operation and maintenance to keep the system in good working order.*

The Village choose to implement its mission statement as the defined Level of Service. The mission statement considers the impacts to the budget, longevity of the roads, and public health. The current procedures and ongoing operations of the Village have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public works leaders choose to continue their ongoing processes at this time rather than defining specific goals to track.

The Village will review the mission statement and ongoing system activities annual to determine if the mission is not being successfully fulfilled and further measurement of the stated goals is necessary

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant

one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The Village does not charge a stormwater utility rate; therefore, the revenue structure was not reviewed for the AMP. Improvements to the storm water system, when needed, are primarily funding through the general or road maintenance funds.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the Village's storm sewer system, using recommendations from the asset inspection processes, and consideration of other system needs.

For horizontal assets, a storm pipe CIP was not developed because the limited sewers that were televised did not need capital repairs. A Structure CIP was developed as a summary of recommended repairs to be completed by the DPW or as part of a larger project.

Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date _**December 31, 2019**
(no later than 3 years from executed grant date)

The Village of Romeo certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1094-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Kathryn Trapp	at (586) 752-3565	Clerk@villageofromeo.org
Name	Phone Number	Email

Kathryn Trapp
Signature of Authorized Representative (Original Signature Required)

10/30/19
Date

Kathryn Trapp, Village Clerk
Print Name and Title of Authorized Representative

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Environment, Great Lakes & Energy (EGLE) - State of Michigan
Revolving Loan Section
Attn: Jonathan Berman

From: Hubbell, Roth and Clark, Inc.

CC: Village of Romeo

Date: October 30, 2019

Re: Village of Romeo
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1094-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant by the Village of Romeo. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount (no match due to disadvantaged status), and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows EGLE guidance.

GRANTEE INFORMATION

Village of Romeo
121 W. St. Clair, Romeo, MI 48065

SAW Grant Project #1094-01

Project Grant Amount: $600,000

Applicant Match Amount $0, disadvantaged status

Authorized Representative:
Kathryn Trapp - Village Clerk
clerk@villageofromeo.org

Christine Malzahn - President
president@villageofromeo.org
Phone: 586-752-3565

Village Hall: 121 W. St. Clair, Romeo, MI 48065

Consultant Contact:
Helen Davis, PE, LEED AP BD+C
Hubbell, Roth & Clark, Inc.
hdavis@hrcengr.com
Phone: 248-454-6330

WWTP Contact:
Allen LaPeer – Waste Water Treatment Plant Supervisor
14787 32 Mile Road (no mail received, mail should go to the Village Hall)
romeowwtp@gmail.com
Phone: 586-752-9321

DPW Contact:
Tim Metz – Department of Public Works Supervisor
70350 Powell
Armada, MI 48005
dpw@villageofromeo.org
Phone: 586-752-2684

EXECUTIVE SUMMARY

The Village of Romeo applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Village owns, operates and maintains the sanitary sewer system and has various tools used to manage the assets, including a Geographic Information System (GIS) geodatabase, Allmax Antero Computer Maintenance Management System (CMMS) Software, condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated on a regular basis, which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The Village's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the Village Hall for at least 15 years.

WASTEWATER INVENTORY

The Village uses its existing GIS geodatabase for horizontal assets, which includes sewers and manholes. Allmax Antero CMMS software obtained through the grant as the primary means to inventory and map the vertical assets in the system, which includes the WWTP and pump station. The GIS and CMMS include key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

The Village reviewed a few additional CMMS options before selecting Allmax Antero as its CMMS software. Operator10 software was purchased as a package with Antero in order to track data and show plant performance. Through grant efforts, the Village populated the information necessary to use these software programs and participated in training.

GIS has been used in the Village for the past decade; however, the Village did not have an active Esri GIS subscription; the data has been kept at Hubbell, Roth & Clark, Inc. Through the grant, the Village purchased an online subscription to Esri software and computers allowing staff to use the GIS. Using a Lidar Scan, GPS, and observations made during condition assessment, the data in the GIS was expanded and accuracy greatly improved.

The next page includes a table of the asset inventory in GIS. The CMMS inventory for the WWTP and pump station is included with the full report and available upon request.

Asset Type	Amount
6-inch sewer	833 feet
8-inch sewer	45,257 feet
10-inch sewer	10,929 feet
12-inch sewer	19,402 feet
15-inch sewer	6003 feet
18-inch sewer	5108 feet
24-inch sewer	66 feet
Unknown diameter sewer	14,574 feet
Manholes	412

Condition assessment tools and protocols were developed by the Village to allow for efficient and consistent recording of asset condition. For sanitary sewer pipes, the NASSCO-compliant inspection information was collected during sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 83,700 of 102,00 lineal feet of sanitary sewers underwent condition assessment via cleaning and televising. Approximately 294 of the 412 manholes were evaluated through manhole inspections.

Vertical assets, including the WWTP and pump station, were inventoried with condition assessment data collected and input to the CMMS.

CRITICALITY OF ASSETS

The Village developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets. For the vertical assets equipment was reviewed by staff as part of the grant work, with POF and COF factors determined and input into the software.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of sanitary gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score and remaining useful life are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material. The COF for horizontal assets was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

Below is a list of BRE scores for the horizontal assets in the Villages system:

- Sanitary Pipes:
    - 56% BRE 1-5
    - 42% BRE 6-10
    - 2% BRE 11-15
    - 0% BRE 16-20
    - 0% BRE 21-25
- Sanitary Manholes:
    - 85% BRE 1-5
    - 14% BRE 6-10
    - 1% BRE 11-15
    - 0% BRE 16-20
    - 0% BRE 21-25

For vertical assets, scores were assigned for Condition (POF) based on visual observations with the use of Equipment Condition Assessment Guides. Criticality (COF) was based on operator knowledge, and then a BRE score was calculated. These scores are stored in Antero and available upon request.

LEVEL OF SERVICE DETERMINATION

The Village reviewed a list of questions related to level of service and developed the following mission statement as part of the AMP:

> *The Village of Romeo strives to provide its sanitary sewer customers with a reliable service at the lowest cost possible.*
>
> *The Village works to ensure that all compliance and water quality issues are met. This includes meeting all State and Federal regulations per the National Pollutant Discharge Elimination System (NPDES) permit, assuring that there is adequately trained staff to operation the system, and appropriate groundwater and surface water quality.*
>
> *The Village has developed a strong emergency response plan in order to assure that customer service disruptions are minimized. WWTP, DPW, and Village staff will continue to work with residents when service interruptions are necessary and will continue to update notification processes as communication techniques evolve. The Village strives to minimize interruptions in service to the maximum extent possible.*
>
> *The Village will continue to work to keep rates stable for customers. This includes budgeting for capital improvements to make sure that the system continues to operate in a cost-effective manner, as well as doing routine operation and maintenance to keep the system in good working order.*

The Village choose to implement its mission statement as the defined Level of Service. The mission statement considers the impacts to public health and the system’s ability to comply with regulations. The current procedures and ongoing operations of the Village have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public works leaders choose to continue their ongoing processes at this time rather than defining specific goals to track.

The Village will review the mission statement and ongoing system activities annual to determine if the mission is not being successfully fulfilled and further measurement of the stated goals is necessary

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The Village worked with Stewart, Beauvais & Whipple, P.C. to confirm that the system's current rate structures are sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date. The analysis did not show any gap between the revenue and expenditures, therefore, a rate increase was not necessary.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the Village's sanitary sewer system, using recommendations from the asset inspection processes, and consideration of other system needs.

For horizontal assets, the sanitary pipe CIP was separated by priority of recommended repairs into a 0-5 year repair, 5-10 year repair, or a 10-20 year repair. The manhole CIP is a summary of all the recommended repairs to be completed by the DPW or as part of a larger project. In summary:

- 42 pipes have repairs that are recommended to be addressed within the next 0-5 years.
- 43 pipes are recommended to be addressed in the next 5-10 years.
- 18 pipes are recommended be addressed in the next 10-20 years.
- 64 manholes have repairs that are recommended be addressed.
- 13 manholes were not found and should investigated further.
- 8 manholes were unable to be inspected due to high traffic flows.
- 4 manholes were located but were unable to be inspected because they were buried or access was unavailable.

For vertical assets, a CIP was developed with projects listed over the next 20 years. The schedule has the Village spending about $1.0 million for each 5-year period for the first 15 years, then $2.0 million from years 16-20. A list of projects with planning level cost estimates is included in the report.

Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Village of Romeo certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1094-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: October 14, 2019.

2) Significant Progress Made: Yes or No

   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Name: Kathryn Trapp at Phone Number: (586) 752-3565 Email: Clerk@villageofRomeo.org

Signature of Authorized Representative (Original Signature Required): Kathryn Trapp

Date: 10/30/19

Kathryn Trapp, Village Clerk / Admin
Print Name and Title of Authorized Representative

HENNESSEY
ENGINEERS, INC

December 23, 2019

Mr. Clarence Jones
Michigan Department of Environment, Great Lakes and Energy
Environmental Resource Management Division
Revolving Loan Section
PO Box 30241
Lansing, Michigan 48909-7741

Re: SAW Grant Completion
Ash Township
Hennessey Project No. 23019

Dear Mr. Jones:

Attached please find the Project Completion Worksheet and Asset Management Plan Executive Summary to close out the SAW grant program for Ash Township. A final disbursement request will be submitted to your attention prior to January 31, 2020.

If you have any questions, or require additional information, please contact Jim Hollandsworth at our office at your earliest convenience.

Very Truly Yours,

HENNESSEY ENGINEERS, INC

R. Ryan Kern, P.E.
Project Manager

cc: Jim Vaslo, Township Manager, Ash Township
James D. Hollandsworth, P.E., P.S., Hennessey Engineers, Inc.

File B.4

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 20, 2019**
(no later than 3 years from executed grant date)

The **Township of Ash** certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1112-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or No
   If No - Date of the rate methodology approval letter: **October 14, 2019**.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

James D. Hollandsworth, P.E., P.S. at **734-759-1600** **jdhollandsworth@hengineers.com**
Name Phone Number Email

12/18/19
Signature of Authorized Representative (Original Signature Required) Date

Jim Vaslo, Township Manager
Print Name and Title of Authorized Representative

Mr. Jim Vaslo, Township Manager
Ash Township
1677 Ready Road
Carleton, Michigan 48117
Phone – 734-654-6992
SAW Grant Project Number 1112-01

Executive Summary

1. Overview of SAW Grant Program

Ash Township, Monroe County, Michigan was successful in obtaining a Storm Water, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environment, Great Lakes and Energy (EGLE) in the amount of $332,618 to complete a thorough, detailed, conditional analysis of the existing sanitary sewer collection system owned and operated by the Township, develop capital improvement planning for the next 20 years and to develop a comprehensive asset management plan. The SAW grant study was managed by the Township's engineering consultant, Hennessey Engineers, Inc. (HEI) of Southgate, Michigan. The following items of work were completed as a part of the SAW grant study:

- Cleaning and televising of all sanitary sewers to identify any structural defects within the sewer system and identify structural defects and/or locations of infiltration through pipe joints.
- Inspection of all manholes along the sewers cleaned and televised to collect data on the structural components of each structure and rate the condition of each component in addition to noting any inflow and infiltration entering the sewer system through manhole structures.
- Developed a Geographic Information System (GIS) geodatabase of the entire sanitary sewer system.
- Conduct flow monitoring of the entire sanitary sewer system to identify areas within the sewer system experiencing higher amounts of flow during wet weather events and to identify areas of the system that may be exceeding capacity.
- Conduct a thorough analysis of the two (2) lift stations within the sewer system.

Results of the SAW grant program were as follows:

- The entire sanitary sewer system was installed in 1967. The overall condition of the sanitary sewer system is primarily in good condition with an occasional crack within the pipe.
- During the cleaning and television investigation, some pipe joints were identified as having low to moderate infiltration.
- Manholes were identified as being in overall good to fair condition with minor structural defects and/or minor infiltration entering the sanitary sewer system.

- Based upon the cleaning and televising of the sewer system, it was identified that constant clear water was flowing from service leads leading to the assumption that several service leads are either broken, cracked or allowing groundwater infiltration through the pipe joints contributing to significant increases in wet weather flows.
- Flow monitoring of the sanitary sewer system at 7 specific locations throughout the system in addition to monitoring flows at the 2 lift stations identified a significant increase in flows during large wet weather events. Prolonged storm induced infiltration and inflow was identified through monitoring in the northern branch of the system whereas significant inflow was identified in the south branch of the system. A small amount of infiltration and inflow was identified through the cleaning and television investigation program and manhole inspection program and a smoke testing program conducted found few defects. It is believed the majority of the infiltration and inflow is coming from private sanitary service leads.
- Lift stations have been maintained and upgraded as necessary throughout their life span. Both stations were overhauled in 2002 and were converted from can style lift stations to duplex submersible lift stations with above grade valve vaults. It is recommended that the Township look to replace pumps and meters by 2025 and to consider mechanical and electrical replacements by 2030.

This report provides a summary of the Asset Management Plan (AMP) for the Township's sanitary collection system. HEI with assistance from Township staff prepared the asset management plan for the sanitary sewer collection system. The goal of asset management is to meet a required level of service for the Township's current and future users in the most cost effective and economical way through proper operation and maintenance techniques and the rehabilitation and/or replacement of assets within the sanitary sewer system to comply with State and Federal regulations.

2. Asset Inventory and Condition Assessment

Ash Township has municipal water service throughout the majority of the Township; however sanitary sewer service only exists along Will-Carleton Road from Romine Road to Grafton Road and Grafton Road from Will-Carleton Road to a point of south of the Village of Carleton at the Airport Schools campus. There are less than 100 users on the system, mostly residential customers. Non-residential customers include Guardian Glass and Mannheim Auto Auction on the north end of the system and the Airport Schools campus on the south end of the system. The water distribution and wastewater collection systems within the Township are owned and maintained by the Township's Department of Public Works. Water is purchased through the Great Lakes Water Authority (GLWA), formerly the Detroit Water and Sewerage Department (DWSD).

Sewage is discharged to the Village of Carleton and treated at the Village's wastewater treatment plant. The sewage collection system within Ash Township was put into service in 1967 and no additional extensions have been constructed since that time.

The wastewater collection system assets consist of 22,107 lineal feet (4.187 miles) of gravity sewers ranging in size from eight (8) inches to eighteen (18) inches in diameter and 65 sanitary manholes. In addition, two (2) lift stations each consisting of two (2) pumps exist within the system. These assets are located in existing road right-of-ways owned and maintained by Monroe County or in dedicated utility easements to allow the Township to access the facilities for continued maintenance and operation purposes. A summary of the pipe inventory is as follows:

Pipe Size (in.)	**Pipe Length (ft.)**		
	Concrete	**VCP**	**Total**
8	0	1,840	1,840
10	1,667	0	1,667
12	5,001	0	5,001
15	7,290	0	7,290
18	6,309	0	6,309
Total	20,267	1,840	22,107
Total Pipe Length (Miles)			***4.187***

Asset Identification and Location

A comprehensive sanitary sewer system asset inventory was developed from operation and maintenance manuals, including a review of existing record drawings, field notes, staff knowledge and site visits, in addition to field reconnaissance, cleaning and television investigation of sewers, visual inspections of manholes and flow monitoring. Information such as age, size and material were identified as best as possible from the cleaning and television investigation programs, as-built drawings and archived records. The physical location of assets with the sanitary collection system were collected with the use of Global Positioning System (GPS) technology and the pipe depth and invert elevations collected and compiled into a Geographic Information System (GIS) geodatabase. The GIS geodatabase will allow for better organization and record keeping, allow Township personnel to better track required maintenance and allow the Township to better prepare capital improvement programs and identify projects for the future. The GIS geodatabase for the entire sanitary sewer system consists of 134 total assets.

Condition Assessment

As part of the SAW grant study, a comprehensive, detailed evaluation of the sanitary collection system was completed consisting of cleaning and televising of sewers and inspections of manholes. Evaluations were based on the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP) rating assets one (1) through five (5), with five (5) being a severe rating. The cleaning and televising investigation included the entire sanitary collection system (100.0% of overall system) and 65 manholes (100.0% of all manholes). Overall, the structural condition of the collection system was found to be in good condition with few structural defects mostly as cracked pipe found sporadically throughout the system; however, there were also locations where infiltration and inflow was entering the system through pipe joints, manholes and service leads.

Based upon the results of the SAW grant study, the Township would pursue addressing structural defects through a sewer rehabilitation program estimated at approximately $140,000 to complete. The Township currently has this amount within their fund balance.

A detailed evaluation of the two (2) lift stations also was conducted.

3. Level of Service

Ash Township has developed overall level of service goals that the sanitary sewer collection system should provide. The primary objective is to provide a reliable and well maintained sanitary sewer collection system in the most cost effective means and in compliance with State and Federal regulations. To meet these requirements, the level of service goals are proposed as the following:

- Provide adequate capacity within the sewer system and meet contractual capacity with the Village of Carleton
- Provide continued maintenance of the collection system to provide for a reliable working condition at all times
- Comply with all County, State and Federal health and environmental regulations
- Work to reduce or eliminate infiltration and inflow sources into the collection system to prevent sewer surcharging and potential basement backups and to meet contractual obligations with the Village of Carleton
- Provide adequate customer service and have an effective emergency response plan in place
- Ensure that all Department of Public Works staff are regularly trained and certified to operate sanitary sewer facilities
- Regularly review safety procedures and provide necessary training to Township staff
- Routinely review and evaluate the sanitary sewer system including pipes, manholes and lift stations and update the asset management plan and capital improvement plan every five (5) years to allow the proper adjustment of water and sewer rates to fund future capital expenditures required to continually maintain a reliably working system

- Regularly maintain and update the GIS geodatabase and utilize this software to track maintenance and repairs of the system

Level of service requirements can be updated regularly to account for changes to the sanitary sewer system, changes in regulatory requirements, technology upgrades, significant population growth or significant decrease in population, staffing levels and financial capabilities.

4. Criticality of Assets

Determining Criticality of Assets

Business risk is the determination of criticality of each asset in the sanitary sewer system. Business Risk, also referred to as criticality, is determined based on two factors; the probability of failure and the consequence of failure. Defining an asset's business risk provides assistance to Township staff in making important, cost effective decisions on how to allocate funds for the operation and maintenance of the sanitary sewer system and for future capital improvements.

The Probability of Failure is a measure of how likely an asset is to fail. Probability of Failure is based

on weighted factors such as the physical or operational condition of the asset, age, service history and operational status.

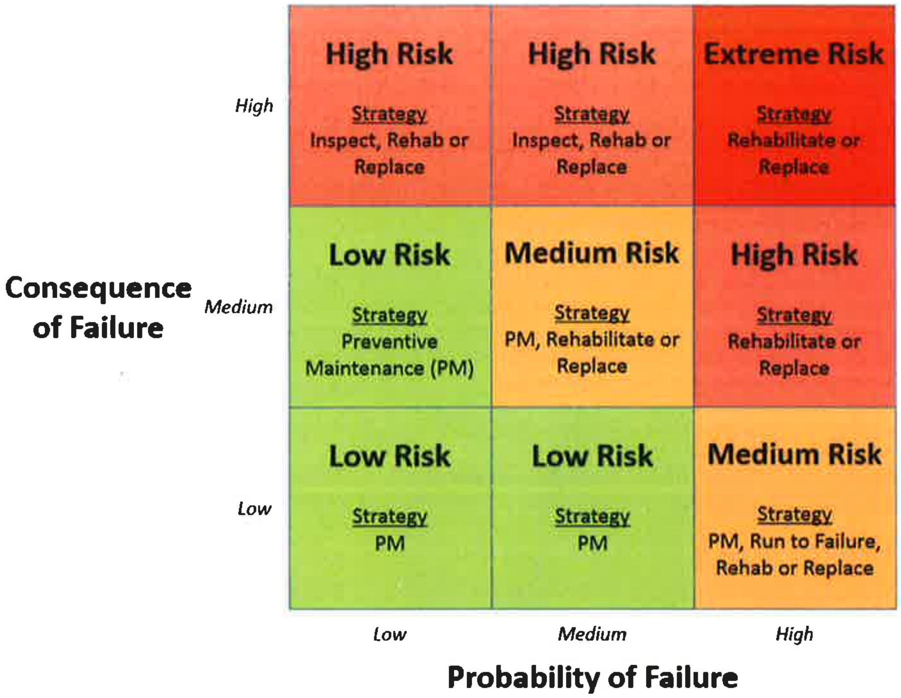
The Consequence of Failure is a measure of the impact of failure for an asset on the sanitary system's ability to convey and treat wastewater. Consequence of Failure is based on weighted factors such as location of asset, facilities or population served by the asset, size of the asset and ability to respond to emergencies for the collection system.

Assessing Criticality of Assets

The criticality of assets is assessed by calculating the "Business Risk Score", also known as Criticality, for each asset and is calculated by the following:

Business Risk = Probability of Failure Score x Consequence of Failure Score

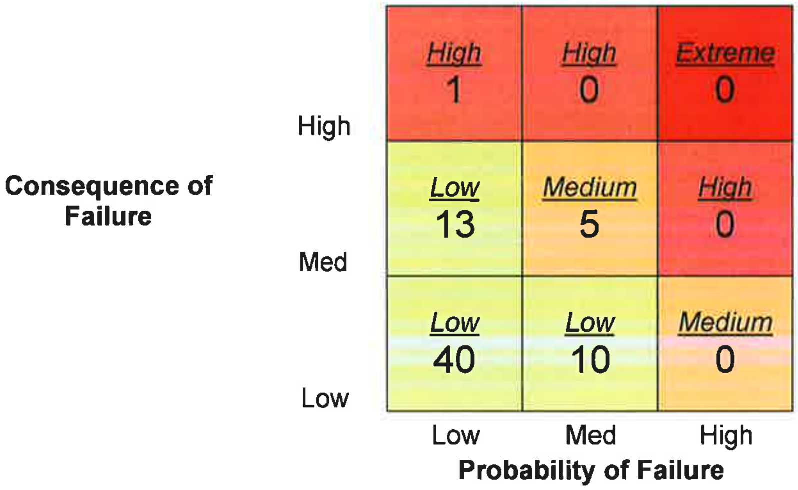
Risk ratings are assigned to each asset based upon the above calculations and placed into the matrix to identify the risk of each asset. Risk ratings were calculated and compiled into a spreadsheet co to be able to analyze and assess business risk for each asset and assists with developing a capital improvement plan.



Consequence of Failure			
High	**High Risk** Strategy Inspect, Rehab or Replace	**High Risk** Strategy Inspect, Rehab or Replace	**Extreme Risk** Strategy Rehabilitate or Replace
Medium	**Low Risk** Strategy Preventive Maintenance (PM)	**Medium Risk** Strategy PM, Rehabilitate or Replace	**High Risk** Strategy Rehabilitate or Replace
Low	**Low Risk** Strategy PM	**Low Risk** Strategy PM	**Medium Risk** Strategy PM, Run to Failure, Rehab or Replace
	Low	Medium	High

Probability of Failure

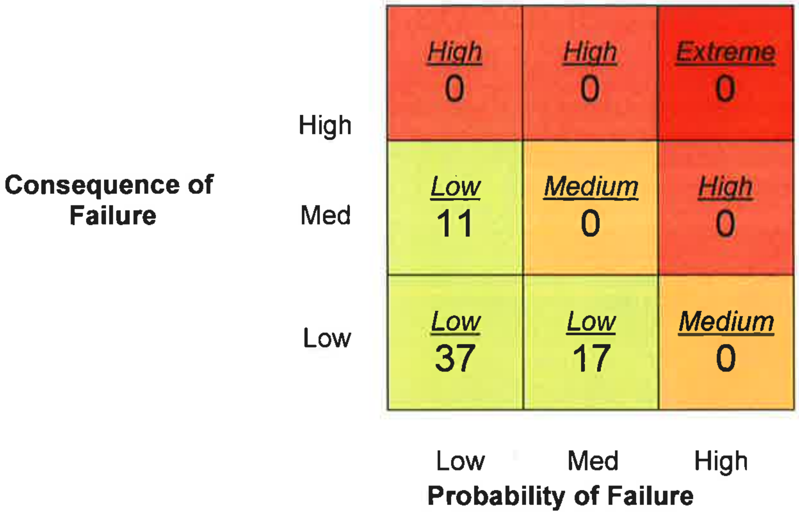
For the collection system, the pipe network and manholes currently have business risks ranging from low risk to high risk. The risk rating of an asset can be used to develop a risk-based strategy for asset rehabilitation or replacement. A summary of the business risk analysis for the 69 pipe assets within the collection system is shown below:



Consequence of Failure			
High	High 1	High 0	Extreme 0
Med	Low 13	Medium 5	High 0
Low	Low 40	Low 10	Medium 0
	Low	Med	High

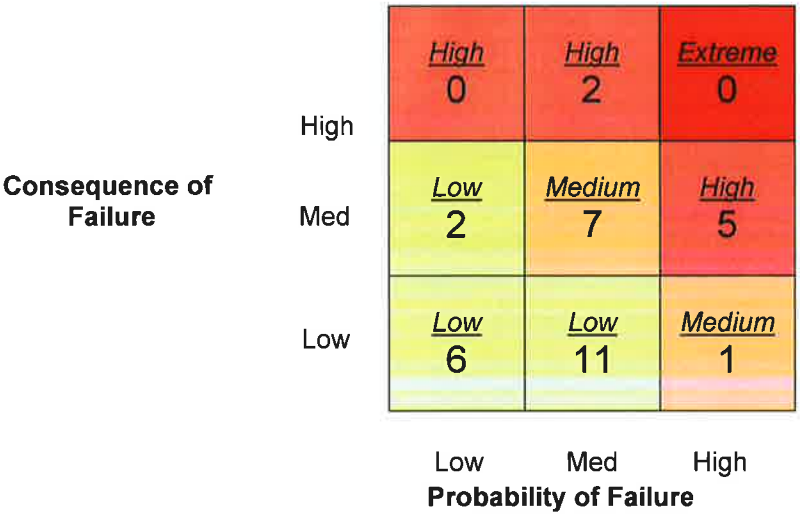
Probability of Failure

A summary of the business risk analysis for the 65 manhole assets within the collection system is shown below:



Consequence of Failure				
	High	*High* 0	*High* 0	*Extreme* 0
	Med	*Low* 11	*Medium* 0	*High* 0
	Low	*Low* 37	*Low* 17	*Medium* 0
		Low	Med	High
		Probability of Failure		

A summary of the business risk analysis for the 36 lift station assets within the collection system is shown below:



Consequence of Failure				
	High	*High* 0	*High* 2	*Extreme* 0
	Med	*Low* 2	*Medium* 7	*High* 5
	Low	*Low* 6	*Low* 11	*Medium* 1
		Low	Med	High
		Probability of Failure		

5. Capital Improvement Project Planning

Based upon the business risk evaluation, the Township has developed short term (5 year) and long term (20 year) capital improvement plans providing recommendations for improvements to the sanitary sewer collection and treatment system. The business risk evaluation assisted the Township to prioritize all future capital improvement projects and develop a rate structure to fund these projects. For the collection system, immediate needs are to address those few structural defects that were rated in poor condition and to eliminate infiltration through pipe joints to eliminate the future risk of sewer surcharging, potential basement backups and contractual capacity issues and to address these needs with available sewer fund balance in 2020. The Township will also work with property owners to address broken or leaking service leads allowing constant groundwater flow into the system. However, prior to completing the sewer rehabilitation program, since the sewers were last cleaned and televised in 2014, it is recommended to re-inspect the collection system in 2020 as generally it is recommended to clean and televise sewers and inspect manholes every five (5) years to identify any new or potential problems and identify ways to address these problems. It is estimated based upon the sewer cleaning and televising completed as part of the SAW grant program, that it would cost $75,000 to complete the entire Township. At this time, there are no recommendations to improve the lift stations; however, by 2025, the Township should consider the potential of replacing pumps and meters at a estimated cost of $214,000. It appears this amount of money is currently available in fund balance; however, as time gets closer to address these needs, the rate structure should be reviewed and adjusted as necessary to complete necessary lift station improvements.

6. Revenue Structure

A rate methodology report was submitted to the MDEQ in June 2019 and approved by MDEQ staff on October 14, 2019. Costs for proposed sewer rehabilitation, future collection system and lift station improvement projects; in addition to future investigative work and frequency of routine maintenance such as cleaning and television investigation and manhole inspections are figured into future rate adjustments. Township staff; along with the Engineering consultant, determine if the rate structures are sufficient to meet the current needs of the Township's sanitary sewer system. Over the course of time, adjustments may need to be made to the rate structure in order to fund future projects.

The asset management plan developed will allow the Township to calculate estimated costs for future projects and assist with future rate adjustments. Based upon the SAW grant study, there is an immediate need to rehabilitate sewers where structural defects exist and to eliminate infiltration through pipe joints. These immediate needs will be addressed in 2020 utilizing the sewer fund balance. The estimated cost for this project is $140,000. In addition to the current needs, there will be additional needs in the future for the system within the next 20 years and the rate structure adjusted as needed. At this time to cover the costs for sewer rehabilitation and investigative work, rates do not need to be increased.

This asset management plan along with the rate methodology should be revisited on an annual basis and the asset management plan and rate methodology updated as needed on an annual basis to account for maintenance and rehabilitative work completed within the given year and to update cost estimates for future projects.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date __**November 30, 2019**________________
(no later than 3 years from executed grant date)

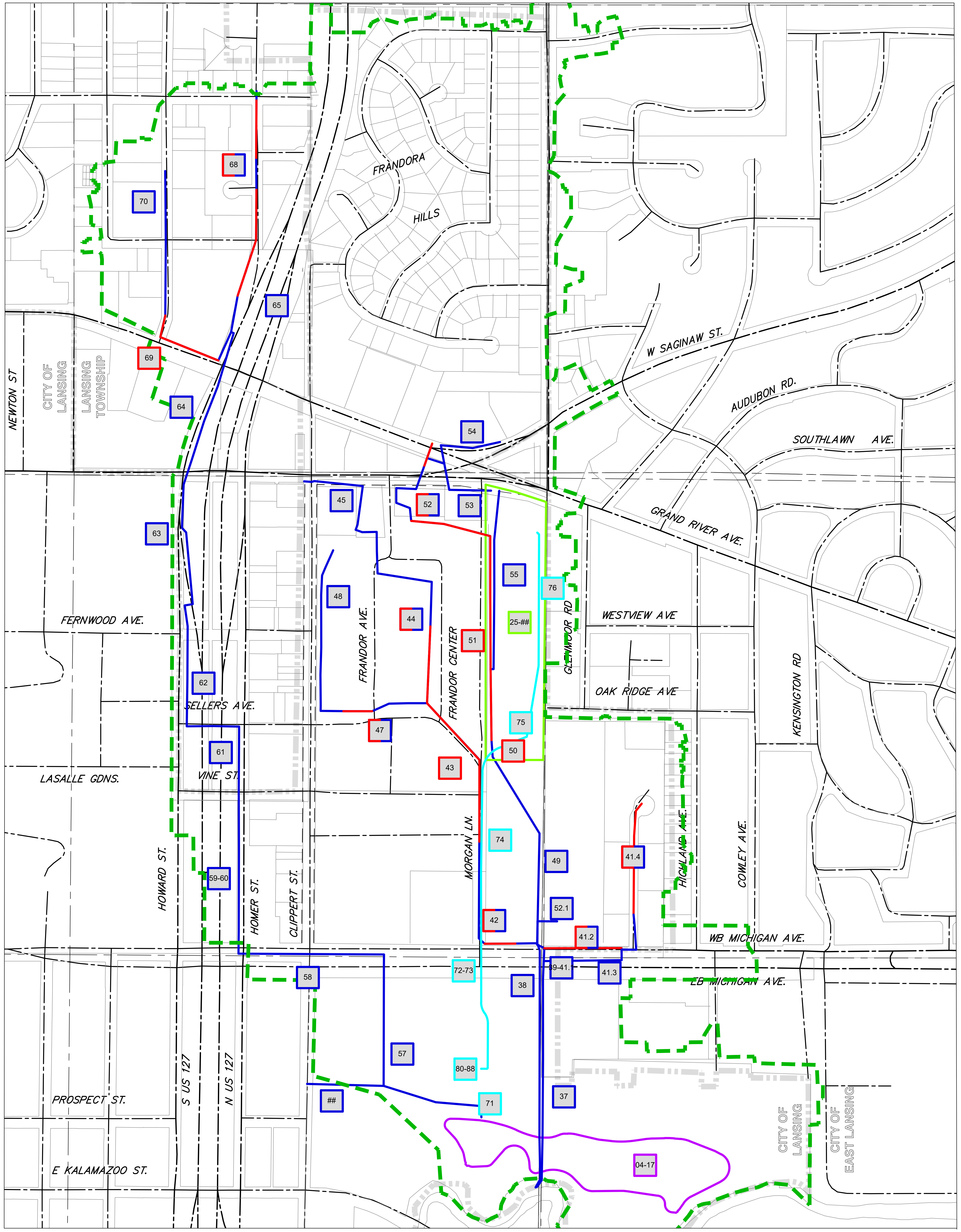
The Montgomery Drain Drainage District *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1124-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Patrick Lindemann, Drain Commissioner at (517) 676-8395 patricklindemann@me.com
Name Phone Number Email

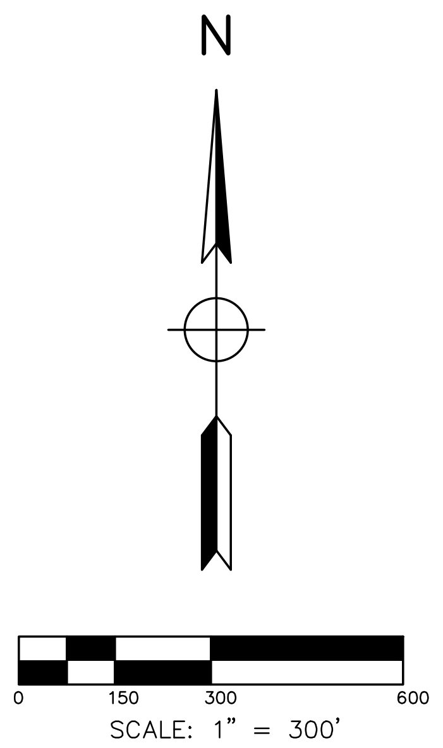
11-27-19
Signature of Authorized Representative (Original Signature Required) Date

PATRICK E. LINDEMANN, INGHAM COUNTY DRAIN COMMISSIONER
Print Name and Title of Authorized Representative



LEGEND

XX	–	SHEET NUMBER
🟪	–	DIVISION I
🟩	–	DIVISION II
🟦	–	DIVISION III
🟥	–	DIVISION IV
🟦	–	DIVISION V
—	–	DIVISION VI
—	–	DIVISION VII
▬ ▬ ▬	–	MONTGOMERY DRAIN SERVICE AREA



INGHAM COUNTY
CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

By	Date	Approved By	Date

REVISIONS

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Tel. 517-325-9977

JDR-2657-03

MONTGOMERY DRAIN
INGHAM COUNTY, MICHIGAN

MONTGOMERY DRAIN
SHEET LOCATION MAP

PROJECT NO.
121096SG2013

DIVISION
--

SHEET NO.
03

RED CEDAR POND - DIVISION I

7/24/2019

Item No.	Estimated Quantity	Unit	Description	Unit Price	Total Amount
RED CEDAR POND					
1.	1	Lump Sum	Mobilization, Max, 4%	$ 211,802.50	$ 211,802.50
2.	1	Lump Sum	Club House Demolition	$ 100,000.00	$ 100,000.00
3.	1	Lump Sum	Dewatering	$ 250,000.00	$ 250,000.00
4.	1	Lump Sum	Stabilized Construction Access (750' x 30' Gravel Approach and Geotextile Fabric)	$ 36,000.00	$ 36,000.00
5.	1446	Lin. Ft.	Safety Fence (Stabilized Construction Access)	$ 10.00	$ 14,460.00
6.	142,500	Cu. Yd.	Earth Excavation	$ 5.00	$ 712,500.00
7.	132,500	Cu. Yd.	Soil Hauling	$ 8.00	$ 1,060,000.00
8.	10,000	Cu. Yd.	Soil Hauling (Non Hazardous Contaminated Soil)	$ 25.00	$ 250,000.00
9.	3	Each	Dr Structure, Rem.	$ 2,000.00	$ 6,000.00
10.	466	Lin. Ft.	Sewer, Rem. Over 48 Inch	$ 20.00	$ 9,320.00
11.	1	L.S.	Overflow Spillway	$ 36,000.00	$ 36,000.00
INTAKE STRUCTURE					
12.	1	Each	Alternate A: 8' Dia. M.H., Intake Structure (Includes Galvanized Steel Grating and Ad Mixes)	$ 14,000.00	$ 14,000.00
13.	1	Each	Alternate B: Crib Intake Structure	$ 36,000.00	$ 36,000.00
14.	200	Lin. Ft.	36" Dia P.V.C. Intake Pipe	$ 175.00	$ 35,000.00
EAST INLET/OUTLET STRUCTURE					
15.	1	Lump Sum	Inlet Control Structure	$ 32,000.00	$ 32,000.00
16.	1	Lump Sum	Outlet Control Structure	$ 40,000.00	$ 40,000.00
17.	65	Lin. Ft.	Turbidity Curtain	$ 12.50	$ 812.50
18.	25	Sq. Yd.	Heavy Riprap	$ 80.00	$ 2,000.00
19.	94	Lin. Ft.	36" Dia. R.C.P. (C-76, CL-III), Tr Det A	$ 175.00	$ 16,450.00

WEST INLET/OUTLET STRUCTURE

20.	1	Lump Sum	Inlet Control Structure	$	32,000.00	$	32,000.00
21.	1	Lump Sum	Outlet Control Structure	$	40,000.00	$	40,000.00
22.	65	Lin. Ft.	Turbidity Curtain	$	12.50	$	812.50
23.	25	Sq. Yd.	Heavy Riprap	$	80.00	$	2,000.00
24.	160	Lin. Ft.	36" Dia. R.C.P. (C-76, CL-III), Tr Det A	$	175.00	$	28,000.00

EXISTING OUTLET REMOVAL

25.	98	Lin. Ft.	Sewer, Rem. Over 48 Inch	$	20.00	$	1,960.00
26.	2	Each	Outlet Structure, Rem.	$	2,000.00	$	4,000.00
27.	65	Lin. Ft.	Turbidity Curtain	$	12.50	$	812.50
28.	25	Sq. Yd.	Heavy Riprap	$	80.00	$	2,000.00
29.	200	Sq. Yd.	SC350 Mulch Blanket	$	1.75	$	350.00

PAVEMENT CONSTRUCTION

30.	6,982	Sq. Yd.	12' Wide Bituminous Path (Includes 6" Aggregate Base)	$	15.00	$	104,730.00

SOIL EROSION AND SEDIMENT CONTROL

31.	2	Each	Catchbasin/Inlet Protection	$	100.00	$	200.00
32.	5660	Lin. Ft.	Silt Fence	$	1.75	$	9,905.00
33.	2000	Lin. Ft.	Compost Wattles, 8 Inch	$	5.00	$	10,000.00
34.	85000	Sq. Yd.	SC150 BioNet	$	2.00	$	170,000.00
35.	50	Sq. Yd.	Plain Riprap	$	45.00	$	2,250.00
36.	50	Sq. Yd.	Heavy Riprap	$	80.00	$	4,000.00
37.	1	Lump Sum	Final Grading, Temp Seed/Mulch	$	30,000.00	$	30,000.00
38.	1	Lump Sum	Soil Binding Polymers (Silt-Stop)	$	4,000.00	$	4,000.00
39.	3	Acre	Site Clearing	$	5,000.00	$	15,000.00

40.	1	Lump Sum	Site Clean Up and Restoration	$ 47,500.00	$ 47,500.00
RED CEDAR POND TRAFFIC CONTROL					
41.	1	Lump Sum	Traffic Control	$ 75,000.00	$ 75,000.00
SHORT STREAM					
42.	1	Lump Sum	Short Stream	$ 50,000.00	$ 50,000.00
LONG STREAM					
43.	1	Lump Sum	Long Stream	$ 250,000.00	$ 250,000.00
EMBANKMENT EARTHWORK					
44.	1	Lump Sum	Embankment Earthwork (Type I)	$ 250,000.00	$ 250,000.00
45.	1	Lump Sum	Embankment Earthwork (Type II)	$ 50,000.00	$ 50,000.00
46.	1	Lump Sum	Pavement Construction (Earthwork)	$ 200,000.00	$ 200,000.00
SUPPLEMENTAL BENEFITS FOR RED CEDAR DEVELOPMENT					
47.	1	Lump Sum	Other Development Supplementals	$ 1,260,000.00	$ 1,260,000.00

SUB-TOTAL CONSTRUCTION COST	**$ 5,506,865.00**
CONTINGENCIES (7.5% +/-)	**$ 413,014.88**
TOTAL CONSTRUCTION COST	**$ 5,919,879.88**

PRELIMINARY ESTIMATE OF COST
RANNEY PARK - DIVISION II

6/6/2019

Item No.	Estimated Quantity	Unit	Description	Unit Price	Total Amount
RANNEY PARK STORM WATER TREATMENT					
MOBILIZATION AND AUXILIARY COSTS					
1.	1	Lump Sum	Mobilization, Max 4% ±	$ 210,741.69	$ 210,741.69
RANNEY PARK					
2.	1	Lump Sum	Dewatering	$ 250,000.00	$ 250,000.00
3.	1	Lumps Sum	Stabilized Construction Access	$ 32,000.00	$ 32,000.00
4.	1,300	Lin. Ft.	Safety Fence (Stabilized Construction Access)	$ 10.00	$ 13,000.00
5.	101,079	Cyd.	Excavation Net Cut = Cut + UG Storage Volume)	$ 5.00	$ 505,394.75
6.	77,817	Cyd.	Spoil Hauling (Spoil Hauling = Net cut - Fill)	$ 8.00	$ 622,532.40
7.	110	Lbs.	Soil Binding Polymers (Granulated- <10 lbs/acre, Granulated w/ compost- 20-25 lbs/acre, Spray- 1 lb/300 gal water)	$ 10.00	$ 1,100.00
8.	8,176	Sq. Yd.	Bituminous Path (Includes 6" Aggregate base) (486.2 LIN.FT. 12' WIDE PATHWAY, 5645.4 LIN.FT. 8' WIDE PATHWAY) [Calculated quanity assumes all pathways as 12' wide]	$ 15.00	$ 122,632.50
9.	230	Lin. Ft.	Exploratory Dig and Stm. Swr. Removal	$ 10.00	$ 2,300.00
10.	52	Each	Tree Rem. 19 inch to 36 inch	$ 775.00	$ 40,300.00
11.	2	Each	Hydrant, Remove and Replace	$ 2,500.00	$ 5,000.00
RANNEY PARK UNDERGROUND STORAGE					
12.	70,000	Cu. Ft.	Underground Storage	$ 8.00	$ 560,000.00
13.	230	Lin. Ft.	Header Pipe		$ -
14.	5	Each	Dr Structure, 6' Dia, R.C.P. MH	$ 7,000.00	$ 35,000.00
15.	4	Each	Diversion Structure		$ -
16.	1	Each	Control Weir Structure		$ -
17.	406	Lin. Ft.	Underdrain	$ 50.00	$ 20,295.00
18.	170	Lin. Ft.	Oulet Manifold		$ -
RANNEY PARK MISCELLANEOUS					
19.	1,720	Sq. Ft.	Pedestrian Bridges	$ 70.00	$ 120,400.00
20.	1,320	Sq. Ft.	Vehicular Bridges	$ 75.00	$ 99,000.00
21.	1,000	Sq. Ft.	Sledding Hill Steps	$ 15.00	$ 15,000.00
22.	200	Lin. Ft.	Conc. Stair 8' Wide	$ 50.00	$ 10,000.00
23.	4.0	Each	Concrete Foundation Structures	$ 5,000.00	$ 20,000.00
24.	200.0	Lin. Ft.	Stair Railing	$ 50.00	$ 10,000.00
25.	1,220.0	Lin. Ft.	Railing/Wall	$ 50.00	$ 61,000.00

26.	850.0	Lin. Ft.	Fencing, Chain Link, 60 inch	$	35.00	$	29,750.00
27.	1,720.0	Sq. Ft.	Fishing Pier	$	75.00	$	129,000.00
28.	1	Each	Fishing Pier Benches and Shade	$	15,000.00	$	15,000.00
29.	700	Lin. Ft.	Retaining Wall	$	650.00	$	455,000.00
RANNEY PARK PAVEMENT REPAIR							
30.	300	Sq. Yd.	Pavement Removal	$	20.00	$	6,000.00
31.	170	Sq. Yd.	Sidewalk Removal	$	10.00	$	1,700.00
32.	2,075	Sq. Ft.	Install 6' Sidewalk	$	25.00	$	51,875.00
33.	185	Lin. Ft.	Remove Curb & Gutter	$	10.00	$	1,850.00
34.	1,800	Lin. Ft.	Curb & Gutter, Conc, Match Existing	$	30.00	$	54,000.00
35.	1,800	Lin. Ft.	Underdrain, Subgrade, 6 inch	$	10.00	$	18,000.00
36.	2,200	Sq. Ft.	Granite Block Walkway	$	145.00	$	319,000.00
37.	1	Lump Sum	Pavement Striping	$	5,000.00	$	5,000.00
RANNEY PARK SOIL EROSION AND SEDIMENT CONTROL							
38.	1,750	Lin. Ft.	Silt Fence	$	1.75	$	3,062.50
39.		Lin. Ft.	Straw Wattles	$	1.75	$	-
40.	1	Lump Sum	Final Grading, Temp Seed/Mulch	$	30,000.00	$	30,000.00
41.	8	Each	Catchbasin Inlet Protection	$	100.00	$	800.00
42.	1	Lump Sum	Cleanup and Site Restoration (Limits of Disturbance)	$	10,000.00	$	10,000.00
RANNEY PARK NORTH WATER TREATMENT AREA							
43.	1	Lump Sum	Floral Clock Water Treatment Base & Installation	$	117,500.00	$	117,500.00
44.	1	Lump Sum	Landscaping North of Wall	$	66,300.00	$	66,300.00
45.	1	Lump Sum	Maintenance Paths North of Wall	$	165,000.00	$	165,000.00
46.	1	Lump Sum	Water Treatment Area	$	144,750.00	$	144,750.00
RANNEY PARK RETAINING WALL							
47.	1	Lump Sum	Retaining Wall	$	1,100,000.00	$	1,100,000.00
SUB-TOTAL CONSTRUCTION COST						**$**	**5,479,283.84**
CONTINGENCIES (7.5% +/-)						**$**	**410,946.29**
TOTAL CONSTRUCTION COST						**$**	**5,890,230.12**

PRELIMINARY ESTIMATE OF COST
PIPE UPGRADES - DIVISION III

11/25/2019

Item No.	Estimated Quantity	Unit	Description	Price	Amount
MONTGOMERY DRAIN STORM SEWER					
1.	1	Lump Sum	Mobilization, Max, 4%	$ 279,477.02	$ 279,477.02
2.	1	Lump Sum	Cast-In-Place Headwall	$ 30,000.00	$ 30,000.00
3.	76	Lin. Ft.	4' X 9' Box Culvert (Premium Joint), Tr Det A	$ 1,000.00	$ 76,000.00
4.	165	Lin. Ft.	4' X 9' Box Culvert (Premium Joint), Tr Det B	$ 1,000.00	$ 165,000.00
5.	1	Each	Junction Chamber A	$ 60,000.00	$ 60,000.00
6.	1	Each	Junction Chamber B	$ 60,000.00	$ 60,000.00
7.	4	Each	MH, Precast Tee, Cl III, 48 inch	$ 8,000.00	$ 32,000.00
8.	1	Each	Dr Structure, 4' Dia. MH	$ 4,000.00	$ 4,000.00
9.	1	Each	Dr Structure, 4' Dia. MH/CB	$ 4,500.00	$ 4,500.00
10.	1	Each	Dr Structure, 4' Dia. CB	$ 4,000.00	$ 4,000.00
11.	7	Each	Casting, Grate, & Adjustment	$ 600.00	$ 4,200.00
12.	4	Ft.	Dr Structure, Add Depth of 4' Dia., 8'-15'	$ 500.00	$ 2,000.00
13.	34	Lin. Ft.	54" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 350.00	$ 11,900.00
14.	13	Lin. Ft.	24" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 140.00	$ 1,820.00
15.	45	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 120.00	$ 5,400.00
16.	12	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 60.00	$ 720.00
17.	50	Lin. Ft.	42" P.V.C. Stm. Swr. (Temporary)		$ -
18.	1	Each	36" Bulkhead	$ 200.00	$ 200.00
19.	31	Lin. Ft.	Sewer, Rem. Less Than 24 Inch	$ 20.00	$ 620.00
20.	229	Lin. Ft.	Sewer, Rem. 24 Inch to 48 Inch	$ 20.00	$ 4,580.00
21.	316	Lin. Ft.	Sewer, Rem. Over 48 Inch	$ 20.00	$ 6,320.00
22.	8	Each	Dr Structure, Rem.	$ 2,000.00	$ 16,000.00
23.	4	Each	Junction Chamber, Rem.	$ 3,000.00	$ 12,000.00
MONTGOMERY DRAIN PAVEMENT REPAIR					
24.	370	Lin. Ft.	Curb and Gutter, Rem	$ 10.00	$ 3,700.00
25.	370	Lin. Ft.	Curb and Gutter, Conc, Det F4 Modified	$ 25.00	$ 9,250.00
26.	370	Lin. Ft.	Underdrain, Subgrade, 6 inch	$ 10.00	$ 3,700.00

27.	700	Sq. Yd.	Bituminous over Concrete Rem. And Rep. (Michigan Avenue)	$	115.00	$	80,500.00
28.	80	Sq. Yd.	Bituminous Drive / Parking Lot Repair (Minimum 4 inch depth)	$	50.00	$	4,000.00
29.	150	Sq. Yd.	6" Conc. Drive Repair	$	65.00	$	9,750.00
30.	225	Sq. Ft.	Sidewalk Rem. And Rep., Conc, 6 inch	$	15.00	$	3,375.00
31.	855	Sq. Ft.	Sidewalk Rem. And Rep., Conc, 4 inch	$	12.00	$	10,260.00

MONTGOMERY DRAIN SOIL EROSION AND SEDIMENT CONTROL

32.		Lin. Ft.	Silt Fence	$	5.00	$	-
33.	3	Each	Catchbasin/Inlet Protection	$	100.00	$	300.00
34.	1	Lump Sum	Bypass Pumping	$	10,000.00	$	10,000.00
35.	1	Lump Sum	Landscape Seeding (Includes min. 4" topsoil)	$	1,000.00	$	1,000.00
36.	800	Sq. Yd.	S75 BN Mulch Blanket	$	1.50	$	1,200.00
37.	1	Lump Sum	Soil Binding Polymers	$	1,000.00	$	1,000.00
38.	1	Lump Sum	Site Clearing	$	1,000.00	$	1,000.00
39.	1	Lump Sum	Cleanup and Site Restoration (Limits of Disturbance)	$	2,500.00	$	2,500.00

MONTGOMERY DRAIN MISCELLANEOUS

40.	1	Each	8" Water Main Lowering	$	20,000.00	$	20,000.00
41.	4	Each	Duct Bank Support System	$	20,000.00	$	80,000.00
42.	3	Each	Tree, Rem, 6 inch to 18 inch	$	500.00	$	1,500.00
43.	6	Each	Sign, Type III, Rem	$	40.00	$	240.00
44.	6	Each	Sign, Type III, Erect, Slav	$	80.00	$	480.00
45.	6	Each	Post, Steel, 3 lb	$	20.00	$	120.00
46.	150	Lin. Ft.	Fence, Chain Link, 48 inch	$	35.00	$	5,250.00

RICHARD'S RELIEF BRANCH STORM SEWER

47.	1	Each	Dr Structure, 8' Dia. MH	$	9,000.00	$	9,000.00
48.	1	Each	Dr Structure, 6' Dia. MH/CB	$	6,500.00	$	6,500.00
49.	2	Each	Dr Structure, 5' Dia. MH	$	5,500.00	$	11,000.00
50.	1	Each	Dr Structure, 5' Dia. MH/CB	$	6,000.00	$	6,000.00
51.	1	Each	Dr Structure, 4' Dia. MH/CB	$	4,500.00	$	4,500.00
52.	1	Each	Dr Structure, 4' Dia. CB	$	4,000.00	$	4,000.00
53.	2	Ft	Dr Structure, Add Depth of 6' Dia., 8'-15'	$	812.50	$	1,625.00

54.	8	Ft	Dr Structure, Add Depth of 5' Dia., 8'-15'	$	687.50	$	5,500.00
55.	1	Ft	Dr Structure, Add Depth of 4' Dia., 8'-15'	$	500.00	$	500.00
56.	419	Lin. Ft.	36" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	220.00	$	92,180.00
57.	240	Lin. Ft.	24"C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	140.00	$	33,600.00
58.	16	Lin. Ft.	21" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	130.00	$	2,080.00
59.	29	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	120.00	$	3,480.00
60.	57	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	60.00	$	3,420.00
61.	32	Lin. Ft.	6" P.V.C. Storm Sewer, Tr Det B	$	40.00	$	1,280.00
62.	240	Lin. Ft.	Sewer, Rem. Less than 24 Inch	$	20.00	$	4,800.00
63.	5	Each	Dr Structure, Rem.	$	2,000.00	$	10,000.00
64.	7	Each	Casting, Grate, & Adjustment	$	600.00	$	4,200.00
RICHARD'S RELIEF BRANCH PAVEMENT REPAIR							
65.	64	Sq. Ft.	8'x8'x6" Concrete Apron	$	7.00	$	448.00
66.	634	Sq. Yd.	Bituminous Over Conc. Pavement Rem. & Rep. (Michigan Ave)	$	115.00	$	72,910.00
67.	315	Sq. Yd.	6" Conc. Drive Rem. & Rep.	$	65.00	$	20,475.00
68.	187	Sq. Ft.	Sidewalk Rem. & Rep. Conc. 6 Inch	$	15.00	$	2,805.00
69.	87	Sq. Ft.	Sidewalk Rem. & Rep. Conc. 4 Inch	$	12.00	$	1,044.00
70.	1	Lump Sum	Pavement Striping	$	1,000.00	$	1,000.00
71.	400	Lin. Ft.	Curb and Gutter, Rem	$	10.00	$	4,000.00
72.	400	Lin. Ft.	Curb and Gutter, Conc, Det F4 Modified	$	30.00	$	12,000.00
73.	400	Lin. Ft.	Underdrain, Subgrade, 6 inch	$	10.00	$	4,000.00
RICHARD'S RELIEF BRANCH SOIL EROSION AND SEDIMENT CONTROL							
74.	4	Each	Catch Basin Inlet Protection	$	100.00	$	400.00
75.	1	Lump Sum	Landscape Seeding (Includes min. 4" topsoil)	$	5,000.00	$	5,000.00
76.	1	Lump Sum	Soil Binding Polymers	$	300.00	$	300.00
77.	2,000	Sq. Yd.	S75 BN Mulch Blanket	$	1.50	$	3,000.00
78.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$	3,000.00	$	3,000.00
RICHARD'S RELIEF BRANCH MISCELLANEOUS							
79.	10	Each	Tree, Rem, 6 inch to 18 inch	$	500.00	$	5,000.00
80.	3	Each	Duct Bank Support System	$	20,000.00	$	60,000.00

81.	4	Each	Sign, Type III, Rem	$	40.00	$	160.00
82.	4	Each	Sign, Type III, Erect, Slav	$	80.00	$	320.00
83.	4	Each	Post, Steel, 3 lb	$	20.00	$	80.00
84.	1	Each	8" Watermain Lowering	$	20,000.00	$	20,000.00
85.	1	Each	6" Watermain Lowering	$	20,000.00	$	20,000.00
86.	1	Each	4" Watermain Lowering	$	20,000.00	$	20,000.00

WEST MAIN STORM SEWER

87.	1	Each	Dr Structure, 6' Dia. MH	$	6,000.00	$	6,000.00
88.	3	Each	Dr Structure, 5' Dia. MH	$	5,500.00	$	16,500.00
89.	3	Each	Dr Structure, 4' Dia. MH	$	4,000.00	$	12,000.00
90.	1	Each	Dr Structure, 8' Dia. MH/CB	$	10,000.00	$	10,000.00
91.	1	Each	Dr Structure, 6' Dia. MH/CB	$	6,500.00	$	6,500.00
92.	1	Each	Dr Structure, 4' Dia. CB	$	4,000.00	$	4,000.00
93.	6	Ft	Dr Structure, Add Depth of 8' Dia., 8'-15'	$	1,250.00	$	7,500.00
94.	8	Ft	Dr Structure, Add Depth of 6' Dia., 8'-15'	$	812.50	$	6,500.00
95.	8	Ft	Dr Structure, Add Depth of 5' Dia., 8'-15'	$	687.50	$	5,500.00
96.	5	Ft	Dr Structure, Add Depth of 4' Dia., 8'-15'	$	500.00	$	2,500.00
97.	16	Lin. Ft.	42" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	240.00	$	3,840.00
98.	246	Lin. Ft.	36" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	220.00	$	54,120.00
99.	303	Lin. Ft.	30" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	180.00	$	54,540.00
100.	395	Lin. Ft.	24" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	140.00	$	55,300.00
101.	16	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	120.00	$	1,920.00
102.	32	Lin. Ft.	15" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	110.00	$	3,520.00
103.	104	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	60.00	$	6,240.00
104.	48	Lin. Ft.	6" P.V.C. Storm Sewer, Tr Det B	$	40.00	$	1,920.00
105.	32	Lin. Ft.	4" P.V.C. Storm Sewer, Tr Det B	$	20.00	$	640.00
106.	262	Lin. Ft.	Sewer, Rem., 24 Inch to 48 Inch	$	20.00	$	5,240.00
107.	746	Lin. Ft.	Sewer, Rem., Less Than 24 Inch	$	20.00	$	14,920.00
108.	9	Each	Dr Structure, Rem.	$	2,000.00	$	18,000.00
109.	10	Each	Casting, Grate, & Adjustment	$	600.00	$	6,000.00

110.	2	Each	Lateral Tile Connection	$ 500.00	$ 1,000.00
111.	2	Cu. Yds.	MDOT Flowable Fill, 12" Storm Sewer	$ 150.00	$ 300.00

WEST MAIN PAVEMENT REPAIR

112.	4,400	Sq. Yd.	Bituminous Drive/ Parking Lot Rem. And Rep. (Min. 4" HMA)	$ 50.00	$ 220,000.00
113.	640	Sq. Ft.	8' x 8' x 6" Concrete Apron	$ 7.00	$ 4,480.00
114.	175	Lin. Ft.	Curb and Gutter, Rem	$ 10.00	$ 1,750.00
115.	175	Lin. Ft.	Curb and Gutter, Conc, Det C4	$ 30.00	$ 5,250.00
116.	175	Lin. Ft.	Underdrain, Subgrade, 6 inch	$ 10.00	$ 1,750.00
117.	1	Lump Sum	Pavement Striping	$ 5,000.00	$ 5,000.00

WEST MAIN SOIL EROSION AND SEDIMENT CONTROL

118.	5	Each	Catch Basin Inlet Protection	$ 100.00	$ 500.00
119.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$ 3,000.00	$ 3,000.00

WEST MAIN MISCELLANEOUS

120.	3	Each	Sign, Type III, Rem	$ 40.00	$ 120.00
121.	3	Each	Sign, Type III, Erect, Slav	$ 80.00	$ 240.00
122.	3	Each	Post, Steel, 3 lb	$ 20.00	$ 60.00
123.	1	Each	Tree, Rem, 6 inch to 18 inch	$ 500.00	$ 500.00
124.	2	Each	12" Bulkhead	$ 200.00	$ 400.00
125.	1	Each	8" Watermain Lowering	$ 20,000.00	$ 20,000.00
126.	50	Lin. Ft.	Remove and Replace 8" San. Swr.	$ 100.00	$ 5,000.00

WEST MAIN BRANCH NO.1 STORM SEWER

127.	1	Each	Dr Structure, 10' Dia. MH	$ 15,000.00	$ 15,000.00
128.	2	Each	Dr Structure, 6' Dia. MH	$ 7,000.00	$ 14,000.00
129.	3	Ft.	Dr Structure, Add Depth of 10' Dia., 8'-15'	$ 1,875.00	$ 5,625.00
130.	2	Ft.	Dr Structure, Add Depth of 6' Dia., 8'-15'	$ 875.00	$ 1,750.00
131.	16	Lin. Ft.	54" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 350.00	$ 5,600.00
132.	227	Lin. Ft.	42" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 240.00	$ 54,480.00
133.	16	Lin. Ft.	30" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 180.00	$ 2,880.00
134.	16	Lin. Ft.	15" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 110.00	$ 1,760.00
135.	32	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$ 60.00	$ 1,920.00
136.	16	Lin. Ft.	6" P.V.C. Storm Sewer	$ 40.00	$ 640.00

137.	259	Lin. Ft.	Sewer, Rem., 24 inch to 48 Inch	$	20.00	$	5,180.00
138.	3	Each	Dr Structure, Rem.	$	2,000.00	$	6,000.00
139.	3	Each	Casting, Grate, & Adjustment	$	600.00	$	1,800.00

WEST MAIN BRANCH NO.1 PAVEMENT REPAIR

140.	1300	Sq. Yd.	Bituminous Drive/ Parking Lot Rem. And Rep. (Min. 4" HMA)	$	50.00	$	65,000.00
141.	1	Lump Sum	Pavement Striping	$	1,000.00	$	1,000.00
142.	192	Sq. Ft.	8' x 8' x 6" Concrete Apron	$	7.00	$	1,344.00

WEST MAIN BRANCH NO.1 SOIL EROSION AND SEDIMENT CONTROL

143.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$	1,000.00	$	1,000.00
144.	2	Each	Catchbasin Inlet Protection	$	100.00	$	200.00

EAST MAIN STORM SEWER

145.	1	Each	Dr Structure, 8' Dia. MH	$	9,000.00	$	9,000.00
146.	1	Ft	Dr Structure, Add Depth of 8' Dia., 8'-15'	$	1,125.00	$	1,125.00
147.	118	Lin. Ft.	54" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	350.00	$	41,300.00
148.	16	Lin. Ft.	42" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	240.00	$	3,840.00
149.	134	Lin. Ft.	Sewer, Rem., 24 Inch to 48 Inch	$	20.00	$	2,680.00
150.	1	Each	Dr Structure, Rem.	$	2,000.00	$	2,000.00
151.	1	Each	Casting, Grate, & Adjustment	$	600.00	$	600.00

EAST MAIN PAVEMENT REPAIR

152.	600	Sq. Yd.	Bituminous Drive/ Parking Lot Rem. And Rep. (Min. 4" HMA)	$	50.00	$	30,000.00
153.	64	Sq. Ft.	8' x 8' x 6" Concrete Apron	$	7.00	$	448.00
154.	1	Lump Sum	Pavement Striping	$	1,000.00	$	1,000.00

EAST MAIN SOIL EROSION AND SEDIMENT CONTROL

155.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$	1,000.00	$	1,000.00
156.	1	Each	Catchbasin Inlet Protection	$	100.00	$	100.00

EAST MAIN MISCELLANEOUS

157.	1	Each	Duct Bank Support	$	20,000.00	$	20,000.00

SPORTING BRANCH STORM SEWER

158.	1	Each	Dr Structure, 7' Dia. MH	$	8,000.00	$	8,000.00
159.	1	Each	Dr Structure, 6' Dia. MH	$	7,000.00	$	7,000.00
160.	1	Ft.	Dr Structure, Add Depth of 7' Dia., 8'-15'	$	875.00	$	875.00
161.	134	Lin. Ft.	36" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	220.00	$	29,480.00

162.	57	Lin. Ft.	30" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	180.00	$	10,260.00
163.	41	Lin. Ft.	Sewer, Rem., 24 Inch to 48 Inch	$	20.00	$	820.00
164.	30	Cu. Yds.	MDOT Flowable Fill, 36" Storm Sewer	$	150.00	$	4,500.00
165.	1	Each	36" Bulkhead	$	2,000.00	$	2,000.00
166.	2	Each	Casting, Grate, & Adjustment	$	600.00	$	1,200.00

SPORTING BRANCH PAVEMENT REPAIR

167.	600	Sq. Yd.	Bituminous Pavment, Rem. And Rep. (Min. 4" HMA)	$	50.00	$	30,000.00
168.	192	Sq. Ft.	8' x 8' x 6" Concrete Apron	$	7.00	$	1,344.00
169.	1	Lump Sum	Pavement Striping	$	1,000.00	$	1,000.00

SPORTING BRANCH SOIL EROSION AND SEDIMENT CONTROL

170.	1	Each	Catch Basin Inlet Protection	$	100.00	$	100.00
171.	1	Lump Sum	Soil Binding Polymers	$	100.00	$	100.00
172.	1	Lump Sum	Landscape Seeding	$	500.00	$	500.00
173.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$	1,500.00	$	1,500.00

RANNEY PARK RELIEF BRANCH STORM SEWER

174.	2	Each	Dr Structure, 8' Dia. MH	$	9,000.00	$	18,000.00
175.	1	Each	Dr Structure, 7' Dia. Junction Chamber	$	12,000.00	$	12,000.00
176.	1	Each	Dr Structure, 6' Dia. MH	$	7,000.00	$	7,000.00
177.	1	Each	Dr Structure, 4' Dia. MH	$	5,000.00	$	5,000.00
178.	4	Ft.	Dr Structure, Add Depth of 8' Dia., 8'-15'	$	1,125.00	$	4,500.00
179.	5	Ft.	Dr Structure, Add Depth of 6' Dia., 8'-15'	$	875.00	$	4,375.00
180.	248	Lin. Ft.	48" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det B	$	275.00	$	68,200.00
181.	132	Lin. Ft.	36" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det B	$	220.00	$	29,040.00
182.	46	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det B	$	75.00	$	3,450.00
183.	32	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det B	$	60.00	$	1,920.00
184.	148	Lin. Ft.	48" C 76-V R.C.P. Storm Sewer, Pipe Jack (Premium Joint)	$	1,200.00	$	177,600.00
185.	16	Lin/ Ft.	Sewer, Rem. Less than 24 Inch	$	20.00	$	320.00
186.	32	Lin. Ft.	Sewer, Rem. 24 Inch to 48 Inch	$	20.00	$	640.00
187.	1	Each	Dr Structure, Rem.	$	2,000.00	$	2,000.00
188.	5	Each	Casting, Grate, & Adjustment	$	600.00	$	3,000.00

RANNEY PARK RELIEF BRANCH PAVEMENT REPAIR

189.	300	Sq. Ft.	Sidewalk, Conc, 4 inch, Rem. And Rep.	$	15.00	$	4,500.00
190.	360	Lin. Ft.	Curb and Gutter, Rem	$	10.00	$	3,600.00
191.	360	Lin. Ft.	Curb and Gutter, Conc, Det C4	$	25.00	$	9,000.00
192.	360	Lin. Ft.	Underdrain, Subgrade, 6 inch	$	10.00	$	3,600.00
193.	550	Sq. Yd.	Bituminous Pavement, Rem And Rep, (Min. 4" HMA)	$	50.00	$	27,500.00
194.	125	Sq. Yd.	Conc Drive, 6 inch, Rem And Rep	$	65.00	$	8,125.00
195.	1	Lump Sum	Pavement Striping	$	1,000.00	$	1,000.00
196.	64	Sq. Ft.	8'x8'x6" Concrete Apron	$	7.00	$	448.00

RANNEY PARK RELIEF BRANCH SOIL EROSION AND SEDIMENT CONTROL

197.	1	Lump Sum	Landscape Seeding (Includes min. 4" Topsoil)	$	4,500.00	$	4,500.00
198.	1	Lump Sum	Soil Binding Polymers	$	200.00	$	200.00
199.	6	Each	Catch Basin Inlet Protection	$	100.00	$	600.00
200.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$	5,000.00	$	5,000.00

RANNEY PARK RELIEF BRANCH MISCELLANEOUS

201.	2	Each	Water Main Relocation	$	20,000.00	$	40,000.00
202.	5	Each	Tree, Rem, 6 inch to 18 inch	$	500.00	$	2,500.00
203.	~~5~~	~~Each~~	~~Light Posts, Rem. & Rep. (By Others?)~~			~~$~~	~~-~~
204.	1	Each	Sign, Type III, Rem	$	40.00	$	40.00
205.	1	Each	Sign, Type III, Erect, Slav	$	80.00	$	80.00
206.	1	Each	Post, Steel, 3 lb	$	20.00	$	20.00
207.	2	Each	12" Bulkhead	$	200.00	$	400.00

COOLIDGE RELIEF BRANCH STORM SEWER

208.	1	Each	Dr Structure, 6' Dia. MH	$	7,000.00	$	7,000.00
209.	1	Each	Dr Structure, 5' Dia. MH	$	6,000.00	$	6,000.00
210.	1	Each	Dr Structure, 5' Dia. MH/CB	$	6,500.00	$	6,500.00
211.	1	Each	Dr Structure, 4' Dia. MH/CB	$	4,500.00	$	4,500.00
212.	1	Each	Dr Structure, 4' Dia. CB	$	4,000.00	$	4,000.00
213.	5	Ft.	Dr Structure, Add Depth of 6' Dia., 8'-15'	$	875.00	$	4,375.00
214.	104	Lin. Ft.	24" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det A	$	90.00	$	9,360.00
215.	332	Lin. Ft.	24" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det B	$	90.00	$	29,880.00
216.	13	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det B	$	150.00	$	1,950.00

217.	24	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer (Premium Joint) Tr Det B	$ 60.00	$ 1,440.00
218.	32	Lin. Ft.	10" P.V.C. Storm Sewer, Tr Det B	$ 80.00	$ 2,560.00
219.	104	Lin. Ft.	24" C 76-V R.C.P. Storm Sewer, Jack and Bore (Premium Joint)	$ 1,200.00	$ 124,800.00
220.	94	Lin. Ft.	36" Steel Casing	$ 200.00	$ 18,800.00
221.	2	Each	Dr Structure, Rem.	$ 2,000.00	$ 4,000.00
222.	148	Lin. Ft.	Sewer, Rem. Less Than 24 Inch	$ 20.00	$ 2,960.00
223.	5	Each	Casting, Grate, & Adjustment	$ 600.00	$ 3,000.00
224.	3	Each	Bulkhead	$ 200.00	$ 600.00

COOLIDGE RELIEF BRANCH PAVEMENT REPAIR

225.	400	Sq. Yd.	Conc Pavt, Nonreinf, 9 inch, Rem and Rep	$ 115.00	$ 46,000.00
226.	1850	Sq. Ft.	Sidewalk, Conc, 4 inch, Rem and Rep	$ 15.00	$ 27,750.00
227.	1	Lump Sum	Pavement Striping	$ 1,000.00	$ 1,000.00
228.	400	Lin. Ft.	Curb and Gutter, Rem	$ 10.00	$ 4,000.00
229.	400	Lin. Ft.	Curb and Gutter, Conc, Det C4	$ 25.00	$ 10,000.00
230.	400	Lin. Ft.	Underdrain, Subgrade, 6 inch	$ 10.00	$ 4,000.00

COOLIDGE RELIEF BRANCH SOIL EROSION AND SEDIMENT CONTROL

231.	9	Each	Catch Basin Inlet Protection	$ 100.00	$ 900.00
232.	1	Lump Sum	Landscape Seeding (Includes min. 4" Topsoil)	$ 5,000.00	$ 5,000.00
233.	1	Lump Sum	Slope Restoration		$ -
234.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$ 5,000.00	$ 5,000.00

COOLIDGE RELIEF BRANCH MISCELLANEOUS

235.	1	Each	Water Main Relocation	$ 20,000.00	$ 20,000.00

COOLIDGE BRANCH STORM SEWER

236.	1005	Lin. Ft.	Sewer, Rem., Less Than 24"	$ 20.00	$ 20,100.00
237.	4	Each	Dr Structure, Rem.	$ 1,500.00	$ 6,000.00

COOLIDGE BRANCH SOIL EROSION AND SEDIMENT CONTROL

238.	3	Each	Catchbasin Inlet Protection	$ 100.00	$ 300.00
239.	1	Lump Sum	Landscape Seeding (Includes min. 4" Topsoil)	$ 8,000.00	$ 8,000.00
240.	1	Lump Sum	Soil Binding Polymers	$ 500.00	$ 500.00
241.	1	Lump Sum	Slope Restoration		$ -
242.	9250	Sq. Yd.	S 75 BN Mulch Blanket	$ 1.50	$ 13,875.00

243.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$	3,000.00	$	3,000.00

COOLIDGE BRANCH MISCELLANEOUS

244.	1	Each	Bulkhead	$	200.00	$	200.00
245.	18	Each	Tree, Rem, 6 inch to 18 inch	$	250.00	$	4,500.00

MDOT RELIEF BRANCH STORM SEWER

246.	1	Lump Sum	Cast-In-Place Concrete Headwall	$	30,000.00	$	30,000.00
247.	920	Lin. Ft.	60" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	400.00	$	368,000.00
248.		Lin. Ft.	60" C 76-IV R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	500.00	$	-
249.	447	Lin. Ft.	48" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	275.00	$	122,925.00
250.	933	Lin. Ft.	36" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det A	$	220.00	$	205,260.00
251.	814	Lin. Ft.	36" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	220.00	$	179,080.00
252.	8	Lin. Ft.	30" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	180.00	$	1,440.00
253.	16	Lin. Ft.	24" C 76-III R.C.P. Storm Sewer (Premium Joint), TD Det B	$	160.00	$	2,560.00
254.	46	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det A	$	150.00	$	6,900.00
255.	32	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	150.00	$	4,800.00
256.	16	Lin. Ft.	15" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	120.00	$	1,920.00
257.	270	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer (Premium Joint), Tr Det B	$	60.00	$	16,200.00
258.	17	Lin Ft.	12" P.V.C. Storm Sewer, Tr Det B	$	100.00	$	1,700.00
259.	16	Lin. Ft.	6" Dia P.V.C. Storm Sewer, Tr Det B	$	40.00	$	640.00
260.	345	Lin. Ft.	48"x76" Elliptical R.C.P. Stm. Swr.	$	600.00	$	207,000.00
261.	453	Lin. Ft.	48" C 76-V R.C.P. Storm Sewer, Pipe Jack (Premium Joint)	$	1,200.00	$	543,600.00
261.	1	Each	Dr Structure, 12' Dia. MH	$	17,500.00	$	17,500.00
262.		Each	Dr Structure, 10' Dia. MH	$	15,000.00	$	-
263.	2	Each	Dr Structure, 8' Dia. MH	$	9,000.00	$	18,000.00
264.	1	Each	Dr Structure, 11' Dia. MH/CB	$	17,000.00	$	17,000.00
265.	2	Each	Dr Structure, 7' Dia. MH	$	8,000.00	$	16,000.00
266.	5	Each	Dr Structure, 6' Dia. MH	$	7,000.00	$	35,000.00
267.	3	Each	Dr Structure, 6' Dia. MH/CB	$	7,500.00	$	15,000.00
268.	5	Each	Dr Structure, 5' Dia. MH	$	5,500.00	$	27,500.00
269.	1	Each	Dr Structure, 5' Dia. MH/CB	$	6,000.00	$	6,000.00
270.	2	Each	Dr Structure, 4' Dia. MH	$	5,000.00	$	10,000.00

271.	2	Each	Dr Structure, 4' Dia. MH/CB	$ 4,500.00	$ 9,000.00
272.	4	Each	Dr Structure, 4' Dia. CB	$ 4,000.00	$ 16,000.00
273.	2	Each	Dr Structure, 4' Dia. MH TEE	$ 4,000.00	$ 8,000.00
274.		Each	Dr Structure, 4' Dia. MH TEE/CB	$ 4,500.00	$ -
275.		Each	10'x10' Junction Chamber	$ 50,000.00	$ -
276.	1	Each	Junction Chamber D	$ 50,000.00	$ 50,000.00
277.		Each	18" F.E.S.	$ 850.00	$ -
278.	2	Ft.	Dr Structure, Add Depth of 8' Dia., 8'-15'	$ 1,125.00	$ 2,250.00
279.	9	Ft.	Dr Structure, Add Depth of 7' Dia., 8'-15'	$ 1,000.00	$ 9,000.00
280.	20	Ft.	Dr Structure, Add Depth of 6' Dia., 8'-15'	$ 875.00	$ 17,500.00
281.	11	Ft.	Dr Structure, Add Depth of 5' Dia., 8'-15'	$ 700.00	$ 7,700.00
278.	8	Each	Dr Structure, Rem.	$ 2,000.00	$ 16,000.00
279.	580	Lin. Ft.	Sewer, Rem., Less Than 24 Inch	$ 20.00	$ 11,600.00
280.	227	Lin. Ft.	Sewer, Rem., 24 Inch to 48 Inch	$ 20.00	$ 4,540.00
281.	1	Each	Bulkhead 30" Storm Sewer	$ 200.00	$ 200.00
282.	1	Each	Bulkhead 24" Storm Sewer	$ 200.00	$ 200.00
283.	1	Each	Bulkhead 18" Storm Sewer	$ 200.00	$ 200.00
284.	4.5	Cu. Yds.	MDOT Flowable Fill, 24" Storm Sewer	$ 150.00	$ 675.00
285.	31	Each	Casting, Grate, & Adjustment	$ 600.00	$ 18,600.00

MDOT RELIEF BRANCH PAVEMENT REPAIR

286.	1,874	Sq. Yd.	Bituminous Pavment, Rem. And Rep. (Min. 4" HMA)	$ 50.00	$ 93,700.00
287.	3,100	Sq. Yd.	Bituminous over Concrete Rem. And Rep. (Michigan Avenue)	$ 115.00	$ 356,500.00
288.	250	Sq. Ft.	Sidewalk, Conc, 4 inch, Rem and Rep	$ 15.00	$ 3,750.00
289.	20	Sq. Ft.	Detectable Warning Surface	$ 50.00	$ 1,000.00
290.	60	Sq. Ft.	Sidewalk Ramp, Conc, 6", Rem and Rep	$ 20.00	$ 1,200.00
288.	1,367	Sq. Yd.	Conc Pavt, Nonreinf, 9 inch, Rem and Rep (Homer St.)	$ 115.00	$ 157,205.00
289.	2,526	Lin. Ft.	Curb and Gutter, Rem	$ 10.00	$ 25,260.00
290.	808	Lin. Ft,	Curb and Gutter, Conc, Det F4 Modified	$ 25.00	$ 20,200.00
291.	1,718	Lin. Ft.	Curb and Gutter, Conc, Det C4	$ 25.00	$ 42,950.00
292.	2,526	Lin. Ft.	Underdrain, Subgrade, 6 inch	$ 10.00	$ 25,260.00

293.	1	Lump Sum	Pavement Striping	$ 2,000.00	$ 2,000.00

MDOT RELIEF BRANCH SOIL EROSION AND SEDIMENT CONTROL

294.	33	Each	Catch Basin Inlet Protection	$ 100.00	$ 3,300.00
295.	915	Lin. Ft.	Silt Fence	$ 5.00	$ 4,575.00
296.	1	Lump Sum	Soil Binding Polymers	$ 5,000.00	$ 5,000.00
297.	1	Lump Sum	Landscape Seeding (Includes min. 4" Topsoil)	$ 10,000.00	$ 10,000.00
298.	13700	Sq. Yd.	S 150 BN Mulch Blanket	$ 2.00	$ 27,400.00
299.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$ 10,000.00	$ 10,000.00

MDOT RELIEF BRANCH MISCELLANEOUS

300.	6	Each	Duct Bank Support System	$ 20,000.00	$ 120,000.00
301.	12	Each	Sign, Type III, Rem	$ 40.00	$ 480.00
302.	12	Each	Sign, Type III, Erect, Slav	$ 80.00	$ 960.00
303.	12	Each	Post, Steel, 3 lb	$ 20.00	$ 240.00
304.	2	Each	4' Dia. R.C.P. Sanitary MH	$ 4,000.00	$ 8,000.00
305.	241	Lin. Ft.	12" SDR 35 PVC San. Swr.	$ 60.00	$ 14,460.00
306.	16	Lin. Ft.	10", SDR 35 PVC San. Swr.	$ 100.00	$ 1,600.00
307.	16	Lin. Ft.	18", SDR 35 PVC San. Swr.	$ 100.00	$ 1,600.00
308.	2400	Lin. Ft.	Fence, Chain Link, 48 inch, Remove and Reinstall	$ 35.00	$ 84,000.00
309.	1	Each	Fence Gate, 4 Foot for 48 inch Chain Link Fence	$ 1,000.00	$ 1,000.00
310.	1	Each	Fence Gate, 12 Foot for 48 inch Chain Link Fence	$ 3,000.00	$ 3,000.00
311.	31	Each	Tree, Rem, 6 inch to 18 inch	$ 500.00	$ 15,500.00
312.	3	Each	Water Main Lowering	$ 20,000.00	$ 60,000.00
313.	1	Each	Electric MH Rem./Rep.		$ -
314.	1	Lump Sum	Sanitary Bypass Pumping		$ -
315.	215	Lin. Ft.	Remove/Replace Ex. 12" San. Swr.	$ 100.00	$ 21,500.00
316.	1	Each	San. Structure, Rem.		$ -
317.	4	Each	Light Posts, Rem. & Rep.		$ -
318.	488	Lin. Ft.	Guardrail, Rem	$ 20.00	$ 9,760.00
319.	266	Lin. Ft.	Guardrail, Type MGS-8	$ 25.00	$ 6,650.00
320.	116	Lin. Ft.	Guardrail, Curved, Type MGS-8	$ 25.00	$ 2,900.00

321.	2	Each	Guardrail, Anch, Bridge, Det T4	$	2,000.00	$	4,000.00
322.	15	Each	Guardrail Reflector	$	10.00	$	150.00
323.	1	Each	Guardrail Departing Terminal, Type MGS	$	1,000.00	$	1,000.00
324.	1	Each	Guardrail Approach Terminal, Type 2M	$	2,500.00	$	2,500.00

CHESTER BRANCH STORM SEWER

325.	1	Each	Dr Structure, 5' Dia. MH	$	6,000.00	$	6,000.00
326.	3	Each	Dr Structure, 4' Dia. MH	$	5,000.00	$	15,000.00
327.	292	Lin. Ft.	21" C 76-III R.C.P. Storm Sewer, Tr Det B	$	85.00	$	24,820.00
328.	29	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer, Tr Det B	$	75.00	$	2,175.00
329.	125	Lin. Ft.	15" C 76-III R.C.P. Storm Sewer, Tr Det B	$	70.00	$	8,750.00
330.	104	Lin. Ft.	12" C 76-III R.C.P. Storm Sewer, Tr Det B	$	60.00	$	6,240.00
331.	4	Each	Casting, Grate, & Adjustement	$	600.00	$	2,400.00

CHESTER BRANCH PAVEMENT REPAIR

332.	256	Sq. Ft.	8' x 8' x 6" Concrete Apron	$	7.00	$	1,792.00
333.	55	Lin. Ft.	Curb and Gutter, Rem	$	10.00	$	550.00
334.	55	Lin. Ft.	Curb and Gutter, Conc, Det F4	$	25.00	$	1,375.00
335.	55	Lin. Ft.	Underdrain, Subgrade, 6 inch	$	10.00	$	550.00
336.	450	Sq. Yd.	Bituminous Pavement, Rem. And Rep. (Min. 4" HMA)	$	115.00	$	51,750.00
337.	60	Sq. Ft.	Detectable Warning Surface	$	50.00	$	3,000.00
338.	180	Sq. Ft.	Sidewalk Ramp, Conc, 6", Rem and Rep	$	20.00	$	3,600.00

CHESTER BRANCH SOIL EROSION AND SEDIMENT CONTROL

339.	1	Lump Sum	Landscape Seeding (Includes min. 4" Topsoil)	$	1,000.00	$	1,000.00
339.	6	Each	Catch Basin Inlet Protection	$	100.00	$	600.00
340.	591	Lin. Ft.	Clean Up and Site Restoration (Limits of Disturbance)	$	2.00	$	1,182.00

CHESTER BRANCH MISCELLANEOUS

341.	1	Each	8" Watermain Lowering	$	20,000.00	$	20,000.00
342.	3	Each	Sign, Type III, Rem	$	40.00	$	120.00
343.	3	Each	Sign, Type III, Erect, Slav	$	80.00	$	240.00
344.	3	Each	Post, Steel, 3 lb	$	20.00	$	60.00

CHESTER ST. PAVING

345.	7000	Sq. Yd.	Cold Milling	$	4.00	$	28,000.00
346.	600	Ton	HMA 1.5 Inch Overlay	$	100.00	$	60,000.00

347.	10	Each	Drainage Structure Cover, Adj, Case 1	$ 500.00	$ 5,000.00
348.	4	Each	Catch Basin Inlet Protection	$ 100.00	$ 400.00
349.	1	Lump Sum	Cleanup and Site Restoration	$ 3,000.00	$ 3,000.00
350.	1	Lump Sum	Traffic Control	$ 10,000.00	$ 10,000.00

HOMER ST. STORM SEWER

351.	1	Each	Dr Structure, 4' Dia. MH	$ 5,000.00	$ 5,000.00
352.	32	Lin. Ft.	18" C 76-III R.C.P. Storm Sewer, Tr Det B	$ 75.00	$ 2,400.00
353.	16	Lin. Ft.	8" P.V.C. Storm Sewer, Tr Det B	$ 60.00	$ 960.00
354.	48	Lin. Ft.	Sewer, Rem., Less Than 24 Inch	$ 20.00	$ 960.00
355.	1	Each	Casting, Grate, & Adjustment	$ 600.00	$ 600.00

HOMER ST. PAVEMENT REPAIR

356.	130	Sq. Yd.	Conc Pavt, Nonreinf, 9 inch, Rem and Rep (Homer St.)	$ 115.00	$ 14,950.00
357.	64	Sq. Ft.	8' x 8' x 6" Concrete Apron	$ 7.00	$ 448.00

HOMER ST. SOIL EROSION AND SEDIMENT CONTROL

358.	1	Each	Catch Basin Inlet Protection	$ 100.00	$ 100.00
359.	1	Lump Sum	Clean Up and Site Restoration	$ 1,000.00	$ 1,000.00

TRAFFIC CONTROL

360.	30	Each	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	$ 80.00	$ 2,400.00
361.	30	Each	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	$ 20.00	$ 600.00
362.	2	Each	Lighted Arrow, Type C, Furn	$ 400.00	$ 800.00
363.	2	Each	Lighted Arrow, Type C, Oper	$ 40.00	$ 80.00
364.	1	Lump Sum	Minor Traf Devices	Lump Sum	$ 8,000.00
365.	2	Each	Sign, Portable, Changeable Message, Furn	$ 2,000.00	$ 4,000.00
366.	2	Each	Sign, Portable, Changeable Message, Oper	$ 200.00	$ 400.00
367.	100	Each	Plastic Drum, High Intensity, Furn	$ 22.00	$ 2,200.00
368.	100	Each	Plastic Drum, High Intensity, Oper	$ 1.00	$ 100.00
369.	812	Sq. Ft.	Sign, Type B, Temp, Prismatic, Furn	$ 4.00	$ 3,248.00
370.	812	Sq. Ft.	Sign, Type B, Temp, Prismatic, Oper	$ 1.00	$ 812.00
371.	106	Sq. Ft.	Sign, Type B, Temp, Prismatic, Special, Furn	$ 6.00	$ 636.00
372.	106	Sq. Ft.	Sign, Type B, Temp, Prismatic, Special, Oper	$ 1.00	$ 106.00

373.	1	Lump Sum	Traf Regulator Control		Lump Sum	$	2,000.00
374.	1	Lump Sum	Light for Night Work		Lump Sum	$	20,000.00
375.	1	Each	Tree, Rem, 19 inch to 36 inch	$	775.00	$	775.00
376.	17	Each	Tree, Rem, 6 inch to 18 inch	$	300.00	$	5,100.00
377.	2	Each	Stump, Rem, 6 inch to 18 inch	$	175.00	$	350.00
378.	699	Lin. Ft.	Curb and Gutter, Rem	$	10.00	$	6,990.00
379.	1290	Cu. Yd.	Embankment, CIP	$	10.00	$	12,900.00
380.	1655	Cu. Yd.	Excavation, Earth	$	11.00	$	18,205.00
381.	2657	Sq. Yd.	Aggregate Base, 8 inch, Modified	$	10.00	$	26,570.00
382.	2	Each	Dr Structure Cover, Adj, Case 1	$	475.00	$	950.00
383.	1	Each	Dr Structure Cover, Adj, Case 2	$	425.00	$	425.00
384.	2426	Sq. Yd.	HMA Surface, Rem	$	5.00	$	12,130.00
385.	382	Ton	HMA, 3C	$	75.00	$	28,650.00
386.	306	Ton	HMA, 4C	$	65.00	$	19,890.00
387.	778	Lin. Ft.	Curb and Gutter, Conc, Det F4	$	25.00	$	19,450.00
388.	882	Lin. Ft.	Pavt Mrkg, Ovly Cold Plastic, 12 inch, Cross Hatching, White	$	5.00	$	4,410.00
389.	136	Lin. Ft.	Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar	$	11.50	$	1,564.00
390.	7	Each	Pavt Mrkg, Ovly Cold Plastic, Direction Arrow Sym, Bike	$	135.00	$	945.00
391.	7	Each	Pavt Mrkg, Ovly Cold Plastic, Bike, Small Sym	$	125.00	$	875.00
392.	2	Each	Pavt Mrkg, Ovly Cold Plastic, Lt Turn Arrow Sym	$	150.00	$	300.00
393.	2	Each	Pavt Mrkg, Ovly Cold Plastic, Only	$	150.00	$	300.00
394.	2438	Lin. Ft.	Pavt Mrkg, Waterborne, 4 inch, White	$	0.12	$	292.56
395.	140	Lin. Ft.	Pavt Mrkg, Waterborne, 4 inch, Yellow	$	0.20	$	28.00
396.	8700	Lin. Ft.	Pavt Mrkg, Waterborne, 6 inch, White	$	0.20	$	1,740.00
397.	2438	Lin. Ft.	Pavt Mrkg, Waterborne, 2nd Application, 4 inch, White	$	0.12	$	292.56
398.	140	Lin. Ft.	Pavt Mrkg, Waterborne, 2nd Application, 4 inch, Yellow	$	0.20	$	28.00
399.	8700	Lin. Ft.	Pavt Mrkg, Waterborne, 2nd Application, 6 inch, White	$	0.20	$	1,740.00
400.	139	Each	Post, Steel, 3 lb	$	5.00	$	695.00
401.	13	Each	Sign, Type III, Erect, Salv	$	40.00	$	520.00
402.	13	Each	Sign, Type III, Rem	$	20.00	$	260.00

403.	236	Sq. Ft.	Rem Spec Mrkg	$	2.50	$	590.00
404.	124	Each	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	$	80.00	$	9,920.00
405.	124	Each	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	$	20.00	$	2,480.00
406.	8	Each	Lighted Arrow, Type C, Furn	$	400.00	$	3,200.00
407.	8	Each	Lighted Arrow, Type C, Oper	$	40.00	$	320.00
408.	1	Lump Sum	Minor Traf Devices		Lump Sum	$	140,000.00
409.	6379	Lin. Ft.	Pavt Mrkg, Longit, 6 inch or Less Width, Rem	$	0.60	$	3,827.40
410.	5	Each	Sign, Portable, Changeable Message, Furn	$	2,000.00	$	10,000.00
411.	5	Each	Sign, Portable, Changeable Message, Oper	$	200.00	$	1,000.00
412.	6053	Lin. Ft.	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, White, Temp	$	1.50	$	9,079.50
413.	10531	Lin. Ft.	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, Yellow, Temp	$	1.50	$	15,796.50
414.	354	Each	Plastic Drum, High Intensity, Furn	$	22.00	$	7,788.00
415.	354	Each	Plastic Drum, High Intensity, Oper	$	1.00	$	354.00
416.	18	Sq. Ft.	Sign, Type A, Temp, Prismatic, Furn	$	5.00	$	90.00
417.	18	Sq. Ft.	Sign, Type A, Temp, Prismatic, Oper	$	1.00	$	18.00
418.	1318	Sq. Ft.	Sign, Type B, Temp, Prismatic, Furn	$	4.00	$	5,272.00
419.	1318	Sq. Ft.	Sign, Type B, Temp, Prismatic, Oper	$	1.00	$	1,318.00
420.	126	Sq. Ft.	Sign, Type B, Temp, Prismatic, Special, Furn	$	6.00	$	756.00
421.	126	Sq. Ft.	Sign, Type B, Temp, Prismatic, Special, Oper	$	1.00	$	126.00
422.	1	Lump Sum	Traf Regulator Control	$	35,000.00	$	35,000.00
423.	6540	Sq. Yd.	Slope Restoration, Type A	$	3.00	$	19,620.00
424.	600	Lin. Ft.	Cable, P.J. 600V, 1, 5/C#16	$	5.00	$	3,000.00
425.	6	Each	TS, One Way Span Wire Mtd (LED)	$	1,100.00	$	6,600.00
426.	4	Each	TS, Bag	$	250.00	$	1,000.00
427.	4	Each	TS, Bag Rem	$	100.00	$	400.00

SUB-TOTAL-- $ 7,266,402.54

CONTINGENCIES 10%+--- $ 726,640.25

TOTAL AMOUNT OF BID-- $ 7,993,042.79

PRELIMINARY ESTIMATE OF COST
PIPE REHABILITATION - DIVISION IV

6/24/2019

Item No.	Estimated Quantity	Unit	Description	Unit Price	Total Amount
PIPE REHABILITATION DIVISION IV					
1.	1	Lump Sum	Mobilization 4%±	$ 51,069.36	$ 51,069.36
2.	2213	Lin. Ft.	Heavy Cleaning and Televise	$ 22.00	$ 48,686.00
3.	625	Lin. Ft.	54" C.I.P.P. (24mm Wallk Thickness)	$ 500.00	$ 312,500.00
4.	1131	Lin. Ft.	42" C.I.P.P. (19.5mm Wallk Thickness)	$ 400.00	$ 452,400.00
5.	578	Lin. Ft.	36" C.I.P.P. (16.5mm Wall Thickness)	$ 300.00	$ 173,400.00
6.	161	Lin. Ft.	30" C.I.P.P. (13.5mm Wall Thickness)	$ 220.00	$ 35,420.00
7.	347	Lin. Ft.	24" C.I.P.P. (12mm Wall Thickness)	$ 140.00	$ 48,580.00
8.	124	Lin. Ft.	21" C.I.P.P. (10.5mm Wall Thickness)	$ 125.00	$ 15,500.00
9.	1009	Lin. Ft.	18" C.I.P.P. (9mm Wall Thickness)	$ 110.00	$ 110,990.00
10.	319	Lin. Ft.	15" C.I.P.P. (6mm Wall Thickness)	$ 90.00	$ 28,710.00
11.	4	Each	Remove & Replace MH Casting and MH Sections	$ 5,000.00	$ 20,000.00
12.	1	Lump Sum	By-Pass Pumping (If Needed)	$ 10,000.00	$ 10,000.00
SOIL EROSION AND SEDIMENT CONTROL					
13.	1	Lump Sum	Clean Up and Site Restoration (Limits of Disturbance)	$ 1,000.00	$ 1,000.00
14.	1	Lump Sum	Soil Erosion and Sediment Control	$ 2,500.00	$ 2,500.00
PAVEMENT REPAIR					
15.	40	Sq. Yd.	Bituminous Pavement, Rem. & Rep. (Min. 4" HMA)	$ 40.00	$ 1,600.00
16.	64	Sq. Ft.	8'x8'x6" Concrete Apron	$ 7.00	$ 448.00
TRAFFIC CONTROL					
13.	1	Lump Sum	Traffic Control	$ 15,000.00	$ 15,000.00

SUB-TOTAL CONSTRUCTION COST ---------- $ 1,327,803.36

CONTINGENCIES (7.5%) ---------- $ 99,585.25

TOTAL CONSTRUCTION COST ---------- $ 1,427,388.61

PRELIMINARY ESTIMATE OF COST
WATER QUALITY RETURN SYSTEM - DIVISION V
1/28/2019

Item No.	Estimated Quantity	Unit	Description	Unit Price	Total Amount
PRESSURE MAIN STORM SEWER					
1.	1	Lump Sum	Mobilization, Max (4%)	$ 144,041.80	$ 144,041.80
2.	904	Lin. Ft.	36" Dia. P.V.C. Intake Pipe	$ 300.00	$ 271,200.00
3.	2,547	Lin. Ft.	24" H.D.P.E. Pressure Main (Open Cut)	$ 250.00	$ 636,750.00
4.	600	Lin. Ft.	24" H.D.P.E. Pressure Main (HDD)	$ 450.00	$ 270,000.00
5.	2	Each	24" H.D.P.E. Elbow	$ 900.00	$ 1,800.00
6.	102	Lin. Ft.	18" HP Storm	$ 40.00	$ 4,080.00
7.	2	Each	18" Galvanized End Section	$ 400.00	$ 800.00
8.	2	Each	5' dia Air Release MH	$ 6,000.00	$ 12,000.00
9.	1	Each	5' dia Pressure Sustaining MH	$ 15,000.00	$ 15,000.00
10.	1,000	Lin. Ft.	4" Treatment Stream Water Supply	$ 40.00	$ 40,000.00
11.	500	Lin. Ft.	6" Treatment Stream Water Supply	$ 50.00	$ 25,000.00
12.	3	Each	Flood Washdown Hydrant	$ 5,000.00	$ 15,000.00
PRESSURE MAIN PAVEMENT REPAIR					
13.	2,202	Sq. Yd.	Remove and Replace Bituminous Pavement	$ 60.00	$ 132,120.00
14.	155	Lin. Ft.	Remove and Replace Curb and Gutter	$ 35.00	$ 5,425.00
15.	155	Lin. Ft.	Underdain, Subgrade, 6 inch	$ 10.00	$ 1,550.00
PRESSURE MAIN SOIL EROSION & SEDIMENTATION CONTROL					
16.	334	Lin. Ft.	Silt Fence	$ 5.00	$ 1,670.00
17.	1	Acre	Spread Topsoil, Seed and Mulch	$ 12,000.00	$ 12,480.00
18.	12	Each	Catchbasin Inlet Protection	$ 100.00	$ 1,200.00
19.	1	Lump Sum	Stabilized Construction Access (750' x 30' Gravel Approach and Geotextile Fabric)	$ 36,000.00	$ 36,000.00
20.	1	Each	Check Dam	$ 1,500.00	$ 1,500.00
PRESSURE MAIN MISCELLANEOUS					
21.	1	Acre	Strip & Stockpile Topsoil (S. of Michigan Ave.)	$ 2,500.00	$ 2,600.00
22.	12,420	CYD	Imported Fill for Pressure Main (CIP)	$ 10.00	$ 124,200.00
PUMP STATION CONSTRUCTION					
23.	1	Lump Sum	Pump Station	$1,913,450.00	$ 1,913,450.00
TRAFFIC CONTROL					
24.	1	Lump Sum	Traffic Control	$ 77,220.00	$ 77,220.00

SUB-TOTAL CONSTRUCTION COST	**$**	**3,745,086.80**
CONTINGENCIES (7.5% +/-)		**$280,881.51**
TOTAL CONSTRUCTION COST		**$4,025,968.31**

PRELIMINARY ESTIMATE OF COST
WATER TREATMENT SYSTEMS - DIVISION VI

2/18/2019

Item No.	Estimated Quantity	Unit	Description	Unit Price	Total Amount
FLOATING ISLANDS					
1.	1	Lump Sum	Mobilization, Max	$ 43,048.64	$ 43,048.64
2.	30	Each	Floating Islands Model 90 Kidney		$ -
3.	8	Each	Floating Islands Model 90 Organic		$ -
4.	127	Flats	Plant Plugs		$ -
5.	38	Each	Floating Island Anchor and Cable		$ -
6.	3420	Sq. Ft.	Armor		$ -
7.	1	Lump Sum	Island Shipping		$ -
8.	24	Each	Bags of Rockwool		$ -
9.	80	Each	Bag of pH Balanced Soil		$ -
10.	15230	Lb	Quikrete 1004-50 Fast Setting Concrete Mix		$ -
11.	152	Each	5 Gallon Buckets		$ -
12.	76	Each	Galvanized Steel Cable - 1/4", Capacity 7000 lbs - 200 ft length		$ -
13.	152	Each	Swivel U Hook		$ -
14.	152	Each	Washers		$ -
15.	304	Each	Nuts		$ -
16.	152	Each	Cable Clasps		$ -
17.	152	Each	Metal Disks		$ -
18.	152	Each	Shackels		$ -
19.	38	Roll	Goose Fencing		$ -
EAST MORGAN LANE MEDIAN					
20.	1	Lump Sum	Michigan Avenue Water Quality Plaza #1	$ 116,624.95	$ 116,624.95
WEST MORGAN LANE MEDIAN					
21.	1	Lump Sum	Michigan Avenue Water Quality Plaza #2	$ 109,590.98	$ 109,590.98
WATER QUALITY SYSTEMS					
22.	1	Lump Sum	Red Cedar Water Quality System #1	$ 400,000.00	$ 400,000.00
23.	1	Lump Sum	Red Cedar Water Quality System #2	$ 250,000.00	$ 250,000.00
24.	1	Lump Sum	Red Cedar Water Quality System #3	$ 100,000.00	$ 100,000.00
25.	1	Lump Sum	Red Cedar Water Quality System #4	$ 100,000.00	$ 100,000.00

SUB-TOTAL CONSTRUCTION COST -- $ 1,119,264.57

CONTINGENCIES (7.5% +/-)	**$**	**83,944.84**
TOTAL CONSTRUCTION COST	**$**	**1,203,209.41**

PRELIMINARY ESTIMATE OF COST
RESTORATION AND FINISHING - DIVISION VII

3/7/2019

Item No.	Estimated Quantity	Unit	Description	Unit Price	Total Amount
RED CEDAR POND WETLAND MITIGATION					
1.	1	Lump Sum	Mobilization	$ 208,649.20	$ 208,649.20
2.	0.43	Acre	Wetland Planting, Scrub Shrub	$ 30,000.00	$ 12,900.00
3.	1.63	Acre	Wetland Planting, Emergent/Wet Meadow	$ 30,000.00	$ 48,900.00
4.	0.54	Acre	Wetland Planting, Deep Emergent	$ 30,000.00	$ 16,200.00
RED CEDAR POND WETLAND CREATION					
5.	6.40	Acre	Wetland Planting, Forested	$ 50,000.00	$ 320,000.00
6.	1.16	Acre	Wetland Planting, Scrub Shrub	$ 30,000.00	$ 34,800.00
7.	0.75	Acre	Wetland Planting, Emergent/Wet Meadow	$ 30,000.00	$ 22,500.00
8.	0.48	Acre	Wetland Planting, Deep Emergent	$ 30,000.00	$ 14,400.00
9.	0.83	Acre	Wetland Planting, Submergent	$ 30,000.00	$ 24,900.00
RED CEDAR POND TURF					
10.	1.25	Acre	Planting, Turfgrass, Parks Mix	$ 5,000.00	$ 12,500.00
11.	0.11	Acre	Planting, Turfgrass, Tread Tough Mix	$ 5,000.00	$ 1,100.00
12.	1.00	Acre	Planting, Turfgrass, Endurance Mix	$ 5,000.00	$ 10,000.00
13.	2.60	Acre	Planting, Turfgrass, Meadow Mix	$ 5,000.00	$ 26,000.00
14.	3.06	Acre	Planting, Turfgrass, Lush Green Mix	$ 5,000.00	$ 30,600.00
15.	0.00	Acre	Planting, Turfgrass, Woodland Mix	$ 5,000.00	$ -
RED CEDAR POND AND RANNEY PARK HERPETOLOGY					
16.	89	Each	Red Cedar Wetland Habitat Structures	$ 1,000.00	$ 89,000.00
17.	5	Each	Red Cedar Conservation Easement Signs	$ 250.00	$ 1,250.00
18.	56	Each	Ranney Park Wetland Habitat Structures	$1,000.00	$ 56,000.00
19.	3	Each	Ranney Park Conservation Easement Signs	$250.00	$ 750.00
RED CEDAR SITE FURNISHINGS					
20.	20	Each	Litter Receptacle	$ 2,000.00	$ 40,000.00
21.	10	Each	Recycling Bins	$ 1,500.00	$ 15,000.00
22.	5	Each	Pet Waste Receptacle	$ 1,200.00	$ 6,000.00
23.	15	Each	Bench	$ 2,000.00	$ 30,000.00
24.	10	Each	Picnic Table	$ 2,500.00	$ 25,000.00
25.	3	Each	Bike Rack	$ 1,500.00	$ 4,500.00

26.		Lin. Ft.	Fencing		$ -
27.	50	Each	Light Pole	$ 10,000.00	$ 500,000.00
RANNEY PARK TREE					
28.	0.00	Acre	Planting, Wet Forest	$50,000.00	$ -
29.	0.00	Acre	Planting, Mesic Forest	$50,000.00	$ -
30.	0.00	Acre	Planting, Dry Forest	$50,000.00	$ -
31.	0.00	Acre	Planting, Chestnut Grove	$50,000.00	$ -
32.	0.00	Acre	Planting, Visual/Noise Barrier	$30,000.00	$ -
RANNEY PARK TURF					
33.	1.17	Acre	Planting, Turfgrass, Parks Mix		$ -
34.	2.40	Acre	Planting, Turfgrass, Tread Tough Mix		$ -
35.	0.22	Acre	Planting, Turfgrass, Endurance Mix		$ -
36.	0.40	Acre	Planting, Turfgrass, Meadow Mix		$ -
37.	1.40	Acre	Planting, Turfgrass, Lush Green Mix		$ -
38.	0.96	Acre	Planting, Turfgrass, Woodland Mix		$ -
39.	12.00	Acres	Seeding	$9,500.00	$ 114,000.00
RANNEY PARK SITE FURNISHINGS					
40.	12	Each	Litter Receptacle	$ 1,500.00	$ 18,000.00
41.	10	Each	Recycling Bins	$ 1,200.00	$ 12,000.00
42.	5	Each	Pet Waste Receptacle	$ 1,000.00	$ 5,000.00
43.	25	Each	Bench	$ 2,000.00	$ 50,000.00
44.	25	Each	Light Pole	$ 10,000.00	$ 250,000.00
45.	10	Each	Picnic Table	$ 2,500.00	$ 25,000.00
46.	3	Each	Bike Rack	$ 1,500.00	$ 4,500.00
47.		Lin. Ft.	Fencing		$ -
48.	10	Each	Landscape Boulders	$ 1,000.00	$ 10,000.00
RANNEY PARK RAIN GARDEN					
49.	1	Lump Sum	ENG Estimate	$ 36,200.00	$ 36,200.00
MICHIGAN AVE RAIN GARDENS STORM SEWER					
50.	1	Each	Dr Structure, 9' dia, Concrete MH	$ 10,000.00	$ 10,000.00
51.	3	Each	Dr Structure, 8' dia, Concrete MH	$ 9,000.00	$ 27,000.00
52.	1	Each	Dr Structure, 7' dia, Concrete MH	$ 8,000.00	$ 8,000.00

53.		Each	Dr Structure, 8' dia, Concrete MH/CB	$ 10,000.00	$ -
54.	11	Each	Dr Structure, 4' dia, Concrete, MH/CB	$ 4,500.00	$ 49,500.00
55.	9	Each	Dr Structure, 4' dia, Concrete CB	$ 4,000.00	$ 36,000.00
56.	1	Each	Control Structure, 9' dia, Concrete	$ 15,000.00	$ 15,000.00
57.	881	Lin. Ft.	48" CL-IV R.C.P. Storm Sewer	$ 350.00	$ 308,350.00
58.	223	Lin. Ft.	24" Cl-IV R.C.P. Storm Sewer	$ 190.00	$ 42,370.00
59.	60	Lin. Ft.	21" Cl-IV R.C.P. Storm Sewer	$ 180.00	$ 10,800.00
60.	219	Lin. Ft.	15" Cl-IV R.C.P. Storm Sewer	$ 130.00	$ 28,470.00
61.	597	Lin. Ft.	24" HDPE Perf. Storm Sewer	$ 50.00	$ 29,850.00
62.	196	Lin. Ft.	18" HDPE Perf. Storm Sewer	$ 40.00	$ 7,840.00
63.	454	Lin. Ft.	15" HDPE Perf. Storm Sewer	$ 30.00	$ 13,620.00
64.	1,160	Lin. Ft.	12" HDPE Perf. Storm Sewer	$ 20.00	$ 23,200.00
65.	29	Each	Casting, Grate, & Adjustment	$ 600.00	$ 17,400.00
66.		Cu. Yd.	MDOT Flowable Fill	$ 150.00	$ -
67.	3	Each	Replace CB Cover with MH Cover	$ 600.00	$ 1,800.00
68.		Each	Remove Catchbasin & Lead	$ 1,500.00	$ -
69.		Lin. Ft.	Stm. Swr. Removal (Including Structures)	$ 20.00	$ -
MICHIGAN AVE RAIN GARDENS PAVEMENT REPAIR					
70.	1	Lump Sum	ENG Estimate	$ 145,000.00	$ 145,000.00
MICHIGAN AVE RAIN GARDENS SOIL EROSION AND SEDIMENT CONTROL					
71.		Each	Catchbasin Inlet Protection	$ 100.00	$ -
72.	1	Lump Sum	Landscape Seeding (Includes min. 4" topsoil)		$ -
73.	1	Lump Sum	Clean up and Site Restoration (Limits of Disturbance)	$ 2,500.00	$ 2,500.00
MICHIGAN AVE RAIN GARDENS MISCELLANEOUS					
74.	1	Lump Sum	ENG Estimate	$ 250,000.00	$ 250,000.00
QDOBA RAIN GARDEN					
75.	1	Lump Sum	ENG Estimate	$ 94,000.00	$ 94,000.00
FRANDOR LLC (FLAP JACK) RAIN GARDEN					
76.	1	Lump Sum	ENG Estimate	$ 80,000.00	$ 80,000.00
E MICHIGAN PARTNERSHIP (DUNHAM'S) RAIN GARDEN					
77.	1	Lump Sum	ENG Estimate	$ 475,000.00	$ 475,000.00
STAPLES RAIN GARDEN					
78.	1	Lump Sum	ENG Estimate	$ 100,000.00	$ 100,000.00

MEDAWAR RAIN GARDEN					
79.	1	Lump Sum	ENG Estimate	$ 84,050.00	$ 84,050.00
BAILEY LAND (CAR WASH) AND ALPHA BUILDING RAIN GARDENS					
80.	1	Lump Sum	ENG Estimate	$ 200,000.00	$ 200,000.00
CLIPPERT SUNSHINE CENTER RAIN GARDEN					
81.	1	Lump Sum	ENG Estimate	$ 110,000.00	$ 110,000.00
SEARS RAIN GARDENS					
82.		Lump Sum	ENG Estimate		$ -
SPARE TIME RAIN GARDEN					
83.	1	Lump Sum	ENG Estimate	$ 25,000.00	$ 25,000.00
FRANDOR RAIN GARDENS STORM SEWER					
84.	1	Lump Sum	ENG Estimate	$ 94,251.00	$ 94,251.00
FRANDOR RAIN GARDENS PAVEMENT REPAIR					
85.	1	Lump Sum	ENG Estimate	$ 197,829.00	$ 197,829.00
FRANDOR RAIN GARDENS MISCELLANEOUS					
86.	1	Lump Sum	ENG Estimate	$ 24,000.00	$ 24,000.00
FRANDOR RAIN GARDEN WASH HYDRANTS					
87.	1	Lump Sum	Wash Hydrants	$ 50,000.00	$ 50,000.00
TREE PLANTING					
88.	250	Each	Trees	$ 400.00	$ 100,000.00
PERMANENT CATCHBASIN INLET PROTECTION					
89.	100	Each	Catchbasin Inlet Protection	$ 240.00	$ 24,000.00
ENVIRONMENTAL AND HABITAT					
90.	1	Lump Sum	Environmental and Habitat	$ 150,000.00	$ 150,000.00
HOWARD ST PATHWAY					
91.	1	Lump Sum	Pathway	$ 50,000.00	$ 50,000.00
VINE ST SIDEWALK					
92.	1	Lump Sum	Sidewalk	$ 50,000.00	$ 50,000.00
CHESTER ST. REPAVING					
93.	7000	Sq. Yd.	Cold Milling	$ 4.00	$ 28,000.00
94.	600	Ton	HMA 1.5 Inch Overlay	$ 100.00	$ 60,000.00
95.	10	Each	Drainage Structure Adjust, Case 1	$ 500.00	$ 5,000.00
96.	4	Each	Inlet Protection	$100.00	$400.00
97.	1	Lump Sum	Soil Erosion and Sediment Control	$ 3,000.00	$ 3,000.00
98.	1	Lump Sum	Cleanup and Sute Restoration	$ 3,000.00	$ 3,000.00
99.	1	Lump Sum	Traffic Control	$ 10,000.00	$ 10,000.00
100.	1	Lump Sum	Mobilization, Max 4%	$ 5,000.00	$ 5,000.00

WATER QUALITY STREAM

101.	1	Lump Sum	Morgan Lane Water Quality Stream	$	300,000.00	$	300,000.00

SUB-TOTAL CONSTRUCTION COST -- **$ 5,424,879.20**

CONTINGENCIES (7.5% +/-) -- **$ 406,865.94**

TOTAL CONSTRUCTION COST -- **$ 5,831,745.14**

MONTGOMERY DRAIN DRAINAGE DISTRICT
SAW Grant Project No. 1124-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
1595 W Lake Lansing Road, Suite 200
East Lansing, MI 48823
(517) 325-9977
Max Clever, P.E., P.S., Project Manager

Owner: **MONTGOMERY DRAIN DRAINAGE DISTRICT**
707 Buhl Ave.
Mason, MI 48854
(517) 676-8395
Patrick Lindemann, Drain Commissioner

On November 22th, 2016, the Montgomery Drain Drainage District entered into an agreement with the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. The District received the follow grant:

Stormwater Asset Management Plan (SWAMP) – 90% Grant	***$1,319,417***
Eligible Cost Subtotal	$1,319,417
LESS Local Match	($217,583)
Total Grant Amount	$1,101,834

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Part 1: Stormwater Asset Inventory and Condition Assessment

For the District's stormwater collection system, Spicer Group, Inc. first set vertical and horizontal control throughout the Drainage District using a combination of real time kinematic GPS and digital leveling. Spicer Group then completed a mobile mapping LiDAR survey of the entire drainage district area. The survey information was used to develop a comprehensive Geographic Information System (GIS) including all stormwater assets (manholes, catchbasins, culvert outlets, etc.). The GIS information is utilized via iPads and desktop computers in the Drain Office, and is a detailed "smart" mapping system, using the ArcMap and ArcGIS Pro software by ESRI. This system can be accessed and updated in the field by ICDC staff from new iPads supplied as part of the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspections, ownership information etc. can be accessed. This information can also be queried to provide specific lists, maps, and reports. It is updated easily when future improvements are made.

The county drain storm sewer collection system within the Montgomery Drain Drainage District as described in the route and course is 7.47 miles in length and includes storm sewer pipes ranging in diameter size from 4”- 72”. The existing collection system consists of mainline sewer, catchbasin leads, and culverts. The District currently owns and operates 353 structures within the collection system, more particularly described as 166 catchbasins, 169 manholes, 2 end sections, and 16 structures labelled “Other Special” including bulkheaded ends of pipe, non-exposed junction chambers, and cleanouts. The manholes and catchbasins diameters range from 24-inch through 72-inch and average 5.3 feet in depth, the deepest being 21.3 feet deep. The material types for the structures in the system are generally reinforced concrete (RCP), brick (B) or polyvinyl chloride (PVC). Summary tables are listed below for District owned and operated pipes and structures.

Table 1: PIPE DIAMETER BY LENGTH

Diameter	**Length (ft)**	**Percent**	**Length (miles)**
4”	175	0.44%	0.03
6”	51	0.13%	0.01
8"	623	1.58%	0.12
10"	1583	4.01%	0.30
12"	7355	18.64%	1.39
15"	3246	8.23%	0.61
18”	4488	11.37%	0.85
21”	3170	8.03%	0.60
24”	1355	3.43%	0.26
27”	874	2.22%	0.17
30”	2756	6.98%	0.52
36”	5379	13.63%	1.02
42”	2757	6.99%	0.52
43” x 68” Elliptical	167	0.42%	0.03
48”	1165	2.95%	0.22
54”	2959	7.50%	0.56
60”	1156	2.93%	0.22
72”	8	0.020%	0.001
Unknown	190	0.48%	0.04
TOTAL	**39,457**	**100%**	**7.47**

Table 2: STRUCTURE TYPES

Structure Type	**Number**
Catchbasins	166
Manholes	169
Outlets	2
Other	16
TOTAL	353

Cleaning and televising operations were performed by the Ingham County Drain Office maintenance staff, in cooperation with Spicer Group on 359 of the storm pipe segments in the collection system. Spicer Group performed comprehensive inspection for all the District's mainline stormwater manholes and catchbasins. The NASSCO Manhole/Pipeline Assessment Certification Program (MACP/PACP) version 7.0.2 standards were used to identify and code defects and apply standardized grading/scoring to provide overall condition ratings of the stormwater assets.

Part 2: Level of Service (LOS)

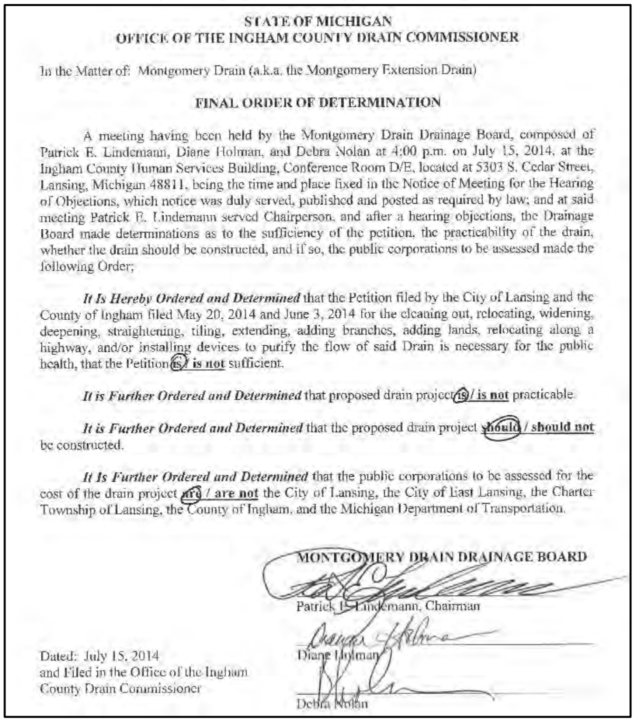
The next phase of the AMP is a Level of Service determination. What level of stormwater service does the Drain Office want to provide to its customers? How are projects going to be prioritized and included in the CIP? What cost is the District willing to endure to provide that level of service? The Drain Commissioner has held multiple public meetings brainstorming solutions to the issues on the Montgomery Drain predating the awarding of the SAW grant. The culmination of the engineering analyses performed on the drain are best summarized in an alternatives analysis presented to the public on November 11, 2018. Below are key excerpts of that report, which is included in the asset management plan in full as an appendix.

> *"The Montgomery Drain is a county drain located in Ingham County and governed under Chapter 20 of the Michigan Drain Code, Public Act 40 of 1956, as amended. The Drain serves areas within the City of Lansing, the City of East Lansing, and Lansing Township ("Service Area"). The Drain is under the jurisdiction of the Drainage Board, consisting of the Drain Commissioner and two members of the Ingham County Board of Commissioners.*
>
> *The Drain was constructed in 1906. Over the ensuing decades, the lands served by the Drain have been converted from primarily agricultural and open space to a more intense mix of commercial and residential use. The Drain was extended when Frandor Shopping Center opened in 1954. In the mid-1960s to early-1970s, major road development and improvement projects occurred in this area, including the construction of US-127 and the expansion of Saginaw Street and Grand River Avenue. The Drain was further extended in 1978 due to additional development.*

Figure 1. 1938 aerial image (left); 2015 aerial image (right).

Since the mid-1990s, there have been ongoing problems with flooding and contamination which have been reported to and investigated by the Drain Commissioner. In 2014, the City of Lansing and Ingham County petitioned for a drain maintenance and improvement project due to mounting problems and concerns with the Drain, including the poor structural condition of the pipes, insufficient capacity of the system, and contaminated stormwater runoff.

Upon receipt of the petition, the Drainage Board held the statutorily required public hearings and ultimately issued a Final Order of Determination finding that a drain maintenance and improvement project is practicable and necessary for the public health. The Drainage Board has authorized the Drain Commissioner to seek a recommended solution to address the identified problems. The Drain Commissioner engaged Spicer Group, Inc. and Eng., Inc. to assess the current condition of the Drain and to develop alternative project designs.



STATE OF MICHIGAN
OFFICE OF THE INGHAM COUNTY DRAIN COMMISSIONER

In the Matter of: Montgomery Drain (a.k.a. the Montgomery Extension Drain)

FINAL ORDER OF DETERMINATION

A meeting having been held by the Montgomery Drain Drainage Board, composed of Patrick E. Lindemann, Diane Holman, and Debra Nolan at 4:00 p.m. on July 15, 2014, at the Ingham County Human Services Building, Conference Room D/E, located at 5303 S. Cedar Street, Lansing, Michigan 48811, being the time and place fixed in the Notice of Meeting for the Hearing of Objections, which notice was duly served, published and posted as required by law; and at said meeting Patrick E. Lindemann served Chairperson, and after a hearing objections, the Drainage Board made determinations as to the sufficiency of the petition, the practicability of the drain, whether the drain should be constructed, and if so, the public corporations to be assessed made the following Order;

It Is Hereby Ordered and Determined that the Petition filed by the City of Lansing and the County of Ingham filed May 20, 2014 and June 3, 2014 for the cleaning out, relocating, widening, deepening, straightening, tiling, extending, adding branches, adding lands, relocating along a highway, and/or installing devices to purify the flow of said Drain is necessary for the public health, that the Petition **[✓ is] / is not** sufficient.

It is Further Ordered and Determined that proposed drain project **[✓ is] / is not** practicable.

It is Further Ordered and Determined that the proposed drain project **[✓ should] / should not** be constructed.

It Is Further Ordered and Determined that the public corporations to be assessed for the cost of the drain project **[✓ are] / are not** the City of Lansing, the City of East Lansing, the Charter Township of Lansing, the County of Ingham, and the Michigan Department of Transportation.

MONTGOMERY DRAIN DRAINAGE BOARD

Patrick E. Lindemann, Chairman

Diane Holman

Debra Nolan

Dated: July 15, 2014
and Filed in the Office of the Ingham
County Drain Commissioner

Figure 2. Final Order of Determination.

CURRENT CONDITIONS OF THE MONTGOMERY DRAIN

1. Poor infrastructure condition. The Drain was inspected and inventoried using techniques such as surveying, pipe televising, manhole scanning, pipe defect assessment, manhole defect assessment, smoke testing, dye testing, illicit discharge *research, flow metering, and automated sampling. The inspections revealed cracked and collapsed pipes, debris buildup, illicit connections, and parts of the system that had reached the end of their useful lives. Additionally, the inspections identified existing infrastructure that could be rehabilitated or repurposed as part of the project. These efforts found that 39% is in fair condition, and 57% is in poor condition. (See Map #1.)*

Figure 3. Photos representative of Drain condition.

2. Insufficient capacity. The Drain lacks the capacity to adequately store and convey stormwater through the system. In its current condition, the Drain does not have stormwater storage and 52% of the pipes are now too small to convey the 10-year design event. (See Map #2.) Land use changes and increases in both the volume and intensity of precipitation events have also caused the Drain to no longer have enough capacity to operate efficiently. The insufficient capacity is evidenced by localized flooding, surcharged pipes, and increased stormwater velocities. Further, advancements in design standards and rainfall data collection support the conclusion that the Drain requires additional capacity to manage the stormwater in the Service Area.

Figure 4. Photos depicting Drain capacity issues. Left: Clippert and Grand River. Right: Clippert and Vine.

3. Contamination. Within the existing Service Area, 80% of the current land cover is impervious–meaning covered with pavement, concrete, rooftops, etc.–which leads to the direct runoff of stormwater into the Drain. This direct runoff causes an increase in non-point source pollution and introduces metals, salts, hydrocarbons, solids, bacteria, nutrients, and other contaminants into the stormwater, which ultimately discharges into the Red Cedar River. Studies performed by Triterra and Spicer Group, Inc. independently show that contamination exceeds mandated state and federal water quality criteria. The high level of contamination is a major contributor to the impairment of the Red Cedar River. Based on two years of sampling data, it is estimated that 50,000-75,000 pounds of contamination are conveyed through the Drain into the Red Cedar River annually. "

Figure 5. Photos depicting Drain contamination.

This alternatives analysis categorized multiple variants of potential drain projects into seven categories and provided the reasoning behind the selection of Targeted Low Impact design as the appropriate project moving forward. The alternatives considered are quoted below from the same report.

"V. PROJECT ALTERNATIVES

The Drain Commissioner has met and consulted with area landowners, local government officials, environmental regulators at Michigan Department of Environmental Quality, engineers, environmental experts, and members of the general public throughout this process. Priorities and concerns were gathered and considered. Based on the feedback and the results of various research efforts, the Drain Commissioner determined that the following levels of service must be accomplished by the chosen project:

- *Repair failing pipes and other parts of the system that are in poor condition;*
- *Increase capacity to handle a 10-year Storm;*[1] *and*
- *Reduce contamination by providing stormwater treatment for 96% of storm events.*[2]

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[1] 10-year storm is defined as a storm that has a 1 in 10 chance of occurring within a given year.
[2] 96% of storms have total rainfall of 2" or less, based on rainfall records from 1910 to 2015.

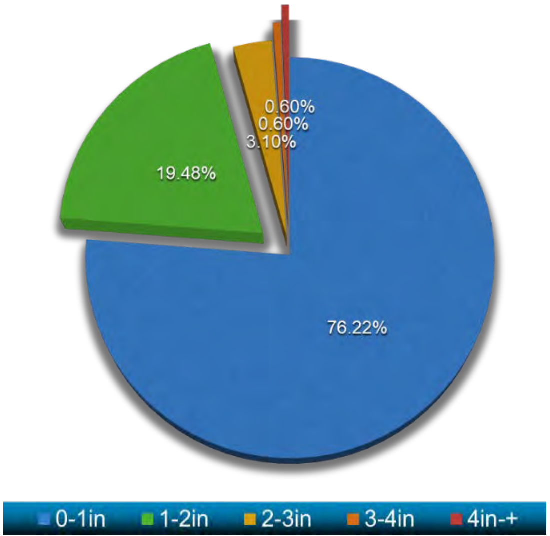

Figure 6. Based on daily rainfall records from 1910 to 2015, approximately 96% of storms have had total rainfall of 2" or less.

The Drain cannot prevent the flooding of the Red Cedar River because the River's watershed and its floodplain encompass an area vastly larger than the Drain's Service Area. However, with proper design and planning, localized flooding can be managed by the Drain while significantly decreasing the pollution that is introduced into the Red Cedar River from the Service Area.

In considering the alternatives, the Drain Commissioner remained committed to implementing the primary objective of the Clean Water Act, which is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental goals: to eliminate the discharge of pollutants and to achieve water quality levels that are fishable and swimmable.

Regulations implemented under the Clean Water Act, referred to as "Phase II," require storm water drainage systems in urbanized areas, such as the Montgomery Drain, to meet the following six minimum control measures:

1. *Public Education and Outreach;*
2. *Public Involvement and Participation;*
3. *Illicit Discharge Detection and Elimination;*
4. *Construction Site Stormwater Runoff Control;*
5. *Post Construction Stormwater Management (BMPs); and*
6. *Stormwater Pollution Prevention and Good Housekeeping.*

Among the multitude of alternatives considered, the following are the best representative options of the different approaches:

Alternative 1 – Stormwater Treatment Plant

This alternative would involve the construction and operation of a stormwater treatment plant ("SWTP")[3] near the Red Cedar River. The SWTP would provide end-of-pipe treatment and storage of stormwater prior to discharge into the Red Cedar River. The SWTP cannot be constructed within the floodway, and any construction within the boundaries of the floodplain would have to be built above the 100-year flood stage of the Red Cedar River. Protection for a 500-year flood stage is required by law.[4] An appropriately sized SWTP for the Drain's Service Area would require substantial land acquisition. Operation and maintenance associated with a SWTP would require 24-hour specialized staffing. In addition to the SWTP, broken and undersized pipes would be replaced or repaired to extend the useful life of the existing system.

The SWTP alternative would meet project goals and is estimated to cost $60.0 million.

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[3] The stormwater treatment plant would be regulated under the same conditions as a wastewater treatment plant.

[4] Michigan Administrative Code §R 408.30451c (Michigan Building Code).

Alternative 2 – Replace Existing Drain System

This alternative would involve the replacement of all existing infrastructure with the modern equivalent, thereby extending the life of the current system. This alternative was considered because it is a common approach to drain improvement projects. Typical operation and maintenance expenses would be expected.

Alternative 2, however, would not meet the project goals of increasing the Drain's capacity or treating contamination. The estimated cost for Alternative 2 is $77.3 million.

Alternative 3 – Total Low Impact Design

This alternative would require the installation of low impact design ("LID") infrastructure such as rain gardens, infiltration basins, green roofs, permeable pavement, and other methods on every parcel in the Drain's Service Area. The LID infrastructure would capture and treat pollutants at the source, reducing the amount of contaminants conveyed through the Drain and ultimately into the Red Cedar River. To implement this alternative, an estimated 20% of each parcel would be dedicated for LID infrastructure. Broken and undersized pipes would be replaced or repaired to extend the useful life of the existing system. Necessary maintenance would be required to ensure that the LID infrastructure operates efficiently, which would require permanent access to every parcel within the Service Area.

This alternative would meet all project goals. The estimated cost for Alternative 3 is $139.4 million.

Alternative 4 – Stormwater Treatment Under Impervious Surfaces

This alternative would involve making underground improvements to the Drain infrastructure and storage capacity. Water quality treatment facilities–such as hydrodynamic separators, baffle boxes, oil/water separators, and grit chambers–would be constructed in pipes or concrete vaults. Treatment and storage facilities would be located under impervious surfaces (roadways, parking lots, etc.) in existing rights of way. Broken and undersized pipes would be replaced or repaired to extend the useful life of the existing system. Necessary maintenance, most of which would have to be performed underground, would be required to ensure that the infrastructure operates efficiently.

This alternative would meet all project goals. The estimated cost for Alternative 4 is $41.7 million.

Alternative 5 – Targeted Low Impact Design

This alternative would involve making improvements to the Drain infrastructure, adding storage capacity, and placing water quality features at key locations. Broken and undersized pipes would be replaced or repaired to extend the useful life of the existing system. The construction of ponds and underground storage would increase the capacity of the system. This additional storage would be part of an overall "treatment train" of media filters, engineered biofiltration, and constructed wetlands to improve water quality. Necessary maintenance to above ground LID elements and underground infrastructure would be required to ensure that the system operates efficiently.

This alternative would meet all project goals. The estimated cost for Alternative 5 is $34.9 million.

Alternative 6 – "Band-Aid®" the Drain

This alternative would only address major structural defects by replacing or repairing those pipes that are failing or in poor condition. This alternative would prolong the useful life of portions of the system. Necessary maintenance would be required to ensure that the system remains operational and would continue to increase in frequency and expense over time.

This alternative would improve the Drain infrastructure condition, but would not address the Drain capacity or water quality goals. The estimated cost for Alternative 6 is $23.9 million.

Alternative 7 – Do Nothing

This alternative would halt design work and eventually abandon the petition. No improvements to the system would be made. System maintenance requirements would continue to increase over time, and the Drain would be more susceptible to catastrophic failure. Moreover, pollution of the Red Cedar River would continue unabated.

This alternative would not meet any of the project goals. The estimated cost of Alternative 7 is $10.9 million, as a result of responding to the petition.

VI. ALTERNATIVES NOT MEETING PROJECT GOALS

Alternatives 2, 6, and 7 were rejected by the Drain Commissioner because they do not fully meet the project goals. The following summarizes important considerations, analysis and reasoning of these alternatives:

***Alternative 2 – Replace Existing Drain System**. This alternative was rejected by the Drain Commissioner because 1) the project would be excessively disruptive to the flow of traffic on local streets and around local businesses; 2) the project would not improve the Drain's water quality; 3) the project would not increase the Drain's capacity.*

***Alternative 6 – "Band-Aid®" the Drain**. This alternative was rejected by the Drain Commissioner because 1) the system would continue to fail and require more substantial and costly repairs over time; 2) the project would not improve the Drain's water quality; and 3) the project would not increase the Drain's capacity.*

***Alternative 7 – Do Nothing**. This alternative was rejected by the Drain Commissioner because 1) the system would continue to fail and require more substantial and costly repairs over time; 2) the project would not improve the Drain's water quality; 3) the project would not increase the Drain's capacity; 4) doing nothing would waste funds that have already been expended to address the concerns of the petition; and 5) doing nothing would likely increase future legal liability.*

VII. ALTERNATIVES MEETING PROJECT GOALS

The remaining four project alternatives meet the Drain Commissioner's goals:

Alternative 1 – Stormwater Treatment Plant

Alternative 3 – Total Low Impact Design

Alternative 4 – Stormwater Treatment Under Impervious Surfaces

Alternative 5 – Targeted Low Impact Design

*Of these four that meet the project goals, Alternative 5 is the recommended alternative.
It is the most cost-effective option, both from a capital and lifecycle cost standpoint."*

Alternative 5 from the alternatives analysis is the official level of service authorized by the Chapter 20 board as a capital improvement to the drain.

Part 3: Criticality (Risk)

For each asset in the District's stormwater collection system, a criticality/risk analysis was performed to determine and prioritize the District's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for assets; including pipes, manholes, and drainage structures, etc. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic and hydraulic impacts. Finally, the Criticality (Risk) score was calculated using:

RISK = LoF x CoF

For the District's stormwater collection system, no pipe or structure locations were identified with a high-risk score. A total of 72 structures and 34 pipes had likelihood of failure scores of 5 or higher. The project did not have any structures or pipes that scored as high-risk.

Part 4: Revenue Structure

Yearly Maintenance Budget

The yearly maintenance budget of county drains is established from Section 280.196 Subsection 4 of the Drain Code of 1956 as $5,000 per mile of drain. The Montgomery Drain Drainage District contains a total of 8 maintenance miles of county drain. Therefore, the Montgomery Drain Drainage District will be able to assess a maximum of $40,000 annually to the assessment rolls on record for work defined as maintenance to storm sewer under said section of the Drain Code. However, any costs related to the operation of pumps or maintaining of detention basins are exempt from this maintenance limit.

Equipment Costs

Non-personnel related costs are recorded on a per unit basis of use during maintenance and inspection activities in order to recoup costs. This includes vehicles, excavators, cleaning trucks and televising equipment.

Petition Project Costs

Petition projects as performed under the Drain Code do not have a defined cost limit. The Chapter 20 Board approved a scope (Targeted Low Impact Design) with an initial cost estimate of approximately 35 million dollars including engineering and legal fees that will be bonded over 20 to 30 years. This project is divided into Divisions to allow for multiple contractors to be awarded bids on the project and will take approximately 2 years to complete.

Part 5: Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the stormwater system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. The petition

This results in the CIP plan over the next 5 years are summarized as follows:

1. Division I – Red Cedar Park Pond ($5.92 Million)
2. Division II – Ranney Park ($5.89 Million)
3. Division III – Storm Sewer Main ($7.99 Million)
4. Division IV – Pipe Rehabilitation ($1.43 Million)

5. Division V – Water Quality Return System ($4.03 Million)
6. Division VI – Water Treatment Systems ($1.20 Million)
7. Division VII – Restoration and Finishing ($5.81 Million)

The cost estimates for the CIP from Appendix L of the Asset Management Plan and its associated map is attached to this summary.

Conclusion

The Montgomery Drain has many pipes in need of repair, replacement, or redesign that will be addressed through the awarded divisions of the petition project. Once the petition project's construction is finished, the storm sewer in the system should easily be maintained within the budget of the drain moving forward.

In accordance with the SAW Grant requirements, the District's Stormwater Asset Management Plan (SWAMP) needs to be kept available for citizen review for 15 years. The SWAMP should be reviewed annually, and the components updated and included in the District's annual budget process.

DEQ

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/20/19
(no later than 3 years from executed grant date)

The City of Inkster *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1127-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/14/19.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Jerome Bivins	at	313-563-9774	jbivins@cityofinkster.com

Jerome Bivins 12-20-19
Signature of Authorized Representative (Original Signature Required) Date

Jerome Bivins, DPS Director
Print Name and Title of Authorized Representative

April 2017

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/20/19
(no later than 3 years from executed grant date)

The City of Inkster *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1127-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
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4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jerome Bivins at 313-563-9774 jbivins@cityofinkster.com
Name Phone Number Email

Jerome Bivins 12-20-19
Signature of Authorized Representative (Original Signature Required) Date

Jerome Bivins, DPS Director
Print Name and Title of Authorized Representative

April 2017

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan (AMP) Executive Summary Guidance

Municipality: City of Inkster
Physical Address / Web Address: 26215 Trowbridge, Inkster, MI 48141
Contact Name and Phone Number: Jerome Bivins, DPS Director, (313) 563-9774
SAW Grant Project Number: 1127-01

Executive Summary

This report details our comprehensive review of manhole and pipe assets owned by the City of Inkster, and investigated under the department of Environment, Great Lakes, and Energy's SAW Grant (grant amount of $2,000,000 with no local match). More than 1,500 assets were televised as part of Inkster's Asset Management Plan (AMP) to analyze asset criticality based on factors such as age, location, and condition.

Our goal during this investigation was to perform an inventory of existing assets, identify and prioritize the encountered defects, determine Inkster's level of service goals, compile conceptual rehabilitation cost estimates based on conclusions of the asset management plan, and determine the scope for future rehabilitation projects via a long-term Capital Improvement Plan (CIP) and Inkster's revenue structure.

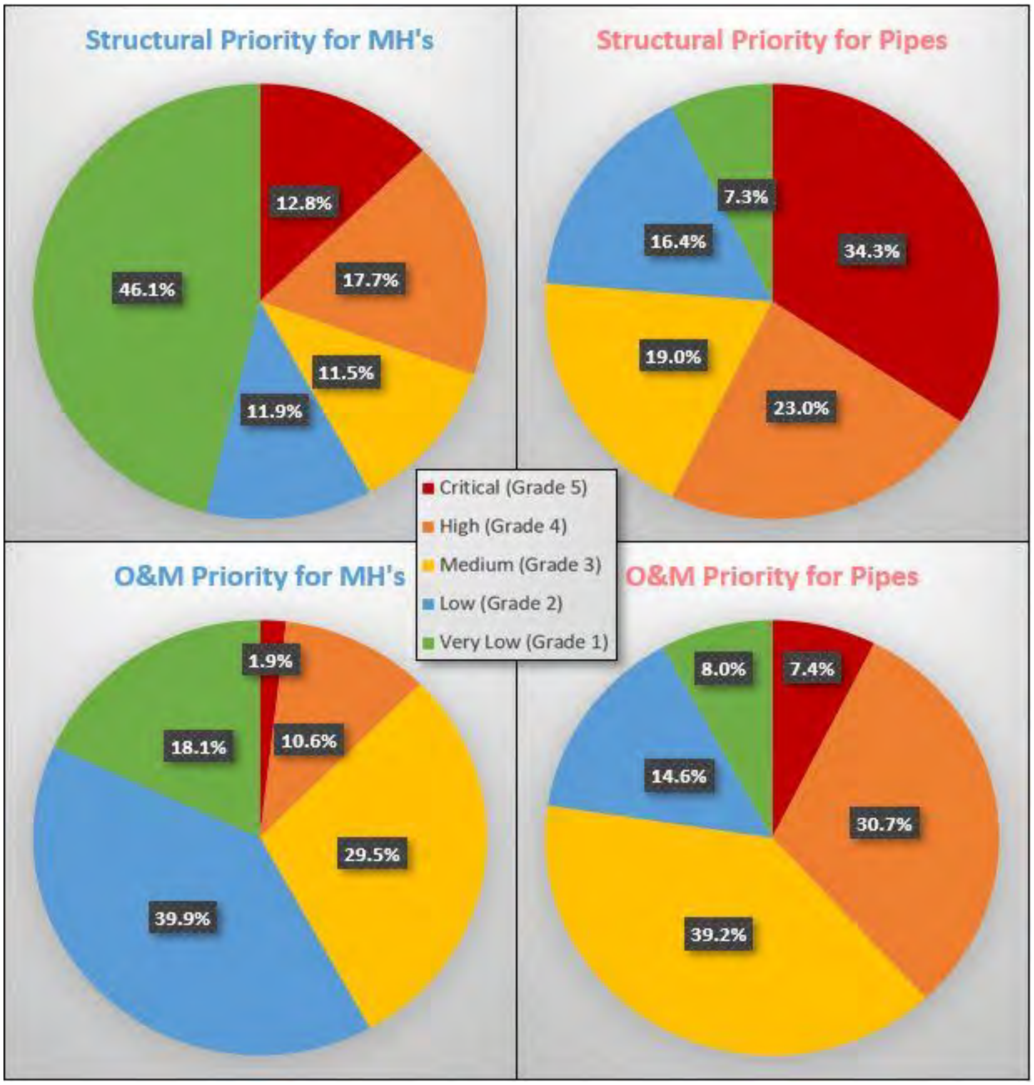
Wastewater Asset Inventory

Identifying all assets in Inkster began with utilizing the existing GIS data, and then editing said GIS as televised inspections progressed and as the existing construction documents and as-built plans were reviewed. Additionally, extensive record drawing review and field work with City staff was completed to locate assets and make updates to the GIS system. The data collected in the field was compiled into a database format utilizing Microsoft Excel and Microsoft Access. This was then input into GIS to compile all the information in one place and be accessible in map format. The ArcGIS database will act as a living document, updated as frequently as new information about existing assets becomes available (e.g. as more of the system is televised as it continues to age) and as new assets are added to the system via new development and additional televising is performed.

The City of Inkster's wastewater system assets consist of approximately 581,000 linear feet of sanitary and combined sewers and 2,392 manholes, with associated force main and accessory structures. Pipe sizes range from 4 to 84 inches while manhole diameters range from 48 to 96 inches. Pipes are made of a variety of materials including ABS truss, PVC, ductile iron, corrugated metal, and reinforced concrete. Manholes are mainly constructed of precast concrete and brick. The oldest age of this part of the system is nearly 80 years old. Approximately one-third of the system was investigated with full CCTV and cleaning following NASSCO pipe and manhole ratings. CCTV investigations were given priority based on historic maintenance issues faced by the City staff. An engineering condition assessment was completed for each inspected asset, with rehabilitation recommendations and estimated costs determined.

Fieldwork lasted from 1/19/2018 to 3/19/2019 with United Resource as the Prime Contractor performing CCTV sewer inspections and Pipetek Infrastructure Services and Metro Consulting Associates (MCA) performing manhole inspections. Rapidview's IBAK PANORAMO SI 3D Optical Manhole Scanner allowed the subcontractors to obtain a complete 360-degree view of the manhole such that its condition can be assessed offsite under NASSCO's MACP program. Robotic equipment traversed the pipe and recorded defect observations live onsite using NASSCO's PACP program. Defect reports were generated and codes were reviewed by PACP-certified engineers at Giffels Webster. Any overlooked defects or defects mistakenly recorded were corrected and rescored where appropriate. All observations were compiled into the previously mentioned GIS, to be viewed alongside the videos, scans, reports, and pictures.

Generally, observed defects include holes and broken/deformed piping as well as O&M defects such as gushing, running, and dripping infiltrations, mineral deposits, and settled grease and gravel debris. Manholes have similar defects in their frame and cover castings, chimney sections, cone sections, the manhole wall, as well as their bench, channel, and pipe connections. The results of the condition assessment identify many deformed areas such that rigid pipe now has an elliptically-shaped cross section. Holes and broken piping were also observed, some of which contain visible soil and/or voids. Other areas show evidence of surface damage due to odorous H_2S gas in pipes' headspace air which gets converted to sulfuric acid by a type of bacteria called acidithiobacillus. The result is loss of pipe and manhole wall: exposed and corroded rebar, visible and missing aggregate, and rough, spalled surfaces. Using NASSCO ratings, the grades of the investigated assets are shown below.



Defects were input into the Microsoft Access and GIS system directly. Along with these, all recommendations based on engineering condition assessment are compiled to be stored in one location. Detailed cost estimates have been included based on engineering judgement, but all will be adjusted based on when individual projects occur.

Criticality of Assets

Criticality, or business risk (BR), is calculated from two main factors: the probability or likelihood of failure (PoF) that is based on the asset's condition and the consequence of failure (CoF) that is based on the asset's location and demographics. Determining an asset's BR will allow Inkster to manage its sanitary assets and aid in apportioning funds for capital expenditures and maintaining the system's operations.

The single most important factor in calculating an asset's PoF is its quick rating. Structural and O&M quick ratings from the contractor's Access database, as well as Giffels Webster's engineering review, were imported to Excel and correlated to a 1-5 PoF score. Assets that were not inspected under this project, for which the condition is unknown, determining an asset's final PoF score was based solely on the life consumed PoF factor and material, regardless of whether or not the age of an inspected asset was known and tabulated.

CoF scores were determined from a variety of factors that vary depending on the type of asset, its inspection status, and what data is known. These seven CoF factors are as follows: asset depth, diameter, proximity to 100-Year floodplain, proximity to waterway, proximity to building, proximity to roadway, and asset accessibility. The CoF factor of diameter for manholes was removed from all analysis because sizes were either unknown, not tabulated by the contractor, or assumed to be 48”. Since level 2 inspections do not require tabulation of manhole diameter, the result was that nearly 100% of the manhole diameter data was 48” and the factor was determined to not be valid with currently known data. The removed factor caused the rest of the CoF factors for manholes to increase in their impact. Asset diameter for pipes, on the other hand, was largely determined from existing GIS data and contractor inspections; with missing data being relatively straightforward to estimate from adjacent, known pipe sizes. GIS software was instrumental in calculating scores for CoF factors related to assets’ proximities to sensitive locations utilizing a buffer. Accessibility was determined solely from the notes of Giffels Webster’s inspector during TV and cleaning operations, resulting in the majority of the system being unknown. For assets with the information not known, the factor was removed just as the CoF factor of manhole diameter.

Giffels Webster created a proprietary asset management model using Microsoft Excel to determine PoF, CoF, and BR. Different weights were tested for the condition PoF factors as well as each CoF factor based on engineering judgement and a variety of cost considerations. Weights were automatically adjusted based on asset type, inspection status, accessibility status, known information, and whether or not the CoF factor was removed from analysis altogether. The final calculation is simply the product of PoF and CoF, or the BR, a number that allows engineers to rank and prioritize assets.

All data collected from the contractor, as well as that determined by the model, is stored in a Microsoft Access database and implemented into GIS. The GIS is intended to provide basic information about assets such as their size, material, and condition, while the Access database will allow Inkster to store less important information such as cone depth or survey direction. The real power, however, lies in GIS’s ability to inform Inkster of critical priority assets and what action to take next, such as a televised inspection, root cutting, or structural repairs. The ability to anticipate problem areas and future actions allows Inkster to budget accordingly, minimizing the amount of resources they spend on damage to backed up basements and collapses. In short, risk-based management allows for strategic decisions, smaller negative impacts on the system, and easier to manage assets.

Level of Service Determination

Level of Service (LoS) defines the way in which the utility stakeholders want the utility to perform over the long term. In order to meet the community’s basic needs and expectations the LoS measures the quality provided. Some outcomes of this are improved quality of life for the community, improve functionality to reduce sanitary sewer backups, and lower life cycle costs.

Public notices at Council Meetings asking the stakeholders opinion of the system were conducted multiple times, along with posting poll questions on the City website. The stakeholders have all expressed concerns that the wastewater system experiences too many CSOs and basement backups each year. Current City residents do not want rates to significantly increase but do understand a proactive approach will reduce life-cycle costs and that repairs must be made to address existing system deficiencies. Major stakeholders have an understanding that a 20-year plan to address defects encountered in this investigation is balancing not wanting rates to increase significantly against repairing issues before they become a larger and potentially catastrophic problem.

Revenue Structure

The City of Inkster consults with Plante Moran to review the funding structure and develop sewer rates for consumers. This is to be reviewed yearly to determine if there is a gap in funding in order to continue to operate the system. At this time, there is not a revenue gap based on the current spending of the City.

That said, there are significant capital improvement projects, along with additional maintenance and future investigation projects, recommended based on findings from this SAW Grant. Under the current rate structure, the City is not able to fund the repairs as identified in the AMP. After evaluation of potential funding options for these repairs, the City and Plante Moran have developed a plan to fund approximately $3,000,000 per year in repairs. This is planned to be done by charging each customer a uniform cost, no matter the usage, that is detailed as Capital Improvement Plan. This proposal has been reviewed by City stakeholders and will be amended to the rates following City Council approval.

Over the next few years, the City also plans to explore additional funding options, such as grants and potential loans, to expedite the repairs to the system and have the system reach the Level of Service set by the stakeholders.

Capital Improvement Plan

The results of the investigation yielded a significant amount of sewer assets in critical condition and in need of repairs. Due to the exorbitant costs of repairing these structural defects, the City must phase these plans over 20 years. Once the remaining assets in the system are investigated, additional repairs will be added to this plan and adjusted accordingly. The phasing of this plan is currently based on repairing emergency areas, such as collapsed or missing walls, that could fail at any time, and then into other critical areas (NASSCO Rating of 4 or 5). The previously discussed CoF, PoF, and BR will all be evaluated to prioritize projects by zone. Along with structural repairs, the investigations of the SAW Grant have yielded a significant amount of sewer assets that require maintenance. To address specific repairs identified, the O&M repairs will be paired with the structural repairs.

The proposed 5-year asset management program is as follows:

Year 1: 2020 (Approximate Final Cost = $2,960,000)
Emergency repairs will be made to sewer segments within the following zones: 3, 9, 14, 17, 18, and 22. These repairs consist of approximately 44% of the emergency repairs needed for the city and are grouped based on proximity and the higher PoF. Majority of repairs to all emergency repairs needed will be full open cut, but there are a handful of segments needing point repair open cut, point repair open cut, and other various repairs throughout the zones in this year.

Year 2: 2021 (Approximate Final Cost = $3,130,000)
Emergency repairs will be carried into a second year. These sewer segments can be found throughout zones: 2, 6, 7, 13, 19, and 23. These repairs consist of approximately 46% of the emergency repairs needed for the city. The majority of these needed repairs will be full open cut, but there are a handful of segments needing point repair open cut, point repair open cut, and other various repairs throughout the zones in this year.

Year 3: 2022 (Approximate Final Cost = $2,660,000)
Emergency repair areas will be carried into a third year. All emergency repairs in zone 4 will be done. These repairs conclude the emergency repairs needed. Additionally, inspection, cleaning, and televising wastewater sewer and manholes in Zones 1 through 15 and rehabilitate sewer segments and structures as necessary will be performed. With the remaining budget for the year, repairs with be made to other critical assets in Zone 4. Chemical grouting, point repair lining, partial open cut work, and other O&M work will be made throughout the zone.

Year 4: 2023 (Approximate Final Cost = $3,000,000)
Repairs to critical assets located in Zone 4 will be made. Full open cut work will be made throughout the zone and will take up approximately 60% of the critical asset repairs for this zone. Recommendations may be altered to avoid open cut in some inaccessible areas.

Year 5: 2024 (Approximate Final Cost = $3,000,000)
Inspect, clean, and televise remaining sanitary and combined sewer and manholes in Zones 16 through 25 and rehabilitate sewer segments and structures as necessary. Televising information will be documented and rated per current NASSCO ratings and descriptions and rehabilitation measures will be proposed. With the remaining budget for the year, repairs to the remaining critical assets in Zone 4 with be made. Full lining segments will be made throughout the zone.

Years 6-20
After five years the plan will be re-assessed to determine its effectiveness. This will be accomplished through additional public outreach and review of any reductions in inflow and infiltration. Reducing infiltration will reduce a cost incurred by the City and not charged to the users.

In the first 5 years of the program the remaining portions of the City will have been investigated. If additional critical areas that have a higher PoF, CoF, and BR are identified the following years will incorporate these items first. Each year the assets will be re-evaluated to determine the critical segments to be repaired.

Recommendations

We recommend Inkster staff work diligently to perform emergency repairs followed by critical asset repairs on a year-to-year basis. Additionally, the City must continue cleaning and televising the remainder of their system so that further asset data and condition information can be incorporated into the model. They must learn to update their new GIS system so that asset information is not lost from changes in staff or lost over time. Lastly, the City must get accustomed to collecting asset inventory information upon the conclusion of future projects such that data can be incorporated into GIS sooner rather than long after project closeout.

List of Major Assets

Below is a compiled table of all major assets owned by the City of Inkster.

Quantity	Unit	Asset
397,455	LF	Sanitary Pipe
1,654	EA	Sanitary Manholes
188,290	LF	Combined Pipe
744	EA	Combined Manholes
6	EA	In-Service Pump Stations
2	EA	Out-of-Service Pump Stations

City of Bangor Stormwater and Wastewater Asset Management Plan
Executive Summary

SAW Grant No. 1131-01

City of Bangor
257 W. Monroe Street
Bangor, MI 49013
www.cityofbangormi.org

Regina Hoover
City Manager
269-427-5831
manager@bangormi.org

Introduction

The City of Bangor was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) (formerly Environmental Quality (DEQ)) in late 2016. The grant amount was $700,990 with a local match of $11,187. The grant provided funds for the creation of Asset Management Plans (AMP) for its stormwater drainage and wastewater collection systems. The intent of the asset management process is to maintain a desired level of service at the lowest life cycle cost for the defined infrastructure asset.

Asset Inventory

The city has a population of 1,885 citizens according to the 2010 Census. Within its limits, the City manages 46,254 feet of gravity pipe and 430 manholes, catch basins, and outfalls in the stormwater system which discharge to Maple Creek and the South Branch Black River. The City manages 80,592 feet of gravity pipe, 354 manholes, five (5) lift stations, and four (4) treatment lagoons in the wastewater system.

Assets were located with survey-grade GPS equipment and imported into an ArcGIS database. Existing information on the conditions of the assets was very limited. To obtain condition information on the gravity sewers, Closed Circuit Television (CCTV) work was performed to allow for review and evaluation of the network. Eighty-eight percent (88%) of the sanitary sewer system and forty-six percent (46%) of the stormwater system was assessed with CCTV based on established budgets. To obtain condition information of manholes and catch basins, National Association of Sewer

Service Companies (NASSCO) Manhole Assessment Certification Program (MACP) assessments were performed by field inspectors, noting the details and conditions of each structure. Inspection information was recorded for 72% of the City's sanitary sewer manholes and 85% of the storm sewer structures.

Criticality of Assets

Criticality and Level of Risk were evaluated for each asset. Assets that have the greatest Probability of Failure (POF) and the greatest Consequence of Failure (COF) associated with them are the most critical assets and are the most likely candidates for immediate action of rehabilitation or replacement. Assets with lower scores should continue to be analyzed to develop the best life cycle strategy.

POF was calculated based on a weighted average of Percent Consumed (age divided by the Estimated Effective Life), maintenance rating score and structural rating score. COF was calculated based on Depth of Pipe, Pipe Diameter, Proximity to Buildings and Proximity to Roadways. Levels of Risk (POF x COF) were then calculated and categorized based on five levels – with Level 1 being of little concern (low POF and COF) and Level 5 needing immediate attention (high POF and COF). None of the City's assets fell within Level 5, and most were in categories of lower risk. Based on these results, maintenance and structural defects of 4 and 5 were targeted for spot repairs and sewer rehabilitation strategies (CIPP lining).

Level of Service Determination

The Level of Service (LOS) defines the way in which utility stakeholders want the utility to perform over a period of time. Based upon meetings with the City's SAW committee and staff, goals were developed within the report such as cleaning and inspecting structures over a 20-year period, responding to 80% of reported problems within an hour, and having less than 3 flooding or odor instances per year. Measurable data will be collected and reviewed to determine if the goals are being met. These goals will be reviewed annually to determine if they are still relevant or need to be updated and whether changes in the system have resulted in the need to add, delete, or modify goals.

Revenue Structure

R.W. Baird & Co. was retained to conduct an analysis of the City's revenue structure regarding sanitary sewer charges. The analysis showed that significant progress has been made toward achieving the funding structure necessary to implement the program.

Capital Improvement Plan

Since the budget would not allow for cleaning and televising all of the storm and sanitary sewers, The City should budget to complete this work on an annual basis. This cost is estimated to be approximately $5,400 per year.

In addition, the annual operation and maintenance (O&M) budget includes typical costs associated with operating and maintaining the sanitary sewer system for a year. It is recommended that the City budget approximately $20,000 per year for sanitary sewer system O&M costs

Excluded from the normal operating budget are any major capital improvements that are needed to increase capacity or replace items with a useful life of more than 20 years. Capital Improvement Plan (CIP) projects are proposed within the report. The projects are prioritized by defect ratings. While a majority of the City's assets fall into lower levels of risk, several severe defects were identified and proposed for repair. A cost estimate is provided for each project, amounting to approximately $386,000 for the storm sewer system, and $547,500 for the sanitary sewer system.

List of Major Assets

Stormwater

- 46,254 feet of gravity sewer
- 430 manholes, catch basins and outfalls

Wastewater

- 80,592 feet of gravity sewer
- 320 manholes
- 5 sanitary sewer lift stations
- 4 wastewater treatment lagoons

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/31/2019
(no later than 3 years from executed grant date)

The City of Bangor *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1131-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

City of Bangor	at	269-427-5831	manager@bangormi.org
Name		Phone Number	Email

Regina Hoover 12/23/19
Signature of Authorized Representative (Original Signature Required) Date

Regina Hoover City Manager
Print Name and Title of Authorized Representative

June 2014

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The City of Bangor *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1131-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: December 3, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

City of Bangor	at 269-427-5831	manager@bangormi.org
Name	Phone Number	Email

Regina Hoover 12/23/19
Signature of Authorized Representative (Original Signature Required) Date

Regina Hoover City Manager
Print Name and Title of Authorized Representative

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date: ***December 18, 2019***
(no later than 3 years from executed grant date)

The Village of Franklin *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. ***1145-01*** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ ***No***]
   If No - Date of the rate methodology approval letter: ***December 18, 2018.***
2) Significant Progress Made: Yes or No ***N/A***
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Drew Sandahl, Oakland County WRC at ***(248) 858-1570*** ***sandahl@oakgov.com***
Name Phone Number Email

12-18-19
Signature of Authorized Representative (Original Signature Required) Date

Jim Creech, Village Administrator
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Revolving Loan Section
Attention: Mr. Jonathan Berman

From: Hubbell, Roth and Clark, Inc.

CC: Village of Franklin Wastewater Board
Oakland County Water Resource Commissioner (WRC)

Date: December 18, 2019

Re: Village of Franklin Sanitary Sewerage Disposal System
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1145-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant awarded to the Village of Franklin. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

Village of Franklin
32325 Franklin Road
Franklin, MI 48025

SAW Grant Project #1145-01

Project Grant Amount: $299.988

Applicant Match Amount $29,999

Village of Franklin
Jim Creech, Village Administrator
(248) 626-9666
administrator@franklin.mi.us

Hubbell, Roth, & Clark, Inc.
Sally Duffy, P.E.
(248) 454-6300
sduffy@hrcengr.com

WRC Project Manager
Drew Sandahl, P.E.
(248) 858-1570
sandahlm@oakgov.com

EXECUTIVE SUMMARY

The Oakland County Water Resource Commissioner (WRC) on behalf of the Village of Franklin applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes, & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Village of Franklin's sanitary sewerage disposal system is owned by the Village and is operated and maintained by WRC through an operations agreement. WRC has various tools used to manage the assets, including a GIS geodatabase, hydraulic model, condition assessment methods, risk and prioritization models, capacity studies, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is evaluated annually, which includes a review of the current rate structure, fund balances, and anticipated future funding needs.

The WRC "Common to All" approach was generally followed for development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, the work completed as part of the grant, and a summary of findings and recommendations.

WASTEWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS.) CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by WRC to allow for efficient and consistent recording of asset condition. Inspection work orders in the CAMS system are used for evaluation of system assets, such as access points and valves and other collection system structures.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Condition assessment of some access structures and valves was completed through CAMS work orders. No inspection of the low-pressure, force main piping system was made due to the difficulty associated with inspection of small diameter force main and because of limited access points being available in the Village's system. However, the asset management plan includes recommendations for construction of additional access structures as part of the recommended capital improvement plan to allow for future inspections.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the “Common to All” Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.)

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as non-gravity main, access structure, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase and inspection data from the CAMS system. For non-gravity mains (such as the Village’s low-pressure sewer system), the POF is based on age, normal operating pressure, quantity of repairs tracked in CAMS, and velocity. For manholes and other access structures, the POF is based primarily on the MACP fields cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data is not available, the score reverts to just age. For valves and cleanouts, the POF is based on the inspection data and age.

The COF for mains and access points (sanitary sewer mains and related structures) is currently determined based on asset depth, diameter/size, proximity to groundwater and flood zones, and proximity to roads and intersections. As the system continues to be developed and refined, additional criteria, such as accessibility for repairs, proximity to structures and surround soil types may be added.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual Long Range Plan (LRP) rate process form additional elements of the LOS.

The WRC’s current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*
>
> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*
>
> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all EGLE policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real world” needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing LRP rate process to prioritize projects and ensure adequate funding is available.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.
- Capital Reserve for replacement of pipes or equipment in kind or with alternate technology.

WRC worked with its internal fiscal staff to determine if the system's current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the EGLE at least six months prior to the SAW grant end date. EGLE approved the rate sufficiency submittal in a letter, dated December 18, 2018.

CAPITAL IMPROVEMENT PLAN

The need for any capital projects was reviewed for the Village's sanitary sewerage disposal system using recommendations from the asset inspection process, and consideration of other system needs. This information is then used in the LRP process to determine rate needs for funding the project established.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 6 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

- **The asset optimization software reports there are no capital improvement events recommended in the 0 to 5-year planning period based on risk of asset failure.**

  The grinder pump core units, the individual pump stations, and the pump station alarm panels are not included in the asset optimization software because those assets are either owned by individual property owners, or in the case of the alarm units, have replacement costs included in the operation and maintenance budget. The assets included in the software model, which are the low-pressure force main piping, the access structures and valves and cleanouts, are all relatively new, and therefore are expected to remain within their useful life over this planning period.
- **Installation of three new access structures for cleaning and inspection: $300,000.**

  However, in consideration of other system needs, it is recommended that three additional access structures be constructed on the 6" diameter low-pressure force main piping. These structures are recommended in order to provide access for cleaning and inspection of the highest risk portion of the low-pressure force main system. It is recommended to be implemented in the next five years to help clean and assess the condition of the force main piping.

6 to 20-Year Capital Improvement Plan

- **No specific capital improvements are currently recommended in the 6 to 20-year planning period, but needs should be re-evaluated after the force main pipes have been inspected and as technology changes that may impact the alarm panels occurs.**

  The asset optimization software also reports there are no capital improvement events recommended in the 6 to 20-year planning period based on risk of asset failure. The low-pressure force main piping, the access structures and valves and cleanouts, would still be expected to remain within their useful life over this planning period.
- **However, it is important to continue to review the condition of the system assets and ensure funding is available should the assets deteriorate more quickly than anticipated. The following other considerations should also be acknowledged as potential capital costs during this planning period:**
  - Because the low-pressure force main has not had its condition physically assessed, it is recommended to continue to monitor the piping system to look for any signs of premature failure. The installation of the access structures to allow for inspection will allow for the condition of the piping to be better understood, and after an inspection is made, recommendations for capital projects should be re-visited.
  - There may be need for increased replacement of individual grinder pump core units. Currently the failure rate of these are low, and many units can be repaired and placed back into service. WRC has been replacing any failed units as part of the O&M budget, but if the failure rate increases, there may be a need to increase the O&M budget and/or start charging private properties for these replacement units, which typically cost approximately $3,000 each.
  - Communication technologies evolve quickly which means that it is difficult to predict when the alarm panel modems or other components will require replacement. The panels were recently upgraded and received current technology modems. But these types of assets usually “fail” due to obsolescence rather than deterioration of the equipment. The O&M budget should be periodically reviewed to determine if there is sufficient funding available to address any upgrades required for the alarm panels due to changes in technology or compatibility of equipment.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the LRP process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Village of Franklin's major sanitary sewerage disposal system assets include:

Asset Name/Class	Number of Unique Assets*
Non-Gravity Low-Pressure Pipe	942 (166,743 lineal feet)
Grinder Pump Stations	707
Number of Grinder Pumps	750
Flushing Connection (Cleanout)	322
System Valve	392
Access Point	203
Meter Chamber	2

*Based on GIS Query September 19, 2019 Asset Summary provided by WRC. Asset Counts can change with ongoing maintenance, installations, and capital improvement.

PROJECT HIGHLIGHTS

The development of this Asset Management Plan for the Village of Franklin Sanitary Sewerage Disposal System was led by WRC with assistance from HRC. The following highlights some of the more tangible outcomes from the AMP development:

- Reviewed options for upgrading the previous "land line" alarm panels and implemented a project (using funding sources outside of SAW) to utilize a modem-based communication system that reports to an internet web site. This website allows for real-time and predictive monitoring of the individual pump units.
- Review and update of the asset registry for the Village's sanitary sewage disposal system. The asset registry is housed in WRC's Collaborative Asset Management System (CAMS.) The inventory was reviewed for completeness and accuracy, and refinements were made to allow for incorporation of the registry into WRC's decision support software.
- The system manhole structures and valves underwent physical condition assessment to provide inspection data in the CAMS system and help determine required future investment in the system.
- The WRC's standard level of service was reviewed with the Village to determine priorities for the system. Public outreach materials are distributed to the public with their sanitary sewer bills.
- Business risk evaluations were made for the system by reviewing the probability and consequence of failure at the individual asset level. These risk scores will assist in prioritizing future investment in the system.
- A hydraulic model was developed to evaluate the existing and future capacity of the system and to review alternative outlets and operational scenarios, as well as to provide a tool for any future studies required.
- Standard details for disconnection of sump pumps and water softeners were developed, which the Village may choose to later enforce to reduce non-sanitary flows to the receiving interceptor and treatment facility.
- The inventory, condition and risk data were synced with WRC's asset optimization software that was used to prioritize cost-effective recommendations for future investment to sustain the sanitary system.
- Developed conceptual drawings for construction of additional access structures to provide access to the low-pressure force main for future condition assessment and cleaning of the Village's most critical assets.
- The sanitary system revenues were reviewed against current and anticipated future expenses to determine the sufficiency of the rate structure.
- Locating previously buried structures.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 9, 2019
(no later than 3 years from executed grant date)

The City of Cedar Springs *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1154-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: August 27, 2019.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Bill Larose at	616-696-1330 x108	dpw@cityofcedarsprings.org
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required)

12/9/2019
Date

WILLIAM J LAROSE PUBLIC WORKS DIRECTOR
Print Name and Title of Authorized Representative

fishbeck
Engineers | Architects | Scientists | Constructors

1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

Executive Summary

Stormwater, Asset Management, and Wastewater Asset Management Plan

City of Cedar Springs
66 S. Main Street
PO Box 310
Cedar Springs, MI 49319
https://cityofcedarsprings.org/
Bill Larose – 616.696.1330
SAW Grant Project No. 1154-01

Executive Summary

The City of Cedar Springs received a SAW Grant in November 2016 to prepare a Wastewater Asset Management Plan (AMP). The grant was awarded in the following amount:

	Amount
Wastewater AMP	$560,195
Match	$0
Grant Amount	$560,195

The City had determined it to be in its best interest to implement a Wastewater AMP for its wastewater collection system. The scope of the AMP was to inventory, assess, and identify areas of deficiency in the system in order to develop recommendations for prioritizing and budgeting improvements and maintenance.

Wastewater Asset Inventory

The City owns and operates a wastewater collection system. The City utilizes a Geographic Information System (GIS) to maintain the inventory of assets. The City's GIS is through the Grand Valley Metropolitan Council and is a Regional Geographic Information System (REGIS). REGIS provides a common database and suite of applications and interfaces to satisfy the needs of all its members. The City's base map was created by converting an existing AutoCAD map which was built schematically from as-builts. As part of the grant, manholes were GPS located to improve the City's mapping.

Condition Assessment

To identify areas of potential deficiency in the system, major components were inspected, including manholes, pump stations, sewers, the wastewater treatment plant, and drain field. Since 2012, approximately 73% of the sewers were televised in accordance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards, utilizing closed circuit television (CCTV). The remaining sewers in the collection system were constructed in the last 20 years. Pipes noted to have significant deficiencies were identified for Capital Improvement Projects (CIP). Manholes were inspected utilizing NASSCO Manhole Assessment Certification Program (MACP) Level 1. Visual inspections were performed from the top of the manholes. Level 1 inspections were completed on 272 manholes out of approximately 321, which is about 85% of the system.

Probability of Failure

A Probability of Failure (POF) rating of 1 to 5 was assigned to each pipe, manhole, and pump station and WWTP asset. A summary of the condition of the inspected assets is presented in the following tables.

Sewer Condition Summary

POF Rating	Percentage of Televised System
1	60%
2	17%
3	13%
4	6%
5	4%

Manhole Condition Summary

POF Rating	Percentage of Inspected System
1	11%
2	18%
3	41%
4	14%
5	16%

Pump Station Condition Summary

POF Rating	Percentage of Inspected System
1	0%
2	50%
3	14%
4	36%
5	0%

WWTP Condition Summary

POF Rating	Percentage of Inspected System
1	2%
2	29%
3	55%
4	13%
5	1%

Criticality of Assets

The POF rating represents the likelihood of the asset failing based on defects and deficiencies identified in the condition assessments. Each pipe segment, manhole, pump station, and asset at the WWTP was assigned a final POF score based on results from sewer televising and visual inspections utilizing PACP and MACP standard ratings.

The Consequence of Failure (COF) rating addresses the impact a failure of a component would have on the community. It represents the criticality of a specific component to the successful operation of the entire system or the potential difficulty in addressing a failure, if it were to occur. The three factors considered when calculating the collection system COF score include pipe diameter, physical location, and service area impact. Each pipe segment and structure was assigned a final COF score based on the average of these three factors.

The pipe diameter is a general measure of the size of the tributary area the pipe or structure serves. Therefore, it can be used as an indicator of the population affected by a failure or amount of industrial or commercial facilities affected. Larger pipes typically service larger tributary areas.

The physical location score indicates the difficulty of performing repairs in the event of a sewer failure. Repairs and replacements of sewers located under streams or railroads present difficulties and likely result in higher repair costs. Additionally, repairs in well-traveled roadways often create more disruption to the community. The physical location score is designed to help identify sewer lines that may face these issues if a failure were to occur.

The service area score indicates the sensitivity of the area that could be affected by a failure in the collection system. Some parts of town, such as in commercial areas, near schools or City facilities would likely experience greater disruption in the event of a sanitary sewer failure. The existing land use layer in the GIS was used to identify which sanitary sewers served the most sensitive areas. Care was taken to ensure proper classification of each parcel within the City.

Business Risk Exposure

The Business Risk Exposure (BRE) score considers how critical each component is within the system in the event that the component fails. The BRE then factors in the consequence of such failure combined with the probability of the component failing based on the condition assessment. The *BRE* is calculated by the formula:

$$BRE = POF \times COF$$

The *POF* and *COF* scores are both on a 1 to 5 rating scale, and therefore, *BRE* scores range from 1 to 25. If an asset has been physically inspected and given a POF rating of 5, it is assumed that the asset is near failure and is considered high priority regardless of the COF rating. The calculated BRE score is then used to prioritize the rehabilitation or replacement tasks.

Level of Service Determination

As a part of the Wastewater AMP, stakeholder meetings were conducted with members of City staff to select Level of Service (LOS) goals. These goals were developed in order to set achievable objectives for operation and maintenance and Capital Improvement Projects. The LOS selected considers budgetary constraints, customer expectations, and condition of the system. The City has established a list of attainable goals it intends to meet regarding its sanitary sewer system. These LOS goals include:

1. Meet all federal and state sanitary system regulations.
2. Jet one quarter of the collection system every year.
3. Visually inspect trouble areas monthly through manhole inspections.
4. Visually inspect pump stations twice per week.
5. Keep spare parts on hand for emergency pump station repairs.

Revenue Structure

As required by Michigan Department of Environment, Great Lakes, and Energy (EGLE), the City was to provide an analysis of the current budget on a cash basis to determine if there is a revenue gap for its collection system. The rate methodology report shows, according to the budget, no revenue gap is projected for the fiscal year 2019. The City plans to set money aside to address the projects in its CIP, for the operation of its system and to continue its maintenance activities to meet its LOS goals.

Capital Improvement Plan

Based on the LOS goals and the condition of the wastewater system discovered during condition assessments, recommendations for repairs or maintenance needs were given for sewers, manholes, pump stations, the WWTP, and drain field. The following list of projects are in the 5-year CIP.

Repair Recommendations

Type	Repair	Estimated Cost
Manhole Rehabilitation	Cementitious Liner w/ admixture; 17 MH	$100,000
Sewer Rehabilitation	CIPP 922 ft of Sewer	$120,000
Drain Field Improvements	New Drain Fields	$2,000,000
WWTP and Pump Stations	Miscellaneous Projects	$4,155,000
	Total Overall Cost	**$6,375,000**

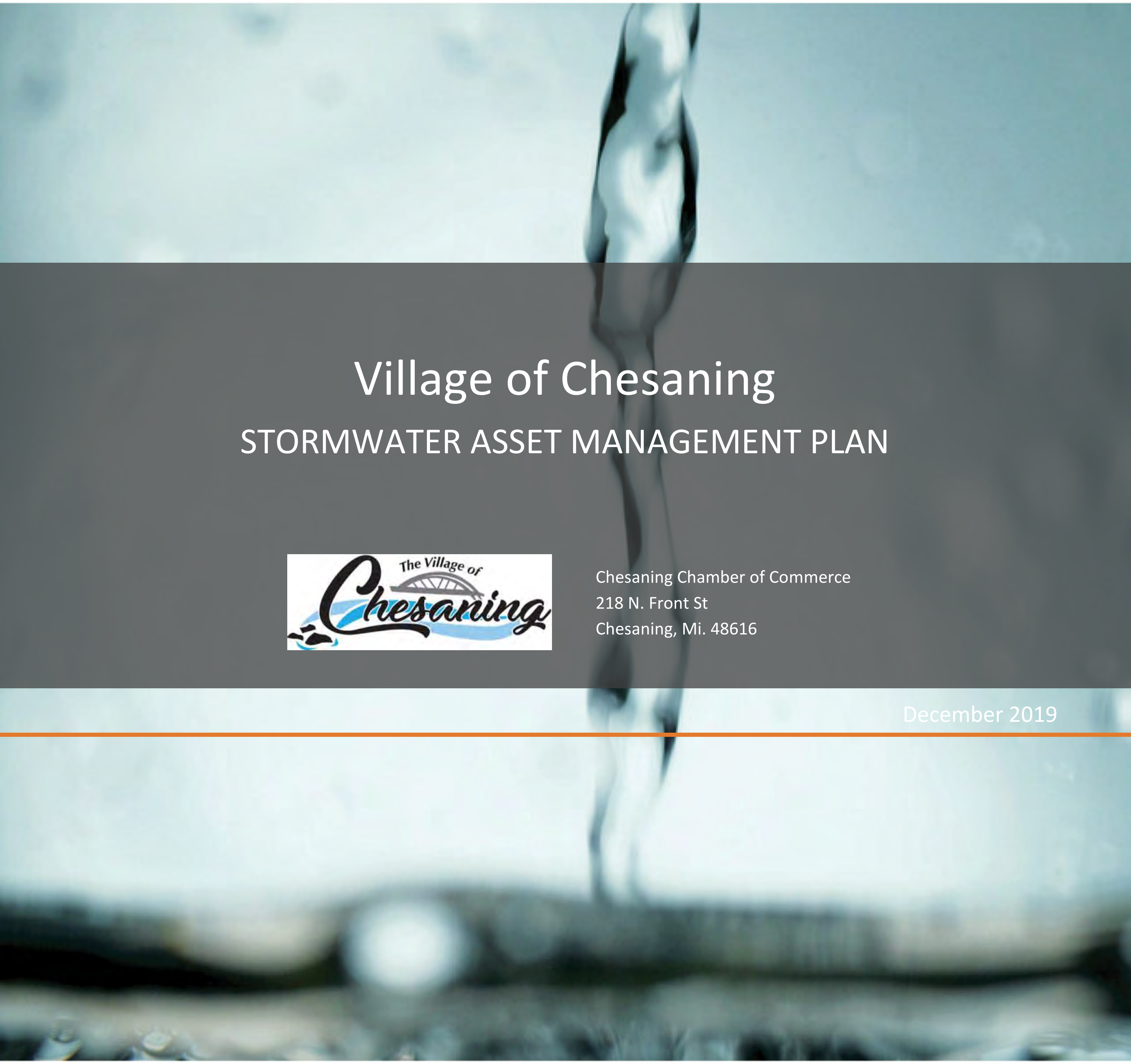
Recommendations

Based on the City's desired LOS goals, it was determined that improvements to the system over the next five years will include sewer and manhole rehabilitation, drain field expansion, and work at the WWTP.

List of Major Assets

City of Cedar Springs' major assets include:

- 82,400 feet of gravity sanitary sewer
- 12,000 feet of force main
- 321 manholes
- 3 pump stations
- SBR WWTP at 1.2 mgd
- Groundwater discharge drain field



Village of Chesaning

STORMWATER ASSET MANAGEMENT PLAN

Chesaning Chamber of Commerce
218 N. Front St
Chesaning, Mi. 48616

December 2019

OHM
Advancing Communities®

Storm, Asset Management, and Wastewater (SAW) Asset Management Plan

Executive Summary

The Village of Chesaning owns and maintains the stormwater collection and conveyance system within Village limits. Within the Village, there is a network of manholes, catch basins and storm sewers to manage drainage. All known stormwater assets owned by the Village were included in this Asset Management Plan (AMP). The Village of Chesaning recognizes the importance of preserving the integrity of their assets. This document was prepared using grant funding from the State of Michigan Stormwater Asset Management and Wastewater (SAW) Grant Program, SAW Grant 1161-01, with a total budget of $394,470.

This AMP was intended to accomplish the following key goals:

- Provide the Village with a framework for collecting, organizing, and storing data for their stormwater collection system using the latest available hardware and software.
- Evaluate key system components to create the Village's Geographic Information System (GIS) database to make it easier for future generations to access infrastructure data with greater ease.
- Add information including asset size, age, material, and location to the GIS database.
- Physically evaluate the structural condition of a representative percentage of publicly owned system components, including manholes, catch basins, inlets and storm sewers and to store the collected data in the Village's newly created GIS database.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
  - Regularly assessed storm structures.
  - Regularly scheduled sewer evaluations (televising).
  - Repair and rehabilitation to address structural problems resulting from aging infrastructure.
- Provide recommendations for developing a prioritized Capital Improvement Plan (CIP) for display of the significance of particular assets.

Mission Statement

One important element to any plan is a mission statement, which identifies the overarching purpose of the Village's AMP. The purpose of the Village's asset management plan is summarized by the following mission Statement:

We are committed to providing and maintaining high-quality storm sewer collection services to our existing and future customers in a cost-effective manner while protecting human health and the environment.

Asset Management Team Leaders

The team leaders listed in Figure 1 are committed to the asset management mission statement and were instrumental in the progress made and findings outlined in this report. Further questions on the Village's AMP can be directed to these team members.

Troy Feltman

- Village Administrator
- 989.845.3800
- villageadmin@villageofchesaning.com
- 218 N. Front St. Suite A
  Chesaning, Mi. 48616

Joe Trzil

- DPW Director
- 989.445.0122
- jtrzil@villageofchesaning.com
- 1101 N. Main St.
  Chesaning, Mi. 48616

Figure 1: Asset Management Team Leaders

Infrastructure Technology & Know-How

The Village has made investment to create a GIS database mapping their storm system with the intent of making it easier for future generations to access infrastructure knowledge. These investments to create a new GIS database include the following:

- Evaluate key system components to augment the Village's created GIS database.
- Added information for sewer material type, size, age and depth to the created GIS database
- Purchased tablets, mobile devices, and a GPS unit to improve access to real-time asset information and enhance future field data collection.
- Provide staff training on new hardware and software.

Asset Inventory

An asset inventory is a summary list of the Village's assets and their attributes. The majority of the Village's storm sewer infrastructure, including manholes, catch basins, inlets, storm sewers and discharge points were inventoried and digitized. The Village is continuing to populate the attributes of the inventory using observations in the field while performing additional condition assessment. This inventory resides in the Village's GIS. The GIS framework was created as part of this project, making it easier for the Village to store critical data for the locations, size, material, install dates and condition of each stormwater asset. The major assets are approximated in the text below. The full AMP report contains additional details on distribution of sizes, ages, and condition.

- 16.8 miles of storm sewer, ranging from 2-inches to 48-inches in diameter
- 78 storm manholes
- 612 storm catch basins

Condition Assessment

The Village's storm sewer infrastructure (manholes, catch basins and storm sewers) was reviewed with the intent of assessing a representative portion large enough to complete the condition assessment. The condition of the infrastructure is based on the National Association of Sewer Service Companies (NASSCO) condition grading system, which uses a scale of zero to five. Zero indicates the asset is brand new or in very good condition, displaying no defects. While a rating of five indicates the infrastructure is in very poor condition or has already failed. As displayed in Figure 2, about 82 percent of the storm structures were condition assessed, while 49 percent of the storm sewers were condition assessed. Inlets were not NASSCO assessed because of the inability to view the entire inlet without televising. Because of this, a condition assessment was not conducted on inlets. It should be noted that during the storm sewer condition assessment all storm sewers with access were reviewed which included approximately 43,500 linear feet.

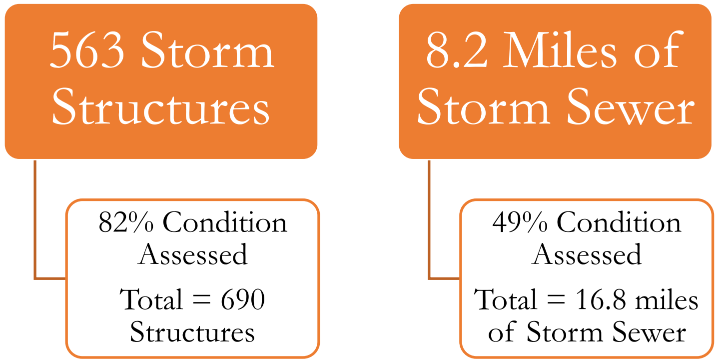


Figure 2: Portion of Storm System Assessed

Additional observations include:

- Manhole and catch basin infrastructure exhibited moderate wear with an average structural rating of 2.07 and an average Operations and Maintenance rating of 1.40 and is considered to be in fair condition.
- Many structural defects in the Village's storm structures were related to brickwork where structures were missing mortar or missing bricks. The leading O&M defects present in structures were deposits and infiltration.
- The storm sewer displayed age appropriate wear with an average structural rating of approximately 2.68 and an average O&M rating of approximately 3.04 and is considered to be in poor condition.

- The primary structural defects found in the storm sewers were cracking, pipe failures and fractures, while the primary O&M defects where roots, deposits, and infiltration.

Criticality and Risk

The investigation led to the identification of critical stormwater infrastructure by considering the Probability of Failure (PoF) with the Consequence of Failure (CoF) as Risk is determined by the formula shown in Figure 3.

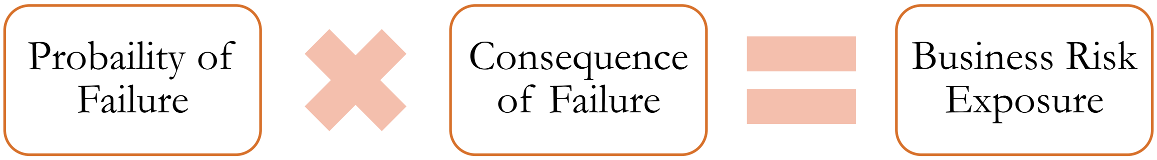


Figure 3: Risk Equation

The PoF is related to the physical condition of an asset. The CoF focuses on the economic losses and impacts to society due to an asset's failure. The following factors were combined to determine the CoF for storm structures and sewers:

- Network Position – the sum of upstream sewers discharging to a storm structure.
- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Location – refers to the surface above or around the asset that will be affected if repairs or replacement is needed.
- Sensitive Environmental Features – proximity to sensitive environmental features like the Shiawassee River, Bear and Deer Creek and county drains.

Numerical values were assigned to the PoF and the CoF resulting in a BRE of 1 through 25. A BRE of 4 or less is considered low risk, a BRE of 5 to 12 is considered medium risk while a BRE of 13 to 25 is considered high risk. The BRE was the basis for the resulting Capital Improvement Plan (CIP). The BRE was calculated for the assessed assets as shown in Figure 4.

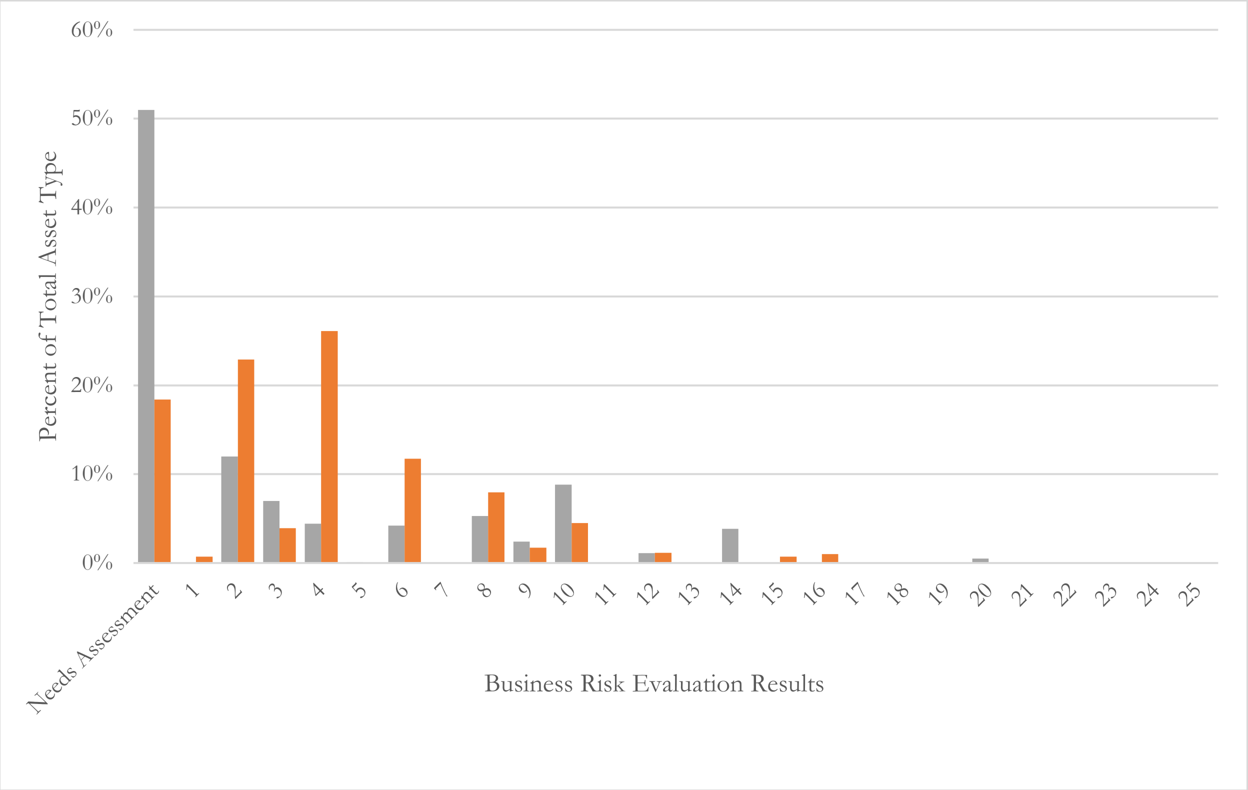


Figure 4: Business Risk Exposure for the Village's Storm Structures and Sewers

Level of Service

The Village, in line with its mission statement outlined prior, adopted Level of Service (LOS) criteria, which it plans on using as guidelines to manage the storm sewer system. These LOS criteria are summarized in Table 1.

Table 1: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	PACP & MACP Assessments per Year*	• MACP assess a minimum of 10 percent of system per year. • PACP assess a minimum of 20 percent of system every 5th years and remining 80 percent every 10th year.**
Regulatory Compliance	Compliance with MDEQ Policy and The Clean Water Act	Continue to comply with MDEQ SSO policy and The Clean Water Act
Service Delivery and Customer Communication	Utilize Software to aid in utility management and promote customer communication, increase effort to reduce number of sewer calls and response time.	Respond to customer complaints and requests efficiently
O&M Optimization	Regular Cleaning and Maintenance	• Clean and maintain 10 percent of storm structures per year • Clean and maintain 20 percent of sewers every 5th years and remaining 80 percent every 10th year**
Capital Improvements	Continue to upgrade stormwater infrastructure during road rehabilitation and replacement projects.	Update CIP as projects are completed and evaluate Criticality every 5 years to ensure the CIP corresponds with Village planning.

* Pipe Assessment Certification Program (PACP), to assess storm sewer condition.

*Manhole Assessment Certification Program (MACP), to assess storm structure condition

**Example - If CIP program begins in the year 2020, in year 2025 clean and televise 20 percent of the sewer system. In year 2030 clean and televise the remaining 80 percent of the sewer system.

Capital Improvement Planning

The BRE helped identify capital improvements that will allow the Village to operate at its maximum potential. Additional long-term operations and maintenance strategies will provide the means to maintain a sound structural condition in perpetuity, including:

- Regularly scheduled storm sewer, manhole and catch basin assessment.

- Repair and rehabilitation to address structural problems resulting from aging infrastructure. These projects should continue to be scheduled during street improvement projects.

As in many communities, the Village's buried infrastructure is deteriorating due to age and unless the Village begins to systematically repair, rehabilitate and/or replace these aging components, Village residents and businesses will experience a decreased level of service which could result in the following:

- Increased threat of property damage, public health and safety.
- Increased potential for environmental impact
- Increased potential for impassible roadways due to failed infrastructure.

Based on the assessments conducted during the SAW grant effort, a 20 year CIP was created to prioritize capital projects necessary to ensure the functionality of the stormwater system. A cost opinion was created for rehabilitation projects for both storm structures and sewers. An O&M plan was generated with an annual associated cost opinion. The cost opinion below represents the total 20 year CIP cost.

Storm Structures Rehabilitation Recommendations Total:	$215,000
Storm Sewer Rehabilitation Recommendations 20 Year Total:	$6,485,000
Total Storm Rehabilitation Recommendation Cost Opinion:	$6,700,000

The annual cost opinion of maintaining the O&M strategies laid out in the CIP is as follows:

Total Annual O&M Costs:	$49,000

END EXECUTIVE SUMMARY

Village of Chesaning

Sanitary Sewer System

Asset Management Plan
Executive Summary

December 2019

OHM Advisors®

EXECUTIVE SUMMARY

The Village of Chesaning provides a critical service to its residents and businesses, providing the collection and treatment of wastewater and protecting its local bodies of water by discharging clean effluent through an advanced treatment process. Recognizing the importance of this sanitary system, Chesaning initiated a comprehensive assessment of its sanitary infrastructure. This Asset Management Plan (AMP) summarizes the assessment and includes key recommendations for future funding levels. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program, SAW Grant 1162-01, comprised of a $246,345 budget. The Village of Chesaning is considered a disadvantaged community and did not require a local match per program requirements.

The intent of the AMP is to accomplish the following key goals:

- Provide the Village with a new framework for collecting, organizing, and storing system condition data for their sanitary collection network using the latest available hardware and software.
- Assess key system components to create the Village's Geographic Information System (GIS) database and to make it easy for future generations to access infrastructure data.
- Add information for sewer material type, size, age and length to the created GIS database.
- Visually evaluate the structural condition of publicly owned system components, including sanitary sewers, manholes and pump stations. Compile and record the collected data in the Village's GIS database.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition, including:
    - Regularly scheduled structure assessments
    - Regularly scheduled sewer line televising
    - Repair and rehabilitation to address structural problems resulting from aging infrastructure
- Provide recommendations for developing a prioritized Capital Improvement Plan (CIP) to be funded through the Village's sanitary enterprise fund.

Mission Statement

One important element to an Asset Management Plan (AMP) is a mission statement, which identifies the overarching purpose of the Village's efforts. The purpose of the Village's asset management plan is summarized by the following mission statement:

We are committed to providing and maintaining high quality sanitary sewer collection services to our existing and future customers in a cost-effective manner while protecting human health and the environment.

Asset Management Team Leaders

The team leaders listed in Figure 1 are committed to the asset management mission statement and were instrumental in the progress made and findings outlined in this report. Further questions on the Village's AMP can be directed to these team members.

Troy Feltman

- Village Administrator
- 989.845.3800
- villageadmin@villageofchesaning.org
- 218 N. Front St. Suite A
  Chesaning, Mi. 48616

Joe Trzil

- DPW Director
- 989.445.0122
- jtrzil@villageofchesaning.org
- 1101 N Main St.
  Chesaning, Mi. 48616

Rod Cantu

- Water Department Superintendent
- 989.845.3410
- dpw@villageofchesaning.org
- 103 N 3rd St
  Chasaning, Mi. 48616

Figure 1: Asset Management Team Leaders

Infrastructure Technology & Know-How

The Village has made investments to create a GIS database for mapping their sanitary system with the intent of making it easier for future generations to access infrastructure knowledge. These GIS database investments include the following:

- Assessment of key system components to augment the Village's created GIS database.
- Added information for sewer material type, size, age and depth to the created GIS database.
- Purchased tablets and mobile devices to improve access to real-time asset information and enhance field data collection.
- Provide staff training on new hardware and software.

Asset Inventory

An asset inventory is a list of the Village's infrastructure and their attributes. Approximately 87 percent of the manholes, 29 percent of the sewers and 5 pump stations throughout the Village's wastewater system were inventoried and locations digitized. The Village has populated the attributes of the inventory using observations in the field while performing visual condition assessments. This inventory resides in the Village's newly created GIS. The GIS framework was created as part of this effort, making it easier for the Village to store critical data for the locations, size, material, install date and condition of each sanitary asset.

List of Major Assets

The major assets are approximated in the text below. The full AMP report contains additional details on the distribution of sizes and conditions.

- 304 manholes
- 15.1 miles of sewer
- 5 pump stations

Condition Assessment

With the intent of assessing a majority of the sanitary manhole structures throughout the Village and using previously collected sewer condition assessment information conducted during a sewer Village sewer lining project, Figure 2 displays the proportions of the system that has been condition assessed. The condition of the infrastructure is based on the National Association of Sewer Service Companies (NASSCO) condition grading system, which utilizes a one to five rating scale. A rating of one indicated the asset is brand new or in very good condition, displaying no defects. A rating of five indicated the asset has already failed or may likely fail in the imminent future. About 87 percent of the approximately 304 total manholes in the sanitary network were assessed while approximately 29 percent of the total 15.1 miles of total sanitary sewer were assessed. Key components within the Village's five pump stations were also inventoried and visually assessed. These include but are not limited to pumps, check/control valves, motors, level control systems, backup power, structure, wet well, valve vault and telemetry. Additionally, nighttime sanitary flow monitoring, smoke testing and hydraulic modeling were conducted in an effort to determine the level of Inflow and Infiltration (I&I) and if measures for removal or additional wet weather storage may prove necessary.

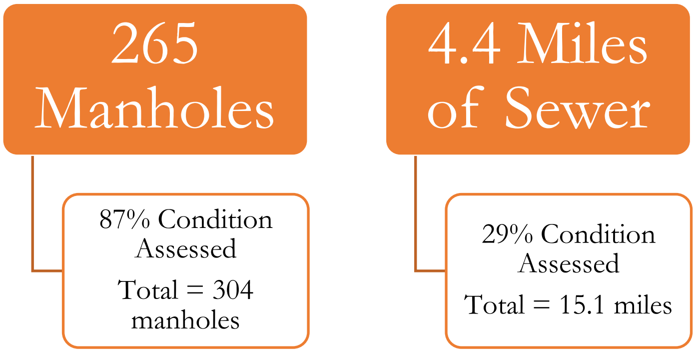


Figure 2: Portion of Sewer System Assessed

It was also observed that:

- Manholes infrastructure exhibits moderate wear with an average structural rating of approximately 1.60 and an average O&M rating of 1.75. Structural manhole defects were predominately related to surface damage and brickwork. O&M manhole issues were driven by deposits while infiltration and roots were also commonly found. Observed deposits were often a result of infiltration. Overall, manholes were found to be in good condition.

- Sewers infrastructure has an average structural rating of 2.03 and an average O&M rating of 2.55. Overall the sanitary sewer system in in average condition. A large majority of the defects coded during sewer televising were deposit encrusted, resulting from mineral build up due to infiltration.
- Visual assessment of the five pump stations in the Village determined pump station infrastructure include some assets which are nearing their manufactures expected lifespan. In the coming years, it is expected that assets may have to be replaced to continue to operate in a functional manner.
- The infrastructure will continue to degrade over time, therefore, ongoing assessments and repairs are recommended
- During nighttime flow monitoring and smoke testing, no major or point sources of I&I or cross connections were found. The hydraulic model indicates that additional storage volume is not required for current system operations. The current Wastewater Treatment Plant (WWTP) capacity proves adequate for current dry and wet weather flows.

Criticality and Risk

The investigation led to the identification of critical Sanitary infrastructure by considering the Probability of Failure (PoF) with the Consequence of Failure (CoF) as Risk is determined by the formula shown in Figure 3.

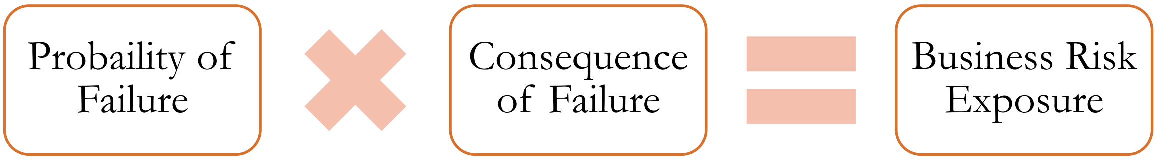


Figure 3: Risk Equation

The PoF is related to the physical condition of an asset. The CoF focuses on the economic, social and environmental losses and impacts to society due to an asset's failure. The following factors were combined to determine the CoF for manholes and sanitary sewers:

- Network Position – the linear sum of upstream sewers discharging to a sewer or manhole structure.
- Diameter/Size – the relative size of the asset with respect to the rest of the system

- Location – refers to the surface above or around the asset that may be affected if repairs or replacement is needed.
- Sensitive Environmental Features – proximity to sensitive environmental features such as the Shiawassee River, Deer Creek, Bear Creek and County Drains.
- Top Users – Customers who are significant to the community's well-being. In Chesaning the top users are listed in Appendix B.
- Depth – Depth of the sewers in the collection system relative to local surface elevations.

Similar to manholes and sewers, for pump station assets the PoF was based on the condition of the asset while the CoF was determined by the effect of an individual asset failure on the system operations.

Numerical values were assigned to the PoF and the CoF resulting in a BRE of 1 through 25. A BRE score of 4 or less is considered low risk. A BRE score of 5 through 12 is considered medium risk. A BRE score of 13 to 25 is considered high risk. The BRE score was the basis for the resulting CIP. The BRE was calculated for the assessed assets as shown in Figure 4.

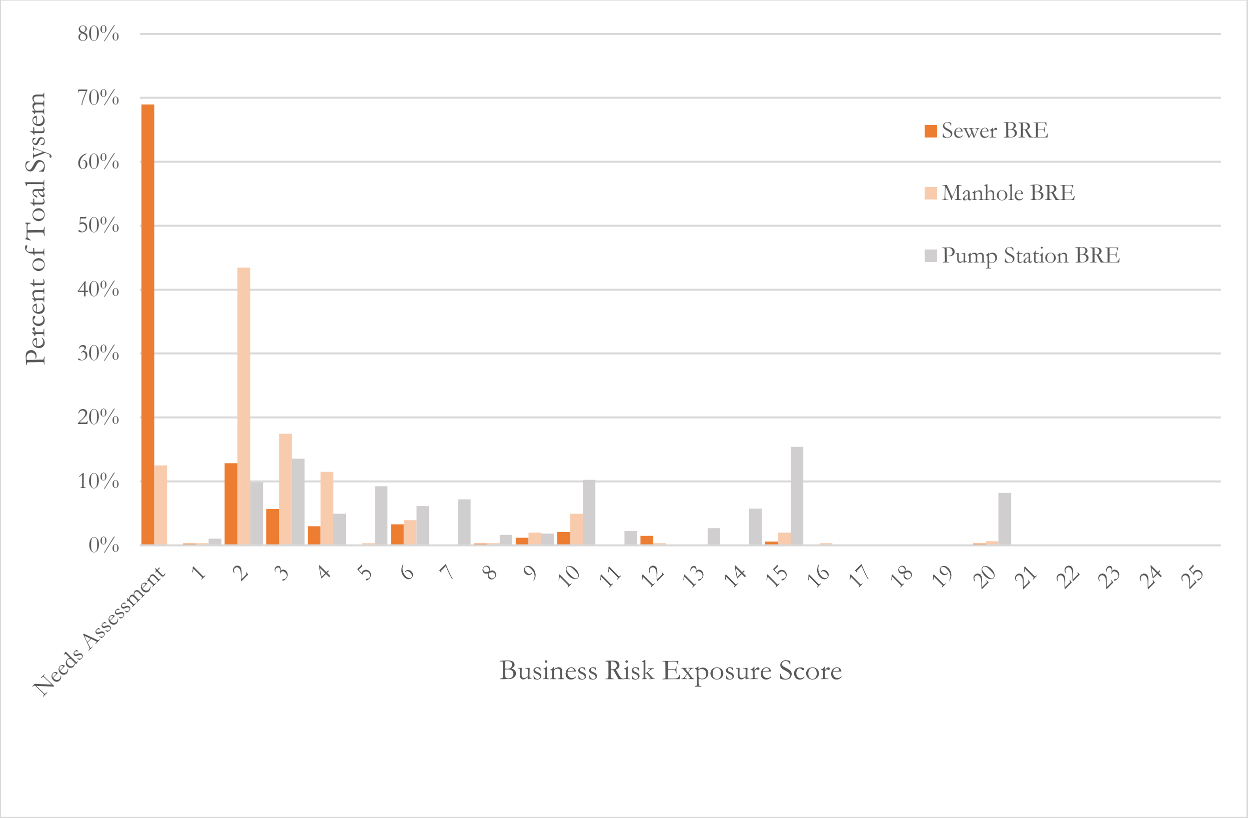


Figure 4: Business Risk Exposure for the Village's Sanitary Manholes and Sewers

Level of Service

The Village, in line with its mission statement outlined prior, adopted Level of Service (LOS) criteria, which it plans on using as guidelines to manage the sanitary sewer system. These LOS criteria are summarized in Table 1.

Table 1: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	PACP & MACP Assessments per Year*	• MACP assess a minimum of 20 percent of system per year. • PACP assess a minimum of 20 percent of system every 5th year and remaining 80 percent every 10th year**
Regulatory Compliance	Compliance with EGLE Sanitary Sewer Overflow (SSO) Policy and the Clean Water Act	Do not exceed EGLE SSO frequency requirements
Service Delivery and Customer communication	Utilize Software to aid in utility management and promote customer communication, increase effort to reduce number of sewer calls and response time.	Respond to customer complaints and requests within a reasonable amount of time
O&M Optimization	Regular cleaning and maintenance of the collection system	• Clean and maintain 20 percent of manholes per year • Clean and maintain 20 percent of sewers every 5th year and remaining 80 percent every 10th year**

*Pipe Assessment Certification Program (PACP), to assess sanitary sewer condition.
*Manhole Assessment Certification Program (MACP), to assess manhole condition.
**Example - If CIP program begins in the year 2020, in year 2025 clean and televise 20 percent of the sewer system. In year 2030 clean and televise the remaining 80 percent of the sewer system.

Revenue Structure and Capital Improvement Plan

The BRE helped identify capital improvements that allows the Village to operate at its maximum potential. Additional long-term operations and maintenance recommendations provide the means to maintain a sound structural condition, including:

- Regularly scheduled sewer, manhole and pump station assessments.
- Repair and rehabilitation to address structural problems resulting from aging infrastructure.
- Upgrades to the Village's sanitary pumping stations, as assets age beyond their useful service lives.

As in many communities, the Village's underground infrastructure is deteriorating due to its age. And unless the Village begins to systematically repair, rehabilitate and/or replace these aging components, Village residents and businesses are likely to experience a decreased level of service which could result in the following:

- Increased threat of property damage, public health and safety.
- Increased potential for environmental impact.
- Increased potential for impassable roadways due to failed infrastructure.

Based on the assessments conducted during the SAW grant effort, a 10-year CIP was created to prioritize capital projects necessary to help ensure the functionality of the sanitary system. A cost opinion was created for rehabilitation projects for both manholes and sewers. An O&M plan was also generated with an annual associated cost opinion. The cost opinion below represents the total 10-year CIP cost:

MACP Rehabilitation Recommendations 10-Year Total:	$44,750
PACP Rehabilitation Recommendations 10-Year Total:	$900,000
Total Sanitary Rehabilitation Recommendation Cost Opinion:	$944,750

The annual cost opinion of maintaining the O&M recommendations laid out in the CIP is as follows:

Total Annual O&M Costs:	$34,500

The Villages sewer rates were analyzed and compared to the anticipated long-term operating expenses and capital improvements. An Asset Management Financial Plan (AMFP) was developed by Baker Tilly Municipal Advisors in collaboration with the Village of Chesaning and OHM Advisors. The AMFP includes an initial rate increase of 9.00 percent and annual increases of 1.75 percent thereafter. The AMFP also sets a cash balance target of two years compared to cash operating expenses. All capital projects outlined in the CIP can be cash-funded for the forecasted period based on the Revenue Structure implemented.

END EXECUTIVE SUMMARY

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 31st, 2019**
(no later than 3 years from executed grant date)

The Village of Chesaning certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1161-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Troy Feltman	at	(989) 845-3800	villageadmin@villageofchesaning.org
Name		Phone Number	Email

	12-23-2019
Signature of Authorized Representative (Original Signature Required)	Date

Troy Feltman, Village Administrator
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31st, 2019
(no later than 3 years from executed grant date)

The Village of Chesaning certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1162-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: [✓ Yes] or No

   If No - Date of the rate methodology approval letter: ______________________.

2) Significant Progress Made: [✓ Yes] or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: 12-9-2019.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on 12-17-2019.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Troy Feltman at (989) 845-3800 villageadmin@villageofchesaning.org
Name Phone Number Email

12-26-2019
Signature of Authorized Representative (Original Signature Required) Date

Troy Feltman, Village Administrator
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/23/2019
(no later than 3 years from executed grant date)

The Township of Columbia *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1163-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10-17-2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Bob Elrod	at 517-592-2000 ext 210	relrod@twp.columbia.mi.us
Name	Phone Number	Email

Robert M Elrod
Signature of Authorized Representative (Original Signature Required)

12/23/19
Date

Bob Elrod, Township Supervisor
Print Name and Title of Authorized Representative

April 2017

OHM
Advancing Communities®

December 30, 2019

Clarence Jones
Project Manager
Revolving Loan Section
EGLE – Drinking Water and Municipal Assistance Division
PO Box 30241
Lansing, MI 48909-7741

RE: Columbia Township SAW - Wastewater AMP
SAW Deliverable Submittal for SAW Grant No. 1163-01

Dear Mr. Jones:

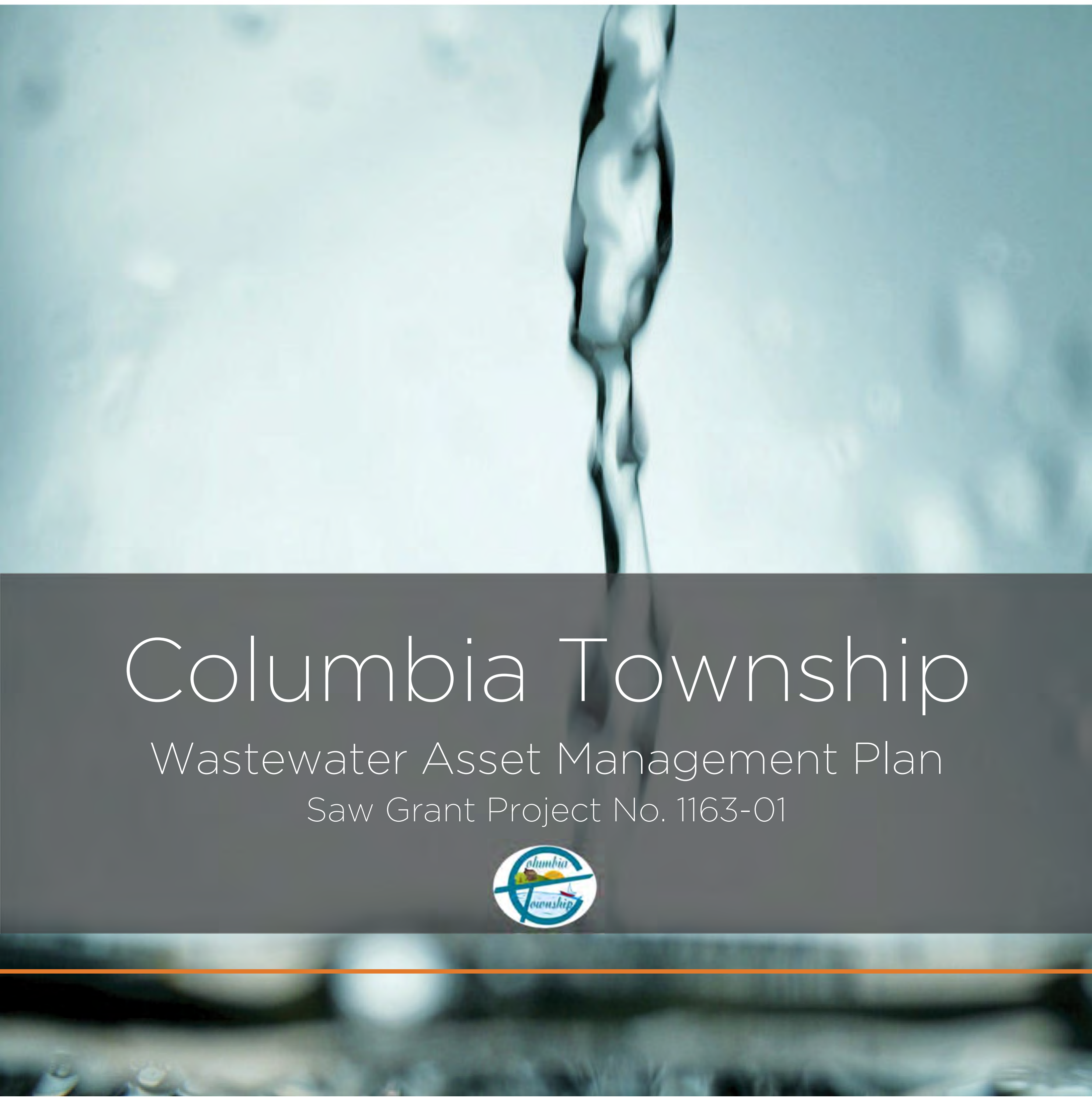
Enclosed you will find the deliverables for the Columbia Township SAW grant, including the signed Certificate of Project Completeness, Notice to Proceed for construction, and an AMP summary. The AMP will be available to the EGLE upon request, and a copy will be available to the public (by request, at the Township offices).

Please inform us if you have comments on this AMP document, or have any other questions related to this SAW grant.

Sincerely,
OHM Advisors

____
Marcus McNamara
Project Manager

Encl: SAW Wastewater Asset Management Plan



Columbia Township

Wastewater Asset Management Plan

Saw Grant Project No. 1163-01

December 2019

OHM Advancing Communities®

Executive Summary

Introduction

This document summarizes the Asset Management Plan (AMP) for Columbia Township's sanitary sewer system and includes key recommendations for future funding levels. Columbia Township's sanitary sewer system is mostly pressurized, making it a unique collection system with different management needs than a system comprised of conventional gravity sewers. The AMP includes details on the assessments completed by OHM Advisors with collaboration from the Township. The AMP was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program. $595,107 was allocated through the SAW Grant Program. Activities completed with these funds were intended to accomplish the following key goals:

- Provide the Township with a new framework for collecting, organizing, and storing data for their wastewater collection system using the latest available hardware and software.
- Survey key system components to develop a Geographic Information System (GIS) database and to allow future generations to access infrastructure data with greater ease.
- Add information for sewer material type, size, and age to the GIS database.
- Evaluate the structural and operational condition of various system components and store the data in the GIS database.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition and provide an adequate Level of Service into perpetuity.
- Provide recommendations for developing a prioritized Capital Improvement Plan.
- Analyze operating budgets and recommend revenue structure changes to facilitate the Township's long-term capital improvements plans.

The contact person for the Columbia Township Wastewater AMP is:

Mr. Bob Elrod, Supervisor
Columbia Township
8500 Jefferson Road
Brooklyn, MI 49230
Phone: 517-592-2000 ext. 210
E-mail: relrod@twp.columbia.mi.us

Asset Inventory

An asset inventory is a comprehensive list of the Township's assets and their key attributes that impact Level of Service (LOS). The Township, in partnership with OHM Advisors, has inventoried much of its sanitary sewer infrastructure. A GIS framework was developed as part of this effort, making it easier to store critical data for the location, size, material, age, and condition of each wastewater asset. The Township's sewer system is a pressure sewer system; it is comprised of four billing districts containing a mix of horizontal and vertical infrastructure as shown in Table A.

Table A. Columbia Township Wastewater Inventory Summary

Billing District	(A) No. Lift Stations	(B) No. Grinder Pumps	(C) No. Chambers[2]	(D) No. Valve Boxes	(E) Length of Force Main (ft)	(F) Length of Gravity Main (ft)	(G) Other Assets
Clark Lake Interceptor	1	0	48	1	48,713	4,417	-
Clark Lake	2	617	68	60	72,599	0	-
Lake Columbia	2	1,359	186	1	106,752	149	-
Southern Regional Interceptor	5	30	142	19	140,385	0	Equalization Basin
Vineyard Lake	2	331[1]	152	0	70,807	0	-
TOTALS	12	2,337	596	81	439,229	4,566	-

1. *Total does not include Vineyard Lake area grinder pumps in Norvell or Cambridge Townships.*
2. *The Chamber inventory is displayed in Table B.*

The Township is responsible for a portion of the Leoni Regional Utility Authority (LRUA) system comprised of 12 lift stations, 2,337 grinder pumps, 596 chambers and manholes, 81 standalone valve boxes, 83 miles of pressure sewer, 4,566 feet of gravity main, and an equalization basin. As part of the LRUA, Columbia Township contracts with the Leoni Water Resource Recovery Facility and does not operate its own facility.

Table B. Columbia Township Chamber Detail Inventory Summary

District	No. Air Release Chambers	No. Air Vacuum Release Chambers	No. Cleanouts / Flushing Stations	No. Gravity Manholes	No. Other Chambers (field verification needed)	Total No. Chambers
Clark Lake Interceptor	19	0	16	13	0	48
Clark Lake	14	0	46	0	8	68
Lake Columbia	56	17	107	0	6	186
Southern Regional Interceptor	65	3	64	0	10	142
Vineyard Lake	44	2	104	0	2	152
TOTALS	198	22	337	13	26	596

Condition Assessment

The lift stations and all corresponding pumping appurtenances were inspected on site by engineers experienced in lift station design. The condition of the collection system was evaluated using estimates of remaining useful life in order to complete the risk assessment. The remaining useful life is determined by comparing an asset's design life with its age. Although not a true representation of existing conditions, the estimated remaining useful life can be used to model the likelihood of asset failure in the absence of physical inspection data.

The electrical and mechanical equipment in Columbia Township's pumping stations is generally in good condition. Operators frequently perform maintenance on items such as pumps, and generators are regularly exercised. However, the sanitary waste collection system experiences problems with high levels hydrogen sulfide which has led to the deterioration of concrete and piping in wet wells. Furthermore, the system is negatively impacted by scum and sludge accumulation in its wet wells. This reduces the efficiency of pumps and increases operational expenses.

The physical condition of much of the Township's horizontal inventory (i.e. piping) has yet to be verified but the age of the assets suggest that the pressure main should be in good condition, but the valves may be deteriorating. The Township's valves are expected to have a service life of around 35 years and are approaching an average age of 18 years. This means that the Township should plan to systematically replace most of its valves within the 20-year planning horizon, as discussed in further detail in the Capital Improvement Plan.

Level of Service

The Township has identified Level of Service (LOS) goals that will be used to guide the AMP and establish critical performance parameters. The LOS is bounded by the minimum regulatory requirements and the maximum capabilities of the assets. The Township's LOS goals are listed in Table C.

Table C. Columbia Township Wastewater Level of Service Goals

Key Service Criteria	Performance Indicator	Target Level of Service
Regulatory Compliance	Compliance with EGLE Policy and the Clean Water Act	Comply with EGLE Policy and the Clean Water Act
Service Delivery and Customer Communication	Customer complaints per year, request response time	Acknowledge customer complaints and requests within 24 hours of receipt Respond to customer complaints and requests within three business days
Capital Improvement Planning	Customer complaints per year, unexpected repair costs per year	Update the CIP annually using gathered information from customer complaints, history of emergency repairs, and inspection data.
Operating Reserves	Enough reserves to cover all anticipated major expenses and potential unexpected breakdowns	Follow EGLE Asset Management Guidelines Evaluate rates every three years

Criticality and Risk

The Township's wastewater system was evaluated, and assets were assigned a Business Risk Exposure (BRE). The BRE is a product of an asset's probability of failure (POF) and its consequence of failure (COF). The equation is shown in Figure A.

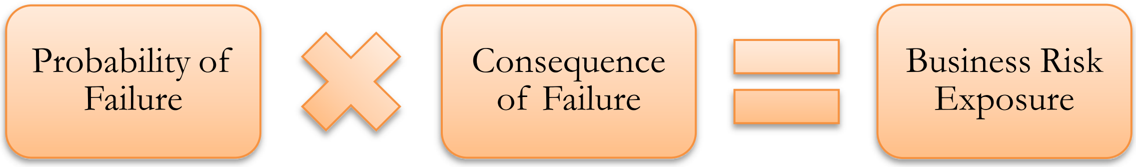


Figure A. Business Risk Equation

The POF is dependent on an asset's age and condition. A high POF represents an asset with significant deterioration, near the end of its expected useful life, with a low reliability for continued operation. As an asset ages, its condition generally worsens and its remaining useful life decreases. Because of the relationship between age and condition, the estimated percent of remaining useful life can be correlated to its probability of failure without a condition rating assigned by direct physical inspection. Due to the difficulty and expense of physical inspections on pressurized assets, which often require specialized technology and disruptions in service, the estimated percent of useful life was used to determine the POF for assets without an assigned condition rating.

The COF represents the economic, social, and environmental impacts of an asset's failure. COF is determined by factors including location or surface type, size or diameter, network position, and redundancy. Geoprocessing tools were used to assign COF factors to the collection network, while the treatment assets were evaluated individually during on-site inspections. The COF factors were combined using a weighted average to determine the overall COF rating for each asset. The overall COF and POF ratings were multiplied to determine the BRE.

Revenue Structure and Capital Improvement Plan

Current sanitary sewer funding sources may include Township reserves and operations and maintenance accounts, federal and state grant and loan programs, and other sources including the United States Department of Agriculture's (USDA's) Rural Development Water and Waste Disposal Loan and Grant Program or the State Revolving Fund (SRF). The Township sewer fund is organized into four billing districts, Clark Lake, Lake Columbia, Vineyard Lake, and the Southern Regional Interceptor, each with its own rate structure.

The 20-year total estimated capital improvement expenses are approximately $6.56 million. Cash-funded repairs, replacements, and inspections are estimated to require approximately $1.05 million per year in addition to the recommended capital improvements. The estimates represent installed costs and include a 25% adjustment for engineering and administration, and 20% for additional contingencies.

High Priority Capital Projects (2020 to 2024) $838,000

High priority projects are those that rehabilitate assets that have a business risk exposure of 16-25 or have an expected remaining useful life of five years or less. The following work has been identified as high priority and should be completed within the next five years:

- Pump Station Improvements: replacement of high-risk pump station assets throughout the system with design lives greater than or equal to 20 years. High-risk pump station assets with design lives less than 20 years are included in the annual recommended Operations and Maintenance Improvements.
- Cady Rd Pump Station Study: study of alternatives for decommissioning the Cady Rd Pump Station. This study should be completed before any rehabilitation at the station to avoid potentially unnecessary spending.
- High Priority Valve Replacements: inspection and as-needed replacement of high-risk valves at an estimated 59 locations in the Clark Lake Sewer System, SRI, and Clark Lake Interceptor. The Township must physically inspect these valves to verify replacement needs, but the estimate assumes complete replacement of the valves and associated fittings.

Medium Priority Capital Projects (2025 to 2029) $4,582,000

Medium priority projects include aged, medium-consequence lift station and system valve components. These assets generally include mechanical components with shorter expected service lives. These assets will likely need to be repaired or replaced within the 10-year planning horizon.

Low Priority Capital Projects (2030 to 2039) $1,144,000

Low priority projects include aging low-consequence lift station and system valve components. These assets will likely need to be repaired or replaced within the 20-year planning horizon.

Operations and Maintenance Improvements (Ongoing) $1,046,000/year

Operations and Maintenance Improvements generally include ongoing repair and replacement on assets that have a design life of less than 20 years. Due to the frequency of repair or replacement on these items it is often practical to incorporate them into the system's operating expenses. There are numerous lift station components included in this category. Another significant recurring expense is for repair and replacement of grinder pumps which have an expected service life of about 13 years. A small portion of this funding will be allocated to annual inspections and condition assessment on the Township's infrastructure.

Conclusions and Recommendations

As capital improvement projects are completed, Columbia Township's GIS geodatabase must be continuously updated to reflect the changing conditions. For example, the Probability of Failure (POF) metric, which indicates structural condition, must be reset after a valve is replaced or repaired. This could consist of the POF rating changing from a five, which represents imminent failure, to a one or two, which represents brand new or good condition. This can be done using the same data collection methodologies employed during the SAW Grant project. The continuation of the inspection program will allow the Township to maintain a current set of structural conditions that can be used to guide the Capital Improvement Planning process every year.

The Township's collection system is unique (compared to a conventional gravity system). Due to the large percentage of pumps and valves that make up the overall collection system, this will require more frequent repair and replacement of components that have relatively short useful lives. This Asset Management Plan provides a roadmap to proactively and systematically manage the system for the Township to provide a reliable service for its wastewater customers.

SECTION 00 55 00 - NOTICE TO PROCEED

Owner: Columbia Township
Contractor: JK of Michigan
Engineer: OHM Advisors
Project: Pump Station Improvements

Engineer's Project No.: 1010-17-0011
Contract Name: Pump Station Improvements
Effective Date of Contract: December 23, 2019

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on December 23, 2019

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, the date of Substantial Completion is **August 31, 2020** and the date of readiness for final payment is **September 30, 2020.**

Before starting any Work at the Site, Contractor must comply with the following:

Attend preconstruction meeting.
Submit MDS for approval.

Owner: Columbia Township

Robert M Elrod
Authorized Signature

By: ROBERT M. ELROD

Title: TOWNSHIP SUPERVISOR

Date Issued: DECEMBER 23, 2019

Copy: Engineer

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Marysville certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1212-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: October 7, 2019.

2) Significant Progress Made: Yes or No

   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Name	Phone Number	Email
Randy Fernandez	at (810) 455-1312	rfernandez@cityofmarysvillemi.com

12/18/19

Signature of Authorized Representative (Original Signature Required) Date

Randy S. Fernandez, City Manager
Print Name and Title of Authorized Representative

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/31/19
(no later than 3 years from executed grant date)

The Village of Spring Lake *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1181-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Marv Hinga at 616.842.1393 marv@springlakevillage.org
Name Phone Number Email

12-31-19
Signature of Authorized Representative (Original Signature Required) Date

MARVIN HINGA VILLAGE CLERK
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/19
(no later than 3 years from executed grant date)

The Village of Spring Lake *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1181-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/14/19.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Marv Hinga at 616.842.1393 marv@springlakevillage.org
Name Phone Number Email

12-31-19
Signature of Authorized Representative (Original Signature Required) Date

MARVIN HINGA VILLAGE CLERK
Print Name and Title of Authorized Representative

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Engineers | Architects | Scientists | Constructors

1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

Wastewater Executive Summary

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan

Village of Spring Lake
102 W Savidge Street
Spring Lake, MI 49456
Marvin Hinga, Village Clerk – 616.846.1393
SAW Grant Project No. 1181-01

Executive Summary

The Village of Spring Lake (Village) received a SAW Grant in September 2016 to prepare a Wastewater Asset Management Plan (AMP). The grant was awarded in the following amount:

	Amount
Wastewater AMP	$628,946
Stormwater AMP	$478,946
Match	$110,789.20
Grant Amount	$997,102.80

The Village has determined it to be in its best interest to implement an AMP for its sanitary collection system. The scope of the AMP was to inventory, assess, and identify areas of deficiency in the system to develop recommendations for prioritizing and budgeting improvements and maintenance.

Wastewater Asset Inventory

The Village of Spring Lake (Village) is located in Spring Lake Township (Township) within Ottawa County, Michigan. Situated along M-104 east of Grand Haven, Spring Lake has a population of approximately 2,323 according to the 2010 U.S. Census. The Village owns and operates a sanitary collection system consisting of approximately 14.9 miles of gravity sewers, 1 mile of force main, 313 manholes, and 6 lift stations. The Village and Township connect at three locations: (1) the Township-owned Lift Station No. 19, located at the northern end of Lake Avenue, (2) the River Street and Lake Avenue intersection, and (3) the Grandview Avenue and South Lake Avenue intersection. The Village discharges to the Grand Haven/Spring Lake Sewer Authority (GHSLSA) by an Authority-owned pump station south of Division Street along the Grand River; the City of Ferrysburg also discharges to the GHSLSA at this location.

At the start of the project, the Village had a sanitary sewer map with approximate pipe and manhole locations that was previously developed in AutoCAD© drawing file format. This initial information was limited to pipe diameter and service zones. The Village was able to obtain Geographic Information System (GIS) base map layers, such as an aerial photo and parcel data, from Ottawa County GIS. In order to more easily share mapping data with neighboring utilities in the County, the Ottawa County GIS schema for wastewater in Esri© geodatabase was adopted by the Village. A unique numbering system was assigned to the wastewater assets based on the four service zones that are familiar to Village staff. Manholes and structures were field surveyed to obtain horizontal positional accuracy and rim elevations. Due to limited historic record drawings available for the system, manhole inspections and televising reports were used to correct and confirm pipe connectivity and direction of flow. The inspections and reports are linked to the GIS data layers and can be viewed by Village staff by Silversmith Asset Status Tracker© electronic software. Staff are provided with a GPS-enabled field tablet and access to a web-based utility map for viewing and collecting maintenance data of assets in the collection system.

Condition Assessment

To identify areas of potential deficiency in the system, manholes and sewers were inspected. A Probability of Failure (POF) rating of 1 to 5 was assigned to each pipe and manhole. A summary of the condition of the inspected assets is presented in the following tables.

Under the SAW Grant, approximately 84% of the sewers were televised in accordance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards, utilizing closed circuit television (CCTV).

Sewer Condition Summary

POF Rating	Percentage of Televised System
1	62.6%
2	4.9%
3	10.2%
4	10.6%
5	11.7%

The Village's manholes were inspected using the NASSCO Manhole Assessment Certification Program MACP scoring system for Level 1 inspection. Visual inspections were performed from the top of the manholes without the use of a camera or manhole entry. Level 1 inspections were completed on 288 of Village's 313 manholes, equating to approximately 92% of the system.

Manhole Condition Summary

POF Rating	Percentage of Inspected System
1	1.0%
2	18.4%
3	56.4%
4	22.5%
5	1.7%

Criticality of Assets

Probability of Failure

The POF rating represents the likelihood of the asset failing based on defects and deficiencies identified in the condition assessments. Each pipe segment and manhole was assigned a final POF score based on results from sewer televising and visual inspections based on PACP and MACP standard ratings.

Consequence of Failure

The Consequence of Failure (COF) rating addresses the impact a failure of a component would have on the community. It represents the criticality of a specific component to the successful operation of the entire system or the potential difficulty in addressing a failure if it were to occur. The three factors considered when calculating the COF score include the pipe diameter, physical location, and service area impact. Each pipe segment and structure were assigned a final COF score based on the average of these three factors.

The pipe diameter is a general measure of the size of the tributary area the pipe or structure serves. Therefore, it can be used as an indicator of the population or number of facilities affected by a failure. Larger pipes typically service larger tributary areas.

The physical location score indicates the difficulty of performing repairs in the event of a sewer failure. Repairs and replacements of sewers located under streams or railroads present difficulties and likely result in higher repair costs. Additionally, repairs in well-traveled roadways often create more disruption to the community. The physical location score is designed to help identify sewer lines that may face issues if a failure were to occur.

The service area score indicates the sensitivity of the area that could be affected by a failure in the collection system. Some parts of the Village, such as in commercial areas, near schools, or Village facilities would likely experience greater disruption in the event of a sanitary sewer failure. The existing Village Zoning Map was used to identify which sewers served the most sensitive areas.

Business Risk Exposure

The Business Risk Exposure (BRE) score considers how critical each component is within the system if the component fails. The BRE then factors in the consequence of such failure combined with the probability of the component failing based on the condition assessment. The *BRE* is calculated by the formula:

$$BRE = POF \times COF$$

The *POF* and *COF* scores are both on a 1 to 5 rating scale, and therefore, *BRE* scores range from 1 to 25. If an asset has been physically inspected and given a POF rating of 5, it is assumed that the asset is near failure and is considered high priority regardless of the COF rating. The calculated BRE score is then used to prioritize the rehabilitation or replacement tasks.

Level of Service Determination

As a part of the Wastewater AMP, Level of Service (LOS) goals were established for cost effectively maintaining and improving the system. These goals were developed to set achievable objectives for operation and maintenance and capital improvement projects. The LOS selected considers budgetary constraints, customer expectations, and condition of the system. The Village has established a list of attainable goals it intends to meet regarding its sanitary sewer system. These LOS goals include:

1. Meet all Federal and State sanitary collection system regulations.
2. Re-televise all sewer with a Pipeline Assessment Certification Program (PACP) rating of 3 or 4 in years 10-20.
3. Address all known sanitary defects rated with a structural Probability of Failure (PoF) of 4 or 5 in conjunction with Capital Improvement Plan (CIP) projects or corresponding road projects.
4. Address all known sanitary manhole defects rated with a structural PoF of 4 or 5 in conjunction with CIP projects or corresponding road projects.

Revenue Structure

As required by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the Village was required to provide an analysis of the current budget on a cash basis to determine if there is a revenue gap for their collection system. The Village hired Baker Tilly Municipal Advisors, LLC (formerly Umbaugh) in 2018 to review the user rates for their system and determine if the rates and charges were sufficient to cover operation, maintenance, replacement, and capital improvement projects for their collection system. The rate methodology report shows, according to the budget, there is no revenue gap in current rates.

Capital Improvement Plan

Based on the LOS goals and the condition of the wastewater system discovered during condition assessments, recommendations for repairs or maintenance needs were given for sewers and manholes. After first removing recommendations that are scheduled to occur prior to the commencement of a CIP, sewer and manhole recommendations were categorized as a 10-year CIP or a Future Project. Projects included in the 10-year CIP included those pipes and manholes within the areas of 4- and 6-inch cast iron watermain to be replaced over the next decade while all other recommendations were included as a future project. The table below summarizes the total cost to complete the recommended repairs.

Sanitary System Repair Recommendations

	10-Year CIP	Future Projects
Sanitary Manholes	$478,950	$106,350
Sanitary Pipes	$1,500,800	$555,250
Total	**$1,979,750**	**$661,600**

Work on the Holiday Inn, Village Cove, and South Lake Lift Stations is scheduled over the next year. Repairs outlined for the remaining three lift stations, which include minor repairs at the River Street and Liberty Street Stations and more extensive upgrades at the Fall Street Lift Station, should be included in the Villages CIP.

Recommendations

Based on the Village's desired LOS goals, it was determined that necessary improvements to defective sewers and manholes will be phased over the course of 20 years. Improvements to the system include sewer, manhole, and lift station rehabilitation. A feasible maintenance schedule was established that aligns with the Village's needs and available resources for sewer televising, manhole location, and assessment.

List of Major Assets

The Village's major assets include:

- 14.9 miles of gravity sanitary sewer
- 1 mile of force main
- 313 manholes
- 6 lift stations

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1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

Stormwater Executive Summary

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan

Village of Spring Lake
102 W Savidge Street
Spring Lake, MI 49456
Marvin Hinga, Village Clerk – 616.846.1393
SAW Grant Project No. 1181-01

Executive Summary

The Village of Spring Lake (Village) received a SAW Grant in September 2016 to prepare a Stormwater Asset Management Plan (AMP). The grant was awarded in the following amount:

	Amount
Wastewater AMP	$628,946
Stormwater AMP	$478,946
Match	$110,789.20
Grant Amount	$997,102.80

The Village has determined it to be in its best interest to implement an AMP for its stormwater collection system. The scope of the AMP was to inventory, assess, and identify areas of deficiency in the system to develop recommendations for prioritizing and budgeting improvements and maintenance.

Stormwater Asset Inventory

The Village of Spring Lake (Village) is located in Spring Lake Township (Township) within Ottawa County, Michigan. Situated along M-104 east of Grand Haven, Spring Lake has a population of approximately 2,323 according to the 2010 U.S. Census. The Village owns and operates a stormwater system consisting of approximately 34,000 feet of storm sewer ranging from 4-inch to 36-inch diameter, 118 manholes, 269 catch basins, and 1 lift station. The Village has 28 stormwater discharge points, made up of points that discharge to other systems or to water of the State.

At the start of the project, the Village had a stormwater map with approximate pipe, catch basin, and manhole locations that was previously developed in AutoCAD© drawing file format. This initial information was limited to pipe diameter and service zones. The Village was able to obtain Geographic Information System (GIS) base map layers, such as an aerial photo and parcel data, from Ottawa County GIS. In order to more easily share mapping data with neighboring utilities in the County, the Ottawa County GIS schema for stormwater in Esri© geodatabase was adopted by the Village. A unique numbering system was assigned to the stormwater assets based on the four service zones that are familiar to Village staff. Manholes, catch basins, and other structures were field surveyed to obtain horizontal positional accuracy and rim elevations. Due to limited historic record drawings available for the system, manhole inspections and televising reports were used to correct and confirm pipe connectivity and direction of flow. The inspections and reports are linked to the GIS data layers and can be viewed by Village staff by Silversmith Asset Status Tracker© electronic software. Staff are provided with a GPS-enabled field tablet and access to a web-based utility map for viewing and collecting maintenance data of assets in the collection system.

Condition Assessment

To identify areas of potential deficiency in the system, manholes and sewers were inspected. A Probability of Failure (POF) rating of 1 to 5 was assigned to each pipe and manhole. A summary of the condition of the inspected assets is presented in the following tables.

Under the SAW Grant, approximately 64% of the sewers were televised in accordance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards, utilizing closed circuit television (CCTV).

Sewer Condition Summary

POF Rating	Percentage of Televised System
1	52.4%
2	28.2%
3	4.8%
4	5.7%
5	8.9%

The Village's manholes were inspected using the NASSCO Manhole Assessment Certification Program MACP scoring system for Level 1 inspection. Visual inspections were performed from the top of the manholes without the use of a camera or manhole entry. Level 1 inspections were completed on 101 of Village's 118 manholes, equating to approximately 85% of the system.

Manhole Condition Summary

POF Rating	Percentage of Inspected System
1	0%
2	19.8%
3	59.4%
4	16.8%
5	4%

Criticality of Assets

Probability of Failure

The POF rating represents the likelihood of the asset failing based on defects and deficiencies identified in the condition assessments. Each pipe segment and manhole was assigned a final POF score based on results from sewer televising and visual inspections based on PACP and MACP standard ratings.

Consequence of Failure

The Consequence of Failure (COF) rating addresses the impact a failure of a component would have on the community. It represents the criticality of a specific component to the successful operation of the entire system or the potential difficulty in addressing a failure if it were to occur. The three factors considered when calculating the COF score include the pipe diameter, physical location, and service area impact. Each pipe segment and structure were assigned a final COF score based on the average of these three factors.

The pipe diameter is a general measure of the size of the tributary area the pipe or structure serves. Therefore, it can be used as an indicator of the population or number of facilities affected by a failure. Larger pipes typically service larger tributary areas.

The physical location score indicates the difficulty of performing repairs in the event of a sewer failure. Repairs and replacements of sewers located under streams or railroads present difficulties and likely result in higher repair costs. Additionally, repairs in well-traveled roadways often create more disruption to the community. The physical location score is designed to help identify sewer lines that may face issues if a failure were to occur.

The service area score indicates the sensitivity of the area that could be affected by a failure in the collection system. Some parts of the Village, such as in commercial areas, near schools, or Village facilities would likely experience greater disruption in the event of a storm sewer failure. The existing Village Zoning Map was used to identify which sewers served the most sensitive areas.

Business Risk Exposure

The Business Risk Exposure (BRE) score considers how critical each component is within the system if the component fails. The BRE then factors in the consequence of such failure combined with the probability of the component failing based on the condition assessment. The *BRE* is calculated by the formula:

$$BRE = POF \times COF$$

The *POF* and *COF* scores are both on a 1 to 5 rating scale, and therefore, *BRE* scores range from 1 to 25. If an asset has been physically inspected and given a POF rating of 5, it is assumed that the asset is near failure and is considered high priority regardless of the COF rating. The calculated BRE score is then used to prioritize the rehabilitation or replacement tasks.

Level of Service Determination

As a part of the Stormwater AMP, Level of Service (LOS) goals were established for cost effectively maintaining and improving the system. These goals were developed to set achievable objectives for operation and maintenance and capital improvement projects. The LOS selected considers budgetary constraints, customer expectations, and condition of the system. The Village has established a list of attainable goals it intends to meet regarding its storm sewer system. These LOS goals include:

1. Meet all Federal and State stormwater regulations.
2. Re-televise all sewer with a PACP rating of 3 or 4 in years 10-20.
3. Address all known storm defects rated with a structural PoF of 4 or 5 in conjunction with CIP projects or corresponding road projects.
4. Address all known storm manhole defects rated with a structural PoF of 4 or 5 in conjunction with CIP projects or corresponding road projects.
5. Inspect all catch basin sumps on a yearly basis, cleaning any basins that are greater than 50% full of debris.

Revenue Structure

The Village plans to set aside money each year from its operating budget to address recommended projects, cleaning, televising, and operation and maintenance activities identified to meet its LOS goals.

Capital Improvement Plan

Based on the LOS goals and the condition of the stormwater system discovered during condition assessments, recommendations for repairs or maintenance needs were given for sewers and manholes. After first removing recommendations that are scheduled to occur prior to the commencement of a CIP, sewer and manhole recommendations were categorized as a 10-year CIP or a Future Project. Projects included in the 10-year CIP included those pipes and manholes within the areas of 4- and 6-inch cast iron watermain to be replaced over the next decade while all other recommendations were included as a future project. The table below summarizes the total cost to complete the recommended repairs.

Storm System Repair Recommendations

	10-Year CIP	Future Projects
Storm Manholes	$111,200	$42,000
Storm Pipes	$58,400	$100,450
Total	**$169,550**	**$142,450**

Recommendations

Based on the Village's desired LOS goals, it was determined that necessary improvements to defective sewers and manholes will be phased over the course of 20 years. Improvements to the system include sewer, manhole, and lift station rehabilitation. A feasible maintenance schedule was established that aligns with the Village's needs and available resources for sewer televising, manhole location, and assessment.

List of Major Assets

The Village's major assets include:

- 6.4 miles of gravity storm sewer
- 118 manholes
- 269 catch basins
- 28 discharge points
- 1 lift station

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date DECEMBER 2, 2019
(no later than 3 years from executed grant date)

The VILLAGE OF HOMER (Mi) *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1194.01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

ARTHUR E. KALE at 517-568-4321 manager@homermichigan.ORG
Name Phone Number Email

12/2/19
Signature of Authorized Representative (Original Signature Required) Date

ARTHUR E KALE VILLAGE MANAGER
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date DECEMBER 2, 2019
(no later than 3 years from executed grant date)

The VILLAGE OF HOMER *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1194-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: [✓ Yes] or No
   If No - Date of the rate methodology approval letter: ____________.
2) Significant Progress Made: [✓ Yes] or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: NOVEMBER 25, 2019.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on MARCH 7, 2016.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

ARTHUR KALE at (517) 568-4321 MANAGER@HOMERMICHIGAN.ORG
Name Phone Number Email

12-2-19
Signature of Authorized Representative (Original Signature Required) Date

ARTHUR E KALE VILLAGE MGR-HOMER 12-2-19
Print Name and Title of Authorized Representative

April 2017

Village of Homer
Stormwater and Wastewater Asset Management Plan

1. Executive Summary

The Village of Homer was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ). Asset management is a process of operating, maintaining, and upgrading assets cost-effectively. This process provides information to help communities make sound decisions about their capital assets, and identify necessary investments in the utility infrastructure. The grant provided funds for the development of the Asset Management Plan (AMP) for stormwater and wastewater collection systems. The goal is to maintain a satisfactory level of service at the lowest life cycle for the infrastructure asset.

Homer's wastewater collection system currently serves an estimated 1,668 residents. The Village manages approximately 49,500 feet of gravity sewer pipe, associated sewer manholes, three lift stations in the wastewater collection system, and an aerated lagoon wastewater treatment facility that discharges into the South Branch of the Kalamazoo River. The Village also manages a storm drainage system that consists of approximately 32,000 feet of gravity pipe, associated manholes, catch basins, culverts, and outfalls which discharge to various surface waters.

Closed Circuit Television (CCTV) work was performed to gather information on the condition of existing gravity sewers, and National Association of Sewer Service Companies (NASSCO) Manhole Assessment Certification Program (MACP) assessments were performed to gather information on the conditions of existing manholes and catch basins. Approximately 2 miles of the sanitary sewer system (21% of wastewater sewer) was recently televised and reviewed, and most structures in the wastewater and stormwater systems were inspected.

The Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The Village has developed goals within the report such as budgeting for the entire sanitary sewer system to be televised over the next five to ten years, perform yearly cleaning and heavy root cutting in portions of the sanitary sewer system and limited slip-lining where necessary. The Village will also allow room in the budget for replacement and repairs in case of sewer failure events. The intention is to provide the most cost effective plan that meets customer expectations and complies with local, state, and federal regulations. Operations staff will collect measurable data that will be reviewed to determine if the goals are being met, if the goals are still relevant or need to be updated, and whether changes in the system have resulted in the need to add, delete, or modify these goals.

Criticality and Level of Risk were evaluated for each asset in the wastewater system. The most critical assets are those with the highest Probability of Failure (POF) and highest Consequence of Failure (COF), and are the most likely assets that require rehabilitation or replacement. Lower scores indicate that the asset should continue to be monitored and analyzed to develop the best strategy for extending the remaining useful life. The majority of the assets in Homer's wastewater system are shown to have criticality factors below 5, which falls in the low priority range, and therefore, in the lower Level of Risk.

The annual operation and maintenance (O&M) budget includes typical costs associated with operating and maintaining the system for a year. It is recommended that the Village continues to clean and televise the wastewater system on an annual basis and budget for the work accordingly. The projected Sewer Fund Budget which includes Labor, Benefits, Operation and Maintenance (O&M), Reserves, and debt service is estimated to be approximately $420,000 per year.

In addition, the Capital Improvement Plan (CIP) should cover a 20-year period and be updated each year to account for changing conditions. The CIP Projects that are proposed within the report are Sanitary Sewer slip-lining projects every 5 years, completion of the televising and root cutting sanitary sewer of the remaining system, and bi-annual repair of pipe joints identified through the video inspection. These projects are prioritized by criticality and defect ratings. The estimated cost for rehabilitation projects within the wastewater and stormwater systems over the next 5 years is $260,000. Other repairs over the remaining 15-year period are approximately $440,000.

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

EGLE

GRETCHEN WHITMER
GOVERNOR

LIESL EICHLER CLARK
DIRECTOR

November 25, 2019

Mr. Art Kale, Village Manager
Village of Homer
130 East Main Street
P.O. Box 155
Homer, Michigan 49245

Dear Mr. Kale:

SUBJECT: Stormwater, Asset Management, and Wastewater (SAW) Grant Program
Village of Homer
Wastewater and Wastewater Asset Management Plan
SAW Grant Project Number 1194-01

We have reviewed the information contained in the rate methodology dated October 7, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404; or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Mr. Eric Pocan, EGLE

Stormwater and Wastewater
Asset Management Plan

Executive Summary

For

The Village of Homer

PREPARED BY:

CIVICA ENGINEERING PLLC

Village of Homer
130 East Main Street
P.O. Box 155
Homer, Michigan 49245
Art Kale, Village Manager
517-568-4321
SAW Grant Project 1194-01

Stormwater and Wastewater Asset Management Plan

1. Executive Summary

The Village of Homer was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ). Asset management is a process of operating, maintaining, and upgrading assets cost-effectively. This process provides information to help communities make sound decisions about their capital assets, and identify necessary investments in the utility infrastructure. The grant provided funds for the development of the Asset Management Plan (AMP) for stormwater and wastewater collection systems. The goal is to maintain a satisfactory level of service at the lowest life cycle for the infrastructure asset.

Homer's wastewater collection system currently serves an estimated 1,668 residents. The Village manages approximately 49,500 feet of gravity sewer pipe, associated sewer manholes, three lift stations in the wastewater collection system, and an aerated lagoon wastewater treatment facility that discharges into the South Branch of the Kalamazoo River. The Village also manages a storm drainage system that consists of approximately 32,000 feet of gravity pipe, associated manholes, catch basins, culverts, and outfalls which discharge to various surface waters.

Closed Circuit Television (CCTV) work was performed to gather information on the condition of existing gravity sewers, and National Association of Sewer Service Companies (NASSCO) Manhole Assessment Certification Program (MACP) assessments were performed to gather information on the conditions of existing manholes and catch basins. Approximately 2 miles of the sanitary sewer system (21% of wastewater sewer) was recently televised and reviewed, and most structures in the wastewater and stormwater systems were inspected.

The Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The Village has developed goals within the report such as budgeting for the entire sanitary sewer system to be televised over the next five to ten years, perform yearly cleaning and heavy root cutting in portions of the sanitary sewer system and limited slip-lining where necessary. The Village will also allow room in the budget for replacement and repairs in case of sewer failure events. The intention is to provide the most cost effective plan that meets customer expectations and complies with local, state, and federal regulations. Operations staff will collect measurable data that will be reviewed to determine if the goals are being met, if the goals are still relevant or need to be updated, and whether changes in the system have resulted in the need to add, delete, or modify these goals.

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The annual operation and maintenance (O&M) budget includes typical costs associated with operating and maintaining the system for a year. It is recommended that the Village continues to clean and televise the wastewater system on an annual basis and budget for the work accordingly. The projected Sewer Fund Budget which includes Labor, Benefits, Operation and Maintenance (O&M), Reserves, and debt service is estimated to be approximately $420,000 per year.

In addition, the Capital Improvement Plan (CIP) should cover a 20-year period and be updated each year to account for changing conditions. The CIP Projects that are proposed within the report are Sanitary Sewer slip-lining projects every 5 years, completion of the televising and root cutting sanitary sewer of the remaining system, and bi-annual repair of pipe joints identified through the video inspection. These projects are prioritized by criticality and defect ratings. The estimated cost for rehabilitation projects within the wastewater and stormwater systems over the next 5 years is $260,000. Other repairs over the remaining 15-year period are approximately $440,000.

2. Introduction

The Village of Homer's wastewater collection system currently serves an estimated 1,668 residents. The Village manages approximately 49,500 feet of gravity sewer pipe, associated sewer manholes, three lift stations in the wastewater collection system, and an aerated lagoon wastewater treatment facility that discharges into the South Branch of the Kalamazoo River. The Village also manages a storm drainage system that consists of approximately 32,000 feet of gravity pipe, associated manholes, catch basins, culverts, and outfalls which discharge to various surface waters.

Asset inventory is an ongoing process that must be updated periodically. The Village is developing an interactive GIS map and database that can be updated as assets are added or deleted from the asset inventory over time. It will assist the Village in managing, tracking, and organizing assets. The database will include or provide information that answers the basic asset management questions. Most importantly, it will inform a utility as to what the next action is regarding each asset. This may be an assessment such as CCTV, a maintenance activity such as cleaning a line, or a rehabilitation activity such as lining with CIPP. Each of these should also have an estimated cost and projected date.

3. Asset Inventory and Condition Assessment

A. Gravity Mains and Laterals

1) Condition Assessment

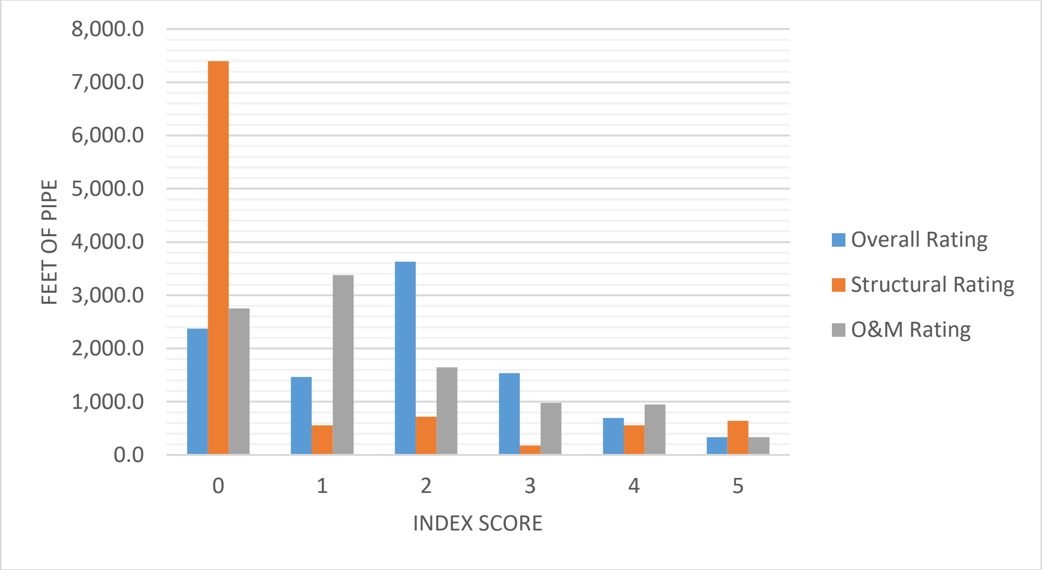
Inspections of sewer mains were conducted on approximately 21% of the wastewater system. (See Table 2)

Table 2. Feet of Gravity Mains Inspected

Asset	Newly Inspected	Total Existing	Percent of Total
Wastewater Gravity Mains	10,566'	49,547'	21.3%

Sewer was televised and Pipeline Assessment Certification Program (PACP) format reports were completed for defects. Structural Pipe Rating Index (SPRI) and Operations & Maintenance Pipe Rating Index (MPRI) scores as well as the Overall Pipe Rating scores were recorded for each pipe segment (See Figure 1 for results). Pipes were ranked on a scale of 0 to 5 where a rating of 0 indicates new or excellent condition and a rating of 5 indicates that failure of the asset will likely to occur within the remaining life cycle. Results showed that more than 75% of the televised sewer had a rating of 2 or lower, indicating only minor deterioration; approximately 15% of the televised sewer had a rating of 3, and less than 10% of the televised sewer had a rating of 4 or 5.

Figure 1. Results of CCTV Inspection of Wastewater Gravity Mains



For pipe segments that were not inspected, an average condition rating was calculated using results from sanitary sewer main inspection of televised sewer pipe by installation year. Table 3 shows the average numerical ranking that was assigned to non-televised wastewater pipe in the system based on installation year.

Table 3. Pipe Condition Assumptions for Non-televised Wastewater Pipe

Installation Year	Length of Non-televised Wastewater Pipe (Ft)	Calculated Average Condition Rating of Wastewater Pipe		
		SPRI	MPRI	Overall
1942	23,365	1.54	0.78	1.18
1967	5,339	0.20	1.61	1.56
1983	9,528	0.30	1.78	1.73

It can be seen in the table above that the average condition rating of non-televised pipe in the wastewater system was less than 2 for all installation years. Condition rating of 2 indicates that there is only minor deterioration in the wastewater pipe.

2) Remaining Useful Life

All assets will eventually reach the end of their remaining useful lives. An asset's Remaining Useful Life (RUL) is determined by subtracting its age from its EEL. Figure 2 shows the RUL for pipes in the wastewater system. Approximately 46% of wastewater pipes are estimated to have only 25 years or less of remaining useful life. Table 4 and Figure 3 summarize the ages of pipes in the wastewater system.

Figure 2. Feet of Wastewater Pipe by RUL

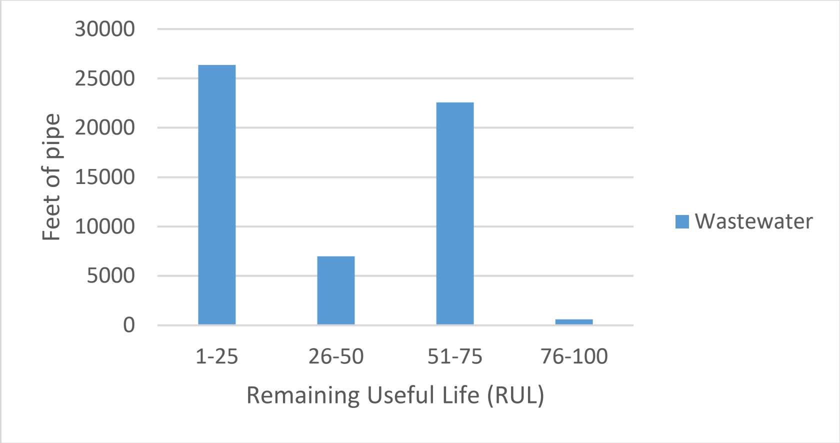
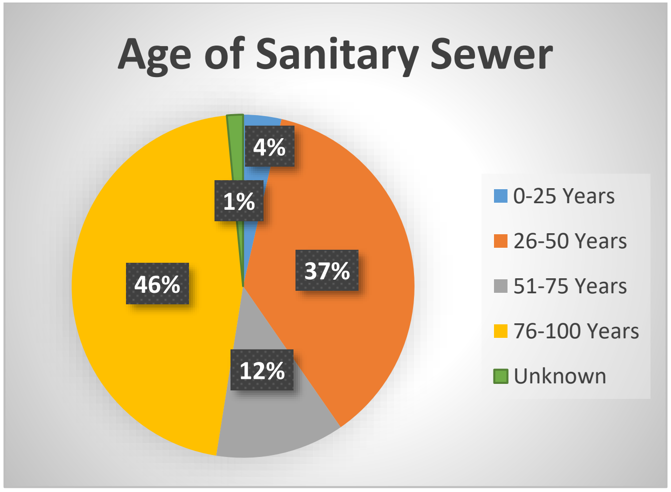


Table 4. Feet of Wastewater Pipe by Installation Year

Asset	Year of Installation								Total
	1942	1967	1977	1978	1983	1994	2012	Unknown	
Feet of Wastewater Gravity Mains	26,376	6,972	1,960	3,269	15,858	1,472	596	871	57,374

Figure 3. Wastewater Pipe by Age Range



B. Lift Stations and Wastewater Treatment Plant

The Village of Homer's wastewater utility consists of a gravity collection system that flows into three lift stations and an aerated lagoon wastewater treatment facility. The Main Lift Station #1 and Lift Station #2 will both be reconstructed in 2020, with new submersible pumps and new construction of a valve chamber and control system. Lift Station #3 is also a submersible station that was built in the mid 2000's to serve a manufacturing facility at the west end of town. Currently, there is not a need for any upgrades to any of these lift stations.

There will also be improvements to the treatment plant in 2020. The improvements at the plant will consist of sludge removal, replacement of the aeration system, repair of the lagoon liners, replacement of the level control system and plant instrumentation, and the investigation, repair, and replacement of sections of inoperable plant piping and valving. The Wastewater Service Lagoon (WWSL) Asset Management Plan is attached.

C. Manholes, Catch Basins, and Outfalls

1) Condition Assessment

Within the Village limits, the sanitary sewer manhole structures and storm structures were inspected using MACP reporting guidelines. Inspection information of the structures can be seen in Figure 4 and Figure 5. The rating system is based on standard PACP defect coding with condition grades ranging from 0 to 5. A rating of 5 is for a structure with the most significant defect and a rating of 1 for only minor defects.

Table 5. Count of Structures Inspected

Asset	Inspected
Wastewater Manholes	177
Stormwater Manholes & Catch Basins	351

Figure 4. Results of MACP Inspection of Wastewater Structures

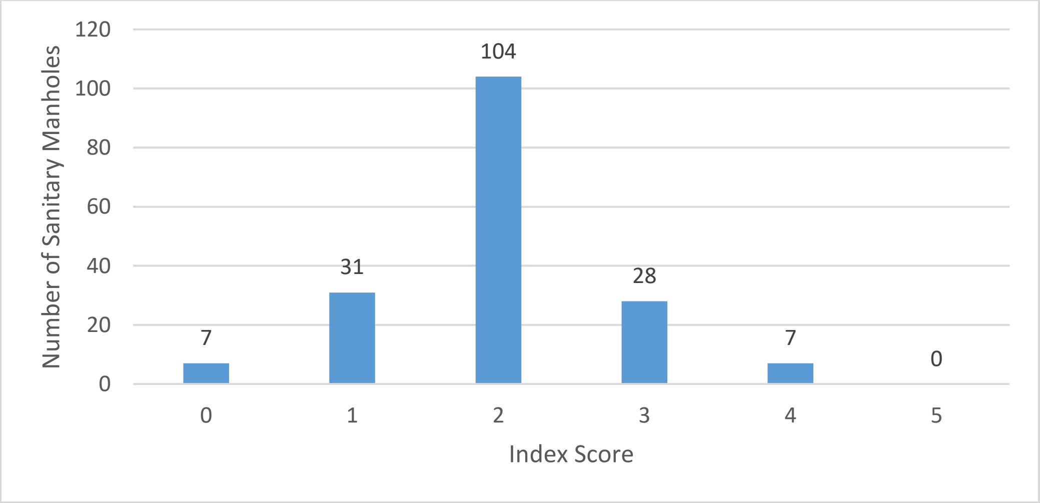
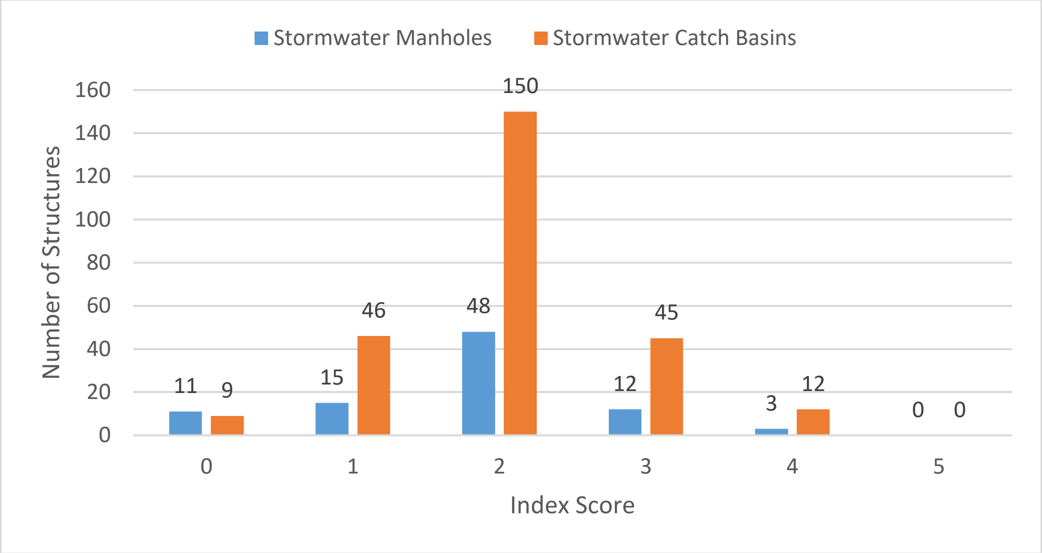


Figure 5. Results of MACP Inspection of Stormwater Structures



2) Remaining Useful Life

Approximately 48% of wastewater manholes are estimated to have 25 years or less of remaining useful life. The RUL may need to be adjusted based on the judgement of professional engineers. Past experience, system knowledge, existing and future conditions, and maintenance practices will dictate ongoing changes/updates to the useful life. A summary of the structures within Village limits is shown in Table 6 and Figures 6 and 7.

Figure 6. Remaining Useful Life of Structures

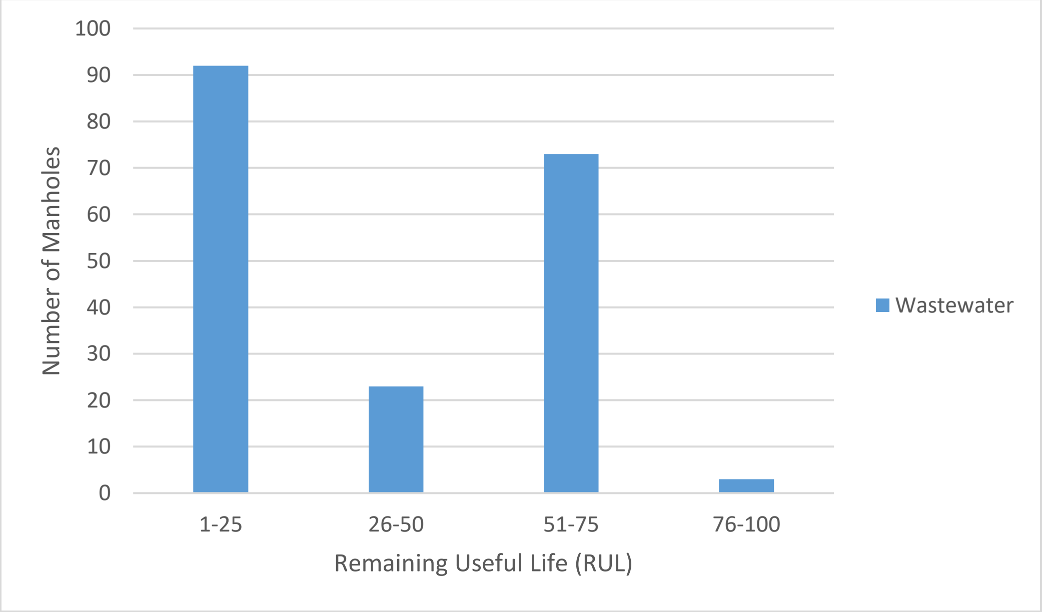
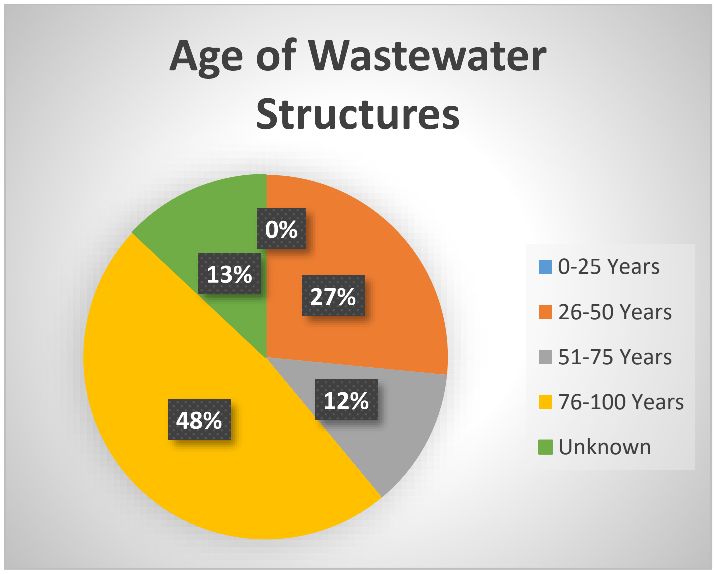


Table 6. Count of Wastewater Structures by Age

Asset	Age in Years					Total
	0-25	26-50	51-75	76-100	Unknown	
Wastewater Manholes	0	47	22	85	23	177

Figure 7. Wastewater Manholes by Age Range



4. Level of Service Goals

Defining the Level of Service (LOS) sets goals for the utility. These goals allow the operations staff to have a better understanding of what is desired from them, and the management has a better understanding of how to use staff and other resources more efficiently and effectively. Based on meetings with the Village staff, the following LOS goals have been developed for each system. These goals can be evaluated based on measurable data. Reviewing how the utility is meeting these LOS goals allows the management to shift resources to operate and maintain the utility's assets most effectively. LOS goals will also help management to prioritize and characterize the system's assets, as well as helping to manage finances.

Table 7. Stormwater Level of Service Goals

Attribute	Objective	Goal	Measurable
Operational	Effective O&M Program – Sewer Pipes	Clean and inspect (PACP CCTV) pipes >75 years old	Annual CCTV Budgeting
Operational Employees and Safety	Effective O&M Program – Manholes and Catch Basins	Clean and inspect manholes and catch basins (MACP)	Maintenance Reports
	Quick response to system failures	Respond to 80% of reported problems or alarms within an hour	Maintenance Reports
	Mark utility locations to prevent damage to the system	Respond to MISSDIG requests within 48 hours	Request Reporting
	Employee Staffing	Maintain adequate staff to meet LOS goals	Number of vacancies & duration to fill positions
Employees and Safety Security	Safe Work Place	No incidents requiring employee down time	Annual worker downtime
	Safe Work Place Maintain secure site and facilities	Zero OSHA violations	# of OSHA violations
		Monitor frequency and address deficiencies	# of vandalism/theft incidents
Customer Relations and Business Practices	Minimize Flooding	Zero incidents per year	# of incidents
Revenue	Secure funding for budget requirements	Annual budgeting from the general fund	Yes or No

Table 8. Wastewater Level of Service Goals

Attribute	Objective	Goal	Measurable
Regulatory Compliance	Protect Kalamazoo River	No exceedances of NPDS permit requirements	NPDES Permit Limits
	Convey all sewage generated by customers	Zero SSO's for less than 25-year/24-hr storm	Basement backups/SSO's
Operational	Effective O&M Program	Clean and inspect (PACP CCTV) pipes >75 years old	Annual CCTV Budgeting
	Quick response to system failures	Respond to 80% of reported problems or alarms within an hour	Maintenance Reports

	Mark utility locations to prevent damage to the system	Respond to MISSDIG requests within 48 hours	Request Reporting
Employees and Safety	Employee Staffing	Maintain adequate staff to meet LOS goals	Number of vacancies & duration to fill positions
	Employee Training	All licensed staff earn required CEC's in license renewal cycle	Continuing education credits
	Safe Work Place	No incidents requiring employee down time	Annual worker downtime
		Zero OSHA violations	# of OSHA violations
Security	Maintain secure site and facilities	Monitor frequency and address deficiencies	# of vandalism/theft incidents
Customer Relations and Business Practices	Minimize Odors	Zero incidents per year	# of incidents
	Engage customers and decision makers	Two outreach events/publications per year	# of outreach events/publications
Revenue	Secure funding for budget requirements	Maintain rate structure to meet OM&R and CIP	Yes or No

5. Asset Criticality

A. Overview

In determining criticality of assets, two questions are important. How likely is it that the asset will fail, and what is the consequence of failure? The Probability and Consequence of Failure will allow a utility to manage its risk and aid in determining appropriate distribution of maintenance dollars and plan for capital expenditures. The most critical assets will have the highest Probability of Failure (POF) and the highest Consequence of Failure (COF).

B. Assessing Criticality

Assessing criticality requires the examination of the Probability of Failure (POF) and the Consequence of Failure (COF) as discussed above. The Criticality Factor is calculated by multiplying the POF by the COF. Assets with the highest Criticality Factor score should have the highest priority for rehabilitation or replacement. Assets with lower scores should be analyzed to develop the best life cycle strategy. The goal is to use the risk data to maximize the useful life before investing in replacement. The Criticality Factor scores are shown in the Score Priority Matrix below.

Table 9. Criticality Factor Score Priority Matrix

Consequence of Failure (COF)

5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5
	1	2	3	4	5

Probability of Failure (POF)

Criticality Factor = POF x COF

Typically, items with a Criticality Factor score of 15-25 are high priority, 6-14 are medium priority and 1-5 are low priority. The criticality analysis is an on-going process as the condition of the asset will change over time as will the consequences related to failure.

C. Major Variables

1) Useful Life

Remaining Useful Life (RUL) is calculated by dividing the age of the asset by its Estimated Effective Life (EEL). Age is determined using record drawings and the EEL is determined based on an asset’s type and material of construction. EEL may be adjusted based on condition and maintenance on the asset.

2) Probability of Failure

The likelihood that a given asset will fail is the Probability of Failure (POF) as discussed in the previous section. Each asset is given a ranking for POF. The POF score is based on the asset’s current condition, age, and history of failure. Each of the factors is given a weight so that the total for all factors equals 5. Each condition rating is divided by 5 to get a value which is than multiplied by the asset’s weight.

The POF Rating is calculated using the following formula.

POF = (Age ÷ EEL)*3 + (Maintenance Rating ÷ 5)*0.75 + (Structural Rating ÷ 5)*1.25

Table 10. Probability of Failure Factor Ratings and Weights

Factors	Weight	Rating	Description
Percent Consumed	3	Varies between 0 and 1	Age ÷ EEL
Maintenance Condition	0.75	1	Excellent
		2	Good
		3	Fair
		4	Poor
		5	Failure Imminent
Structural Condition	1.25	1	Excellent
		2	Good
		3	Fair
		4	Poor
		5	Failure Imminent

3) Consequence of Failure

The Consequence of Failure (COF) is calculated similar to the Probability of Failure (POF). The calculation takes into consideration factors that affect the financial cost, health cost, and human safety. It is important to consider cost of repair, social cost associated with the loss of the asset, repair/replacement costs related to collateral damage, legal costs related to additional damage, environmental costs created by the failure, loss of business revenue to the community, and other associated costs or asset losses. Pipe depth, pipe diameter, and proximity to buildings and roadways are factors used to calculate the COF. Each variable is assigned a value that is multiplied by an asset's factor weight. A higher value for the COF indicates a more severe consequence. The table below shows the factors used to evaluate COF. The COF Rating is calculated using the following formula.

COF = (Depth Value * 1.5) + (Diameter Value * 1.5) + (Buildings Value * 0.75) + (Roadway Value * 1.25)

Table 11. Wastewater Pipe COF Factor Values and Weights

Factors	Weights	Value	Variable
Depth of Pipe	1.5	0.1	Depth ≤ 8 feet
		0.3	8 < depth ≤ 15 feet
		1.0	Depth > 15 feet
Pipe Diameter	1.5	0.1	Size ≤ 8 inches
		0.3	8 < Size ≤ 12 inches

		1.0	Size > 12 inches
Proximity to Buildings			
	0.75	0.0	More than 20 feet from a building
		0.5	Within 20 feet of a building
		1.0	Under a building
Proximity to Roadway	1.25	0.0	Outside of ROW
		0.2	Pipe is within ROW of minor road or in alley
		0.3	Pipe is within ROW of major road
		0.8	Pipe is under pavement of minor road
		1.0	Pipe is under pavement of major road or in ravine
Total	5		

Table 12. Structure COF Factor Values and Weights

Factors	Weights	Value	Variable
Depth of Structure	2	0.1	Depth ≤ 8 feet
		0.3	8 < depth ≤ 15 feet
		1.0	Depth > 15 feet
Proximity to Buildings	1.25	0.0	More than 20 feet from a building
		0.5	Within 20 feet of a building
		1.0	Under a Building
Proximity to Roadway	1.75	0.0	Outside of ROW
		0.2	Pipe is within ROW of minor road or alley
		0.3	Pipe is within ROW of major road
		0.8	Pipe is under pavement of minor road
		1.0	Pipe is under pavement of major road
Total	5		

D. Gravity Mains and Laterals

1) Probability and Consequence of Failure

Each pipe segment has been given a score for Probability and Consequence of Failure that is used to calculate a Criticality Factor. All of the televised wastewater pipe in Homer's system has a POF and COF less than 4. Scores were calculated using the weights and values shown in Tables 10 and 11.

2) Criticality Factor

Typically an asset falling in the criticality range from 1 to 5 will not be considered critical. An asset falling in the criticality range of 6 to 14 will be important, but not critical. An asset with a criticality factor above 15 will be considered critical. A Criticality Factor was calculated for each televised sanitary sewer pipe. Results showed that the majority of televised wastewater pipe in Homer’s system has a Criticality Factor less than or equal to 5, which is in the low priority range.

E. Manholes, Catch Basins, and Outfalls

1) Probability and Consequence of Failure

The Probability and Consequence of Failure has been calculated for each structure. All of the inspected structures in Homer’s system have a POF less than 4, and a COF less than or equal to 2. These scores were calculated using the weights and values as detailed in Table 12.

2) Criticality Factor

A Criticality Factor was calculated for each wastewater structure in the system. The majority of wastewater structures have a Criticality Factor less than 9, and are found in the low to medium priority range. Therefore, the wastewater structures found in this range are important, but not critical.

6. Revenue Structure

Methodologies are used to determine how revenue is generated to help fund rehabilitation or replacement of assets. The fixed rate methodology can be used to determine rates and charges to generate revenues to cover generally fixed costs that occur such as operation, maintenance, and replacement of assets. The billable flow methodology can be used to generate revenue through a commodity rate based on consumer usage to cover variable costs based on flow, such as utility consumption for a lift station or WWTP expenses. When using a fixed and variable methodology, revenue is generated from two sources, the fixed unit for the source and a commodity rate.

The rates and charges for the users will be reviewed to be sure that there is sufficient revenue to cover all of the expenses. Temporary subsidies may be necessary on occasion when there are unexpected expenses, but if there is a continuous use of subsidies, a rate increase would be necessary to avoid a deficit in the budget.

The Village is in the process of completing a Rural Development project which included the rehabilitation of two lift stations and improvements to the wastewater treatment plant. As part of this project, the sewer rates were reviewed and adjusted to meet the debt obligations.

A. Operation and Maintenance (O&M) Budget

The annual operation and maintenance (O&M) budget includes typical costs associated with operating and maintaining the system for a year. Excluded from this budget are any major capital improvements that are needed to increase capacity or replace items with a useful life of more than 20 years. Included in the budget are the costs associated with personnel, energy use, supplies, etc. The budget needs to account for the inflation of cost, wages, and utility charges.

1) Recommended Future Sewer Cleaning and Televising

   Due to the cost and time required to perform cleaning and televising of sewers, much of the collection system was not initially included in the SAW Grant inspection program. Additionally, some inspections were attempted, but were unable to be completed due to excess debris, sediment in the pipes, or large defects. Due to the age of the systems, it is recommended that the Village continue cleaning and televising wastewater sewers on a bi-annual basis and budget for work accordingly.

2) Recommended Future Slip-Lining of Wastewater Pipes with Cured-in-Place Pipes

   It was discovered in the CCTV reports that certain wastewater pipes in the system were not able to be televised due to roots or damage to the pipe. It is recommended that these wastewater pipes with critical condition ratings utilize the process of slip-lining with the Cured-in-Place Pipes (CIPP). The CIPP process is suited for wastewater pipe repair and rehabilitation of sanitary sewers. CIPP is a jointless pipe-within-a-pipe rehabilitation of pipelines ranging in diameter from 6-96 inches. This process also has the capability to negotiate bends. CIPP restores structural integrity to damaged sewer pipes, reduces infiltration, eliminates leakage from the system, and improves flow capacity through the wastewater pipe. Slip-lining of a pipe with heavy cleaning/root cutting is approximately $45-$50 per foot for a typical 8-inch sanitary sewer main. This includes bypass pumping of that sewer line. Slip-lining is an economical and efficient way to make improvements to the wastewater system.

B. Replacement Fund

The rate methodology should include a replacement schedule for short-lived assets. The breakdown will identify items owned by the utility that have a useful life of 20 years or less and contain moving parts. The replacement items will appear in the asset inventory, but should have a dedicated funding source due to their limited useful life and importance. On an annual basis, replacement funds are set aside and saved until needed. Once a particular item fails, money is drawn from the replacement fund to replace the failed item without having to disrupt the normal operating budget.

Most of the time, it is not known when any asset will need to be repaired or replaced. Because of that, the repair and rehabilitation costs were divided into the expected remaining life of the assets to determine how much money should be set aside. The amount should be set aside each year, so that when a repair is needed, the funds are available without having to borrow money for the expense. The replacement schedule can be reviewed and amended annually for budgeting purposes.

1) Recommended Budget for Short-Lived Assets

The WWSL and lift stations are typically comprised of parts that have shorter EEL. The Village recently made improvements to the Lift Stations and therefore budgeting for short-lived assets within the Lift Stations is not necessary at this time. The WWSL has also recently been improved. See the attached WWSL Asset Management Plan that discusses the recommended budget for short-lived assets within the WWSL.

7. Capital Improvement Plan and Long-Term Funding

A. Introduction

A long-term Capital Improvement Plan (CIP) should look at the utility's needs for the future, typically over a period of at least 20 years, both near and long-term. The specific expenditures and needs of the utility in the later years are more speculative than the needs for the first 5 years, but it is important to include the needs for the longer time period in order to provide a better opportunity for the utility to ensure that the whole system is evaluated comprehensively and allows for proper budgeting. Capital improvement projects are typically projects that the utility has an extended period of time to plan for and are projects that usually have higher costs and non-recurring items.

There are many categories of capital improvements that must be considered to develop projects and a plan. The following items need to be considered:

- Capital Needs related to future/upcoming regulations
- Capital Needs related to major asset replacement
- Capital Needs related to the expansion of the system
- Capital Needs related to the consolidation of the system
- Capital Needs related to improvements in technology

B. Funding for Capital Improvements Projects

To prepare to fund any of the CIP projects, the scope of work and projected costs need to be identified. Once costs are known, the utility could choose to begin to set money aside to fund future projects. The Capital Improvement Fund could be funded on an annual basis and the accumulated Capital Improvement Fund monies can be used to supplement bonding for the particular project, act as a down payment, or cover the entire cost of the project as determined by the utility. Clear identification of the project, its cost, and the intended timeframe provides a solid strategy for setting aside enough funds for the project. It is also helpful to have the following information when prioritizing and gaining support of a CIP:

- Project Description
- Project Length
- Estimated cost
- Funding sources considered

The plan should be updated every year in order to have a future project list into at least the next ten years. Annual review of the project list can indicate that some projects may be delayed for several years or may need to be constructed sooner than planned due to changing conditions.

Some of the expenses related to the CIP may be funded out of the system's revenues rather than outside sources. If revenues are to be used, the budgets and rates must reflect the costs.

C. Recommended CIP Projects

The following is a list of recommended CIP Projects for the Village of Homer wastewater and stormwater systems. Project cost estimates and anticipated project schedule for construction are listed below.

1) Sanitary sewer televising and root cutting of system.

Project Cost Estimate: $40,000.00

Anticipated Project Schedule for Construction: Over the next 4 years. (2022, 2024)

Source of Funding: Sewer Fund

Project Summary: Heavy cleaning and televising of the sanitary sewer system. Identification of future slip lining and joint repair projects.

2) Slip-lining sanitary sewer every 5 years

Project Cost Estimate: $200,000

Anticipated Project Schedule for Construction: Every 5 years beginning in 2025

Source of Funding: Sewer Operating Revenue

Project Summary: Slip lining of approximately 2,000 lft of sewer main every five years. Projects to be identified after entire sewer system has been cleaned and televised.

3) Sanitary Sewer Joint Repair

Project Cost Estimate: $10,000 bi-annually

Anticipated Project Schedule for Construction: Bi-annually

Source of Funding: Sewer Operating Revenue

Project Summary: The DPW will budget for joint repair of off set and broken joints. Either in anticipation of slip lining projects or specific joints within the system needing repair in lines that otherwise are in satisfactory condition.

D. Long Term Funding Strategy

The Village has prepared for the capital and operational costs identified in this report over the short and long term. The Village will enact a rate increase over the next three years as recommended in the Final Analysis of the Rate Study. The base fee for a typical residence will increase from $64.00 per quarter to $78.60 per quarter and the commodity charge will increase from $3.35 per 1,000 gallons to $4.20 per 1,000 gallons.

The proposed net revenues provide additional funds to address the remaining recommended CIP projects and other unexpected needs.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 16, 2019**
(no later than 3 years from executed grant date)

The Village of Eau Claire, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1198-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. John Glassman at **(269) 461-6173** **ecclerk@sbcglobal.net**
Name Phone Number Email

12-16-19
Signature of Authorized Representative (Original Signature Required) Date

Mr. John Glassman, Village President
Print Name and Title of Authorized Representative

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date __12/31/19__
(no later than 3 years from executed grant date)

The Village of Eau Claire, Michigan *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1198-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Mr. John Glassman at *(269) 461-6173* *ecclerk@sbcglobal.net*
Phone Number Email

12-16-19
Signature of Authorized Representative (Original Signature Required) Date

John Glassman; Village President
Print Name and Title of Authorized Representative

WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Eau Claire, Michigan

Storm Water System

Date: December 16, 2019
To: Mr. David Worthington
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Village of Lawton: Summary of Storm Water Asset Management Plan

Grantee Information:
Village of Eau Claire
6625 E. Main St.
Eau Claire, MI 49111
Ms. Shawn Foster: ecclerk@sbcglobal.net
Mr. John Glassman; President
Ph: (269) 461-6173
SAW Project #: 1198-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP)

1) Asset Inventory and Condition Assessment
2) Level of Service
3) Criticality of Assets
4) Capital Improvement Plan
5) Asset Management Financial Plan and Revenue Structure

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS)

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$299,000	$116,000	$415,000

Stormwater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The Village maintains a stormwater collection system consisting of approximately 1.9 miles of gravity storm sewer, 41 sewer inlets and 47 storm sewer manholes. Several collection mains are connected to various downstream storm sewers owned and maintained by the Berrien County Drain Commission (BCDC). The collection system discharges the collected stormwater at 10 outlets connected to Berrien County drains or creeks throughout the Village.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all storm water system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the storm water collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the storm water collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.
Table 1 contains a summary of the storm water system assets identified.

Item	Quantity	Units
60-inch Storm Sewer	238	LF
24-inch Storm Sewer	275	LF
21-inch Storm Sewer	35	LF
18-inch Storm Sewer	758	LF
15-inch Storm Sewer	1,846	LF
12-inch Storm Sewer	1,637	LF
10-inch Storm Sewer	1,524	LF
8-inch Storm Sewer	256	LF

Storm Sewer, Unknown Size	768	LF
Stormwater Culverts, Various Sizes	680	EA
4-foot Diameter Storm Manhole	47	EA
Stormwater Inlet Structure	41	EA
Stormwater Discharge Point	10	EA

Table 1 – Storm water system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman performed limited conditional assessments on the manholes and inlet structures within the storm water collection system, including photographing them, as depicted in Figure 1. In addition, a large portion of the gravity storm piping was inspected using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging[1]. CCTV services were provided by Corby Energy Services, Inc (CES). All the CCTV videos and pipe reports and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

During the field inspections discussed above, any manhole and/or pipe defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.
The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, the gravity storm sewer piping was televised by CES. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the

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[1] Pipes connected to manholes which could not be located in the field or opened were not televised.

individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman employees using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology.

Figure 2 and Figure 3 show the condition ratings for the storm water gravity main piping and the storm water structures (respectively).

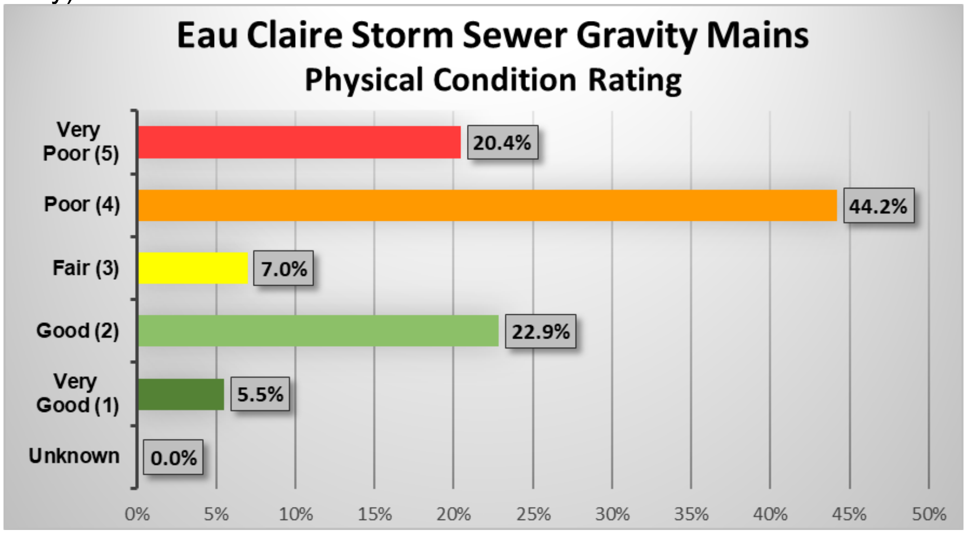

Figure 1 - Storm sewer gravity main physical condition rating

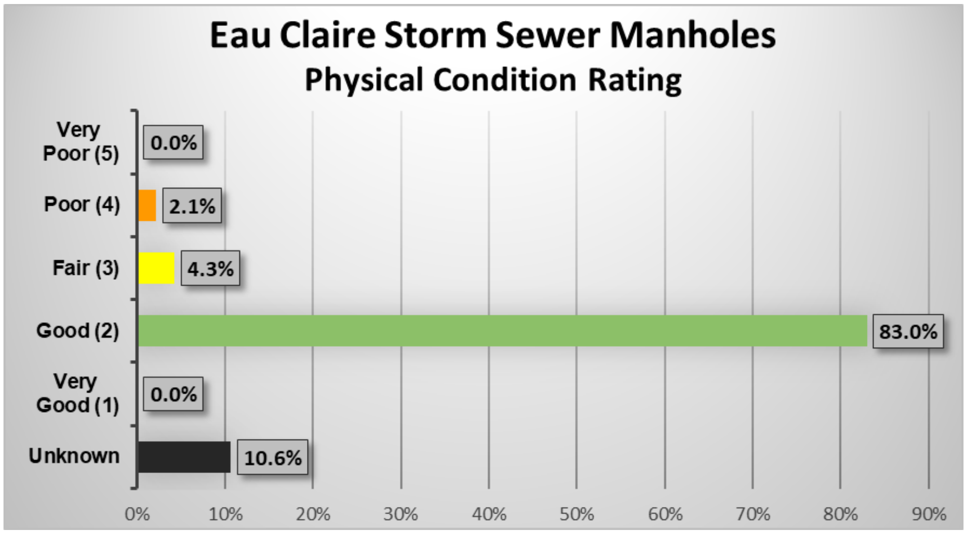

Figure 2 – Storm water structure physical condition rating

There is a significant amount of storm sewer manholes with unknown physical condition. This is due to an inability to locate these assets in the field or if found, they were unable to be opened. These assets are assumed to be in a similar condition to other assets installed at a similar time.

A. Remaining Useful Life

Remaining useful life estimation is another method commonly used to characterize the condition of assets – especially those assets that were not physically assessed (such as by visual inspection or utilizing CCTV inspection). Remaining useful life is defined as an estimate of the duration of time remaining until an unacceptable condition exists or an asset no longer meets its primary function. It does not mean that the asset will fail at that point in time, but rather that replacement of the asset should be budgeted for due to rising maintenance costs, inability to find replacement parts, increased unreliability, and/or the potential for failure.

Remaining useful life for storm sewers is dependent on the materials used in construction. Storm sewer pipe materials have evolved over the years. Early piping was generally constructed of brick and non-reinforced concrete and transitioned over the years to corrugated metal, clay, and reinforced concrete. Most storm sewers constructed today typically use reinforced concrete, plastic (truss pipe), high-density polyethylene (HDPE), and polyvinyl chloride (PVC) piping. Early manholes and inlet structures were generally constructed of bricks, cast-in-place concrete, or segmented block and transitioned over the years to precast reinforced concrete.
Figure 4 shows the percentages of the various pipe materials that are present in the gravity sewers throughout the storm water collection system. The pipe materials of construction are included as an attribute in each asset's entry in the electronic GIS mapping database.

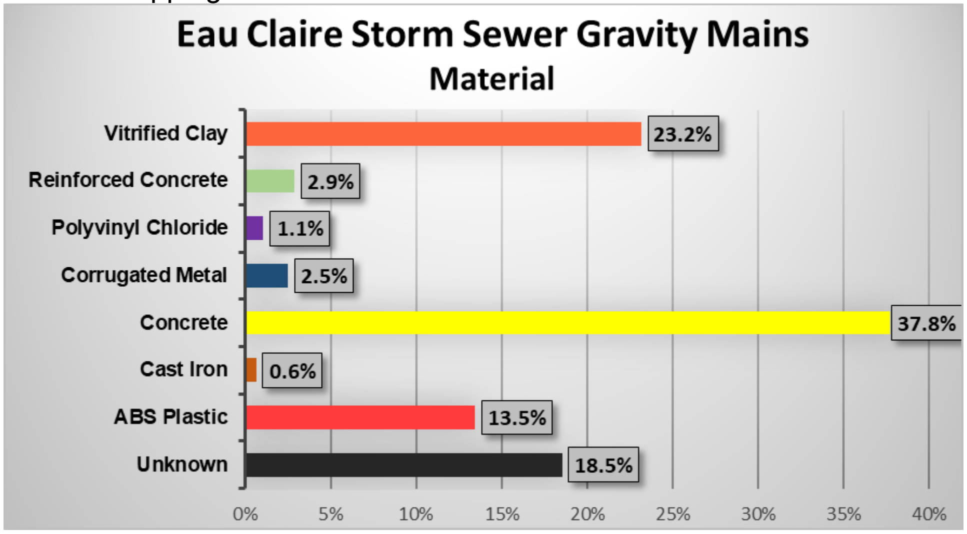

Figure 3 - Storm sewer gravity main pipe materials

There are several methods utilized to estimate the remaining useful life of an asset:

- The simplest method uses a typical useful life table, which lists the estimated total life of an asset type from its first day of use to when it is estimated to fail to function. Based upon the actual age of the asset, the remaining useful life is calculated. This method does not consider the current condition of the asset or any other factors.
- A second method utilizes a typical useful life table as well but applies a factor to the calculation based upon the current condition of the asset.
- A third method utilizes actual decay curves based upon the maintenance and failure experience of a specific asset or asset class for the utility in question. This is the most accurate method. However, most utilities do not have the historical data necessary to develop the decay curves.

Determining the useful life of an asset is as much art as it is science. For this AMP, the remaining useful life has been calculated using the second method discussed above – a typical useful life table modified by current condition factors. Table 3 presents the typical useful lives for the asset types included in the storm water system.

Asset Type	Typical Useful Life (years)
Gravity Sewer Pipe (HDPE, PVC, Truss Pipe, Vitrified Clay)	100
Gravity Sewer Pipe (ABS Plastic, Concrete, Brick)	75
Gravity Sewer Pipe (Corrugated Metal)	50
Manholes/Concrete Structures	80
Outfalls	75
Land	Unlimited

Table 3 - Typical useful lives for storm water assets

Remaining useful life values are typically increased or decreased for each specific asset based upon industry-standard specifications for materials and components.

<u>Level of Service Determination:</u> *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the storm water system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 4 to define the desired level of service for the storm water system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the environment.	Regular safety meetings – monthly at a minimum. No MIOSHA safety violations.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within 1 day and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within 1 hours at all times and non-emergency calls within 1 day during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from the EGLE to all affected staff.

Collection System	Maintain the gravity sewers in good operating condition and prevent overflows and system back-ups.	Gravity storm sewers will be cleaned on a rotational basis such that 5% of the system is cleaned annually resulting in the entire system being cleaned every 20 years.

Table 4 - Level of service statements

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

B. Likelihood of Failure

For assets that were physically inspected, including gravity storm sewers and storm manholes, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 5. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 5.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 5 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

C. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a storm water asset, social costs and/or the costs of collateral damage caused by the failure can even outweigh the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 6.

Consequence of Failure Rating	Social Effects	Collateral Damage Effects
1 (Insignificant)	Minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	Minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	Limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	Moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	Extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 6 - Consequence of failure rating scheme for storm water assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the storm water system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the storm water collection system is shown in Figure 5 and Figure 6 below.

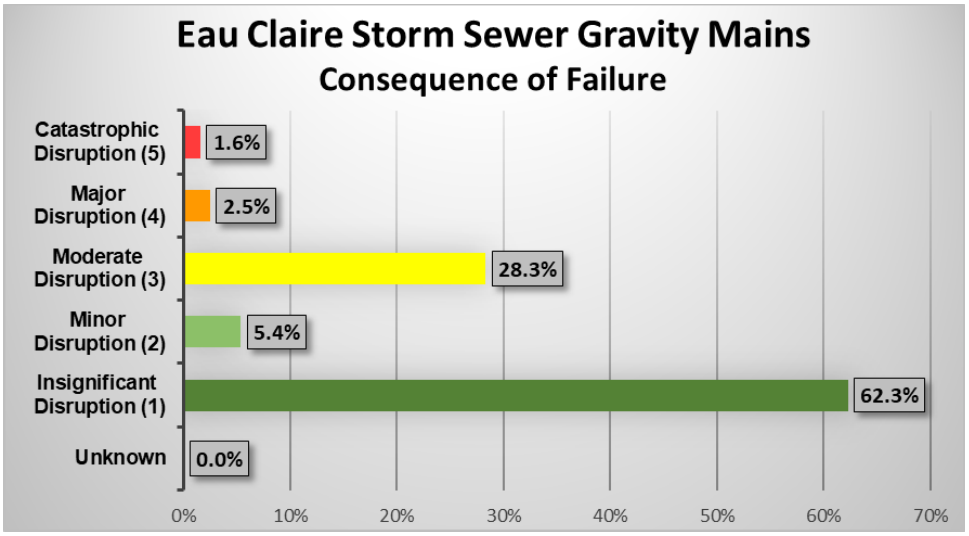

Figure 4 – Storm sewer gravity main consequence of failure rating

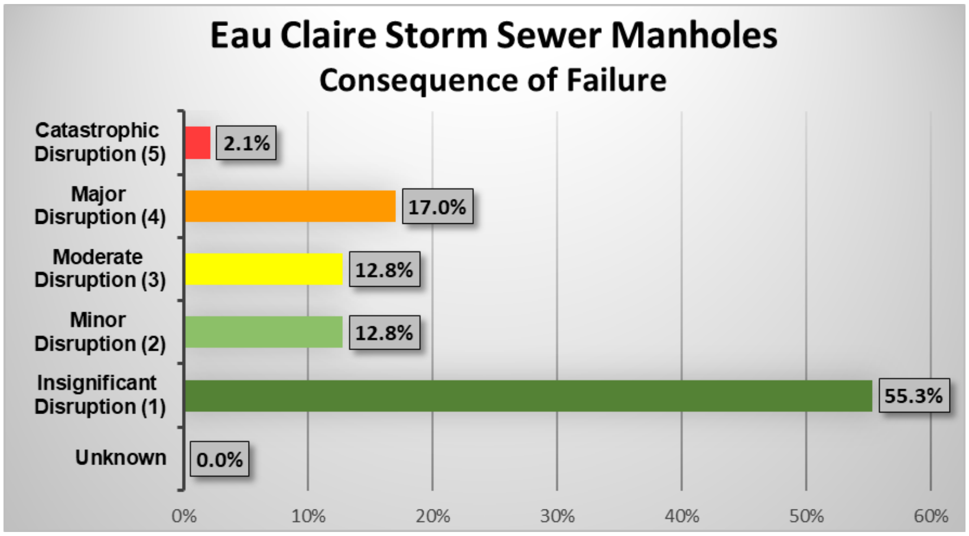

Figure 5 – Storm sewer manhole consequence of failure rating

D. Criticality Maps

As previously discussed, the criticality of each asset was calculated by multiplying the condition rating corresponding to the likelihood of failure of the asset by the consequence of failure rating of the asset. As such, the range of criticality numbers that can be assigned to an asset is 1 to 25 with the criticality of the asset increasing the higher the number assigned to it, as shown in Table 7. The resulting criticality of each asset is included as an attribute for that asset in the GIS mapping database. A map of the storm water collection system showing asset criticality is included in Appendix D and the criticality of the gravity mains and manholes are further illustrated in Figure 7 and Figure 8, respectively.

The stormwater gravity mains with a “High” criticality rating are located either near the discharge point in a line, or very close to or under a building. Failures in either of these cases would result in significant damage and/or safety risk to surrounding facilities.

Criticality Rating	Criticality Description
1 to 5	Very Low
6 to 10	Low
11 to 15	Moderate
16 to 20	High
21 to 25	Very High

Table 7 - Criticality rating descriptions

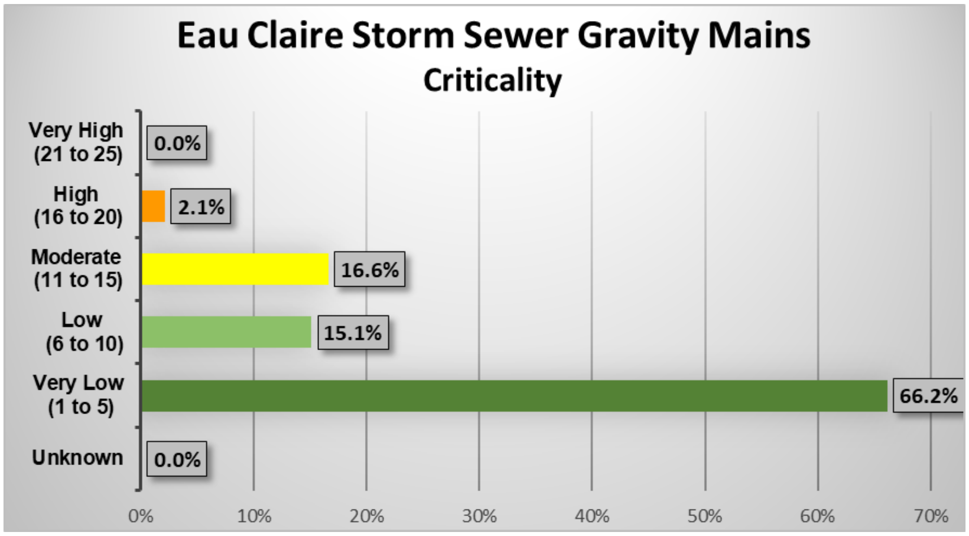

Figure 6 - Storm sewer gravity main criticality rating

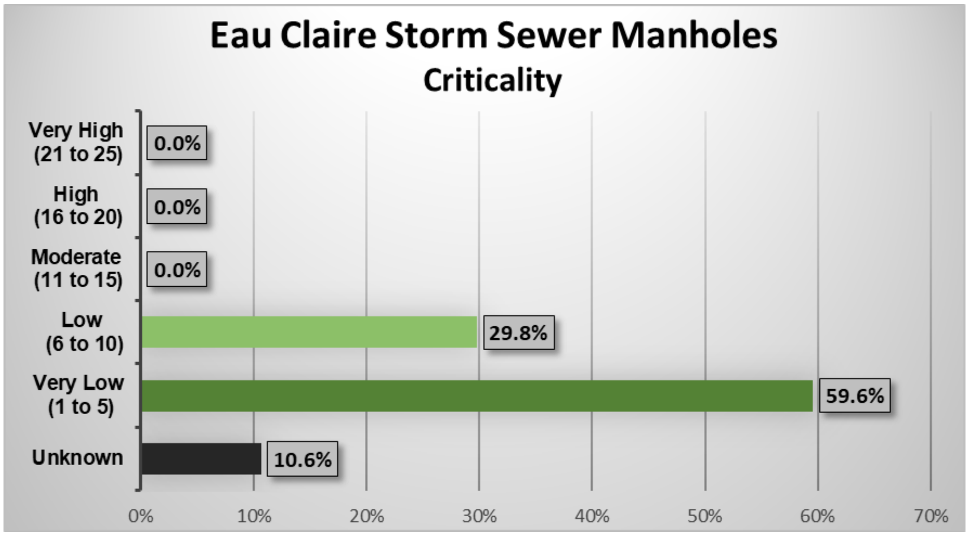

Figure 7 - Storm sewer manhole criticality rating

While the criticality ratings provide a point of reference to help in determining issues that may need to be addressed, it is only a tool. Sound engineering judgement still needs to be applied to determine if there is an issue with an asset that needs to be addressed by a capital improvement project. A low criticality number does not necessarily mean that there is not an issue that should be addressed by a capital improvement project. For example, if a segment of pipe has a hole in it with soil visible, it is graded as a Level 5 defect with a likelihood of failure of Very Poor. If this defect occurred on a segment of pipe with a Level 1 consequence of failure, it would result in a criticality rating of 5, Very Low. That does not mean, however, that this defect does not need to be addressed. It may just be a lower priority for being addressed than other defects with higher criticality ratings.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

As previously mentioned, one of the primary goals of an AMP is to develop a long-term plan for revenues capable of supporting the required capital improvements in addition to routine O&M costs. However, unlike a sanitary sewer AMP, where a source of revenue exists from sanitary sewer user fees, stormwater systems have no separate stream of revenue. Improvements to the stormwater system are usually funded as a part of a street improvement project and routine O&M costs are covered in the day-to-day operations of the Village. As such, an in-depth asset management financial review (AMFR) cannot be conducted and a revenue structure cannot be developed for the stormwater system.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

E. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

F. Recommended Storm Water System Projects

Table 8 lists the recommended capital improvement projects over the next 20 years for the storm water collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 8 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 8 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Various Spot Repairs	$ 16,000.00
2	2023	Main Street Spot Repairs	$ 34,000.00
3	2025	Replace Sections of Storm Sewer under Main Street	$ 41,000.00
4	2030	Replace Sewer in 4th Street Easement	$ 49,000.00
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 140,000.00
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) =	$ 159,000.00

Table 8 - Recommended storm water system capital improvement projects

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

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Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Eau Claire, Michigan

Wastewater Sewer System

Date: December 16, 2019
To: Mr. David Worthington
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Village of Lawton: Summary of Wastewater Asset Management Plan

Grantee Information:
Village of Eau Claire
6625 E. Main St.
Eau Claire, MI 49111
Ms. Shawn Foster: ecclerk@sbcglobal.net
Mr. John Glassman; President
Ph: (269) 461-6173
SAW Project #: 1198-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable.   List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service.   The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$299,000	$116,000	$415,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

Eau Claire owns and operates a wastewater collection and treatment system consisting of approximately 0.4 miles of 12-inch sanitary sewer, 1.1 miles of 10-inch sanitary sewer, 3.6 miles of 8-inch sanitary sewer and about 300 feet of sanitary sewer of unknown size. Aside from 550 feet of 8-inch Polyvinyl Chloride (PVC) pipe, all of the gravity mains are vitrified clay pipe (VCP). The gravity mains feed to two lift stations operating in series to pump effluent through approximately 0.7 miles of 6-inch forcemain, 0.2 miles of 4-inch forcemain, and 0.4 miles of forcemain of unknown size. All of the force mains are cast iron pipe.

The Village utilizes wastewater treatment lagoons (WWTL) for treatment. Two cells of the lagoons were originally built in 1966, while the third was added in 1984.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the wastewater collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.
Table 1 contains a summary of the wastewater system assets identified.

Item	Quantity	Units
12-inch Sanitary Sewer	1,983	LF
10-inch Sanitary Sewer	5,656	LF
8-inch Sanitary Sewer	19,971	LF
Sanitary Sewer, Size Unknown	235	LF
4-foot Diameter Sanitary Manhole	118	EA
Service Lead, Complete	260	EA
Lift Station – Less than 500 GPM	2	EA
Backup Generator – 70 kW	1	EA
Backup Generator – 30 kW	1	EA
Bypass Pump – Less than 500 GPM	1	EA
6-inch Force Main	3,572	LF
4-inch Force Main	1,102	LF
Force Main, Unknown Size	1,879	LF
Air Release Valve	1	EA

Table 1 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Manholes were visually assessed and photographed by Wightman staff as depicted in Figure 1 through Figure 1. The gravity sewer piping was inspected using closed-circuit televising (CCTV) equipment designed for use in sewer pipes. CCTV services were provided by Corby Energy Services, Inc. (CES). All the CCTV videos and pipe reports and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets previously discussed.

Both lift stations owned and maintained by the Village were inspected in detail and the equipment was assessed by Wightman staff, including drawdown testing to determine the current condition of the pumping equipment and photographing the various assets comprising the lift station. Examples of some of these pictures are shown in Figure 1 through Figure 4. All photographs taken by Wightman employees are attached to the lift station assets in the GIS map and are accessible via the computer and tablets previously discussed.

The lagoons were also inspected in detail by Wightman employees including lagoon sludge judging and photographing the various assets comprising the treatment system. As with other wastewater system assets, all photographs taken by Wightman employees are attached to the treatment lagoon assets in the GIS map and are accessible via the computer and tablets discussed previously.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all collection system assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 1 - NASSCO conditional assessment system

<u>Level of Service Determination:</u> *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Village desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Village deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 6 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	
Health and Safety	Provide a safe and injury free workplace. Protect the public health. Protect the environment.	Regular safety meetings – monthly at a minimum.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked and secured at all times. WWTL fenced and padlocked at all times
Operator Certification	Provisions for appropriately credentialed and experienced operators. Provide opportunities for on-going professional development.	A minimum L1 operator's license is required by at least one facility operator. Budget for and allow employees to attend professional training or continuing education

		every year as necessary to maintain appropriate licenses.
Administrative	Provide excellent customer service.	Produce accurate, timely billing.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within one day and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within two hours at all times and non-emergency calls within one business day during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from EGLE to all affected staff.

Table 2 - Level of service statements

Major Area	Goals and Objectives	Level of Service Statements
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – annually at a minimum. Enforce provisions of wastewater ordinances.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are sufficient to meet wastewater budget annually. Review sewer rates annually.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of twelve months' operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Backup generators shall be available for use at all lift stations. Generators shall be maintained in accordance with manufacturer's recommendations.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Force mains. Air release valves. Manholes and Structures	Gravity sanitary sewers will be cleaned on a rotational basis such that 10% of the system is cleaned annually resulting in the entire system being cleaned every 10 years. Flow will be monitored through force mains and air release valves to these aged assets continue to function. Should issues arise, replacement of these assets should be undertaken. Assess and clean manholes and structures at least annually for issues in need of repair.
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown.	Maintain all mechanical and electrical equipment monthly. Visually inspect all components of each lift station weekly. Clean the equipment and verify it functions.

	Lift station valve maintenance.	Clean lift station wet wells bi-annually to remove grease and sediment. Exercise check valves and gate valves monthly (at a minimum).

Table 6 - Level of service statements (continued)

<u>Criticality of Assets:</u> *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, lift station components, and treatment lagoons, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 7. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 7.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 3 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 8.

Consequence of Failure Rating	Social, Human, and Environmental Effects[1]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 4 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater collection system is shown in Figure 13 through Figure 15 below.

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[1] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to summarize the policy formulation in the areas of rate management, capital spending, and fund balance.

Methodology
A significant effort has been made by the Village and their consulting engineers to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account.
The AMFP is a four step process: 1) historical comparison with audits and budgets, 2) test year, or normalized budget year, along with inflation assumptions for purposes of forecasting, 3) proof of rate to revenue for reliance on customer data, and 4) cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance). The analysis is a "cash basis" approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

Audit Comparison
One key indicator of financial health is the cash and investments found in the Comparative Statement of Net Position of the Sewer Fund. The Village has maintained this cash and investment balance at around eighteen months compared to the cash operating expenses. Management of the cash balance will be discussed further under Forecast – Cash Balance.

The Sewer Fund audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (excluding one-time expenditures).

Budget Comparison / Test Year
The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

Proof of Rate to Revenue
The Village bills customers based on generally accepted methods. The customers are billed a ready-to-serve charge ("RTS charge") based on meter size and a commodity charge based on usage. The number of customers billed at the current rates tie to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

Forecast - Capital Cost
Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. These are expenses not already included in the operating and maintenance budget. The forecast reflects cash-funding projects which results in good maintenance of the cash balance.

Forecast - Cash Balance
Our standard minimum target of cash and investment to operating expenses (net of depreciation) is six months. This minimum target is higher for a system of this size. Due to the size of the system and extent of capital improvements forecasted, the cash balance target is around thirty-six months. With the right mix of cash funding capital improvements and inflationary rate increases, the system will be able to maintain an adequate amount of cash to respond to unforeseen events.

Forecast - Rate Management

The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The cash flow forecast demonstrates a rate track with annual increases of 2.00% per year. Annual increases are highly recommended to keep up with expected rising expenses over time.

Management Summary

- Rates: increase by 2.00% per year (preliminary assumption). This will need to be updated as bonds are issued and capital improvements are better known.
- Cash Balance: target of thirty-six months compared to cash operating expenses over forecast period.
- Capital Improvements: cash funding in order to manage rates and cash effectively over time.

AMFP – Management Tool

The AMFP is a living document. It is most effective as a tool used annually for budget and user rate decisions.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Wastewater System Projects

Table 10 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 10 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 10 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Structure Cleaning	$ 22,000
2	2022	Spot Repairs 1	$ 38,000
3	2023	CIPP Lining in Pipe south of Aubill/west of Hochberger	$ 32,000
4	2024	Root Treatment	$ 6,000
5	2025	Spot Lining Project 1	$ 33,000
6	2026	Spot Repairs 2	$ 55,000
7	2027	Spot Lining Project 2	$ 22,000
8	2028	Repair and Seal Manholes	$ 10,000
9	2029	Lift Station 2 Improvements	$ 22,000
10	2030	Lift Station 1 Improvements	$ 18,000
11	2031	Line Hochberger Sewer	$ 33,000
12	2036	Replace Lift Station Submersible Pumps	$ 119,000
13	2039	Forcemain Replacement - from LS 2 to Lagoons	$ 694,000
14	2039	Forcemain Replacement - Lift Station 1 Along Main Street	$ 171,000

Total Estimated Project Cost for 20 Year CIP (current dollars) = $ 1,275,000
Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) = $ 1,756,000

Table 5 - Recommended wastewater system capital improvement projects (continued)

As previously mentioned, both force mains have reached their expected useful life based on conservative estimates of material life. However, they have continued to function well with few reported issues. The force mains should continue to function well, however replacements should be planned as these projects will be a significant cost to the Village. As these assets age, an eye should be kept on them for an increase in repairs as this may be an indication that the replacements should be completed sooner.

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 16, 2019**
(no later than 3 years from executed grant date)

The Southwest Regional Sanitary Sewer and Water Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1199-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ **No**]

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Steve Tilly at **(269) 429-2501** **stilly@royaltontownship.org**
Name Phone Number Email

12-12-19
Signature of Authorized Representative (Original Signature Required) Date

Mr. Steve Tilly, Chairman
Print Name and Title of Authorized Representative

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Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Southwest Michigan Regional Sanitary Sewer and Water Authority

Wastewater Sewer System

Date: December 12, 2019
To: Mr. Jonathon Berman
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Southwest Michigan Regional Sanitary Sewer and Water Authority - Summary of Wastewater AMP

Grantee Information:
Southwest Michigan Regional Sanitary Sewer and Water Authority
980 Miners Road
St. Joseph, MI 49085
Steve Tilly: stilly@royaltontownship.org
Mr. Steve Tilly; Chairman
Ph: (269) 429-2501
SAW Project #: 1199-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Total
1) Total Grant:	$1,111,000	$1,111,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The Authority system consists of transmission assets only. This transmission system serves the adjacent Townships, St. Joseph Charter Township, Lincoln Township and Royalton Township. Assets include approximately 31,000 feet of 30 to 48 inch gravity main, 133 manholes, a single 4,400 gpm lift station, and 12,000 feet of 20 inch forcemain. The gravity portion of the system starts in Lincoln Township and follows Hickory Creek to the north. Along the gravity main a total of 16 flow meters exist at the connection points to Township collection systems. The gravity system concludes at Niles Road (M-63) and is pumped via the 4,400 gpm Hickory Creek lift station through a 20 inch pressurized forcemain which continues to follow Hickory Creek and then the St. Joseph River to the north. This forcemain discharges to a joint WWTP along Industrial Ct. on Marina Island.

With a thorough knowledge of the basic layout of the system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the wastewater system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.
Table 1 contains a summary of the wastewater system assets identified.

Item	Quantity	Units
48-inch Sanitary Sewer	87	LF
42-inch Sanitary Sewer	21,459	LF
36-inch Sanitary Sewer	7,298	LF
30-inch Sanitary Sewer	2,830	LF
Sanitary Manholes	133	EA
Lift Station	1	EA
Backup Generator	1	EA
20-inch Force Main	11,851	LF
Air Release Valve with Manhole	15	EA

Table 1 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the system and estimate their remaining service life. Many manholes were visually assessed and photographed by Wightman employees as depicted in Figure 3. The manhole pictures are attached to those assets in the GIS map.

The single lift station owned by the Authority was assessed as part of a forcemain replacement project which was implemented in concurrence with this AMP. Generally, the station was found to be in good working order but requiring several equipment replacements. These replacements were incorporated into the forcemain project. The Authority's gravity system was lined in 2010 and will likely have an expected useful life of 90 more years. Because of its young age, the gravity main is not eligible for televising.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 6 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	
Health and Safety	Provide a safe and injury free workplace. Protect the public health. Protect the environment.	
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked at all times.
Operator Certification	Provisions for appropriately credentialed and experienced operators.	Contract operators should be qualified and available when required for both regular and emergency work.
Administrative	Provide excellent customer service.	Produce accurate, timely invoicing.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within 24 hours and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within 4 hours at all times and non-emergency calls within 8 hours during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from the EGLE to all affected staff.

Table 3 - Level of service statements

Major Area	Goals and Objectives	Level of Service Statements
Rules and Regulations	Monitor and enforce all wastewater contract requirements.	Review wastewater contract requirements periodically – Annually at a minimum. Enforce provisions of contract requirements.
Financial	Maintain a financial plan to generate enough revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are enough to meet wastewater budget annually.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months' operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	A backup generator is provided at the Hickory Creek lift station. Generator shall be maintained annually.
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown. Lift station valve maintenance.	Maintain all mechanical and electrical equipment monthly. Visually inspect all components of each lift station weekly. Clean the equipment and verify it functions. Clean lift station wet wells annually to remove grease and sediment. Exercise check valves and gate valves Monthly (at a minimum).
Wastewater System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Force mains. Air release valves. General System Maintenance.	Gravity sanitary sewers will be cleaned on a rotational basis such that 10% of the system is cleaned annually resulting in the entire system being cleaned every 10 years.

Table 4 - Level of service statements (continued)

<u>Criticality of Assets:</u> *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 7. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 7.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 5 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 8.

Consequence of Failure Rating	Social, Human, and Environmental Effects[1]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 6 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater system is shown in Figure 12 through Figure 14 below.

While the above figures may appear alarming, due to the large amount of assets that show as red (“Catastrophic Disruption”), it is noted that this is due to the nature of the Authority sanitary sewer system. Because the Authority transmission system serves a large area all assets are highly critical. As such, a failure of one of these mains would result in a nearly 100% loss of service to at least one community and likely more. It is further stressed that the consequence of failure rating does not suggest in any way whether an asset is likely to fail, only the consequences of such a failure.

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[1] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to summarize the policy formulation in the areas of rate management, capital spending, and fund balance.

Methodology

A significant effort has been made by the Authority and their consulting engineers to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account.

The AMFP is a four step process: 1) historical comparison with audits and budgets, 2) test year, or normalized budget year, along with inflation assumptions for purposes of forecasting, 3) proof of rate to revenue for reliance on customer data, and 4) cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance). The analysis is a "cash basis" approach as described in the AWWA Manual of Rate Making Practices.

From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

Audit Comparison

One key indicator of financial health is the cash and investments found in the Comparative Statement of Net Position of the Sewer Fund. The Authority has maintained this cash and investment balance to keep up with budgeted operating expenses. Management of the cash balance will be discussed further under Forecast – Cash Balance.

The Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (excluding one-time expenditures).

Budget Comparison / Test Year

The current year budget is consistent with previous years, excluding planned capital improvement projects. Certain adjustments have been made to reflect a normalized year for maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

Proof of Rate to Revenue

The member communities are billed a percentage of total expenses incurred based on their percentage of total flow.

Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. These are expenses not already included in the operating and maintenance budget. The forecast reflects cash-funding all projects.

Forecast - Cash Balance

Since the authority bills its incurred expenses directly to the communities, a moderate cash balance necessary. The member communities are responsible for setting their rates in order to support both the authority's operating and capital related expenses.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Wastewater System Projects

Table 10 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 10 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 10 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Flow Meter Equipment Replacement	$ 16,000
2	2027	Hickory Creek Lift Station Rehabilitation Project	$ 693,000
3	2028	Purchase Replacement Sewer Camera	$ 110,000
4	2030	Manhole Inspection Study	$ 88,000
5	2035	Replacement of Existing Flow Meters	$ 93,000
6	2040	Air Release Valve Replacements	$ 65,000
7	2040	Hickory Creek Lift Station 2040 Rehabilitation Project	$ 73,000

Total Estimated Project Cost for 20 Year CIP (current dollars) = $ 1,138,000
Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) = $ 1,382,000

Table 7 - Recommended wastewater system capital improvement projects

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Cassopolis Area Utilities Authority, Cassopolis, Michigan

Wastewater Sanitary System

Date: December 12, 2019
To: Mr. Clarence Jones
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: CAUA - Summary of Wastewater Asset Management Plan

Grantee Information:
Cassopolis Area Utilities Authority
241 Front St.
Dowagiac, MI 49047
Kevin Anderson: kanderson@dowagiac.gov>
Mr. Kevin Anderson; General Manager
Ph: (269) 782-2195
SAW Project #: 1201-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Total
1) Total Grant:	$535,000	$535,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The Cassopolis Area Utilities Authority (CAUA) operates a wastewater collection system serving customers in portions of Penn Township, Calvin Township, Jefferson Township and LaGrange Township. The service area is primarily related to the Village of Vandalia, Diamond Lake, Donnell Lake and Paradise Lake. The collection system consists of over 26 miles of gravity sewer pipe ranging from 8-inch to 10-inch pipe and over 13 miles of pressurized force mains ranging from 1.5-inches to 10-inches. The gravity sewers and the force mains in conjunction with 30 lift stations convey the wastewater from the CAUA service area to the Village of Cassopolis interceptor which conveys the wastewater to the City of Dowagiac Wastewater Treatment Plant for treatment. The collection system includes over 500 manhole structures and nearly 1,500 individual service leads or taps. The system was built as follows; Diamond Lake 1990, Donnell Lake 1997, Vandalia 1999 and Paradise Lake 2001.

Using knowledge of the basic layout of the collection system, a comprehensive inventory of all wastewater system assets was performed using as-built drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, maps of the wastewater collection system were prepared using ArcGIS Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage. Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS database mentioned above, allowing staff easy access to all records for the wastewater collection system. This can also allow staff to access all available information while in the field with a hand-held device. Table 1 contains a summary of the wastewater system assets identified.

Item	Quantity	Units
10-inch Sanitary Sewer	12,224	LF
8-inch Sanitary Sewer	127,708	LF
4 foot Diameter Sanitary Manhole	529	EA
Service Lead, Complete	1,497	EA
Lift Station – 500 gpm or Larger	1	EA
Lift Station – Less Than 500 gpm	24	EA
Grinder Pump Station	5	EA
Backup Generator	15	EA
10-inch Force Main	2,781	LF
8-inch Force Main	34,078	LF
6-inch Force Main	15,287	LF
4-inch Force Main	19,866	LF
2-inch Force Main	2,890	LF
1.5-inch Force Main	253	LF
Air Release Valve with Vault	13	EA
Force Main Cleanout Station	36	EA

Table 1 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. The condition assessment is developed through the physical inspections, the review of videos and photographs, conversations with the operations staff, review of historical records and data and any relevant antidotal information. Manholes were visually assessed and photographed by Wightman staff as depicted in Figure 3 and coded in accordance with a NASSCO MACP level 1 inspection. All eligible gravity sewer piping over 20 years old was inspected using closed-circuit televising (CCTV) equipment designed for use in sewer pipes[1]. CCTV services were provided by Corby Energy Services, Inc (CES). All the CCTV videos and pipe reports were coded in accordance with NASSCO PACP and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

29 of the 30 lift stations owned and maintained by the CAUA were inspected in detail and the equipment was assessed by Wightman staff, including drawdown testing to determine the current condition of the pumping equipment and photographing the various assets comprising the lift station, specifically, the overall site, wet wells, valve vaults, pumps, controls, alarms and generators (where applicable). The 30th lift station, lift station B-4 was not inspected as the lift station was scheduled to be replaced during the inspection period with a conversion from a can style station to a more modern style submersible station. The station was replaced in 2018 and the condition of the new components at this station have been included in the database after the lift station upgrade project was complete. Examples of some of these pictures are shown in the following pictures. All photographs taken by Wightman staff are attached to the lift station assets in the GIS database and are accessible via the computer and tablets previously discussed.

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[1] Pipes with severe structural issues that could be exacerbated or cause complete failure due to the cleaning associated with CCTV activities and pipes younger than 20 years old were not televised.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

<u>Level of Service Determination:</u> *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 5 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	Strive to avoid any system failures that could results in property damage or sanitary sewer overflows.
Health and Safety	Provide a safe and injury free work place. Protect the public health. Protect the environment.	Regular safety meetings called "Lunch and Learns" are held monthly at a minimum to review safety topics with operations staff.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels, wet wells, and vaults are padlocked at all times.

Operator Certification	Provisions for appropriately credentialed and experienced operators.	The treatment is handled by the City of Dowagiac WWTP and they maintain appropriate certified operators. The operation of the collection system does not require any specific operator certification at this time.
Administrative	Provide excellent customer service.	Produce accurate, timely billing.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within one hour and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within one hour at all times and non-emergency calls within twenty-four hours during normal business hours.
Reporting		Provide the Board monthly reports
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs, including regional and annual meetings as appropriate. Route applicable correspondence from EGLE to all affected staff.

Major Area	**Goals and Objectives**	**Level of Service Statements**
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – annually at a minimum. Enforce provisions of wastewater ordinances.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are sufficient to meet wastewater budget annually. Review sewer rates every year.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months’ operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Backup generators shall be provided at all designated critical lift stations. Generators are maintained under an annual maintenance contract with a third party vendor.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Force mains. Air release valves.	Gravity sanitary sewers will be cleaned on a rotational basis such that 15% of the system is cleaned annually resulting in the entire system being cleaned every seven years.
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown.	Maintain all mechanical and electrical equipment weekly.

	Lift station valve maintenance.	Visually inspect all components of each lift station weekly. Clean the equipment and verify it functions. Clean lift station wet wells annually or as needed to remove grease and sediment. Exercise check valves and gate valves annually (at a minimum).

Table 5 - Level of service statements (continued)

<u>Criticality of Assets:</u> *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. <u>Likelihood of Failure</u>

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, and lift station components, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 6. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 6.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 3 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 7.

Consequence of Failure Rating	Social, Human, and Environmental Effects[2]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 4 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater collection system is shown in Figure 12 through Figure 14 below.

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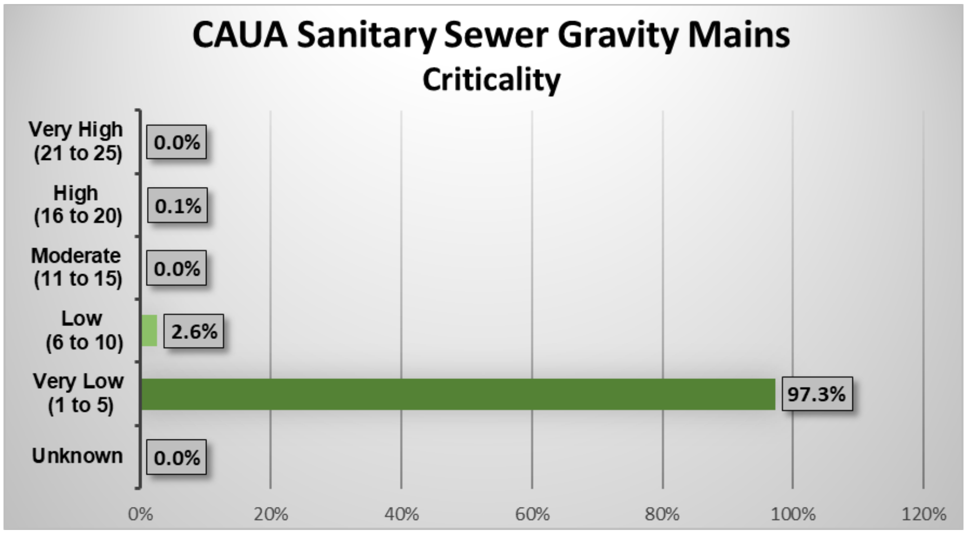
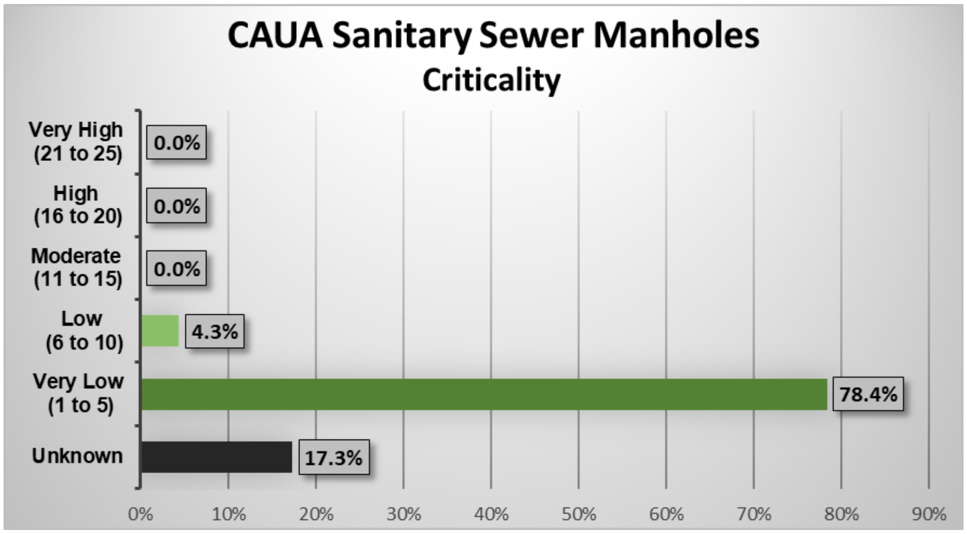
[2] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.





<u>Revenue Structure:</u> *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. An Asset Management Financial Plan (AMFP) was developed and is intended to help CAUA formulate policy in the areas of rate management, capital spending, and fund balance. *The AMFP is a living document. It is most effective as a tool used annually for budget and user rate decisions.*

AMFP Methodology

A significant effort has been made by Cassopolis Area Utilities Authority to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account. The AMFP is a four-step process:

1) Historical comparison with audits and budgets.
2) Test year, or normalized budget year, along with inflation assumptions for purposes of forecasting.
3) Proof of rate to revenue for reliance on customer data.
4) Cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance).

The analysis is “cash basis” approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

Audit Comparison

One key indicator of financial health is found in the Statement of Net Positions. “Cash and Investments”. The Authority has an increasing cash balance. The cash balance has increased over the past few years. Management of the cash balance will be discussed further under Cash Flow Forecast. The Sewer Fund audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses when grant revenue and expenditures are removed.

Budget Comparison / Test Year

The majority of the current year budget has been adopted as the Test Year as it aligns with the Test Year development criteria (other than one-time expenditures). This has been utilized to develop the Test Year budget including expected percent inflation factors.

Proof of Rate to Revenue

The Authority bills its customers based on widely used and accepted methods. Customers are charged a flat monthly fee which encompasses a ready-to-serve fee and commodity used. The amount of customers billed the flat fee tie out to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. The forecast reflects debt issuance to fund capital and also an increase in operating and maintenance costs. Given projected revenues and cash balance, as well as the dollar amount of anticipated capital spending, new debt issuance has been modeled. An inflation factor of 2% per year was used to forecast costs.

Model Forecast - Cash Balance

Our financial partners recommend that a standard minimum target of cash and investment to operating expenses of six months. It would not be advisable to bring the ongoing cash balance any lower than six months given the potential variation in the amount and timing of capital cost. Calculated rate increase are imperative to keep a positive cash and investment balance.

Model Forecast - Rate Management

The revenue support based on current rates, does support immediate, operations, debt, and capital cost, cash balance. The cash flow forecast demonstrates a rate track with a moderate rate increase the first and third years and reevaluation during the 4th year to determine what further increases will be required.

Management Summary

1) Rate Increases - Annual:
    - **a)** 2020: $4.50
    - **b)** 2022: $4.50
2) Cash Balance: Build to a cash balances above six months of average, annual Operating Expenditure.
3) Capital Cost will be cash flowed cash reserves and rate increases.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Wastewater System Projects

Table 9 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 9 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 9 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	2020 Annual Pump Replacements	$30,000
2	2020	22218 Lake Service Connection repair	$5,000
3	2020	Lift Station Alarm Fixes	$36,000
4	2020	Replace clean out on Hideaway Drive	$3,000
5	2020	Spot Liner Repairs - Multiple Locations	$36,000
6	2020	Spot Repair - Forest Hall north of LS-B4	$13,000
7	2020	Spot Repair - Forest Hall west of Beech	$13,000
8	2020	Spot Repair Diamond Shore Drive west of Beechwood	$17,000
9	2020	Spot Repair on Diamond Shores west of LS A-4	$13,000
10	2020	Spot Repair on Howell north of Potawatami	$13,000
11	2020	Spot Repair on Lagoon Drive south of LS B-1	$13,000
12	2020	Spot Repair on Sail Bay Drive North of LS E-1	$13,000
13	2021	2021 Annual Pump Replacements	$30,000
14	2021	Spot Repair at the west end of Isabel Court	$14,000
15	2021	Spot Repair Carlton west of Ferry Landing	$14,000
16	2021	Spot Repair for Cross-bore at 20923 Decatur Street	$14,000
17	2021	Spot Repair on Lakeview west of Curtis	$14,000
18	2021	Spot Repair on north end of Diamond View	$14,000
19	2021	Spot Repair on west dead end of Decatur Road	$15,000
20	2022	2022 Annual Pump Replacements	$30,000
21	2022	Lift Station B-3 Wet Well Lining	$75,000
22	2022	Spot Repair Diamond Shore Drive east of LS A-4	$17,000
23	2022	Spot Repair on Howell at Potawatami Lane	$27,000
24	2022	Spot Repair on Leigh north of LS A-6	$14,000
25	2022	Spot Repair on west end of Colony Bay Drive	$14,000
26	2022	Spot Repairs - Howell east of Cass	$13,000
27	2023	2023 Annual Pump Replacements	$30,000
28	2023	Line Forcemain Discharge MH Part 1	$30,000
29	2024	2024 Annual Pump Replacements	$30,000
30	2024	Line Forcemain Discharge MH Part 2	$30,000
31	2025	2025 Annual Pump Replacements	$30,000
32	2025	Line Forcemain Discharge MH Part 3	$30,000
33	2026	2026 Annual Pump Replacements	$30,000
34	2026	Install Safety Grate at Lift Stations	$87,000
35	2027	2027 Annual Pump Replacements	$30,000
36	2027	Lift Station Site Lighting	$102,000
37	2028	2028 Annual Pump Replacements	$30,000
38	2028	Controls Upgrades Part 1	$209,000
39	2029	2029 Annual Pump Replacements	$30,000
40	2029	Controls Upgrades Part 2	$209,000
41	2030	2030 Annual Pump Replacements	$30,000
42	2030	Controls Upgrades Part 3	$209,000
43	2031	2031 Annual Pump Replacements	$30,000
44	2031	Misc. Manhole Lining	$30,000
45	2032	2032 Annual Pump Replacements	$30,000
46	2033	2033 Annual Pump Replacements	$30,000
47	2034	2034 Annual Pump Replacements	$30,000

48	2035	2035 Annual Pump Replacements	$30,000
49	2036	2036 Annual Pump Replacements	$30,000
50	2037	2037 Annual Pump Replacements	$30,000
51	2038	2038 Annual Pump Replacements	$30,000
52	2039	2039 Annual Pump Replacements	$30,000
53	2040	2040 Annual Pump Replacements	$30,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$1,986,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[3] costs) =	$2,311,000

Table 5 - Recommended wastewater system capital improvement projects

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[3] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 16, 2019**
(no later than 3 years from executed grant date)

The Cassopolis Area Utilities Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1201-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Kevin Anderson	at	**(269) 782-2195**	**kanderson@dowagiac.org**
Name		Phone Number	Email

12/16/19

Signature of Authorized Representative (Original Signature Required) Date

Mr. Kevin Anderson, General Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Saline *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1206-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No

   If No - Date of the rate methodology approval letter: October 7, 2019.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jeff Fordice	(734) 429-5624 x 2601	jfordice@cityofsaline.org
Name	Phone Number	Email

	12/13/18
Signature of Authorized Representative (Original Signature Required)	Date

Todd J. Campbell, City Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Saline *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1206-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Jeff Fordice	(734) 429-5624 x 2601	jfordice@cityofsaline.org
Name	Phone Number	Email

12/13/19

Signature of Authorized Representative (Original Signature Required) Date

Todd J. Campbell, City Manager
Print Name and Title of Authorized Representative

WASTEWATER AND STORMWATER ASSET MANAGEMENT PLAN **SUMMARY**

Tetra Tech Project Number: 200-12758-17001
December 2019

PRESENTED TO

City of Saline
100 N. Harris Street
Saline, MI 48176

PRESENTED BY

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Ann Arbor, Michigan 48108

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1866

TETRA TECH

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USE OF DATA

This report is intended to be a planning-level document. Additional data are required before implementing recommendations in this document.

CITY OF SALINE
WASTEWATER AND STORMWATER
ASSET MANAGEMENT PLAN SUMMARY

December 2019

City of Saline, MI
100 North Harris Street
Saline, MI 48176

EXECUTIVE SUMMARY

Contact and Budget Information

Jeff Fordice, PE, City Engineer

100 N. Harris

Saline, MI 48176

(734) 429-4907

jfordice@cityofsaline.org

Project Budget:	$1,005,403 ($904,863 grant)
Grant Number:	1206-01

Introduction

In 2016, the City of Saline was awarded a State of Michigan Stormwater, Asset Management, and Wastewater (SAW) Grant to complete management services for the storm sewer and wastewater system.

This Asset Management Plan (AMP) summarizes the work completed as part of the SAW grant. This AMP has been designed to provide the City with a proactive and long-term plan to sustain the wastewater and stormwater infrastructure and protect the environment.

The AMP approach centers on the following five core elements:

1. Asset Inventory
2. Level of Service
3. Criticality
4. Revenue Structure
5. Capital Improvement Plan

Asset Inventory

Existing City GIS information was used as a basis for the plan, and was augmented with survey data, detailed process equipment and collection system asset inventories cost development. To aid in this analysis, as well as simplify annual reporting needs, the system information has been integrated with Lucity™ Asset Management Software (AMS) which was purchased and implemented as part of this program. The Lucity™ software operates as an extension of the GIS and is primarily a work order and capital improvement planning tool aimed to help the City streamline administrative processes and simplify mandatory reporting.

The current estimated value of the entire wastewater infrastructure exceeds $71.68 million. The current value of the City's sanitary sewer collection system is estimated at approximately $30.2 million, with approximately 88% of the system cost associated with gravity mains and manholes with the remaining cost attributed to pump station and force mains. The remaining $41.5 million is associated with the WWTP value. At the WWTP, 727 unique assets were inventoried.

Table ES-1 – Summary Value of WWTP Assets

Process Location	Current Value
Raw Sewage Pump Station	$3,636,000
Pretreatment / Grit Building	$1,340,000
Primary Clarifiers	$1,917,000
Rotating Biological Contactors	$13,405,000
Secondary Clarifiers	$1,810,000
Tertiary Filter Building	$2,039,000
Ultraviolet Disinfection	$607,000
Septage Receiving Building	$799,000
Sludge System	$4,461,000
Odor Control	$2,377,000
Main Building	$3,214,000
Yard Assets	$4,184,000
Other Misc. Assets	$1,693,000
TOTAL WWTP VALUE	**$41,482,000**

Table ES-2 and ES-2 summarizes the systems units and baseline system replacement value (in 2019 dollars) for the wastewater collection and treatment system.

Table ES-1 – Summary Value of WWTP Assets

Process Location	Current Value
Raw Sewage Pump Station	$3,636,000
Pretreatment / Grit Building	$1,340,000
Primary Clarifiers	$1,917,000
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Sludge System	$4,461,000
Odor Control	$2,377,000
Main Building	$3,214,000
Yard Assets	$4,184,000
Other Misc. Assets	$1,693,000
TOTAL WWTP VALUE	**$41,482,000**

Table ES-2 – Summary Value of Wastewater Collection System Assets

System Component	Quantity (unit)	Baseline System Value (Current Replacement Cost)
Gravity Mains	224,440 feet	$16,784,000
Manholes	1,320 each	$9,900,000
Force Mains	6,502 feet	$427,000
Pump Stations*	7 each	$3,083,000
Subtotal Wastewater Collection System		**$30,194,000**
Subtotal Wastewater Treatment Plant		**$41,482,000**
Total Wastewater System		**$71,676,000**

*Includes 1 lift station

The current value of the stormwater collection system is estimated at approximately $44.5 million. Table ES-3 summarizes the systems units and baseline system replacement value (in 2019 dollars) for the stormwater collection system.

Table ES-3 – Stormwater Collection System Asset Summary and Cost

System Component	Quantity (unit)	Baseline System Value (Current Replacement Cost)
Gravity Mains - City owned	231,370 feet	$32,282,789
Gravity Mains - MDOT owned	12,615 feet	$1,625,912
Manholes - City Owned	784 each	$4,694,000
Manholes - MDOT owned	97 each	$542,000
Catch Basins - City owned	1659 each	$6,636,000
Catch Basins - MDOT owned	155 each	$620,000
Detention Basins - Publicly-owned	9 each	$900,000
Detention Basins - Privately-owned	21 each	$2,100,000
	Total	**$44,512,789**

Notes:

1. Total does not include MDOT-owned current replacement costs
2. Excludes value of open channel systems, outfall costs are included with gravity mains. There are approximately 176 outfalls.

Level of Service

A major factor in the quality of community life is the quality of the community's facilities, services and amenities. Level of service is a measure of the amount and/or quality of the public facility which must be provided to meet that community's basic needs and expectations. The City developed a list of key performance indicators (KPIs) to hold as goals for the Level of Service for their wastewater and stormwater facilities, which can be seen in Table ES-4 and ES-5. The City currently is meeting all the listed performance goals and will focus on maintaining this high level of service. This list was developed in discussions with City staff based on feedback they had received from City Council and the public.

Table ES-4 – Wastewater Level of Service KPIs

Meet Requirements of NPDES Permit
Reduce Basement Potential for Backups
Reduce Infiltration/Inflow Rates and Volumes
Reduce Odor Complaints
Clean All Sewers At Least Once In 10-Year Period
Upgrade Underperforming Pump Stations
Implement Equipment Inventory and Maintenance Tracking System
Enforce Sewer Use Ordinance Requirements

Table ES-5 – Stormwater Level of Service KPIs

Capacity to Convey Design Storm
Clean All Sewers and Catch Basins At Least Once In 5-Year Period
Meet Requirement of NPDES Permit
Implement Equipment Inventory and Maintenance Tracking System

Criticality

Defining the criticality of assets is a step used to prioritize future improvements so that resources are invested in the most needed projects. Criticality is quantified by use of a numerical score called Business Risk Exposure (BRE).

BRE is defined as the product of probability of failure (POF) of an asset and the consequence of failure (COF) for that asset. That is, BRE = POF x COF, with numerical values assigned for both POF and COF. BRE calculations for WWTP assets also include a factor for asset redundancy.

POF is based on the condition of the asset. For this project, the age of each asset was identified and evaluated with additional information such as equipment records, staff observations and field condition analysis. In the case of the wastewater collection system, 730 manholes (panoramic photography and three-dimensional point cloud scan) and 25,000 feet of sewer were inspected (closed circuit television) so that a condition rating could be assigned to the assets. In the stormwater collection system, nearly 19,750 feet of sewer and 513 manholes were inspected. The catch basins, outfalls, and detention basins were not inspected.

Most of the sanitary and storm system is in fair to excellent condition. As is the case in most older systems, there are areas where repairs are needed. On the sanitary sewer, 7% of the manholes are rated for repair and 19 sewer segments were noted for repair. On the storm sewer, 8% of the manholes and 11 sewer segments were identified for repair. 27 (approximately 4% of the WWTP assets) were rated in poor condition.

COF is based on the consequence to the utility, public and environment of the asset failing. Numerical scores were assigned to each asset based on these factors.

The BRE was then calculated for each asset in the City's system. These BRE ratings, combined with City Staff experience, were used to develop a Capital Improvement Plan (CIP) for the City of Saline.

Revenue Structure

The City reviewed their revenue structure as part of the AMP to demonstrate the City's wastewater utility generates sufficient revenue to fund the operation and maintenance for the wastewater utility. The SAW grant does not require the City to fund capital improvements through wastewater rates although Saline, like most municipalities, typically does. A separate report has been prepared to analyze the ability of the City's rates to pay operational costs and has been included as an Appendix. The City also uses its rates to pay for capital and repair costs and the City regularly updates its rate model to fully fund all needed work. A rate analysis was also conducted to fund the CIP defined in this report. Costs to construct and maintain storm sewers are paid from street budgets and general funds. The grant does not require a community to demonstrate financial adequacy to operate its storm sewer system.

Capital Improvement Plan

A 20-year capital improvement plan was developed for the wastewater treatment plant (WWTP), the wastewater collection system (WWCS), and the stormwater collection system (SWCS) using both the results of the business risk exposure conducted in this AMP and City staff observations. The capital improvement plan identifies areas in the collection systems and specific parts of the WWTP processes where funding should be provided over the next 20 years. Inevitably, some assets will require attention earlier and some later than projected in this report. This capital improvement plan should be routinely updated to ensure that it includes short- and long-term needs. It will provide the City with documentation for setting aside and safeguarding funds to sustain the infrastructure addressed.

Table ES-6 - City of Saline 20-Year Wastewater Capital Improvement Plan (2020-2040)

Project Number	Description	Project Year	Project Cost
WWTP – 1	**RBC Motor Control Center Replacement and Transfer Switch Replacement**	**2020**	**$275,000.00**
WWCS - 1	**Grade 5 Defect Sewer Repairs & Sewer Lining**	**2020**	**$408,000.00**
WWCS - 2	**Eastbelt Sewer Improvements - South**	**2021**	**$1,687,000.00**
WWCS - 3	**Grade 4 Defect Sewer Repairs**	**2021**	**$134,000.00**
WWCS - 4	**Pump Station Improvements & SCADA**	**2021**	**$472,000.00**
WWCS - 5	**Eastbelt Sewer Improvements - North**	**2022**	**$1,377,000.00**
WWTP – 2	**Raw Sewage Pump Replacement**	**2022**	**$1,400,000.00**
WWCS - 6	**Grade 4 & 5 Defect Manhole Repairs**	**2022**	**$507,000.00**
WWTP – 3	Digester No. 3 Cover Replacement	2026	$600,000.00
WWTP – 4	Sludge Storage Tank Expansion	2026	$2,050,000.00
WWCS - 7	Westbelt Sewer Improvements	2026	$3,262,000.00
WWTP – 5	Primary Clarifier Mechanism Replacement	2028	$520,000.00
WWTP – 6	Primary Clarifier Expansion – 60 ft. Dia.	2028	$1,600,000.00
WWCS - 8	Future Defect Repairs & Sewer Lining	2026 - 2038	$1,263,000.00
WWCS - 9	Centralbelt Sewer Improvements	2030	$5,003,000.00
WWTP – 7	Secondary Clarifier Mechanism Replacement	2030	$580,000.00
WWTP – 8	Secondary Clarifier Expansion – 60 ft. Dia.	2030	$2,120,000.00
WWTP – 9	RBC Media and Cover Replacement	2032	$5,710,000.00
WWTP – 10	UV Module Upgrade	2034	$790,000.00
WWCS - 10	Future Pump Station Pump Replacements	2035	$100,000.00
WWTP – 11	Generator Replacement	2036	$530,000.00
WWTP – 12	4.1 MG Equalization Basin	2038	$14,310,000.00
WWTP – 13	**RBC Gear Box Replacement (annual 2020-2026)**		**$790,000.00**
WWTP – 14	**Roof Replacement (annual 2020-30)**		**$460,000.00**
WWTP – 15	**Building Door Replacement (annual 2020-30)**		**$70,000.00**
	6-year	**Subtotal**	**$7,255,150.00**
	Remaining	**Subtotal**	**$38,762,850.00**
		Total	**$46,018,000.00**

Note: Projects in bold are within City's 6-year planning period

Table ES-7 - City of Saline 20-Year Stormwater Capital Improvement Plan (2020-2040)

Project Number	Description	Project Year	Project Cost
SWCS - 1	**Grade 5 Defect Sewer Repairs & Sewer Lining**	**2020**	**$638,000.00**
SWCS - 2	**Grade 4 Defect Sewer Repairs**	**2021**	**$113,000.00**
SWCS - 3	**Grade 4 & 5 Defect Manhole Repairs**	**2022**	**$309,000.00**
SWCS -4	West McKay Street Improvement	2028	$659,000.00
SWCS - 5	Harris Street Improvement	2034	$1,511,000.00
SWCS - 6	Future Defect Repairs & Sewer Lining	2026 - 2038	$1,800,000.00
	6-year	**Subtotal**	**$1,060,000.00**
	Remaining	**Subtotal**	**$3,970,000.00**
		Total	**$5,030,000.00**

Note: Projects in bold are within City's 6-year planning period

Future Steps

The City's current NPDES wastewater permit requires this asset management plan (wastewater plan) and annual reports communicating the City's progress in implementing the plan. The Lucity Software is designed to provide detailed reports regarding specific performance measures which will be essential to completing annual MDEQ reporting requirements.

This AMP, inclusive of the GIS model of the sewer system and Lucity, are intended to work as a unit to assist City staff in operating, maintaining and upgrading the City's wastewater infrastructure efficiently and cost effectively. It will be a living set of documents that will require an on-going process of recording information and adjusting the plan to best manage the needs of the City's wastewater infrastructure.

The City of Saline also is regulated by a NPDES Stormwater Permit. This permit seeks to improve water quality through controlling nonpoint source pollution. This asset management plan is not a requirement of the stormwater permit. However, by accepting the SAW grant, the City has made a commitment to implement this asset management plan. In the future the City may also wish to consider adding open channel drainage systems to this plan which were not studied as part of the present plan.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date _**December 31, 2019**
(no later than 3 years from executed grant date)

The City of Marysville certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1212-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Randy Fernandez	at (810) 455-1312	rfernandez@cityofmarysvillemi.com
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required) 1/13/2020 Date

Randy S. Fernandez, City Manager
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of the Environment, Great Lakes, and Energy (EGLE)
Revolving Loan Section – Office of Drinking Water and Municipal Assistance
Att: Valorie White, Project Manager

From: Hubbell, Roth and Clark, Inc.

CC: City of Marysville
Att: Randy Fernandez, City Manager
Barry Kreiner, DPW Director
Bari Wrubel, WWTP Superintendent

Date: December 20, 2019

Re: City of Marysville
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1212-01
Summary of Wastewater/Stormwater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of the Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management and Wastewater (SAW) Grant work performed by the City of Marysville. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

City of Marysville
1255 Delaware Avenue
Marysville, MI 48040

SAW Grant Project #1212-01

Project Grant Amount: $2,000,000.00

Applicant Match Amount $444,444

Authorized Representative:	Consultant Contact:
Randall S. Fernandez – City Manager	Jennifer Morreale, P.E., CFM – Hubbell, Roth & Clark
(810) 455 – 1312	(313) 463 – 4248
rfernandez@cityofmarysvillemi.com	jmorreale@hrcengr.com
Marysville DPW Contact:	Marysville WWTP Contact:
Barry Kreiner – DPW Director	Bari Wrubel – WWTP Superintendent
(810) 364 – 8340	(810) 364 – 8460
bkreiner@cityofmarysvillemi.com	bwrubel@cityofmarysvillemi.com

EXECUTIVE SUMMARY

The City of Marysville applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary and storm systems through EGLE's SAW program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City of Marysville owns, operates and maintains the sanitary sewer system and wastewater treatment plant (WWTP), and stormwater system and utilizes various tools to manage the horizontal and vertical assets, including a Geographic Information System (GIS) geodatabase, hydraulic model, WWTP inventory spreadsheet, Check-Up Program for Small Systems (CUPSS) Computer Maintenance Management System (CMMS) software, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the City Hall for at least 15 years.

WASTEWATER INVENTORY

The Environmental Protection Agency's (EPA) CUPSS CMMS software along with a WWTP AMP spreadsheet are both utilized to inventory and track the vertical assets in the system, which includes the collection system pump stations and the WWTP mechanical, electrical, and process equipment. The City of Marysville uses its existing GIS geodatabase as the primary means to inventory and map horizontal assets, which includes sanitary manholes and sewers. The GIS database, WWTP inventory tracking spreadsheet and CMMS program includes key attributes associated with each asset, such as unique asset IDs, installation date (age), size, material, capacity, along with other information as needed for a given asset type.

For vertical assets, condition assessments were estimated based on age, input from staff, industry standards, review of record installation and repair data, and in some cases, detailed inspections. Condition was recorded in both the WWTP Inventory spreadsheets and CUPSS CMMS program. Condition assessment work orders were generated within the CUPSS CMMS program to encourage the City to continue to evaluate and maintain assets.

For the horizontal assets, condition assessments were performed using detailed surface inspections, for those assets not inspected, the condition was estimated based on age, input from staff, industry standards, and review of record installation and repair data. Detailed inspections were made following the National Associated of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) and Manhole Assessment and Certification Program (MACP) protocols. The data is stored in the GIS database to continue to evaluate and maintain assets, such as manholes and sewer pipes.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness to ensure critical attributes were populated. Approximately 282,000 of 327,000 lineal feet of sanitary sewer were televised with condition assessment performed by the PACP certified cleaning and televising companies, Tri-County

Vac Services, LLC. and Michigan Pipe Inspection, Inc. Approximately 1,148 of 1,344 manholes structures were inspected by MACP certified inspectors using a level 1 hybrid inspection form and were given an overall rating of good, fair, or poor in addition to the standard MACP ratings. Additional information was collected beyond the normal scope of a MACP level 1 inspection, including surcharging data, manhole depth, flow characteristics, and recommended rehabilitation. Table 1 summarizes the horizontal asset inventory for the sanitary collection system per the City's GIS.

Table 1: Horizontal Asset Inventory Summary – Sanitary Collection System

Asset Type	Amount
6-inch sewer	6,514 lft.
8-inch sewer	100,522 lft.
10-inch sewer	72,719 lft.
12-inch sewer	35,345 lft.
15-inch sewer	36,094 lft.
18-inch sewer	35,151 lft.
21-inch sewer	6,566 lft.
24-inch sewer	13,839 lft.
30-inch and above sewer	4,539 lft.
Unknown diameter sewer	14,775 lft.
Manholes	1,344

Note: lft. = linear feet

Copies of the manhole inspection reports, sanitary sewer inspection reports, and the WWTP inventory spreadsheet were included within the full City deliverable report.

STORMWATER INVENTORY

Prior to the start of the SAW program, the City's stormwater database was limited. In order to maximize use of available SAW funds, all stormwater plans were scanned and digitized, and Global Positioning System (GPS) data for 1,844 storm structures was collected. Table 2 summarizes the horizontal asset inventory for the storm system per the City's GIS.

Table 2: Horizontal Asset Inventory Summary – Storm Sewer System

Asset Type	Amount
6- to 12-inch sewer	41,235 lft
15- to 30-inch sewer	46,507 lft.
36- to 48-inch sewer	23,451 lft.
54- to 66-inch sewer	9,028 lft.
72- to 105-inch sewer	7,401 lft.
Unknown Diameter	117,485 lft
Storm Inlets	2,417
Outfalls	174
Manholes	746

Note: lft. = linear feet

LIST OF MAJOR ASSETS

The Owner's major sanitary assets include:

- 326,483 linear feet (61.8 mi) of 6 to 48-inch sanitary sewer pipe
- 2,100 feet of 6-inch HDPE force main
- 1,322 sanitary manholes
- 2 collection system pump stations
- 342 vertical assets at one (1) WWTP

The Owner's major storm assets include:

- 221,725 linear feet (42 mi) of 8- to 105-inch gravity storm sewer pipe
- 14,740 linear feet of storm culverts
- 2,417 inlets
- 844 outfalls
- 746 storm manholes

CRITICALITY OF ASSETS

The City of Marysville developed baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that were associated to GIS attributes, and were used to estimate the overall risk of the horizontal sanitary assets. For vertical assets, individual assets were reviewed by staff and consulting engineers as part of the grant work, and POF and COF factors were determined and input into WWTP inventory spreadsheet and within the CUPSS CMMS program.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type (wastewater only). The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and the NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (sanitary sewers) was the PACP Structural and Maintenance Quick Score and asset age. Where PACP scores were not available, the POF score was based on the asset age, material and size. The COF for horizontal assets was determined based on asset depth, size, surface type, proximity to groundwater and flood zones, and proximity to roads and railroads.

The POF and COF of vertical assets were calculated using a scoring matrix. The POF for vertical assets was calculated using a combination of age, operation/process condition and physical condition collected from inspections performed. In the absence of any other data, age was used to estimate POF. The COF for vertical assets was scored using a matrix of factors including safety of the public and employees, financial impact, public confidence, regulatory compliance, and firm capacity.

POF, COF, and BRE was not evaluated for the stormwater system at this time; however, it is recommended to continue to collect location information and eventually include condition information with the development of the stormwater's POF, COF and BRE ratings.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall example of LOS goals matrix was developed to consider the goals and strategies of the City of Marysville and are present in Table 3.

Table 3: Level of Service Goals

Attribute	Objective	Goal	Measurable
Regulatory Compliance	• Protect receiving river	• No exceedances of permit	• NPDES permit limits
	• Convey all sewage generated by customers	• Zero SSOs for less than 25-year / 24-year storm	• Basement backups/SSOs
Operational	• Assess condition of sewers, manholes and related structures	• Televise and inspect structures for 10% of the system annually	• % of system inspected
	• Reduce pollutant loading to stormwater	• Sweep major streets each spring and fall	• % of streets swept
	• Have a proactive maintenance program at WWTP	• Spend 70% of maintenance time on preventive maintenance	• % of time on preventive maintenance
Environmental Protection	• Minimize discharge to receiving river	• Meet TMDL goals	• Yes or No
Customer Relations and Business Practices	• Minimize odors	• Less than 5 incidents per year	• # of incidents
	• Correct Billing of Accounts	• Less than 5 errant bills per year	• # of errant bills
	• Engage customers and decision makers	• Four outreach events/publications per year	• # of outreach events/ publications
Revenue	• Ensure revenue meets budget requirements	• Maintain rate structure sufficient for Operation, Maintenance and Repair (OM&R) and CIP	• Yes or no

At the strategic level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and probability of failure. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance can be measured at the asset level using work orders to collect data, and annual reporting of measurable to develop goals with operational staff.

The City of Marysville has chosen to continue their ongoing process rather than adopting specific goals. They will continue to consider the impact of to the public health and the system's ability to comply with any applicable regulations and operational needs.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline Operation and Maintenance (O&M) budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant

one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City of Marysville worked with a financial consultant to determine if the system's current rate structures were sufficient to meet the current needs for the management of the City's wastewater, sanitary sewer collection, and stormwater sewer systems, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date. The MDEQ reviewed the submitted rate structure and approved it per correspondence dated October 7th, 2019.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City's WWTP and sanitary sewer collection system, using recommendations from the asset criticality assessment process, and consideration of other system needs. Recommendations were made to the City to continue collecting data within the stormwater system, and eventually collect structure drop information and preform condition assessments to determine of the required capital improvement projects for the stormwater system in the future.

These recommended CIP projects are summarized below. Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 6 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

- Collection System Rehabilitation – $3,700,000
- WWTP Equipment Upgrades – $1,130,000
- Stormwater System Data Collection – $500,000

Capital Projects, 6 to 20 years:

- Collection System Rehabilitation – $3,900,000
- WWTP Equipment Upgrades – $4,280,000
- Stormwater System Condition Assessment – $1,500,000

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken routinely (such as annually) to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis as part of the annual process to ensure the availability of required funds for the projects.

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Marysville certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1212-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: October 7, 2019.

2) Significant Progress Made: Yes or No

   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Randy Fernandez	at (810) 455-1312	rfernandez@cityofmarysvillemi.com
Name	Phone Number	Email

12/18/19

Signature of Authorized Representative (Original Signature Required) Date

Randy S. Fernandez, City Manager

Print Name and Title of Authorized Representative

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Marysville certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1212-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ **No**]

   If No - Date of the rate methodology approval letter: October 7, 2019.

2) Significant Progress Made: Yes or No

   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Randy Fernandez	at (810) 455-1312	rfernandez@cityofmarysvillemi.com
Name	Phone Number	Email

12/18/19

Signature of Authorized Representative (Original Signature Required) Date

Randy S. Fernandez, City Manager

Print Name and Title of Authorized Representative

EXECUTIVE SUMMARY

The Village of St. Charles applied for $600,000 in funding to prepare a Wastewater Asset Management Plan (WWAMP) and Stormwater Asset Management Plan (SWAMP) through Public Act No. 511 of 2012 *Stormwater, Asset Management, and Wastewater (SAW)* grant system.

Due to the overwhelming response to the program, the MDEQ implemented a lottery process and published a list of the order that communities would be offered SAW grants. The Village of St. Charles received Round 4 SAW Grant funding.

On September 23, 2016 the Village of St. Charles received a Notice of Grant Application Approval from the Michigan Department of Environmental Quality (MDEQ) for the following:

WWAMP	$302,011
SWAMP	$251,929
Eligible Cost Subtotal	$553,940
LESS Local Match	($55,394)
Total Grant Amount	$498,546

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Wastewater Asset Inventory & Condition Assessment

The Village's wastewater system consists of three main components: collection system (pipes and manholes), pumping stations and force mains, and the wastewater stabilization lagoons (WWSL).

For the collection system, Spicer Group completed a mobile mapping LiDAR survey of the entire Village street network and used the survey information to develop a comprehensive wastewater collection system map and Geographic Information System (GIS). The GIS is a detailed "smart mapping" system with information databases and can be accessed on a desktop computer in the Village office or on an iPad in the field using the ArcGIS/ArcGIS Online by ESRI platform. The GIS will be utilized to view information about wastewater assets such as material, diameter, installation date, and condition as well as locating assets in the field, viewing as-builts, and updating information as necessary. This information can also be queried to provide specific lists and maps and updated easily when future improvements are made.

The Village of St. Charles' wastewater collection system consists of a network of approximately 75,400 linear feet (14.3 miles) of 3-inch to 12-inch diameter gravity and force main pipes and 259 manhole structures. Corby Energy Services (CES) completed a comprehensive cleaning and televising and inspection of the wastewater pipes and Spicer Group and CES completed a comprehensive inspection of the wastewater manholes using the National Association of Sewer Service Companies (NASSCO)

Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the defects. The MACP/PACP systems are used to standardize the identification of defects and to quantify the condition of the wastewater assets. Assets were graded for condition on a scale of 1 (Excellent) to 5 (Failing). Recommendations were made and included in the Village's Capital Improvement Plan (CIP) for future collection system improvements.

An inspection and condition assessment of the Village's three wastewater pump stations, named as follows:

- *Pump Station #1- E. Maple Street*
- *Pump Station #2- Walnut Street*
- *Pump Station #3- Entrepreneur Drive*

The E. Maple Street pump station is a critical asset and is overall in good condition. The pump station exterior including the wet well hatch, ventilation pipe, and control panel were in good working condition. This pump station was built 50 years ago and the can-style station is older infrastructure. Gate valves, check valves, flow meter, and piping received a condition score of 3, or poor. The ultrasonic flow meter is not currently working. Pump motors (15hp) received scores of 3, and motor mounts were in good condition. Pump station internal conditions including the wet well, level floats, and piping were in good to poor condition. The electrical controls and level controls are old technology and showing their age. The on-site generator and portable generator receptacle were in a good state. Pump #1 was rebuilt in 2013 and pump #2 has also been rebuilt. Rehabilitating this station has been included in the Capital Improvement Plan.

The Walnut Street pump station, which serves the schools complex, had components in poor condition and the pump station is outdated but functioning. The wet well hatch and vent pipe are in good condition. The control panel and external wet well received condition scores of 3, considered poor. This can-style pump station was built in 1971 and better, safer technology exists. Pump station internal equipment such as isolation valves and check valves, piping, and pump motors and mounts received condition scores of 3, and are beginning to show their age. Wet well concrete, piping, and level control floats are in poor condition, which is expected of a pump station this old. Both pump #1 and pump #2 were rebuilt in 2014. Rehabilitating this pump station has been included in the CIP.

The Entrepreneur Drive pump station is the newest of the three pump stations (built 1989) and in need of upgrades. The drain line connecting the valve vault and wet well is not working to drain the valve vault. The valve vault has enough standing water to make checking the condition of the valves difficult. Since the pump station was built in 1989, minimum maintenance has been performed. Wet well ductile iron piping is corroded and in very poor condition receiving a condition rating of 4. The control panel has a Raco alarm autodialer that is not connected. The site conditions including the surrounding grass lot and electrical service are good. The 5-horsepower submersible pumps were not pulled to observe condition. Rehabilitation of this pump station has been included in the CIP.

The wastewater stabilization lagoon (WWSL) contains three wastewater biological treatment cells and is located east of M-52 in the northern portion of the Village. A condition assessment was conducted in conjunction with Village Staff using the same condition scale as listed above.

Cell #1, built in 1989, was in good condition. The geotextile fabric and rip-rap were intact and preventing side slope erosion. None of the 6 aerators located in Cell #1 are currently operational. The soil side slopes of Cell #2 and Cell #3 (built 1967) are showing signs of erosion and are considered very poor, receiving a condition rating of 4. Side slope erosion can affect perimeter access drives, which are also in need of

repair due to several sections being rutted and narrow. The primary concrete influent structure, in which all of the Village's wastewater passes through prior to entering the stabilization lagoons, has defects in the concrete and is missing a proper grating cover. Also, receiving a condition rating of 4 was the WWSL effluent outfall ditch and Beaver Creek. Improper grading and capacity allowed for ponding of WWSL effluent and wetland water near the WWSL outfall and perimeter. The WWSL effluent structures are deteriorated and components within them such as gates and valves received condition scores as high as 4 and 5. Wastewater Stabilization Lagoon improvements have been included in the CIP.

In conjunction with the condition assessment, biosolids testing of the three lagoon cells was completed by Biotech Agronomics, Inc. as part of the condition assessment. This was accomplished by utilizing a "sludge judge" sampler and chemical analysis of the bio solids. A "sludge judge" sampler is a long tube that is pushed to the bottom of the lagoon collecting a vertical core sample of solids as it passes through the water column. Lab analysis determined biosolids collected from each lagoon cell met MDEQ requirements for Residuals Management Plan (RMP) and the biosolids can be recycled in a beneficial reuse program, such as land application without the use of an irrigation pump station.

Level of Service (LOS)

The next phase of the asset management plan is a Level of Service determination. What level of service does the Village want to provide to its wastewater customers? How are projects going to be prioritized and included in the CIP? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Village's Level of Service statement/goals are as follows:

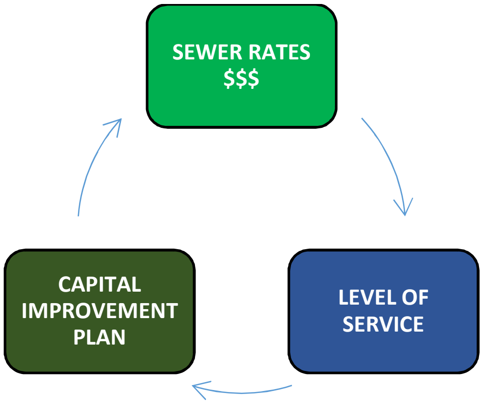
> *The Village of St. Charles strives to develop a financially stable, high performing wastewater collection, pumping and treatment service that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.*

One of the basic goals is to review the capital improvement projects to determine the best value options for the Village's customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Meet the minimum local, State, and/or Federal regulations. With minimal or no increase to the sewer rates to customers.
- "**MEDIUM**" Level of Service – Proactive projects that increase the life expectancy and reduce long-term costs, with a minimal rate increase to customers.
- "**HIGH**" Level of Service – Replacement projects that bring the system to "new" conditions, with a high rate increase to customers.

The Village of St. Charles has chosen to adopt a level of service on an individual project basis in which certain projects receive higher, or lower level of service based on necessity and cost. The Village plans to increase rates progressively and invest a minimal amount of money into the system while minimizing customer complaints and maintaining wastewater regulations.

Asset Management Plan Evaluation Process



The resulting capital improvement plan and revenue structure was one that met the Village's goals, addressed the improvements that need to be made, and maintains a sustainable rate structure for the Village's customers.

Criticality (Risk)

For each asset in the Village's wastewater system, a criticality/risk analysis was performed to determine condition and prioritize the Village's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including all pipes, manholes, pumping stations, and WWSL components. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences, if that asset failed. Finally, the Criticality (Risk) score was calculated using:

$$\textbf{RISK} = \textbf{LoF} \times \textbf{CoF}$$

The Likelihood of Failure, Consequence of Failure, and Risk scores for each asset were taken into consideration for the capital improvement projects (CIP) outlined below.

Revenue Structure

Spicer Group teamed with Municipal Analytics to prepare the revenue structure analysis for the asset management plan. Wastewater account balances, expenditures, revenues, etc. were reviewed and input into Municipal Analytics' financial software to determine if there were any deficiencies in the rates. Based on Municipal Analytics' analysis, no gap exists in the Village's current Sewer Fund.

Next, the Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion, and the rate structure to support those improvements was determined. Many iterations and scenarios were performed to find a rate structure that met the Village's Level of Service goals, fund the CIP projects that are needed, and had sustainable rates for the Village's customers. The Village council looked at the wastewater and water rate plans together and on September 11, 2019 approved a motion to adopt a 5-year rate plan of an annual increase of 10% to the Village's sewer commodity charge and adjusted sewer minimum charge. The rate structure should be reviewed annually as a part of the Village's normal budgeting process. The sewer and water utilities revenue report can be seen in Part 5 – Revenue Structure.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the asset management plan. Reviewing the results of the wastewater system Inventory & Condition Assessment, Level of Service determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. Various degrees of Level of Service and the associated CIP projects were evaluated and plugged into the Revenue Structure model, and the resulting sewer rates for that set of scenarios were reviewed. If the projected rates were too high, a lower LOS was chosen and those CIP projects were plugged into the Revenue Structure model and the resulting rates were then reviewed. The process then continued with different CIP projects at varying LOS's until an acceptable rate structure, level of service, and capital improvement plan was developed.

A CIP was developed that includes various collection system improvements including:

Collection System

- Sunview Dr. sanitary sewer improvements – M-52 to End (SAN1.33-SAN1.38) – Broken pipe
- N. Saginaw St. sanitary sewer improvements – SAN2.15-SAN2.21 – Hole in the pipe
- E. Belle Ave. sanitary sewer improvements – SAN3.93-SAN3.91 – Infiltration, Fractured pipe
- Manhole Repairs – System-wide – Budget line item of $10,000 per year for replacing frames, covers, and components and raising manholes to grade
- Cured-In-Place-Pipe Liner (CIPP) – System-wide – Budget line item $50,000 per year for a CIPP plan to line the entirety of the Village-owned system on a set year-cycle

Pumping Stations

- Pump Station #3 Improvements – Entrepreneur Drive – Valve Vault filled with water, required maintenance
- Pump Station #1 Improvements – E. Maple Street – Exceeded service life
- Pump Station #2 Improvements – Walnut Street – Exceeded service life

Wastewater Stabilization Lagoon (WWSL)

- Floating Aerators – Cell #1 – Aerators are broken – Research alternate system
- Effluent Structure Improvements – Cell #2 & Cell #3 – Broken valves, exceeded service life
- Primary Influent Structure Improvements – Central lagoon – Missing effective cover, weir gates damages, exceeded service life
- Cell #2 soil side slopes, Perimeter drives – Cell #2 – Bank erosion, narrow/rutted drives
- Cell #3 soil side slope, Perimeter drives – Cell #3 – Bank erosion, narrow/rutted drives

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Revolving Loan Section
Attention: Jonathan Berman

From: Hubbell, Roth and Clark, Inc.

CC: City of Keego Harbor

Date: November 15, 2019

Re: City of Keego Harbor
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1220-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the City of Keego Harbor. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows recent MDEQ guidance.

GRANTEE INFORMATION

City of Keego Harbor
2025 Beechmont Street
Keego Harbor, Michigan 48320

SAW Grant Project #1220-01

Project Grant Amount: $430,000

Applicant Match Amount $43,000

City of Keego Harbor	Hubbell, Roth, & Clark
Jered Ottenwess, City Manager	Karyn Stickel, P.E.
248-682-1930	248-454-6300
manager@keegoharbor.org	kstickel@hrcengr.com

EXECUTIVE SUMMARY

The City of Keego Harbor applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City of Keego Harbor owns, operates and maintains their storm system and has various tools to manage the assets, including a GIS geodatabase, condition assessment methods, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the fund balances and anticipated future funding needs.

As required by the program, this full plan and associated materials will be made available to the public for review at City Hall upon request for 15 years following the December 2019 deadline.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

STORMWATER INVENTORY

City of Keego Harbor currently uses its new Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as size, material, along with other information as needed for a given asset type. The geodatabase also includes attributes owned and maintained by other entities including Oakland County Water Recourses Commissioner (WRC), Oakland County Road Commission (RCOC), and privately-owned assets.

Condition assessment tools and protocols were developed to allow for efficient and consistent recording of asset condition. For stormwater assets, the NASSCO-compliant inspection information was collected during drain televising. The data is stored in the GIS system database and will be used to develop inspection work orders to continue to evaluate and maintain assets, such as manholes and drains.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 4,400 lineal feet of City storm pipe underwent condition assessment via cleaning and televising. Approximately 66 City manholes and other related structures were evaluated using the NASSCO inspection protocol.

CRITICALITY OF ASSETS

The City of Keego Harbor developed a baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets (storm drains and associated structures.)

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of storm gravity mains was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition.

The COF for mains was determined based on asset depth, size, proximity flood zones, and proximity to roads and intersections.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall example of LOS goals matrix was developed to consider the goals and strategies of the City of Keego Harbor.

The City of Keego Harbor strategic example Level of Service Goals included:

- Limit the presence of standing water following storm events to 48 hours.
- Maintain a GIS map of the system including condition information.
- Provide budget for Operation, Maintenance, and Improvements (OM&I).
- Respond to residential inquiries regarding ROW drainage within a reasonable time.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance can be measured at the asset level using work orders to collect data, and annual reporting of measurable to develop goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The City does not charge a stormwater utility rate; therefore, the revenue structure was not reviewed for the AMP. Improvements to the storm water system, when needed, are primarily funding through the general or road maintenance funds.

CAPITAL IMPROVEMENT PLAN

A list of capital improvement projects was developed for the City of Keego Harbor's stormwater system, using recommendations from the asset inspection process, and considerations of other system needs.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

- Excavation – $24,000
- Pipe Open Cut – $7,700
- Pipe Spot Liner – $8,000
- Point Repair – $11,000
- Stabilize Culvert – $1,500
- Heavy Clean, Pre-Post CCTV – $3,000
- Manhole Repairs – $27,850

Capital Projects, 5 to 20 years:

- Excavation – $12,000
- Pipe Open Cut – $6,000
- Pipe Spot Liner – $2,000
- Stabilize Culvert – $1,500
- Heavy Clean, Pre-Post CCTV – $3,500
- Manhole Repairs – $6,500

Stormwater Management Improvements on City Properties:

- Bank Stabilization – $18,500
- Culvert Outlet Stabilization – $7,000
- Install Riprap – $5,000
- Swale Installation – $12,000
- Rain Garden Installation – $11,500
- Pervious Pavement – $13,000
- Install New Storm Pipe – $16,000

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis as part of the annual process to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Owner's major assets include:

- 5,500 feet of 8-inch to 30-inch storm pipes
- 22 culverts
- 14 outfalls
- 2 leaching basins
- 47 catch basins
- 20 storm manholes

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date: December 31, 2019
(no later than 3 years from executed grant date)

The City of Keego Harbor certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1220-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

JERED OTTENWESS at 248-682-1930 MANAGER@KEEGOHARBOR.ORG
Name Phone Number Email

Jered Ottenwess 12-16-19
Signature of Authorized Representative (Original Signature Required) Date

Jered Ottenwess, City Manager
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Revolving Loan Section
Attention: Mr. Jonathan Berman

From: Hubbell, Roth and Clark, Inc.

CC: City of Keego Harbor
Oakland County Water Resource Commissioner (WRC)

Date: November 4, 2019

Re: City of Keego Harbor Sanitary Sewer System
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1220-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant work performed by the City of Keego Harbor. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

City of Keego Harbor
2025 Beechmont Street
Keego Harbor, Michigan 48320

SAW Grant Project #1220-01

Project Grant Amount: $366,330

Applicant Match Amount $36,633

City of Keego Harbor	Hubbell, Roth, & Clark	WRC Project Manager
Jered Ottenwess, City Manager	Karyn Stickel, P.E.	Karen Warren, P.E.
248-682-1930	248-454-6300	248-858-0958
manager@keegoharbor.org	kstickel@hrcengr.com	warrenk@oakgov.com

EXECUTIVE SUMMARY

The Oakland County Water Resource Commissioner (WRC) on behalf of the City of Keego Harbor applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes, & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City of Keego Harbor's sanitary sewer system is owned by the City and is operated and maintained by WRC. WRC has various tools used to manage the assets, including a GIS geodatabase, hydraulic model, condition assessment methods, risk and prioritization models, capacity studies, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The WRC "Common to All" approach was generally followed with in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

WASTEWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS.) CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by WRC to allow for efficient and consistent recording of asset condition. For sanitary sewer assets, a NASSCO-compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS system. Inspection work orders in the CAMS system are used for evaluation of other types of assets, such as manholes and other collection system structures.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 55,000 lineal feet of sanitary underwent condition assessment via cleaning and televising. Approximately 262 manhole and other related structures were evaluated using the NASSCO inspection protocol. Pump stations were inventoried using a WRC hierarchy template and condition assessment data was collected and input into the CAMS system.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the "Common to All" Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations and storage and treatment facilities, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, non-gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the CAMS system, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (sanitary and storm sewers) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition. For force mains, the POF was based on age.

The COF for mains and access points (sanitary sewers, force mains, and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

The POF and COF of vertical assets were calculated using a scoring matrix. The POF for vertical assets was calculated using a combination of age and physical condition collected from inspections performed. O&M protocol and performance factors were also scored and used in the calculation. In the absence of any other data, age was used to estimate POF. The COF for vertical assets was scored using a matrix of factors including: safety of public and employees, financial impact, public confidence, regulatory compliance, and firm capacity.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual LRP rate process form additional elements of the LOS.

The WRC's current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*

In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.

We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to "real world" needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing LRP rate process to prioritize projects and ensure adequate funding is available.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.
- Capital Reserve for replacement of pipes or equipment in kind or with alternate technology.

WRC worked with its internal fiscal staff to determine if the system's current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City's sanitary sewer system, using recommendations from the asset inspection process, and consideration of other system needs. This information is then used in the LRP process to determine rate needs for funding the project established.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

• Sewer Open Cut:	$82,500
• Sewer Liner:	$17,000
• Sewer Spot Liner:	$2,000
• Sewer Pressure Test:	$800
• Sewer Cement Seal Joints:	$400
• Sewer Chemical Seal Joints:	$8,000
• *Sewer Heavy Clean, Pre CCTV, Post CCTV:	$16,000
• Manhole Repair (Cover, Joints, Adjust, Replace, etc.):	$27,000
SUBTOTAL Collection System	**$153,000**

• Lift Station – Generator Replacement:	$30,000
• Lift Station – General Electric Replacement:	$15,000
• Lift Station – Pumps Replacement:	$27,000
SUBTOTAL Lift Stations	**$72,000**

Capital Projects, 5 to 20 years:

• Sewer Open Cut:	$12,000
• Sewer Spot Liner:	$6,000
• Sewer Pressure Test:	$500
• Sewer Cement Seal Joints:	$1,000
• Sewer Point Repair:	$4,000
• *Sewer Heavy Clean, Pre CCTV, Post CCTV:	$13,000
• Manhole Repair (Cover, Joints, Adjust, Replace, etc.):	$20,000
SUBTOTAL Collection System	**$56,500**
• Lift Station – Control Panel:	$195,000
• Lift Station – Electrical Service Equipment:	$44,000
• Lift Station – General Electric:	$20,000
• Lift Station – Transducer:	$16,000
• Lift Station – On Going SCADA Upgrades:	TBD
SUBTOTAL Lift Stations	**$275,000**
TOTAL 0-20 YEAR COSTS	**$557,000**

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the LRP process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The City of Keego Harbor's major assets include:

- 55,000 feet of 6-15-inch sanitary sewer pipe
- 13,000 feet of 6-10-inch forcemain
- 262 sanitary manholes
- 3 collection system pump stations

PROJECT HIGHLIGHTS

The development of this Asset Management Program for the City of Keego Harbor Sanitary System was led by WRC with assistance from HRC. The following highlights some of the more tangible outcomes from the Program development:

- Updated GIS inventory system with age, material, size, and depth information.
- Purchase of ESRI ArcGIS software and hardware.
- Cleaned and televised 50,500 lft (90%) of the system.
- Inspected 247 manholes.
- Inspected 3 pump station.
- Reviewed frequently cleaned sewers and made recommendations for FOG public education.
- Model of the sanitary system was developed to determine areas of flow restrictions.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date: December 31, 2019
(no later than 3 years from executed grant date)

The City of Keego Harbor certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1220-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: December 17, 2018.

2) Significant Progress Made: Yes or No

   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ___________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

JERED OTTENWESS at 248-682-1930 MANAGER@KEEGOHARBOR.ORG
Name Phone Number Email

Jered Ottenwess 12-16-19
Signature of Authorized Representative (Original Signature Required) Date

Jered Ottenwess, City Manager
Print Name and Title of Authorized Representative

November 2019

HRC 100 YEARS
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Revolving Loan Section,
Attn: Jonathan Berman

From: Hubbell, Roth, & Clark, Inc.

CC: Oakland County Water Resources Commissioner
Henry Graham Drainage District

Date: December 27, 2019

Re: Henry Graham Drain Drainage District
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1222-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the EGLE, formerly MDEQ, SAW Grant work performed by the Henry Graham Drain Drainage District. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

Henry Graham Drain Drainage District
One Public Works Drive, Building 95 West
Waterford, Michigan 48328

SAW Grant Project #1222-01

Project Grant Amount: $427,500

Applicant Match Amount: $42,750

Authorized Representative	Consultant Contact	Oakland County Water Resources Commissioner's Office Contact
Jim Nash, Chairman	Karyn Stickel, Associate	Mike McMahon, Chief Engineer
Henry Graham Drain	Hubbell, Roth & Clark, Inc.	(248) 858-5397
(248) 858-0958	(248) 454-6566	mcmahonm@oakgov.com
wrc@oakgov.com	kstickel@hrcengr.com	

EXECUTIVE SUMMARY

The Henry Graham Drain Drainage District applied for and received a grant to further develop an Asset Management Plan (AMP) for its stormwater system through the Michigan Department of Environment, Great Lakes, & Energy's (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. The SAW program was funded through monies appropriated for water quality. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Henry Graham Drain is operated and maintained by the Oakland County Water Resources Commissioner (WRC) on behalf of the Drainage Board of Henry Graham Drain created under Chapter 20 in Oakland County under the Drain Code. The WRC has various tools used to manage the assets it owns or operates and maintains, including a GIS geodatabase, collaborative asset management system, hydraulic models, condition assessment methods, risk and prioritization models, capacity studies, asset deterioration models, and an operating and capital improvement project prioritization model. These tools are used to guide the short and long-term strategies for WRC to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective.

The WRC "Common to All" approach was generally followed with in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

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STORMWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS.) CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by Independence to allow for efficient and consistent recording of asset condition. For stormwater assets, the NASSCO-compliant inspection information was collected during televising. The data is stored in the GIS system and will integrate with the Cityworks software to share this data to develop inspection work orders to continue to evaluate and maintain assets, such as manholes, catch basins and pipes. No open channel or detention basin inspections were completed as part of this CIP review.

As part of the grant for Henry Graham Drain, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 56,500 lineal feet of storm underwent condition assessment via cleaning and televising. Approximately 142 manhole and other related structures were evaluated using the NASSCO inspection protocol.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the "Common to All" Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (pipes and associated structures).

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (storm pipes) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition.

For manholes and other access structures, the POF is based primarily on the MACP fields cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based on just age.

The COF for mains and access points (storm and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual LRP rate process form additional elements of the LOS.

The WRC's current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*

> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*
>
> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets. *(Note that this WRC strategic goal does not apply to drainage districts because reserve budgets are not developed for these stormwater systems.)*
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ polices. Measurable: Number of violations.
- Safety if Public Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score. Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the budgeting process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data and annual reporting of measurable and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real word” needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing Long Range Plan (LRP) process to prioritize projects and ensure adequate funding is available.

The LRP process is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term. The stormwater and Drainage District funds do not currently use the LRP rate process but the overall framework is set up to accommodate these systems in the future. Revenue for the drainage districts is generated through special assessments to the benefiting public entities according to percentages established by the Drainage Board in accordance with the Michigan Drain Code, Act 40 of 1956.

CAPITAL IMPROVEMENT PLAN

The asset optimization software forecasts and prioritizes assets that require replacement in the planning period. The individual replacements can be combined into projects and scheduled with budget amounts established. This information is then used in the LRP process to determine rate needs for funding the project established. A list of capital projects was developed for the Henry Graham Drain, using recommendations from the asset optimization software, and consideration of other system needs. These projects will be constructed as funding allows.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 6 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

- Seal joints on pipe where reinforcement is visible – $102,000
- Spot Line hole on pipe– $8,000
- Manhole Repairs – $19,000

Capital Projects, 6 to 20 years:

- Seal Joints – $27,000
- Manhole Replacement – $52,000
- Construct Five (5) New Access Structures Over Triple Box Culvert – $125,000

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, periodic review of the recommendations, status of current projects, and forecasted needs will be reviewed against any available and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations should be reviewed periodically to assist with determining the funds required for the required projects.

LIST OF MAJOR ASSETS

The Henry Graham Drain's major assets include:

- 10 catch basins
- 140 manhole structures
- 6 inlets/no structure inlets
- 3 pipe outlets
- 1 flow regulator/roller gate structure
- 325' of Circular 12" pipe
- 545' of Circular 18" pipe
- 1,741' of Circular 24" pipe
- 21' of Circular 27" pipe
- 1,106' of Circular 30" pipe
- 2,794' of Circular 36" pipe
- 1,697' of Circular 42" pipe
- 3,436' of Circular 48" pipe
- 2,075' of Circular 54" pipe
- 2,901' of Circular 60" pipe
- 674' of Circular 66" pipe
- 1,018' of Circular 72" pipe
- 12' of Circular 78" pipe
- 60' of Circular 90" pipe
- 437' of Circular 96" pipe
- 1,169' of Circular 102" pipe
- 1,386' of Circular 108" pipe
- 2,665' of Circular 144" pipe
- 2,546' of Circular 156" pipe
- 4,757' of Circular 204" pipe
- 365' of Elliptical 68" x 43" pipe
- 20' of Elliptical 74" x 48" pipe
- 14' of Elliptical 58" x 91" pipe
- 40' of Elliptical 155" x 165" pipe
- 25,423' of Rectangular 171"x171" box culvert

PROJECT HIGHLIGHTS

The development of this Asset Management Program for the Henry Graham Drain Drainage District was led by HRC with assistance from the WRC Construction Drain Maintenance Division. The following highlights some of the more tangible outcomes from the Program development:

- Updated GIS inventory of system to include all age, material, and size information
- Scanned record drawing data for improve future accessibility to system information
- Inspected 98% of the storm sewer system
- Inspected 142 manhole structures
- Generated a 5 and 20-year Capital Improvement Plan (CIP) for the system.
- Developed list of high consequence crossings for incorporation into the GIS
- Reviewed access needs for the triple box culvert

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date: December 31, 2019
(no later than 3 years from executed grant date)

The **Henry Graham Drain Drainage District** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1222-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Jim Nash at 248-858-0958 wrc@oakgov.com
Name Phone Number Email

12-27-2019
Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Chairman of the Drainage Board and Oakland County Water Resources Commissioner
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Charter Township of Marquette *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1238-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 7, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jon Kangas, P.E.	(906) 228-6220 ext. 106	jonkangas@marquettetownship.org
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required)

12/31/2019
Date

Jon Kangas, P.E., Superintendent of Public Works
Print Name and Title of Authorized Representative

April 2017

Wastewater Asset Management and Capital Improvement Plan

SAW Grant No. 1238-01

December 31, 2019

Prepared for:

Marquette Township
1000 Commerce
Marquette, Michigan 49855

Website: https://marquettetownship.org/
Contact: Jon Kangas – (906) 228-6220

Prepared by:

Stantec Consulting Michigan Inc.
3754 Ranchero Drive
Ann Arbor, Michigan 48108

Executive Summary

Marquette Township (Township) was awarded a Stormwater, Asset Management and Wastewater (SAW) Grant administered by the Michigan Department of Environment, Great Lakes, and Energy (EGLE, formerly MDEQ). The purpose of this grant is to assist communities in the development and/or upgrade of their Asset Management Program (AMP). The Township retained Stantec Consulting Michigan Inc. (Stantec) to compile major elements of its AMP and develop a Capital Improvement Plan (CIP).

Asset Management Team

This Plan was developed in cooperation with the Township's Asset Management Team (AMT) which included:

- Kirk Page, Superintendent of Public Works
- Jon Kangas, Superintendent of Public Works
- Leonard Bodenus, Water Operator
- Ryan Diederichsen, Staff Planner
- Izaak Peterson, Staff Planner (former)
- Marquette Township Board
- Stantec, CIP and Asset Management Consultant
- U.P. Engineers & Architects (UPEA), Pump Station Condition Assessment
- Tunnel Vision, CCTV inspection

Asset Inventory

The Township utilizes ESRI's ArcGIS for their asset inventory which includes a record of the Township-owned pump stations, force mains, grinder pumps, gravity sewer mains and manholes, as well as other appurtenances which may not be fully populated, such as laterals. The inventory is also reflected in Cartegraph; the workorder management solution the Township has recently begun to implement. An overall review and update of this data was incorporated with this project to ensure that the CIP was compiled based on data that was complete to the extent possible based on readily available information. This included further population of the attribute information for the manholes, pipes, and pump stations (i.e., ownership, material, install date, etc.), as well as updates to reflect the observed system configurations in the field and from as built drawings.

List of Major Assets Being Tracked

- Five sanitary pump stations:
  - Bancroft & Woodridge PS
  - Center PS
  - Huron & Granite PS
  - US-41 PS
  - Wright PS

- Approximately 50,695 feet of pressure sewer piping from 1½ to 8-inches in diameter with the following material types:
    - 32% High Density Polyethylene (HDPE);
    - 47% Polyvinyl Chloride (PVC);
    - 21% Ductile Iron;
- Approximately 77,040 feet of gravity sewer pipes from 8- to 15-inches in diameter with the following material types:
    - <1% Ductile Iron;
    - 31% PVC;
    - 42% Ribbed PVC;
    - 13% Vitrified Clay;
    - 14% Reinforced Concrete;
- 321 gravity manhole structures;
- 17 Air/Vacuum Release Valves (ARV);
- 375 residential grinder pump stations with their associated structures and pumps.

Asset Inventory Sustainability

The Township will review and update the inventory on a yearly basis, or as needed, for completed wastewater system projects, system improvements, and extensions.

Risk Assessment

Risk can be described as a function of the probability of failure and the consequences of failure, and is typically represented using the following formula:

$$\text{Risk} = [\text{Probability of Failure}] \times [\text{Consequence of Failure}]$$

The condition assessment that was completed (by others) as part of this effort helps to define the probability of failure for the wastewater collection system assets. The examination of several factors, such as: impact on facility operations, impact on operator health and safety, difficulty of repair, and cost of repair, helped in determining the potential consequence of failure, or criticality, for each pump station facility and their respective components. For the linear infrastructure (i.e. pipes, manholes, ARVs), factors such as pipe size, customers served, environmental/public risk, and location led to an assessment of the consequence of failure (criticality).

Condition Ratings

As part of the AMP development, a condition rating was assigned to each of the tracked assets in the Township wastewater collection system. Condition assessment ratings were used to determine the likelihood of failure for each asset and were assigned to the assets based on a scale from 1-5:

1 = Excellent:	New or Excellent Condition - Only normal maintenance required;
2 = Good:	Minor Deterioration - Minor maintenance required;
3 = Average:	Moderate Deterioration - Moderate maintenance required;
4 = Fair:	Significant Deterioration - Significant renewal/upgrade required;
5 = Poor:	Asset Unserviceable - Replacement required OR asset poses safety risk.

Inspections

The Township hired a third-party contractor to carry out the condition assessment of the gravity sewer system in 2018 using Closed Circuit Television (CCTV) inspection. Inspections were completed for approximately 63% of the system (48,596 linear feet of pipe and 158 manholes), that met the SAW eligibility requirement of being over 20 years old. The inspections were performed using the Pipe Assessment Certification Program (PACP) and Level 2 Manhole Assessment Certification Program (MACP) standards for condition ratings, which were developed by the National Association of Sewer Service Companies (NASSCO). Stantec evaluated the inspection data that was provided for the Township's system and used it as the basis of the condition assessment for the collection system.

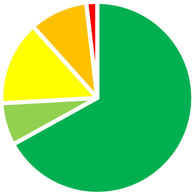
A part of this project, the township also retained UPEA to carryout condition assessment evaluations of its pump stations. A series of field visits were made by UPEA's staff in 2019. The goal of the inspections was to assess the condition of the five pump station facilities. Information on the condition of each pump station component was gathered to assess the condition of the facilities and their equipment and to advance the population of the asset inventory database as described earlier.

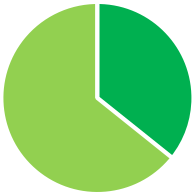
Desktop Analysis

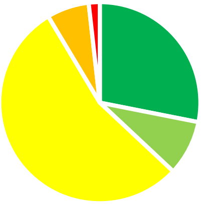
Several wastewater system assets were present that could not be inspected. Inspection of force mains is by nature invasive and expensive, and there are gravity sewers and manholes that were deemed ineligible for inspection funding through the SAW grant because they are less than 20 years old. The Township elects to track the uninspected assets (grinder pumps, pressure sewers, and select manholes and gravity sewers) via desktop analysis methods. To assign a condition assessment rating to an uninspected asset, a condition score of 1-5 was assigned based on the age of the asset.

The following tables summarize the condition (both inspected and estimated) of the Township's wastewater system:

			Component Condition Ratings				
			1	2	3	4	5
Facility	**Average Condition Rating**	**Total # of Components**	**%**	**%**	**%**	**%**	**%**
Bancroft & Woodridge PS	2.2	24	8%	79%	4%	--	8%
Center PS	1.2	19	79%	21%	--	--	--
Huron & Granite PS	2.2	22	14%	73%	5%	--	9%
US-41 PS	1.3	15	73%	27%	--	--	--
Wright PS	2.4	18	17%	44%	28%	--	11%
Grinder Pump Stations	3	781	16%	38%	12%	<1%	33%

Gravity Sewer Condition Rating	Length	%	Summary
1	51,586	67%	
2	5,506	7%	
3	10,967	14%	
4	7,565	10%	
5	1,415	2%	
TOTAL	**77,040**	**100%**	

Pressure Sewer Condition Rating	Length	%	Summary
1	18,120	36%	
2	32,575	64%	
3	0	0%	
4	0	0%	
5	0	0%	
TOTAL	**50,695**	**100%**	

Manhole and ARV Condition Rating	#	%	Summary
1	95	28%	
2	30	9%	
3	184	54%	
4	23	7%	
5	6	2%	
TOTAL	**338**	**100%**	

Criticality Ratings

A criticality rating system was developed to analyze the consequence of failure for the wastewater system assets and to determine the relative importance of the assets for the prioritization of future capital expenses. The criticality analysis was performed separately for the pump stations and the linear assets (gravity sewers and force mains), and uses a scale of 1-5, with 1 being the least critical, and 5 the most critical. Several key risk criteria were identified:

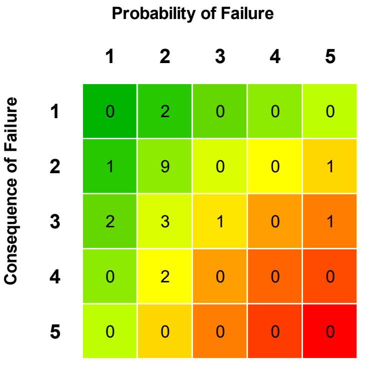
- Impact on Facility Operation
- Impact on Operator Health and Safety
- Cost of Repair
- Difficulty of Repair
- Customer Type
- Wastewater Asset Location and Size
- Redundancy

Each of the criticality criteria were assigned a weighting factor according to their relative importance as determined by the AMT. The consequence of failure for each asset was evaluated within this framework based on the qualities they possess, and an overall criticality rating was assigned to each by summing the weighted criticality scores for each of the risk criteria. For example, a large diameter force main crossing a freeway would be considered more critical than a small diameter grinder pump service line in an unimproved right-of-way. It should be noted that the criticality of the gravity sewer manholes and ARV manholes was assigned based on the criticality of the adjacent pipe since those assets are essentially inseparable from the pipe and located in the same general vicinity of the critical features (i.e. major roads, railroads, wetlands, etc.).

Risk Summary

The risk to the Township associated with the failure of an asset was estimated based on the product of the condition rating and the criticality rating, with higher scores indicating greater risk. A map of the Township wastewater collection system with the overall criticality of the force mains and gravity sewers is included in **Appendix B**. Heat maps summarizing the risk are also provided below. For each pump station and linear asset type, the number of components is indicated for each combination of Probability of Failure (condition) and Consequence of Failure (criticality) score.

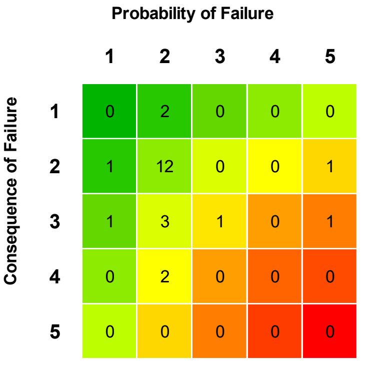
Huron & Granite PS



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	0	2	0	0	0
2	1	9	0	0	1
3	2	3	1	0	1
4	0	2	0	0	0
5	0	0	0	0	0

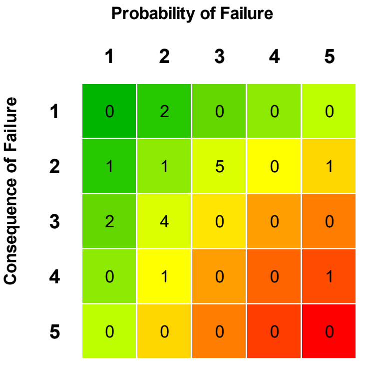
Bancroft & Woodbridge PS



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	0	2	0	0	0
2	1	12	0	0	1
3	1	3	1	0	1
4	0	2	0	0	0
5	0	0	0	0	0

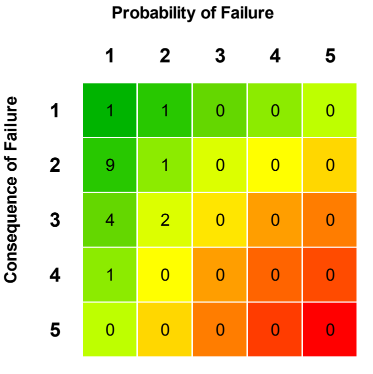
Wright Street PS



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	0	2	0	0	0
2	1	1	5	0	1
3	2	4	0	0	0
4	0	1	0	0	1
5	0	0	0	0	0

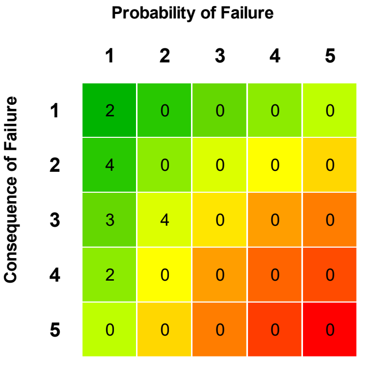
Center Street PS



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	1	1	0	0	0
2	9	1	0	0	0
3	4	2	0	0	0
4	1	0	0	0	0
5	0	0	0	0	0

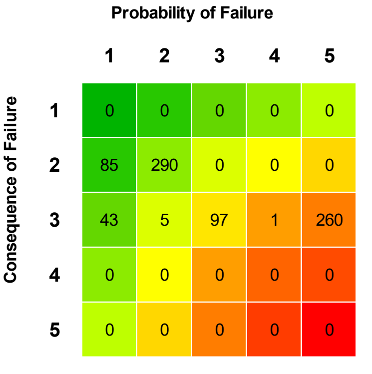
US-41 PS



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	2	0	0	0	0
2	4	0	0	0	0
3	3	4	0	0	0
4	2	0	0	0	0
5	0	0	0	0	0

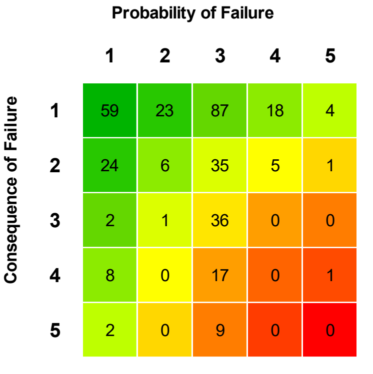
Grinder Pump Station



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	0	0	0	0	0
2	85	290	0	0	0
3	43	5	97	1	260
4	0	0	0	0	0
5	0	0	0	0	0

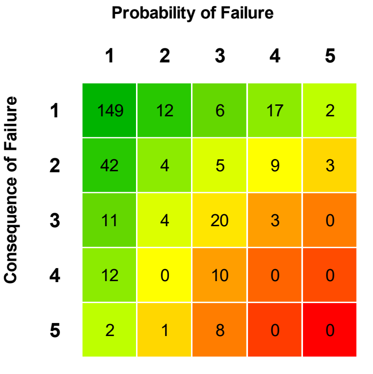
Manholes & ARVs



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	59	23	87	18	4
2	24	6	35	5	1
3	2	1	36	0	0
4	8	0	17	0	1
5	2	0	9	0	0

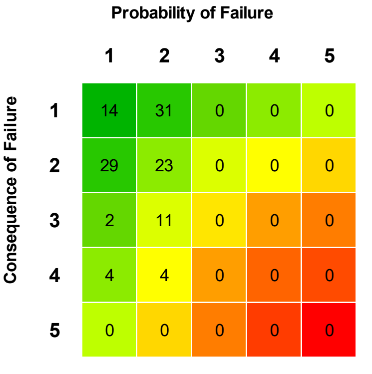
Gravity Sewer



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	149	12	6	17	2
2	42	4	5	9	3
3	11	4	20	3	0
4	12	0	10	0	0
5	2	1	8	0	0

Pressure Sewer



Probability of Failure

Consequence of Failure	1	2	3	4	5
1	14	31	0	0	0
2	29	23	0	0	0
3	2	11	0	0	0
4	4	4	0	0	0
5	0	0	0	0	0

Risk Assessment Sustainability

To ensure the sustainability of the AMP, the Township plans to track the condition of their assets and update their condition ratings as necessary in the Asset Management Supplemental Analysis Tool (AMSAT); a spreadsheet tool developed to facilitate the AMP. The AMSAT is intended to facilitate asset management planning moving forward and can be used as a stand-alone tool, or in conjunction with other systems like ESRI's ArcGIS, and Cartegraph. It provides a repository for the asset inventory, as well as a method of updating condition assessment ratings, criticality ratings, and rehabilitation or replacement costs. The work being performed by the Township on the wastewater system will be tracked using Cartegraph, which is intended to also be formatted to predict asset condition in the future, similar to the AMSAT.

The Township plans to inspect the pump station facilities annually or as needed. Condition ratings will be tracked and updated as necessary.

For force mains and any uninspected assets, the condition rating is driven by age, which will update automatically within the AMSAT, but the asset inventory and AMSAT will need to be updated if any assets are replaced, repaired, or added to the system. The AMSAT also has a provision for including future inspection condition ratings, should the uninspected sewers or manholes be inspected in the future.

Level of Service (LOS)

The Township's LOS goal is to maintain all critical assets as well as some less critical assets to provide enhanced reliability, with an emphasis on meeting the regulatory requirements set by EGLE. The AMT identified this goal as the starting point for guiding CIP and maintenance expenditures. Qualitatively, LOS can be described in three tiers: Low, Medium, and High. With a Low LOS, only the most critical components in the system, or those with the highest risk, would be proactively maintained, and with a High LOS, every asset would be maintained proactively. The Township consistently endeavors to offer a High LOS. Therefore, based on AMT feedback and for the purposes of projecting conservative CIP expenditures, a High LOS has been assumed. Quantitatively, this correlation between LOS and criticality, is defined within the AMSAT and the Township's LOS goals have an impact on the projected CIP expenditures. The Township will continue to review and refine their LOS goals moving forward.

Level of Service Sustainability

The Township plans to review and update their stated LOS goals regularly and assess the performance of their system against those goals to identify any areas that may need improvement. The Township will also examine the impact of LOS on CIP projections and may alter the LOS goals as deemed necessary.

Capital Improvement Plan

Assuming a high level of Service, a CIP has been developed using the results of the AMP analysis and is divided short-term (0-5 year) and long-term (20 year), and ongoing initiatives. A summary is provided in the table below, with initial conceptual cost opinions in 2020 dollars. It should be noted that the funding source (shown as TBD in the table) for the proposed CIP projects will be determined during the Rate

Study Evaluation process. The Township will continue to review and refine these findings moving forward.

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source
Short Term (0-5 years)	Pump Station Upgrades	Bancroft & Woodbridge PS - Replace air exchange blower, generator and sump pump	Service Life	2020	$62,500	Fund Balance
	Pump Station Upgrades	Huron & Granite PS - Replace air exchange blower, generator and sump pump	Service Life	2020	$27,500	Fund Balance
	Pump Station Upgrades	Wright Street PS - Rehab or replace transfer switch, odor control, and Pump B	Service Life	2021	$58,000	Fund Balance
	Gravity Sewer Upgrades	Sewer and Manhole Rehabilitation	Condition Rehab	2021	$513,300	Fund Balance
Long Term (5-20 years)	Pump Station Upgrades	Huron & Granite PS - miscellaneous repair/replacements per AMSAT*	Routine Maintenance; Service Life	2025-2040	$276,250	TBD
	Pump Station Upgrades	Bancroft & Woodbridge PS - miscellaneous repair/replacements per AMSAT*	Routine Maintenance; Service Life	2025-2040	$211,950	TBD
	Pump Station Upgrades	Wright Street PS - miscellaneous repair/replacements per AMSAT*	Routine Maintenance; Service Life	2025-2040	$193,400	TBD
	Pump Station Upgrades	Center Street PS - miscellaneous repair/replacements per AMSAT*	Routine Maintenance; Service Life	2025-2040	$166,900	TBD
	Pump Station Upgrades	US-41 PS - miscellaneous repair/replacements per AMSAT*	Routine Maintenance; Service Life	2025-2040	$162,400	TBD
	Gravity Sewer Upgrades	Sewer Rehabilitation per AMSAT*	Condition Rehab	2025-2040	$1,918,300	TBD
	Manhole Upgrades	Manhole Rehabilitation per AMSAT*	Condition Rehab	2025-2040	$768,700	TBD
Ongoing	Grinder Pumps	Plan to replace 25 grinder pumps per year @ $2,500/ea	Routine Maintenance; Service Life	Ongoing	$62,500 (annually)	Fund Balance
	CCTV	Plan to inspect 20% of gravity pipes and manholes per year @ $50,000/yr	Routine Maintenance; Prevention	Ongoing	$50,000 (annually)	Fund Balance

**See AMSAT for details on projected annual expenditures*

CIP Sustainability

To maintain the sustainability of the AMP, the Township plans to update the CIP project list annually as part of the yearly budget process and as work is completed or new pertinent information is available (e.g. condition assessment and LOS updates).

Funding Structure and Rate Methodology

A rate study and evaluation of the Township's funding structure has not been included in this report but will be performed separately and appended to this document. The document will address the following:

- Annual operating budget
- Current approved rate structure
- Documentation of legal authority for setting rates
- Discussion of anticipated costs (operations and capital) against revenue
- Documentation showing no funding gap

Funding Structure and Rate Methodology Sustainability

To maintain the sustainability of the AMP, the Township plans to revisit the funding structure and rate methodology to ensure that the funding is available to meet the requirements of the Township wastewater collection system.

This Plan will be presented to the Township Board as the recommended plan of action. Future updates will be listed here and attached as they become available.

EXECUTIVE SUMMARY

INRODUCTION

Waterford Charter Township applied for and was subsequently awarded a Storm water, Asset Management, and Wastewater Grant (SAW Grant) for $979,313 (with a local match of $108,812) from the Environment, Great Lakes & Energy (EGLE) Department for the purposes of development and implementation of a Wastewater Asset Management Plan (WWAMP). A Grant Agreement was entered into in November 2016 with an effective grant period from November 2016 to December 2019. Please refer to Appendix A for a copy of this grant agreement.

A WWAMP team consisting of Township elected officials, pertinent Township staff, and engineering and financial consultants assumed the mission to develop and implement a WWAMP. The final WWAMP report was placed on file at the Township Office and will be made available to the public for a period of 15 years, beginning in December 2019.

Mr. Russell Williams, Township DPW Director, has been assigned as the Authorized Representative for the SAW Grant project. His contact information is as follows: 5240 Civic Center Drive, Waterford, Michigan, 48329; (248) 618-7462.

The Charter Township of Waterford's wastewater collection system consists of gravity sanitary sewers, pressure sanitary sewers, manholes, service laterals, and pumping stations. The oldest components of the system were generally constructed in the late 1930's. Waterford Township currently discharges all sanitary flows to the Clinton-Oakland Sewage Disposal System via the Clinton-Oakland Interceptor. Partial flow from the Clinton-Oakland Interceptor is transported to the Oakland County Water Resource Commissioner (OCWRC) Wastewater Treatment Plant (WWTP) in the City of Pontiac with the rest flowing onto the Great Lakes Water Authorities (GLWA) WWTP in Detroit. Waterford Township has a purchased capacity in the Clinton-Oakland Interceptor of 37.46 cfs. The Township does not own or operate any treatment facilities.

The Waterford Township sanitary sewer collection system currently serves 27,025 customers. The total number of residential customers served is approximately 58,900 based on SEMCOG's 2010 estimate of 2.40 persons per household.

The existing municipal sewage transport/treatment/disposal facilities are described as follows:

A. Greater than 70% of all sewage flow from the Township is treated by the GLWA WWTP while the remaining 30% is treated at the OCWRC WWTP in Pontiac.
B. The sludge handling and disposal and the status of the Program for Effective Residuals Management are implemented by GLWA and OCWRC.
C. The Waterford Township collection system is comprised of sewers ranging in size from 6-inch to 60-inch diameter gravity sanitary sewers and 1.25-inch to 30-inch diameter pressure sanitary sewer mains. Low pressure sanitary sewers that are 1-inch or 1.25-

inches in diameter typically only serve one customer. The sanitary sewers range in age from over 100 years old to newly installed. Table 2 indicates the various sanitary sewer diameters and the total length for that diameter in the system. All Township flow discharges to the Clinton-Oakland Interceptor. The Township has over 80 connection points to the Interceptor. The Township also has 64 sewage pumping stations ranging in capacity from 40 gallons per minute (gpm) to 3,200 gpm.

BACKGROUND

The Township's strategic Wastewater Asset Management Plan (WWAMP) outlines the Township's plan for years 2020-2039. The WWAMP is the framework for providing the best overall strategy for asset management of the wastewater collection system and to help ensure reliable and cost-effective service to residents and businesses in the Township. It was developed to meet the EGLE SAW grant program outline requirements over a twenty (20) year planning and operational period to ensure optimal asset management and Capital Improvement Planning (CIP) for the Township's wastewater collection system infrastructure.

The five (5) core components of the WWAMP outlined in this summary are as follows:

1) Asset Inventory
2) Level of Service
3) Asset Criticality
4) Revenue Structure
5) Capital Improvement Project Plan

ASSET INVENTORY

The entire Township is served via a wastewater conveyance system that consists of gravity sanitary sewer, pressure sanitary sewer, manhole, and pumping station assets. Table 1 quantifies the Township's wastewater collection system infrastructure.

Table 1 Township Wastewater collection system Asset Inventory

System Asset	Quantity	Unit
Gravity Sanitary Sewer	1,853,686	LF
Pressure Sanitary Sewer	67,755	LF
Manholes	8,788	EA
Laterals*	27,025	EA
Pump Stations - Small (20-100 gpm)	16	EA
Pump Stations - Medium (500-115 gpm)	34	EA
Pump Stations - Large (525-2400 gpm)	13	EA

Condition Assessment/Remaining Useful Life

To perform a condition assessment, the gravity sanitary sewer and discharge manholes were inspected using the guidelines of the National Association of Sewer Service Companies (NASSCO) Sewer main/Manhole Assessment and Certification Program (PACP and MACP) standards. As part of the SAW grant project, 5% of the gravity sanitary sewer in the Township was inspected using closed-circuit television (CCTV) equipment. Discharge manholes were field-inspected using a NASSCO Level 2 inspection, photographs were taken and manhole characteristics and defects were recorded. Additionally, the remaining manholes in the system were GPS located. Pump stations were evaluated and scored with critical input and historical information provided by Department of Public Works (DPW) personnel and field assessments. Ratings of gravity sanitary sewer, manholes and pump stations were catalogued into a spreadsheet to be used for analysis, and the development of a capital improvement plan.

The NASSCO system is the North American standard for sewer mainline and manhole defect identification and assessment providing standardization and consistency to methods in which conditions are identified, evaluated, and managed. Please refer to Table 3 for the NASSCO rating system utilized to rate the sewer manholes.

The estimated remaining useful life is different for every type of asset. An asset reaches the end of its useful life when it is physically non-functioning, no longer performs as it was intended, and/or is no longer the most cost-effective solution to maintain a certain level of performance. For the purposes of the SAW grant project evaluation, the gravity sanitary sewer and manholes were estimated to have a useful life of approximately 80 years. Pumping stations were estimated to have a useful life of approximately 40 years.

LEVEL OF SERVICE

A Level of Service (LOS) plan was developed by the team members, which defines how the Township wants the wastewater collection system to perform against established operational, planning, and best management practices. The LOS standards and goals were developed with review and additional input from the Township DPW and Engineering staff. Issues addressed in the development of the LOS included:

- Is the Township ever out of compliance with regulations? If so, how often?
- How does the Township track and respond to customer needs and complaints?
- Are current O&M activities cost-effective and are they being maximized?
- How can current processes be improved?
- Are assets being properly maintained to ensure reliability and sustainability?
- How will improvement costs be funded?

In the development of the LOS goals, several tools were reviewed and analyzed, such as:

- existing and proposed land uses;
- areas of development and redevelopment;

- population trends;
- review of previous reports
- staff and consultant knowledge of the systems.

During this review, it was identified that:

- Township is anticipated to maintain the same population between now and 2040, which means future wastewater collection system capacity is not a major concern as it is serving the current population adequately even though I/I reduction efforts need to continue;

The analytical framework for the LOS is a triple bottom line approach that incorporates social, environmental, and economic criteria. The social component was divided into four indicators including customer service, reliability, health/safety and administration/organizational development. The environmental component was divided into two (2) indicators that included environmental stewardship and regulatory compliance. The economic component was centered on financial criteria. The LOS impetus was determined to be either self, customer, or regulatory driven with current and future targets identified with their respective performance measures, data, and reporting procedure.

For social indicators, customer service LOS goals focus primarily on the Township's responsiveness and efficiency (how effectively operations, maintenance, and daily tasks are performed). Reliability was determined to be the dependability of the wastewater collection system to convey flow throughout the system without sewer backups. The health and safety indicator includes the protection of the community's health and the health of Township staff maintaining the system in accordance with local, state, and federal safety standards. The administration/organizational development indicator considered the optimization of resources and reduction of overall O&M, planning, and engineering costs.

The Environmental LOS goals include environmental stewardship and regulatory compliance. The Township and its residents are committed to protecting their waterways and the environmental stewardship focuses on protecting the water quality of the rivers, creeks, and the thirty-four (34) named lakes that flow through the Township.

The regulatory compliance component focuses on complying with all the local, state, and federal regulations regarding the wastewater collection system. The Township has already taken measures to reduce overflows of wastewater into local rivers, creeks and lakes through feasibility studies, planning, and project implementation.

LOS goals for the financial indicator have been developed to ensure adequate funding is available to maintain the wastewater collection system.

A rating or color code system was developed to identify strategic areas that do not need improvement, are acceptable with additional improvement needed, and those that require improvement. Table 2 illustrates the rating/color code system.

Table 2 LOS Goals Rating System

Color Code	Rating
🟩	No Improvement Needed
🟨	Acceptable (Perhaps Some Improvement Needed)
🟥	Improvement Necessary

The Township currently primarily takes a reactive approach regarding some wastewater collection O&M activities. The Township is working to improve this through re-implementing an organized FOG program, increased inspection and continual Cityworks CMMS updates. The Township has applied for and has been successful at acquiring grants and loans for system planning and implementation and will continue to seek local, state, and federal funding to help meet its needs. To optimize improvements, the Township will also continue to coordinate utility infrastructure, including wastewater, water, and stormwater infrastructure, with road improvements projects to maximize reinvestment dollars and reduce long term capital costs.

By instituting a WWAMP, which includes conducting condition assessments and determining the criticality of assets, the Township can embark on a proactive approach to managing wastewater collection system assets. The effort will also assist the DPW to prioritize project development, reduce overall project costs and improve project planning and management. The Township's approach to wastewater collection system improvements will now also include assessments of other Township owned and operated utilities including water main, roads and storm sewer in the planning areas to optimize infrastructure improvements, which will lower individual stand-alone project costs and disruption to residents and businesses.

ASSET CRITICALITY

The criticality of wastewater collection system assets including gravity sanitary sewer, manholes, pressure sanitary sewer and pumping stations were examined in regard to their overall functional importance to the operation of the wastewater collection system and their impacts if they failed. To determine the criticality of wastewater collection system assets, a Business Risk Evaluation (BRE) was performed by analyzing the Consequence of Failure (COF) and Probability of Failure (POF) for each wastewater collection system asset.

The COF was determined for gravity sanitary sewers using the following factors:

- Economic Impacts (Diameter of Sewer, Surface Type Above Sewer, Depth of Sewer)
- Environmental/Regulatory Compliance (Distance to Surface Water)
- Social/Community Disruption (Number of Customers, Roadway Impact)

The COF was determined for manholes using the following factors:

- Economic Impacts (Diameter of Manhole, Surface Type Around Asset, Depth of Manhole)
- Environmental/Regulatory Compliance (Distance to Surface Water)
- Social/Community Disruption (Number of Customers, Roadway Impact)

The COF was determined for pressure sanitary sewers using the following factors:

- Economic Impacts (Diameter of Sewer, Surface Type Above Sewer, Depth of Sewer)
- Environmental/Regulatory Compliance (Distance to Surface Water)
- Social/Community Disruption (Roadway Impact)

The COF of the pump stations were determined by analyzing the number of upstream customers impacted in the event a pump station was out of service and the distance to the nearest body of water, as an asset further away from surface water is less critical because there is more time to contain and mitigate a Sanitary Sewer Overflow (SSO) if one occurs.

Each of the weighting factors were reviewed and agreed upon by Township staff. Social/Community Disruption was scored at 55% of the COF determination for manholes, 45% for gravity sanitary sewers, and 20% for pressure sanitary sewers. The more customers out of service due to a wastewater collection system failure, the more severe the situation. As service is disrupted to a larger number of residents and businesses, additional costs are also incurred to reroute and bypass sewage flow and associated time to set up temporary pumping equipment and to notify the public in an expedient manner.

Environmental/Regulatory Compliance was established as 20% of the COF for manholes, gravity sanitary sewers, and pressure sanitary sewers. It is assumed that, if community disruptions are kept to a minimum, the Township will remain in compliance with environmental and regulatory standards. Non-compliance can result in the need for public notification, fines and consent orders to eliminate the problem from reoccurring. Additionally, a wastewater collection system asset further away from surface water is less critical because there is more time to contain and mitigate an SSO if one occurs.

Replacement costs of a section of gravity sanitary sewer, a manhole, and pressure sanitary sewer are directly related to the diameter of the asset, the type of surface above the asset, and the depth of the asset. . Please refer to Table 3 below for the assigned scores for gravity manholes and gravity sanitary sewer and pressure manholes and gravity sanitary sewer.

Table 3 Economic Impact Weighting Factors

Gravity Manholes	Gravity Sanitary Sewer	Pressure Sewer
Diameter – 5% Depth of Manhole – 10% Surface around Manhole – 10%	Diameter – 20% Depth of Pipe – 10% Surface above Asset – 5%	Diameter – 15% Depth of Manhole – 5% Surface above Manhole – 10%

Each asset was assigned an overall COF rating of 1 to 5, with a rating of 1 being a slight effect to 5 being a severe disruption to the wastewater collection system.

The POF was determined for each asset using the following factors:

Manholes

- Ratings were assigned to manholes using a combination of 80% based on the age and 20% based on the material.

Gravity Sanitary Sewer

- Structural Condition Rating – Condition ratings were assigned to gravity sanitary sewers based on the structural scores, and if the sewers were not inspected, then a combination of 60% based on the sewer age and 40% based on the sewer material

  The structural score was determined for gravity sanitary sewers using the following factors:

  - NASSCO Structural Rating of the sanitary sewer
  - NASSCO O&M Rating of the sanitary sewer

Pressure Sanitary Sewer

- Ratings were assigned to pressure sanitary sewers using a combination of 70% based on the sewer age, 25% based on the sewer material, and 5% based on the pressure rating of the sewer

Pumping Stations

- Ratings were assigned to pumping stations based on the age of the station

Manhole condition was assessed based upon the age and corresponding remaining useful life of each pumping station. Manhole age ratings were assigned on a 1-5 scale, with a rating of 1 indicating 80%-100% useful life remaining, and a rating of 5 indicating 0-20% useful life remaining. Manhole condition was also assessed based on the material the manhole was made of.

The structural condition of a gravity sanitary sewer is important given that the wastewater collection system infrastructure is designed to be a sealed system with breaks, or openings, in the sealed system resulting in increased I/I and greater costs to convey and treat the resultant flows. Gravity sanitary sewer structural condition scoring was utilized for the POF to account for the increased likelihood of catastrophic failure for assets in poor condition.

The structural condition of a gravity sanitary sewer is directly related to the remaining useful life. As the greater amount of structural damage to a structure, the sooner the sanitary sewer is likely to fail. An overall POF rating of 1 to 5 was assigned to each sanitary sewer based on asset NASSCO structural score with a rating of 1 being excellent condition and 5 being unserviceable.

Pumping station condition was assessed based upon the age and corresponding remaining useful life of each pumping station. Each pumping station was estimated to have a useful life of 40 years. Pumping station condition ratings were assigned on a 1-5 scale, with a rating of 1 indicating 80%-100% useful life remaining, and a rating of 5 indicating 0-20% useful life remaining. Pumping station performance was assessed using information from pump station maintenance records, DLZ-J&A experience with Township pumping stations, and input from Township DPW staff. Based on this information, pumping station performance ratings were assigned a 1-5 scale. The performance and condition rating for each pumping station was weighted 50% to develop an overall POF for each pumping station. An overall POF rating of 1 to 5 was assigned to each asset, with a rating of 1 being excellent condition and 5 being unserviceable.

Comprehensive BRE's were developed for manholes, gravity sanitary sewer, pressure sanitary sewer and pumping stations. Based on asset scoring, a total BRE score was developed, which is the mathematical product of COF and POF. The BRE score was utilized to rank overall wastewater collection system assets, determine areas of concern, and to guide operation and maintenance and timing of CIP project development. Table 8 provides an outline of the BRE scale.

Based on BRE analysis, there were six (6) manholes, nineteen (19) gravity sanitary sewers, and two (2) pressure sanitary sewers that were rated critical. Additionally, six-hundred fifty (650) gravity sanitary sewers, seven-hundred thirteen (713) manholes, and twenty-five (25) pressure sanitary sewers, were rated high risk.

REVENUE STRUCTURE

As required by the SAW Grant Implementation Project guidelines, a non-detailed wastewater collection system revenue/expense budget review was developed and submitted to the EGLE prior to the June 2019 deadline. The review was conducted by financial consultant, BakerTilly. Upon completion of the review, BakerTilly submitted a "*Schedule of 2018/19 Budgeted Operating Expenses and Adjustments*" to the EGLE for review and approval. The required review indicated no wastewater collection system revenue gap and the Township subsequently received an October 17, 2019 letter from the EGLE affirming the Township had successfully fulfilled the significant progress requirement and that they were in compliance with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994, PA 451, as amended.

Projected twenty (20) year planning period wastewater collection system annual capital projects are as low as $1,339,000 in 2020 and as high as $3,117,000 in 2038 with budget generally increasing each year. It must be pointed out that the CIP funding outline over the twenty (20) year planning period does not include unforeseen infrastructure projects, emergencies or repairs and rehabilitations that will be needed as the wastewater collection system is inspected and continues to age. Annual maintenance activities in the WWAMP that are comprised of gravity sanitary sewer cleaning and inspection, root control, and FOG program are expected to start at $130,000 annually and increase over time to $235,000 in 2039. It is recommended that as further system information is gained, the information be used to update the annual O&M expense projections over the twenty (20) year planning period.

A financial forecasting model was also developed using Township budget information and the WWAMP developed CIP as part of the SAW Grant to review Township funding and financing alternatives over the twenty (20) year planning period. As part of the forecasting model development, it is recommended and a best management practice, to review the water and sewer rates every 2-3 years to determine their ability to provide the necessary funding for wastewater collection system O&M, CIP activities and debt retirement obligations. As these reviews are completed, the information can be updated into the forecasting model over the twenty (20) year planning period to provide an accurate and comprehensive financing dashboard that outlines the Township's alternatives for funding necessary O&M, CIP and debt retirement.

CAPITAL IMPROVEMENT PROJECT PLAN

Using the information obtained during the SAW grant asset inventory and assessment phases, a recommended CIP outline for the twenty (20) year planning period was developed to identify and outline cost and timelines related to the repair and replacement of gravity sanitary sewer, manhole, pressure sanitary sewer and pumping station equipment to ensure reliable operation of the wastewater collection system and to meet new and existing LOS goals.

It is recommended that the Township develop a comprehensive Infrastructure Management Plan (IMP) that encompasses coordinating road, water, and sewer infrastructure repairs and replacements for the entire Township. Coordination efforts and planning with other Township infrastructure work over the twenty (20) year planning period can be completed using the Township's GIS along with Road Pavement Surface Evaluation and Rating (PASER) ratings, and SAW work that has been completed. As the wastewater collection system infrastructure is continually inspected, this information will continue to be implemented into the GIS and evaluated to further enhance CIP and wastewater asset planning and coordination.

Table 4 contains a summary of costs associated with each asset class for the CIP projects identified over the twenty (20) year planning period.

Table 4 Capital Improvements & O&M

Item Description	Cost
Capital Improvement Costs	
Manhole Rehabilitation	$2,290,000
Gravity Sanitary Sewer Relining	$18,950,000
Pump Rehabilitation / Replacement	$10,160,000
Pumping Station Generators	$3,300,000
Pump Station Electrical Panel Replacement	$2,900,000
Pressure Sanitary Sewer Replacement	$5,990,000
Capital Improvement Sub-Total	**$43,590,000**
Operation & Maintenance Costs	
Clean & Inspect Wastewater Collection System	$2,750,000
Root Control	$350,000
FOG Program	$550,000
Operations & Maintenance Sub-Total	**$3,650,000**
Wastewater collection system Total	**$47,240,000**

SUMMARY

The Township's WWAMP has been designed and constructed to provide a living and dynamic framework to provide the most cost effective, efficient and accountable wastewater collection system service to the residents and businesses. The analysis framework consists of five (5) main asset management components: Asset Inventory, Level of Service, Critical Assets, Revenue Structure, and the Capital Improvement Project Plan. The asset inventory and condition assessment were based on as-built information supplemented with field inspection, asset location and metering information.

Three (3) LOS goal criteria levels including social, environmental and economic were developed to provide an effective framework to gauge program performance. Each level has identified service and goal criteria that can be improved upon. The BRE was based on the product of COF and POF scores, which include economic impacts, regulatory compliance, community disruption, operational condition and structural condition. The analysis provided the basis, over the twenty (20) year planning period, to develop a realistic CIP to cost effectively provide needed wastewater collection system asset repair, replacement and O&M improvements.

The WWAMP also included the development of an accurate and comprehensive GIS that includes a geometric network of the wastewater collection system and calibrated hydraulic sewer model as well as asset attribute information including asset diameter, date of installation, rim and invert elevations, electronic as-built drawings, lead locations and photos. The GIS and existing CMMS are also developed to be mobile, enabling staff to utilize and interact with the information in the field using laptops or other mobile devices including tablets and smart phones. These innovative implementations will provide Township staff, and management, with powerful cost tracking, scheduling and project development capabilities to allow continual updating of the CIP.

CONCLUSIONS

The Asset Inventory effort revealed that, overall, the Township's wastewater collection system is in fair condition and that the Township will continue finding ways to provide necessary staff and funding to ensure reliable long-term wastewater collection system services to the residents and businesses. The CIP development has identified a range of recommended CIP improvements ranging from $1,339,000 to $3,117,000 annually and an additional annual $130,000 to $235,000 annually for identified O&M activities. As the WWAMP is deployed and additional wastewater collection system inspection information is obtained and created, the Township's GIS and WWAMP can methodically be updated to modify CIP planning and O&M priorities over the twenty (20) year planning period and beyond.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Charter Township of Waterford *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1241-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: October 17, 2019
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Russell D. Williams	at	(248) 618 7462	rwilliams@waterfordmi.gov

Russell D Williams 12/19/19
Signature of Authorized Representative (Original Signature Required) Date

Russell D Williams DPW Director
Print Name and Title of Authorized Representative

April 2017

Johnson&Anderson
A DLZ Company

December 20, 2019

Mr. Eric Pocan, Project Manager
Michigan Department of Environment, Great Lakes & Energy
Office of Drinking Water and Municipal Assistance – Revolving Loan Section
P.O. Box 30817
Lansing, Michigan 48909-8311

Re: Charter Township of White Lake SAW Grant #1244-01
Wastewater Asset Management Plan (WWAMP) Executive Summary &
Certificate of Project Completeness

Dear Mr. Pocan:

On behalf of White Lake Township, we are pleased to provide you with the Township's Wastewater Asset Management Plan Executive Summary, signed Certificate of Project Completeness, and the Baker Tilly cash flow analysis for your files.

The Township certifies that they have completed all of the wastewater asset management plan activities as specified in their SAW Grant No. 1244-01.

A copy of the WWAMP will be available to the public in the coming weeks.

Don't hesitate to contact us if you have any questions or need anything further at this time.

Sincerely,
Johnson & Anderson, Inc., a DLZ Company

Laura M Gruzwalski

Laura M. Gruzwalski
Environmental Analyst
(248) 681-7800
lgruzwalski@dlz.com

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 31, 2019**
(no later than 3 years from executed grant date)

The **Charter Township of White Lake** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1244-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: **October 17, 2019**.

2) Significant Progress Made: [✓ Yes] or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Rik Kowall at **(248) 698-3300** **rkowall@whitelaketwp.com**
Name Phone Number Email

Rik Kowall 12-19-2019
Signature of Authorized Representative (Original Signature Required) Date

Rik Kowall, Township Supervisor
Print Name and Title of Authorized Representative

April 2017

EXECUTIVE SUMMARY

INTRODUCTION

The Charter Township of White Lake (Township) applied for and was subsequently awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant for $570,514.00 with a local match of $57,051.00, from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) for the purposes of development and implementation of a Wastewater Asset Management Plan (WWAMP). A Grant Agreement between the Township and the EGLE was entered into in December 2016 with an effective grant period from January 2017 to December 2019. Johnson & Anderson, Inc., a DLZ Company, was contracted to assist the Township with the WWAMP implementation project.

A project team consisting of pertinent Township staff as well as engineering and financial consultants undertook the mission of developing and implementing the WWAMP with the final goal of receiving approval from the EGLE. The final WWAMP report will be placed on file at the Township Office and made available to the public for a period of 15 years, beginning in December 2019.

Mr. Rik Kowall, Township Supervisor, has been assigned as the Authorized Representative for the SAW Grant project. His contact information is as follows: 7525 Highland Road, White Lake, Michigan, 48383; (248) 698-3300.

The Charter Township of White Lake wastewater collection system is comprised of both pressure sanitary sewers and gravity sanitary sewers (approximately 41 miles), serving 4,500 people (approximately 15% of the Township's population). The system generally flows from north to south, utilizing 10 sanitary sewage pumping and 629 grinder stations (approximately 27 of which are commercial), 774 gravity laterals and 625 pressure laterals. The wastewater flow is ultimately discharged into Commerce Township's collection system and is conveyed to the Commerce Township Wastewater Treatment Plant for treatment.

The (10) pumping stations that are owned and operated by the Township are:

1. Village Lakes
2. White Lake Estates
3. Williams Lake Road
4. Suburban Knolls
5. White Lake Market Place
6. Cranberry Lake Estates
7. Worthington Crossings
8. Bocavina
9. Meijer

10. Kroger

The Oakland County Water Resources Commissioner's Office (WRC) has a contractual agreement with the Township to operate and maintain the Township's wastewater collection system. The Township desires to proactively manage the wastewater collection system assets in a cost-effective manner because:

- these assets represent a major public investment and trust;
- well-run utilities are important for economic development;
- asset management promotes efficiency and accountability in the operation of the system;
- these assets provide an essential customer service; and
- proper management of the assets provides the basis for self-sufficiency.

Due to the young age of the system, none of the collection system was televised as part of this project. Five hundred and ninety (590) sewer manholes (76.5% of the wastewater system) were GPS located and assessed; all 10 pumping stations were inventoried; and WRC CCTV data from previous years was incorporated into GIS and Cityworks as part of this assignment. In addition, all manhole assessment videos and photos generated through the SAW project were incorporated into GIS and Cityworks for easy retrieval.

BACKGROUND

The Township's strategic timeframe for the WWAMP is for planning years 2020-2039. It outlines the framework to provide proactive asset management guidance and planning of the wastewater collection system. It was developed to meet the EGLE SAW grant program outline requirements over a twenty (20) year planning and operational period to ensure optimal asset management and Capital Improvement Planning (CIP) for the Township's wastewater collection system infrastructure.

The five (5) core components of an EGLE approvable WWAMP are listed as follows:

1) Asset Inventory
2) Level of Service
3) Asset Criticality
4) Revenue Structure
5) Capital Improvement Project Plan

ASSET INVENTORY

Approximately 15% of the Township is served with a wastewater collection system that consists of pressure and gravity main, gravity and pressure manhole, and pumping station assets.

A total 590 sewer manholes were inventoried and located with a GPS and Robotic Total Station to establish State Plan Coordinates (northing, easting, and elevation of rims and inverts). These asset types and locations were then incorporated into the Township's GIS. The Township's base GIS information includes parcels, road centerline, and other feature layers.

Several manholes that were initially in the Township's GIS were located but could not be inspected due to: vehicles parked over the structures, structures within the roadway that were eventually paved over, lids that were bolted down, etc. Of the manholes that were GPS located and assessed, 171 manholes were buried, could not be located, or the manhole cover bolts were damaged, preventing access.

Condition Assessment/Remaining Useful Life

To perform a condition assessment, eligible sewer main and manholes were inspected using the guidelines of the National Association of Sewer Service Companies (NASSCO) Pipe/Manhole Assessment and Certification Program (PACP) standards. This system is the North American standard for pipeline and manhole defect identification and assessment, providing standardization and consistency to methods in which conditions are identified, evaluated, and managed. Under the SAW grant, sewer main older than twenty (20) years of age were eligible to be inspected using closed-circuit television (CCTV) equipment. Approximately 590 manholes were inspected using NASSCO standards.

This NASSCO system is the North American standard for pipeline and manhole defect identification and assessment providing standardization and consistency to methods in which conditions are identified, evaluated, and managed.

An asset reaches the end of its useful life when it is physically non-functioning, no longer performs as it was intended, and/or is no longer the most cost-effective solution to maintain a certain level of performance. The estimated remaining useful life is different for every type of asset. For the purpose of the SAW grant project evaluation, the wastewater collection system sewer mains were estimated to have a useful life of approximately 80 years.

LEVEL OF SERVICE

A Level of Service (LOS) plan was developed by the team members, which defines how the Township wants the wastewater collection system to perform against established operational, planning, and best management practices. The LOS standards and goals were developed with review and input from the Township DPS staff. Issues addressed in the development of the LOS included:

- Is the Township ever out of compliance with regulations? If so, how often?
- How do the Township and WRC track and respond to customer needs and complaints?
- Are current staffing levels sufficient to provide proper customer service?
- Are current O&M activities cost-effective and are they being maximized?
- How can current processes be improved?

- Are assets being properly maintained to insure reliability and sustainability?
- How will improvement costs be funded?

In the development of the LOS goals, several tools were reviewed and analyzed, such as:

- existing and proposed land uses;
- areas of development and redevelopment;
- population trends and population loss;
- review of previous reports and studies; and
- staff and consultant knowledge of the systems.

During this review, it was identified that better coordination with the County is needed to more efficiently and effectively clean and televise the Township sanitary sewer assets and track the costs of repairing and maintaining specific assets and performance against targets.

The analytical framework for the LOS is a triple bottom line approach that incorporates social, environmental, and economic criteria. The social component was divided into four indicators including customer service, reliability, health/safety and administration/organizational development. The environmental component was divided into two (2) indicators that included environmental stewardship and regulatory compliance. The economic component was centered on financial criteria. The LOS impetus was determined to be either self, customer, or regulatory driven with current and future targets identified with their respective performance measures, data, and reporting procedure.

For social indicators, customer service LOS goals focus primarily on the Township's responsiveness and efficiency (how effectively operations, maintenance, and daily tasks are performed with limited staff and budget). Reliability was determined to be the dependability of the wastewater collection system to convey flow throughout the system without sewer backups. The health and safety indicator includes the protection of the community's health and the health of Township staff maintaining the system in accordance with local, state, and federal safety standards. The administration/organizational development indicator considered the optimization of resources and reduction of overall O&M, planning, and engineering costs.

The Environmental LOS goals include environmental stewardship and regulatory compliance. The regulatory compliance component focuses on complying with all the local, state, and federal regulations regarding the wastewater collection system.

LOS goals for the financial indicator have been developed to ensure adequate funding is available to maintain the wastewater collection system.

A rating or color code system was developed to identify strategic areas that do not need improvement (green), are acceptable with additional improvement needed (yellow), and those that require improvement (red). Please refer to Table 1 on the following page for the LOS rating system.

Table 1 LOS Goals Rating System

Color Code	Rating
🟩	No Improvement Needed
🟨	Acceptable (Perhaps Some Improvement Needed)
🟥	Improvement Necessary

As part of its mission, the Township strives to provide reliable wastewater services at the minimum cost necessary to meet environmental and health regulations. The LOS plan has also been developed to reinforce the Mission Statement developed by the Township, which is outlined below:

Strive for a sustainable Township that balances the community's economic, environmental, and social needs. Promote the identity of White Lake Township as a small country town with City amenities by protecting and preserving natural features, encouraging redevelopment of obsolete properties, and directing growth and redevelopment to a central community core.

By instituting a WWAMP, which includes conducting condition assessments and determining the criticality of assets, the Township can embark on a proactive approach to managing wastewater collection system assets. The effort will also assist the DPS to prioritize project development, reduce overall project costs, and improve project planning and management. The Township's approach to wastewater collection system improvements will now also include assessments of other Township owned and operated utilities including water main in the planning areas to optimize infrastructure improvements, which will lower individual stand-alone project costs and disruption to residents and businesses.

ASSET CRITICALITY

The criticality of wastewater collection system assets including gravity and pressure sewer main, gravity and pressure sewer manholes, and pumping stations were examined in regard to their overall functional importance to the operation of the wastewater collection system and their impacts if they failed. To determine the criticality of system assets, a Business Risk Evaluation (BRE) was performed by analyzing the Consequence of Failure (COF) and Probability of Failure (POF) for each asset.

The COF was determined for sewer mains and manholes using the following factors:

- Economic Impacts (Diameter of Asset, Surface Type Above Asset)
- Environmental/Regulatory Compliance (Distance to Surface Water)
- Social/Community Disruption (Number of Customers, Roadway Impact)

Each of the weighting factors were reviewed and agreed upon by Township staff. Social/Community Disruption was scored at 50% of the COF determination for gravity manholes and 45% for gravity sewer mains. The more customers out of service due to a wastewater collection system failure, the more severe the situation. As service is disrupted to a larger number of residents and businesses, additional costs are also incurred to reroute and bypass sewer mains, set up temporary pumping equipment, and to notify the public in an expedient manner. Sewer mains associated with critical business facilities and roadway areas are also an important component of this analysis. For pressure manholes, the COF determination for Social/Community Disruption was 55% and for pressure mains, the determination was 45%.

Environmental/Regulatory Compliance was established as 20% of the COF for gravity and pressure manholes and gravity mains. For pressure mains, the COF determination for Environmental/Regulatory Compliance was 40%. It is assumed that, if community disruptions are kept to a minimum, the Township will remain in compliance with environmental and regulatory standards. Non-compliance can result in the need for public notification, fines and consent orders to eliminate the problem from reoccurring. Additionally, a wastewater collection system asset further away from surface water is less critical because there is more time to contain and mitigate a Sanitary Sewer Overflow (SOS) if one occurs.

Replacement costs of a section of sewer main and a sewer manhole are directly related to the diameter of the sewer main or manhole, the manhole depth, and the type of surface above the asset. Please refer to Table 2 below for the assigned scores for gravity manholes and sewer main and pressure manholes and sewer main.

Table 2 Economic Impact Weighting Factors

Gravity Manholes	Gravity Sewer	Pressure Manholes	Pressure Sewer
Diameter – 10% Depth of Manhole – 15% Surface around Manhole – 5%	Diameter – 20% Depth of Pipe – 10% Surface above Asset – 5%	Surface above Manhole – 5%	Diameter – 30% Surface above Main – 5%

Each sewer main and manhole were assigned an overall COF rating of 1 to 5, with a rating of 1 being a slight effect to 5 being a severe disruption to the wastewater collection system.

The POF was determined for sewer mains using the following factor:

- Structural Condition Rating – Condition ratings were assigned to wastewater mains based on WRC CCTV data, pipe age, pipe material, and hydrogen sulfide concern

The POF was determined for sewer manholes using the following factor:

- NASSCO Structural Rating of the manhole

The structural condition of a sewer main is important given that the wastewater collection system infrastructure is designed to be a sealed system with breaks, or openings, in the sealed system resulting in increased I/I and greater costs to convey and treat the resultant flows. Sewer main structural condition scoring was utilized for the POF to account for the increased likelihood of catastrophic failure for assets in poor condition. An overall POF rating of 1 to 5 was assigned to each sewer main based on structural condition with a rating of 1 being excellent condition and 5 being unserviceable.

The structural condition of a sewer manhole is directly related to the remaining useful life. As the greater amount of structural damage to a structure, the sooner the manhole is likely to fail. An overall POF rating of 1 to 5 was assigned to each sewer manhole based on asset NASSCO structural score with a rating of 1 being excellent condition and 5 being unserviceable.

An overall POF rating of 1 to 5 was assigned to each force main and pumping station, as well as the WPCF, with a rating of 1 being excellent condition and 5 being unserviceable.

Comprehensive BRE's were developed for gravity and pressure sewer main and gravity and pressure manholes. The BRE's were created using sewer main age and NASSCO ratings for the sewer manholes and a COF and POF scoring matrix model. Based on asset scoring, a total BRE score was developed, which is the mathematical product of COF and POF. The BRE score was utilized to overall rank wastewater collection system assets, determine areas of concern, and to guide operation and maintenance and timing of CIP project development.

Based on BRE analysis, there were fourteen (14) sewer mains and seven (7) sewer manholes that were rated critical. Additionally, forty-five (45) sewer mains and ten (10) manholes were rated high risk. The critical and high-risk sewer mains are scheduled for rehabilitation or continued inspection as part of the Township's twenty (20) year CIP program. Manhole rehabilitation funding and scheduling will need to be created during the twenty (20) year planning period and has been outlined in the CIP.

REVENUE STRUCTURE

As required by the SAW Grant Implementation Project guidelines, a non-detailed wastewater collection system revenue/expense budget review was developed and submitted to the EGLE prior to the August 2019 deadline. The review was conducted by financial consultant, Baker Tilly. Baker Tilly submitted a "*Schedule of 2019 Budgeted Operating Expenses and Adjustments*" to the EGLE for review and approval. The required review indicated no wastewater collection system revenue gap and the Township subsequently received a October 17, 2019 letter from the EGLE affirming the Township had successfully fulfilled the significant progress requirement and that they were in compliance with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994, PA 451, as amended.

Projected twenty (20) year planning period wastewater collection system annual capital projects are $772,188 in 2020 and as high as $1,419,628 in 2025 and almost always between $554,070 and $1,390,000. It must be pointed out that the CIP funding outline over the twenty (20) year planning period does not include unforeseen infrastructure projects, emergencies or repairs and rehabilitations that will be needed as the sanitary sewer main system is inspected and continues to age.

A financial forecasting model was also developed using Township budget information and the WWAMP developed CIP as part of the SAW Grant to review Township funding and financing alternatives over the twenty (20) year planning period. As part of the forecasting model development, it is recommended, and a best management practice, to review the water and sewer rates every 2-3 years to determine their ability to provide the necessary funding for wastewater collection system O&M, CIP activities and debt retirement obligations. As these reviews are completed, the information can be updated into the forecasting model over the twenty (20) year planning period to provide an accurate and comprehensive financing dashboard that outlines the Township's alternatives for funding necessary O&M, CIP, and debt retirement.

CAPITAL IMPROVEMENT PROJECT PLAN

Using the information obtained during the SAW grant asset inventory and assessment phases, a recommended CIP outline for the twenty (20) year planning period was developed to identify and outline cost and timelines related to the repair and replacement of sewer main, manhole, and pumping station equipment to ensure reliable operation of the wastewater collection system and to meet new and existing LOS goals.

The largest recurring component of the annual budget costs for the wastewater collection system CIP is gravity main repairs. It is recommended that the Township develop a comprehensive Infrastructure Management Plan (IMP) that encompasses coordinating water and sewer infrastructure repairs and replacements for the entire Township. Continuing coordination with WRC is needed to ensure efficiency. As the remaining portion of the Township wastewater collection system infrastructure is inspected over the twenty (20) year planning period, this information should also be implemented into the GIS and evaluated to further enhance CIP and wastewater asset planning and coordination.

The Oakland County Water Resources Commissioner's Office intends to implement an annual sewer main cleaning and televising program; therefore, monies are allocated in the CIP for further CCTV of the Township's system.

Table 3 on the following page contains a summary of costs associated with each asset class for the CIP projects identified over the twenty (20) year planning period.

Table 3 Capital Improvements & O&M

Item Description	Cost
Capital Improvement Costs	
Gravity Manhole Repairs	$444,000
Pressure Manhole Repairs	$298,000
Gravity Main Repairs	$9,531,000
Pressure Main Repairs	$4,910,000
Capital Improvement Subtotal	**$15,181,000**
Operation & Maintenance Costs	
OCWRC CCTV of Sanitary Sewer	$1,341,000
Pumping Station Improvements	$1,973,000
Elizabeth Lake Road/Oxbow Road Odor Control Program	$826,000
FOG Program	$20,000
Operations & Maintenance Subtotal	**$4,160,000**
Wastewater System Total	**$19,341,000**

OHM
Advancing Communities®

December 18, 2019

Clarence Jones
Project Manager
Revolving Loan Section
EGLE – Drinking Water and Municipal Assistance Division
PO Box 30241
Lansing, MI 48909-7741

RE: Alma SAW - Wastewater AMP
SAW Deliverable Submittal for SAW Grant No. 1245-01

Dear Mr. Jones:

Enclosed you will find the deliverables for Alma's SAW grant deliverables, including the signed Certificate of Project Completeness and an AMP summary. The AMP will be available to EGLE upon request, and a copy will be available to the public (by request, at the City offices, or on the City website).

Please inform us if you have comments on this AMP document, or have any other questions related to this SAW grant.

Sincerely,
OHM Advisors

John Tanner, PE
Project Manager

Encl: SAW Wastewater Asset Management Plan

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Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/1/2019
(no later than 3 years from executed grant date)

The City of Alma *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1245-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/14/2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Matthew Schooley at (989) 463-8336 mschooley@ci.alma.mi.us
Name Phone Number Email

12/12/2019
Signature of Authorized Representative (Original Signature Required) Date

Matthew Schooley City Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/1/2019
(no later than 3 years from executed grant date)

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4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name	Phone Number	Email
DAVID RINGLE	at (989) 463-8346	DRINGLE@CI.ALMA.MI.US

Signature of Authorized Representative (Original Signature Required)

Date: 12/12/2019

DAVID RINGLE PUBLIC SERVICES DIRECTOR
Print Name and Title of Authorized Representative

April 2017

EXECUTIVE SUMMARY

The wastewater infrastructure system of the City of Alma provides the collection and conveyance of wastewater from its residents and businesses in a manner that aims to protect the local streams and Pine River watershed. Wastewater generated in Alma is ultimately discharged to its treatment facility on Washington Avenue. Recognizing the importance of this wastewater collection system, Alma initiated an assessment of its wastewater collection infrastructure.

This Asset Management Plan (AMP) summarizes this assessment along with a summary of findings, observations, as well as a capital improvement plan. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program, SAW GRANT 1245-01, with a total budget of $671,344 that includes a $74,594 local match required by Alma.

The AMP was intended to accomplish the following key goals:

- Provide Alma with an update to their existing framework for collecting, organizing, and storing data for their wastewater collection system.
- Update asset information attribute information in GIS as necessary
- Physically evaluate the structural condition of grant eligible, publicly owned system components, including wastewater sewer pipes and manholes.
- Identify long-term strategies for continued system operation and maintenance
- Provide recommendations for developing a prioritized Capital Improvement Plan (CIP).

Mission Statement

The mission of the Wastewater Department in Alma can be summarized as ***an ongoing effort to support and maintain the safety and quality of life for Alma's residents, businesses, and visitors***.

Asset Management Team Leaders

The Asset Management Team listed in Figure 1 is committed to the asset management mission and were instrumental in the progress made and findings outlined in this report. Further questions on the AMP can be directed to these team members.

Matt Schooley

- City Manager
- Administration
  525 East Superior Street Alma, Michigan 48801
- (989) 463-9501

David Ringle

- Director
- Public Services Department
  525 East Superior Street Alma, Michigan 48801
- (989) 463-9516

Figure 1: AMP Local Project Team

Infrastructure Technology & Know-How

Alma has a robust GIS database, which has been updated as a result of the recent inspection plan. Information such as sewer material and pipe diameter was updated as it became available from the physical inspections.

Asset Inventory

An asset inventory is a list of Alma's wastewater sewers and manholes and their attributes. The majority of the wastewater sewer infrastructure were previously inventoried and digitized prior to their Stormwater, Asset Management, and Wastewater (SAW) grant initiation. Updates to this inventory were made as necessary as part of this project.

Condition Assessment

With the intent of assessing the wastewater system, Alma's wastewater sewer infrastructure (wastewater sewer pipes and manholes) have been evaluated. The condition of the infrastructure is based on the National Association of Sewer Service Companies (NASSCO) condition grading system, which uses a scale of zero (0) to five (5) to code features and defects observed in the asset. A Grade 1 defect is the most minor and a Grade 5 is the most significant defect. A Grade of 0 indicates the presence of a non-defect feature such as the water level in the pipe or the location where a lateral service line taps the sewer. About 32% of the 1,204 structures in the manhole network and about 26% of the approximately 58 miles of wastewater sewer pipe infrastructure has been condition assessed, as shown in Figure 2.

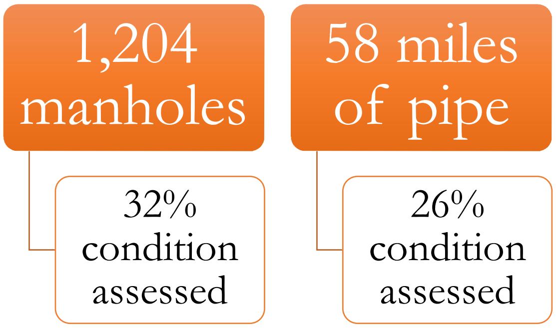

Figure 2 : Portion of Sewer System Assessed

It was observed that:

- Manhole infrastructure has a weighted-average structural rating index of approximately 1.34 and a weighted-average O&M rating index of 1.05. The weighted-average overall rating was 1.52.
- Within the inspected manhole infrastructure nine structural grade 5 defect were observed, equating to approximately 2% of the inspected system and nineteen structural grade 4 defects were observed, equating to approximately 5% of the inspected system.
- The most common structural defects within the manhole infrastructure were related to brickwork. Deposits were the most common O&M defect.
- For gravity mains, the most frequently observed structural defect was cracks. Deposits and roots were the most common O&M defects.
- 18% of gravity main sewers were assigned an overall rating of 5. These are the most serious defects observed during the inspection process.

In addition, the wastewater treatment facility was condition assessed in partnership with City personnel. Several components of the plant are in need of upgrade or replacement. Most importantly, the aeration basins require significant modernization in the short term. More improvements will be needed for other parts of the facility over the next twenty years.

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the evaluation of Business Risk Exposure (BRE), which is determined by the combination of the Probability of Failure (PoF) and the Consequence of Failure (CoF) as shown in Figure 3 on the next page.

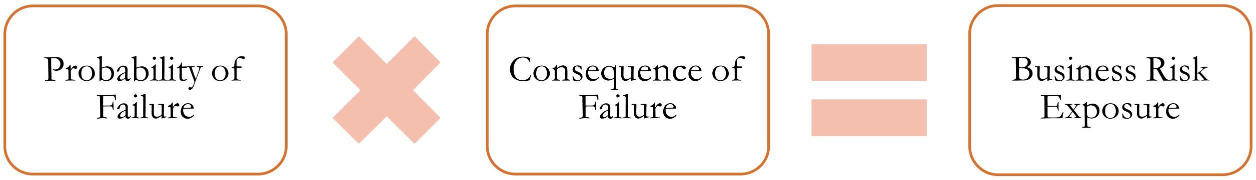

Figure 3 : Risk Equation

The PoF is related to the physical condition of an asset, which is derived from inspection reports. The CoF focuses on the economic losses, environmental impacts, and impacts to society due to an asset's failure. The following factors were combined to determine the consequence of failure for wastewater sewers.

- Diameter/Size – the relative size of the asset with respect to the rest of the system, i.e. larger diameter pipes carry larger flow volumes, service larger areas, and thus their failure would have a greater consequence
- Proximity to Critical Users – Higher consequence is assigned to pipes nearest to critical users identified throughout Alma, e.g. Medical, Government, Health, and Educational facilities

Level of Service

Alma, in line with its mission outlined earlier, adopted Level of Service (LOS) criteria, which it plans to use as guidelines to manage the wastewater sewer system. These LOS criteria are summarized in Table 1.

Table 1: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Collection System Inspection	PACP & MACP Standard Condition Assessment	• MACP inspect a minimum of 10% of the system per year. • PACP inspect a minimum of 10% of the system per year.
Asset Inventory	GIS Completion Level	• Update GIS data when pipes are repaired or replaced
Regulatory Compliance	Compliance with EGLE Sanitary Sewer Overflow (SSO) Policy and the Clean Water Act	Continue to comply with the EGLE SSO policy and The Clean Water Act
Service Delivery	Response to Sanitary Sewer Complaints	Respond on-site to sanitary sewer collection system back-ups within 3 hours
O&M Optimization	Operate and maintain system in accordance with Part 41 of PA 451	• Clean manholes as needed based on inspection findings • Clean sewer pipes as needed based on inspection findings

O&M Strategies

Alma's Operation and Maintenance Strategies is directly tied to its Target LOS criteria which is to inspect a minimum of 10% of the manholes and sewers in the wastewater system annually. By inspecting 10% of the sewers and manholes per year, the entire system will be inspected on a five-year cycle. The cleaning schedule depends on the needs found during televised inspections.

Revenue Structure and Capital Improvement Plan

The condition assessment helped identify capital improvement needs, which are summarized in Table 2 below.

Table 2: Sanitary Sewer CIP Summary

CIP Category	CIP Costs
Manhole Rehabilitation	$40,000
Pipe Rehabilitation	$930,000
Trunk Sewer Upgrades	$610,000
Subtotal*	**$1,580,000**
Engineering and Contingency	$630,000
Total CIP Cost*	**$2,100,000**

**Totals may not be additive due to rounding*

The City of Alma is in the process of re-evaluating their rate structure with the updated CIP options. This evaluation will determine whether the needs referenced above, and the vertical assets, can be met by the City's current rate structure.

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

EGLE
LIESL EICHLER CLARK
DIRECTOR

October 14, 2019

Mr. Matthew Schooley
City of Alma
525 East Superior Street
Alma, Michigan 48801

Dear Mr. Schooley:

SUBJECT: Stormwater, Asset Management, Wastewater (SAW)
City of Alma
SAW Grant Project Number 1245-01

We have reviewed the information contained in the rate methodology dated July 26, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404, or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Mr. Clarence Jones, EGLE

City of Alma Commission
Excerpt of Minutes

February 22, 2018

Motion by Commissioner Piccolo as supported by Vice-Mayor Harrington to allow Mayor Mapes to enter into negotiations with Matthew Schooley for City Manager position.

Yes: Ayers, Harrington, Mapes, Mott, Nyman & Piccolo.
No: None.

April 9, 2019

Motion by Commissioner Pitts as supported by Vice-Mayor Harrington to approve the appointment of David Ringle as City of Alma Public Services Director.

City Manager Schooley expressed his excitement to have David Ringle as the Public Services Director. No one is more committed the City. The is a very positive move, congratulations to David.

Yes: Allman, Harrington, Mapes, Mott, Piccolo, Pitts & Stahl.
No: None.

Certificate

I, Sheila Letourneau, Clerk of the City of Alma, do hereby certify that the above resolutions are a true and exact copy adopted at a regular meeting of the City Commission held on Tuesday, February 22, 2018 and April 9, 2019 at 6:00 p.m.

Sheila Letourneau
Sheila Letourneau, City Clerk

EMPLOYMENT CONTRACT

THIS AGREEMENT, made and entered into this 10th day of April, 2018 by and between the **City of Alma**, a Michigan Municipal Corporation, hereinafter referred to as City and **Matthew Schooley**, hereinafter referred to as Manager;

WITNESSETH:

WHEREAS, the City desires to retain the services of Matthew Schooley as City Manager of the City of Alma, as provided by the Charter of the City and;

WHEREAS, it is the desire of the City Commission to provide certain benefits and establish certain conditions of employment for said Manager and;

WHEREAS, it is the desire of the City to (1) retain the services of Manager and to provide inducement for him to remain in such employment, (2) to make possible full work productivity by assuring Manager's morale and peace of mind with respect to future security, (3) to provide a just means for terminating Manager's services at such time as he may be unable to fully discharge his duties due to disability or when City may desire to otherwise terminate his employ;

NOW, THEREFORE, in consideration of the mutual covenants herein contained the parties hereto agree as follows:

I. DUTIES

City does hereby employ Manager to perform the functions and duties specified in Section 3.6 of the City Charter, and other proper duties and functions as the City Commission may, from time to time, assign or the efficient management of the City shall require.

II. TERM

A. Nothing in this Agreement shall prevent, limit or otherwise interfere with the right of City to terminate services of Manager at anytime in accordance with Section 303 of the City Charter, subject only to the provisions set forth in Section III, paragraphs A and B of this Agreement

B. The term of this Agreement shall be for a period of three (3) years. Notwithstanding the execution of this Agreement after such date, the effective date shall be deemed to be March 4, 2018 and the initial term of this Agreement shall expire on March 3, 2021. In the event that neither party gives notice to the other party within ninety days prior to the expiration of such term, or any extension thereof, of a desire to terminate such employment, this Agreement shall be extended upon the same terms and conditions as herein provided, for additional periods of one year each.

C. Nothing in this Agreement shall prevent, limit or otherwise interfere with the right of the Manager to resign at anytime, subject only to the provisions of Section III, Paragraph C of this Agreement.

D. Manager agrees to remain in the exclusive employ of the City until the termination of this Agreement, or any extensions thereof, and not to accept or become employed by any other employer until such termination date. The term "employed" shall not be construed to include occasional teaching, writing or consulting performed on Manager's own time.

III. TERMINATION AND SEVERANCE PAY

A. In the event Manager is terminated by City before expiration of the aforesaid term of employment, or any extensions thereof, and during such time that Manager is willing and able to perform the duties of City Manager, then, in that event, City agrees to pay Manager a lump sum cash payment equal to six (6) months aggregate salary and in addition continue such health, life insurance and vacation benefit, as herein provided, for Manager and his dependents, for a six (6) month period; provided, however, that in the event Manager is terminated because of his conviction of any illegal act involving personal gain to him, then, in that event, City shall have no obligation to pay the aggregate severance sum designated in this paragraph.

B. In the event City, during any extension of this Agreement, reduces the salary or benefits of Manager, or Manager resigns following a suggestion, formal or informal, by a majority of the City Commission that he resign, then, in that event, Manager may, at his option, be deemed to be terminated at the date of such circumstance within the meaning and context of the severance pay provision.

C. In the event Manager voluntarily resigns his position with City before expiration of the aforesaid term of employment, then Manager shall give the City 60 days notice of such resignation prior to the cessation of this performance of his duties hereunder. In the event of such resignation, no payment will be made, or benefits provided, as otherwise set forth in subparagraph A, above.

IV. SALARY

City agrees to pay Manager for his services rendered pursuant hereto, a base annual salary of Ninety-Four Thousand Nine Hundred Fifty-Two dollars ($94,952.00), payable in installments as other employees of the City. This salary shall be increased or decreased in amounts set by the City Commission in accordance with annual review at the time such review is conducted for other employees or employee groups, or at an earlier date established by the City Commission.

V. DUES AND SUBSCRIPTION

City agrees to budget and pay the professional dues and subscription of Manager necessary for his continuation and full participation in National, Regional, State and Local Associations and Organizations necessary and desirable for his continued professional participation, growth, and advancement and for the good of the City.

VI. PROFESSIONAL DEVELOPMENT

City agrees to budget and pay the travel and subsistence expenses of Manager for professional travel, meetings and occasions designed to continue the professional development of Manager, as approved by the City Commission of City, but which shall include as a minimum the annual conference of International City Managers Association, meetings of the Municipal League and meetings of the Michigan Local Government Management Association.

VII. GENERAL EXPENSES

City recognizes that certain expenses of a non-personal and job affiliated nature are incurred by Manager and hereby agrees to reimburse and pay said general expenses up to an amount not to exceed $100.00 per month, and the finance director is hereby authorized to disburse such monies upon receipt of duly executed expense vouchers, receipts, statements or personal affidavits.

VIII. CIVIC CLUB MEMBERSHIPS

City recognizes the desirability of representation in and before local civic and other organizations, and Manager is authorized to become a member of one such civic club or organization for which City shall pay all expenses.

IX. VACATION, SICK LEAVE AND PERSONAL TIME

Manager shall be entitled to vacation leave pursuant to the City's personnel policy, which policy would entitle Manager to 176 hours of vacation leave during the term of this Agreement. Not more than 120 hours shall be carried over from one year to the next. Upon expiration or termination, Manage shall be compensated for unused vacation leave; subject to the foregoing. During the term of this Agreement, and during any extension or renewal if this Agreement is extended or renewed, Manager shall be entitled to three days (24 hours) of personal leave during each year. In addition, Manager shall be entitled to two additional personal days (16 hours), during each year, to be deducted from his accumulated sick leave. In the event Manager shall resign during the term hereof, or during the term of any extension or renewal hereof, such vacation leave only shall be prorated for the period served.

X. HEALTH AND LIFE INSURANCE

A. City agrees to provide hospitalization, surgical and comprehensive medical insurance for Manager and his dependents and pay premiums thereon equal to that which are provided to all other City employees.

B. City agrees to purchase and pay the required premiums on life insurance policies as provided in City's policy manual in the same manner as provided to other City employees.

C. City agrees to purchase and pay the required premium for a policy of long term disability insurance covering Manager. To the extent that Manager has incurred any premium expense for long term disability insurance coverage personally, City shall reimburse such premium to Manager.

XI. RETIREMENT

Manager shall continue to participate in the MERS defined benefit retirement program in the same fashion and with the same benefits as realized by Manager in his capacity as City's former Transportation Director and Police Lieutenant.

XII. OTHER TERMS AND CONDITIONS

A. The City Commission shall fix any such other terms and conditions of employment as it may determine, from time to time, relating to the performance of the Manager, providing such terms and conditions are not inconsistent with or in conflict with the provisions of this Agreement, the City Charter, or any law of the State of Michigan.

B. All provisions relating to vacation, sick leave, retirement and pension systems, holidays and other fringe benefits not specifically provided for herein, shall apply to the Manager as they would to other City employees, in addition to said benefits enumerated specifically for the benefit of Manager, except as herein provided.

C. Manager shall be entitled to receive payment for all accrued vacation time at termination.

XIII. HOURS OF WORK

It is recognized that Manager must devote a great deal of his time outside normal office hours to City business. Consequently, Manager will be allowed to take compensatory time off as he shall deem appropriate during said normal office hours. No monetary compensation shall be paid in lieu thereof.

XIV. ENTIRE AGREEMENT

A. The text hereof shall constitute the entire agreement between the parties.

B. This Agreement shall be binding upon and inure to the benefit of the heirs at law and personal representative of Manager.

C. If any provision or any portion herein contained is held to be unconstitutional, invalid or unenforceable, the remainder of this Agreement or portions thereof, shall be deemed severable and shall remain in full force and effect.

IN WITNESS WHEREOF, the City of Alma has caused this Agreement to be signed and executed in its behalf by its Mayor and duly attested by its City Clerk and Manager has signed and executed the same.

Witnesses:

Sheila Letourneau

Amy Huntoon

Sheila Letourneau

CITY OF ALMA

By:
Gregory S., Mayor

By: Sheila Letourneau
Sheila Letourneau, City Clerk

MANAGER

Matthew Schooley

1211 Ludington St.
Escanaba, MI 49829
O: 906.233.9360
www.c2ae.com

CITY OF MENOMINEE
ASSET MANAGEMENT PROGRAM SUMMARY

Grantee Information

City of Menominee SAW Grant
2511 Tenth St. Menominee, MI. 49858
www.menomineemi.us

Contact Information for the Grantee

Mr. Anton Graff
Address: 2511 Tenth St. Menominee, MI 49858
Phone: 906-863-2656
Email: tgraff@cityofmenominee.net

SAW Grant Project Number: 1249-01

Executive Summary

The City of Menominee Asset Management Program (AMP) was created through funding from the Michigan Department of Environment, Great Lakes, and Energy.

The applicant has formed a SAW team which is composed of City officials and members of the public. The purpose of the team is to develop a mission statement and to discuss and decide upon the Level of Service the system should provide, this impacts cost. The team will meet annually before the City's budget process begins.

The program is GIS based which provides a digital map background of the Menominee sanitary and storm collection systems. The City treats its own sewage and the treatment facility is also included.

The other major components of the program include the asset management spreadsheet (AMS), financial advice recommendations, and filing system; the filing system is accessed through the GIS system.

The AMS utilizes the MDEQ/WEF recommended spreadsheet workbook, which is the master compilation tool for the program. It includes (worksheets ordered as follows):

1. System information and personnel worksheet
2. Summary- worksheet; listing all assets and calculating the business risk
3. Asset Rating Definitions- worksheet
4. Level of Service Statement- worksheet
5. Criticality Calculation – worksheet
6. Probability of Failure - worksheet

7. Budget and Rate formulation worksheet
8. Replacement - worksheet
9. Timing - worksheet
10. Capital Improvement Project – worksheet
11. Ten Year Forecast – worksheet

A. The System Information and Personnel worksheet contains system basic data.
B. The Summary worksheet lists all system assets, with accompanying data related to asset type, location, capacity or size, material type, estimate of original installation year and costs, expected remaining life and value, the cost of replacement in today's dollars, and data from items E and F above, plus redundancy due to number of units, which leads to a calculation of business risk observation.
C. The 1-5 rating scales for condition, probability of failure and criticality of asset is found in the asset rating definitions.
D. Level of service statement for the system is developed by the SAW team committee and along with the mission statement is on D. above.
E. Worksheets E and F are the calculator worksheets for criticality and probability of failure of a particular asset. These worksheets were only used for major assets where additional documentation was felt necessary. Most cases utilize engineering judgment for the rating decision.
G. The budget and rate sheet is another calculator which includes the operating budget for the system as well as required capital commitment. It makes an assessment of needed operating reserves based on the planned short term replacements needs as well as future capital needs. It also indicates what is being put away to satisfy these requirements.
H. The replacement worksheet derives the depreciated value of the system as well as a calculation of the replacement value.
I. The timing worksheet attempts to identify whether an asset needs replacing and when to consider and formulate future capital improvement projects.
J. Capital Improvement Plan indicating future possible projects. This is a forecast based on current data, debt retirement, and typical funding agency grouping of project value
K. Ten-year budget worksheet attempts to identify the work of inflation on the plan over "10 years".
L. A twenty-year cash flow forecast is included to assist in the formulation of utility rates. It also includes the detailed level of service statement and detailed capital improvement forecast.

Finally is the data filing system which will include items such as, the system televising data, the hydraulic model, easements, user information and other relevant data.

The City of Menominee received fourth round grants as follows:

WAMP

Grant	Local Share	Total
$617,940	$71,760	$689,700

SAMP

Grant	Local Share	Total
$279,000	$27,900	$306,900

The asset management development procedure generally followed this path:

A. Identifying and numbering all the assets before field efforts begin.
B. A survey team gathered all GPS coordinates of items such as manholes in the field.
C. A digital orthographic photo was developed using aerial photography to create a GIS system background.
D. A Sewer system layer was created in the GIS system to locate the various assets.
E. A field team inspected and using the NASSCO rating system inventoried and detailed the in-ground assets. Field inspections, records research, capacity testing where needed, and management/staff interviews were used to inventory pump stations and treatment facility components.
F. The inventory data is used in the construction of a production data base which helps populate the Asset Management Data Base and subsequent Spreadsheet (AMS) as described above.
G. The AMS is the calculating tool for assessing the future viability of the delineated assets and the criticality and future impact on the system overall.
H. The criteria of Business Risk and remaining useful life are used to determine what assets need attention and the cost impact of that attention.
I. This data also leads to the formulation of future capital improvement projects.
J. The data is combined into the system's current operating budget to determine whether sufficient financial reserves are being collected.
K. Rate impacts are then considered.
L. The system operators are then trained by IGI in the GIS system use and maintenance
M. The process is to be revisited annually.

Wastewater and Stormwater Asset Inventory

The program included two components under different grant offers. The Wastewater Asset Management Program is call the WAMP and the corresponding Stormwater Asset Management Program is called the SAMP.

The WAMP includes:

A. All collection system components

The SAMP includes all assets making up

A. The stormwater collection system
B. The ditches, culverts, and drainage structures

The inventory was performed by records research, field visitation, and inspection. Briefly it included;

Collection systems both sanitary and storm

  a) Name and label all manholes
  b) Acquire GPS coordinates of all these structures

c) Visually inspect all manholes structures as per NASSCO dictated methodology.
d) Televise selected portions of the collection piping and rate per NASSCO
e) Acquire the age (installation year) of all the elements as close as possible.

The decision was made to utilize the EGLE offered spreadsheet for compiling and analyzing the data.

The manholes condition assessment was gleaned from the field inventories. The NASSCO rating system was utilized to develop a quick rating of the components. In some circumstances engineering judgement was necessary. The process evaluation for the Wastewater Treatment Facility went a step further determining whether the equipment in place was functioning as is needed to maintain regulatory compliance.

The results of the Menominee WAMP and SAMP assessments were as follows:

General

WAMP
In ground (2442 assets)
- 70% were considered low business risk
- 9% were considered average business risk
- 21% were considered in need of effort

SAMP
In ground (5417 assets)
- 66% were considered low business risk
- 17% were considered average business risk
- 17% were considered in need of effort

Criticality of Assets

The criticality of assets was determined based on the following factors;

Collection System (WAMP & SAMP)

Highly Critical (5 rating)

Failure of an asset would result in flooding, severe adverse environmental impact, or impede an activity.

Moderately Critical (3-4 rating)

Failure of an asset would damage properties in high value areas or a large number of users

Slightly Critical (1-2 rating)

Failure will develop slowly and can be dealt with when personnel are available.

The ranking of an asset has a component of criticality involved but it is only one factor in determining business risk, the other two being redundancy (i.e. back up of the asset) and probability of failure (the condition) of the asset. Our methodology utilizes business risk (ranking 1 to 25) and depreciation (age) of the asset to rank its need for attention and subsequent budget set aside for maintenance or replacement.

Level of Service Determination

The level of services that the system is to offer was determined by the SAW Team to prioritize what the system should offer and how it should respond. Typically four or five major goals were determined and then subdivided into items that should be or not be pursued to meet the goals. These items are placed in a level of service statements with reference in the asset management database.

Revenue Structure

The EGLE spreadsheet was utilized to list and prioritize items, which required short term or long-term capital infusion. The long-term items were grouped into project groups and targeted as future projects under the Capital Improvement Plan, which follows. The intent for these projects is future borrowing with monies being added to the current operating budget for future borrowing applications.

The short-term capital needs were identified for operating budget inclusion annually. They may include annual maintenance needs or small replacement items along with large project needs in the first seven years after the project is created.

We found that set aside reserves are adequate.

The SAMP identified budget considerations, which have been delivered to the City’s management to determine what should be done and when to align with other possible future utility or street improvements.

A wastewater system twenty-year cash flow statement is attached.

Capital Improvement Plan

Menominee’s future Wastewater capital improvement project scheduling for a twenty year a cash flow analysis is projected as follows:

Infrastructure Phase 1	$1,800,00	USDA	2021
Infrastructure Phase 2	$3,000,000	SRF	2026
Infrastructure Phase 3	$4,000,000	USDA	2035
Plant Improvements	$900,000	SRF	2037

The SAMP has identified three priority project areas. The City will attempt to pursue these storm sewer improvements with other utility and street projects. The dollars indicated are budgeting attempts to maintain the consideration of storm work in other utility or road repair projects.

Project 1 (2021- 2035)
Storm Pipe and Manholes $17,000,000

Project 2 (2035 -2059)
Storm Pipe and Manholes $16,000,000

Project 3 (2059 - 2079)
Storm Pipe and Manholes $12,000,000

List of Major Assets

Wastewater:

The City of Menominee's wastewater system includes:

Treatment

1	Headworks with grit removal
2	Primary Clarifiers
2	Aeration basins
3	Blowers
2	Secondary Clarifiers
1	Chlorine Disinfection
1	Chemical Storage
1	Primary Digester
1	Secondary Digester
2	Sludge Holding Tanks
1	Administration Building/Laboratory
2	Garages

Pump Stations

7	System pump stations

Force main 24,866 ft.

Mainline Gravity Sewer

2 inch	PVC	359 feet
3 inch	PVC	54 feet
4 inch	PVC	1337 feet
	CI	93 feet
6 inch	VCP	1822 feet
	PVC	5206 feet
	RCP	1308 feet
	CI	31 feet
8 inch	VCP	59,036 feet
	PVC	38,205 feet
	RCP	38,598 feet
	Other	680 feet
10 inch	VCP	22,753 feet
	PVC	11,236 feet
	RCP	10,445 feet
	Other	7 feet
12 inch	VCP	14,933 feet
	PVC	12,588 feet
	RCP	8,123 feet
	Other	219 feet
15 inch	VCP	10,987 feet
	PVC	7,989 feet
	RCP	5,224 feet
	Other	1,969 feet
18 inch	VCP	7,397 feet
	PVC	3,297 feet
	RCP	2,739 feet
	Other	348 feet
21 inch	VCP	4,251 feet
	RCP	2,634 feet
24 inch	VCP	403 feet
	RCP	1,472 feet
27 inch	VCP	295 feet
30 inch	VCP	298 feet
	RCP	979 feet
36 inch	RCP	5.697 feet
	PVC	159 feet
42 inch	RCP	959 feet
Total		285,532 feet

System Value:	$15,193,000
Replacement Value:	$75,850,000

Stormwater:

Sewer & Culverts

2 inch	50 feet
4 inch	697 feet
6 inch	8,338 feet
8 inch	8,854 feet
9 inch	0 feet
10 inch	13,700 feet
12 inch	78,043 feet
15 inch	24,392 feet
18 inch	21,002 feet
21 inch	4,436 feet
24 inch	20,150 feet
27 inch	752 feet
30 inch	19,053 feet
36 inch	10,976 feet
42 inch	1,453 feet
48 inch	4,352 feet
54 inch	7,634 feet
60 inch	1,717 feet
66 inch	936 feet
Unknown	23,528 feet
Total	250,065 feet

System Value: $16,485,000

Replacement Value: $59,242,000

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 20, 2019
(no later than 3 years from executed grant date)

The City of Menominee *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1249-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Tony Graff at 906-863-1747 tgraff@cityofmenominee.net
Name Phone Number Email

Tony Graff, City Manager 12/20/2019
Signature of Authorized Representative (Original Signature Required) Date

Tony Graff – City Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 20, 2019
(no later than 3 years from executed grant date)

The City of Menominee *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1249-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or ~~No~~
   If No - Date of the rate methodology approval letter: July 26, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Tony Graff at 906 863-1747 tgraff@cityofmenominee.net
Name Phone Number Email

Tony Graff, City Manager 12/20/2019
Signature of Authorized Representative (Original Signature Required) Date

Tony Graff – City Manager
Print Name and Title of Authorized Representative

April 2017

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

OHM
Advancing Communities℠
Engineering Advisors

Memorandum

To:	Michigan Department of Environment, Great Lakes, and Energy (EGLE) Revolving Loan Section Attn: Leni L. Steiner-Zehender
From:	Hubbell, Roth and Clark, Inc. and OHM Advisors
CC:	City of Southfield
Date:	December 31, 2019
Re:	City of Southfield EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1251-01 Executive Summary: Wastewater Asset Management Plan

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The following is an Executive Summary of the work completed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) SAW Grant performed for the City of Southfield. It includes a summary of the project scope, results, and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION
City of Southfield
26000 Evergreen Road
Southfield, Michigan 48037
SAW Grant Project #1251-01

Project Grant Amount: $2,444,444

Applicant Match Amount $444,444

Authorized Representative Contact:
Frederick Zorn, CEcD
City Administrator

Phone: (248) 796-5110
Email: fzorn@cityofsouthfield.com

Engineering Representative:
Leigh Schultz, PE
City Engineer
City of Southfield
Phone: (248) 796-4812
Email: lschultz@cityofsouthfield.com

Consultant Contacts:
Matthew Slicker, PE
Hubbell, Roth & Clark, Inc.
Phone: (248) 454-6300
Email:mslicker@hrcengr.com

Greg Kacvinsky, PE
OHM Advisors
Phone: (313) 481-1250
Email:Greg.Kacvinsky@ohm-advisors.com

EXECUTIVE SUMMARY

The City of Southfield applied for and received a grant to further develop an Asset Management Plan (AMP) for its wastewater collection system through the EGLE Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through appropriations for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City of Southfield owns, operates and maintains the separate wastewater and combined sewer collection systems and has various tools used to manage the assets, including an Esri Geographic Information System (GIS) geodatabase, Lucity Computer Maintenance Management System (CMMS), condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools were used to guide the short- and long-term strategies to operate the various systems in a sustainable manner that meets the desired Level of Service, with a focus on prioritizing assets that are most critical and cost-effective. The funding strategy was also evaluated; this included a review of the current rate structure, current fund balances, and anticipated future funding needs based on the Operations & Maintenance (O&M) and Capital Improvement Plan (CIP) recommendations in the Asset Management Plan (AMP).

The following is a summary of the AMP, as required by EGLE, as part of the final submittal process. This summary includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMP documents will be available to EGLE upon request, and a copy of the AMP will be available to the public review at the Southfield City Hall for at least 15 years, per SAW Grant requirements.

WASTEWATER INVENTORY

The City of Southfield uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes critical attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through the AMP efforts, the geodatabase was populated with additional key information, including more accurate location data (rim locations, rim elevations, and depths), structural condition, and asset criticality data, all necessary to more effectively use the GIS to manage the wastewater and combined sewer assets.

The City uses Lucity CMMS software for the Department of Public Services' work order system. The City will continue to use Lucity and increase its use through Lucity Mobile and Lucity Web. The AMP effort included the integration of structural condition data, so City field staff can more effectively use this software for work order management and tracking the condition of system assets in the future.

GIS has been used in the City through a subscription with Esri ArcGIS software and was updated with new projects performed in the City. Using the GPS-based survey, and observations made during the condition assessment effort, the data in the GIS geodatabase was expanded, and accuracy greatly improved using the SAW Grant funds.

The next page includes a table of the asset inventory in GIS.

Combined Sewer Collection System

ASSET TYPE	ASSET QUANTITY
4-inch sewer	69 feet
6-inch sewer	576 feet
8-inch sewer	5,708 feet
10-inch sewer	25,025 feet
12-inch sewer	86,463 feet
15-inch sewer	28,799 feet
18-inch sewer	24,762 feet
21-inch sewer	12,486 feet
24-inch sewer	15,888 feet
27-inch sewer	11,642 feet
30-inch sewer	9,249 feet
33-inch sewer	524 feet
36-inch sewer	9,888 feet
42-inch sewer	4,548 feet
48-inch sewer	5,844 feet
54-inch sewer	50 feet
Unknown diameter sewer	3,065 feet
Manhole	3,003

Separate Wastewater Collection System

ASSET TYPE	ASSET QUANTITY
4-inch sewer	136 feet
6-inch sewer	5,738 feet
8-inch sewer	40,988 feet
10-inch sewer	880,432 feet
12-inch sewer	168,762 feet
15-inch sewer	60,864 feet
18-inch sewer	35,340 feet
21-inch sewer	24,776 feet
24-inch sewer	10,194 feet
27-inch sewer	2,093 feet
30-inch sewer	4,961 feet
Unknown diameter sewer	12,099 feet
Manhole	6,007

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For wastewater and combined sewer assets, the NASSCO-compliant inspection information was collected during sewer televising. For manholes, NASSCO inspection protocol were used to collect data. The data is stored in the GIS geodatabase to share this data with Esri Workforce and Lucity to develop inspection work orders to continue to evaluate and maintain assets, such as manholes and sewer pipes.

As part of the grant, the GIS geodatabase was reviewed for completeness and to ensure critical attributes were populated. Approximately 1,103,430 lineal feet of separate wastewater and combined sewers underwent condition assessment via cleaning and televising. Approximately 7,531 manholes in the wastewater and combined sewer systems were evaluated through manhole inspections, which included videos of each manhole inspected.

Temporary flow metering was performed to determine if specific wastewater sewersheds were contributing high rates of infiltration or inflow (I/I) to the wastewater collection system. Four out of six districts were ranked as Priority Districts with high observed rates of I/I. The hydrologic modeling projected that a 10-year recurrence interval flow event could cause significant surcharging, potentially resulting in basement backup or other overflows within specific areas of the collection system. The smoke testing performed in these districts identified numerous potential sources of surface inflows; likely, addressing these inflow sources will significantly reduce the potential of sewer surcharge during wet weather events.

Temporary flow metering was also performed in the combined sewer district to determine if there was backflow from the downstream system. There was one meter that showed backflow during the recorded rain events. A capacity analysis was completed for all the city’s sewers in the George W Kuhn drainage district (GWK). Various areas within the drainage district have undersized sewers for the 10-year, 1-hour duration rain event. The city has installed restricted covers in some of these districts to reduce the possibility of basement flooding. Recommendations have been made to reduce the potential for basement flooding in the GWK drainage district.

CRITICALITY OF ASSETS

The City of Southfield developed baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations, individual assets were reviewed prior to the grant award; recommendations for pump station improvements have been included in separate documentation previously developed for the City.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score for each asset (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the most significant overall risk and therefore require the highest priority for rehabilitation or replacement.

The POF and COF for horizontal assets were determined using scoring values developed uniquely for each asset type, such as gravity main, manhole. The POF and COF scores for each asset type were calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of sanitary gravity mains was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the remaining useful life based on the age and material of the asset. The COF for horizontal assets was determined based on asset depth, size, surface type, proximity to wetlands, proximity to railroads, and proximity to roads and intersections.

Below is a list of the BRE scores for the horizontal assets in the City's system:

Wastewater Collection System (Sewers)	
BRE Score	Percent of Manholes
<= 5	80%
5 <= 10	17%
10 <= 15	2%
15 <= 20	1%
20 <= 25	0%

Wastewater Collection System (manholes)	
BRE Score	Percent of Manholes
<= 5	84%
5 <= 10	15%
10 <= 15	1%
15 <= 20	0%
20 <= 25	0%

The POF, COF, and BRE ratings for each asset were incorporated into an Asset Inventory Master Spreadsheet and the GIS geodatabase.

LEVEL OF SERVICE DETERMINATION

The City develops a Proposed Operating Budget document each year to summarize the previous year and propose a budget for the upcoming fiscal year, which starts on July 1. Key factors in the list of goals that are developed are quality infrastructure and pro-active approaches to wastewater operations. As part of the asset management planning, it was determined the Level of Service currently being provided for the collection system is adequate. The City developed a Mission Statement as part of the AMP to summarize its goals. The following Mission Statement was used in developing the CIP as well:

> *The City of Southfield strives to provide its sanitary sewer customers with a reliable service at the lowest cost possible without backups into buildings or dwellings.*
>
> *The City works to ensure that all compliance and water quality issues are met, assuring that there is adequately trained staff to operate the system.*
>
> *The City has developed a robust emergency response plan to assure that customer service disruptions are minimized. DPW staff will continue to work with residents when service interruptions are necessary and will continue to update notification processes as communication techniques evolve. The City strives to minimize interruptions in service to the maximum extent possible.*

> *The City will continue working to keep rates stable for customers. This effort includes budgeting for capital improvements to make sure that the system continues to operate cost-effectively, as well as doing routine operation and maintenance to keep the system in good working order.*

The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. The City of Southfield has chosen to continue its ongoing process rather than adopting specific goals. They will continue to consider the impact on the public's health and the system's ability to comply with any applicable regulations and operational needs.

REVENUE STRUCTURE

The annual Operations and Maintenance (O&M) budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated O&M, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year and over the long term.

The City works with Plante Moran, LLC, to confirm the system's current rate structures are sufficient to meet the current needs for the management of the wastewater system and to plan for any adjustments that may be required to meet the anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to EGLE six months before the SAW grant end date. The analysis did not show any gap between the revenue and expenditures; therefore, a rate increase was not necessary.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City of Southfield's wastewater and combined sewer systems, using recommendations from the asset inspection process, and consideration of other system needs.

All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost, and timing are expected as resources are allocated, and changes occur in prioritization, regulations, technology, cost, and other data become available.

In summary, the horizontal CIP includes:

- Thirty-nine sewer segments have recommended repairs identified to be addressed within the next 0-5 years.
- Forty-nine manholes have recommended repairs identified to be addressed in the next 0-5 years.
- Remaining sewers are recommended to be reviewed and addressed as necessary in the next 5 to 20 years based on ongoing updates to structural condition data.
- Remaining manholes are recommended to be reviewed and addressed as necessary in the next 5 to 20 years based on ongoing updates to structural condition data.

- Manholes not found should be investigated further. This investigation will require additional fieldwork and surface modifications (i.e., pavement removal) and will be planned with ongoing (regularly scheduled) system inspections.

The horizontal assets' CIP has an average yearly cost of $504,000 for the first 5 years. For years 5 through 20, the cost estimate will be determined based on continued inspections.

Additional potential capital projects include the replacement of undersized separate wastewater and combined sewers. The replacement of these sewers depends on the success of I/I removal and future budget priorities. These additional capital projects are highlighted in the full Asset Management Plan document.

RECOMMENDATIONS

To keep this AMP sustainable into the future, the review process will be undertaken annually to review existing recommendations, the status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update the recommended treatment and replacement strategies and capital projects. The updated recommendations will be reviewed on a regular basis as part of the annual process to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Owner's major assets include:

- 244,586 feet of 4-54-inch combined sewer pipe
- 3,003 combined system manholes
- 1,247,381 feet of 4-30-inch separate wastewater sewer pipe
- 6,007 separate wastewater system manholes
- 15 collection system pump stations

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Southfield *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1251-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: May 30, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: __________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Leigh Schultz, P.E., City Engineer at 248-796-4812 lschultz@cityofsouthfield.com
Name Phone Number Email

Frederick E Zorn 12.18.19.
Signature of Authorized Representative (Original Signature Required) Date

Frederick E. Zorn, Jr., CEcD, City Administrator, Southfield, Michigan
Print Name and Title of Authorized Representative

April 2017

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Charter Township of Muskegon *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1253-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: October 23, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jennifer Hodges	at (231) 777-2555	jhodges@muskegontwp.org
Name	Phone Number	Email

Hodges 12/30/19
Signature of Authorized Representative (Original Signature Required) Date

Jennifer Hodges, Supervisor
Print Name and Title of Authorized Representative

April 2017

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Revolving Loan Section
Attention: Mr. Eric Pocan

From: Hubbell, Roth and Clark, Inc.

CC: Village of Bingham Farms
Oakland County Water Resource Commissioner (WRC)

Date: November 7, 2019

Re: Village of Bingham Farms Sanitary Sewer System
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1257-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant work performed by the Village of Bingham Farms. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

Village of Bingham Farms
24255 Thirteen Mile Road, Suite 190
Bingham Farms, Michigan 48025

SAW Grant Project #1257-01

DEQ Approved Grant Amount: $270,000

Applicant Match Amount $30,000

Village of Bingham Farms	Hubbell, Roth, & Clark	WRC Project Manager
Ken Marten, Village Clerk	Karyn Stickel, P.E.	Rick DeVisch, P.E.
248-644-0044	248-454-6300	248-858-4939
kmarten@binghamfarms.org	kstickel@hrcengr.com	devischr@oakgov.com

EXECUTIVE SUMMARY

The Oakland County Water Resource Commissioner (WRC) on behalf of the Village of Bingham Farms applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes, & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Village of Bingham Farm's sanitary sewer system is owned by the Village and is operated and maintained by WRC. WRC has various tools used to manage the assets, including a GIS geodatabase, hydraulic model, condition assessment methods, risk and prioritization models, capacity studies, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The WRC "Common to All" approach was generally followed in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

WASTEWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS). CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by WRC to allow for efficient and consistent recording of asset condition. For sanitary sewer assets, a NASSCO-compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS system. Inspection work orders in the CAMS system are used for evaluation of other types of assets, such as manholes and other collection system structures.

As part of the grant for Bingham Farms, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 48,074 lineal feet of sanitary sewer CCTV data underwent condition assessment via review PACP scoring and assignment of risk. Approximately 205 manhole and other related structures were evaluated using the NASSCO inspection protocol. The pump station was inventoried using a WRC hierarchy template and condition assessment data was collected and input into the CAMS system.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the “Common to All” Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations and storage and treatment facilities, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, non-gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the CAMS system, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (sanitary and storm sewers) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition. For force mains, the POF was based on age.

The COF for mains and access points (sanitary sewers, force mains, and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

The POF and COF of vertical assets were calculated using a scoring matrix. The POF for vertical assets was calculated using a combination of age and physical condition collected from inspections performed. O&M protocol and performance factors were also scored and used in the calculation. In the absence of any other data, age was used to estimate POF. The COF for vertical assets was scored using a matrix of factors including: safety of public and employees, financial impact, public confidence, regulatory compliance, and firm capacity.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual LRP rate process form additional elements of the LOS.

The WRC’s current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*

> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*
>
> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real world” needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing LRP rate process to prioritize projects and ensure adequate funding is available.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.
- Capital Reserve for replacement of pipes or equipment in kind or with alternate technology.

WRC worked with its internal fiscal staff to determine if the system’s current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system’s current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the Village’s sanitary sewer system, using recommendations from the asset inspection process, and consideration of other system needs. This information is then used in the LRP process to determine rate needs for funding the project established.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

• Sewer Point Repair:	$1,500
• Sewer Spot Liner:	$29,000
• Sewer Pressure Test and Seal Joints:	$2,500
• Manhole Repair (Chimney, Adjust F&C, Inspect, etc.):	$25,000
SUBTOTAL Collection System	**$58,000**
• Pump Station – General Electrical:	$5,000
• Pump Station – Mechanical:	$5,000
SUBTOTAL Pump Station	**$10,000**
TOTAL 0-5 YEAR CIP COSTS	**$68,000**

Capital Projects, 6 to 20 years:

- There were no CIP sewer projects identified for this period; however, in accordance with WRC's Asset Management Program ongoing inspections will be made and future projects will be identified as need arises.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the LRP process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Village of Bingham Farm's major assets include:

- 49,025 feet of 6 to 12-inch sanitary sewer pipe
- 986 feet of 6-inch forcemain
- 219 sanitary manholes
- 2 sewer system valve
- 1 collection system pump station

PROJECT HIGHLIGHTS

The development of this Asset Management Program for the Village of Bingham Farms Sanitary System was led by WRC with assistance from HRC. The following highlights some of the more tangible outcomes from the Program development:

- Updated GIS inventory system with age, material, size, and depth information
- Reviewed PACP scoring and assigned risk for 48,074 lft of CCTV data for the system
- Inspected 205 manholes.
- Inspected 1 pump station
- Reviewed frequently cleaned sewers and made recommendations for FOG public education
- Model of the sanitary system was developed to determine areas of flow restrictions
- Pump Station elimination feasibility study was performed
- Completed meter study to identify areas of increased inflow and infiltration

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date Dec. 2, 2019
(no later than 3 years from executed grant date)

The Village of Bingham Farms *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1257-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: December 17, 2018.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Ken Marten at 248-644-0044, kmarten@binghamfarms.org
Name Phone Number Email

Kenneth Marten Dec 2, 2019
Signature of Authorized Representative (Original Signature Required) Date

Ken Marten, Clerk / Administrator
Print Name and Title of Authorized Representative

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date: November 22, 2019
(no later than 3 years from executed grant date)

The **Village of St. Charles** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No.**1266-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

HARTMANN AUE, MANAGER at (989) 865-8287 haue@stcmi.com
Name Phone Number Email

Hart F. Aue 11/13/19
Signature of Authorized Representative (Original Signature Required) Date

HARTMANN F. AUE, MANAGER
Print Name and Title of Authorized Representative

EXECUTIVE SUMMARY

The Village of St. Charles applied for $600,000 in funding to prepare a Wastewater Asset Management Plan (WWAMP) and Stormwater Asset Management Plan (SWAMP) through Public Act No. 511 of 2012 *Stormwater, Asset Management, and Wastewater (SAW)* grant system.

Due to the overwhelming response to the program, the MDEQ implemented a lottery process and published a list of the order that communities would be offered SAW grants. The Village of St. Charles received Round 4 SAW Grant funding.

On September 23, 2016 the Village of St. Charles received a Notice of Grant Application Approval from the Michigan Department of Environmental Quality (MDEQ) for the following:

WWAMP	$302,011
SWAMP	$251,929
Eligible Cost Subtotal	$553,940
LESS Local Match	($55,394)
Total Grant Amount	$498,546

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Storm Water Asset Inventory & Condition Assessment

The Village of St. Charles' storm water collection system consists of an estimated network of 54,000 linear feet (10.22 miles), about 24,000 linear feet (4.56 miles) was located and mapped, of 6-inch to 42-inch diameter gravity flow pipes and approximately 65 manholes, 212 catch basins, and 78 curb inlets. Storm water manholes, catch basins, and curb inlets with vented covers collect runoff occurring from precipitation, preventing it from ponding along roads, road right-of-ways, and other low elevation areas. The storm water is then conveyed by gravity through pipes to a specific effluent, or outfall, point to a larger body of water. Four storm water pump stations are located along FEMA flood control levees that border the Bad River. These pump stations pump water across the levee to the river as part of the 1986 flood reparations.

Within Village of St. Charles village limits are storm water structures and pipes owned by the Village of St. Charles, Saginaw County Public Works Commissioner's Office, Michigan Department of Transportation (MDOT), and various privately-owned storm water sewers.

Locating and identifying Village-owned storm water assets was critical in determining connectivity of the pipe network and creating an accurate base map of the system. The location and connectivity of many pipes have not been field verified due to difficult access to pipes, structures filled with debris, and lack of

budget due to heavy cleaning. To aid in locating manholes and other structures, Spicer Group mobilized its mobile mapping technology to the Village to collect survey-grade data on the entire network of municipal streets. The mobile mapping truck consisted of 8 cameras, tactical grade IMU (Inertial Measurement Unit), and GNSS (Global Navigation Satellite System). The mobile mapping team collected survey grade LiDAR data, and 360-degree street view style imagery on the entire Village road network. After processing the data, the XYZ position of each visible storm water structure was extracted using the LiDAR and Image data. Meaning, the location and elevations of manholes could be found more efficiently from the office reducing time in the field searching for each structure. Manhole assets were field verified by Spicer Group crews, and pipes were field verified by Corby Energy Services (CES) during the cleaning & televising phase of the project.

Corby Energy Services (CES) completed the cleaning and televising and inspection of the storm water pipes and Spicer Group and CES completed inspection of the storm water manholes using the National Association of Sewer Service Companies (NASSCO) Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the defects. The MACP/PACP systems are used to standardize the identification of defects and to quantify the condition of the wastewater assets. Assets were graded for condition on a scale of 1 (Excellent) to 5 (Failing).

Of all of the village-owned storm manhole structures inspected (94% of system) using MACP standards, approximately 57% of all defects observed were related to operation and maintenance (O&M). Common O&M defects were infiltration, deposits settled, and roots present. Many of these have a relatively low criticality and can be addressed by routine cleaning.

Level 2 and Level 3 defects made up 83% of all structural defects identified in the storm water manholes. Some common defects observed were cracks, fractures, and missing mortar medium. More significant structural defects were also observed such as holes, broken concrete, and corroded reinforcement.

Of the 24,000 linear feet of storm sewer that was located, approximately one third of the pipes were televised. Many O&M and structural defects were discovered. Defects such as holes (18), fractures (30), and breaks (14) were observed. Most of the system was not field verified due to difficult access to pipes, structures filled with debris, and lack of budget due to heavy cleaning.

An inspection and condition assessment was performed of the Village's four storm water pump stations, named as follows:

- *Pump Station #1- N. Saginaw Street*
- *Pump Station #2- E. Water Street*
- *Pump Station #3- E. Belle Avenue*
- *Pump Station #4- E. Walnut Street*

PS #1- N. Saginaw Street contained several major components in good to poor condition. Major pump station components such as the wet well concrete walls, wet well piping, discharge structure and hatch, and the level controls received a condition score of 2, or "good" working condition. At the time of inspection both 7.5-horsepower submersible pumps are condition rating 3 and have been replaced in summer 2018 and are new. The old pumps are kept as back-up and parts. Two flap gates in the discharge structure are in good working condition. The control panel, in poor condition, is outdated.

PS #2- E. Water Street contains two 7.5-horsepower submersible, axial flow pumps in poor condition (rating 3). Both pumps and controls (existing condition rating 3) were slated for replacement in 2018 and are now new pumps and controls (condition rating 1). The existing control panel did not make use of

telemetry capabilities. The replaced pumps are kept as back-ups and for parts. Site conditions such as the surrounding grass lot and electrical service are in good condition. External structures such as the wet well, discharge structure, double-leaf steel grate wet well hatch, and discharge structure hatch received a condition rating of 2 and are in good working condition. Internal condition ratings of concrete, piping, and level controls of the same structures were similarly in good condition.

PS #3- E. Belle Avenue site conditions are in good condition (rating 2). Exterior wet well and valve vault hatches and concrete are in a good working state. Discharge structure internals such as flap gates, piping, and concrete walls received condition ratings of 2. However, it's noted that PVC piping may be brittle due to age and exposure to the elements. The level controls, piping, and concrete walls within the wet well are also in good working order (rating 2). This station contains two 7.5-horsepower submersible pumps and controls that were in poor condition and have been replaced to new in 2018.

PS #4- E. Walnut Street contains one 5-horsepower submersible, axial flow pump in good operating order. Likewise, the flap gate check valve and SDR-35 piping are also received a condition score of 2 and are in good condition. Wet well internal steel condition was good as well as the PVC piping and level controls. It is noted that the pump station point of discharge has washed away much of the soil and rip rap at the outfall.

Level of Service (LOS)

The next phase of the asset management plan is a Level of Service determination. What level of service does the Village want to provide to residents in regards to storm water assets? How are projects going to be prioritized and included in the CIP? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Village's Level of Service statement and goals are as follows:

> *The Village of St. Charles strives to develop a financially stable, high performing storm water collection and pumping system that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.*

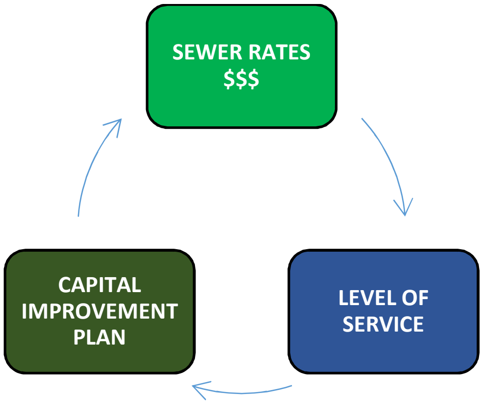
One of the basic goals is to review the capital improvement projects to determine the best value options for the Village's customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Meet the minimum local, State, and/or Federal regulations. Minimal to no cost to the Village, and/or residents
- "**MEDIUM**" Level of Service – Proactive projects that increase the life expectancy and reduce long-term costs, while minimizing costs to the Village, and/or residents
- "**HIGH**" Level of Service – Replacement projects that bring the assets within the project scope to "new" conditions, with a high cost to the Village, and/or residents system to "new" conditions, with a high cost to the Village, and/or residents

The Village of St. Charles has chosen to adopt a Minimum Level of Service in which to operate the storm water system. The Village plans to address issues as they occur and continue to search for a source for storm water funding. Future storm water improvements feasibility will be looked at in conjunction with

other asset improvements, such as streets, wastewater, and water. The Village plans to invest a minimal amount of money into the system while responding to customer complaints.

Asset Management Plan Evaluation Process



Revenue Structure

Spicer Group teamed with Municipal Analytics to prepare the revenue structure analysis for the storm water asset management plan. The Village of St. Charles does not charge Village residents for use of storm water assets and therefore a rate structure does not exist. The Village has adequate financial resources to fund routine maintenance and repairs in the storm water system, through the General Fund and Operation & Maintenance budget items, but cannot fund major capital improvements identified in the asset management plan. The State of Michigan provides local governments few options for paying for storm water projects. Currently, the Village's General Fund, Major Streets Fund, Local Streets Fund, and Village Street Millage Fund are the primary options for storm water funding; leaning more heavily on the Street Millage Fund and General Fund.

Based on the information provided above and knowledge of the condition of the system, the Village council approved a Level of Service documentation at June 12, 2019 Village council meeting to operate the storm water system at a 'Low' level of service, or reactionary level of service. Village Department of Public Works (DPW) will react to system issues and resident complaints as they occur, putting minimal capital into the system.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). The Asset Management Team in conjunction with the Village of St. Charles, held several meetings over the course of the project to discuss and prioritize the capital improvement plan utilizing Parts 1-4 of this report. The Village staff reviewed the condition of the storm water system and possible funding sources. The Village does not currently charge residents for storm water and a rate structure does not exist. The process schematic below shows the working of a typical utility where a rate structure exists.

This process was still applied to the Village's storm water system. However, a lack of funding was the limiting factor.

For storm water collection system assets, the following factors were reviewed:

- Total Defects
- Major Structural Defects
- Likelihood of Failure (LoF)
- Consequences of Failure (CoF)
- Customer complaints
- DPW/Village staff first-hand knowledge of trouble areas

The state of Michigan does not have a significant funding mechanism in place for municipality-owned storm water asset improvements. Funding for Village storm water projects and improvements comes from the Village's general fund. Improvements, or replacements, could be funded for indirectly through Act 51 monies for street improvements, if the project is for road sub-base and/or roadway drainage.

Since there is a lack of funding for storm water assets, the Village has been operating the storm water collection system at a *low* level of service. The Village has reacted to fix drainage issues and flooding as they occur, and/or residents complain. This reactionary method is a way to keep the system functioning, but not improving. Until a storm water funding mechanism becomes available, the Village plans to continue implementing a case-by-case reactionary method of operation and maintenance. Therefore, no significant capital improvements are scheduled at this time.

However, we do recommend that the remainder of the storm water collection system be mapped, cleaned, and televised and assessed for condition. By televising via CCTV, Village DPW staff will have a better grasp of location, condition, and functionality of Village-owned storm water assets. Therefore, future capital improvement decisions to the system could be made based on system-wide condition assessment.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date November 13, 2019
(no later than 3 years from executed grant date)

The **Village of St. Charles** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No.**1266-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes or~~ **No**
   If No - Date of the rate methodology approval letter: **July 17, 2019**.
2) Significant Progress Made: **Yes** ~~or No~~
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: **N/A**
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on **N/A**.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

HARTMANN AUE, MANAGER at (989) 865-6287 haue@stcmi.com
Name Phone Number Email

Hart F. Aue 11/13/19
Signature of Authorized Representative (Original Signature Required) Date

HARTMANN F. AUE, MANAGER
Print Name and Title of Authorized Representative

April 2017

EXECUTIVE SUMMARY

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Wastewater Asset Inventory & Condition Assessment

The Village's wastewater system consists of three main components: collection system (pipes and manholes), pumping stations and force mains, and the wastewater stabilization lagoons (WWSL).

For the collection system, Spicer Group completed a mobile mapping LiDAR survey of the entire Village street network and used the survey information to develop a comprehensive wastewater collection system map and Geographic Information System (GIS). The GIS is a detailed "smart mapping" system with information databases and can be accessed on a desktop computer in the Village office or on an iPad in the field using the ArcGIS/ArcGIS Online by ESRI platform. The GIS will be utilized to view information about wastewater assets such as material, diameter, installation date, and condition as well as locating assets in the field, viewing as-builts, and updating information as necessary. This information can also be queried to provide specific lists and maps and updated easily when future improvements are made.

The Village of St. Charles' wastewater collection system consists of a network of approximately 75,400 linear feet (14.3 miles) of 3-inch to 12-inch diameter gravity and force main pipes and 259 manhole structures. Corby Energy Services (CES) completed a comprehensive cleaning and televising and inspection of the wastewater pipes and Spicer Group and CES completed a comprehensive inspection of the wastewater manholes using the National Association of Sewer Service Companies (NASSCO)

Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the defects. The MACP/PACP systems are used to standardize the identification of defects and to quantify the condition of the wastewater assets. Assets were graded for condition on a scale of 1 (Excellent) to 5 (Failing). Recommendations were made and included in the Village's Capital Improvement Plan (CIP) for future collection system improvements.

An inspection and condition assessment of the Village's three wastewater pump stations, named as follows:

- *Pump Station #1- E. Maple Street*
- *Pump Station #2- Walnut Street*
- *Pump Station #3- Entrepreneur Drive*

The E. Maple Street pump station is a critical asset and is overall in good condition. The pump station exterior including the wet well hatch, ventilation pipe, and control panel were in good working condition. This pump station was built 50 years ago and the can-style station is older infrastructure. Gate valves, check valves, flow meter, and piping received a condition score of 3, or poor. The ultrasonic flow meter is not currently working. Pump motors (15hp) received scores of 3, and motor mounts were in good condition. Pump station internal conditions including the wet well, level floats, and piping were in good to poor condition. The electrical controls and level controls are old technology and showing their age. The on-site generator and portable generator receptacle were in a good state. Pump #1 was rebuilt in 2013 and pump #2 has also been rebuilt. Rehabilitating this station has been included in the Capital Improvement Plan.

The Walnut Street pump station, which serves the schools complex, had components in poor condition and the pump station is outdated but functioning. The wet well hatch and vent pipe are in good condition. The control panel and external wet well received condition scores of 3, considered poor. This can-style pump station was built in 1971 and better, safer technology exists. Pump station internal equipment such as isolation valves and check valves, piping, and pump motors and mounts received condition scores of 3, and are beginning to show their age. Wet well concrete, piping, and level control floats are in poor condition, which is expected of a pump station this old. Both pump #1 and pump #2 were rebuilt in 2014. Rehabilitating this pump station has been included in the CIP.

The Entrepreneur Drive pump station is the newest of the three pump stations (built 1989) and in need of upgrades. The drain line connecting the valve vault and wet well is not working to drain the valve vault. The valve vault has enough standing water to make checking the condition of the valves difficult. Since the pump station was built in 1989, minimum maintenance has been performed. Wet well ductile iron piping is corroded and in very poor condition receiving a condition rating of 4. The control panel has a Raco alarm autodialer that is not connected. The site conditions including the surrounding grass lot and electrical service are good. The 5-horsepower submersible pumps were not pulled to observe condition. Rehabilitation of this pump station has been included in the CIP.

The wastewater stabilization lagoon (WWSL) contains three wastewater biological treatment cells and is located east of M-52 in the northern portion of the Village. A condition assessment was conducted in conjunction with Village Staff using the same condition scale as listed above.

Cell #1, built in 1989, was in good condition. The geotextile fabric and rip-rap were intact and preventing side slope erosion. None of the 6 aerators located in Cell #1 are currently operational. The soil side slopes of Cell #2 and Cell #3 (built 1967) are showing signs of erosion and are considered very poor, receiving a condition rating of 4. Side slope erosion can affect perimeter access drives, which are also in need of

repair due to several sections being rutted and narrow. The primary concrete influent structure, in which all of the Village's wastewater passes through prior to entering the stabilization lagoons, has defects in the concrete and is missing a proper grating cover. Also, receiving a condition rating of 4 was the WWSL effluent outfall ditch and Beaver Creek. Improper grading and capacity allowed for ponding of WWSL effluent and wetland water near the WWSL outfall and perimeter. The WWSL effluent structures are deteriorated and components within them such as gates and valves received condition scores as high as 4 and 5. Wastewater Stabilization Lagoon improvements have been included in the CIP.

In conjunction with the condition assessment, biosolids testing of the three lagoon cells was completed by Biotech Agronomics, Inc. as part of the condition assessment. This was accomplished by utilizing a "sludge judge" sampler and chemical analysis of the bio solids. A "sludge judge" sampler is a long tube that is pushed to the bottom of the lagoon collecting a vertical core sample of solids as it passes through the water column. Lab analysis determined biosolids collected from each lagoon cell met MDEQ requirements for Residuals Management Plan (RMP) and the biosolids can be recycled in a beneficial reuse program, such as land application without the use of an irrigation pump station.

Level of Service (LOS)

The next phase of the asset management plan is a Level of Service determination. What level of service does the Village want to provide to its wastewater customers? How are projects going to be prioritized and included in the CIP? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Village's Level of Service statement/goals are as follows:

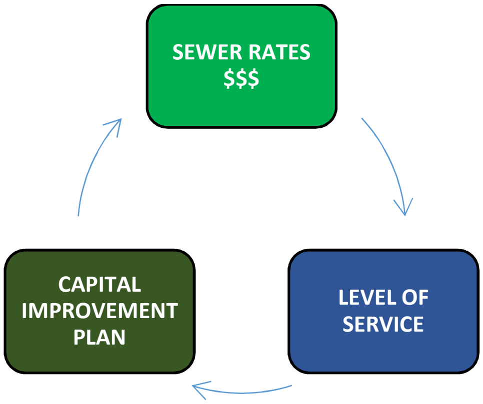
> *The Village of St. Charles strives to develop a financially stable, high performing wastewater collection, pumping and treatment service that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.*

One of the basic goals is to review the capital improvement projects to determine the best value options for the Village's customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Meet the minimum local, State, and/or Federal regulations. With minimal or no increase to the sewer rates to customers.
- "**MEDIUM**" Level of Service – Proactive projects that increase the life expectancy and reduce long-term costs, with a minimal rate increase to customers.
- "**HIGH**" Level of Service – Replacement projects that bring the system to "new" conditions, with a high rate increase to customers.

The Village of St. Charles has chosen to adopt a level of service on an individual project basis in which certain projects receive higher, or lower level of service based on necessity and cost. The Village plans to increase rates progressively and invest a minimal amount of money into the system while minimizing customer complaints and maintaining wastewater regulations.

Asset Management Plan Evaluation Process



The resulting capital improvement plan and revenue structure was one that met the Village's goals, addressed the improvements that need to be made, and maintains a sustainable rate structure for the Village's customers.

Criticality (Risk)

For each asset in the Village's wastewater system, a criticality/risk analysis was performed to determine condition and prioritize the Village's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including all pipes, manholes, pumping stations, and WWSL components. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences, if that asset failed. Finally, the Criticality (Risk) score was calculated using:

RISK = LoF x CoF

The Likelihood of Failure, Consequence of Failure, and Risk scores for each asset were taken into consideration for the capital improvement projects (CIP) outlined below.

Revenue Structure

Spicer Group teamed with Municipal Analytics to prepare the revenue structure analysis for the asset management plan. Wastewater account balances, expenditures, revenues, etc. were reviewed and input into Municipal Analytics' financial software to determine if there were any deficiencies in the rates. Based on Municipal Analytics' analysis, no gap exists in the Village's current Sewer Fund.

Next, the Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion, and the rate structure to support those improvements was determined. Many iterations and scenarios were performed to find a rate structure that met the Village's Level of Service goals, fund the CIP projects that are needed, and had sustainable rates for the Village's customers. The Village council looked at the wastewater and water rate plans together and on September 11, 2019 approved a motion to adopt a 5-year rate plan of an annual increase of 10% to the Village's sewer commodity charge and adjusted sewer minimum charge. The rate structure should be reviewed annually as a part of the Village's normal budgeting process. The sewer and water utilities revenue report can be seen in Part 5 – Revenue Structure.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the asset management plan. Reviewing the results of the wastewater system Inventory & Condition Assessment, Level of Service determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. Various degrees of Level of Service and the associated CIP projects were evaluated and plugged into the Revenue Structure model, and the resulting sewer rates for that set of scenarios were reviewed. If the projected rates were too high, a lower LOS was chosen and those CIP projects were plugged into the Revenue Structure model and the resulting rates were then reviewed. The process then continued with different CIP projects at varying LOS's until an acceptable rate structure, level of service, and capital improvement plan was developed.

A CIP was developed that includes various collection system improvements including:

Collection System
- Sunview Dr. sanitary sewer improvements – M-52 to End (SAN1.33-SAN1.38) – Broken pipe
- N. Saginaw St. sanitary sewer improvements – SAN2.15-SAN2.21 – Hole in the pipe
- E. Belle Ave. sanitary sewer improvements – SAN3.93-SAN3.91 – Infiltration, Fractured pipe
- Manhole Repairs – System-wide – Budget line item of $10,000 per year for replacing frames, covers, and components and raising manholes to grade
- Cured-In-Place-Pipe Liner (CIPP) – System-wide – Budget line item $50,000 per year for a CIPP plan to line the entirety of the Village-owned system on a set year-cycle

Pumping Stations
- Pump Station #3 Improvements – Entrepreneur Drive – Valve Vault filled with water, required maintenance
- Pump Station #1 Improvements – E. Maple Street – Exceeded service life
- Pump Station #2 Improvements – Walnut Street – Exceeded service life

Wastewater Stabilization Lagoon (WWSL)
- Floating Aerators – Cell #1 – Aerators are broken – Research alternate system
- Effluent Structure Improvements – Cell #2 & Cell #3 – Broken valves, exceeded service life
- Primary Influent Structure Improvements – Central lagoon – Missing effective cover, weir gates damages, exceeded service life
- Cell #2 soil side slopes, Perimeter drives – Cell #2 – Bank erosion, narrow/rutted drives
- Cell #3 soil side slope, Perimeter drives – Cell #3 – Bank erosion, narrow/rutted drives

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- *Pump Station #4- E. Walnut Street*

PS #1- N. Saginaw Street contained several major components in good to poor condition. Major pump station components such as the wet well concrete walls, wet well piping, discharge structure and hatch, and the level controls received a condition score of 2, or "good" working condition. At the time of inspection both 7.5-horsepower submersible pumps are condition rating 3 and have been replaced in summer 2018 and are new. The old pumps are kept as back-up and parts. Two flap gates in the discharge structure are in good working condition. The control panel, in poor condition, is outdated.

PS #2- E. Water Street contains two 7.5-horsepower submersible, axial flow pumps in poor condition (rating 3). Both pumps and controls (existing condition rating 3) were slated for replacement in 2018 and are now new pumps and controls (condition rating 1). The existing control panel did not make use of

telemetry capabilities. The replaced pumps are kept as back-ups and for parts. Site conditions such as the surrounding grass lot and electrical service are in good condition. External structures such as the wet well, discharge structure, double-leaf steel grate wet well hatch, and discharge structure hatch received a condition rating of 2 and are in good working condition. Internal condition ratings of concrete, piping, and level controls of the same structures were similarly in good condition.

PS #3- E. Belle Avenue site conditions are in good condition (rating 2). Exterior wet well and valve vault hatches and concrete are in a good working state. Discharge structure internals such as flap gates, piping, and concrete walls received condition ratings of 2. However, it's noted that PVC piping may be brittle due to age and exposure to the elements. The level controls, piping, and concrete walls within the wet well are also in good working order (rating 2). This station contains two 7.5-horsepower submersible pumps and controls that were in poor condition and have been replaced to new in 2018.

PS #4- E. Walnut Street contains one 5-horsepower submersible, axial flow pump in good operating order. Likewise, the flap gate check valve and SDR-35 piping are also received a condition score of 2 and are in good condition. Wet well internal steel condition was good as well as the PVC piping and level controls. It is noted that the pump station point of discharge has washed away much of the soil and rip rap at the outfall.

Level of Service (LOS)

The next phase of the asset management plan is a Level of Service determination. What level of service does the Village want to provide to residents in regards to storm water assets? How are projects going to be prioritized and included in the CIP? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Village's Level of Service statement and goals are as follows:

> *The Village of St. Charles strives to develop a financially stable, high performing storm water collection and pumping system that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.*

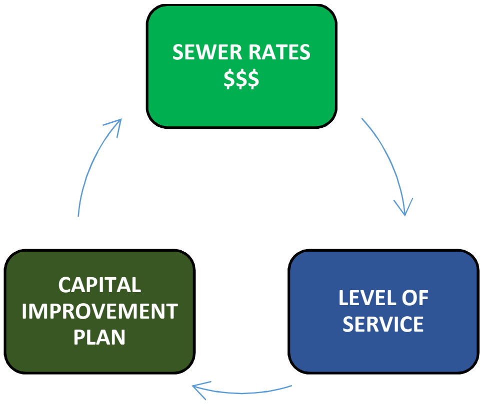
One of the basic goals is to review the capital improvement projects to determine the best value options for the Village's customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Meet the minimum local, State, and/or Federal regulations. Minimal to no cost to the Village, and/or residents
- "**MEDIUM**" Level of Service – Proactive projects that increase the life expectancy and reduce long-term costs, while minimizing costs to the Village, and/or residents
- "**HIGH**" Level of Service – Replacement projects that bring the assets within the project scope to "new" conditions, with a high cost to the Village, and/or residents system to "new" conditions, with a high cost to the Village, and/or residents

The Village of St. Charles has chosen to adopt a Minimum Level of Service in which to operate the storm water system. The Village plans to address issues as they occur and continue to search for a source for storm water funding. Future storm water improvements feasibility will be looked at in conjunction with

other asset improvements, such as streets, wastewater, and water. The Village plans to invest a minimal amount of money into the system while responding to customer complaints.

Asset Management Plan Evaluation Process



Revenue Structure

Spicer Group teamed with Municipal Analytics to prepare the revenue structure analysis for the storm water asset management plan. The Village of St. Charles does not charge Village residents for use of storm water assets and therefore a rate structure does not exist. The Village has adequate financial resources to fund routine maintenance and repairs in the storm water system, through the General Fund and Operation & Maintenance budget items, but cannot fund major capital improvements identified in the asset management plan. The State of Michigan provides local governments few options for paying for storm water projects. Currently, the Village's General Fund, Major Streets Fund, Local Streets Fund, and Village Street Millage Fund are the primary options for storm water funding; leaning more heavily on the Street Millage Fund and General Fund.

Based on the information provided above and knowledge of the condition of the system, the Village council approved a Level of Service documentation at June 12, 2019 Village council meeting to operate the storm water system at a 'Low' level of service, or reactionary level of service. Village Department of Public Works (DPW) will react to system issues and resident complaints as they occur, putting minimal capital into the system.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). The Asset Management Team in conjunction with the Village of St. Charles, held several meetings over the course of the project to discuss and prioritize the capital improvement plan utilizing Parts 1-4 of this report. The Village staff reviewed the condition of the storm water system and possible funding sources. The Village does not currently charge residents for storm water and a rate structure does not exist. The process schematic below shows the working of a typical utility where a rate structure exists.

This process was still applied to the Village's storm water system. However, a lack of funding was the limiting factor.

For storm water collection system assets, the following factors were reviewed:

- Total Defects
- Major Structural Defects
- Likelihood of Failure (LoF)
- Consequences of Failure (CoF)
- Customer complaints
- DPW/Village staff first-hand knowledge of trouble areas

The state of Michigan does not have a significant funding mechanism in place for municipality-owned storm water asset improvements. Funding for Village storm water projects and improvements comes from the Village's general fund. Improvements, or replacements, could be funded for indirectly through Act 51 monies for street improvements, if the project is for road sub-base and/or roadway drainage.

Since there is a lack of funding for storm water assets, the Village has been operating the storm water collection system at a *low* level of service. The Village has reacted to fix drainage issues and flooding as they occur, and/or residents complain. This reactionary method is a way to keep the system functioning, but not improving. Until a storm water funding mechanism becomes available, the Village plans to continue implementing a case-by-case reactionary method of operation and maintenance. Therefore, no significant capital improvements are scheduled at this time.

However, we do recommend that the remainder of the storm water collection system be mapped, cleaned, and televised and assessed for condition. By televising via CCTV, Village DPW staff will have a better grasp of location, condition, and functionality of Village-owned storm water assets. Therefore, future capital improvement decisions to the system could be made based on system-wide condition assessment.

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date: November 22, 2019
(no later than 3 years from executed grant date)

The **Village of St. Charles** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No.**1266-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

HARTMANN AUE, MANAGER at (989) 865-8287 haue@stcmi.com
Name Phone Number Email

Hart F. Aue 11/13/19
Signature of Authorized Representative (Original Signature Required) Date

HARTMANN F. AUE, MANAGER
Print Name and Title of Authorized Representative

EXECUTIVE SUMMARY

The Village of St. Charles applied for $600,000 in funding to prepare a Wastewater Asset Management Plan (WWAMP) and Stormwater Asset Management Plan (SWAMP) through Public Act No. 511 of 2012 *Stormwater, Asset Management, and Wastewater (SAW)* grant system.

Due to the overwhelming response to the program, the MDEQ implemented a lottery process and published a list of the order that communities would be offered SAW grants. The Village of St. Charles received Round 4 SAW Grant funding.

On September 23, 2016 the Village of St. Charles received a Notice of Grant Application Approval from the Michigan Department of Environmental Quality (MDEQ) for the following:

WWAMP	$302,011
SWAMP	$251,929
Eligible Cost Subtotal	$553,940
LESS Local Match	($55,394)
Total Grant Amount	$498,546

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Storm Water Asset Inventory & Condition Assessment

The Village of St. Charles' storm water collection system consists of an estimated network of 54,000 linear feet (10.22 miles), about 24,000 linear feet (4.56 miles) was located and mapped, of 6-inch to 42-inch diameter gravity flow pipes and approximately 65 manholes, 212 catch basins, and 78 curb inlets. Storm water manholes, catch basins, and curb inlets with vented covers collect runoff occurring from precipitation, preventing it from ponding along roads, road right-of-ways, and other low elevation areas. The storm water is then conveyed by gravity through pipes to a specific effluent, or outfall, point to a larger body of water. Four storm water pump stations are located along FEMA flood control levees that border the Bad River. These pump stations pump water across the levee to the river as part of the 1986 flood reparations.

Within Village of St. Charles village limits are storm water structures and pipes owned by the Village of St. Charles, Saginaw County Public Works Commissioner's Office, Michigan Department of Transportation (MDOT), and various privately-owned storm water sewers.

Locating and identifying Village-owned storm water assets was critical in determining connectivity of the pipe network and creating an accurate base map of the system. The location and connectivity of many pipes have not been field verified due to difficult access to pipes, structures filled with debris, and lack of

budget due to heavy cleaning. To aid in locating manholes and other structures, Spicer Group mobilized its mobile mapping technology to the Village to collect survey-grade data on the entire network of municipal streets. The mobile mapping truck consisted of 8 cameras, tactical grade IMU (Inertial Measurement Unit), and GNSS (Global Navigation Satellite System). The mobile mapping team collected survey grade LiDAR data, and 360-degree street view style imagery on the entire Village road network. After processing the data, the XYZ position of each visible storm water structure was extracted using the LiDAR and Image data. Meaning, the location and elevations of manholes could be found more efficiently from the office reducing time in the field searching for each structure. Manhole assets were field verified by Spicer Group crews, and pipes were field verified by Corby Energy Services (CES) during the cleaning & televising phase of the project.

Corby Energy Services (CES) completed the cleaning and televising and inspection of the storm water pipes and Spicer Group and CES completed inspection of the storm water manholes using the National Association of Sewer Service Companies (NASSCO) Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the defects. The MACP/PACP systems are used to standardize the identification of defects and to quantify the condition of the wastewater assets. Assets were graded for condition on a scale of 1 (Excellent) to 5 (Failing).

Of all of the village-owned storm manhole structures inspected (94% of system) using MACP standards, approximately 57% of all defects observed were related to operation and maintenance (O&M). Common O&M defects were infiltration, deposits settled, and roots present. Many of these have a relatively low criticality and can be addressed by routine cleaning.

Level 2 and Level 3 defects made up 83% of all structural defects identified in the storm water manholes. Some common defects observed were cracks, fractures, and missing mortar medium. More significant structural defects were also observed such as holes, broken concrete, and corroded reinforcement.

Of the 24,000 linear feet of storm sewer that was located, approximately one third of the pipes were televised. Many O&M and structural defects were discovered. Defects such as holes (18), fractures (30), and breaks (14) were observed. Most of the system was not field verified due to difficult access to pipes, structures filled with debris, and lack of budget due to heavy cleaning.

An inspection and condition assessment was performed of the Village's four storm water pump stations, named as follows:

- *Pump Station #1- N. Saginaw Street*
- *Pump Station #2- E. Water Street*
- *Pump Station #3- E. Belle Avenue*
- *Pump Station #4- E. Walnut Street*

PS #1- N. Saginaw Street contained several major components in good to poor condition. Major pump station components such as the wet well concrete walls, wet well piping, discharge structure and hatch, and the level controls received a condition score of 2, or "good" working condition. At the time of inspection both 7.5-horsepower submersible pumps are condition rating 3 and have been replaced in summer 2018 and are new. The old pumps are kept as back-up and parts. Two flap gates in the discharge structure are in good working condition. The control panel, in poor condition, is outdated.

PS #2- E. Water Street contains two 7.5-horsepower submersible, axial flow pumps in poor condition (rating 3). Both pumps and controls (existing condition rating 3) were slated for replacement in 2018 and are now new pumps and controls (condition rating 1). The existing control panel did not make use of

telemetry capabilities. The replaced pumps are kept as back-ups and for parts. Site conditions such as the surrounding grass lot and electrical service are in good condition. External structures such as the wet well, discharge structure, double-leaf steel grate wet well hatch, and discharge structure hatch received a condition rating of 2 and are in good working condition. Internal condition ratings of concrete, piping, and level controls of the same structures were similarly in good condition.

PS #3- E. Belle Avenue site conditions are in good condition (rating 2). Exterior wet well and valve vault hatches and concrete are in a good working state. Discharge structure internals such as flap gates, piping, and concrete walls received condition ratings of 2. However, it's noted that PVC piping may be brittle due to age and exposure to the elements. The level controls, piping, and concrete walls within the wet well are also in good working order (rating 2). This station contains two 7.5-horsepower submersible pumps and controls that were in poor condition and have been replaced to new in 2018.

PS #4- E. Walnut Street contains one 5-horsepower submersible, axial flow pump in good operating order. Likewise, the flap gate check valve and SDR-35 piping are also received a condition score of 2 and are in good condition. Wet well internal steel condition was good as well as the PVC piping and level controls. It is noted that the pump station point of discharge has washed away much of the soil and rip rap at the outfall.

Level of Service (LOS)

The next phase of the asset management plan is a Level of Service determination. What level of service does the Village want to provide to residents in regards to storm water assets? How are projects going to be prioritized and included in the CIP? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Village's Level of Service statement and goals are as follows:

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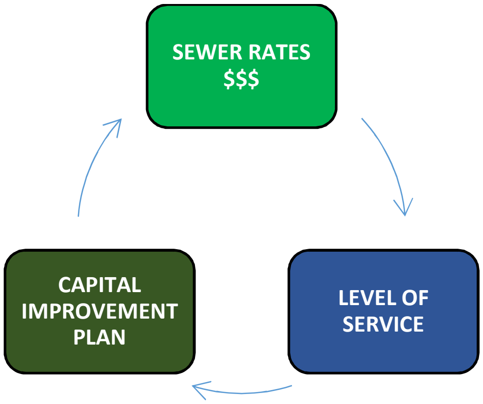
other asset improvements, such as streets, wastewater, and water. The Village plans to invest a minimal amount of money into the system while responding to customer complaints.

Asset Management Plan Evaluation Process



Revenue Structure

Spicer Group teamed with Municipal Analytics to prepare the revenue structure analysis for the storm water asset management plan. The Village of St. Charles does not charge Village residents for use of storm water assets and therefore a rate structure does not exist. The Village has adequate financial resources to fund routine maintenance and repairs in the storm water system, through the General Fund and Operation & Maintenance budget items, but cannot fund major capital improvements identified in the asset management plan. The State of Michigan provides local governments few options for paying for storm water projects. Currently, the Village's General Fund, Major Streets Fund, Local Streets Fund, and Village Street Millage Fund are the primary options for storm water funding; leaning more heavily on the Street Millage Fund and General Fund.

Based on the information provided above and knowledge of the condition of the system, the Village council approved a Level of Service documentation at June 12, 2019 Village council meeting to operate the storm water system at a 'Low' level of service, or reactionary level of service. Village Department of Public Works (DPW) will react to system issues and resident complaints as they occur, putting minimal capital into the system.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). The Asset Management Team in conjunction with the Village of St. Charles, held several meetings over the course of the project to discuss and prioritize the capital improvement plan utilizing Parts 1-4 of this report. The Village staff reviewed the condition of the storm water system and possible funding sources. The Village does not currently charge residents for storm water and a rate structure does not exist. The process schematic below shows the working of a typical utility where a rate structure exists.

This process was still applied to the Village's storm water system. However, a lack of funding was the limiting factor.

For storm water collection system assets, the following factors were reviewed:

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The state of Michigan does not have a significant funding mechanism in place for municipality-owned storm water asset improvements. Funding for Village storm water projects and improvements comes from the Village's general fund. Improvements, or replacements, could be funded for indirectly through Act 51 monies for street improvements, if the project is for road sub-base and/or roadway drainage.

Since there is a lack of funding for storm water assets, the Village has been operating the storm water collection system at a *low* level of service. The Village has reacted to fix drainage issues and flooding as they occur, and/or residents complain. This reactionary method is a way to keep the system functioning, but not improving. Until a storm water funding mechanism becomes available, the Village plans to continue implementing a case-by-case reactionary method of operation and maintenance. Therefore, no significant capital improvements are scheduled at this time.

However, we do recommend that the remainder of the storm water collection system be mapped, cleaned, and televised and assessed for condition. By televising via CCTV, Village DPW staff will have a better grasp of location, condition, and functionality of Village-owned storm water assets. Therefore, future capital improvement decisions to the system could be made based on system-wide condition assessment.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date November 13, 2019
(no later than 3 years from executed grant date)

The **Village of St. Charles** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No.**1266-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes or~~ **No**

   If No - Date of the rate methodology approval letter: **July 17, 2019**.

2) Significant Progress Made: **Yes** ~~or No~~

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: **N/A**

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on **N/A**.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

HARTMANN AUE, MANAGER at (989) 865-6287 haue@stcmi.com
Name Phone Number Email

Hart F. Aue 11/13/19
Signature of Authorized Representative (Original Signature Required) Date

HARTMANN F. AUE, MANAGER
Print Name and Title of Authorized Representative

April 2017

EXECUTIVE SUMMARY

The Village of St. Charles applied for $600,000 in funding to prepare a Wastewater Asset Management Plan (WWAMP) and Stormwater Asset Management Plan (SWAMP) through Public Act No. 511 of 2012 *Stormwater, Asset Management, and Wastewater (SAW)* grant system.

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Total Grant Amount	$498,546

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Wastewater Asset Inventory & Condition Assessment

The Village's wastewater system consists of three main components: collection system (pipes and manholes), pumping stations and force mains, and the wastewater stabilization lagoons (WWSL).

For the collection system, Spicer Group completed a mobile mapping LiDAR survey of the entire Village street network and used the survey information to develop a comprehensive wastewater collection system map and Geographic Information System (GIS). The GIS is a detailed "smart mapping" system with information databases and can be accessed on a desktop computer in the Village office or on an iPad in the field using the ArcGIS/ArcGIS Online by ESRI platform. The GIS will be utilized to view information about wastewater assets such as material, diameter, installation date, and condition as well as locating assets in the field, viewing as-builts, and updating information as necessary. This information can also be queried to provide specific lists and maps and updated easily when future improvements are made.

The Village of St. Charles' wastewater collection system consists of a network of approximately 75,400 linear feet (14.3 miles) of 3-inch to 12-inch diameter gravity and force main pipes and 259 manhole structures. Corby Energy Services (CES) completed a comprehensive cleaning and televising and inspection of the wastewater pipes and Spicer Group and CES completed a comprehensive inspection of the wastewater manholes using the National Association of Sewer Service Companies (NASSCO)

Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the defects. The MACP/PACP systems are used to standardize the identification of defects and to quantify the condition of the wastewater assets. Assets were graded for condition on a scale of 1 (Excellent) to 5 (Failing). Recommendations were made and included in the Village's Capital Improvement Plan (CIP) for future collection system improvements.

An inspection and condition assessment of the Village's three wastewater pump stations, named as follows:

- *Pump Station #1- E. Maple Street*
- *Pump Station #2- Walnut Street*
- *Pump Station #3- Entrepreneur Drive*

The E. Maple Street pump station is a critical asset and is overall in good condition. The pump station exterior including the wet well hatch, ventilation pipe, and control panel were in good working condition. This pump station was built 50 years ago and the can-style station is older infrastructure. Gate valves, check valves, flow meter, and piping received a condition score of 3, or poor. The ultrasonic flow meter is not currently working. Pump motors (15hp) received scores of 3, and motor mounts were in good condition. Pump station internal conditions including the wet well, level floats, and piping were in good to poor condition. The electrical controls and level controls are old technology and showing their age. The on-site generator and portable generator receptacle were in a good state. Pump #1 was rebuilt in 2013 and pump #2 has also been rebuilt. Rehabilitating this station has been included in the Capital Improvement Plan.

The Walnut Street pump station, which serves the schools complex, had components in poor condition and the pump station is outdated but functioning. The wet well hatch and vent pipe are in good condition. The control panel and external wet well received condition scores of 3, considered poor. This can-style pump station was built in 1971 and better, safer technology exists. Pump station internal equipment such as isolation valves and check valves, piping, and pump motors and mounts received condition scores of 3, and are beginning to show their age. Wet well concrete, piping, and level control floats are in poor condition, which is expected of a pump station this old. Both pump #1 and pump #2 were rebuilt in 2014. Rehabilitating this pump station has been included in the CIP.

The Entrepreneur Drive pump station is the newest of the three pump stations (built 1989) and in need of upgrades. The drain line connecting the valve vault and wet well is not working to drain the valve vault. The valve vault has enough standing water to make checking the condition of the valves difficult. Since the pump station was built in 1989, minimum maintenance has been performed. Wet well ductile iron piping is corroded and in very poor condition receiving a condition rating of 4. The control panel has a Raco alarm autodialer that is not connected. The site conditions including the surrounding grass lot and electrical service are good. The 5-horsepower submersible pumps were not pulled to observe condition. Rehabilitation of this pump station has been included in the CIP.

The wastewater stabilization lagoon (WWSL) contains three wastewater biological treatment cells and is located east of M-52 in the northern portion of the Village. A condition assessment was conducted in conjunction with Village Staff using the same condition scale as listed above.

Cell #1, built in 1989, was in good condition. The geotextile fabric and rip-rap were intact and preventing side slope erosion. None of the 6 aerators located in Cell #1 are currently operational. The soil side slopes of Cell #2 and Cell #3 (built 1967) are showing signs of erosion and are considered very poor, receiving a condition rating of 4. Side slope erosion can affect perimeter access drives, which are also in need of

repair due to several sections being rutted and narrow. The primary concrete influent structure, in which all of the Village's wastewater passes through prior to entering the stabilization lagoons, has defects in the concrete and is missing a proper grating cover. Also, receiving a condition rating of 4 was the WWSL effluent outfall ditch and Beaver Creek. Improper grading and capacity allowed for ponding of WWSL effluent and wetland water near the WWSL outfall and perimeter. The WWSL effluent structures are deteriorated and components within them such as gates and valves received condition scores as high as 4 and 5. Wastewater Stabilization Lagoon improvements have been included in the CIP.

In conjunction with the condition assessment, biosolids testing of the three lagoon cells was completed by Biotech Agronomics, Inc. as part of the condition assessment. This was accomplished by utilizing a "sludge judge" sampler and chemical analysis of the bio solids. A "sludge judge" sampler is a long tube that is pushed to the bottom of the lagoon collecting a vertical core sample of solids as it passes through the water column. Lab analysis determined biosolids collected from each lagoon cell met MDEQ requirements for Residuals Management Plan (RMP) and the biosolids can be recycled in a beneficial reuse program, such as land application without the use of an irrigation pump station.

Level of Service (LOS)

The next phase of the asset management plan is a Level of Service determination. What level of service does the Village want to provide to its wastewater customers? How are projects going to be prioritized and included in the CIP? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Village's Level of Service statement/goals are as follows:

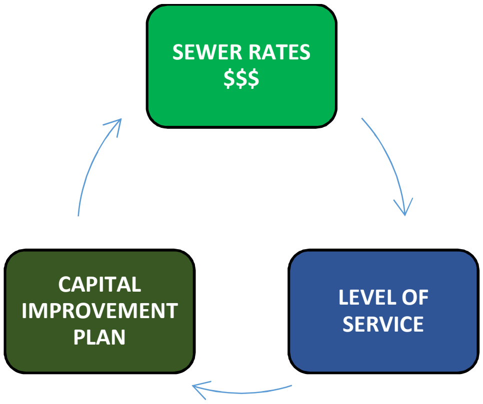
> *The Village of St. Charles strives to develop a financially stable, high performing wastewater collection, pumping and treatment service that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.*

One of the basic goals is to review the capital improvement projects to determine the best value options for the Village's customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Meet the minimum local, State, and/or Federal regulations. With minimal or no increase to the sewer rates to customers.
- "**MEDIUM**" Level of Service – Proactive projects that increase the life expectancy and reduce long-term costs, with a minimal rate increase to customers.
- "**HIGH**" Level of Service – Replacement projects that bring the system to "new" conditions, with a high rate increase to customers.

The Village of St. Charles has chosen to adopt a level of service on an individual project basis in which certain projects receive higher, or lower level of service based on necessity and cost. The Village plans to increase rates progressively and invest a minimal amount of money into the system while minimizing customer complaints and maintaining wastewater regulations.

Asset Management Plan Evaluation Process



The resulting capital improvement plan and revenue structure was one that met the Village's goals, addressed the improvements that need to be made, and maintains a sustainable rate structure for the Village's customers.

Criticality (Risk)

For each asset in the Village's wastewater system, a criticality/risk analysis was performed to determine condition and prioritize the Village's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including all pipes, manholes, pumping stations, and WWSL components. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences, if that asset failed. Finally, the Criticality (Risk) score was calculated using:

RISK = LoF x CoF

The Likelihood of Failure, Consequence of Failure, and Risk scores for each asset were taken into consideration for the capital improvement projects (CIP) outlined below.

Revenue Structure

Spicer Group teamed with Municipal Analytics to prepare the revenue structure analysis for the asset management plan. Wastewater account balances, expenditures, revenues, etc. were reviewed and input into Municipal Analytics' financial software to determine if there were any deficiencies in the rates. Based on Municipal Analytics' analysis, no gap exists in the Village's current Sewer Fund.

Next, the Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion, and the rate structure to support those improvements was determined. Many iterations and scenarios were performed to find a rate structure that met the Village's Level of Service goals, fund the CIP projects that are needed, and had sustainable rates for the Village's customers. The Village council looked at the wastewater and water rate plans together and on September 11, 2019 approved a motion to adopt a 5-year rate plan of an annual increase of 10% to the Village's sewer commodity charge and adjusted sewer minimum charge. The rate structure should be reviewed annually as a part of the Village's normal budgeting process. The sewer and water utilities revenue report can be seen in Part 5 – Revenue Structure.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the asset management plan. Reviewing the results of the wastewater system Inventory & Condition Assessment, Level of Service determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. Various degrees of Level of Service and the associated CIP projects were evaluated and plugged into the Revenue Structure model, and the resulting sewer rates for that set of scenarios were reviewed. If the projected rates were too high, a lower LOS was chosen and those CIP projects were plugged into the Revenue Structure model and the resulting rates were then reviewed. The process then continued with different CIP projects at varying LOS's until an acceptable rate structure, level of service, and capital improvement plan was developed.

A CIP was developed that includes various collection system improvements including:

Collection System

- Sunview Dr. sanitary sewer improvements – M-52 to End (SAN1.33-SAN1.38) – Broken pipe
- N. Saginaw St. sanitary sewer improvements – SAN2.15-SAN2.21 – Hole in the pipe
- E. Belle Ave. sanitary sewer improvements – SAN3.93-SAN3.91 – Infiltration, Fractured pipe
- Manhole Repairs – System-wide – Budget line item of $10,000 per year for replacing frames, covers, and components and raising manholes to grade
- Cured-In-Place-Pipe Liner (CIPP) – System-wide – Budget line item $50,000 per year for a CIPP plan to line the entirety of the Village-owned system on a set year-cycle

Pumping Stations

- Pump Station #3 Improvements – Entrepreneur Drive – Valve Vault filled with water, required maintenance
- Pump Station #1 Improvements – E. Maple Street – Exceeded service life
- Pump Station #2 Improvements – Walnut Street – Exceeded service life

Wastewater Stabilization Lagoon (WWSL)

- Floating Aerators – Cell #1 – Aerators are broken – Research alternate system
- Effluent Structure Improvements – Cell #2 & Cell #3 – Broken valves, exceeded service life
- Primary Influent Structure Improvements – Central lagoon – Missing effective cover, weir gates damages, exceeded service life
- Cell #2 soil side slopes, Perimeter drives – Cell #2 – Bank erosion, narrow/rutted drives
- Cell #3 soil side slope, Perimeter drives – Cell #3 – Bank erosion, narrow/rutted drives

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Bridgeport Charter Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1267-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 7, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: __________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Dan Billingsley, WWTP Supt. at (989) 293-7645 dbillingsley@bridgeportmi.org
Name Phone Number Email

12/13/19
Signature of Authorized Representative (Original Signature Required) Date

Rose Licht, Township Supervisor
Print Name and Title of Authorized Representative

April 2017

Certification of Project Completeness Summary

Bridgeport Charter Township
6740 Dixie Highway
Bridgeport, MI 48722
(989) 777-0940

SAW Grant Project No. 1267-01

In November 2016, Bridgeport Charter Township entered into an agreement with the Michigan Department of Environment, Great Lakes, & Energy and the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. The Township received the following:

Wastewater Asset Management Plan (WWAMP) Project Cost	$893,292
LESS Local Match – 0%	($ 0)
Total Grant Amount – 100% Grant	$893,292

Wastewater Asset Inventory

The Township's wastewater collection system has been inventoried, including approximately 246,000 feet of gravity sewer, approximately 24,000 feet of force main, 890 gravity and forcemain manholes and cleanouts, 6 pump stations, and an activated sludge mechanical treatment plant with surface water discharge rated for 3.41 MGD average day and 11.0 MGD max day.

Each asset was identified and accounted for using existing as-built information that was provided by the Township. These assets can be located using the ESRI GIS base map that has been created as part of the Asset Management Plan. This base map was populated using survey grade geospatial data which shows structures, pump stations, pipelines, and the wastewater treatment plant in the Michigan State Plane coordinate system. In addition to the geospatial data, each asset was populated with asset management information based on field observations of existing conditions. The Township will be able to facilitate an asset management program by updating the asset information as repairs and maintenance activities take place.

Using this data, the total asset value in 2019 dollars is estimated at $100-110 million dollars.

Condition Assessment

Topographic survey, field inspections, and condition assessments were performed on the manholes, pipelines, pump stations, and at the wastewater treatment plant. Manholes, cleanouts, valves, and WWTP structures were inspected using NASSCO's MACP standards for field inspections. A sewer televising company was retained to televise the pipes and perform a condition assessment of the pipes to identify defects and obvious issues. All pipe lines were televised using NASSCO's PACP standards for pipeline inspections. Using the inspection data, spreadsheets were created to document and perform condition assessment calculations using NASSCO's MACP/PACP Quick Rating System.

For manholes and pipelines, the quick rating system is the sum of all defect grades divided by the number of defects. This quick rating is broken down into two categories: structural and operation and maintenance. The two scores are then combined to generate a Combined quick rating, which was then used to calculate the Likelihood of Failure for the risk assessment.

At this time, the greatest need within the system is the gravity piping and manholes throughout the collection system. Structural and operational and maintenance defects in the manholes and piping are contributing to elevated risks throughout the community.

Overall, most of the Township's manholes are in fair to good condition, having either medium or low severity defect(s). The results of the condition assessment are summarized in the following tables:

SANITARY MANHOLE OVERALL DEFECTS	
Defect Category	Number of Manholes
Structural	409
O&M	861

SANITARY MANHOLE COMBINED DEFECTS		
Combined Quick Rating	Number of Manholes	Percent of System (%)
High - Grade 5	37	4%
Medium - Grade 3-4	346	40%
Low - Grade 1-2	469	55%
No Defects - 0000	9	1%
Total	**861**	**100%**

Overall, most of the Township's pipes are in fair to good condition, having either medium or low severity defect(s). The results of the condition assessment are summarized in the following tables:

SANITARY PIPE OVERALL DEFECTS	
Defect Category	Number of Pipe Segments
Structural	207
O&M	648

SANITARY PIPE COMBINED DEFECTS		
Combined Quick Rating	Number of Pipe Segments	Percent of System
High - Grade 5	33	4%
Medium - Grade 3-4	386	45%
Low - Grade 1-2	236	27%
No Defects - 0000	72	8%
Total	136	16%

This inventory and condition assessment of the Township's system is the basis of the entire AMP. It was used to determine a current need for repair, the priority of repair projects, and a future O&M plan. The inventory, as-built data, and condition assessments were used to create and populate an ESRI ArcGIS base map.

Additionally, the GIS base map was used to create a system flow model in Autodesk Storm and Sanitary Analysis (SSA) and flow meters were placed in various locations around the Township for a period of 7 months. The flow meter data further analyzed with available rainfall records using EPA's Sanitary Sewer Overflow Analysis and Planning (SSOAP) software, to develop a relationship between rainfall events and the observed response in the sanitary sewer system. Overall, the results were that SSA model that has been prepared is calibrated for dry weather flows. It was prepared using customer water meter data provided by the Township, and sanitary sewer flow meter data gathered in the field by Spicer Group. The flow was further defined using diurnal curves, which were developed from flow meter data, to simulate times of peak water use. The resulting sanitary flows mimic the peak flows that are seen throughout a 24-hour period, while still maintaining the appropriate volume to match metered sales.

Level of Service Determination

For the Level of Service, the Township prioritized projects in their CIP and rate structure based on the level of service that they feel is affordable and achieves their Mission Statement:

> *Bridgeport Charter Township has committed to create lasting financial sustainability through the implementation of asset management. We will continue to provide the community with cost-effective treatment and reliable wastewater service that will minimize service interruptions through effective budgeting and capital improvement planning.*

Based on Rate Methodology Decision Meetings held in 2019, the Township chose a level of service that they felt best fit the Township's needs from both a risk management standpoint and rate standpoint. From there, the financial consultant entered the costs into the financial model, along with operating expense minimums and bonded project considerations. Bridgeport Charter Township set their target level of service as Low Level of Service and plan to implement the recommended rate increases from the financial model. Pump station improvements, wastewater treatment plant improvements, and pipe and manhole repairs identified from the inspections will be accomplished in years 1 through 20.

Criticality (Risk)

For each asset in the Township's wastewater system, a criticality/risk analysis was developed. The calculation that determined overall risk was defined as:

Likelihood of Failure (LoF) * Consequence of Failure (CoF) = Risk

The LoF for assets is primarily based on the physical condition of the asset as inspected in the field. Using the quick rating developed from NASSCO standards, a LoF value between 1000 and 5999 was found for each sewer and manhole asset. A LoF value between 1 and 5 was determined for each pump station and WWTP asset, by assessing the age of the asset, performing a visual inspection, interviewing operators for maintenance records, and performing flow rate tests on the pumps. The following table shows the grading scale definitions for all assets throughout the Township:

Likelihood of Failure (LoF)		
Description	Grade	Failure of Asset
Immediate	5	Asset has failed or will likely fail within 5 years
Poor	4	Asset will probably fail in 5-10 years
Fair	3	Asset may fail in 10-20 years
Good	2	Asset unlikely to fail for at least 20 years
Excellent	1	Failure unlikely in foreseeable future

The Consequence of Failure (CoF) aggregates the empirical value associated with failure of an asset as it directly and indirectly pertains to social, environmental, and cost implications. A percentage of the carried weight between the social, environment, and cost factors must be assigned by the Owner and Engineer. The factors established are for this system evaluation and are not finite. The underlying components contributing to the social, environmental, and cost factors are described below. One (1) has the lowest CoF implications, where six (6) has the highest.

Factors:

1. Position of Pipe/Sewer/Manhole Relative to System Network
   a. Position of main trunk / interceptor sewers have greater CoF as opposed to small tributary sewers.
   b. Weighting can be population based or service area based.

2. Pipe Diameter
   a. Generally, larger diameter sewers carry larger amounts of flow and typically constitute trunk sewers.
   b. Weighting is relative to the system's range of pipe diameter sizes.

3. Depth of Sewer/Manhole
    a. Sewers constructed at deeper elevations typically require more costs to excavate and repair/replace.
    b. Weighting is relative to the system's range of depths.

4. Locations of Sewer/Manhole
    a. Location will have social, economic, and environmental impacts.
    b. Factors have been established on PACP criteria.
    c. Example, a sewer in a resident's "yard" will carry less CoF for the same sewer in a "Major Highway" such as an MDOT trunk line.

5. Proximity to a Waterway.
    a. This is primarily an environmental consideration.
    b. Failure directly or indirectly to environmentally sensitive areas like rivers, lakes, streams, and or wetlands are associated with this factor.

6. Accessibility Standards
    a. Ease of access is vital to timely repairs.
    b. Impacts include cost, social, and potentially environmental.

The following table summarizes the CoF scale definitions:

Consequence of Failure (CoF)		
Description	Grade	Failure of Asset
Catastrophic Disruption	6	Massive system failure - severe health effect, extensive damages, LOS severely compromised
Major Disruption	5	Major effect - major capacity loss, health effects and costs, LOS compromised
Moderate to Major Disruption	4	Major effect - moderate to major loss of system capacity, costs and health effects, LOS may be compromised
Moderate Disruption	3	Moderate effect - moderate loss of system capacity, health effects and costs, LOS still achieved
Minor Disruption	2	Minor effect - minor capacity loss, costs and health effects
Insignificant Disruption	1	Slight effect - slight loss of system capacity, minor health effects, minor costs

Using the aforementioned formula, the risk for each asset was calculated. The assets were ranked based on the nature of the defects found and the CoF. The results for the Bridgeport Charter Township system were that 22 manholes 21 pipe segments, and 3 assets at the WWTP were found to be high risk. Using LoF and risk information, a capital improvement plan (CIP) was developed to reduce the overall risk of the system. The CIP involves a systematic approach to address system assets over the next 10-20 years.

Capital Improvement Plan

The Capital Improvement Plan is a prioritized list of all the projects that need to be completed to meet the level of service goals of the system. The asset inventory, condition assessment, critical assets and level of service sections were taken into consideration to form the capital improvement plan.

After selecting the desired level of service for each scope of work, over the next 20 years, the total costs of system improvements are: Manhole repairs $949,000, pipe repairs $4.27M, pump stations improvements $1.8M, and WWTP improvements $3M.

Revenue Structure

Wastewater account balances, expenditures, revenues, etc. were reviewed and entered into a financial software model. The model was used initially to determine if there was a gap the operating funds compared to generated revenue. After reviewing the financial data, rate structure, and operating budgets, the Township was found to have no deficiencies in the 2.5-year gap analysis.

Following the 2.5-year gap analysis, the capital improvement plan (CIP) was added to the financial model. By reviewing the Township's reserve funds, current rate structure, and cost estimates for the CIP, various rate structure iterations were developed. The result was a recommendation for annual rate increases to the Township's sanitary sewer rates in a 10-year planning period.

List of Major Assets

The following is a breakdown of the assets of Bridgeport Charter Township's wastewater system:

- 245,655 feet of gravity pipe

SEWER PIPE MATERIAL		
Material	Diameter (in)	Length (ft)
VCP	6	1,142
Asbestos Cement	8	335
PVC	8	9,746
Reinforced Concrete Pipe	8	16,691
VCP	8	111,512
Asbestos Cement	10	3,247
Polyethylene	10	317
PVC	10	11,566
Reinforced Concrete Pipe	10	14,421
VCP	10	23,687
Asbestos Cement	12	1,514
Polyethylene	12	390
PVC	12	2,663
Reinforced Concrete Pipe	12	12,424
VCP	12	1,270
RCP	15	10,952
PVC	18	1,644
Reinforced Concrete Pipe	18	6,272
Reinforced Concrete Pipe	21	659
Reinforced Concrete Pipe	24	10,333
Reinforced Concrete Pipe	30	4,850
Reinforced Concrete Pipe	60	20
Total:		**245,655**

- 23,515 feet of forcemain
    - 2,080 feet of 6-inch asbestos cement pipe
    - 900 feet of 6-inch HDPE pipe
    - 3,215 feet of 8-inch asbestos cement pipe
    - 4,100 feet of 8-inch HDPE pipe
    - 1,460 feet of 10-inch asbestos cement pipe
    - 1,460 feet of 10-inch ductile iron pipe
    - 4,600 feet of 12-inch asbestos cement pipe
    - 5,700 feet of 14-inch polyethylene pipe
- 890 gravity and forcemain manholes, and cleanouts
- 6 pump stations
- An activated sludge mechanical treatment plant with surface water discharge, rated for 3.41 MGD average day and 11.0 MGD max day.

MEMORANDUM

SAW Grant Executive Summary

To:	Village of Kalkaska	Date:	December 31, 2019
From:	Adam Segerlind, P.E. Mark Hurley, P.E.	Re:	SAW Grant Executive Summary

GRANTEE:	Village of Kalkaska
GRANT NUMBER:	1272-01
AUTHORIZED REPRESENTATIVE:	Scott Yost
PLAN LOCATION:	Village of Kalkaska DPW Office 200 Hyde Street Kalkaska, MI 49646
PHONE:	(231) 258-9191

1.0 INTRODUCTION

The Village of Kalkaska was the recipient of a Stormwater, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE, previously MDEQ). An asset management plan (AMP) for the Village's sanitary sewer system was developed and is available for review by the public. The AMP was developed in accordance with the grant application and the requirements of the grant agreement. The following Scope of Work was implemented to complete the requirements of the grant:

1. Collection System Map
   - Compile and develop a map of the sewer collection system.
   - Field locate system components with GPS equipment for inclusion in a system GIS database.
   - Develop a new AM/Geographic Information System (GIS) system to manage the assets of the system
2. Inventory and assessment of fixed assets
   - Brief description of the asset, its required capacity, level of redundancy, and ID number
   - Location of the asset
   - Year the asset was installed (when available)
   - Complete an asset condition assessment (manhole inventory, cleaning, and televising).
   - Describe present condition of the asset (e.g. excellent, good, fair, poor)

- Current asset replacement cost
- Risk Evaluation that combines the probability of failure and criticality of the asset

3. OM&R Budget and Rate Sufficiency
   - Complete an assessment of user rates and replacement fund.
   - Technical, legal, and financial costs to develop a funding structure and implementation schedule necessary to implement an AMP.
4. Level of Service
   - Establishing a Level of Service guidance, including service agreement development, public meeting costs, and ordinance costs.

To complete this work, the Village of Kalkaska was awarded a grant totaling $494,200.00. As required by the grant agreement, this summary report has been prepared to meet the requirements of Section 603 of Public Act 84 of 2015 and includes the following information:

1. Contact Information
2. Review of the five major AMP components
3. List of major assets

2.0 MAJOR AMP COMPONENTS

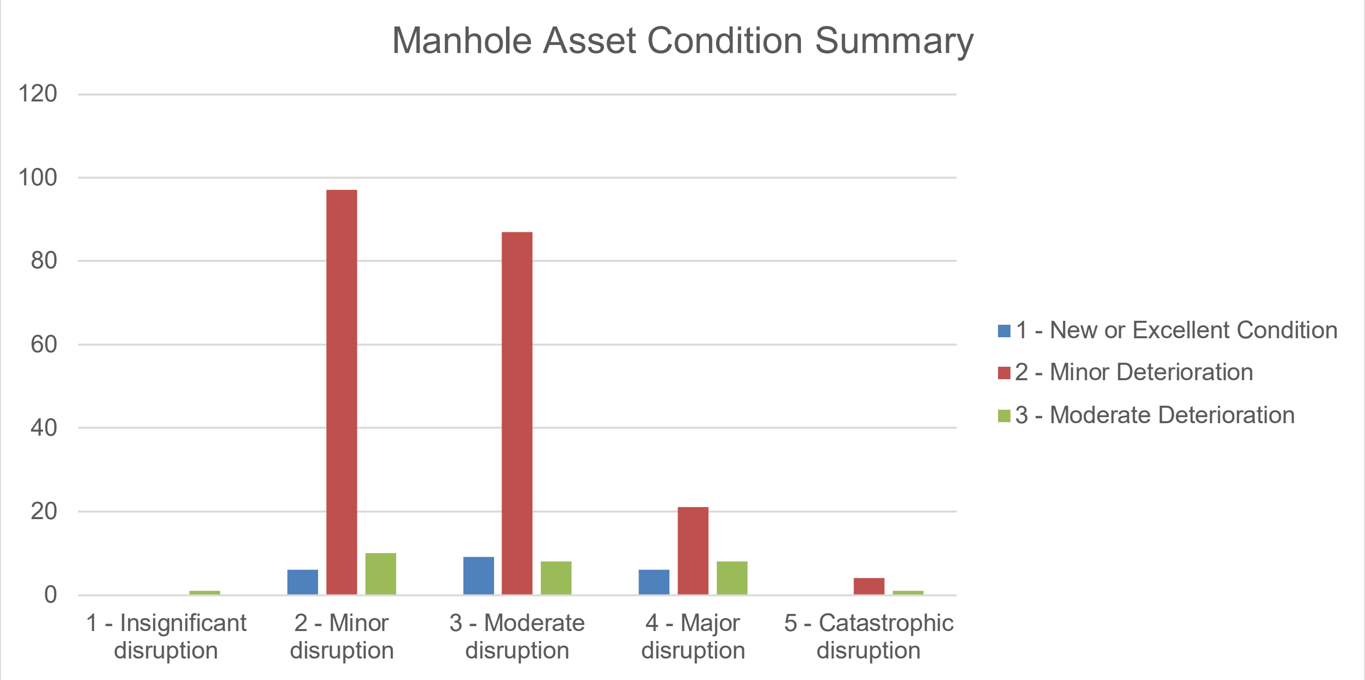
The Village of Kalkaska elected to utilize a spreadsheet-based AMP platform to record and track asset data. The AMP includes sanitary sewer system components used in the collection, treatment, and analysis of sanitary sewer flows, and maintenance equipment for those systems. The five major components of the AMP, identified below, are summarized in the following subsections.

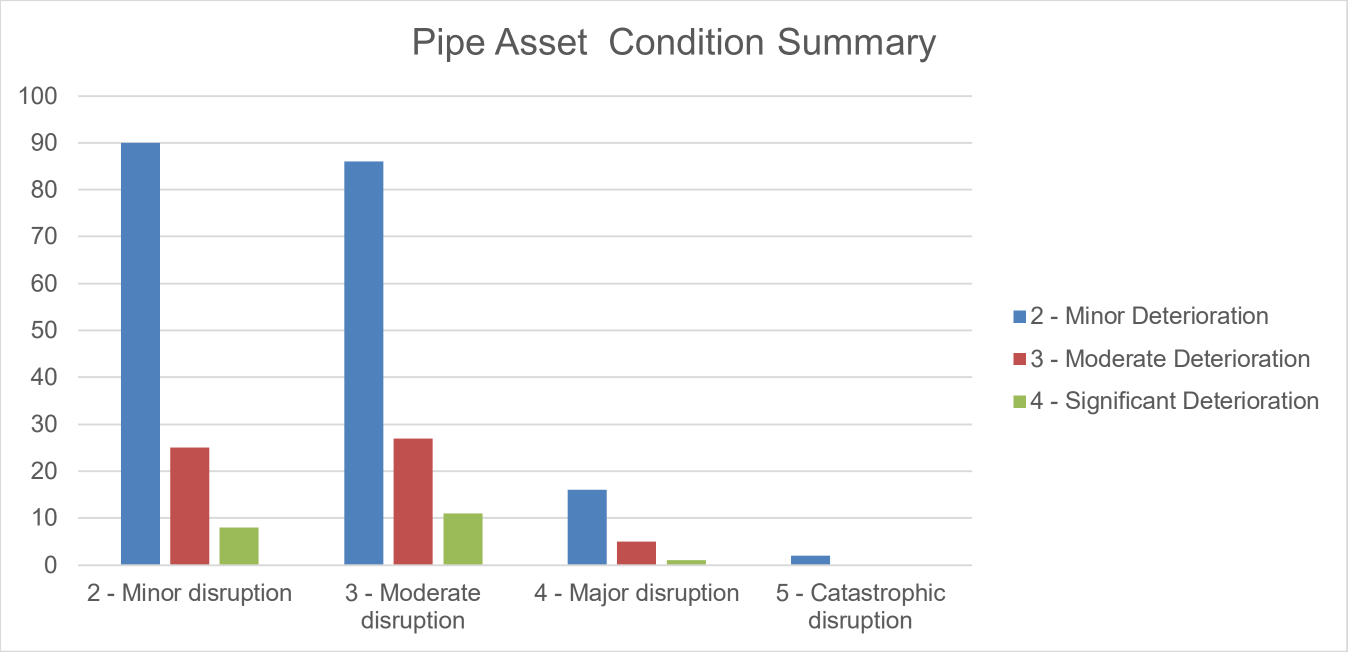
1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality of Assets
4. Operation and Maintenance Strategies / Revenue Structure; and,
5. Long-term Funding / Capital Improvement Plan

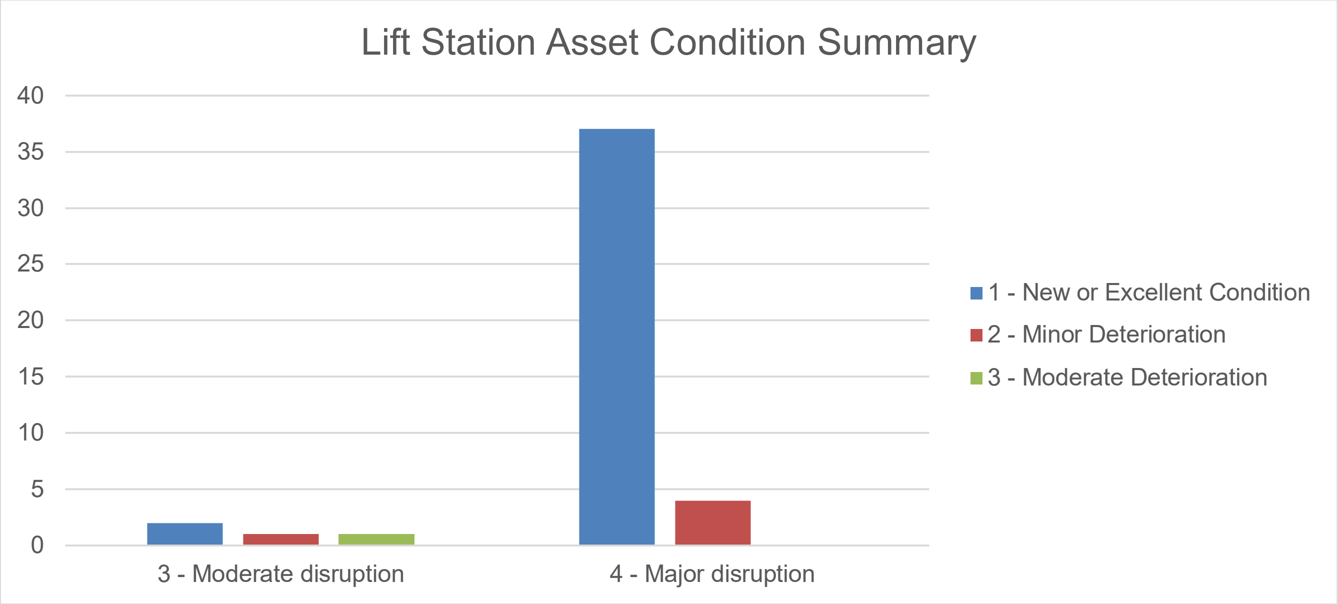
2.1 Asset Inventory and Condition Assessment

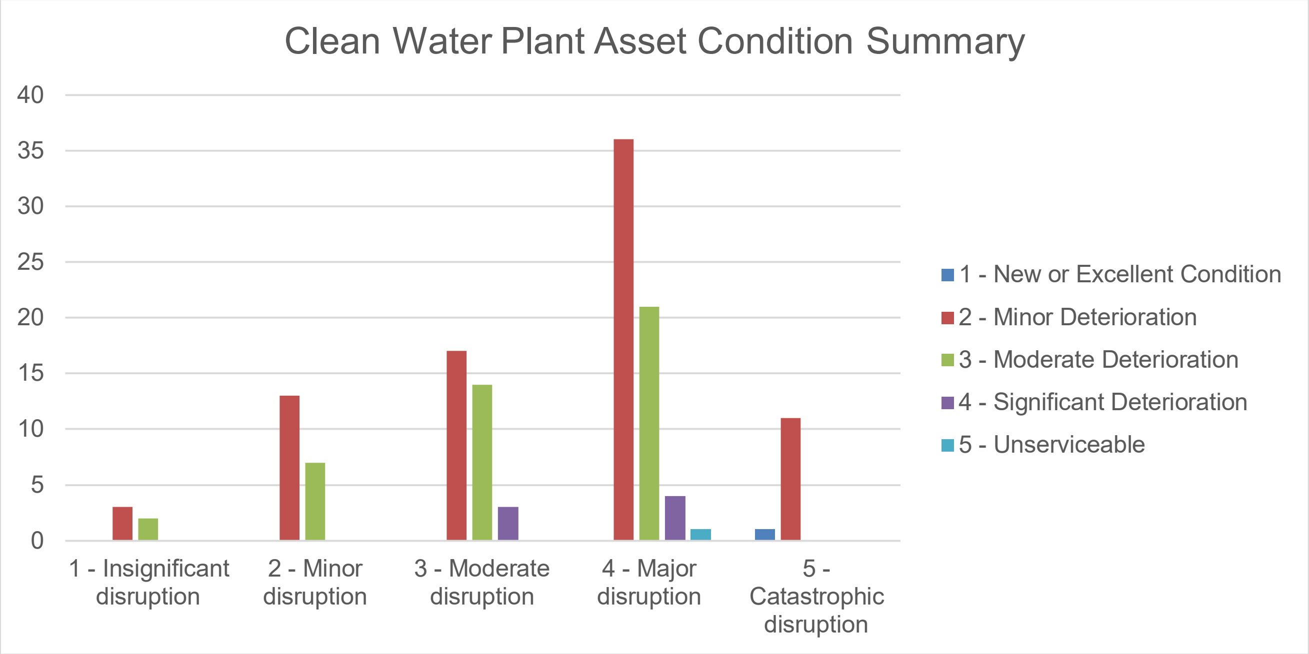
An asset inventory and condition assessments for the Village of Kalkaska sewer system were compiled by the Village DPW personnel and Gosling Czubak. Collection and treatment assets were categorized as Lift Station; Plant; Manhole; or, Pipe assets and populated into the AMP spreadsheet. Conditions were assigned on a 1 (very good) to 5 (very poor) rating scale based upon visual inspections and operational experience of the operations personnel. Qualifying gravity sewer pipes were inspected using CCTV techniques in accordance with the National Association of Sewer Service Companies (NASSCO) pipe standard. Manholes inspections were completed in accordance with the NASSCO level 1 standard.

Condition and criticality for each asset category are summarized in the following charts.




Pipe Asset Condition Summary
100
90
80
70
60
50
40
30
20
10
0
2 - Minor disruption
3 - Moderate disruption
4 - Major disruption
5 - Catastrophic disruption
2 - Minor Deterioration
3 - Moderate Deterioration
4 - Significant Deterioration


Lift Station Asset Condition Summary
40
35
30
25
20
15
10
5
0
3 - Moderate disruption
4 - Major disruption
1 - New or Excellent Condition
2 - Minor Deterioration
3 - Moderate Deterioration



2.2 Level of Service

The Village of Kalkaska established the following Level of Service for the sewer utility. The Level of Service was established during public meetings of the Public Works committee.

AREA OF SERVICE	GOAL	ACTION STEPS
Regulatory	Meets all minimum State and Federal regulatory requirements and operates in a manner that is protective of the environment and public health.	Follow all State and Federal permit requirements. Report violations promptly. Develop an action plan to prevent future violations.
Staffing	Has adequate staffing to conduct routine operations and maintenance, as well as respond to emergency situations.	Annual operating budgets will support the staffing levels recommended by the system operator.

AREA OF SERVICE	GOAL	ACTION STEPS
Training	Has adequately trained staff with the proper certifications to keep the utility within regulatory compliance and conduct day-to-day operations safely.	Must have operator in charge & backup operator on staff.
Funding	Generates revenue to cover all costs, including operations and supplies, labor, training, and annual savings for future repair and replacement of equipment.	Follow EGLE Asset Management Guidelines and re-evaluate sewer rates every year through the budgeting process.
Master Planning	Generates revenue to fund periodic Capital Improvements to ensure system assets have adequate capacity, redundancy, and are in proper working order.	Budgeting process will anticipate CIP needs and funding.
Customer Service	Be available to help customers with questions regarding billing, new services, and complaints.	Responds to customer questions, requests, and complaints in a prompt and professional manner.
Efficiency	Provide efficient operations and make prudent decisions to keep user costs as low as possible while maintaining the Level of Service desired.	Annual review of operating budget and user rates will balance the need of system assets with reasonable rates and charges.

2.3 Criticality of Assets

The criticality of each asset was assigned based on how much disruption an asset's failure may cause to the system. Criticality ratings were assigned on a scale of 1 (Non-essential) to 5 (Critical). Factors considered during the criticality evaluations include:

1. Redundancy of asset
2. Proximity to surface waterbody
3. Proximity to sensitive populations (i.e. high capacity users)
4. Current use status (i.e. backup or active)

2.4 Operation and Maintenance Strategies / Revenue Structure

A financial analysis of the 2019 budget was submitted by Baker Tilly Municipal Advisors at the 2.5-year mark of the grant. It was determined that a funding gap did not exist based on their current revenue and expenses. EGLE approved the rate methodology in a letter dated October 17, 2019.

Each asset in the AMP is classified as either a Capital or a Repair, Replace, and Improve (RRI) asset. The RRI assets are generally considered to be assets with less than a 15-year lifespan that are typically repaired or replaced with cash from the sewer fund. RRI cost projects for the next 20 years, based upon the anticipated replacement year, were added to the revenue structure review for consideration by the Village.

2.5 Long-term Funding / Capital Improvement Plan

Capital assets generally have a longer lifespan and may require the use of another funding source (e.g. grant, or loan) to implement repair or replacement. Potential capital improvement projects identified during preparation of the AMP include:

1. Replacing three manholes
2. Replacing approximately 6,800 feet of gravity sewer pipe
3. Replacement of grit removal and sludge handling equipment at the Clean Water Plant

Some potential long-term funding scenarios were prepared for the Village by Baker Tilly. It is the Village's responsibility to review and evaluate the funding scenarios presented and determine the best course of action as it relates to user rates, capital and repair projects, and the sewer fund cash balance.

3.0 MAJOR ASSETS

The major assets for each of the four asset categories are summarized in the following tables.

MANHOLE ASSETS
Gravity Sewer Manholes (273)
Lift Station Wet Wells (6)
Cleanouts (7)

LIFT STATION ASSETS	
PS-P	IDC Lift Station
PS-C	Coral Street Lift Station
PS-B	Big Boy Lift Stations
PS-A	Birch Street Lift Station
PS-TP	Trailer Park Lift Station

PIPE ASSETS
2” Force main (133’ +/-)
4” Force main (1,099’ +/-)
6” Force main (5,231’ +/-)
8” Force main (6,507’ +/-)
6” Gravity (445’ +/-)
8” Gravity (69,227’ +/-)
10” Gravity (13,950’ +/-)
12” Gravity (1,451’ +/-)

CLEAN WATER PLANT ASSETS
Headworks Building
Grit Removal System
Oxidation Ditches (2)
Anoxic Tanks (2)
Clarifiers (2)
Ferric Chloride Feed System
Laboratory/Office Building
Sludge Removal & Storage

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Village of Kalkaska *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1272-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes or~~ [✓ No]
   If No - Date of the rate methodology approval letter: 10/17/2019.
2) Significant Progress Made: ~~Yes or No~~ Not Applicable
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: Not Applicable.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on Not Applicable.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Nick Blasko, Village DPW at 231-258-9191 DPW@kalkaskavillage.com
Name Phone Number Email

12 DEC 2019
Signature of Authorized Representative (Original Signature Required) Date

Scott Yost, Village Manager
Print Name and Title of Authorized Representative

April 2017

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Village of Kalkaska *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1272-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

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3) Date of rate methodology review letter identifying the gap: Not Applicable.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on Not Applicable.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Nick Blasko, Village DPW at 231-258-9191 DPW@kalkaskavillage.com
Name Phone Number Email

12 DEC 2019
Signature of Authorized Representative (Original Signature Required) Date

Scott Yost, Village Manager
Print Name and Title of Authorized Representative

To:	Village of Kalkaska	Date:	December 31, 2019
From:	Adam Segerlind, P.E. Mark Hurley, P.E.	Re:	SAW Grant Executive Summary

GRANTEE:	Village of Kalkaska
GRANT NUMBER:	1272-01
AUTHORIZED REPRESENTATIVE:	Scott Yost
PLAN LOCATION:	Village of Kalkaska DPW Office 200 Hyde Street Kalkaska, MI 49646
PHONE:	(231) 258-9191

1.0 INTRODUCTION

The Village of Kalkaska was the recipient of a Stormwater, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE, previously MDEQ). An asset management plan (AMP) for the Village's sanitary sewer system was developed and is available for review by the public. The AMP was developed in accordance with the grant application and the requirements of the grant agreement. The following Scope of Work was implemented to complete the requirements of the grant:

1. Collection System Map
    - Compile and develop a map of the sewer collection system.
    - Field locate system components with GPS equipment for inclusion in a system GIS database.
    - Develop a new AM/Geographic Information System (GIS) system to manage the assets of the system
2. Inventory and assessment of fixed assets
    - Brief description of the asset, its required capacity, level of redundancy, and ID number
    - Location of the asset
    - Year the asset was installed (when available)
    - Complete an asset condition assessment (manhole inventory, cleaning, and televising).
    - Describe present condition of the asset (e.g. excellent, good, fair, poor)

- Current asset replacement cost
- Risk Evaluation that combines the probability of failure and criticality of the asset

3. OM&R Budget and Rate Sufficiency
   - Complete an assessment of user rates and replacement fund.
   - Technical, legal, and financial costs to develop a funding structure and implementation schedule necessary to implement an AMP.
4. Level of Service
   - Establishing a Level of Service guidance, including service agreement development, public meeting costs, and ordinance costs.

To complete this work, the Village of Kalkaska was awarded a grant totaling $494,200.00. As required by the grant agreement, this summary report has been prepared to meet the requirements of Section 603 of Public Act 84 of 2015 and includes the following information:

1. Contact Information
2. Review of the five major AMP components
3. List of major assets

2.0 MAJOR AMP COMPONENTS

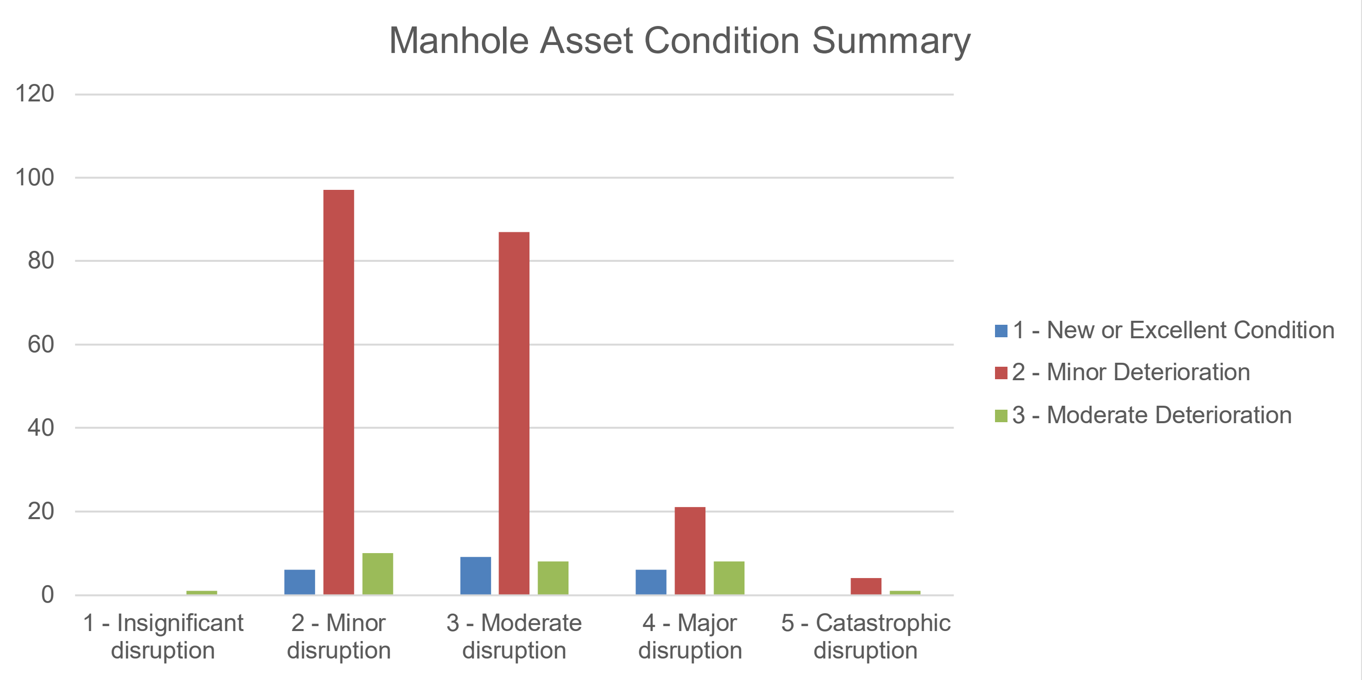
The Village of Kalkaska elected to utilize a spreadsheet-based AMP platform to record and track asset data. The AMP includes sanitary sewer system components used in the collection, treatment, and analysis of sanitary sewer flows, and maintenance equipment for those systems. The five major components of the AMP, identified below, are summarized in the following subsections.

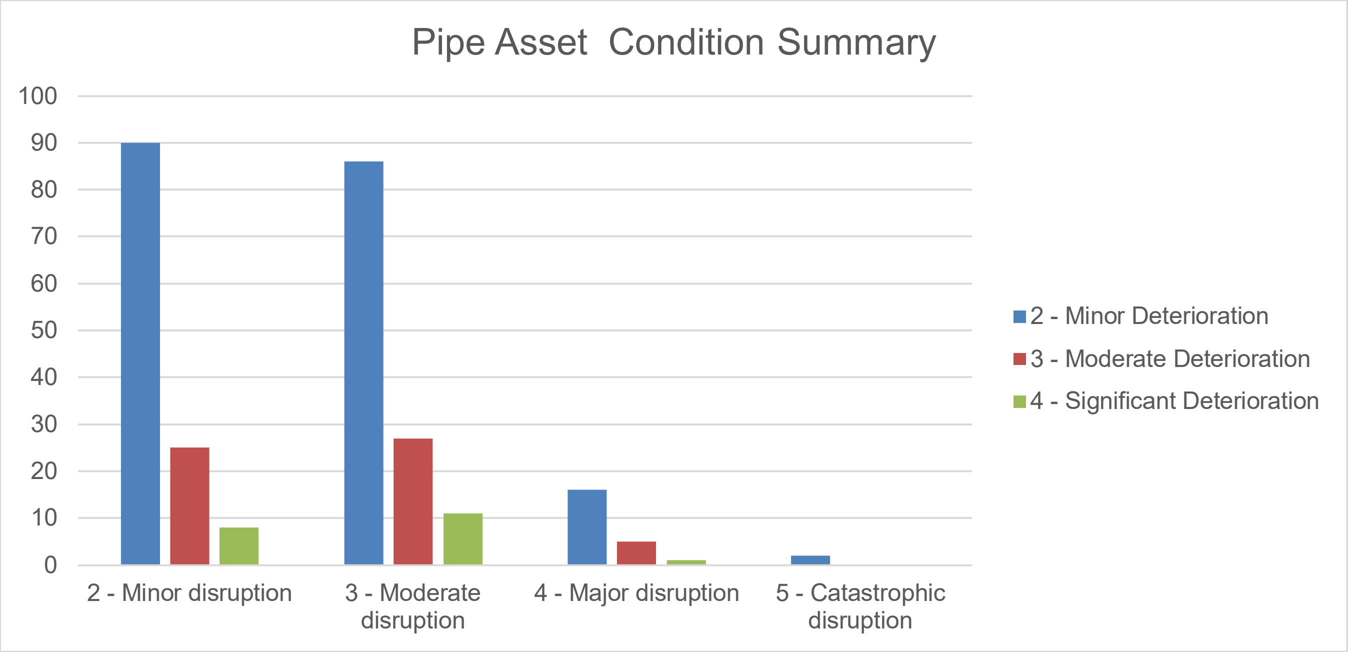
1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality of Assets
4. Operation and Maintenance Strategies / Revenue Structure; and,
5. Long-term Funding / Capital Improvement Plan

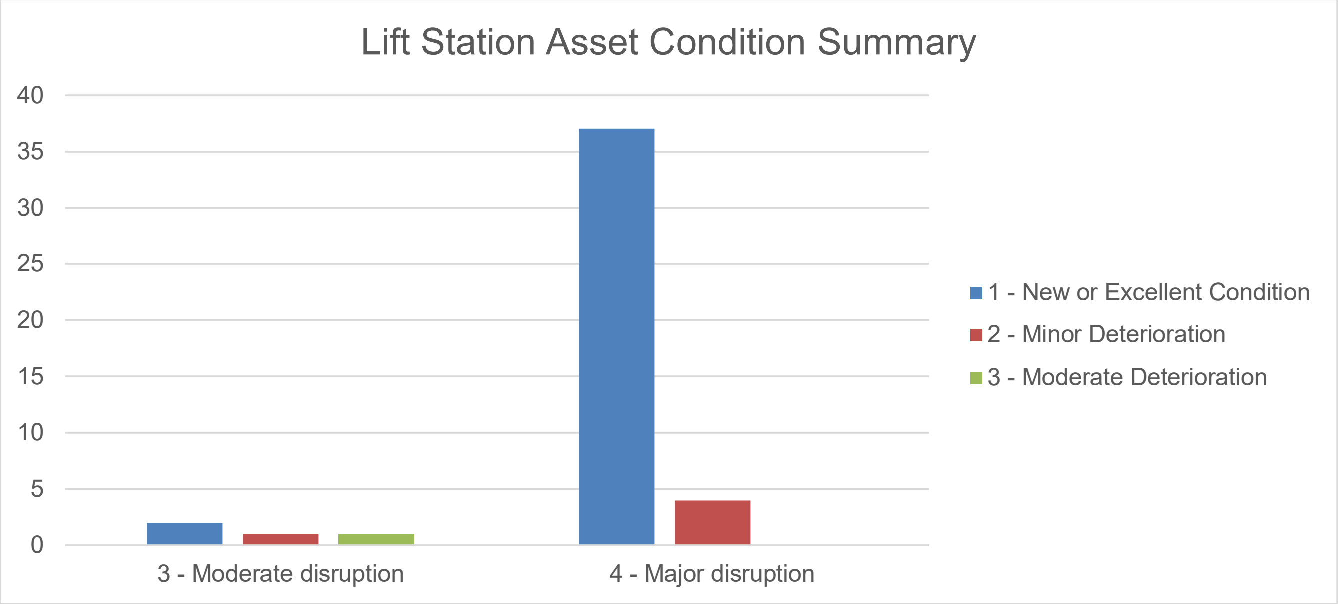
2.1 Asset Inventory and Condition Assessment

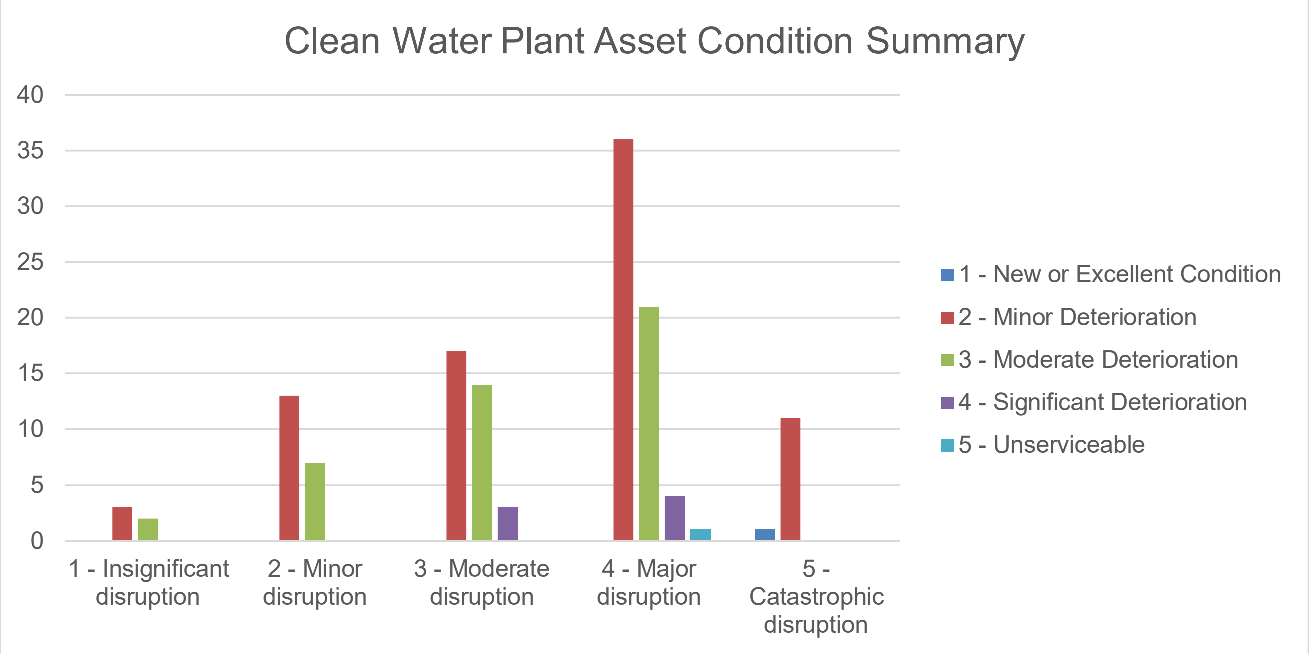
An asset inventory and condition assessments for the Village of Kalkaska sewer system were compiled by the Village DPW personnel and Gosling Czubak. Collection and treatment assets were categorized as Lift Station; Plant; Manhole; or, Pipe assets and populated into the AMP spreadsheet. Conditions were assigned on a 1 (very good) to 5 (very poor) rating scale based upon visual inspections and operational experience of the operations personnel. Qualifying gravity sewer pipes were inspected using CCTV techniques in accordance with the National Association of Sewer Service Companies (NASSCO) pipe standard. Manholes inspections were completed in accordance with the NASSCO level 1 standard.

Condition and criticality for each asset category are summarized in the following charts.




Pipe Asset Condition Summary
100
90
80
70
60
50
40
30
20
10
0
2 - Minor disruption
3 - Moderate disruption
4 - Major disruption
5 - Catastrophic disruption
2 - Minor Deterioration
3 - Moderate Deterioration
4 - Significant Deterioration


Lift Station Asset Condition Summary
40
35
30
25
20
15
10
5
0
3 - Moderate disruption
4 - Major disruption
1 - New or Excellent Condition
2 - Minor Deterioration
3 - Moderate Deterioration



2.2 Level of Service

The Village of Kalkaska established the following Level of Service for the sewer utility. The Level of Service was established during public meetings of the Public Works committee.

AREA OF SERVICE	GOAL	ACTION STEPS
Regulatory	Meets all minimum State and Federal regulatory requirements and operates in a manner that is protective of the environment and public health.	Follow all State and Federal permit requirements. Report violations promptly. Develop an action plan to prevent future violations.
Staffing	Has adequate staffing to conduct routine operations and maintenance, as well as respond to emergency situations.	Annual operating budgets will support the staffing levels recommended by the system operator.

AREA OF SERVICE	GOAL	ACTION STEPS
Training	Has adequately trained staff with the proper certifications to keep the utility within regulatory compliance and conduct day-to-day operations safely.	Must have operator in charge & backup operator on staff.
Funding	Generates revenue to cover all costs, including operations and supplies, labor, training, and annual savings for future repair and replacement of equipment.	Follow EGLE Asset Management Guidelines and re-evaluate sewer rates every year through the budgeting process.
Master Planning	Generates revenue to fund periodic Capital Improvements to ensure system assets have adequate capacity, redundancy, and are in proper working order.	Budgeting process will anticipate CIP needs and funding.
Customer Service	Be available to help customers with questions regarding billing, new services, and complaints.	Responds to customer questions, requests, and complaints in a prompt and professional manner.
Efficiency	Provide efficient operations and make prudent decisions to keep user costs as low as possible while maintaining the Level of Service desired.	Annual review of operating budget and user rates will balance the need of system assets with reasonable rates and charges.

2.3 Criticality of Assets

The criticality of each asset was assigned based on how much disruption an asset's failure may cause to the system. Criticality ratings were assigned on a scale of 1 (Non-essential) to 5 (Critical). Factors considered during the criticality evaluations include:

1. Redundancy of asset
2. Proximity to surface waterbody
3. Proximity to sensitive populations (i.e. high capacity users)
4. Current use status (i.e. backup or active)

2.4 Operation and Maintenance Strategies / Revenue Structure

A financial analysis of the 2019 budget was submitted by Baker Tilly Municipal Advisors at the 2.5-year mark of the grant. It was determined that a funding gap did not exist based on their current revenue and expenses. EGLE approved the rate methodology in a letter dated October 17, 2019.

Each asset in the AMP is classified as either a Capital or a Repair, Replace, and Improve (RRI) asset. The RRI assets are generally considered to be assets with less than a 15-year lifespan that are typically repaired or replaced with cash from the sewer fund. RRI cost projects for the next 20 years, based upon the anticipated replacement year, were added to the revenue structure review for consideration by the Village.

2.5 Long-term Funding / Capital Improvement Plan

Capital assets generally have a longer lifespan and may require the use of another funding source (e.g. grant, or loan) to implement repair or replacement. Potential capital improvement projects identified during preparation of the AMP include:

1. Replacing three manholes
2. Replacing approximately 6,800 feet of gravity sewer pipe
3. Replacement of grit removal and sludge handling equipment at the Clean Water Plant

Some potential long-term funding scenarios were prepared for the Village by Baker Tilly. It is the Village's responsibility to review and evaluate the funding scenarios presented and determine the best course of action as it relates to user rates, capital and repair projects, and the sewer fund cash balance.

3.0 MAJOR ASSETS

The major assets for each of the four asset categories are summarized in the following tables.

MANHOLE ASSETS
Gravity Sewer Manholes (273)
Lift Station Wet Wells (6)
Cleanouts (7)

PIPE ASSETS
2” Force main (133’ +/-)
4” Force main (1,099’ +/-)
6” Force main (5,231’ +/-)
8” Force main (6,507’ +/-)
6” Gravity (445’ +/-)
8” Gravity (69,227’ +/-)
10” Gravity (13,950’ +/-)
12” Gravity (1,451’ +/-)

LIFT STATION ASSETS	
PS-P	IDC Lift Station
PS-C	Coral Street Lift Station
PS-B	Big Boy Lift Stations
PS-A	Birch Street Lift Station
PS-TP	Trailer Park Lift Station

CLEAN WATER PLANT ASSETS
Headworks Building
Grit Removal System
Oxidation Ditches (2)
Anoxic Tanks (2)
Clarifiers (2)
Ferric Chloride Feed System
Laboratory/Office Building
Sludge Removal & Storage

Department of Environment, Great Lakes, and Energy

City of Madison Heights
Wastewater Asset Management Program Summary

Prepared for:

City of Madison Heights
300 W Thirteen Mile Road, Madison Heights, MI

City of Madison Heights Department of Public Services
801 Ajax Drive, Madison Heights, MI

MH SAW Grant
Project Number 1283-01

Prepared by

Nowak & Fraus Engineers
46777 Woodward Avenue
Pontiac, MI 48342
PH: 248-332-7931 / FX: 248-332-8257
www.nowakfraus.com

NFE Job # J453 (2016-2019)
Dated December 31, 2019

INTRODUCTION

The City of Madison Heights was awarded a grant by the Michigan Department of Environmental Quality in 2016 under the Stormwater, Asset Management, and Wastewater (SAW) Program. This grant has provided the financial assistance for the continued development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility.

The grant was identified as SAW Grant 1283-01 and provided **$2,000,000** with an additional **$444,444** matching contribution from the City of Madison Heights for an overall total budget of **$2,444,444** which was utilized to develop an Asset Management Plan (AMP) for its wastewater collection system. This report summarizes the findings of the Wastewater system AMP for the City of Madison Heights.

City of Madison Heights Asset Management Team

This plan was developed in cooperation with the City of Madison Heights, City of Madison Heights Department of Public Services, Community Development and GIS Department, and consultant Nowak & Fraus Engineers. Each of these team members were instrumental in obtaining field data, data input and findings outlined in this report. Further questions regarding the City's Asset Management Plan can be directed to the following AMP team members.

KEY SAW GRANT TEAM MEMBERS

Melissa Marsh - City Manager and the City Council for Madison Heights
E: melissamarsh@madison-heights.org P: (248) 837-2601

Corey Almas, PE - Director, Department of Public Services
E: coreyalmas@madison-heights.org P: (248) 589-2294 x 2799

Sean Ballantine - Department of Public Services – Public Services Analyst / Planner
E: seanballantine@madison-heights.org P: (248) 589-2294 x 2787

Chris Woodward - Department of Public Services – Utility Supervisor
E: chriswoodward@madison-heights.org P: (248) 589-2294 x 2803

Madhu Rakshit - Community Development Department – GIS Technician
E: madhurakshit@madison-heights.org P: (248) 583-0831

Timothy Germain, PE – Nowak & Fraus Engineers – Consulting City Engineer
E: tgermain@nfe-engr.com P: (248) 332-7931

Marwan Hani - Nowak & Fraus Engineers – Engineer I, PACP / MACP Certified
E: mhani@nfe-engr.com P: (248) 332-7931

Will Fowler - Nowak & Fraus Engineers – Engineer II, PACP / MACP Certified
E: wfowler@nfe-engr.com P: (248) 332-7931

NOWAK & FRAUS ENGINEERS

December 31, 2019

Grantee Information:

City of Madison Heights
300 West Thirteen Mile Road
Madison Heights, Michigan 48071
Website : www.madison-heights.org

SAW Grant Information:

MDEQ/EGLE SAW Grant 1283-01
Total Grant: $ 2,444,444.00
Grant Amount: $ 2,000,000.00
Local Match: $ 444,444.00

Grantee Contact Information:

City of Madison Heights
Melissa Marsh - City Manager
melissamarsh@madison-heights.org
Phone: (248) 837-2601

City of Madison Heights DPS
Corey Almas, PE – Director DPS
coreyalmas@madison-heighs.org
Phone: (248) 589-2294

Consultant Information:

Nowak & Fraus Engineers
46777 Woodward Avenue
Pontiac, Michigan 48342
Tim Germain, PE-City Engineer
tgermain@nfe-engr.com
Phone: (248) 332-7931

EXECUTIVE SUMMARY

The City of Madison Heights was awarded a grant by the Michigan Department of Environmental Quality in 2016 under the Stormwater, Asset Management, and Wastewater (SAW) Program. This grant has provided the financial assistance for the continued development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as the assets age and continue to function.

The scope of the AMP was to obtain a current inventory of the City's wastewater system while assessing the current condition of assets and to identity areas of required maintenance and deficiency within the system to develop recommendations for assisting the City's to prioritize and budget future maintenance and system improvements.

The objective of an AMP is to meet the required level of Service (LOS) in the most economic and cost-effective manner through proper maintenance and repair of existing assets. The goal of this plan was to provide the City of Madison Heights with the following measurable results to formulate a complete and accurate up-to date snapshot of the current system.

- Provide the City with a method for collecting, organizing, and storing data for their existing wastewater collection system utilizing current hardware and software technology.
- Survey key system components of the wastewater system to add real-time video and inspection data into the City's Geographic Information System (GIS) database to provide a current baseline condition of the system and to provide an easy and quick way to access its infrastructure data for future repair, maintenance, or historic record keeping.

- Add available information for sewer material type, size, approximate age and depth to the City's GIS database system.
- To physically evaluate the structural condition of the entire wastewater collection system including wastewater pipes and manhole structures. This data will be linked to the GIS system for easy and quick access for future maintenance or repairs.
- Identify long-term operations / maintenance strategies to maintain structural condition of the wastewater collection system and its components. This work would include regularly scheduled sewer cleaning, sewer inspection, and periodic televising of the system. It would also include the repair and rehabilitation of pipe / manholes to address structure problems resulting from the long- term operation and aging infrastructure.
- Provide recommendations for developing a prioritized Capital Improvement Plan (CIP) to be funded by the City's water and sewer fund.

This Asset Management Plan summarizes this assessment and includes key recommendations for future funding levels. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program – SAW Grant #1283-01, with a total overall grant budget of $2,444,444. Approximately $2,000,000 was provided by MDEQ/EGLE with an additional matching contribution of $444,444 being provided by the City of Madison Heights.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

1. Inventory and Conditional Assessment
2. Level of Service
3. Criticality of Assets (Risk)
4. Revenue Structure
5. Capital Improvement Plan

City of Madison Heights Asset Management Team

This plan was developed in cooperation with the City of Madison Heights, City of Madison Heights Department of Public Services, Community Development and GIS Department, and consultant Nowak & Fraus Engineers. Each of these team members were instrumental in obtaining field data, data input and the overall progress and findings outlined in this report. Further questions regarding the City's Asset Management Plan can be directed to the following AMP team members.

Melissa Marsh - City Manager and the City Council for Madison Heights	(248) 837-2601
Corey Almas, PE - Department of Public Services - Director	(248) 589-2294
Sean Ballantine - Department of Public Services - Public Services Analyst / Planner	(248) 589-2294
Chris Woodward - Department of Public Services - Utility Supervisor	(248) 589-2294
Madhu Rakshit - Community Development Department - GIS Technician	(248) 583-0831
Timothy Germain, PE – Nowak & Fraus Engineers - Consulting City Engineer	(248) 332-7931
Marwan Hani - Nowak & Fraus Engineers - Engineer I, PACP/MACP Certified	(248) 332-7931
Will Fowler - Nowak & Fraus Engineers - Engineer II, PACP/ MACP Certified	(248) 332-7931
United Resources - Third Party Contractor - CCTV Services Bid/Contracted	(734) 338-7730

Wastewater Asset Inventory

The City's wastewater system consists of two main components. The collection system is comprised of various sized gravity sanitary sewer pipes and sanitary sewer manholes. There are no pump-stations or force mains located within the City's public wastewater collection system.

The City of Madison Heights has an existing GIS system database that has been in operation for approximately 15 years. This system is based on the ArcGIS and ESRI software platforms. To supplement this database, the City purchased a version of PipeLogix Sewer Inspection Software to complete their "smart mapping" system. These programs have been configured to allow the system to be accessed and updated in the field by DPS staff or in the office by GIS technicians.

This existing GIS database was utilized to create a list of all known wastewater assets to be reviewed. The sewers were cleaned, televised and rated using a certified contractor in accordance with NASSCO PACP standards by NASSCO certified personnel. The manholes were located with handheld GPS units and all field inventories and conditional assessments were completed structure by structure in accordance with NASSCO MACP standards by NASSCO certified personnel. This information was then uploaded by the City's GIS department and an ESRI ArcGIS data set was created and indexed to the locations and attributes of the assets.

Through this process, 2212 of the 2260 existing sanitary manhole structures and 500,854 linear feet of the 542,579 linear feet of existing mainline sanitary sewers within the City's wastewater collection system has been entered into the City's GIS system. This represents 97.87% of the existing manhole structures and 92.31% of the existing sewer lines. A secondary review of all CCTV video and manhole structure data was completed to ensure that the data is complete to the extent possible based upon all available information. This data set / attribute information includes manhole / pipe location information, invert and rim elevations, pipe slope, pipe material, diameter, etc.

List of Major Assets – City Owned Infrastructure

- **Approximately - 104.97 miles of gravity sewer pipe ranging from 6-inch to 72-inch diameter.**
- **Approximately - 382,644 linear feet of 6-inch to 12-inch diameter sanitary sewer piping.**
- **Approximately - 107,831 linear feet of 15-inch to 21-inch diameter sanitary sewer piping.**
- **Approximately - 33,631 linear feet of 24-inch to 36-inch diameter sanitary sewer piping.**
- **Approximately - 19,937 linear feet of 42-inch to 60-inch diameter sanitary sewer piping.**
- **Approximately - 6,349 linear feet of 72-inch diameter sanitary sewer piping.**
- **Approximately - 2,260 City Owned Sanitary sewer manhole structures.**

List of Major Assets – County Owned Infrastructure withing the City of Madison Heights City Limits

- **Approximately - 8.61 miles of gravity sewer pipe ranging from 48-inch to 108-inch diameter.**
- **Approximately - 12,293 linear feet of 48-inch to 60-inch diameter sanitary sewer piping.**
- **Approximately - 21,004 linear feet of 72-inch to 96-inch diameter sanitary sewer piping.**
- **Approximately - 12,171 linear feet of 120-inch to 180-inch diameter sanitary sewer piping.**
- **Approximately - 42 County Owned Sanitary sewer manhole structures.**

Conditional Assessment

The City of Madison Heights utilized the services of a third-party sewer contractor - United Resources and certified consulting engineering staff from Nowak & Fraus Engineers to complete the conditional assessment of the gravity wastewater sewer system using closed circuit television (CCTV) inspection to establish a comprehensive analysis of the existing sewer pipes using the NASSCO Pipeline Assessment Certification Program (PACP) to identify features and defects within the collection system.

NFE Engineers, completed a comprehensive field inspection of the existing sanitary sewer manholes using the NASSCO Manhole Assessment Certification Program (MACP) standards to identify features and defects within the manhole structures. The PACP/MACP system was used to standardize the scoring and to quantify the condition of the wastewater assets.

The City of Madison Heights wastewater collection system is in very good condition for its age. The municipality was incorporated in 1955 and much of its wastewater system is original and approaching 50 to 70 years old. This assessment is important in respect to the aging infrastructure condition and the need to continually repair and rehabilitate these assets for efficient future operations.

In regard to verifying current conditions and to identify areas of potential deficiencies within the system; the physical condition of the sanitary sewer and manholes were assessed. Assessments were based upon the National Association of Sewer Service Companies (NASSCO) standard for sewer pipe and manholes to ensure consistency with future evaluations.

Condition assessment ratings were used to determine the likelihood of failure for each asset and were assigned to the asset based upon a scale of 1- 5 per the following breakdown based upon deterioration:

1 = Excellent:	New or Excellent Condition – Normal Periodic Maintenance Required
2 = Good:	Minor Deterioration – Minor Annual / Periodic Maintenance Required
3 = Average:	Moderate Deterioration – Significant Maintenance Required
4 = Fair:	Significant Deterioration – Significant Renewal / Upgrade Required
5 = Poor:	Asset Unserviceable / Failed – Safety Risk or Replacement Required

Gravity Wastewater Sewer Assets – City Owned = 500,854 LF Sanitary Pipe / 41,725 LF Not Rated

Based upon the CCTV video data collected, reviewed, and analyzed – approximately 99.09% of the sanitary sewer pipes had an overall structural conditional rating of 3 or less per PACP Rating Criteria and 99.76 % of the sewer pipes had an overall structural rating of 4 or less per PACP Rating Criteria:

Rating Criteria 1	Rating Criteria 2	Rating Criteria 3	Rating Criteria 4	Rating Criteria 5
176,798 LF	240,443 LF	79,095 LF	3,369 LF	1,149 LF
35.30 %	48.00 %	15.79 %	0.67 %	0.23 %

Wastewater Manhole Structure Assets – City Owned = 2,260 Structures / 2212 Rated / 48 Not Rated

Based upon the field inspection data collected, reviewed, and analyzed – approximately 98.37% of the sanitary manhole structures had an overall conditional rating of 3 or less per MACP Rating criteria and 99.91% of the sanitary structures had an overall conditional rating of 4 or less per MACP Criteria:

Rating Criteria 1	Rating Criteria 2	Rating Criteria 3	Rating Criteria 4	Rating Criteria 5
8 structures	1972 structures	196 structures	34 structure	2 structures
0.36 %	89.15 %	8.86 %	1.54 %	0.09 %

Criticality of Assets (Risk)

For each asset within the City's wastewater system; a criticality/risk analysis was performed to determine and to prioritize the City's key components. The criticality of the wastewater assets was determined by assigning ratings based on their importance in the operation and reliability of the system. Based upon the condition assessments, field inspections, and CCTV videos; the Probability of Failure (PoF) was calculated for each component of the wastewater collection system including sewer pipes and manhole structures. Next the Consequence of Failure (CoF) was calculated and scored for each asset based on economic, environmental, and social consequences if that asset failed. Finally, the Criticality (Risk) score was calculated using the following formula: P**oF x CoF = Risk**

This risk score or Business Risk Exposure (BRE) represents the asset's criticality on a scale of 1 to 25 and serves as the tool for prioritizing future repairs, rehabilitation & replacement of wastewater assets. The criteria utilized in determining the PoF and CoF for system assets include the following:

- Physical Location – which represents how difficult the repair or replacement would be in a sudden failure (under roadway, near major outfall, depth of sewer, etc.)
- Pipe Diameter – which represents the size of the tributary area the pipe or manhole serves.
- Service area – primary residential area or commercial or industrial area of the municipality.

The most critical assets were generally found under major roadways (causing the most disruption to repair with the most impact to neighborhood residences, commercial business owners, and commuter traffic). Refer to Appendix B for the complete summary of the individual overall systems scores and individual assets criticality.

Below is a summary of the risk ratings for both the sanitary sewer and sanitary sewer structures based upon the above referenced calculation(s). The **Consequence of Failure (CoF)** is along the y-axis while the **Probability of Failure (PoF)** is along the x-axis.

Sanitary Sewer Pipes **Sanitary Sewer Manhole Structures**

High	**Medium** **131**	**High** **3**	**Extreme** **2**		**Medium** **271**	**High** **0**	**Extreme** **0**
Medium	**Low** **101**	**Medium** **10**	**Extreme** **5**		**Low** **1,933**	**Medium** **23**	**Extreme** **0**
Low	**Negligible** **448**	**Low** **37**	**High** **2**		**Negligible** **62**	**Low** **11**	**High** **2**
PoF	**Low**	**Medium**	**High**		**Low**	**Medium**	**High**

Level of Services Determination

The City of Madison Heights is an older municipality which has been built-out in the 1950's to 1970's. Much of the development in the past twenty-years has been demolition and reconstruction of commercial properties. Therefore, the need for future growth, expansion, and development is almost negligible. The goals for an older community differ widely from a new or growing municipality.

As a result of several meetings with the City's Asset Management Team the following level of service (LOS) goals have been established to maintain its wastewater assets in good working order and to provide enhanced reliability in the overall system network based upon reasonable economic resources and future budgets.

- Strive to meet regulatory requirements set by the State pending funding commitments.
- Maintain existing flow characteristics and capacity to prevent basement back-ups.
- Reduce service interruption duration and complaint / service response times.
- Maintain existing modest rate charges for residential and commercial customers.
- Implement equipment and Maintenance Tracking System for wastewater service calls.
- Maintain an asset management program for the system and provide access to customers.
- Provide regular cleaning and maintenance of the collection system on periodic basis.
- Expand staff training for O & M Staff for the continuation of experience and knowledge.

Revenue Structure

The revenue and rate methodology is an instrument to determine if user rates and changes will provide sufficient revenues to pay for the overall utility operating costs. The SAW Grant Asset Management Plan requires an analysis of the current municipal rate structure to determine if there is a revenue gap which would create funding issues for future CIP or emergency repair projects.

Per the attached November 5, 2019 correspondence from the Department of Environment, Great Lakes, and Energy the City of Madison Heights current rate methodology, last dated March 19, 2019 and received by EGLE on October 7, 2019 – as attached in Appendix D has been found to be acceptable to meet plan objectives based upon current rate methodology.

Capital Improvement Plan

As previously stated, the City's wastewater system consists of two main components. The collection system is comprised of various sized gravity sanitary sewer pipes and sanitary sewer manholes.

The conditional assessment has identified both sanitary sewer pipe and sanitary sewer manhole repairs, rehabilitation, and replacement areas which are priority segments to be addressed by the City of Madison Heights in the next five years.

Required Repairs / Rehabilitation / Replacement - Summary

Pipe Structure PACP Quick Rating 4 = 3,369 Linear Feet of pipe need Repair / Replacement (PACP)
Pipe Structure PACP Quick Rating 5 = 1,149 Linear Feet of pipe need Repair / Replacement (PACP)

Manhole Structure Overall MACP Rating 4 = 34 Structures need Repair / Rehabilitation (MACP)
Manhole Structure Overall MACP Rating 5 = 2 Structures need Repair / Rehabilitation (MACP)

In addition to these priority segments, additional long-term operations and maintenance strategies will be needed to provide the means to operate and maintain a structurally sound wastewater collection system into perpetuity.

A 5-year CIP plan has been developed that will include various collection system improvements. The plan focuses on priority pipe segments as well as providing costs for structural manhole repairs and construction of additional manhole access on existing large diameter pipe without intermediate access. These improvements will aid in future sewer cleaning and inspections.

PACP / MACP Rehabilitation Program – 5 Year CIP

Capital Project 0-5 Year:

Rehabilitation Actions		2020	2021	2022	2023	2024
Pipe Replacement		$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000
Pipe Lining Program		$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 50,000
Pipe Point Repairs		$ 100,000	$ 100,000	$ 100,000	$ 50,000	$ 50,000
Manhole Clean/Line/Repair		$ 100,000	$ 100,000	$ 50,000	$ 50,000	$ 50,000
Manhole Clean / Line		$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
Manhole Clean / Repair		$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
Totals –		$ 600,000	$ 600,000	$ 550,000	$ 500,000	$ 450,000

A future 6-10 Year CIP plan will be developed by the City of Madison Heights that will include future sewer lining, isolated sewer replacement and sewer tap repairs to address minor structural problems resulting from aging infrastructure. It is recommended that on-going sewer and manhole inspections be scheduled toward the end of the 6-10-year plan to monitor existing sewer and manhole defects and to identify further deterioration to the wastewater collection system.

PACP / MACP Rehabilitation Program – 6-10 Year CIP

Capital Project 6-10 Year:

Rehabilitation Actions		2025	2026	2027	2028	2029
Pipe Replacement		$ TBD	$ TBD	$ TBD	$ TBD	$ TBD
Pipe Lining Program		$ TBD	$ TBD	$ TBD	$ TBD	$ TBD
Pipe Point Repairs		$ TBD	$ TBD	$ TBD	$ TBD	$ TBD
Manhole Clean/Line/Repair		$ TBD	$ TBD	$ TBD	$ TBD	$ TBD
Manhole Clean / Line		$ TBD	$ TBD	$ TBD	$ TBD	$ TBD
Manhole Clean / Repair		$ TBD	$ TBD	$ TBD	$ TBD	$ TBD
Totals –		$ TBD	$ TBD	$ TBD	$ TBD	$ TBD

There were no CIP sewer projects identified for this period; however, in accordance with the City of Madison Heights Asset Management Program ongoing inspections will be made and future projects will be identified as the need arises.

Recommendations

In order to keep this AMP sustainable in the future, the City of Madison Heights will review this document annually to re-review current recommendations, status of current projects and forecasted needs against available reserves and anticipated funding.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Madison Heights *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1283-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Melissa Marsh - City Manager at (248) 837-2601 melissamarsh@madison-heights.org
Name Phone Number Email

Melissa Marsh December 31, 2019
Signature of Authorized Representative (Original Signature Required) Date

Melissa Marsh - City Manager for Madison Heights
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 31, 2019**
(no later than 3 years from executed grant date)

The **Huron Rouge Sewage Disposal System** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1289-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No

   If No - Date of the rate methodology approval letter: **December 17, 2018**

2) Significant Progress Made: Yes or No N/A

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jim Nash at **248-858-0958** **wrc@oakgov.com**
Name Phone Number Email

12/31/19
Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Oakland County Water Resources Commissioner
Print Name and Title of Authorized Representative

OHM
Advancing Communities®

MEMORANDUM

To: Michigan Department of Environment Great Lakes and Energy (EGLE)
Formerly Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section, Attn: Eric Pocan

From: OHM Advisors

CC: Huron-Rouge Sewer Disposal System

Date: December 31, 2019

Re: Huron-Rouge Sewer Disposal System
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1289-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the Huron-Rouge Sewer Disposal System. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows recent MDEQ guidance.

GRANTEE INFORMATION

Huron-Rouge Sewer Disposal System, SAW Grant Project #1289-01

Project Grant Amount: $341,814

Applicant Match Amount $37,979

Jim Nash
Oakland County Water Resources Commissioner
(248) 858-0958
nashj@oakgov.com

Lindsey Kerkez, P.E.
OHM Advisors
Project Manager
(734) 466-4474
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Brian Coburn, P.E.
Oakland County Water Resources Commissioner's Office
Chief Engineer
(248) 452-9846
coburnbr@oakgov.com

EXECUTIVE SUMMARY

The Huron-Rouge Sewer Disposal System applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environmental

Quality's (MDEQ) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Huron-Rouge Sewer Disposal System is owned by Oakland County under Act 342 is operated and maintained by the Oakland County Water Resources Commissioner (WRC.) The WRC has various tools used to manage the assets it owns or operates and maintains, including a GIS geodatabase, collaborative asset management system, hydraulic models, condition assessment methods, risk and prioritization models, capacity studies, asset deterioration models, and an operating and capital improvement project prioritization model. These tools are used to guide the short and long-term strategies for WRC to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy for each fund is also evaluated annually through WRC's "Long-Term Plan" (LRP) process that includes a review of the current rate structure, fund balances and anticipated future funding needs.

The WRC "Common to All" approach was generally followed in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

WASTEWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS.) CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by WRC to allow for efficient and consistent recording of asset condition. For sanitary sewer assets, a NASSCO-compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS system. Inspection work orders in the CAMS system are used for evaluation of other types of assets, such as manholes and other collection system structures, and for most vertical asset types, such as pumps, valves, structures, etc.

As part of the grant for Huron-Rouge Sewer Disposal System, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 48,740 lineal feet of sanitary sewer underwent condition assessment via cleaning and televising. Approximately 165 manholes were evaluated using the CAMS inspection work orders.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the "Common to All" Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.)

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, non-gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the CAMS system, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (sanitary sewers) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition.

For manholes, the POF is based primarily on the MACP fields cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based on just age.

The COF for sanitary sewers and manholes was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual LRP rate process form additional elements of the LOS.

The WRC's current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*
>
> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*

> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real world” needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing LRP rate process to prioritize projects and ensure adequate funding is available.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Capital Improvement Plan (CIP) Reserve for replacement of equipment or facilities in kind or with alternate technology.
- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.

WRC worked with its internal fiscal staff to determine if the system's current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN

The asset optimization software forecasts and prioritizes assets that require replacement in the planning period. The individual replacements can be combined into projects and scheduled with budget amounts established. This information is then used in the LRP process to determine rate needs for funding the project established. A list of capital projects was developed for Huron-Rouge Sewer Disposal System, using recommendations from the asset optimization software, and consideration of other system needs.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available. Sewer inspections revealed damage to the interior surfaces of many sewers and a need for full lining of much of the system. High risk assets in the 6-20 year capital projects will monitored frequently to review their rate of degradation.

Capital Projects, 0 to 5 years:
- Full Sewer Lining, $1,000,000 per year, Years 1-5
- Approximately 7,000 feet of lining (5,000 feet of 36 inch sewer and 2,000 feet of 42 inch sewer)

Capital Projects, 6 to 10 years:
- Full Sewer Lining, $1,000,000 per year, Years 6-10
- Approximately 7,000 feet of lining (5,300 feet of 36-inch sewer and 2,000 feet of 42-inch sewer)

Capital Projects, 10 to 20 years:
- Full Sewer Lining, $1,000,000 per year, Years 11-18
- Approximately 7,000 feet of lining (500 feet of 30-inch sewer, 4,000 feet of 36-inch sewer and 7,200 feet of 42-inch sewer)

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the LRP process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Huron-Rouge Sewer Disposal System's major assets include:

- Approximately 9.5 miles of gravity sanitary sewer ranging from 10" to 42" in diameter
- 167 manholes
- 2 Sewer Flow Meters

Below is a summary of the sanitary sewer within the Huron-Rouge Sewer Disposal System

Table 1: Sanitary Sewer Assets by Material

Sewer Assets by Material	Total Length (ft)	Number of Assets
Clay or VCP	4,669	15
Reinforced Concrete	45,682	157
Total	**50,531**	**172**

Table 2: Sanitary Sewer Assets by Size

Sewer Assets by Diameter (IN)	Total Length (ft)	Number of Assets
>8 and <=12	4,669	15
>12 and <=16	2,707	10
>16 and <= 24	8,613	35
>24 and <=36	18,152	57
42	16,210	55
Total	**50,351**	**172**

PROJECT HIGHLIGHTS

The development of this Asset Management Program for the system name was led by Oakland County Water Resources Commissioner with assistance from OHM Advisors. The following highlights some of the more tangible outcomes from the Program development:

- Updated GIS inventory of system
- Cleaned and televised 48,740 lft (97%) of the system.
- Inspected 165 manholes
- Made recommendations for asset rehabilitation and maintenance
- Reviewed high-consequence utility crossings and added them to the GIS database
- Developed 5, 10 and 20-year CIPs

City of Zeeland
21 S Elm St., Zeeland MI 49464 – www.ci.zeeland.mi.us
Mr. Timothy Klunder – City Manager – 616-772-6400
SAW Grant # 1299-01

Summary of Asset Management Plan

The City of Zeeland's SAW Grant included asset inventory, condition assessment, criticality rating, and business risk determination of the collection system and treatment plant assets. The total grant amount was $692,611.00, of which the City paid for 10% with a local match. $600,000.00 of this was used toward the large Clean Water Plant expansion/renovation in 2013-2017. The remaining amount was split between sanitary and storm water asset management programs. Overall, the system was in "good health" and the City successfully collects and treats wastewater from their community and the wholesale customer communities to within NPDES permit limits. The City maintains adequate staffing to appropriately manage the plant operations, maintenance, and laboratory functions to an above average level. The rates that the City proposes to charge in 2019 are adequate to maintain the system and continue to perform modest capital upgrades to continue to improve the system.

Asset Inventory

The major task in the SAW Grant was reviewing and updating an inventory of the City's assets and rating their condition. Below is a summary of the collection and treatment plant assets and ratings.

Clean Water Plant Asset Inventory

The asset management inventory for the CWP contains all assets at the plant that have a value of approximately $1,000 or higher. The assets were organized by process or building, and include year installed, condition, and a variety of other attributes. The assets were inventoried with the use of plant as-built drawings, coordination with the plant staff, and site visits. Conditions were assessed mainly by a formula using useful life remaining compared to total expected life. Since the plant recently underwent a large expansion/renovation, many of the assets are brand new as of 2017. 75.5% of the plant assets received a condition rating of 1, 9.5% received a 2, 7.0% received a 3, 4.0% received a 4, and 4.0% received a 5.

Collection System Inventory

The asset management spreadsheet for the collections system includes the gravity collection system, the lift stations, and the force mains. The spreadsheet was created using as-built records of the entire system and coordination with plant Staff. 10% of the collection system was televised/inspected by persons with PACP/MACP certification. The remaining assets were assigned condition ratings by extrapolating the inspected asset conditions or by an age/material formula generated in excel using standard useful life expectancies. The lift stations were evaluated in the same manner as the CWP mechanical system assets. 28% of the collection system assets received a condition rating of 1, 45% received a 2, 18% received a 3, 5% received a 4, and 4% received a 5. The collection system assets were all located using a GPS unit, and a GIS system map was generated that includes asset attributes and as-built attachments. This GIS map is updated after every project that affects an asset.

Criticality of Assets

The rating of "Criticality" demonstrates how important the asset is to maintain a functioning system, and what would be the consequence of a failure of that asset. The performance rating for the consequence of failure is determined with consideration for social safety, economic and financial implications, and environmental impacts that would be affected if the asset were to fail (i.e. ground cover, pipe size, redundancies in place). The assets were rated on a 1 to 5 scale based on EGLE SAW Grant guidance.

Level of Service Determination

The Zeeland Staff and Engineers had multiple discussions about the Level of Service Below is a summary of the Level of Service for the Zeeland System:

1. THE PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT

   Constantly monitoring permit levels and proactively keeping them lower than needed, transparency when corresponding with EGLE and residents of the surrounding areas.

2. MAINTAIN A SUSTAINABLE SYSTEM

   Proactive replacements, sufficient rates, quality materials used. The City invests in labor of its staff to inspect older assets to plan for proactive replacements.

3. COMMUNICATE THE VALUE OF WATER RESOURCES

   The City of Zeeland maintains a Clean Water Plant section on their website, and the plant staff offer various tours and presentations throughout the year.

Revenue Structure

It was determined that with a 1% rate increase in 2019 the revenue structure was adequate to support the operations and maintenance, as well as capital improvements planned through the SAW analysis. The rates are reviewed annually by a firm that specializes in utility rate planning, and Zeeland's rates are adjusted as needed to meet the desired LOS based on these studies.

Capital Improvement Plan

A few processes in the Clean Water Plant have assets that have been flagged for replacement based on age or for improvement based on the business risk. While plant operations function properly at this time, capital improvements will proactively ensure treatment continues to operate and produce the desired LOS to the customer. There are several assets slated for replacement within the collection system as well.

<u>Summary of Major CWP Capital Improvement Projects</u>

- Final Clarifier no. 3 Re-build
- Solids Thickening Equipment
- Final Clarifier no. 2 Re-build
- Primary Tanks 1 & 2 mechanisms
- Motor Control Center no. 3 and solids holding tank renovations

<u>Summary of Major Collection Systems Capital Improvements Projects</u>

- Replace a number of gravity sewers in critical areas describe in AMP (aligned with street projects usually).
- Lift Station renovations and upsizing in future.
- Force main replacement in critical areas.

List of Major Assets:

<u>Treatment Plant</u>

- Raw Sewage Pumps (2)
- Screen Building and appurtenances (1)
- Grit Removal Systems (1)
- Primary Collection Tanks (5)
- Primary Sludge Pumps (2)
- Aeration Tanks (8)
- Turbo Blowers (3)
- Return Sludge Pumps (4)
- Final Clarification Tanks (5)
- UV Disinfection System (1 channel)
- Final Effluent Pumps (2)
- Aerobic Digesters (2)
- PD Blowers (3)
- Digested Sludge Pumps (2)
- Sieve Drum Concentrator (1)
- Thickened Sludge pumps (2)
- Sludge Storage Tanks (6)

<u>Collection System</u>

- 106,159 lft of 8" Gravity Piping
- 36,385 lft of 10" Gravity Piping
- 16,523 lft of 12" Gravity Piping
- 13,214 lft of 15" Gravity Piping
- 474 lft of 16" Gravity Piping
- 4,949 lft of 18" Gravity Piping
- 2,008 lft of 21" Gravity Piping
- 5,554 lft of 24" Gravity Piping
- 923 lft of 27" Gravity Piping
- Lift Stations (6)
- 3,729 lft of 6" Force main
- 3,566 lft of 8" Force main
- 1,803 lft of 10" Force main
- 6,970 lft of 16" Force main

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date August 5, 2019
(no later than 3 years from executed grant date)

The City of Zeeland *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1299-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Timothy R. Klunder	at	616-772-6400	citymgr@ci.zeeland.mi.us
Name		Phone Number	Email

10/31/2019

Signature of Authorized Representative (Original Signature Required) Date

Timothy R. Klunder, City Manager

Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date August 5, 2019
(no later than 3 years from executed grant date)

The City of Zeeland *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1299-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 7, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: __________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Timothy R. Klunder	at 616-772-6400	citymgr@ci.zeeland.mi.us
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required)

10/31/2019
Date

Timothy R. Klunder, City Manager
Print Name and Title of Authorized Representative

April 2017

City of Zeeland
21 S Elm St. Zeeland, MI 49464 – www.cityofzeeland.com
Mr. Timothy Klunder – City Manager – 616-772-6400
SAW Grant # 1299-01

Summary of Storm Water Asset Management Plan

The City of Zeeland SAW Grant included asset inventory, condition assessment, criticality rating, and business risk determination of the storm water collection system. The total grant amount was $692,611.00 of which the City paid for 10% with a local match. $600,000.00 of this was dedicated to the Clean Water Plant expansion from 2013-2017. The remainder was split between the sanitary system and storm system asset management programs. The 10% match was accounted for through in kind activities. Overall, the system was in “good health” and the City successfully collects and discharges storm water within the City limits. The City maintains adequate staffing to appropriately maintain the system. The City currently budget is adequate to maintain the system and continue to perform modest capital upgrades to continue to improve the system.

Asset Inventory

The major task in the SAW Grant was reviewing and updating an inventory of the City’s assets and rating their condition. Below is a summary of the collection ratings.

Storm Water Collection System Inventory

The asset management spreadsheet for the storm water collections system includes the gravity collection system and hydrodynamic separators. The spreadsheet was created with the use of as-built records, and coordination with the City staff. The condition rating of 10% of the collection infrastructure was done by a person with PACP/MACP certification. The ratings were done through a small percentage of televising of the most critical assets and interpolation of rating based on similar size and age. The collection system was rated on a scale of 1 to 5, with a rating of 1 being Excellent Condition and 5 being the Asset is Unserviceable.

Criticality of Assets

The rating of “Criticality” demonstrates how important the asset is to maintain a functioning system, and what would be the consequence of a failure of that asset. The performance rating for the consequence of failure is determined with consideration for social safety, economic and financial implications, and environmental impacts that would be affected if the asset were to fail. The assets were rated on a 1 to 5 scale based on criteria from MDEQ SAW Grant guidance. The criticality of the asset was multiplied by the condition to create a business risk ranging from 1-25.

Level of Service Determination

The Zeeland Staff and Engineers had multiple discussions about the Level of Service Below is a summary of the Level of Service for the Zeeland System:

1. THE PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT
2. MAINTAIN A SUSTAINABLE SYSTEM
3. COMMUNICATE THE VALUE OF WATER RESOURCES

Capital Improvement Plan

Several assets that have been flagged for improvement based on that condition or business risk will be scheduled to be improved. While the storm sewer functions properly at this time, capital improvements will proactively ensure collection continues to operate and maintain at a reliable level for the City.

Summary of Major Collection Systems Capital Improvements Projects

- Clean and Televise Collection System Lines (approx. 10% per year)

- CIPP Line Sewers based on annual inspections/hotspot mapping
- Gravity sewer replacements in conjunction with the following street projects:
    - Washington Ave from Lee easement to Franklin
    - Carlton St from Main to Washington
    - W Lawrence from Lee to dead end
    - Taft from Main to Huizenga
    - Paw Paw from 104th to dead end
    - E Cherry from Elm to Church
    - Plainfield and Plainfield Ct
    - Peck St from Lincoln to Rich

List of Major Assets:

Collection System

- Approximately 110,000 linear feet of 12”-54” Gravity Piping
- 18 Culverts
- Approximately 550 Mainline Structures
- Approximately 975 Catch Basins

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Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Southwestern Michigan College, Dowagiac, Michigan

Storm Water and Wastewater Sewer System

Date: November 24, 2019
To: Jonathan Berman
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Southwestern Michigan College: Summary of Storm Water and Wastewater Asset Management Plan

Grantee Information:
Southwestern Michigan College
58900 Cherry Grove Road
Dowagiac, MI 49047
Susan Coulston: Susan Coulston <scoulston@swmich.edu>
Ms. Susan Coulston; Vice President and Chief Business Officer
Ph: (269) 782-1396
SAW Project #: 1322-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$134,000	$115,000	$249,000

Storm Water and Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The first step in developing an AMP is to identify and evaluate the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

A. Description

SMC's storm sewer system consists of 21 manholes, 85 inlets, approximately 550 feet of 27-inch gravity main, 675 feet of 24-inch gravity main, 855 feet of 18-inch gravity main, 1,015 feet of 12-inch gravity main, 280 feet of 10-inch gravity main, 4,595 feet of 8-inch gravity main, 750 feet of 6-inch gravity main, 60 feet for 4-inch gravity main, and 650 feet of main with unknown size. Stormwater collected is discharges towards the north of the SMC site to a wooded lot where it flows toward Wild Puck Pond.

The wastewater system consists of 19 manholes, 4 sewer cleanouts, approximately 160 feet of 8-inch sewer lateral line, 730 feet of later line of unknown size, and 4,530 feet of 8-inch gravity sewer. Wastewater is sent to the City of Dowagiac wastewater collection system and treated at the City of Dowagiac Wastewater Treatment Facility.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all stormwater and wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the stormwater and wastewater collection systems were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the stormwater and wastewater collection systems. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.

Table 1 contains a summary of the stormwater and wastewater system assets identified.

Item	Quantity	Units
27-inch Storm Sewer	548	LF
24-inch Storm Sewer	674	LF
18-inch Storm Sewer	853	LF
12-inch Storm Sewer	1,015	LF
10-inch Storm Sewer	283	LF
8-inch Storm Sewer	4,595	LF
6-inch Storm Sewer	750	LF
4-inch Storm Sewer	57	LF
Storm Sewer, Unknown Diameter	651	LF
4-foot Diameter Storm Manhole	21	LF
Stormwater Inlet Structure	85	EA
Stormwater Discharge Point	20	EA

Table 1 - Stormwater system assets

Item	Quantity	Units
8-inch Sanitary Sewer	4,213	LF
4-foot Diameter Sanitary Sewer	19	EA
Service Lead, Complete	11	EA
Septic System	3	EA

Table 2 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

B. Asset Conditions

After completing the comprehensive inventory of the stormwater and wastewater systems assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Storm and sanitary manholes and storm drainage structures were visually assessed and photographed by Wightman employees as depicted in. Most of the gravity sewer piping was inspected using closed-circuit televising (CCTV) equipment designed for use in sewer pipes. CCTV services were provided by Corby Energy Services, Inc. (CES). All the CCTV videos and pipe reports and the manhole and drainage structure pictures are attached to those assets in the GIS map and are accessible via the computer and tablets.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 3.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 3 - NASSCO conditional assessment system

As previously mentioned, the gravity sanitary sewer piping was televised by CES. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman employees NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 1 and Figure 2 show the condition ratings for the storm sewer gravity main piping and the storm sewer manholes (respectively). Figure 3 and Figure 4 show the condition ratings for the sanitary sewer gravity main piping and the sanitary sewer manholes (respectively).

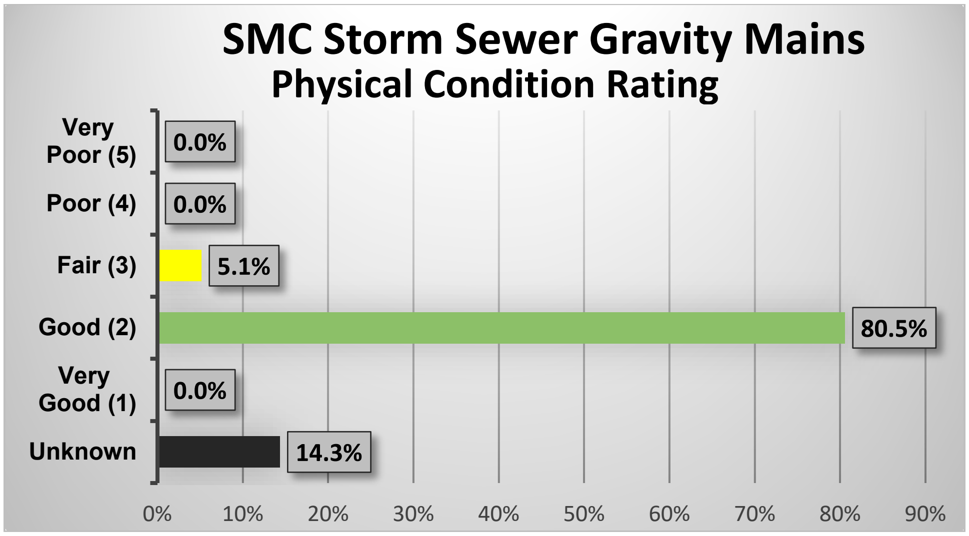

Figure 1 - Storm sewer gravity main physical condition rating

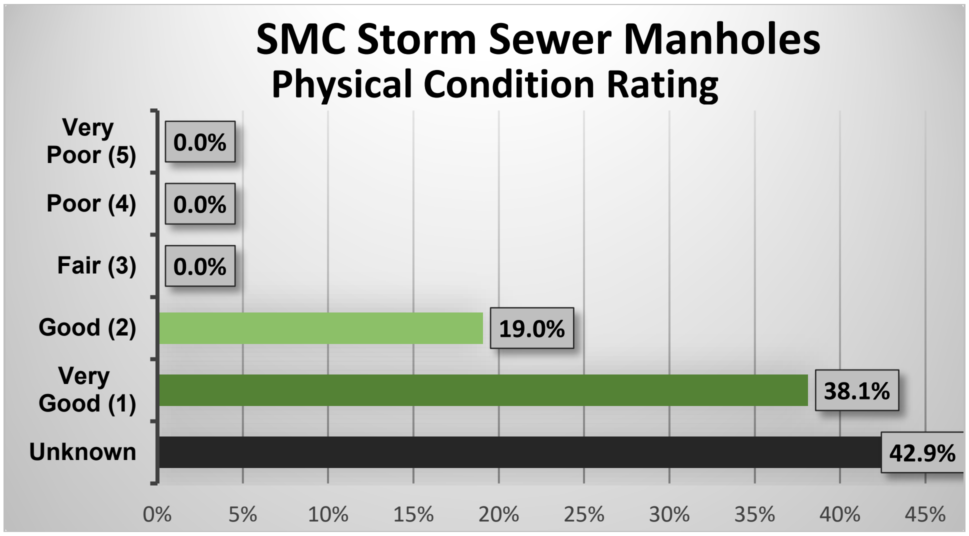

Figure 2 – Stormwater structure physical condition rating

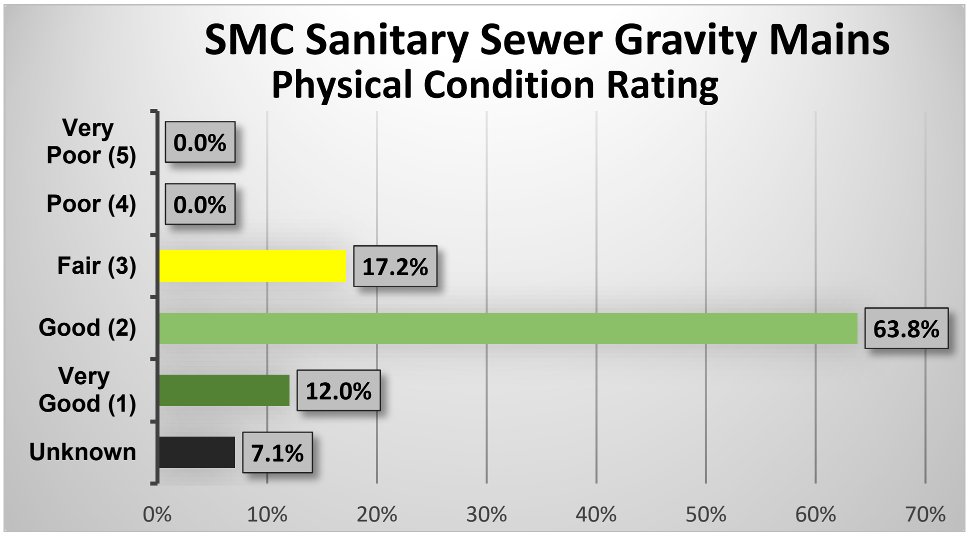

Figure 3 - Sanitary sewer gravity main physical condition rating

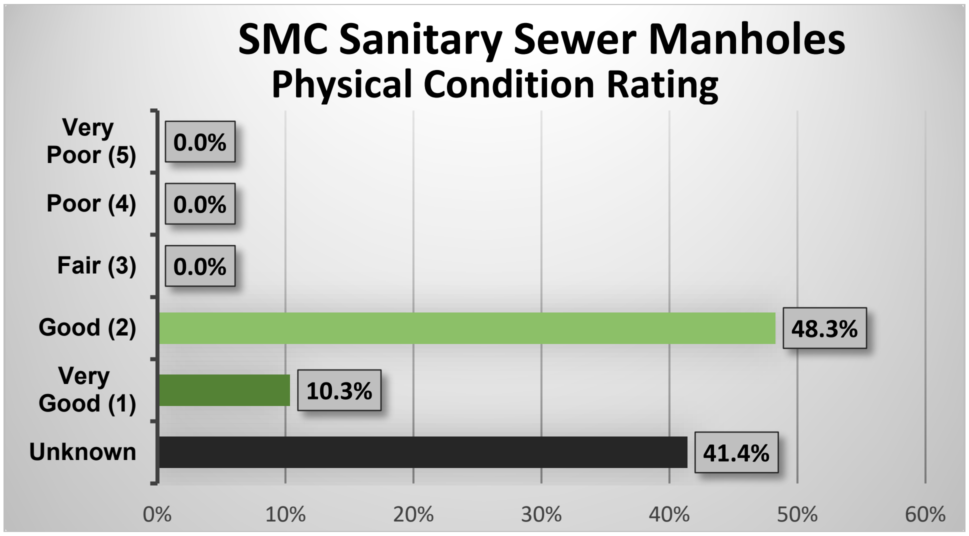

Figure 4 - Sanitary sewer manhole physical condition rating

The storm and sanitary assets with unknown physical condition were either unable to be physically or visually inspected due to size, location, inability to be opened, or they could not be found in the field. These assets were likely built with similar materials and installed at a similar time as other assets and were assumed to be in a similar condition.

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its users based on the owners's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 4 to define the desired level of service for the stormwater system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the environment.	Regular safety meetings – Monthly at a minimum. No MIOSHA safety violations.
Staff/Student Complaints	Provide excellent service.	Respond to staff/student complaints within 1 day and communicate through close of issue.
Response Time	Provide excellent service.	Respond to emergency calls within 4 hours at all times and non-emergency calls within 1 week during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from EGLE to all affected staff.
Collection System	Maintain the gravity sewers in good operating condition and prevent overflows and system back-ups.	All gravity storm sewers will be cleaned bi-annually.

Table 4 – Stormwater system level of service statements

The Asset Management Team developed the statements in Table 5 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the public health. Protect the environment.	Regular safety meetings – Monthly at a minimum.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	Ensure lids are installed on all manholes.
Staff/Student Complaints	Provide excellent service.	Respond to staff/student complaints within 1 day and communicate through close of issue.
Response Time	Provide excellent service.	Respond to emergency calls 4 hours at all times and non-emergency calls within 1 week during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from EGLE to all affected staff.
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review Dowagiac wastewater ordinances periodically – annually at a minimum.
Collection System	Maintain manholes and gravity sewers in good operating condition and prevent overflows and system back-ups.	All gravity sanitary sewers will be cleaned bi-annually.

Table 5 - Wastewater system level of service statements

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

C. Likelihood of Failure

For assets that were physically inspected, including gravity storm sewers, storm manholes, gravity sanitary sewers, and sanitary manholes, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 6. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section I.B. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 6.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 6 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

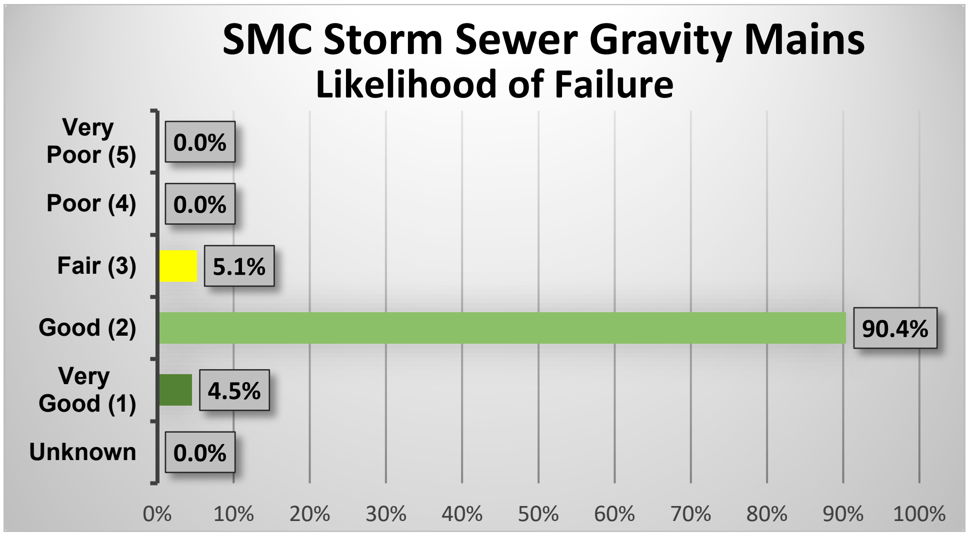

Figure 5 – Storm sewer gravity main Likelihood of Failure

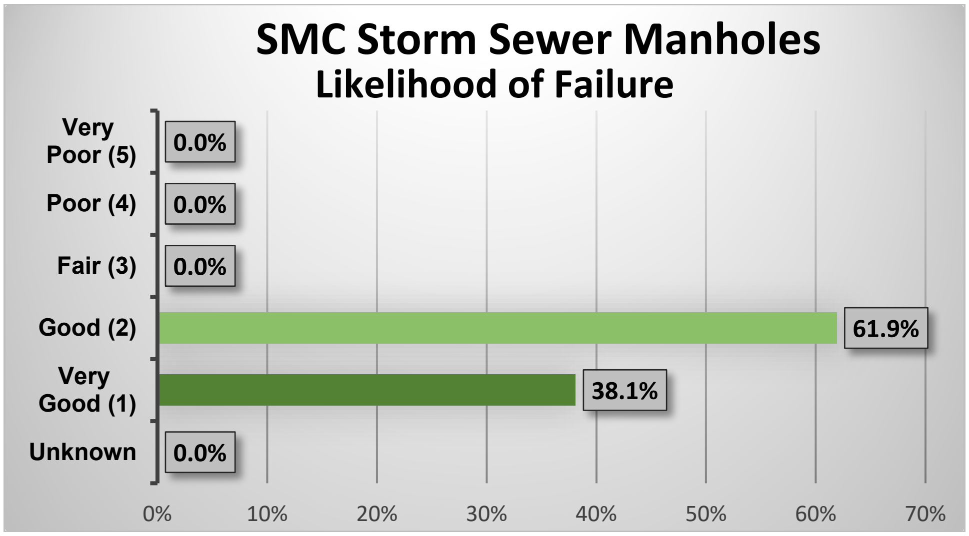

Figure 6 – Storm sewer manholes Likelihood of Failure

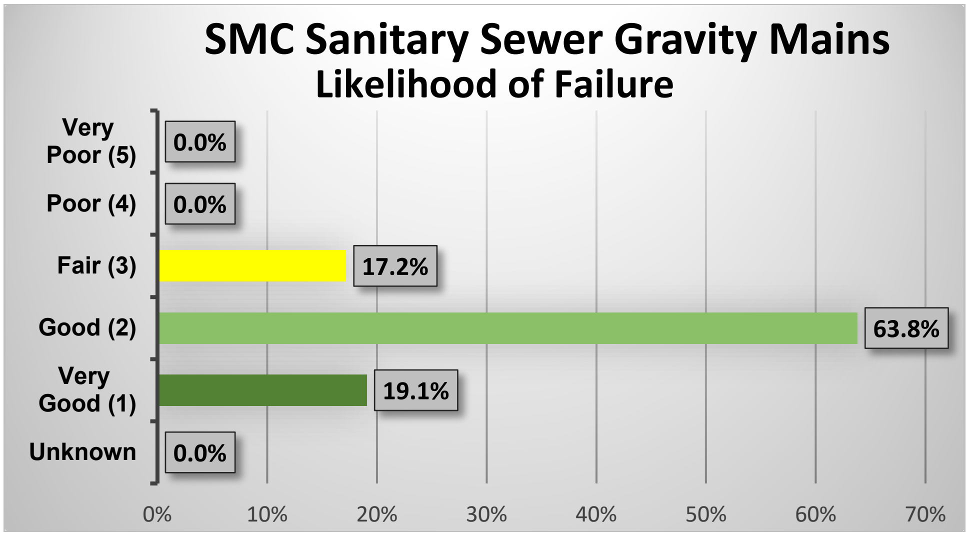

Figure 7 – Sanitary sewer gravity main Likelihood of Failure

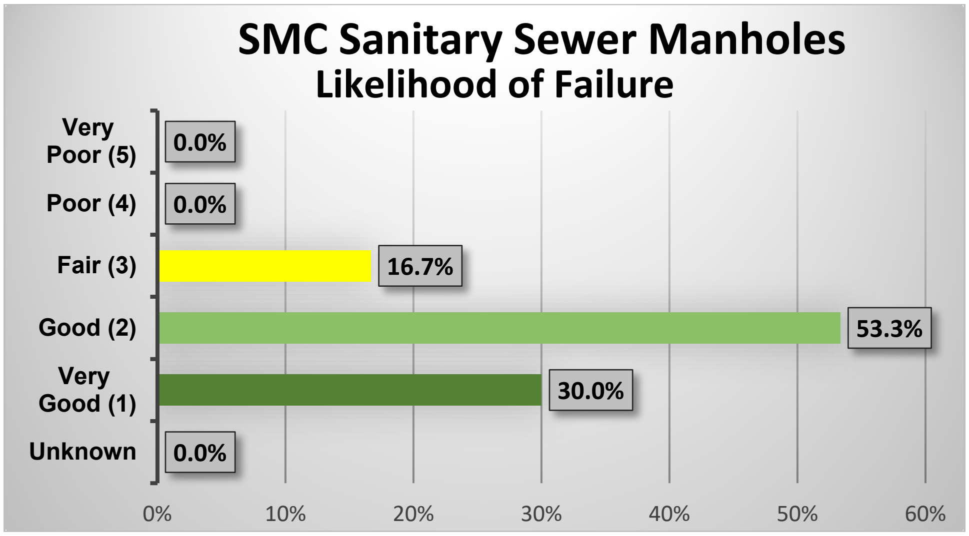

Figure 8 – Sanitary sewer manholes Likelihood of Failure

D. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 7.

Consequence of Failure Rating	Social, Human, and Environmental Effects[1]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 7 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the stormwater and wastewater systems. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the stormwater and wastewater collection systems is shown in Figure 9 through Figure 12 below.

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[1] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

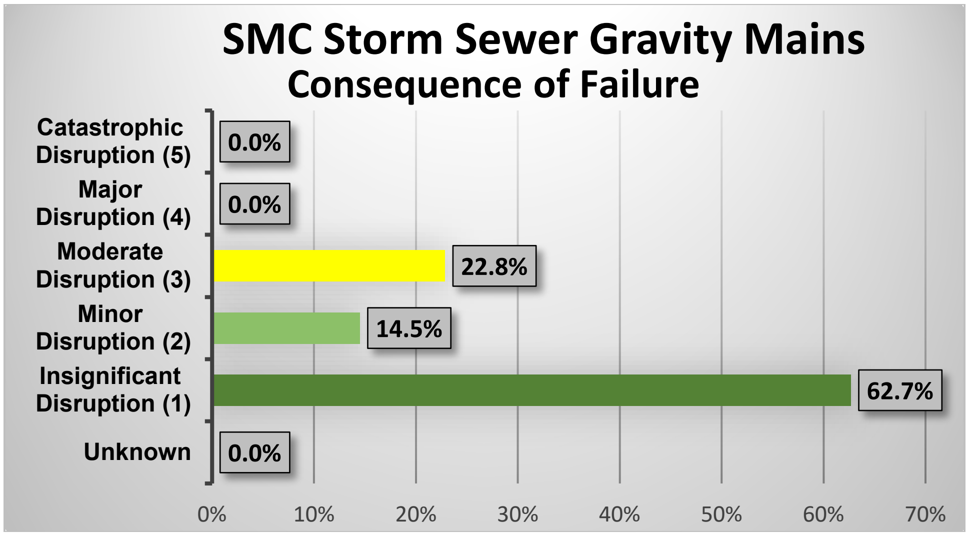

Figure 9 – Storm sewer gravity main consequence of failure rating

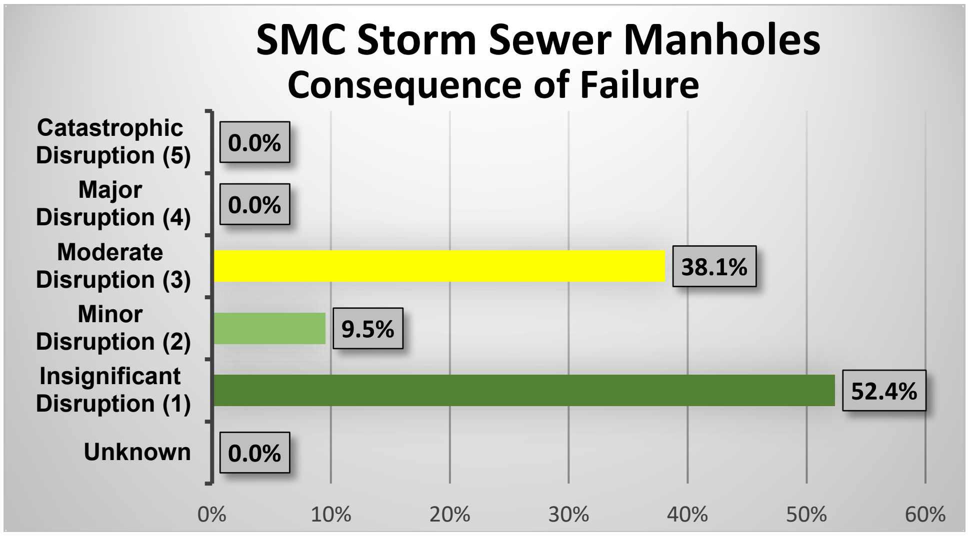

Figure 10 – Storm sewer manhole consequence of failure rating

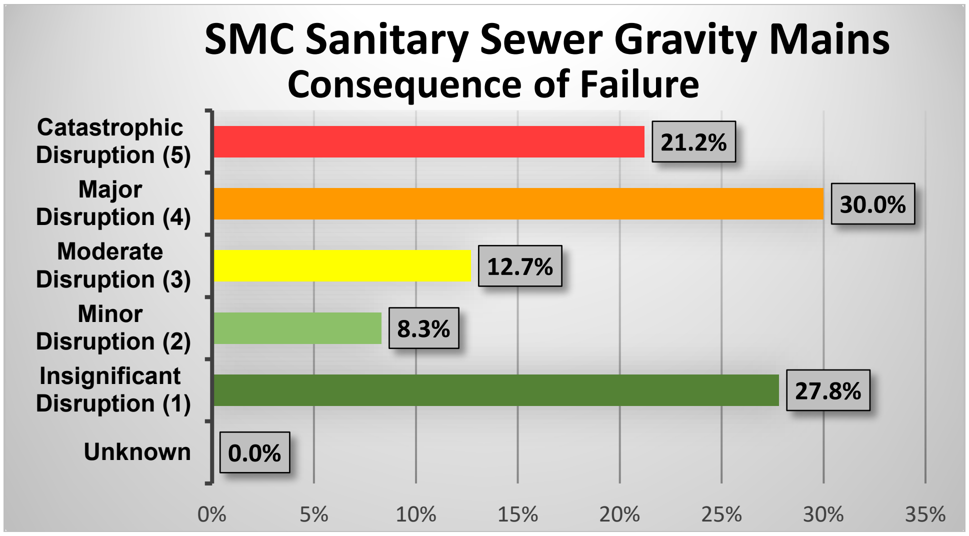

Figure 11 - Sanitary sewer gravity main consequence of failure rating

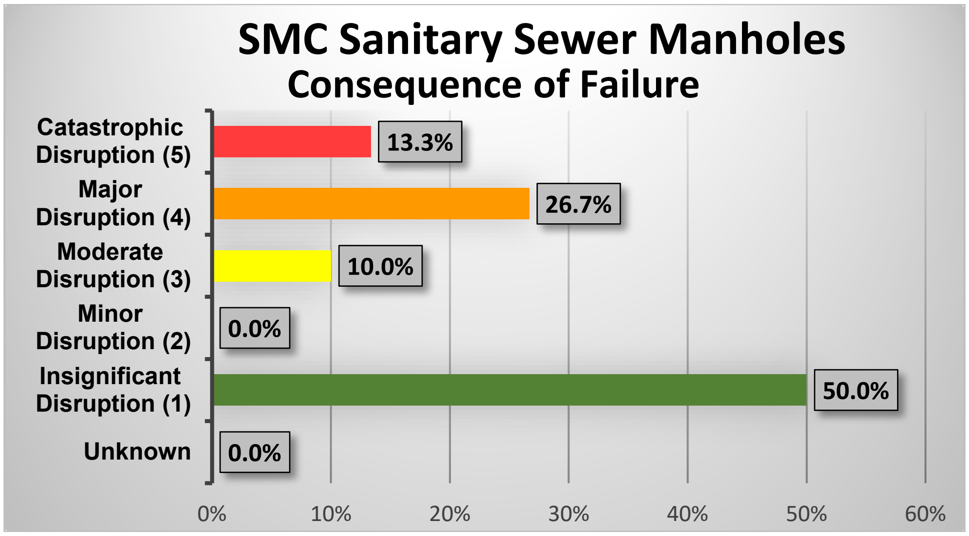

Figure 12 - Sanitary sewer manhole consequence of failure rating

The gravity sanitary sewer and manholes rated as 5 “Catastrophic Disruption” is due to the layout of the sanitary system. The collection system feeds through one pipe to the City of Dowagiac wastewater system, and therefore would have a significant effect on the SMC system if a failure were to occur in that area.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

One of the primary goals of Asset Management is to develop a long-term plan for revenues capable of supporting the required capital improvements in addition to routine O&M costs. However, due to the nature of this community, there is no dedicated stream of revenue allocated specifically for the stormwater and wastewater systems. Improvements to the storm sewer and sanitary sewer systems are funded as capital improvement projects and routine O&M costs are covered in the day-to-day operations of the DBG through the general fund.

Since there is no dedicated stream of regular revenue to the stormwater and wastewater systems, an in-depth asset management financial review (AMFR) could not be conducted. In addition, projections for the development of a revenue structure capable of supporting ongoing O&M and capital improvement costs cannot be developed as there are not dedicated rates for these services.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

E. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

F. Recommended Stormwater System Projects

Table 8 lists the recommended capital improvement projects over the next 20 years for the stormwater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix Where appropriate, the estimated project costs shown in Table 8 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 8 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Storm Sewer Replacement	$ 7,000
2	2025	Storm Sewer Replacement	$ 7,000
3	2028	Vacuum Catch Basin Sump	$ 6,000
4	2033	Trail Drainage Improvements	$ 51,000
5	2038	Vacuum Catch Basin Sump	$ 6,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 77,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) =	$ 98,000

Table 8 - Recommended stormwater system capital improvement projects

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

G. Recommended Wastewater System Projects

Table 9 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix. Where appropriate, the estimated project costs shown in Table 9 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 9 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2021	Replace Undersized Section	$ 4,000
2	2023	Sewer Cleaning	$ 9,000
3	2026	Cured in Place Pipe Lining	$ 10,000
4	2028	Sewer Cleaning	$ 9,000
5	2030	Polyurea Line Manhole	$ 4,000
6	2033	Sewer Cleaning	$ 9,000
7	2038	Sewer Cleaning	$ 9,000

Total Estimated Project Cost for 20 Year CIP (current dollars) = $ 54,000
Total Estimated Project Cost for 20 Year CIP (inflation adjusted[3] costs) = $ 68,000

Table 9 - Recommended wastewater system capital improvement projects

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[3] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Moore+Bruggink
Consulting Engineers

December 31, 2019

Re: SAW Grant 1300-01
Project No. 140124.01

Mr. David Worthington, Senior Project Manager
Michigan Department of Environment, Great Lake, and Energy
525 West Allegan Street
P.O Box 30473
Lansing, Michigan 48909

Dear Mr. Worthington,

The Asset Management Plan for Ada Township (Grant 1300-01) is complete. With this letter we have included the signed Certification of Project Completeness form. As noted in the Certificate of Project Completeness, we are also including the attached list of major assets, which includes six lift stations, along with 36 miles of sanitary sewer. This is from Appendix B of the AMP Report.

The contact for Ada Township is George Haga, Utility Director. He can be reached at (616) 676-9191, ext. 50. I can serve as the secondary contact and can be reached at (616) 363-9801.

Copies of the AMP are available at the Ada Township Offices at 7330 Thornapple River Drive, Ada, Michigan 49301.

Please give me a call if you have any questions.

Sincerely,

Steven C. Groenenboom, P.E.
Project Manager

cc: George Haga

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date ________________
(no later than 3 years from executed grant date)

The Township of Ada *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1300-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/28/2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Steven C. Groenenboom, P.E.	at (616) 363-9801	sgroenenboom@mbce.com
Name	Phone Number	Email

	12/31/2019
Signature of Authorized Representative (Original Signature Required)	Date

Steven C. Groenenboom, P.E., President, Moore & Bruggink, Inc.
Print Name and Title of Authorized Representative

APPENDIX B

Collection System Asset Inventory
Lift Station Asset Inventory

Sanitary_Sewer_System_Assets	FacilityID	Contract_ID	Slope	Capacity	Material	Length	Upstream_MH	Upstream MH Field Inspected	Upstream MH Condition	Downstream_MH	Downstream MH Field Inspected	Downstream MH Condition	Size	Approx_Depth	Yr_Installed	Useful_Life	Remaining_Useful_Life	Condition	Probability	Consequence	Business_Risk	Recommended Action
Ada Dr SE	30294146	012-02-035	1.88%	13821.82	RCP	430	30405857			30730031			24	10	1973	80	34	5	4	5	25	Improvement
Ada Dr SE	30294167	012-02-036	0.15%	7130.86	RCP	403.6	30294155			30294164			30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294159	012-02-036	0.15%	7130.86	RCP	418	30730031			30294155			30	13	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294188	012-02-037	0.15%	7130.86	RCP	398.7	30294187			30294185			30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294200	012-02-037	1.24%	20046.18	RCP	373	30294185			30294043			30	12	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294144	012-02-037	0.15%	7130.86	RCP	404.3	30294184			30294167			30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294223	012-02-038	0.15%	7130.86	RCP	428.1	30294218						30	21	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294219	012-02-038	0.15%	7130.86	RCP	398.6	30294208			30294218			30	15	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294207	012-02-038	0.15%	7130.86	RCP	324.2	30294199			30294206			30	8	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294242	012-02-039	0.15%	7130.86	RCP	493.5	30294231						30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294232	012-02-039	0.15%	7130.86	RCP	485.4	30294222			30293338			30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294278	012-02-040	0.15%	7130.86	RCP	397.8	30294264			30294277			30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294265	012-02-040	0.15%	7130.86	RCP	358.8	30294253			30293851			30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294254	012-02-040	0.15%	7130.86	RCP	373.9	30294241			30294253			30	18	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294298	012-02-041	0.38%	11845.83	RCP	283	30294292	X	2	30294297			30	12	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294283	012-02-041	0.38%	11845.83	RCP	305.2	30294280						30	12	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30294281	012-02-041	3.28%	33382.16	RCP	147	30294277			30293040	X	3	30	13	1973	80	34	5	5	5	25	Improvement
Ada Dr SE	30293940	012-03-055	0.48%	13486.87	RCP	72	30294287			30293821			30		1973	80	34	5	5	5	25	Improvement
Argo Ave SE	30294409	012-03-044	0.16%	7363.88	RCP	205	30294397	X	4	30294387	X	4	30	10	1973	80	34	5	5	5	25	Improvement
Argo Ave SE	30294388	012-03-044	0.16%	7363.88	RCP	225	30294374	X	4	30294374	X	4	30	12	1973	80	34	5	5	5	25	Improvement
Thornapple River Dr SE	30315223	012-02-030_025-03-038	0.25%	2357.30	AC Pipe	278	30315221			30315219			18	12	1938	80	-3	5	4	4	20	Improvement
Thornapple River Dr SE	30315220	012-02-030_025-03-038	0.25%	2357.30	AC Pipe	85	30315219			30315303			18	5	1938	80	-3	5	4	4	20	Improvement
Thornapple River Dr SE	30315223	012-02-030_025-03-038	0.25%	2357.30	AC Pipe	300	30313331			30315221			18	14	1938	80	-3	5	4	4	20	Improvement
Thornapple River Dr SE	30294045	012-02-017	0.23%	471.81	Cast Iron	201	30294037			30294039			10		1967	80	8	4	3	4	16	Observe
Ada Dr SE	30313333	025-03-037	0.80%	1358.65	AC Pipe	389	30313327						12	12	1938	80	-3	5	4	3	15	Improvement
Argo Ave SE	30294432	012-03-044	0.16%	7363.88	RCP	149	30294419	X	3	30294421			30	20	1973	80	34	3	3	5	15	Observe
Argo Ave SE	30294420	012-03-044	0.16%	7363.88	RCP	210	30294408	X	4	30294419	X	3	30	13	1973	80	34	3	3	5	15	Observe
Argo Ave SE	30294398	012-03-044	0.16%	7363.88	RCP	220	30294385	X	3	30294385	X	3	30	11	1973	80	34	3	3	5	15	Observe
Argo Ave SE	30294375	012-03-044	0.16%	7363.88	RCP	365	30292935	X	2	30292935	X	2	30	15	1973	80	34	3	3	5	15	Observe
Aylesworth St SE	30294371	012-03-043	0.16%	7363.88	RCP	300	30294387	X	2	30292935	X	2	30	18	1973	80	34	3	3	5	15	Observe
Aylesworth St SE	30294368	012-03-043	0.16%	7363.88	RCP	225	30294355			30294367	X	2	30	15	1973	80	34	3	3	5	15	Observe
Aylesworth St SE	30294358	012-03-043	0.16%	7363.88	RCP	175	30294349	X	3	30294355			30	15	1973	80	34	3	3	5	15	Observe
Aylesworth St SE	30294350	012-03-043	0.16%	7363.88	RCP	60	30294324			30294349	X	3	30	13	1973	80	34	3	3	5	15	Observe
Patterson Ave SE	30013267	012-03-042	0.20%	8233.67	RCP	60	30294315			30294318			30	13	1973	80	34	3	3	5	15	Observe
Patterson Ave SE	30294318	012-03-042	0.20%	8233.67	RCP	142	30294311			30294311			30	12	1973	80	34	3	3	5	15	Observe
Patterson Ave SE	30294312	012-03-042	1.78%	24623.24	RCP	350	30294304			30294311			30	12	1973	80	34	3	3	5	15	Observe
Patterson Ave SE	30293943	012-03-042	2.20%	27386.01	RCP	248	30293941			30294304			30	11	1973	80	34	3	3	5	15	Observe
Patterson Ave SE	30294321	012-03-043	0.16%	7363.88	RCP	300	30294951			30294951			30	12	1973	80	34	3	3	5	15	Observe
Patterson Ave SE	30294320	012-03-043	0.16%	7363.88	RCP	120	30294318			30294951			30	13	1973	80	34	3	3	5	15	Observe
Patterson Ave SE	30293853	012-03-035	5.30%	42583.33	RCP	7.35	30293923						30		1974	80	35	3	3	5	15	Observe
Patterson Ave SE	30013403	012-03-035	0.88%	16181.83	RCP	46.5				30293938			30		1974	80	35	3	3	5	15	Observe
Patterson Ave SE	30293942	012-03-035	0.48%	12794.82	RCP	20.6	30293938			30293941			30	11	1974	80	35	3	3	5	15	Observe
Patterson Ave SE	30293924	012-03-035	0.71%	15512.29	RCP	38.2	30293921			30293923			30		1974	80	35	3	3	5	15	Observe
River St SE	30315228	012-02-030	0.40%	621.86	AC Pipe	385	30315227			30315219			10	10	1938	80	-3	5	4	3	15	Improvement
Thornapple River Dr SE	30315225	012-02-030	0.20%	715.14	AC Pipe	408	30315224			30313331			12	13	1938	80	-3	5	4	3	15	Improvement
Thornapple River Dr SE	30315226	012-02-030_025-03-028	0.20%	715.14	AC Pipe	400	30294134			30315224			12	10	1938	80	-3	5	4	3	15	Improvement
Ada Dr SE (Easement)	30313729	012-03-019	0.20%	4546.83	AC Pipe	71	30313726			30313763			24	12	1974	80	35	3	3	4	12	No Action Required
Ada Dr SE (Easement)	30313727	012-03-019	0.14%	3484.02	AC Pipe	346.5	30313723			30313726			21	12	1974	80	35	3	3	4	12	No Action Required
Brookside Woods Ct	30314068	057-02-012_012-03-025	0.80%	1438.37	Clay	248	30293267			30314062			12	20	1988	80	7	4	3	3	12	No Action Required
E Fulton St	30314009	012-02-048	0.12%	1603.21	AC Pipe	298.3	30314005			30313997			18	12	1973	80	34	3	3	4	12	No Action Required
E Fulton St	30314000	012-02-049	0.12%	1603.21	AC Pipe	362	30313997			30313988			18	12	1973	80	34	3	3	4	12	No Action Required
E Fulton St	30313992	012-02-049	0.12%	1603.21	AC Pipe	358.5	30313988			30313980			18	12	1973	80	34	3	3	4	12	No Action Required
E Fulton St	30313983	012-02-049	0.12%	1603.21	AC Pipe	383.5	30313980			30313844			18	13	1973	80	34	3	3	4	12	No Action Required
E Fulton St	30313846	012-02-050	0.12%	1603.21	AC Pipe	358	30313844			30313835			18	13	1973	80	34	3	3	4	12	No Action Required
E Fulton St	30313836	012-02-050	0.12%	1603.21	AC Pipe	205.3	30313835			30313822			18		1973	80	34	3	3	4	12	No Action Required
E Fulton St	30313823	012-02-050	0.12%	1603.21	AC Pipe	203.5	30313822			30313820			18		1973	80	34	3	3	4	12	No Action Required
E Fulton St	30313821	012-02-050	0.12%	1603.21	AC Pipe	253.5	30313820			30313738			18	4	1973	80	34	3	3	4	12	No Action Required
E Fulton St (Easement)	30313740	012-03-019	2.20%	6962.67	AC Pipe	78.5	30313738			30313736			18	8	1974	80	35	3	3	4	12	No Action Required
E Fulton St (Easement)	30313741	012-03-019	2.20%	6962.67	AC Pipe	18.5	30313736			30313726			18	10	1974	80	35	3	3	4	12	No Action Required
Ada Dr SE	30315248	012-02-030	8.00%	1328.53	AC Pipe	354	30294102			30313328			8	10	1938	80	-3	5	3	2	10	No Action Required
Ada Dr SE	30313335	025-03-037_012-02-030	0.40%	343.83	AC Pipe	265	30313334						8	12	1938	80	-3	5	3	2	10	No Action Required
Bronson St SE	30315244	012-02-030	0.90%	514.54	AC Pipe	350	30315242	X	3	30315239			8	8	1938	80	-3	5	3	2	10	No Action Required
Bronson St SE	30315243	012-02-030	0.90%	514.54	AC Pipe	375	30315241	X	3	30315242	X	3	8	10	1938	80	-3	5	3	2	10	No Action Required
Bronson St SE	30315247	012-02-030_012-02-001	0.90%	514.54	AC Pipe	425	30315245	X	2	30315241	X	3	8	11	1938	80	-3	5	3	2	10	No Action Required
Bronson St SE	30315240	012-02-030_012-02-002	0.90%	514.54	AC Pipe	350	30315239			30313327			8	8	1938	80	-3	5	3	2	10	No Action Required
Bronson St SE	30315250	012-02-030_012-02-003	0.40%	343.83	AC Pipe	415	30315258			30315227			8	8	1938	80	-3	5	3	2	10	No Action Required
Rix St SE	30315258	012-02-030	1.60%	686.66	AC Pipe	400	30315257			30315249	X	2	8	8	1938	80	-3	5	3	2	10	No Action Required
Rix St SE	30315250	012-02-030	4.50%	1150.54	AC Pipe	300	30315249	X	2	30313328			8	10	1938	80	-3	5	3	2	10	No Action Required
Rix St SE	30315298	012-02-030	0.40%	343.83	AC Pipe	335	30293815	X	1	30315257			8	8	1938	80	-3	5	3	2	10	No Action Required
Ada Dr SE	30388404	012-03-019	0.28%	520.36	AC Pipe	80.7	30293959			30313723			10	11	1974	80	35	3	2	3	9	No Action Required
Ada Dr SE (Easement)	30294069	012-02-018	0.28%	520.36	AC Pipe	154	30294130			30294065			10	10	1967	80	28	3	2	3	9	No Action Required
Ada Dr SE (Easement)	30294068	012-02-018	0.28%	520.36	AC Pipe	225	30294065						10	10	1967	80	28	3	2	3	9	No Action Required
Amway	30313802	012-02-052	0.22%	758.84	RCP	331.5	30313801			30313790			12	8	1973	80	34	3	2	3	9	No Action Required
Amway	30313792	012-02-052	0.22%	758.84	RCP	302.5	30313790			30313779			12	9	1973	80	34	3	2	3	9	No Action Required
Amway	30313782	012-02-052	0.22%	758.84	RCP	314	30313779			30313773			12	10	1973	80	34	3	2	3	9	No Action Required
Brookside Woods Ct	30314159	012-03-025	0.80%	1438.37	AC Pipe	210.3	30314158			30314084			12	14	1988	80	27	3	2	3	9	No Action Required
Brookside Woods Ct	30314085	057-02-012_012-03-025	0.80%	1438.37	AC Pipe	289.3	30314084			30293257			12	17	1988	80	27	3	2	3	9	No Action Required
Brookside Woods Ct	30314087	057-02-012_012-03-025	0.80%	1438.37	AC Pipe	202.8	30314062			30294095	X	2	12	17	1988	80	27	3	2	3	9	No Action Required
Bultrick Ave SE	30294532	012-04-018	0.30%	538.62	AC Pipe	143	30294527			30294524			10	15	1978	80	37	3	2	3	9	No Action Required
Bultrick Ave SE	30294533	012-04-018	0.30%	538.62	AC Pipe	177	30294524			30293993	X	3	10	11	1978	80	37	3	2	3	9	No Action Required
Bultrick Ave SE	30294531	012-04-018	0.30%	538.62	AC Pipe	159	30293892			30294527			10	15	1978	80	37	3	2	3	9	No Action Required
Driftwood Dr SE	30292823	012-04-038	0.28%	520.36	AC Pipe	188	30292818			30292822			10	11	1979	80	40	3	2	3	9	No Action Required
Driftwood Dr SE	30292819	012-04-038	0.28%	520.36	AC Pipe	154	30292817	X	3	30292818			10	11	1979	80	40	3	2	3	9	No Action Required
Driftwood Dr SE	30292840	012-04-039	0.28%	520.36	AC Pipe	182	30292837			30292839			10	15	1979	80	40	3	2	3	9	No Action Required
Driftwood Dr SE	30292838	012-04-039	0.28%	520.36	AC Pipe	353	30292835			30292837			10	14	1979	80	40	3	2	3	9	No Action Required
Driftwood Dr SE	30292836	012-04-039	0.28%	520.36	AC Pipe	302	30292833			30292835			10	14	1979	80	40	3	2	3	9	No Action Required
Driftwood Dr SE	30292824	012-04-039	0.28%	520.36	AC Pipe	245	30292822			30292833			10	12	1979	80	40	3	2	3	9	No Action Required
Dunbarton St SE	30314398	013-02-022_070-02-058.pdf	0.80%	1438.37	AC Pipe	217.5	30313179			30280488			12	9	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE	30314303	012-03-023	0.80%	879.57	AC Pipe	277.9	30314296	X	2	30314292	X	2	10	11	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE	30314297	012-03-023	0.80%	879.57	AC Pipe	252.2	30314290	X	2	30314298	X	2	10	11	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE	30314291	012-03-065	0.80%	879.57	AC Pipe	228.5	30313878	X	3	30314290	X	2	10	12	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE	30280589	012-03-065_012-03-022	0.80%	879.57	AC Pipe	371	30280584			30313878	X	3	10	11	1988	80	29	3	2	3	9	No Action Required
Duxbury Dr SE	30280585	012-03-065_012-03-022	0.80%	879.57	AC Pipe	335.8	30280523			30280584			10	12	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE	30280524	012-03-067_012-03-022	0.80%	879.57	AC Pipe	314	30280488			30280488			10	10	1988	80	29	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314283	012-03-023	0.80%	879.57	AC Pipe	272.1	30314282	X	2	30314278	X	2	10	12	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314242	012-03-023	0.80%	879.57	AC Pipe	141.4	30314241	X	2	30282315	X	3	10	8	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314240	012-03-023	0.80%	879.57	AC Pipe	310.7	30282315	X	3	30314238	X	2	10	9	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314239	012-03-024	0.80%	879.57	AC Pipe	315.2	30314238	X	2	30282327	X	2	10	12	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314185	012-03-024	2.88%	1663.86	AC Pipe	258.85	30314182	X	2	30291772	X	2	10	9	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314184	012-03-024	0.80%	879.57	AC Pipe	284.4	30282327	X	2	30314182	X	2	10	11	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314279	024-04-035_012-03-023	0.80%	879.57	AC Pipe	184.4	30314278	X	2	30313591			10	10	1988	80	27	3	2	3	9	No Action Required
Duxbury Dr SE (Easement)	30314274	024-04-035_012-03-023	0.80%	879.57	AC Pipe	98.4	30313591			30313591			10	10	1988	80	27	3	2	3	9	No Action Required
E Fulton St	30315004	012-03-028	4.31%	8918.20	AC Pipe	60	30314993			30315003			15	8	1988	80	27	3	1	3	9	No Action Required
E Fulton St	30314987	012-03-047	0.40%	1803.71	AC Pipe	15	30314985			30314980			15		1973	80	34	3	1	3	9	No Action Required
E Fulton St	30314046	012-03-047	0.15%	1122.81	AC Pipe	384	30314044			30314041			15	13	1973	80	34	3	1	3	9	No Action Required
E Fulton St	30314043	012-03-047	1.32%	3331.18	AC Pipe	123.5	30314041			30314037			15	11	1973	80	34	3	1	3	9	No Action Required
E Fulton St	30314040	012-03-047	1.32%	3331.18	AC Pipe	226	30314037			30314031			15	13	1973	80	34	3	1	3	9	No Action Required
E Fulton St	30314034	012-02-048	0.15%	1122.81	AC Pipe	318.2	30314031			30314028			15	13	1973	80	34	3	1	3	9	No Action Required
E Fulton St	30314033	012-02-048	0.15%	1122.81	AC Pipe	301.3	30314028			30314018			15	12	1973	80	34	3	1	3	9	No Action Required
E Fulton St	30314021	012-02-048	0.15%	1122.81	AC Pipe	300.5	30314018			30314005			15	12	1973	80	34	3	1	3	9	No Action Required
E Fulton St	30313772	012-02-051	0.80%	1238.65	AC Pipe	240	30313769			30313738			12	4	1973	80	34	3	1	3	9	No Action Required
E Fulton St	30313620	024-04-024	0.22%	758.84	Clay	177	30313619			30293187			12	8	1988	80	27	3	2	3	9	No Action Required
E Fulton St (Easement)	30314986	012-02-026	1.00%	2898.35	AC Pipe	118.1	30297044			30314985			15	18	1988	80	27	3	1	3	9	No Action Required
E Fulton St (Easement)	30294096	012-03-026	0.30%	1588.84	AC Pipe	392.2	30294095	X	2	30294092			15	10	1988	80	27	3	1	3	9	No Action Required
E Fulton St (Easement)	30294094	012-03-026	0.30%	1588.84	AC Pipe	187.5	30294092			30292809			15	4	1988	80	27	3	1	3	9	No Action Required
E Fulton St (Easement)	30297045	012-03-026	0.30%	1588.84	AC Pipe	195.5	30292809			30297044			15	10	1988	80	27	3	1	3	9	No Action Required
E Fulton St SE	30315005	012-02-010	0.15%	1122.81	AC Pipe	86.5	30315003			30314985			15	8	1987	80	28	3	1	3	9	No Action Required
E Fulton St SE	30314998	012-02-047	0.15%	1122.81	AC Pipe	78	30314983			30314990			15		1973	80	34	3	1	3	9	No Action Required
E Fulton St SE	30315001	012-02-047	0.15%	1122.81	AC Pipe	93.5	30314990			30314044			15	14	1973	80	34	3	1	3	9	No Action Required
E Fulton St SE	30313774	012-02-051	0.40%	1011.35	RCP	172	30313773			30313769			12	10	1973	80	34	3	2	3	9	No Action Required
Fase St SE	30293997	012-02-018	0.28%	520.36	AC Pipe	369	30293993	X	3	30293990			10	9	1967	80	28	3	2	3	9	No Action Required
Fase St SE	30293998	012-02-018	0.28%	520.36	AC Pipe	350	30293990			30293982			10	9	1967	80	28	3	2	3	9	No Action Required
Fase St SE	30293999	012-02-018	0.28%	520.36	AC Pipe	283	30293982			30293974			10	10	1967	80	28	3	2	3	9	No Action Required
Kulross Ave SE	30314173	012-02-024	0.80%	1438.37	AC Pipe	107.5	30282530	X	3	30314171			12	8	1988	80	27	3	2	3	9	No Action Required
Kulross Ave SE (Easement)	30314176	012-03-024	0.80%	1438.37	AC Pipe	318.7	30291772	X	2	30282530	X	3	12	8	1988	80	27	3	2	3	9	No Action Required
Kulross Ave SE (Easement)	30314172	012-02-025	0.80%	1438.37	AC Pipe	290.5	30314171			30282176			12	13	1988	80	27	3	2	3	9	No Action Required
Kulross Ave SE (Easement)	30314180	012-02-025	0.80%	1438.37	AC Pipe	258.9	30282176			30314158			12	17	1988	80	27	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291880	012-03-053	0.40%	821.86	Clay	239	30291853			30291878			10	18	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291854	012-03-053	0.40%	821.86	Clay	195	30291851			30291853			10	19	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291852	012-03-053	0.40%	821.86	Clay	192	30291847			30291851			10	17	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291848	012-03-053	0.40%	821.86	Clay	166	30291835			30291847			10	13	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291839	012-03-053	0.40%	821.86	Clay	156	30291833			30291835			10	8	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291837	012-03-053	0.40%	821.86	Clay	189	30291831			30291833			10	8	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291832	012-03-053	0.72%	854.43	Clay	142	30291547			30291831			10	8	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291876	012-03-054	0.40%	821.86	Clay	82	30291878			30291873			10	18	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291875	012-03-054	0.40%	821.86	Clay	154	30291873			30291870			10	11	1975	80	18	3	2	3	9	No Action Required
Paradise Lake Dr SE	30291879	012-03-054	0.40%	821.86	Clay	190	30291870			30730031			10	8	1975	80	18	3	2	3	9	No Action Required
Thornapple River Dr (Easement)	30294132	012-02-018	0.28%	520.36	AC Pipe	81	30294067			30294130			10		1967	80	28	3	2	3	9	No Action Required
Thornapple River Dr SE	30293977	012-02-017	0.25%	491.69	AC Pipe	301	30293974			30293964			10		1967	80	28	3	2	3	9	No Action Required
Thornapple River Dr SE	30294058	012-02-017	0.25%	491.69	AC Pipe	82	30293965			30294037			10		1967	80	28	3	2	3	9	No Action Required
Thornapple River Dr SE	30293966	012-02-017	0.25%	491.69	AC Pipe	184	30293964			30293965			10		1967	80	28	3	2	3	9	No Action Required
Thornapple River Dr SE	30294139	012-02-032_025-03-028	0.28%	520.36	AC Pipe	177.5	30294138	X	3	30294138	X	2	10	7	1970	80	31	3	2	3	9	No Action Required
Thornapple River Dr SE	30294137	012-02-032_025-03-028	0.28%	520.36	AC Pipe	321.5	30294136	X	2	30294134			10	8	1970	80	31	3	2	3	9	No Action Required
Thornapple River Dr SE	30292848	012-04-039	0.28%	520.36	AC Pipe	242	30292839			30292845			10	20	1979	80	40	3	2	3	9	No Action Required
Thornapple River Dr SE	30292867	012-04-042	0.28%	520.36	AC Pipe	340	30292845			30292866			10	10	1979	80	40	3	2	3	9	No Action Required

LS	Treatment Assets	Capacity	Material	Location	Size	HP	Manufacturer	Tag Number	Original Cost	Replacement Cost	Depreciation Value	Estimated Life Span	Year Installed	Remaining Useful Life in Years	Condition	Probability of Failure	Criticality of Asset	Business Risk	Suggested Action
Ada Moorings	Control Panel	n/a		Surface Mounted								25	1992	-2	3	3	5	15	Improvement
Ada Moorings	T-Comm Panel	n/a		Control Panel								25	2015	21	1	1	5	5	No Action Required
Ada Moorings	Multismart Controller	n/a		Control Panel								25	2015	21	1	1	5	5	No Action Required
Ada Moorings	level transducer and float level switches	n/a		Wet Well								25	1992	-2	3	3	4	12	No Action Required
Ada Moorings	Electrical panel	n/a		Surface Mounted								25	1991	-3	2	2	5	10	No Action Required
Ada Moorings	Electrical breakers	n/a		Surface Mounted								25	1992	-2	2	2	5	10	No Action Required
Ada Moorings	Emergency Generator			Surface Mounted								25	1992	-2	2	2	5	10	No Action Required
Ada Moorings	Lighting Systems	n/a		Surface Mounted								25	1992	-2	2	2	4	8	No Action Required
Ada Moorings	Submersible Sewage Pump #1	577 gpm @ 33' TDH		Dry Well	6"		Sulzer ABSXFP100C-CB1.1-PE20/6-C-60FM					25	2017	23	1	1	4	4	No Action Required
Ada Moorings	Submersible Sewage Pump #2			Dry Well	6"							25	1992	-2	3	3	4	12	No Action Required
Ada Moorings	Discharge Piping	n/a		Valve Pit	6"							40	1992	13	3	3	3	9	No Action Required
Ada Moorings	Discharge Check Valves	n/a		Valve Pit	6"							40	1992	13	3	3	3	9	No Action Required
Ada Moorings	Discharge Gate Valves	n/a		Valve Pit	6"							40	1992	13	3	3	3	9	No Action Required
Ada Moorings	Bypass connection - 6" quick connect	n/a		Valve Pit	6"							40	1992	13	3	3	3	9	No Action Required
Ada Moorings	Bypass connection piping	n/a		Valve Pit	6"							40	1992	13	3	3	3	9	No Action Required
Ada Moorings	Bypass connection valve	n/a		Valve Pit	6"							40	1992	13	3	3	3	9	No Action Required
Ada Moorings	Valve Pit	n/a		Valve Pit								75	1992	48	2	2	3	6	No Action Required
Ada Moorings	Wet Well Hatch	n/a		Wet Well								40	1992	13	4	4	3	12	No Action Required
Ada Moorings	Wet Well	n/a		Wet Well								75	1992	48	2	2	3	6	No Action Required
Cascade Lift Station	Control Panel	n/a		Surface Mounted								25	1987	-7	3	3	3	9	No Action Required
Cascade Lift Station	Multismart Controller	n/a		Control Panel								25	2015	21	3	3	3	9	No Action Required
Cascade Lift Station	T-Comm Panel	n/a		Control Panel								25	2015	21	3	3	3	9	No Action Required
Cascade Lift Station	Level Transducers, Float Switches	n/a		Wet Well								25	2015	21	3	3	3	9	No Action Required
Cascade Lift Station	Electrical panel	n/a		Control Panel								20	1987	-12	3	3	3	9	No Action Required
Cascade Lift Station	Electrical Breakers	n/a		Control Panel								20	1987	-12	3	3	3	9	No Action Required
Cascade Lift Station	Emergency Generator			Surface Mounted								25	1987	-7	3	3	3	9	No Action Required
Cascade Lift Station	Emergency Generator connection	n/a		Surface Mounted								25	1987	-7	3	3	3	9	No Action Required
Cascade Lift Station	Site Lighting	n/a		Surface Mounted								25	1987	-7	3	3	2	6	No Action Required
Cascade Lift Station	Sewage Pump #1	320 gpm @ 90 ft		Wet Well	4"							40	1987	8	3	3	3	9	No Action Required
Cascade Lift Station	Sewage Pump #2	320 gpm @ 90 ft		Wet Well	4"							40	1987	8	3	3	3	9	No Action Required
Cascade Lift Station	Discharge Piping (wet well)	n/a	DI	Wet Well	4"							40	1987	8	3	3	3	9	No Action Required
Cascade Lift Station	Discharge Piping (valve pit)	n/a	DI	Valve Pit	4"							40	1987	8	3	3	3	9	No Action Required
Cascade Lift Station	Discharge Gate Valves	n/a	DI	Valve Pit	4"							40	1987	8	3	3	3	9	No Action Required
Cascade Lift Station	Discharge Check Valves	n/a	DI	Valve Pit	4"							40	1987	8	3	3	3	9	No Action Required
Cascade Lift Station	Bypass connection valve	n/a	DI	Valve Pit	6"							40	1987	8	3	3	3	9	No Action Required
Cascade Lift Station	Bypass connection piping	n/a	DI	Valve Pit	6"							40	1987	8	3	3	2	6	No Action Required
Cascade Lift Station	Bypass connection - Male N.P.T. Quick Coupler	n/a	AL	Valve Pit	3"							40	1987	8	3	3	2	6	No Action Required
Cascade Lift Station	Radio Antenna	n/a		Surface Mounted								20	1987	-12	3	3	4	12	No Action Required
Cascade Lift Station	Railing, Stairs, Ladders, Grating, Hatches	n/a		Various								60	1987	28	3	3	4	12	No Action Required
Cascade Lift Station	SCADA controls (RTU)	n/a		Surface Mounted								25	2015	21	3	3	4	12	No Action Required
Cascade Lift Station	Drain Piping	n/a	DI	Valve Pit	3"							50	1987	18	2	2	1	2	No Action Required
Cascade Lift Station	Valve Pit	n/a	Concrete	Valve Pit								75	1987	43	3	3	4	12	No Action Required
Cascade Lift Station	Wet Well	2000 gallon	Concrete	Wet Well	8' dia.							75	1987	43	3	3	4	12	No Action Required
Cascade Lift Station	Wet Well Hatch	n/a	AL	Wet Well	59.25"x42.75"							25	1987	-7	3	3	2	6	No Action Required
Country Homes Lift Statio	Bypass connection	n/a	AL	Bypass Chamber	3"		Andrews #300B Male Quick Coupler					25	1985	-9	3	3	2	6	No Action Required
Country Homes Lift Statio	Bypass Piping	n/a	DI	Bypass Chamber	4"							25	1985	-9	3	3	2	6	No Action Required
Country Homes Lift Statio	Bypass valve	n/a	DI	Bypass Chamber	4"							25	1985	-9	3	3	2	6	No Action Required
Country Homes Lift Statio	Bypass chamber	n/a	concrete	Bypass Chamber	5' dia.							25	1985	-9	3	3	2	6	No Action Required
Country Homes Lift Statio	Cathodic Protection System	n/a		Underground								35	1985	1	3	3	2	6	No Action Required
Country Homes Lift Statio	Control Panel, Transducer and float level switches	n/a		Wet Well								20	1985	-14	3	3	4	12	No Action Required
Country Homes Lift Statio	Discharge Check Valves	n/a		Dry Well								40	1985	6	3	3	4	12	No Action Required
Country Homes Lift Statio	Discharge Piping and Valves	n/a		Dry Well								40	1985	6	3	3	4	12	No Action Required
Country Homes Lift Statio	Dry Well	n/a		Dry Well								40	1985	6	3	3	4	12	No Action Required
Country Homes Lift Statio	Dry Well - barrel section	n/a		Dry Well								40	1985	6	3	3	4	12	No Action Required
Country Homes Lift Statio	Electrical panel	n/a		Surface Mounted								25	1985	-9	3	3	4	12	No Action Required
Country Homes Lift Statio	Emergency Generator connection	n/a		Surface Mounted								25	1985	-9	3	3	3	9	No Action Required
Country Homes Lift Statio	HVAC Systems (dehumidifier, blower, air intake, space heater)	n/a		Dry Well								25	1985	-9	3	3	3	9	No Action Required
Country Homes Lift Statio	Lighting Systems	n/a		Varies								25	1985	-9	3	3	3	9	No Action Required
Country Homes Lift Statio	Pump #1	550 gpm		Dry Well								25	1985	-9	4	4	4	16	Improvement
Country Homes Lift Statio	Pump #2	550 gpm		Dry Well								25	1985	-9	4	4	4	16	Improvement
Country Homes Lift Statio	Ladder & safety landings	n/a		Dry Well								40	1985	6	2	2	3	6	No Action Required
Country Homes Lift Statio	SCADA controls (RTU)	n/a		Surface Mounted								25	1985	-9	2	2	3	6	No Action Required
Country Homes Lift Statio	Suction Piping	n/a	DI	Wet Well								40	1985	6	3	3	4	12	No Action Required
Country Homes Lift Statio	Discharge Piping	n/a	DI	Wet Well								40	1986	7	3	3	4	12	No Action Required
Country Homes Lift Statio	Suction Gate Valves	n/a	DI	Wet Well								40	1987	8	3	3	4	12	No Action Required
Country Homes Lift Statio	Discharge Gate Valves	n/a	DI	Wet Well								40	1988	9	3	3	4	12	No Action Required
Country Homes Lift Statio	Discharge Check Valves	n/a	DI	Wet Well								40	1989	10	3	3	4	12	No Action Required
Country Homes Lift Statio	Sump Pump	?		Dry Well								25	1985	-9	3	3	3	9	No Action Required
Country Homes Lift Statio	Sump Pump Piping	n/a		Various								40	1985	6	2	2	2	4	No Action Required
Country Homes Lift Statio	Wet Well	n/a		Wet Well								60	1985	26	2	2	4	8	No Action Required
Fulton St Lift Station	Bypass Chamber #1	n/a	Concrete	Bypass Chamber	4' dia.							70	1974	25	3	3	1	3	No Action Required
Fulton St Lift Station	Bypass Chamber #1 Hatch	n/a	AL	Bypass Chamber								40	1974	-5	3	3	1	3	No Action Required
Fulton St Lift Station	Bypass connection #1 piping	n/a		Bypass Chamber								40	1974	-5	3	3	1	3	No Action Required
Fulton St Lift Station	Bypass connection #1 valve	n/a		Bypass Chamber								40	1974	-5	3	2	1	3	No Action Required
Fulton St Lift Station	Bypass Chamber #2	n/a	Concrete	Bypass Chamber	4' dia.							40	1974	-5	2	2	3	6	No Action Required
Fulton St Lift Station	Bypass Chamber #2 Hatch	n/a	AL	Bypass Chamber								40	1974	-5	2	2	3	6	No Action Required
Fulton St Lift Station	Bypass connection #2 piping	n/a		Bypass Chamber								40	1974	-5	2	2	3	6	No Action Required
Fulton St Lift Station	Bypass connection #2 valve	n/a		Bypass Chamber								40	1974	-5	2	2	3	6	No Action Required
Fulton St Lift Station	Wet Well	n/a	Concrete	Wet Well								75	1974	30	2	2	4	8	No Action Required
Fulton St Lift Station	Wet Well influent manhole	n/a	Concrete	Wet Well								75	1974	30	2	2	5	10	No Action Required
Fulton St Lift Station	Wet Well influent stop gate	n/a	steel	Wet Well								25	1974	-20	5	5	2	10	No Action Required
Fulton St Lift Station	Control Panel	n/a		Control Building 1st lvl								25	1974	-20	3	3	4	12	No Action Required
Fulton St Lift Station	Main Power Disconnect	n/a		Control Building 1st lvl								25	1974	-20	4	4	4	16	Improvement
Fulton St Lift Station	MCC 1 Disconnect	n/a		Control Building 1st lvl								25	1974	-20	4	4	4	16	Improvement
Fulton St Lift Station	MCC 2 Disconnect	n/a		Control Building 1st lvl								25	1974	-20	4	4	4	16	Improvement
Fulton St Lift Station	MCC 3 Disconnect	n/a		Control Building 1st lvl								25	1974	-20	4	4	4	16	Improvement
Fulton St Lift Station	Transducer and float level switches	n/a		Wet Well								25	1974	-20	3	3	4	12	No Action Required
Fulton St Lift Station	Discharge Piping	n/a		Basement Dry Well	8"							40	2013	34	2	2	4	8	No Action Required
Fulton St Lift Station	Discharge Manifold	n/a		Basement Dry Well	8", 18", 20"							40	2013	34	2	2	4	8	No Action Required
Fulton St Lift Station	Discharge Air Cushioned Check Valves	n/a		Basement Dry Well	8"		APCO					40	2013	34	2	2	4	8	No Action Required
Fulton St Lift Station	Discharge Plug Valves	n/a		Basement Dry Well	8"							40	1974	-5	2	2	4	8	No Action Required
Fulton St Lift Station	Suction Gate Valves	n/a		Basement Dry Well	10"							40	1974	-5	2	2	3	6	No Action Required
Fulton St Lift Station	Suction Piping	n/a		Basement Dry Well	10"							40	1974	-5	2	2	3	6	No Action Required

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date ___**December 31, 2019**_______________
(no later than 3 years from executed grant date)

The _______City of Chelsea_______________________________________ *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. _1305-01_________ have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

John P. Hanifan, City Mgr	at	734.475.1771	jhanifan@city-chelsea.org
Name		Phone Number	Email

	12/17/19
Signature of Authorized Representative (Original Signature Required)	Date

_____Melissa Johnson, Mayor ____
Print Name and Title of Authorized Representative

City of Chelsea
SAW Grant
CCTV Analysis
Printed 12/13/2019

Truck No	Setup	Up MH	Down MH	Surveyed Length (ft)	Structural Peak	Operation & Maintenance Peak2	Comment	Comment 2	Criticality / Location Factor (1-5, 5 is most important)	Condition Factor (1-5, 5 is worst)	Priority Ranking (criticality x Condition - 25 is highest priority)	Criticality Comments
xx	75/76	S153	S152	399.9	2	8	Multiple	Infil gusher, 9 infil weepers, 3 cracks, 3 water level sags up to 50%, & multiple DAE	5	5	25	Mckinley at Dewey
140	63	S283	S282	184.9	5	7	Multiple	8 Infil weepers, 2 infil gushers, broken w/ soil visible, 2 cracks, & several water level sag up to 40%	5	5	25	Lincoln at Congdon (all of Lincoln is bad)
140	24	S266	S267A	315.1	9	3	Multiple	17 Cracks, 20 fractures, 7 water level sags < 40%, broken w/ soil visible, & protruding tap (able to get by)	5	5	25	Wilkinson N of Wellington
140	25	S267A	S267	177.4	8	4	Multiple	8 Cracks, 37 fractures, & 3 water level sags up to 40%, & offset joint	5	5	25	Wilkinson N of Wellington
140	46	S287	S286	310.3	8	4	Multiple	Broken w/ soil visible, 44 fractures, infil weeper, & water level sag throughout	4	5	20	Pierce at Main
xx	77	S152	S11	409.8	3	4	Multiple	Water level sag throughout up to 45%, infil weeper, & crack	5	4	20	McKinley north of Dewey
140	60/62	S274A	S283	227.7	6	5	Multiple	2 Broken w/ soil visible, 2 infil weepers, 4 fractures, 49 cracks, & water level sag	4	5	20	Lincoln at Main
140	26	S267	S84	346.3	8	5	Multiple	41 Fractures, 6 water level sags up to 45%, & crack	5	4	20	Wilkinson just south of Chandler
140	112/113	S160	S903	135.4	5	4	Multiple	Broken w/ soil visible, 8 fractures, crack, & 2 infil weepers	4	4	16	Jackson at East
140	88	S167	S169	465.5	4	5	Multiple	6 Cracks, 11 fractures, and 2 water sag up to 50%	4	4	16	Harrison at East
140	157	S34	S35A	282.3	3	6	Multiple	Crack, infil runner, infil gusher, & 4 deposits attached encrustations	4	4	16	Sycamore
120	37	S281	S280	222.9	5	4	Multiple	4 Cracks, broken w/ soil visible, & 4 water level sag up to 60%	4	4	16	Lincoln at Garfield
XXXX	264/263	S59	S58	160.6	2	9	Multiple	Infil gusher, 3 infil weepers, water level sag up to 20%, & DAE	5	3	15	Lett's Creek Interceptor - North of Buchanon
XXXX	257	S68	S65	259.5	2	7	Multiple	Infil gusher, 4 infil weepers, & water sag	5	3	15	Lett's Creek Interceptor - at Hayes and North
XXXX	265	S57	S56	301.3	0	9	Infil	6 Infil weepers	5	3	15	Lett's Creek Interceptor - North of Buchanon
XXXX	261	S61	S60	277.9	0	9	Infil	4 Infil weepers	5	3	15	Lett's Creek Interceptor - West of Buchanon
XXXX	24	S70	S69	270.8	0	8	Infil	7 Infil weepers	5	3	15	Lett's Creek Interceptor - at Hayes and North
XXXX	21	S74	S73	189.6	3	6	Multiple	3 Infil weepers & 3 water level sag up to 40%	5	3	15	Lett's Creek Interceptor - at Cleveland
XXXX	17	S246	S83	341.6	0	2	Infil	Infil weeper/gusher in MH S246	5	3	15	Lett's Creek Interceptor - West of Wilkinson, just south of Chandler
XXXX	269	S54	S48	134.5	2	5	Multiple	Water level sag up to 30%, infil weeper, & 3 deposits attached encrustations	5	3	15	Lett's Creek Interceptor @ Vet's Park PS
XXXX	268	S55	S54	198.4	2	4	Multiple	Water level sag up to 30%, 2 infil weepers, & DAE	5	3	15	Lett's Creek Intercepotr - Vet's Park
XXXX	260	S62	S61	323.9	0	10	Infil	2 Infil weepers	5	3	15	Lett's Creek Interceptor - at Buchanon
XXXX	256/255	S69	S68	122.4	0	7	Infil	3 Infil weepers	5	3	15	Lett's Creek Interceptor - at Hayes and North
XXXX	23	S72	S71	207.7	0	7	Infil	3 Infil weepers	5	3	15	Lett's Creek Interceptor
XXXX	22	S73	S72	275.2	0	6	Infil	3 Infil weepers	5	3	15	Lett's Creek Interceptor
140	45	S286A	S286	464.3	5	2	Multiple	Broken w/ soil visible, 68 fractures, & crack	3	5	15	Pierce at Taylor
xx	69/70	S51A	S151	405.2	3	6	Multiple	9 Infil weepers, water level sag up to 40%, crack, & multiple DAE	3	5	15	Dewey at Main
xx	71	S151	S153	437.3	3	10	Multiple	12 Infil weepers, 5 water level sags up to 40%, crack, & many DAE	3	5	15	Dewey
120	32	S129	S283	292.1	9	4	Multiple	35 Fractures, broken w/ soil visible, many DAE & roots in joints	3	5	15	Summit at Garfield
120	16	S114	S91	432	5	5	Multiple	5 Broken w/ soil vis, 2 infil weepers, infil dripper, 42 cracks, fracture, 10 water lvl sag (75%), & offset joint	3	5	15	West Middel just east of Grant

Process Results®
THE ART OF ENGINEERING

City of Chelsea
305 S. Main Street,
Suite 101
Chelsea, MI 48118

December 31, 2019

John Hanifan, 734.475.1771 x 201 jhanifan@city-chelsea.org
SAW Grant Project Number: 1305-01

Executive Summary

The Asset Management Plan (AMP) focused on the City of Chelsea (City) sanitary collection, storm water system and wastewater treatment plant.

The proposed AMP will allow the City to:

- Move from reactive to predictive maintenance and minimize the risk of critical components failing
- Capture institutional knowledge
- Help maintain compliance with NPDES requirements
- Identify and correct system deficiencies.

In general, the AMP is an extension of the general operating practices of the City. Problems are addressed or planned for as they are identified by citizens, operators or staff. The collection system and wastewater treatment plant are actively managed and generally in good condition.

Cost summary

Total Project	$650,300
Grant Amount	$585,270
Local Match	$65,030

The key components of the asset management plan include:

- Inventory and condition assessment listing of WWTP and pump station equipment
- Inventory and condition assessment of approximately 128,800 feet of sanitary sewer
- GIS Application of Collection system on tablet computers giving users access to CCTV records and scanned drawings
- User charge review (August 2019)
- Capital Improvement Program.

Asset Inventory:

Asset inventory included in the following:

- Survey locations of existing sanitary sewer collection components (manholes, pump station)
- Survey location of existing storm water conveyance components (manholes, catch basins, outlets)
- Review of existing as built drawings
- Closed circuit televising (CCTV) of sanitary sewers to find and verify location of manholes
- Discussion with City staff regarding storm water conveyance system
- Component listing of major process components at the City of Wastewater Treatment Plant.
- Development of GIS mapping for wastewater collection and storm water conveyance systems.

The assets are tracked utilizing a modified version of the EGLE Asset Management Plan Workbook for Wastewater Systems, inventory maps, and a GIS system. Known relevant parameters are tracked for the assets. Parameters may include asset name, material, location, year installed, remaining useful life, manufacturer, model and capacity, size, invert elevation, replacement cost, and condition assessment.

Condition Assessment

- CCTV of portions of the sanitary collection system installed prior to 1993 to review condition of piping and discussion with Public Works staff.
- CCTV assessed the condition and scored each asset using the Pipeline Assessment and Certification Program (PACP) industry coding standard.
- Review of components of the WWTP and discussion with operators.

The assets were rated on a scale of 1 to 5 both for Condition and probability of Failure as listed below

Rating	Condition Assessment	Probability of Failure
1	New or Excellent Condition - Only normal maintenance required	Improbable - So unlikely, it can be assumed occurrence may not be experienced
2	Minor Deterioration - Minor maintenance required (5%)	Remote - Unlikely but possible to occur in the life of an item
3	Moderate deterioration - Significant maintenance required (10 - 20%)	Occasional - Likely to occur sometime in the life of an item
4	Significant deterioration - significant renewal/upgrade required (20 -40%)	Probable - Will occur several times in the life of an item
5	Asset Unserviceable - Over 50% of asset requires replacement	Imminent - Likely to occur in the life of the item

In general, the wastewater treatment plant and pump stations are in good condition with excellent maintenance practices, and proactive equipment replacement.

Of the CCTV surveyed sewer collection system:

Good Condition	61.5% (represented by peak PACP score of 0, 1, or 2)
Fair Condition	25.7% (represented by peak PACP score of 3 or 4)
Bad Condition	12.8% (represented by a peak PACP score of 5 or more)

Level of Service

The City of Chelsea is committed to improving and maintaining the public health protection and performance of our wastewater plant, sanitary collection system and stormwater conveyance system while minimizing the long-term cost of operating those assets. We strive to make the most cost-effective renewal and replacement investments and provide the highest quality customer service possible.

The components of the AMP were programmed and developed in conjunction with City Staff, including the Manager, Utility director and department foremen. The AMP is intended to be a simple living document allowing the City to make informed decisions about improvements, and allow operators to quickly find information during emergencies. The City Council reviews and approves budgets as part of the normal process of the City Government

Criticality of Assets

The criticality of the assets were rated on a scale of 1 to 5 as listed below:

Rating	Criticality of Asset
1	Insignificant Disruption
2	Minor Disruption
3	Moderate Disruption
4	Major Disruption
5	Catastrophic Disruption

The ratings for the wastewater treatment plant and pump stations considered the following:

- Consequence of failure (if equipment fails, what percent of the treatment capacity is diminished or impacted? What impact on customers or environment?)
- Redundancy of the equipment (is there an installed and operational backup system or equipment?)
- Availability of replacement (how long to procure a replacement? At what cost?)

The ratings for the sanitary collection system considered the following:

- Consequence of failure
- Impact to commercial or industrial customers
- Number of residents impacted by a sewer failure
- The location of the sewer (on M-52, or local street)

The criticality factor was multiplied by the probability of failure (or PACP condition for the collection system) and assigned a Business Risk score between 1 and 25. Any Business Risk score greater than 16 was included in the Capital Improvement Program.

The most critical assets include:

- Wastewater Treatment Plant
- Vet's Park Lift Station and force main
- Freer Road Lift Station and force main
- West side interceptor

Revenue Structure

The City has used the various consultants to review and set rates over the last decade. The current rate structure was reviewed and found adequate to cover system operation, maintenance, replacement, capital improvement, and debt costs.

Capital Improvement Plan

The AMP did not identify any major long term capital improvement projects at the Wastewater Treatment Plant.

The attached projects were identified in the sanitary collection system.

List of Major Assets

- Wastewater Treatment Plant
- 5 pump stations
- 665 manholes
- 156,485 feet of 8 to 30" sewer pipe
- 2,100 feet of 8" and 12" force main
- 400 storm manholes
- 944 storm catch basins

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date ____December 31, 2019______________
(no later than 3 years from executed grant date)

The __City of Chelsea, ____ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. __1305-01_______ have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes~~ or **No**
   If No - Date of the rate methodology approval letter: ______November 5, 2019_____________.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

John P. Hanifan, City Mgr at 734.475.1771 jhanifan@city-chelsea.org
Name Phone Number Email

12/17/19
Signature of Authorized Representative (Original Signature Required) Date

______Melissa Johnson, Mayor ____
Print Name and Title of Authorized Representative

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

EGLE

LIESL EICHLER CLARK
DIRECTOR

November 5, 2019

The Honorable Melissa Johnson
City of Chelsea
305 South Main Street - Suite 100
Chelsea, Michigan 48118-1556

Dear Mayor Johnson:

SUBJECT: Stormwater, Asset Management, and Wastewater (SAW) Grant Program
City of Chelsea
Wastewater and Stormwater Asset Management Plans
SAW Grant Project Number 1305-01

We have reviewed the information contained in the rate methodology dated September 18, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404, or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Mr. Eric Pocan, EGLE

CONSTITUTION HALL • 525 WEST ALLEGAN STREET • P.O. BOX 30473 • LANSING, MICHIGAN 48909-7973
Michigan.gov/EGLE • 800-662-9278

EGLE
MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Department of Environmental, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date 10/18/2019
(no later than 3 years from executed grant date)

The Portage Lake Water & Sewer Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1307-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/14/19.
2) Significant Progress Made: Yes or No N/A
   (The EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: N/A.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on N/A.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the EGLE or the public upon request by contacting:

Portage Lake Water & Sewage Authority at (906) 487-9820 plwsasup@up.net
Name Phone Number Email

11/12/19
Signature of Authorized Representative (Original Signature Required) Date

Neil Hutzler, Chairman
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)

Asset Management Plan Executive Summary

SAW Grant No. 1307-01

Portage Lake Water & Sewage Authority
100 Princess Point Drive
Houghton, MI 49931
Neil Hutzler, Chairman
(906)487-9820

Executive Summary

Portage Lake Water and Sewage Authority (PLWSA) was awarded the SAW Grant in 2016. The PLWSA sewer systems consist of a gravity interceptor main, force main, two lift stations, a wastewater treatment plant, and maintenance equipment. Maintenance of the system is performed by PLWSA personnel. The PLWSA service area includes the communities of Houghton, Hancock and a portion of Franklin Township. The communities are separated by a 970' wide canal known as the Keweenaw Waterway

The existing sewer collection system consists of approximately 13,000 lineal feet (LF) of intereceptor piping which is reinforced concrete pipe (RCP) and 5500 LF of ductile iron (DI) force main. There are approximately 70 manholes in the system, including clean out manholes, and air release valve manholes. The collection system collects flow from the Cities of Houghton, Hancock and a portion of Franklin Township.

The Houghton and Hancock LS were originally constructed in 1965, and renovated in 1992-93. The original system pumped wastewater from Houghton to Hancock, into the Hancock waste water Treatment Plant. In 1991 the PLWSA wastewater Treatment Plant was relocated which resulted in the system operating from Hancock to Houghton, reversing the direction of flow in the force main.

In 2004, additional air release valves were installed on the Hancock force main to remedy an issue with pumping at the Lift Stations.

In 2008, a project was completed to reroute the flow through a new force main pipe underneath the Keweenaw Waterway. The new force main goes from the Hancock lift station to the East, parallel to the canal along the old rail road grade, then crossing into Houghton along the bottom of the Keweenaw Waterway and discharges into a manhole located within PLWSA's gravity collection/ interceptor system. The original force main connecting the two lift station was closed with valves, and reserved for emergency situations. Upgrades to both lift stations controls were made, including a new emergency generator for the Hancock lift station. A new emergency generator at the Houghton lift station was installed in 2015.

The PLWSA Wastewater Treatment Plant was designed by UPEA and TKDA. It was constructed between 1991 and 1992. It can handle a maximum flow of approximately 20 MGD (million gallons per day); the average daily flow the system currently experiences is approximately 3.1 MGD. The plant currently has enough capacity to keep up with peak flow periods. However, a plant expansion may be required in the future to keep up with the community's growth.

This SAW Grant included compiling an inventory of all sewer system, and wastewater treatment assets. This is then used to develop an Asset Management Plan (AMP), and develop a master map of the entire system through Geographical Information System (GIS) for PLWSA. The AMP provides: a proposed 20-year capital improvement projects in five (5) year increments, a maintenance recording platform, system replacement budgeting, and financial budget planning.

Sewer mains and manholes older than 20 years in age were televised. All found manholes were surveyed and this survey data was used to create the master mapping. All of this information was gathered and put into ESRI mapping/GIS system.

The final project total was $180,410.07 of the $185,930 SAW Grant (100% grant, no local match).

Wastewater and/or Stormwater Asset Inventory

The system components included in the asset management include the 13,000 LF of gravity sanitary sewer, 5,500 LF of sewer force main, 70 manholes, the Houghton & Hancock lift stations, and the Wastewater Treatment Facility. It also includes the sewer maintenance equipment operated by the PLWSA personnel. All system components were identified and located in the field using various surveying methods. That information was imported into AutoCAD and exported into the GIS mapping system for use by the PLWSA. Pipe televising and manhole inspection information was also linked to the various components in GIS to provide a robust, interactive system inventory for PLWSA.

The GIS mapping system is then linked to the Asset Management database, a program developed by UPEA to meet the specific needs of the PLWSA. PLWSA personnel can easily update and modify the program when improvements or repairs are made to the system. The database includes preliminary budget information, replacement plans, capital improvement plans, detailed information on existing assets in the treatment/collection system and maintenance plans.

Condition Assessment

The condition assessment for the collection assets was completed by applying the condition rating provided by Tunnel Vision Pipeline Services using the PACP/ MACP standard pipeline reviewing protocol for coding defects and construction features. This information was sufficient to assess the condition of the collection/interceptor system components. An analysis was performed by UPEA on the location and criticality of the components in order to assign a failure criticality rating for each component of the collection/interceptor system. Overall the system is in good condition, with the following percentages of components condition: good (65%), fair (30%) and poor (5%).

The condition assessment for the treatment facility assets was completed by exchanging information with PLWSA operators on the current condition of components, and also applying proper service life spans for all components. The service life was then adjusted for frequency of required and routine maintenance, along with the service demand placed upon each treatment component. This method was used to properly identify the current condition of each asset located within the treatment processes.

Level of Service Determination

The PLWSA desires to meet all EGLE requirements in regards to level of service expected from a Municipal Sewer Collection and Treatment System. The goal is to provide a system that effectively transmits all of the sewage within the system by maintaining/upgrading assets that become deficient. This prevents direct discharges of untreated sewage into the environment. By completing past improvements to their system, and planning future sewer improvement projects, they have taken the appropriate steps toward ensuring this goal is maintained to sustain a high level of service.

Criticality of Assets

The criticality level of the assets was determined by reviewing the entire collection system and determining the severity of defects to each pipe segment. The televising by the PACP/ MACP standard provided an initial rating for the structural condition and maintenance condition. This rating was further refined based on reviewing the televising video and adjusting for severity of defect, taking into account the sewer operators first-hand accounts of known issues.

This review/rating process required a strong understanding of the existing sewer system, which UPEA had as they designed the PLWSA system but was improved during the review of the system information throughout the course of the SAW grant project.

Assets were ranked based on their importance to the operation of the system. The greater the consequence of having a particular asset out of service, the higher ranking it received. The PLWSA systems most critical pieces of infrastructure are the lift stations and treatment facility. Without the lift stations operating as intended, an overall back-up of the system would occur causing major, negative consequences. Also, without the treatment facility operating normally, sewage would not be properly treated. If failure were to occur to the treatment system, unintended discharge or overflow could occur and cause adverse environmental issues.

Revenue Structure

Rates, charges, expenditures, capital improvements, replacement costs, maintenance cost and debt payments are all taken into consideration in the asset management database that was developed by UPEA. This information was then shared with Umbaugh and Associates, a financial consultant who reviewed and prepared the GAP analysis and the financial forecasting analysis. The financial forecasting analysis is an attachment to this report.

Capital Improvement Plan

The PLWSA intends to undertake a series of improvement projects over the next 20 years to address deficiencies found through the AMP development in the sewer system. These projects may be funded by USDA RD loan/grant funding and/or MDEGLE SRF funding with local funding when required.

The following is a summary of the proposed capital improvement projects over a 20 year period in five year increments. The detailed projects over this time frame are attached to this report.

Phase 1:

Proposed Construction - 2019-2023
Miscellaneous upgrades primarily related to treatment processes and pumping operations.

Construction:	$	655,000
Contingency:	$	80,000
Engineering/ Administration:	$	85,000
Bonding/ Legal:	$	15,000
Total:	$	835,000

Phase 2:

Proposed Construction - 2024-2028:
Miscellaneous upgrades primarily related to treatment processes and pumping operations.

Construction:	$	2,925,000
Contingency:	$	350,000
Engineering/ Administration:	$	380,000
Bonding/ Legal:	$	50,000
Total:	$	3,705,000

Phase 3:

Proposed Construction - 2029-2033:
Miscellaneous upgrades primarily related to treatment processes and pumping operations.

Construction:	$	2,955,000
Contingency:	$	355,000
Engineering/ Administration:	$	385,000
Bonding/ Legal:	$	50,000
Total:	$	3,745,000

Phase 4:

Proposed Construction - 2034-2038:
Miscellaneous upgrades primarily related to treatment processes and pumping operations.

Construction:	$	1,040,000
Contingency:	$	125,000
Engineering/ Administration:	$	135,000
Bonding/ Legal:	$	20,000
Total:	$	1,320,000

Recommendations:

UPEA recommends the continued use of the GIS mapping and Asset Management Database. These items will be useful tools for everyone involved with the sewer system. The system should be updated frequently as aspects/conditions of the sewer system changes. Fully utilizing the program will produce a well-organized, detailed, up-to-date account on the current state of the sewer system and help project budgeting for future projects.

List of Major Assets

Below is a general list of the major assets identified in the AMP.

- 13,000 *feet of 12 - 48 inch concrete interceptor pipe*
- 5,500 *feet of 16 - 24 inch force main*
- *70 manholes*
- Two (2) Lift stations (Houghton & Hancock)
- Wastewater Treatment Facility

Attachments:

-Financial Report prepared by Bakertilly

-Detailed Capital Improvement Plan (CIP) prepared by UPEA

Financial Report

bakertilly

now joined with Umbaugh

Baker Tilly Municipal Advisors, LLC
2852 Eyde Pkwy, Suite 150
East Lansing, MI 48823
(517) 321-0110
bakertilly.com

Portage Lake Water & Sewer Authority
SAW Grant
Asset Management Financial Plan
October 2019

A primary goal of Asset Management is to develop a long term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to summarize the policy formulation in the areas of revenue management, capital spending, and fund balance.

Methodology

A significant effort has been made by the Authority and their consulting engineers to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account.

The AMFP is a four step process: 1) historical comparison with audits and budgets, 2) test year, or normalized budget year, along with inflation assumptions for purposes of forecasting, 3) proof of revenue for reliance on data, and 4) cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance). The analysis is a "cash basis" approach as described in the AWWA Manual of Rate Making Practices.

From year to year, this AMFP may be used to implement policy regarding revenue management and budgeting.

Audit Comparison

One key indicator of financial health is the cash and cash equivalents balance found in the Comparative Statement of Net Position of the Sewer Fund. The Authority has maintained this cash and investment balance to allow for an operating expenses and capital expenditure buffer. In addition, the member communities have cash balance objectives.

The Sewer Fund audited Revenues, Expenses and Changes in Net Position comparison reveals fairly consistent revenue support.

Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year. This has been utilized to develop the Test Year budget including expected percent inflation factors.

Revenue Allocation

The Authority bills the member communities on a dollar for dollar basis and thus does not have user rates. The expenses are determined and then divided between the communities based on flow. For forecasting, an average of past years was considered, but is more reflective of recent nominal trending.

Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. These are expenses not already included in the operating and maintenance budget. We have provided two analysis ...

Bond Financing – This version includes modeling of three bond issues over the next 20 years as well as some cash funding. The result is a reduced level of total expense due to spreading capital cost over a longer period through bond issuance. In other words, revenue support from the communities would actually to down in the coming years. This does add interest cost compared to fully cash funding.

Cash Funding – This version demonstrates fully cash funding capital cost, i.e. no bond issuance. The result is a total expense that moves up and down but is fairly consistent, over time, with the current level of revenue. In other words, revenue support from the communities would stay relatively the same in the coming years.

The Bond Financing and Cash Funding are two ends of the spectrum and there could be an averaging between the scenarios.

Forecast - Cash Balances

Since the Authority bills its incurred expenses directly to the communities, a large reserve cash balance is not needed for every day expenses. However, given the capital cost and maintenance needs, it may be prudent for the Authority to maintain the approximately 12 months cash on hand compared to operating expense. This could, as an option, be accomplished with a separate capital reserve fund ... for example, six months in operating and six months in a capital fund. Whether a separate fund or not, it should be kept in mind that capital projects may require a fair amount of cash investment for planning and design prior to financing.

AMFP – Management Tool

The AMFP is a living document. It is most effective as a tool used annually for budget and user rate decisions.

bakertilly

now joined with Umbaugh

Baker Tilly Municipal Advisors, LLC
2852 Eyde Pkwy, Suite 150
East Lansing, MI 48823
(517) 321-0110
bakertilly.com

October 7, 2019

Portage Lake Water & Sewer Authority
100 Princess Point Drive
Houghton, MI 49931

Re: Portage Lake Water & Sewer Authority (Michigan) Sewer Fund – SAW Grant – Asset Management Financial Plan

Dear Portage Lake Water & Sewer Authority:

The attached schedules (listed below) present unaudited and limited information for the purpose of discussion and consideration in the preliminary planning stage of a SAW financial plan by the appropriate officers, officials and advisors of the Portage Lake Water & Sewer Authority. The use of these schedules should be restricted to this purpose, for internal use only, as the information is subject to future revision and final report.

We would appreciate your questions or comments on this information and would provide additional information upon request.

Sincerely,

BAKER TILLY MUNICIPAL ADVISORS, LLC

Tom Traciak

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

COMPARATIVE STATEMENT OF NET POSITION

	As of			
	6/30/2015	6/30/2016	6/30/2017	6/30/2018
		(------------------Per Audit	------------------)	
Assets				
Current assets:				
Cash and cash equivalents	$460,452	$443,485	$1,755,443	$1,847,713
Accounts receivable	22,430	23,284	47,086	42,315
Prepaid expenses	3,141	8,980	10,796	-
Due from other units of government	7,758	2,554	5,258	3,968
Restricted cash	1,171,576	1,102,038	-	-
Capital assets - net	12,583,138	11,997,026	11,377,175	10,739,286
Total Assets	$14,248,495	$13,577,367	$13,195,758	$12,633,282
Liabilities				
Current liabilities:				
Accounts payable	$77,714	$40,067	$82,721	$39,140
Due to other units of government	100,369	112,300	146,914	112,487
Accrued interest	65,396	38,838	33,838	27,732
Accrued expenses	26,646	21,256	18,707	14,475
Pension withdrawal liability assessment	-	-	108,180	101,870
Amortization of bond premium	-	-	119,731	89,798
Bonds payable, due in one year	820,000	800,000	830,000	850,000
Bonds payable, due in more than one year	5,088,758	4,443,399	3,453,758	2,603,758
Compensated absences	54,344	95,973	111,909	121,265
Total Liabilities	6,233,227	5,551,833	4,905,758	3,960,525
Net Position				
Net investment in capital assets	6,674,380	6,753,627	7,093,417	7,285,528
Unrestricted	1,340,887	1,271,907	1,196,583	1,387,229
Total Net Position	8,015,267	8,025,534	8,290,000	8,672,757
Total Liabilities and Net Position	$14,248,495	$13,577,367	$13,195,758	$12,633,282

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

COMPARATIVE STATEMENT OF REVENUES, EXPENSES AND CHANGES IN NET POSITION

	Fiscal Year Ended			
	6/30/2015	6/30/2016	6/30/2017	6/30/2018
	(------------------Per Audit------------------)			
Operating Revenues				
Charges for services	$2,176,477	$2,063,516	$2,066,957	$2,101,983
Other income	1,897	6,271	161,188	14,704
Total operating revenues	2,178,374	2,069,787	2,228,145	2,116,687
Operating Expenses				
Personnel services	547,147	583,338	679,775	577,941
Utilities	184,164	181,387	173,680	157,672
Professional services	-	-	42,289	9,731
Repairs and maintenance	127,362	107,789	156,895	85,833
Insurance	-	-	25,451	33,285
Other supplies and expenses	171,375	136,519	96,170	105,754
Subtotal	1,030,048	1,009,033	1,174,260	970,216
Depreciation expense	670,129	678,146	689,094	687,657
Total operating expenses	1,700,177	1,687,179	1,863,354	1,657,873
Net operating income (loss)	478,197	382,608	364,791	458,814
Non-Operating Revenues (Expenses)				
Interest income	7,834	7,639	5,441	16,593
Bond discount amortization	-	-	39,910	29,933
Refunding bond expenses	-	(116,825)	-	-
Loss on sale of fixed asset	-	(114,428)	-	-
Interest expense	(242,021)	(148,727)	(145,676)	(122,583)
Total non-operating revenues (expenses)	(234,187)	(372,341)	(100,325)	(76,057)
Change in net position	244,010	10,267	264,466	382,757
Net position, beginning of year	7,771,257	8,015,267	8,025,534	8,290,000
Net position, end of year	$8,015,267	$8,025,534	$8,290,000	$8,672,757

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

COMPARATIVE DETAIL OF OPERATING EXPENSES

		Fiscal Year Ended					
		6/30/2016	6/30/2017	6/30/2018	6/30/2019	Test Year	Multiplier
		(--------------Per Client			--------------)		
Operating Expenses							
Operating expenses							
702	Wages	$270,640	$291,553	$297,350	$305,000	$305,000	2.5%
704	Payroll taxes	35,394	33,530	35,225	37,000	37,000	2.5%
706	Employee welfare	125,256	134,988	147,076	146,000	153,000	4.0%
710	Administrative expenses	110,419	95,588	93,195	96,000	96,000	2.5%
712	Office expense	4,742	3,980	5,621	5,000	5,000	0.5%
714	Power	168,296	159,856	137,901	145,000	170,000	1.5%
715	Fuel for heat	7,089	8,707	9,331	10,000	10,000	1.0%
716	Water	2,924	2,038	5,128	4,000	4,700	0.5%
719	Phosphate chemicals	38,580	37,715	39,242	41,000	41,000	1.0%
720	Snow removal and bed prep	807	104	2,127	3,000	3,000	0.5%
722	Maintenance parts and supplies	47,684	52,424	50,470	45,000	45,000	1.5%
723	Repair and replacements	54,920	103,424	82,780	73,000	73,000	1.5%
724	Vehicle expense	5,185	1,047	2,351	7,000	7,000	0.5%
726	Lab and other supplies	14,025	16,433	15,417	16,500	16,500	2.0%
728	Insurance	29,803	25,451	33,285	28,500	28,500	2.0%
730	Telephone	3,078	3,079	5,312	3,200	3,200	1.0%
750	Professional services	23,341	15,126	29,040	25,000	20,000	1.0%
751	Outside lab services	12,106	7,893	4,326	6,000	6,000	2.0%
752	Training and travel	4,130	5,889	1,756	6,000	6,000	1.0%
753	State fees	8,508	8,307	7,513	8,500	8,500	0.5%
754	Interest expense	-	-	-	- [1]	-	0.0%
755	Bond paying fees	300	500	-	-	-	0.0%
756	Bank service charges	175	153	-	-	-	0.0%
757	Deferred revenue used	92,500	69,243	-	-	-	0.0%
759	Generator project	139,731	-	-	-	-	0.0%
770	Service charges and fees	-	-	-	-	-	0.0%
771	Sick and vacation payout	-	-	-	-	-	0.0%
777	Miscellaneous	-	70	-	-	-	0.0%
795	Investment fees	972	936	-	-	-	0.0%
808	SAW grant expense	-	-	-	-	-	0.0%
	Total operating expenses	$1,200,608	$1,078,032	$1,004,445	$1,010,700	$1,038,400	

[1] Interest expense is removed from this section of the report. This item is discussed later in the report.

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SCHEDULE OF AMORTIZATION OF $1,233,758 PRINCIPAL AMOUNT OUTSTANDING OF 2008 SRF LTGO BONDS

Payment Date	Principal Balance	Interest Rate	Debt Service			Fiscal Year Total
			Principal	Interest	Total	
	(In Dollars)	(%)	(-----------------------------In Dollars		------------------------------)	
10/01/17	$1,233,758	2.50	$95,000	$15,421.98	$110,421.98	
04/01/18	1,138,758			14,234.48	14,234.48	$124,656.46
10/01/18	1,138,758	2.50	95,000	14,234.48	109,234.48	
04/01/19	1,043,758			13,046.98	13,046.98	122,281.46
10/01/19	1,043,758	2.50	100,000	13,046.98	113,046.98	
04/01/20	943,758			11,796.98	11,796.98	124,843.96
10/01/20	943,758	2.50	100,000	11,796.98	111,796.98	
04/01/21	843,758			10,546.98	10,546.98	122,343.96
10/01/21	843,758	2.50	105,000	10,546.98	115,546.98	
04/01/22	738,758			9,234.48	9,234.48	124,781.46
10/01/22	738,758	2.50	105,000	9,234.48	114,234.48	
04/01/23	633,758			7,921.98	7,921.98	122,156.46
10/01/23	633,758	2.50	110,000	7,921.98	117,921.98	
04/01/24	523,758			6,546.98	6,546.98	124,468.96
10/01/24	523,758	2.50	110,000	6,546.98	116,546.98	
04/01/25	413,758			5,171.98	5,171.98	121,718.96
10/01/25	413,758	2.50	115,000	5,171.98	120,171.98	
04/01/26	298,758			3,734.48	3,734.48	123,906.46
10/01/26	298,758	2.50	120,000	3,734.48	123,734.48	
04/01/27	178,758			2,234.48	2,234.48	125,968.96
10/01/27	178,758	2.50	120,000	2,234.48	122,234.48	
04/01/28	58,758			734.48	734.48	122,968.96
10/01/28	58,758	2.50	58,758	734.48	59,492.48	59,492.48
	Totals		$1,233,758	$185,830.54	$1,419,588.54	$1,419,588.54

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SCHEDULE OF AMORTIZATION OF $3,050,000 PRINCIPAL AMOUNT OUTSTANDING OF 2015 LTGO REFUNDING BONDS

Payment Date	Principal Balance	Interest Rate	Debt Service			Fiscal Year Total
			Principal	Interest	Total	
	(In Dollars)	(%)	(------------------------------	In Dollars	------------------------------)	
10/01/17	$3,050,000	3.00	$365,000	$51,650.00	$416,650.00	
04/01/18	2,685,000	3.00	370,000	46,175.00	416,175.00	$832,825.00
10/01/18	2,315,000	3.00	375,000	40,625.00	415,625.00	
04/01/19	1,940,000	3.00	380,000	35,000.00	415,000.00	830,625.00
10/01/19	1,560,000	3.00	380,000	29,300.00	409,300.00	
04/01/20	1,180,000	4.00	385,000	23,600.00	408,600.00	817,900.00
10/01/20	795,000	4.00	395,000	15,900.00	410,900.00	
04/01/21	400,000	4.00	400,000	8,000.00	408,000.00	818,900.00
	Totals		$3,050,000	$250,250.00	$3,300,250.00	$3,300,250.00

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SCHEDULE OF COMBINED DEBT SERVICE

Fiscal Year	2008 SRF Bonds	2015 Ref. Bonds	Total
2017/18	$124,656.46	$832,825.00	$957,481.46 *
2018/19	122,281.46	830,625.00	952,906.46
2019/20	124,843.96	817,900.00	942,743.96
2020/21	122,343.96	818,900.00	941,243.96
2021/22	124,781.46		124,781.46
2022/23	122,156.46		122,156.46
2023/24	124,468.96		124,468.96
2024/25	121,718.96		121,718.96
2025/26	123,906.46		123,906.46
2026/27	125,968.96		125,968.96
2027/28	122,968.96		122,968.96
2028/29	59,492.48		59,492.48
Totals	$1,419,588.54	$3,300,250.00	$4,719,838.54

* Maximum annual combined debt service

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

FLOW ANALYSIS

	Fiscal Year Ended June 30, 2014	
	Gallons	Percentage
City of Houghton	570,087,057	67.49%
City of Hancock	267,003,000	31.61%
Township of Franklin	7,580,110	0.90%
Total	844,670,167	100.00%

	Fiscal Year Ended June 30, 2015	
	Gallons	Percentage
City of Houghton	617,720,136	65.41%
City of Hancock	319,408,000	33.82%
Township of Franklin	7,238,108	0.77%
Total	944,366,244	100.00%

	Fiscal Year Ended June 30, 2016	
	Gallons	Percentage
City of Houghton	589,515,435	63.16%
City of Hancock	333,239,000	35.70%
Township of Franklin	10,627,286	1.14%
Total	933,381,721	100.00%

	Fiscal Year Ended June 30, 2017	
	Gallons	Percentage
City of Houghton	590,465,930	64.36%
City of Hancock	315,063,000	34.34%
Township of Franklin	11,944,313	1.30%
Total	917,473,243	100.00%

	Fiscal Year Ended June 30, 2018	
	Gallons	Percentage
City of Houghton	605,743,002	62.31%
City of Hancock	353,569,000	36.37%
Township of Franklin	12,810,131	1.32%
Total	972,122,133	100.00%

	Averages Used for Cash Flow	
	Gallons	Percentage
City of Houghton	N/A	63.61%
City of Hancock	N/A	35.08%
Township of Franklin	N/A	1.31%
Total	N/A	100.00%

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - AUTHORITY SUMMARY

	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Operating Expenses by Local Unit									
Houghton City	$638,928	$675,381	$690,626	$706,271	$722,330	$738,813	$755,735	$773,108	$790,945
Hancock City	352,359	372,463	380,870	389,498	398,354	407,445	416,777	426,358	436,195
Franklin Township	13,158	13,909	14,223	14,545	14,876	15,215	15,564	15,922	16,289
Total Operating Expenses	1,004,445	1,061,753	1,085,718	1,110,315	1,135,560	1,161,474	1,188,076	1,215,387	1,243,429
Current Debt & Cash-Funded Capital Improvements									
Current debt service payments	957,481	952,906	942,744	941,244	124,781	122,156	124,469	121,719	123,906
Total Expenses Before Proposed Debt Service Payments	1,961,927	2,014,659	2,028,462	2,051,558	1,260,341	1,283,630	1,312,545	1,337,106	1,367,336
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	-				414,250	414,250	740,860	740,860	740,860
Total Estimated Capital Costs	-	-	-	-	414,250	414,250	740,860	740,860	740,860
Total PLWSA Expenses	$1,961,927	$2,014,659	$2,028,462	$2,051,558	1,674,591	$1,697,880	$2,053,405	$2,077,966	$2,108,196

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - AUTHORITY SUMMARY

(Continued)

2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$809,261	$828,070	$847,386	$867,226	$887,605	$908,539	$930,045	$952,142	$974,846	$998,178	$1,022,155	$1,046,798
446,296	456,669	467,321	478,263	489,501	501,046	512,907	525,092	537,614	550,481	563,704	577,294
16,666	17,053	17,451	17,860	18,280	18,711	19,154	19,609	20,076	20,557	21,051	21,558
1,272,223	1,301,792	1,332,159	1,363,348	1,395,385	1,428,295	1,462,105	1,496,843	1,532,536	1,569,215	1,606,909	1,645,651
125,969	122,969	59,492	-	-	-	-	-	-	-	-	-
1,398,192	1,424,761	1,391,651	1,363,348	1,395,385	1,428,295	1,462,105	1,496,843	1,532,536	1,569,215	1,606,909	1,645,651
740,860	740,860	747,040	747,040	747,040	747,040	747,040	262,340	262,340	262,340	262,340	262,340
740,860	740,860	747,040	747,040	747,040	747,040	747,040	262,340	262,340	262,340	262,340	262,340
$2,139,052	$2,165,621	$2,138,691	$2,110,388	$2,142,425	$2,175,335	$2,209,145	$1,759,183	$1,794,876	$1,831,555	$1,869,249	$1,907,991

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - HOUGHTON CITY

	% Share	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Expenses Allocated to the City of Houghton									
Operating costs	63.61%	$638,928	$675,381	$690,626	$706,271	$722,330	$738,813	$755,735	$773,108
Current debt service payment	64.57% [1]	618,246	615,292	608,730	607,761	80,571	78,876	80,370	78,594
Total Expenses Before Proposed Debt		1,257,174	1,290,673	1,299,355	1,314,032	802,901	817,690	836,105	851,702
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	64.57% [1]	-	-	-	-	267,481	267,481	478,373	478,373
Total Estimated Capital Costs		-	-	-	-	267,481	267,481	478,373	478,373
Total Expenses Allocated to the City of Houghton		$1,257,174	$1,290,673	$1,299,355	$1,314,032	$1,070,382	$1,085,171	$1,314,478	$1,330,075

[1] Weighted average calculation between direct and usage allocations of principal and interest expense from June 30, 2017 audit.

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

(Continued)

SEWER CASH FLOW ANALYSIS - HOUGHTON CITY

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$790,945	$809,261	$828,070	$847,386	$867,226	$887,605	$908,539	$930,045	$952,142	$974,846	$998,178	$1,022,155	$1,046,798
80,006	81,338	79,401	38,414	-	-	-	-	-	-	-	-	-
870,952	890,599	907,471	885,800	867,226	887,605	908,539	930,045	952,142	974,846	998,178	1,022,155	1,046,798
478,373	478,373	478,373	482,364	482,364	482,364	482,364	482,364	169,393	169,393	169,393	169,393	169,393
478,373	478,373	478,373	482,364	482,364	482,364	482,364	482,364	169,393	169,393	169,393	169,393	169,393
$1,349,325	$1,368,972	$1,385,844	$1,368,164	$1,349,590	$1,369,968	$1,390,902	$1,412,409	$1,121,535	$1,144,239	$1,167,571	$1,191,548	$1,216,191

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - HANCOCK

	% Share	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Expenses Allocated to the City of Hancock									
Operating costs	35.08%	$352,359	$372,463	$380,870	$389,498	$398,354	$407,445	$416,777	$426,358
Current debt service payment	34.16% [1]	327,076	325,513	322,041	321,529	42,625	41,729	42,519	41,579
Total Expenses Before Proposed Debt		679,435	697,976	702,911	711,027	440,980	449,174	459,296	467,937
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	34.16% [1]	-	-	-	-	141,508	141,508	253,078	253,078
Total Estimated Capital Costs		-	-	-	-	141,508	141,508	253,078	253,078
Total Expenses Allocated to the City of Hancock		$679,435	$697,976	$702,911	$711,027	$582,488	$590,681	$712,373	$721,015

[1] Weighted average calculation between direct and usage allocations of principal and interest expense from June 30, 2017 audit.

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

(Continued)

SEWER CASH FLOW ANALYSIS - HANCOCK

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$436,195	$446,296	$456,669	$467,321	$478,263	$489,501	$501,046	$512,907	$525,092	$537,614	$550,481	$563,704	$577,294
42,326	43,031	42,006	20,323	-	-	-	-	-	-	-	-	-
478,521	489,327	498,675	487,644	478,263	489,501	501,046	512,907	525,092	537,614	550,481	563,704	577,294
253,078	253,078	253,078	255,189	255,189	255,189	255,189	255,189	89,615	89,615	89,615	89,615	89,615
253,078	253,078	253,078	255,189	255,189	255,189	255,189	255,189	89,615	89,615	89,615	89,615	89,615
$731,599	$742,405	$751,753	$742,833	$733,451	$744,690	$756,235	$768,095	$614,708	$627,229	$640,096	$653,319	$666,910

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - FRANKLIN

	% Share	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Expenses Allocated to the Township of Franklin									
Operating costs	1.31%	$13,158	$13,909	$14,223	$14,545	$14,876	$15,215	$15,564	$15,922
Current debt service payment	1.27% [1]	12,160	12,102	11,973	11,954	1,585	1,551	1,581	1,546
Total Expenses Before Proposed Debt		25,318	26,011	26,196	26,499	16,461	16,767	17,145	17,467
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	1.27% [1]	-	-	-	-	5,261	5,261	9,409	9,409
Total Estimated Capital Costs		-	-	-	-	5,261	5,261	9,409	9,409
Total Expenses Allocated to the Township of Franklin		$25,318	$26,011	$26,196	$26,499	$21,722	$22,028	$26,553	$26,876

[1] Weighted average calculation between direct and usage allocations of principal and interest expense from June 30, 2017 audit.

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

(Continued)

SEWER CASH FLOW ANALYSIS - FRANKLIN

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$16,289	$16,666	$17,053	$17,451	$17,860	$18,280	$18,711	$19,154	$19,609	$20,076	$20,557	$21,051	$21,558
1,574	1,600	1,562	756	-	-	-	-	-	-	-	-	-
17,863	18,266	18,615	18,207	17,860	18,280	18,711	19,154	19,609	20,076	20,557	21,051	21,558
9,409	9,409	9,409	9,487	9,487	9,487	9,487	9,487	3,332	3,332	3,332	3,332	3,332
9,409	9,409	9,409	9,487	9,487	9,487	9,487	9,487	3,332	3,332	3,332	3,332	3,332
$27,271	$27,675	$28,024	$27,694	$27,347	$27,767	$28,198	$28,641	$22,940	$23,408	$23,888	$24,382	$24,890

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - AUTHORITY SUMMARY

	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Operating Expenses by Local Unit									
Houghton City	$638,928	$675,381	$690,626	$706,271	$722,330	$738,813	$755,735	$773,108	$790,945
Hancock City	352,359	372,463	380,870	389,498	398,354	407,445	416,777	426,358	436,195
Franklin Township	13,158	13,909	14,223	14,545	14,876	15,215	15,564	15,922	16,289
Total Operating Expenses	1,004,445	1,061,753	1,085,718	1,110,315	1,135,560	1,161,474	1,188,076	1,215,387	1,243,429
Current Debt & Cash-Funded Capital Improvements									
Current debt service payments	957,481	952,906	942,744	941,244	124,781	122,156	124,469	121,719	123,906
Total Expenses Before Proposed Debt Service Payments	1,961,927	2,014,659	2,028,462	2,051,558	1,260,341	1,283,630	1,312,545	1,337,106	1,367,336
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	-	-	-	-	414,250	414,250	-	-	-
Estimated 2026/27 Bonds [1]	-	-	-	-	-	-	-	-	-
Estimated 2031/32 Bonds [2]	-	-	-	-	-	-	-	-	-
Estimated 2036/37 Bonds [3]	-	-	-	-	-	-	-	-	-
Total Estimated Capital Costs	-	-	-	-	414,250	414,250	-	-	-
Total PLWSA Expenses	$1,961,927	$2,014,659	$2,028,462	$2,051,558	$1,674,591	$1,697,880	$1,312,545	$1,337,106	$1,367,336

[1] Estimated debt service payments based on a $3,705,000 20-year bond issue at the current SRF rate (2.00%).
[2] Estimated debt service payments based on a $3,740,000 20-year bond issue at the current SRF rate (2.00%).
[3] Estimated debt service payments based on a $1,315,000 20-year bond issue at the current SRF rate (2.00%).

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

(Continued)

SEWER CASH FLOW ANALYSIS - AUTHORITY SUMMARY

2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$809,261	$828,070	$847,386	$867,226	$887,605	$908,539	$930,045	$952,142	$974,846	$998,178	$1,022,155	$1,046,798
446,296	456,669	467,321	478,263	489,501	501,046	512,907	525,092	537,614	550,481	563,704	577,294
16,666	17,053	17,451	17,860	18,280	18,711	19,154	19,609	20,076	20,557	21,051	21,558
1,272,223	1,301,792	1,332,159	1,363,348	1,395,385	1,428,295	1,462,105	1,496,843	1,532,536	1,569,215	1,606,909	1,645,651
125,969	122,969	59,492	-	-	-	-	-	-	-	-	-
1,398,192	1,424,761	1,391,651	1,363,348	1,395,385	1,428,295	1,462,105	1,496,843	1,532,536	1,569,215	1,606,909	1,645,651
-	-	-	-	-	-	-	-	-	-	-	-
222,000	222,000	222,000	222,000	222,000	222,000	222,000	222,000	222,000	222,000	222,000	222,000
-	-	-	-	-	225,000	225,000	225,000	225,000	225,000	225,000	225,000
-	-	-	-	-	-	-	-	-	-	79,000	79,000
222,000	222,000	222,000	222,000	222,000	447,000	447,000	447,000	447,000	447,000	526,000	526,000
$1,620,192	$1,646,761	$1,613,651	$1,585,348	$1,617,385	$1,875,295	$1,909,105	$1,943,843	$1,979,536	$2,016,215	$2,132,909	$2,171,651

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - HOUGHTON CITY

	% Share	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Expenses Allocated to the City of Houghton									
Operating costs	63.61%	$638,928	$675,381	$690,626	$706,271	$722,330	$738,813	$755,735	$773,108
Current debt service payment	64.57% [1]	618,246	615,292	608,730	607,761	80,571	78,876	80,370	78,594
Total Expenses Before Proposed Debt		1,257,174	1,290,673	1,299,355	1,314,032	802,901	817,690	836,105	851,702
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	64.57% [1]	-	-	-	-	267,481	267,481	-	-
Estimated 2026 Bonds	64.57% [1]	-	-	-	-	-	-	-	-
Estimated 2031 Bonds	64.57% [1]	-	-	-	-	-	-	-	-
Estimated 2036 Bonds	64.57% [1]	-	-	-	-	-	-	-	-
Total Estimated Capital Costs		-	-	-	-	267,481	267,481	-	-
Total Expenses Allocated to the City of Houghton		$1,257,174	$1,290,673	$1,299,355	1,314,032	$1,070,382	$1,085,171	$836,105	$851,702

[1] Weighted average calculation between direct and usage allocations of principal and interest expense from June 30, 2017 audit.

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

(Continued)

SEWER CASH FLOW ANALYSIS - HOUGHTON CITY

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$790,945	$809,261	$828,070	$847,386	$867,226	$887,605	$908,539	$930,045	$952,142	$974,846	$998,178	$1,022,155	$1,046,798
80,006	81,338	79,401	38,414	-	-	-	-	-	-	-	-	-
870,952	890,599	907,471	885,800	867,226	887,605	908,539	930,045	952,142	974,846	998,178	1,022,155	1,046,798
-	-	-	-	-	-	-	-	-	-	-	-	-
-	143,345	143,345	143,345	143,345	143,345	143,345	143,345	143,345	143,345	143,345	143,345	143,345
-	-	-	-	-	-	145,283	145,283	145,283	145,283	145,283	145,283	145,283
-	-	-	-	-	-	-	-	-	-	-	51,010	51,010
-	143,345	143,345	143,345	143,345	143,345	288,628	288,628	288,628	288,628	288,628	339,638	339,638
$870,952	$1,033,945	$1,050,816	$1,029,146	$1,010,571	$1,030,950	$1,197,167	$1,218,673	$1,240,770	$1,263,474	$1,286,806	$1,361,793	$1,386,437

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - HANCOCK

	% Share	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Expenses Allocated to the City of Hancock									
Operating costs	35.08%	$352,359	$372,463	$380,870	$389,498	$398,354	$407,445	$416,777	$426,358
Current debt service payment	34.16% [1]	327,076	325,513	322,041	321,529	42,625	41,729	42,519	41,579
Total Expenses Before Proposed Debt		679,435	697,976	702,911	711,027	440,980	449,174	459,296	467,937
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	34.16% [1]	-	-	-	-	141,508	141,508	-	-
Estimated 2026 Bonds	34.16% [1]	-	-	-	-	-	-	-	-
Estimated 2031 Bonds	34.16% [1]	-	-	-	-	-	-	-	-
Estimated 2036 Bonds	34.16% [1]	-	-	-	-	-	-	-	-
Total Estimated Capital Costs		-	-	-	-	141,508	141,508	-	-
Total Expenses Allocated to the City of Hancock		$679,435	$697,976	$702,911	$711,027	$582,488	$590,681	$459,296	$467,937

[1] Weighted average calculation between direct and usage allocations of principal and interest expense from June 30, 2017 audit.

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

(Continued)

SEWER CASH FLOW ANALYSIS - HANCOCK

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$436,195	$446,296	$456,669	$467,321	$478,263	$489,501	$501,046	$512,907	$525,092	$537,614	$550,481	$563,704	$577,294
42,326	43,031	42,006	20,323	-	-	-	-	-	-	-	-	-
478,521	489,327	498,675	487,644	478,263	489,501	501,046	512,907	525,092	537,614	550,481	563,704	577,294
-	-	-	-	-	-	-	-	-	-	-	-	-
-	75,835	75,835	75,835	75,835	75,835	75,835	75,835	75,835	75,835	75,835	75,835	75,835
-	-	-	-	-	-	76,860	76,860	76,860	76,860	76,860	76,860	76,860
-	-	-	-	-	-	-	-	-	-	-	26,986	26,986
-	75,835	75,835	75,835	75,835	75,835	152,695	152,695	152,695	152,695	152,695	179,682	179,682
$478,521	$565,162	$574,510	$563,479	$554,098	$565,336	$653,741	$665,602	$677,788	$690,309	$703,176	$743,385	$756,976

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

SEWER CASH FLOW ANALYSIS - FRANKLIN

	% Share	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Expenses Allocated to the Township of Franklin									
Operating costs	1.31%	$13,158	$13,909	$14,223	$14,545	$14,876	$15,215	$15,564	$15,922
Current debt service payment	1.27% [1]	12,160	12,102	11,973	11,954	1,585	1,551	1,581	1,546
Total Expenses Before Proposed Debt		25,318	26,011	26,196	26,499	16,461	16,767	17,145	17,467
Proposed PLWSA Capital Improvement Plan									
Estimated cash funded capital improvements	1.27% [1]	-	-	-	-	5,261	5,261	-	-
Estimated 2026 Bonds	1.27% [1]	-	-	-	-	-	-	-	-
Estimated 2031 Bonds	1.27% [1]	-	-	-	-	-	-	-	-
Estimated 2036 Bonds	1.27% [1]	-	-	-	-	-	-	-	-
Total Estimated Capital Costs		-	-	-	-	5,261	5,261	-	-
Total Expenses Allocated to the Township of Franklin		$25,318	$26,011	$26,196	$26,499	$21,722	$22,028	$17,145	$17,467

[1] Weighted average calculation between direct and usage allocations of principal and interest expense from June 30, 2017 audit.

PORTAGE LAKE WATER & SEWER AUTHORITY (MICHIGAN)

(Continued)

SEWER CASH FLOW ANALYSIS - FRANKLIN

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
$16,289	$16,666	$17,053	$17,451	$17,860	$18,280	$18,711	$19,154	$19,609	$20,076	$20,557	$21,051	$21,558
1,574	1,600	1,562	756	-	-	-	-	-	-	-	-	-
17,863	18,266	18,615	18,207	17,860	18,280	18,711	19,154	19,609	20,076	20,557	21,051	21,558
-	-	-	-	-	-	-	-	-	-	-	-	-
-	2,819	2,819	2,819	2,819	2,819	2,819	2,819	2,819	2,819	2,819	2,819	2,819
-	-	-	-	-	-	2,858	2,858	2,858	2,858	2,858	2,858	2,858
-	-	-	-	-	-	-	-	-	-	-	1,003	1,003
-	2,819	2,819	2,819	2,819	2,819	5,677	5,677	5,677	5,677	5,677	6,680	6,680
$17,863	$21,085	$21,435	$21,026	$20,679	$21,099	$24,388	$24,830	$25,286	$25,753	$26,234	$27,731	$28,238

Capital Improvement Plan

UPEA
ENGINEERS & ARCHITECTS
100 Portage Street Houghton, MI 49931
906-482-4810 • 800-562-7684 • Fax: 906-482-9799

PORTAGE LAKE WATER AND SEWER AUTHORITY

SAW / ASSET MANAGEMENT PLAN

IIB. CAPITAL IMPROVEMENT PLAN

09/06/2019

Summary:

This Capital Improvement Plan identifies observed sewer system improvement needs and prioritizes these needs based on severity of sewer main deterioration, severity of inflow and infiltration, service life remaining of treatment assets, projected growth and treatment capacity requirements, potential for damage or environmental pollution and threat to public health and safety if asset fails, and other criteria as identified by Portage Lake Water and Sewer Authority personnel.

The Capital Improvement Plan includes identified needs out to 20 years.

Capital Improvements:

The Capital Improvements have been prioritized and programmed to be completed in a series of projects to be funded by USDA Rural Development, MDEQ SRF and/or local funds where applicable. The projects are preliminary sized and scheduled to be in the $835,000 to $4,000,000 dollar range and take place every 5 years, with the first phase planned construction in 2019-2022.

Phase 1:

Proposed Construction 2019-2023: (See Attached Sheets for Phase 1 Capital Improvements Inventory.)

Construction:	$ 655,000
Contingency:	$ 80,000
Engineering/ Administration:	$ 85,000
Bonding/ Legal:	$ 15,000
Total:	$ 835,000

Phase 2:

Proposed Construction 2024-2028: (See Attached Sheets for Phase 2 Capital Improvements Inventory.)

Construction:	$2,925,000
Contingency:	$ 350,000
Engineering/ Administration:	$ 380,000
Bonding/ Legal:	$ 50,000

Total:	$3,705,000

Phase 3:

Proposed Construction 2029-2033: (See Attached Sheets for Phase 3 Capital Improvements Inventory.)

Construction:	$2,955,000
Contingency:	$ 355,000
Engineering/ Administration:	$ 385,000
Bonding/ Legal:	$ 50,000
Total:	$3,745,000

Phase 4:

Proposed Construction 2034-2038: (See Attached Sheets for Phase 4 Capital Improvements Inventory.)

Construction:	$1,040,000
Contingency:	$ 125,000
Engineering/ Administration:	$ 135,000
Bonding/ Legal:	$ 20,000
Total:	$1,320,000

Anticipated Capital Project Schedule

Start Year: 2019 End Year: 2023

Asset	Location	Year to Replace	Criticality	Repl. Cost
Screw Lift Pump P-102	Raw Sewage L.S.	2019	12	$245,000
Screw Lift Pump P-101	Raw Sewage L.S.	2019	8	$245,000
Screen	Hancock Liftstation Primary Channel	2019	12	
Grinder-1	Hancock Liftstation Primary Channel	2019	12	$65,000
Grit Seperator-Cyclone	Pretreatment Building	2022	8	$50,000
Grit Classifier	Pretreatment Building	2022	8	$30,000
Polymer Feed Unit- P-184	Sludge Processing Building	2023	9	$9,700
Polymer Feed Unit- P-183	Sludge Processing Building	2023	9	$9,700
		Total		**$654,400**

Anticipated Capital Project Schedule

Start Year: 2024 End Year: 2028

Asset	Location	Year to Replace	Criticality	Repl. Cost
Centrifugal Blower No. 2	Pump and Blower Building, Room 104	2025	6	$15,000
Sludge/Scum Pump-1	Pump And Blower Building	2025	6	$29,500
Furnace-4		2025	6	$25,000
Centrifugal Blower No. 3	Pump and Blower Building, Room 105	2025	6	$15,000
Gas Mixing Unit	Sludge Processing Building	2025	12	$120,000
Gas Safety Equipment	Sludge Processing Building	2025	5	$20,000
Loader	Sludge Storage Building	2025	9	$153,000
Main Switchboard	Pump and Blower Building	2025	5	$50,000
Automatic Transfer Switch-3	Pump and Blower Building	2025	5	$14,000
Emergency Distribution Panel	Pump and Blower Building	2025	5	$15,000
Air Handling Unit-3	Pretreatment Building	2025	3	$15,000
Air Handling Unit-4	Pretreatment Building	2025	3	$15,000
Furnace-3		2025	6	$25,000
Primary Clarifier Sludge Collector-2	Primary Clarifier Tank	2026	8	$180,000
Controls-2	Houghton Liftstation Primary Channel	2026	6	
Grit Pump-2	Pretreatment Building	2026	9	$15,000
Screw Lift Pump P-103	Raw Sewagae L.S.	2026	8	$245,000
UV Disinfection System	UV Disinfection Room	2026	8	$375,000
Primary Clarifier Sludge Collector-1	Primary Clarifier Tank	2026	8	$180,000
Controls-1	Hancock Liftstation Primary Channel	2026	6	
Belt Filter Press Feed Pump-2	Sludge Processing Building	2026	9	$17,500
Belt Filter Press-1	Sludge Processing Building	2026	9	$275,000
Belt Filter Press-2	Sludge Processing Building	2026	9	$275,000
Screw Lift Pump P-104	Raw Sewagae L.S.	2026	8	$245,000
Grinder-2	Houghton Liftstation Primary Channel	2027	6	$65,000
Screen	Houghton Liftstation Primary Channel	2027	6	
Pump-1 (Centrifugal, 95 HP)	Hancock Liftstation Subbasement	2028	5	$57,000
Pump-2 (Centrifugal, 95 HP)	Hancock Liftstation Subbasement	2028	5	$57,000
Pump-3 (Centrifugal, 95 HP)	Hancock Liftstation Subbasement	2028	5	$57,000
Pump-4 (Centrifugal, 95 HP)	Hancock Liftstation Subbasement	2028	5	$57,000

VFD Controls-1	Hancock Liftstation Basement	2028	4	$11,700	
VFD Controls-2	Hancock Liftstation Basement	2028	4	$9,000	
VFD Controls-4	Hancock Liftstation Basement	2028	4	$9,000	
Hot Water Boiler	Sludge Processing Building	2028	12	$120,000	
Controls	Septage Receiving Station	2028	6	$46,000	
Septage Receiving Station	Septage Receiving Building	2028	6	$52,000	
Slinger	Maintenance Garage	2028	9	$54,600	
VFD Controls-3	Hancock Liftstation Basement	2028	4	$11,700	
			Total	**$2,926,000**	2024-2028

Anticipated Capital Project Schedule

Start Year: 2029 End Year: 2033

Asset	Location	Year to Replace	Criticality	Repl. Cost
Final Clarifier Collector-2	Secondary Clarifier	2029	8	$300,000
VFD Controls-1 Hou	Houghton Liftstation	2029	5	$9,000
VFD Controls-2 Hou	Houghton Liftstation	2029	5	$11,700
VFD Controls-3 Hou	Houghton Liftstation	2029	5	$9,000
VFD Controls-4 Hou	Houghton Liftstation	2029	5	$11,700
Final Clarifier Collector-1	Secondary Clarifier	2029	8	$300,000
Final Clarifier Collector-3	Secondary Clarifier	2029	8	$300,000
Secondary Forcemain	975', crossing Portage Lake	2029	6	
Maintenance Garage Roof		2030	1	$75,000
Sludge Heat Exchanger	Sludge Processing Building	2030	8	$60,000
SCADA System	Operations Building	2030	3	$27,000
Screw Conveyors (1-2)	Grit Tanks	2030	8	$44,000
Bar Screen- Mechanically Cleaned	Pretreatment Building	2031	6	$100,000
Air Release Manholes (3)		2031	4	$18,000
Cleanout Manhole		2031	4	$6,000
Truck-1 Slinger	Maintenance Garage	2031	6	$70,100
Hydraulic Lift	Maintenance Garage	2031	6	$61,100
Inlet Control Slide Gates (3)	UV Disinfection Room	2031	6	$15,000
Pump-3 Hou (Centrifugal, 95 HP)	Houghton Liftstation	2031	5	$57,000
Pump-2 Hou (Centrifugal, 95 HP)	Houghton Liftstation	2031	5	$57,000
Pump-1 Hou (Centrifugal, 95 HP)	Houghton Liftstation	2031	5	$57,000
Blower Building Roof		2031	1	$75,000
Headworks Building Roof		2031	1	$25,000
Sludge Storage Building Roof		2031	1	$75,000
Pump-4 Hou (Centrifugal, 95 HP)	Houghton Liftstation	2031	5	$57,000
UV Disinfection Control Box-3	UV Disinfection Room	2031	8	$100,000
Discharge Screw Conveyor	Sludge Processing Building	2031	9	$25,000
Belt Filter Press Feed Pump-1	Sludge Processing Building	2031	9	$17,500
Floating Gasholder Digester Cover	Secondary Digester	2031	4	$120,000
Fixed Digester Cover	Primary Digester	2031	5	$120,000

Grit Pump-1	Pretreatment Building	2031	9	$15,000
Ultraviolet Lamp Bank-2	UV Disinfection Room	2031	8	$10,000
Screw Press	Pretreatment Building	2031	8	$15,000
UV Disinfection Control Box-2	UV Disinfection Room	2031	8	$100,000
UV Disinfection Control Box-1	UV Disinfection Room	2031	8	$100,000
Dump Trailer	Maintenance Garage	2031	9	$80,300
Administration Building Roof		2031	1	$75,000
Primary Sludge Pump-2	Digestor Control Building	2031	9	$29,500
UV Flow Control Panel	UV Disinfection Room	2031	8	$5,000
Emergency Generator-3	Pump and Blower Building	2032	8	$190,000
Centrifugal Blower No. 1	Pump and Blower Building, Room 104	2032	6	$15,000
VFD Blower No. 1	Pump and Blower Building, Room 105	2032	6	$14,500
Sludge Trailer	Sludge Processing Building	2032	4	$98,000
			Total	**$2,950,400**

2029-2033

Anticipated Capital Project Schedule

Start Year: 2034 End Year: 2039

Asset	Location	Year to Replace	Criticality	Repl. Cost
Return Sludge Pump-5	Pump And Blower Building	2034	6	$30,000
Primary Sludge Pump-1	Digestor Control Building	2034	9	$29,500
Primary Sludge Pump-3	Digestor Control Building	2034	9	$29,500
Return Sludge Pump-1	Pump And Blower Building	2034	6	$30,000
Return Sludge Pump-2	Pump And Blower Building	2034	6	$30,000
Return Sludge Pump-4	Pump And Blower Building	2034	6	$30,000
Tractor Trailer	Sludge Processing Building	2034	6	$100,000
Return Sludge Pump-6	Pump And Blower Building	2034	6	$30,000
Waste Sludge Pump-1	Pump And Blower Building	2034	6	$11,000
Waste Sludge Pump-2	Pump And Blower Building	2034	6	$11,000
Waste Sludge Pump-3	Pump And Blower Building	2034	6	$11,000
Sludge/Scum Pump-2	Pump And Blower Building	2034	6	$29,500
Return Sludge Pump-3	Pump And Blower Building	2034	6	$30,000
Air Diffusion System	Secondary Aeration Tanks	2036	4	$500,000
Drain Pump	Pump And Blower Building	2036	4	$28,000
Emergency Generator-1	Hancock Liftstation	2038	8	$100,000
Transfer Switch-1	Hancock Liftstation	2038	5	$6,600
			Total	**$1,036,100**

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Charter Township of Haring *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1315-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes or~~ [✓ No]
   If No - Date of the rate methodology approval letter: 10/17/2019.
2) Significant Progress Made: ~~Yes or No~~ Not Applicable
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: Not Applicable.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on Not Applicable.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Bob Polanic at (616) 204-1866 bpolanic@iaiwater.com
Name Phone Number Email

12/9/2019
Signature of Authorized Representative (Original Signature Required) Date

Robert Scarbrough, Township Supervisor
Print Name and Title of Authorized Representative

MEMORANDUM

SAW Grant Executive Summary

To:	Haring Charter Township	Date:	December 31, 2019
From:	Adam Segerlind, P.E. Doug Coates, P.E.	Re:	SAW Grant Executive Summary

GRANTEE:	Haring Charter Township
GRANT NUMBER:	1315-01
AUTHORIZED REPRESENTATIVE:	Robert Scarbrough
PLAN LOCATION:	Haring Township Wastewater Treatment Plant 9494 E 34 Road Cadillac, MI 49601
PHONE:	(231) 775-8822

1.0 INTRODUCTION

Haring Charter Township was the recipient of a Stormwater, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE, previously MDEQ). An asset management plan (AMP) for the Township's sanitary sewer system was developed and is available for review by the public. The AMP was developed in accordance with the grant application and the requirements of the grant agreement. The following Scope of Work was proposed in the grant application:

1. Collection System Map
   - Compile and develop a map of the sewer collection system.
   - Field locate system components with GPS equipment for inclusion in a system GIS database.
   - Develop a new AM/Geographic Information System (GIS) system to manage the assets of the system, including mapping software, hardware and training
2. Inventory and assessment of fixed assets
   - Brief description of the asset, its required capacity, level of redundancy, and ID number
   - Location of the asset
   - Year the asset was installed (when available)
   - Complete an asset condition assessment (manhole inventory, cleaning, and televising).
   - Describe present condition of the asset (e.g. excellent, good, fair, poor)
   - Depreciated value of the asset
   - Current asset replacement cost

- Risk Evaluation that combines the probability of failure and criticality of the asset

3. OM&R Budget and Rate Sufficiency
   - Complete an assessment of user rates and replacement fund.
   - Technical, legal, and financial costs to develop a funding structure and implementation schedule necessary to implement an AMP.
4. Level of Service
   - Establishing a Level of Service guidance, including service agreement development, public meeting costs, and ordinance costs.

To complete this work, the Haring Charter Township was awarded a grant totaling $440,147.00, with a 10% ($48,905) local match. As required by the grant agreement, this summary report has been prepared to meet the requirements of Section 603 of Public Act 84 of 2015 and includes the following information:

1. Contact Information
2. Review of the five major AMP components
3. List of major assets

2.0 MAJOR AMP COMPONENTS

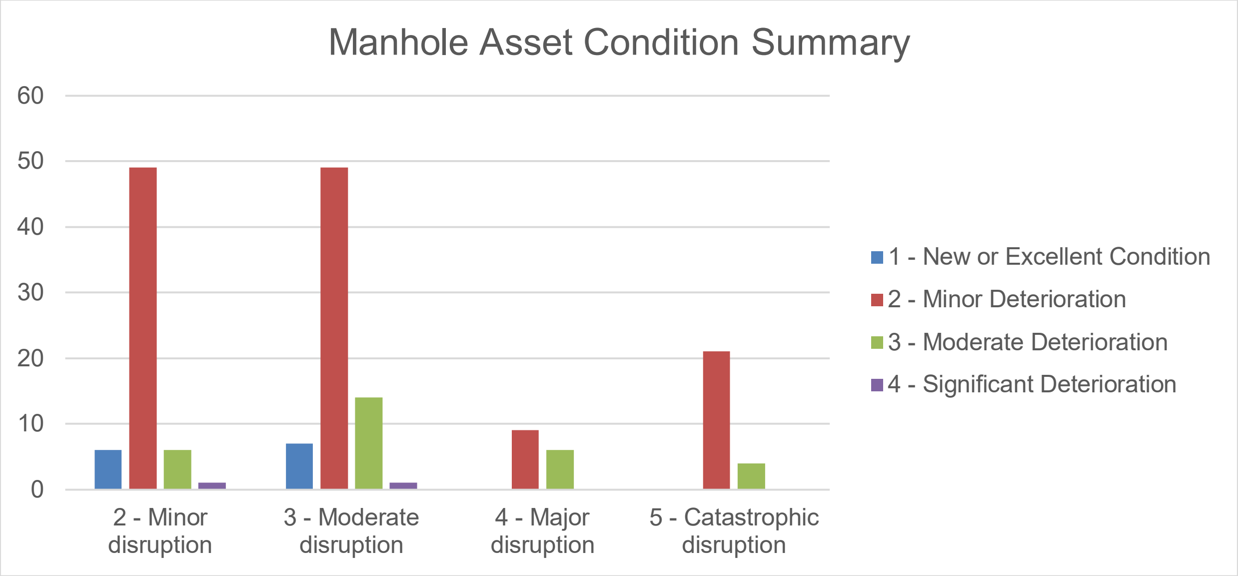
The Haring Charter Township elected to utilize a spreadsheet-based AMP platform to record and track asset data. The AMP includes sanitary sewer system components used in the collection, treatment, and analysis of sanitary sewer flows, and maintenance equipment for those systems. The five major components of the AMP, identified below, are summarized in the following subsections.

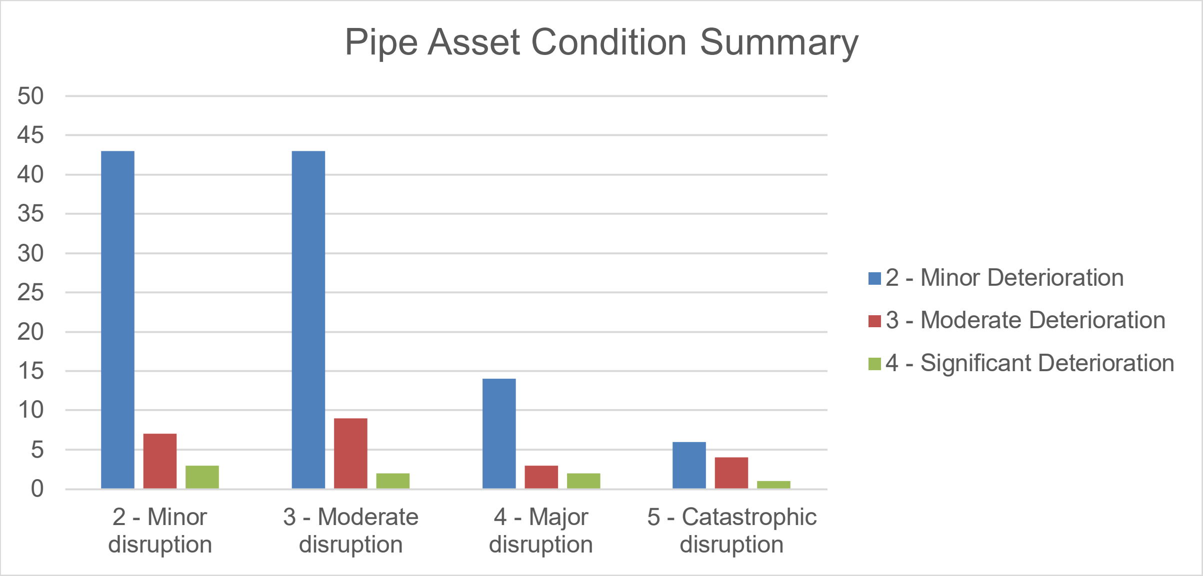
1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality of Assets
4. Operation and Maintenance Strategies / Revenue Structure; and,
5. Long-term Funding / Capital Improvement Plan

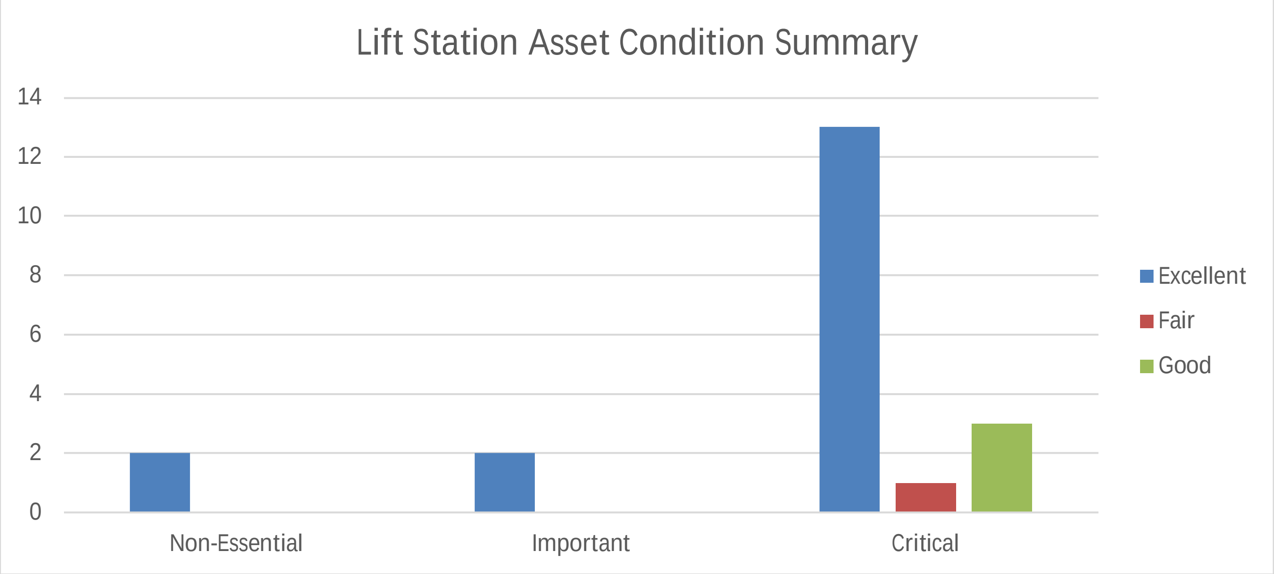
2.1 Asset Inventory and Condition Assessment

An asset inventory and condition assessments for the Haring Charter Township sewer system were compiled by Infrastructure Alternatives (the contracted operations personnel for the Township's sewer collection and treatment system) and Gosling Czubak. Collection and treatment assets were categorized as Lift Station; Plant; Manhole; or, Pipe assets and populated into the AMP spreadsheet. Conditions were assigned on a 1 (very good) to 5 (very poor) rating scale based upon visual inspections and operational experience of the operations personnel. Qualifying gravity sewer pipes were inspected using CCTV techniques in accordance with the National Association of Sewer Service Companies (NASSCO) pipe standard. Manholes inspections were completed in accordance with the NASSCO level 1 standard.

Condition and criticality for each asset category are summarized in the following charts.







2.2 Level of Service

The Haring Charter Township's Infrastructure Committee established the Level of Service for the sewer utility. The Level of Service was presented to the Council, and members of the community, during the December 9, 2019, Township Board meeting.

AREA OF SERVICE	GOAL	ACTION STEPS
Regulatory	Meets all minimum State and Federal regulatory requirements and operates in a manner that is protective of the environment and public health.	Follow all State and Federal permit requirements. Report violations promptly. Develop an action plan to prevent future violations.
Staffing	Has adequate staffing to conduct routine operations and maintenance, as well as respond to emergency situations.	Annual operating budgets will support the staffing levels recommended by the system operator.
Emergency Response Time	Customer and system emergency response time within 60 minutes to 24 hours depending on type of emergency.	Staffing levels will support on call time and staff "off time". Customers will receive written notice 24 hours in advance of any planned interruption in service.
Training	Has adequately trained staff with the proper certifications to keep the utility within regulatory compliance and conduct day-to-day operations safely.	Must have operator in charge & backup operator on staff.
Funding	Generates revenue to cover all costs, including operations and supplies, labor, training, and annual savings for future repair and replacement of equipment.	Follow EGLE Asset Management Guidelines and re-evaluate sewer rates every year through the budgeting process.

AREA OF SERVICE	GOAL	ACTION STEPS
Master Planning	Generates revenue to fund periodic Capital Improvements to ensure system assets have adequate capacity, redundancy, and are in proper working order.	Budgeting process will anticipate CIP needs and funding.
Customer Service	Be available to help customers with questions regarding billing, new services, and complaints.	Responds to customer questions, requests, and complaints in a prompt and professional manner.
Efficiency	Provide efficient operations and make prudent decisions to keep user costs as low as possible while maintaining the Level of Service desired.	Annual review of operating budget and user rates will balance the need of system assets with reasonable rates and charges.
Health & Safety	To provide a safe and injury free work place	Conduct regular safety meetings and in-house safety inspections.

2.3 Criticality of Assets

The criticality of each asset was assigned based on how much disruption an asset's failure may cause to the system. Criticality ratings were assigned on a scale of 1 (Non-essential) to 5 (Critical). Factors considered during the criticality evaluations include:

1. Redundancy of asset
2. Proximity to surface waterbody
3. Proximity to sensitive populations (i.e. high capacity users)
4. Current use status (i.e. backup or active)

2.4 Operation and Maintenance Strategies / Revenue Structure

A financial analysis of the 2019 budget was submitted by Baker Tilly Municipal Advisors at the 2.5-year mark of the grant. It was determined that a funding gap did not exist based on their current revenue and expenses. EGLE approved the rate methodology in a letter dated October 17, 2019.

Each asset in the AMP is classified as either a Capital or Repair, Replace and Improve (RRI) asset. The RRI assets are generally considered to be assets with less than a 15-year lifespan that are typically repaired or replaced with funds from the sewer fund. RRI cost projects for the next 20 years, based upon the anticipated replacement year, were added to the revenue structure review for consideration by the Township.

2.5 Long-term Funding / Capital Improvement Plan

Capital assets generally have a longer lifespan and may require the use of another funding source to implement repair or replacement. Potential capital improvement projects identified during preparation of the AMP include:

1. Replacing three manholes (7, 13, and 14)
2. Replacing four pipe sections (101-PS-100, 17-16, 21-20A, and 6_Bell)

Some potential long-term funding scenarios were presented to the Township Council for evaluation by Baker Tilly. It is the Township's responsibility to review and evaluate the funding scenarios presented and determine the best course of action as it relates to user rates, capital and repair projects, and the sewer fund cash balance.

3.0 MAJOR ASSETS

The major assets for each of the four asset categories are summarized in the following tables.

MANHOLE ASSETS
Gravity Sewer Manholes (136)
Force Main Structures (7)
Lift Station Wet Wells (7)
Cleanouts (15)
Force main Valves (9)

PIPE ASSETS
1.25" Force main (2,715' +/-)
2" Force main (1,450' +/-)
6" Force main (590' +/-)
8" Force main (5,790' +/-)
8" Gravity (27,580' +/-)
10" Gravity (9,660' +/-)
12" Gravity (62' +/-)

LIFT STATION ASSETS	
LS-1	Bell Avenue Lift Station
PS-1	West 13th Street – MI News 26
PS-2	West 13th Street – Penske Trucks
PS-3	East 13th Street – The Wex
PS-4	East 13th Street
PS-100	Meijer Lift Station
PS-700	Works Avenue Lift Station

WWTP ASSETS
Reactor/Clarifier #1
Reactor/Clarifier #2
Huber Ro5c Grit Removal System
North Lagoon
South Lagoon
UV Disinfection System
NOVA Ultrascreen
Ferric Chloride Dosage System

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **12/31/19**
(no later than 3 years from executed grant date)

The Village of Lawton, Michigan *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1320-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Mr. Dan Bishop at *(269) 624-6407* *BishopD@lawtonmi.gov*
Phone Number Email

Signature of Authorized Representative (Original Signature Required) Date

Mr. Richard Reeves, Village President
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **November 12, 2019**
(no later than 3 years from executed grant date)

The Village of Lawton, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1320-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 5/14/19
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Dan Bishop at **(269) 624-6407** **BishopD@lawtonmi.gov**
Name Phone Number Email

Signature of Authorized Representative (Original Signature Required) Date

Mr. Richard Reeves, Village President
Print Name and Title of Authorized Representative

Nov. 2019

WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Lawton, Michigan

Stormwater Sewer System

Date: November 12, 2019
To: Mr. David Worthington
C/O: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Village of Lawton SAW Grant: Summary of Stormwater Asset Management Plan

Grantee Information:
Village of Lawton
125 S. Main St.
Lawton, MI 49065
Dan Bishop: Dan Bishop <BishopD@lawtonmi.gov>
Mr. Rick Reeves; President
Ph: (269) 624-6407
SAW Project #: 1320-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP)

1) Asset Inventory and Condition Assessment
2) Level of Service
3) Criticality of Assets
4) Capital Improvement Plan
5) Asset Management Financial Plan and Revenue Structure

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS)

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$1,267,000	$179,000	$1,446,000

Stormwater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The Village of Lawton operates a storm water collection system consisting of nearly five miles of collection system, 87 48"diameter manholes, and 228 storm inlets that conveys the storm water from various portions of the Village to five discharge points to the county drain system. There are two discharges on Union Street near the Waste Water Treatment Facility (WWTF), two on south Main Street at Orchard and Morrill Streets, and one on White Oak Road (CR358) west of 32nd Street. The total approximate value of the storm water system is $3M.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all storm water system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the storm water collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. Information collected about all identified storm water assets is also maintained within the GIS model.

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman performed limited conditional assessments on the manholes and inlet structures within the storm water collection system, including photographing them, as depicted in **Error! Reference source not found.**. In addition, a large portion of the gravity storm piping was inspected using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging[1]. CCTV services were provided by Corby Energy

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[1] Footnote should be added to explain why not all pipes were televised if only portions were. For example: Pipes with severe structural issues that could be exacerbated or cause complete failure due to the cleaning associated with CCTV activities and pipes younger than 20 years old were not televised.

Services, Inc (CES). All the CCTV videos and pipe reports and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

During the field inspections discussed above, any manhole and/or pipe defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 1.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 1 - NASSCO conditional assessment system

As previously mentioned, the gravity storm sewer piping was televised by CES. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman employees or name who did the assessments using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology.

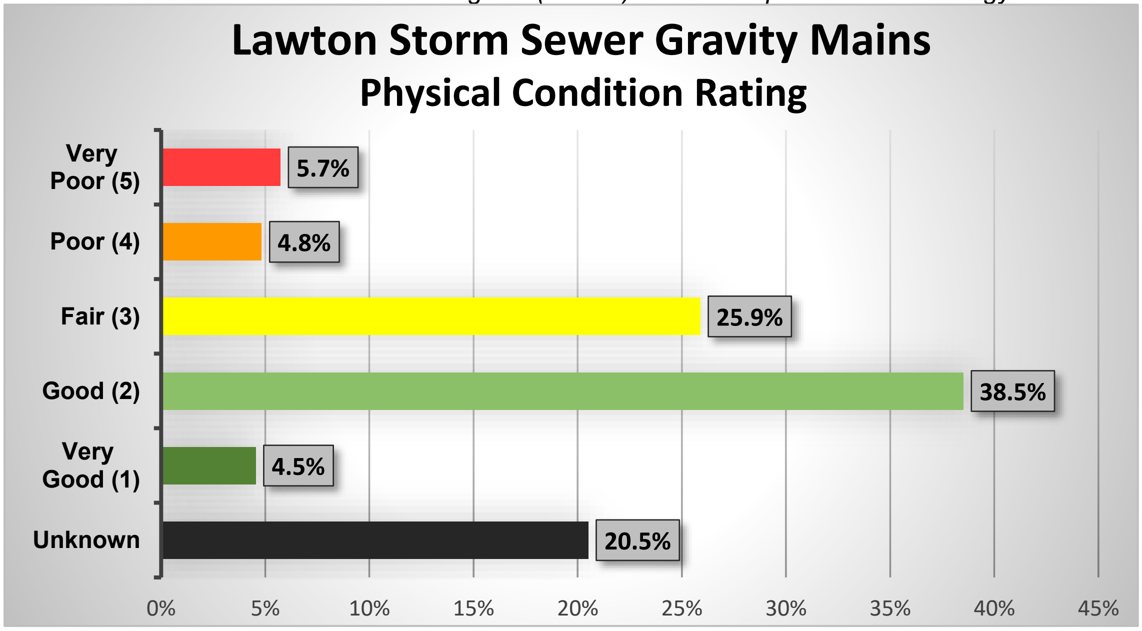


Figure 1 and Figure 2 show the condition ratings for the storm water gravity main piping and the storm water structures (respectively).

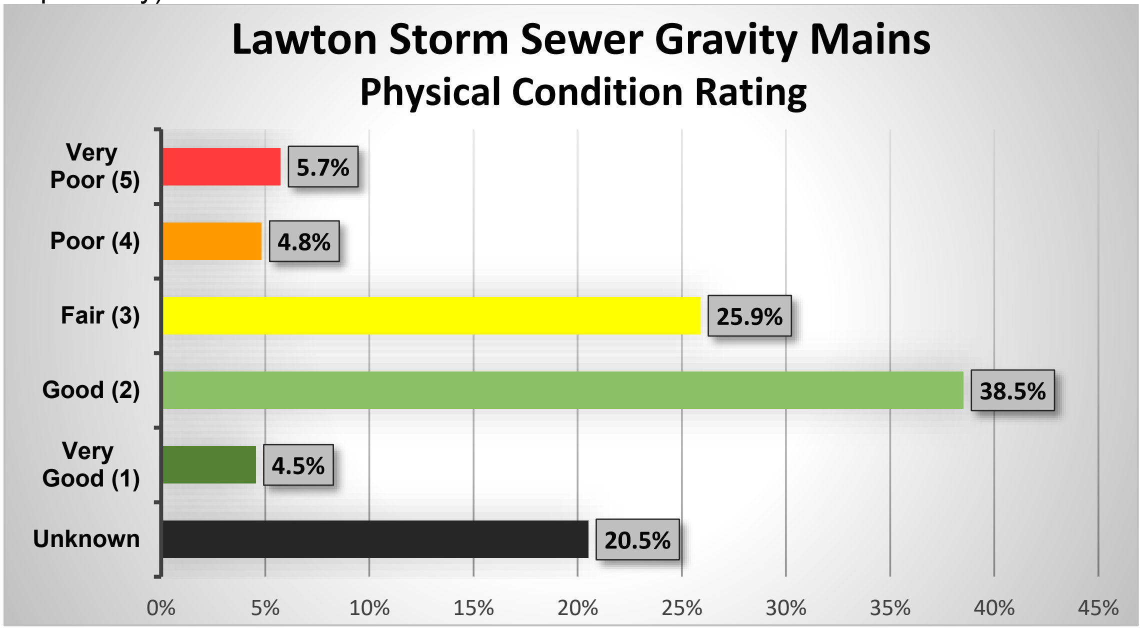


Figure 1 - Storm sewer gravity main physical condition rating

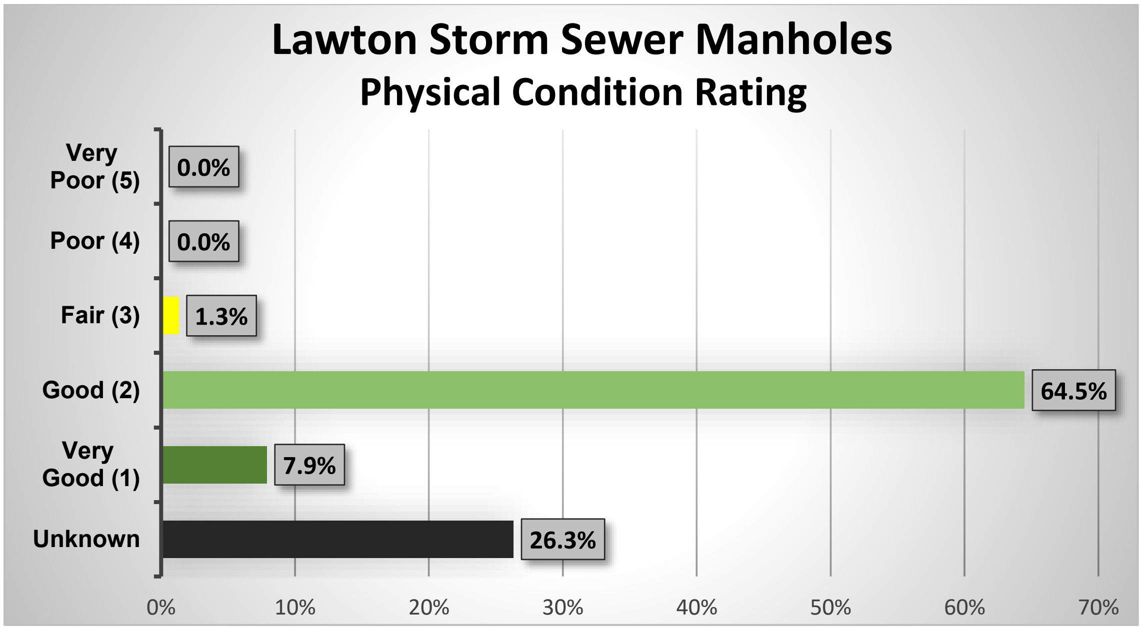


Figure 2 – Storm water structure physical condition rating

<u>Level of Service Determination:</u> *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the* *service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the storm water system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in to define the desired level of service for the storm water system:

Table 2 - Level of service statements

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free work place. Protect the environment.	Regular safety meetings – [frequency] at a minimum. No MIOSHA safety violations.
Operator Certification	Provisions for appropriately credentialed and experienced operators.	Qualifications currently held by DPW personnel in water and sewer utilities qualify them to work on the storm system.
Administrative	Provide excellent customer service.	Any administrative functions as part of the storm water system?
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within [X time frame] and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within [X time frame] at all times and non-emergency calls within [X time frame] during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from the EGLE and MDOT to all affected staff.
Master Planning	All construction shall conform to the requirements of the Storm Water Master Plan.	Develop a Storm Water Master Plan.
Collection System	Maintain the gravity sewers in good operating condition and prevent overflows and system back-ups.	Gravity storm sewers will be cleaned on a rotational basis such that 20% of the system is cleaned annually resulting in the entire system being cleaned every five years.

Table 2 - Level of service statements

Major Area	Goals and Objectives	Level of Service Statements
Financial	Establish a revenue stream to operate and maintain the storm water system.	Explore options for storm sewer system funding and use Act 51 funding judiciously.
Operating Reserves	Establish sufficient reserves to cover anticipated major expenses.	Once a funding stream is identified, maintain a minimum of six months' operating expenses in reserve accounts.

County Drains	Make sure County drains are cleaned	Contact VBCDC as needed to ensure drainage pathways are properly maintained.

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity storm sewers, storm manholes and inlet structures, and drainage pathways, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 3. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section **Error! Reference source not found.**. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 3.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 3 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

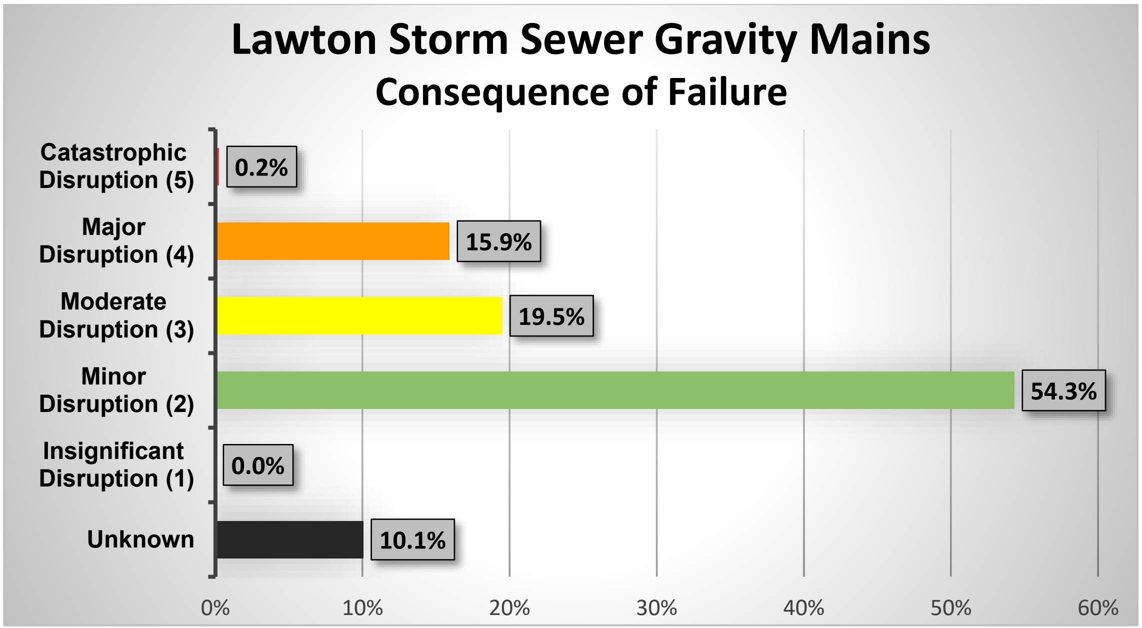
- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a storm water asset, social costs and/or the costs of collateral damage caused by the failure can even outweigh the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 4.

Consequence of Failure Rating	Social Effects	Collateral Damage Effects
1 (Insignificant)	Minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	Minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	Limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	Moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	Extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 4 - Consequence of failure rating scheme for storm water assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the storm water system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the storm water collection system is shown.



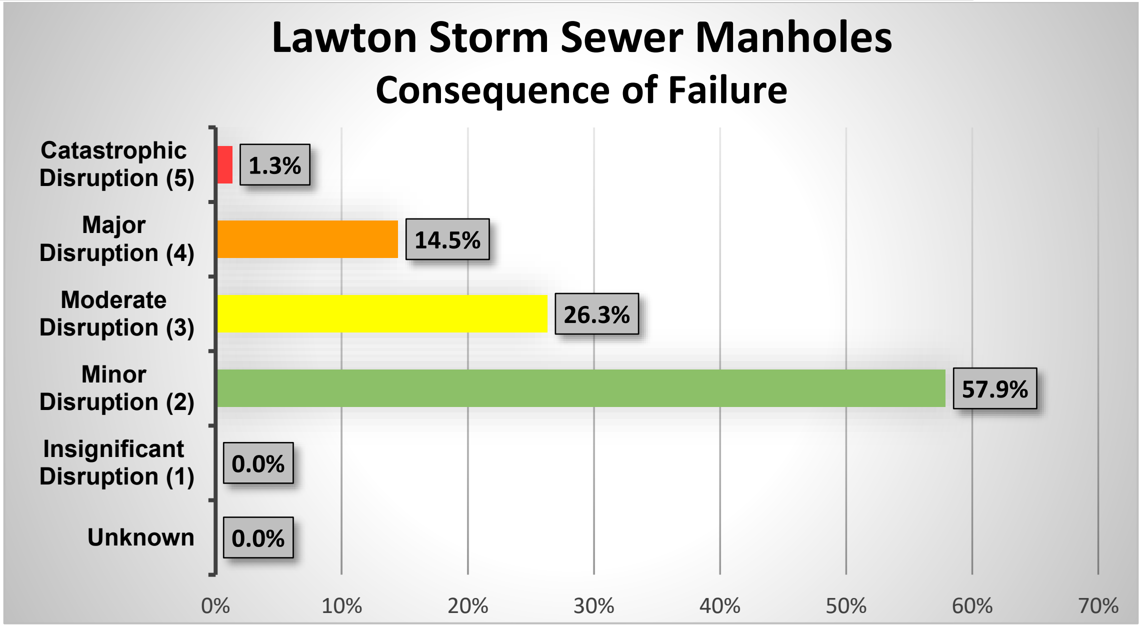


Figure 3 and Figure 4 below.

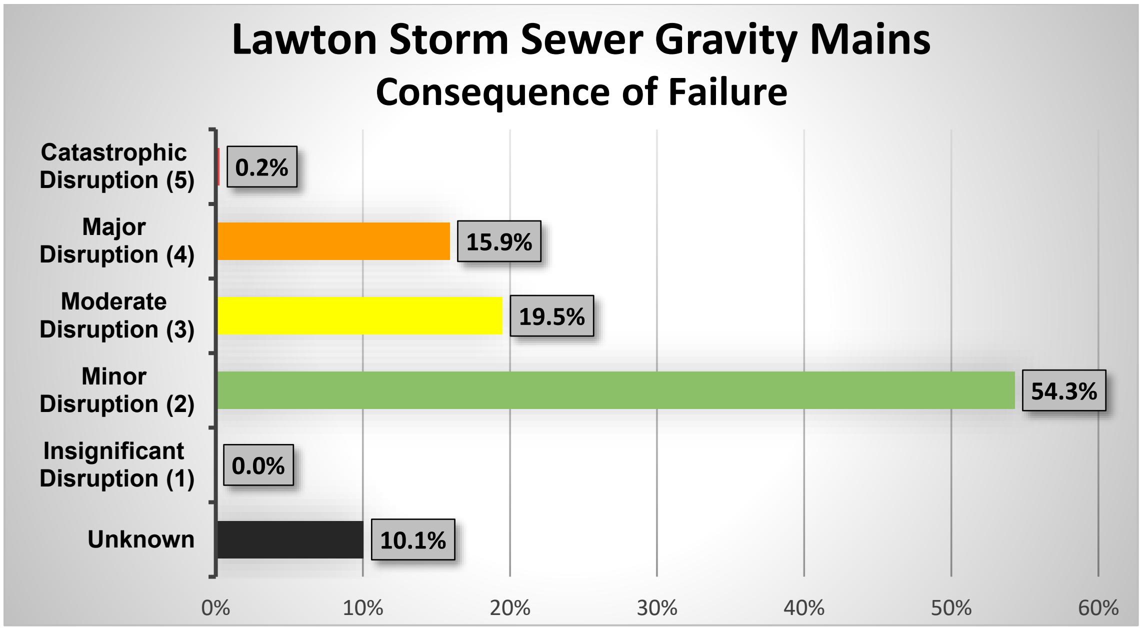


Figure 3 – Storm sewer gravity main consequence of failure rating

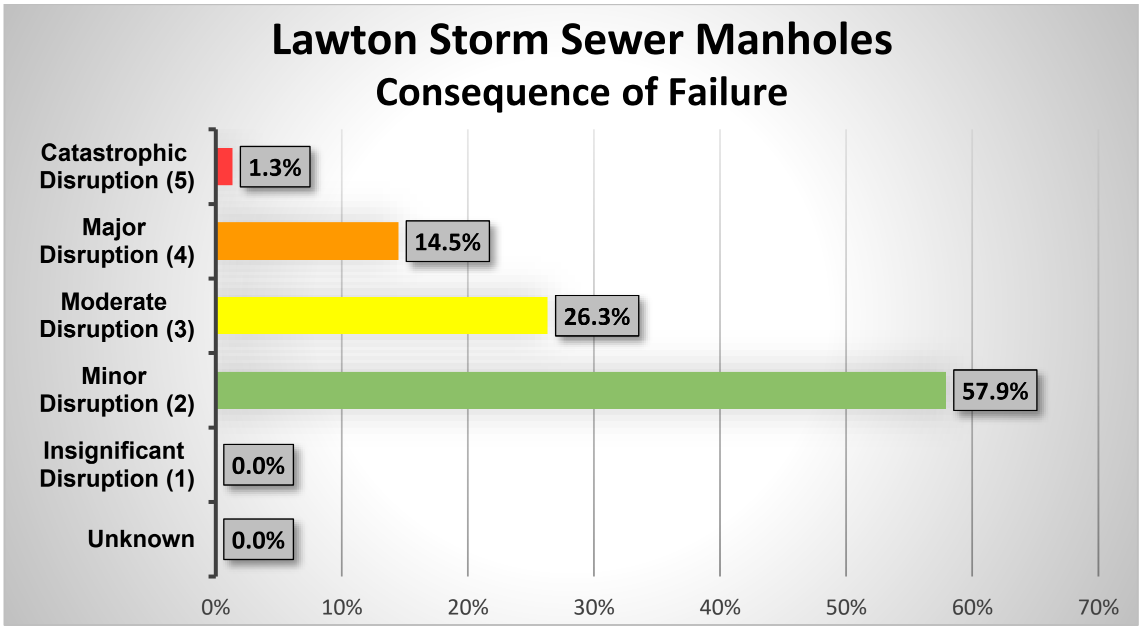


Figure 4 – Storm sewer manhole consequence of failure rating

A substantial of the storm sewer is located under Main Street, which is actually a State highway (M-40). As such, a failure of one of these pipes would result in damage to a state roadway. This roadway is planned to be reconstructed in 2023 within an MDOT road replacement project and the Village is planning to pay for oversizing mains across M-40 to accommodate flows from east to west. It is further stressed that the consequence of failure rating does not suggest in any way whether an asset is likely to fail, only the consequences of such a failure.

<u>Revenue Structure:</u> *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

As previously mentioned, one of the primary goals of an AMP is to develop a long-term plan for revenues capable of supporting the required capital improvements in addition to routine O&M costs. However, unlike a sanitary sewer AMP, where a source of revenue exists from sanitary sewer user fees, stormwater systems have no separate stream of revenue. Improvements to the stormwater system are usually funded as a part of a street improvement project and routine O&M costs are covered in the day-to-day operations of the Village. As such, an in-depth asset management financial review (AMFR) cannot be conducted and a revenue structure cannot be developed for the stormwater system.

<u>Capital Improvement Plan:</u> *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Storm Water System Projects

Error! Reference source not found. lists the recommended capital improvement projects over the next 20 years for the storm water collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix **Error! Reference source not found.**. Where appropriate, the estimated project costs shown in **Error! Reference source not found.** include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in **Error! Reference source not found.** are in current costs (no inflation) unless otherwise noted. The costs shown in Table 8 below are predicated on including the replacements within a larger project which covers surface restoration such as a road reconstruction project with a minimum contract size in the $150-$200k range.

CIP Year	Project Name	
2020	1st Street at Railroad Street	$5,000
2020	2nd Street at Hamilton Street	$10,000
2020	2nd Street, East of Fremont Street	$11,000
2020	2nd Street, East of Hamilton Street	$8,000
2020	2nd Street, East of Nursery Street	$7,000
2020	4th Street East of Walker - swGM-139	$36,000
2020	4th Street West of West Street swGM-137	$29,000
2020	Fremont Street, South of 3rd Street	$6,000
2020	Nursery Street, North of 3rd Street	$18,000
2020	Railroad Street, North of 2nd Street	$14,000
2020	South of Railroad Tracks, North of Union Street	$58,000
2020	South of Railroad Tracks, West of Main Street	$10,000
2020	South Side of 2nd Street, West of Nursery Street	$8,000
2020	swGM-138 4th Street East of Walker Street	$20,000
2020	Union Street, South of West Street	$19,000
2020	Walker Street East Side Across Union Street	$12,000
2020	Walker Street from Welch Foods	$51,000
2025	1st Street, West of Hamilton Street	$2,000
2025	3rd Street, East of Franklin Street	$1,000
2025	3rd Street, East of Railroad Street	$1,000
2025	Fremont Street, South of 2nd Street	$2,000
2025	Nursery Street, North of 4th Street	$2,000
2025	Union Street, West of Main Street	$1,000
2025	Walker North of 4th Street swGM-149	$47,000
2025	Walker South of Union swGM-151	$20,000
2025	Walker Street, North of 4th Street	$47,000
2025	Walker Street, South of White Oak Street	$55,000
	Total Improvements 20yr CIP	$500,000

A. List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

Error! Reference source not found. contains a summary of the storm water system assets identified.

Item	Quantity	Units
Unknown Storm	2,103.30	LF
8" Storm Sewer	61.6922092	LF
10" Storm Sewer	401.64018	LF
12" Storm Sewer	12038.0005	LF
15" Storm Sewer	4399.19876	LF
18" Storm Sewer	2354.04862	LF

20" Storm Sewer	259.134549	LF
21" Storm Sewer	1196.33217	LF
24" Storm Sewer	1354.86598	LF
30" Storm Sewer	648.225155	LF
36" Storm Sewer	4633.10241	LF
42" Storm Sewer	1262.42081	LF
4' Storm Manhole	87	EA
Inlets	228	EA

WIGHTMAN
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Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Lawton, Michigan

Wastewater Sewer System

Date: November 12, 2019
To: Mr. David Worthington
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Village of Lawton: Summary of Wastewater Asset Management Plan

Grantee Information:
Village of Lawton
125 S. Main St.
Lawton, MI 49065
Dan Bishop: Dan Bishop <BishopD@lawtonmi.gov>
Mr. Rick Reeves; President
Ph: (269) 624-6407
SAW Project #: 1320-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$1,267,000	$179,000	$1,446,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The Village of Lawton operates a wastewater collection and treatment system consisting of 7.7 miles of gravity pipe and 750 feet of pressurized force mains that convey the wastewater from the Village to the Village Wastewater Treatment Facility (WWTF) for treatment. In addition to the pipes in the collection system, Lawton relies on one sewage lift station to convey the wastewater through the system and another to lift the sewage at the WWTF for treatment.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. Information collected about all identified wastewater assets is also maintained within the GIS model.

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman staff performed conditional assessments beginning with complete visual and physical inspection of all of the sanitary manholes in the wastewater collection system and visual and physical inspection coupled with performance testing at the two City-owned wastewater lift stations. Wightman staff also visually and physically inspected all of the assets at the WWTF. In addition, all the gravity sewer pipe in the wastewater system was videoed using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging.

During the field inspections, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects. Grades for both structural and operation and maintenance defects were assigned based on the severity of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical grading system uses numbers ranging from 1 (superficial or very minor defects) to 5 (defect requiring immediate action).

Once field inspections were completed for each asset and individual defects were graded, an overall condition rating was applied to each asset, again using a numerical system ranging from 1 (very good condition) to 5 (very poor condition). Overall condition ratings for pipes were based on NASSCO Pipeline Assessment Certification Program methodology. Overall condition ratings for manholes were based on NASSCO Manhole Assessment Certification Program Level 1 inspection methodology.

Overall condition ratings for lift stations were based on physical inspection of the major components and drawdown testing to determine the performance of the pumping equipment.

Condition Rating	Description
1	New or Excellent (Very Good)
2	Minor Deterioration (Good)
3	Moderate Deterioration (Fair)
4	Significant Deterioration (Poor)
5	Unserviceable (Very Poor)

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Level of Service (LOS) defines the way in which Village of Lawton wants the wastewater system to perform over the long term. The LOS should include any technical, managerial, or financial components the Township wishes, as long as all regulatory requirements are met. The LOS is a fundamental part of how the Village wastewater system is operated.

As with all components of the AMP, defining the desired level of service will be an ongoing process. The Asset Management Team developed the statements in Table 5 to define the desired level of service for the wastewater system:

The Asset Management Team developed the statements in Table 6 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	
Health and Safety	Provide a safe and injury free work place. Protect the public health. Protect the environment.	Regular safety meetings – weekly at a minimum.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked at all times. WWTF security – planning to install surveillance cameras
Operator Certification	Provisions for appropriately credentialed and experienced operators.	Class C One and two as backup Paw Paw
Administrative	Provide excellent customer service.	Produce accurate, timely billing.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within two hours and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within two hours at all times and non-emergency calls within 24hrs during normal business hours.
Reporting		
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from the EGLE to all affected staff.
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – annually at a minimum. Enforce provisions of wastewater ordinances.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are sufficient to meet wastewater budget annually. Review sewer rates every year.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months' operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Treatment facility has a backup generator for emergency power. It is planned to use a portable generator at the White Oak Lift Station. Generators shall be maintained under an annual maintenance contract.

Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Force mains. General System Maintenance.	Gravity sanitary sewers will be cleaned on a rotational basis such that 20% of the system is cleaned annually resulting in the entire system being cleaned every 5 years. Track breaks and replace when appropriate Will be televising 20% annually

Major Area	Goals and Objectives	Level of Service Statements
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown. Lift station valve maintenance.	Maintain all mechanical and electrical equipment in accordance with manufacturer's recommendations. Visually inspect all components of each lift station monthly. Clean the equipment and verify it functions. Clean lift station wet wells semi-annually to remove grease and sediment. Exercise check valves and gate valves semi-annually (at a minimum).

Table 6 - Level of service statements (continued)

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, lift station components, and WWTF equipment, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 7. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section 0. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 7.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 1 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.

- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 8.

Consequence of Failure Rating	Social, Human, and Environmental Effects[1]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 2 - Consequence of failure rating scheme for wastewater assets

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to summarize the policy formulation in the areas of rate management, capital spending, and fund balance.

Methodology

A significant effort has been made by the Village and their consulting engineers to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account.

The AMFP is a four step process: 1) historical comparison with audits and budgets, 2) test year, or normalized budget year, along with inflation assumptions for purposes of forecasting, 3) proof of rate to revenue for reliance on customer data, and 4) cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance). The analysis is a "cash basis" approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

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[1] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

Audit Comparison

One key indicator of financial health is the cash and investments found in the Comparative Statement of Net Position of the Sewer Fund. The Village has maintained this cash and investment balance at around three months compared to the cash operating expenses. Management of the cash balance will be discussed further under Forecast – Cash Balance.

The Sewer Fund audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (excluding one-time expenditures).

Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

Proof of Rate to Revenue

The Village bills customers based on generally accepted methods. The customers are billed based on a residential equivalent unit method. The number of residential equivalent units billed at the current rates tie to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. These are expenses not already included in the operating and maintenance budget. The forecast reflects cash-funding all projects. This is the goal of the Village, unless the project is too large to be funded with cash reserves.

Forecast - Cash Balance

Our standard minimum target of cash and investment to operating expenses (net of depreciation) is six months. This minimum target is higher for a system of this size. Due to the size of the system and extent of capital improvements forecasted, the cash balance target is around three to four years. This target will not be reached soon and the forecast shows a steady build up of cash reserves to achieve an acceptable reserve for capital funding and operations.

Forecast - Rate Management

The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The Village is considering two separate rate track possibilities based on the current and a proposed new rate structure by the Village. The first cash flow analysis shows an immediate rate of $6 and then 3.75% inflationary increases thereafter. The second cash flow analysis shows no increase in rates. This is due to the fact that the number of units billed would be higher as the Village would eliminate fractional units for rates.

Management Summary

- Rates Option #1: (current rate structure): increase REU charge to $60, then increase 3.75% per year
- Rates Option #2: (proposed rate structure): no change to rates in the short term, reassessing needed after rate change
- Cash Balance: target of three to four years compared to cash operating expenses over forecast period
- Capital Improvements: cash-funding all capital improvements, as cash balance allows

AMFP – Management Tool

The AMFP is a living document. It is most effective as a tool used annually for budget and user rate decisions.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Wastewater System Projects

Table 10 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 10 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 10 are in current costs (no inflation) unless otherwise noted.

CIP Year	Project Name	
2020	Bitely Main to Railroad	$3,000
2020	Portable Generator for Lift Station	$42,000
2020	Replace Decanter Seals (2) at WWTF	$36,000
2021	New Roof over WWTF	$17,000
2023	North Main St South of White Oak	$15,000
2023	North Main St, South of RR Tracks	$39,000
2023	Orchard East of Main	$22,000
2023	Re route sewer from east on 2nd St down Main to Union	$59,000
2023	South Main St Between Durkee St and Morrill St	$12,000
2023	South Main St North of Orchard St	$6,000
2023	South Main St South of Morrill St	$6,000
2025	Replace Force Main from White Oak to Main	$61,000
2028	2nd St at Main St Intersection	$7,000
2028	2nd St, West of 29th St	$8,000
2028	Alley South of 2nd St	$34,000
2028	Bitely East of Hamilton	$15,000
2028	Bitely St Between Hamilton St and Liberty St	$28,000
2028	Bitely St Between Liberty St and Railroad St	$20,000
2028	Durkee St Between S Main St and Railroad St	$20,000
2028	Durkee St Between S Railroad St and Liberty St	$21,000
2028	East Bitely St, West of S Hamilton St	$18,000

2028	Fremont St, North of 4th St	$10,000
2028	Liberty St Between Durkee St and Bitely St	$18,000
2028	Lining N. Main South of White Oak	$11,000
2028	Lining S. Main Between Durkee and Morrill	$16,000
2028	Merchant St, North of 2nd St	$11,000
2028	North Main St north of the railroad tracks	$11,000
2028	North Main St, North of RR Tracks	$25,000
2028	Quincy St, South of 3rd St	$10,000
2028	South Main St Between 5th St and Bitely St	$24,000
2033	1st St, East of Railroad St	$24,000
2033	1st St, West of Adams St	$20,000
2033	1st St, West of Franklin St	$19,000
2033	2nd St, West of Hamilton St	$16,000
2033	3rd St, East of Franklin St	$28,000
2033	3rd St, West of Adams St	$20,000
2033	3rd St, West of Fremont St	$16,000
2033	3rd St, West of Hamilton St	$20,000
2033	4th St, West of Fremont St	$20,000
2033	Adams St, South of 3rd St.	$18,000
2038	Franklin St, 4th St to Washington St	$19,000
2038	Franklin St, South of 1st St	$19,000
2038	Hamilton St, South of 3rd St	$17,000
2038	Harvey St, West of West St	$9,000
2038	Nursery St Morrill to Durkee	$3,000
2038	Nursery St, North of Washington St	$8,000
2038	Railroad St, South of 4th St	$25,000
2038	Railroad St, South of 5th St	$15,000
2038	Union St, West of Walker St	$28,000
2038	Washington S, East of Hamilton St	$20,000
2038	Washington St, West of Adams St	$20,000
	Total in 2019 Dollars	$1,009,000
	Total Adjusted for 2% inflation per year and each project moved to the proposed year and rounded to the nearest thousand dollars	$1,243,000

Table 3 - Recommended wastewater system capital improvement projects

The sanitary sewer collection system improvements planned in 2023 are those directly related to the MDOT M-40 reconstruction project and are planned at this time to leverage the MDOT providing surface restoration.

The estimated cost of projects is a pre-design figure and assumes they are part of a larger overall project in the $200k-$250k range and should be adjusted if not be considered the estimated cost if undertaken as a single improvement. The estimated cost of each improvement has a substantial contingency figure typically at 25% as they are pre-design figures. These estimates will be refined in accordance with the scope of planned improvements for a particular bid package at Village direction.

List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

Table 1 contains a summary of the wastewater system assets identified.

Item	Quantity	Unit	Repl Cost	Total Cost
Unknown Sanitary Sewer	623	LF	$ 110.00	$ 68,600.00
6" Sanitary Sewer	543	LF	$ 110.00	$ 59,700.00
8" Sanitary Sewer	32737	LF	$ 110.00	$ 3,601,100.00
10" Sanitary Sewer	5363	LF	$ 120.00	$ 643,600.00
12" Sanitary Sewer	1187	LF	$ 130.00	$ 154,300.00
4' Sanitary Manhole	155	EA	$ 2,900.00	$ 449,500.00
Sewer Leads	640	EA	$ 3,630.00	$ 2,323,200.00
3" Force Main	193	LF	$ 60.00	$ 11,600.00
4" Force Main	507	LF	$ 65.00	$ 33,000.00
8" Force Main	51	LF	$ 95.00	$ 4,900.00
Treatment Plant	1	EA	$ 6,150,000.00	$ 6,150,000.00
Lift Station	2	EA	$ 437,500.00	$ 875,000.00
				$ 14,374,500.00

Table 4 - Wastewater system assets

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **12/31/19**
(no later than 3 years from executed grant date)

Southwestern Michigan College, Dowagiac, Michigan *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1322-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Ms. Susan Coulston	at	**(269) 782-1396**	**scoulston@swmich.edu**
Name		Phone Number	Email

Susan B. Coulston

11/26/19

Signature of Authorized Representative (Original Signature Required) Date

Ms. Susan Coulston, Vice President and Chief Business Officer
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **November 26, 2019**
(no later than 3 years from executed grant date)

Southwestern Michigan College, Dowagiac, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1322-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ms. Susan Coulston	at	**(269) 782-1396**	**scoulston@swmich.edu**
Name		Phone Number	Email

Susan B. Coulston 11/26/19
Signature of Authorized Representative (Original Signature Required) Date

Ms. Susan Coulston, Vice President and Chief Business Officer
Print Name and Title of Authorized Representative

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Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Southwestern Michigan College, Dowagiac, Michigan

Storm Water and Wastewater Sewer System

Date: November 24, 2019
To: Jonathan Berman
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Southwestern Michigan College: Summary of Storm Water and Wastewater Asset Management Plan

Grantee Information:
Southwestern Michigan College
58900 Cherry Grove Road
Dowagiac, MI 49047
Susan Coulston: Susan Coulston <scoulston@swmich.edu>
Ms. Susan Coulston; Vice President and Chief Business Officer
Ph: (269) 782-1396
SAW Project #: 1322-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$134,000	$115,000	$249,000

Storm Water and Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The first step in developing an AMP is to identify and evaluate the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

A. Description

SMC's storm sewer system consists of 21 manholes, 85 inlets, approximately 550 feet of 27-inch gravity main, 675 feet of 24-inch gravity main, 855 feet of 18-inch gravity main, 1,015 feet of 12-inch gravity main, 280 feet of 10-inch gravity main, 4,595 feet of 8-inch gravity main, 750 feet of 6-inch gravity main, 60 feet for 4-inch gravity main, and 650 feet of main with unknown size. Stormwater collected is discharges towards the north of the SMC site to a wooded lot where it flows toward Wild Puck Pond.

The wastewater system consists of 19 manholes, 4 sewer cleanouts, approximately 160 feet of 8-inch sewer lateral line, 730 feet of later line of unknown size, and 4,530 feet of 8-inch gravity sewer. Wastewater is sent to the City of Dowagiac wastewater collection system and treated at the City of Dowagiac Wastewater Treatment Facility.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all stormwater and wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the stormwater and wastewater collection systems were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the stormwater and wastewater collection systems. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.

Table 1 contains a summary of the stormwater and wastewater system assets identified.

Item	Quantity	Units
27-inch Storm Sewer	548	LF
24-inch Storm Sewer	674	LF
18-inch Storm Sewer	853	LF
12-inch Storm Sewer	1,015	LF
10-inch Storm Sewer	283	LF
8-inch Storm Sewer	4,595	LF
6-inch Storm Sewer	750	LF
4-inch Storm Sewer	57	LF
Storm Sewer, Unknown Diameter	651	LF
4-foot Diameter Storm Manhole	21	LF
Stormwater Inlet Structure	85	EA
Stormwater Discharge Point	20	EA

Table 1 - Stormwater system assets

Item	Quantity	Units
8-inch Sanitary Sewer	4,213	LF
4-foot Diameter Sanitary Sewer	19	EA
Service Lead, Complete	11	EA
Septic System	3	EA

Table 2 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

B. Asset Conditions

After completing the comprehensive inventory of the stormwater and wastewater systems assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Storm and sanitary manholes and storm drainage structures were visually assessed and photographed by Wightman employees as depicted in. Most of the gravity sewer piping was inspected using closed-circuit televising (CCTV) equipment designed for use in sewer pipes. CCTV services were provided by Corby Energy Services, Inc. (CES). All the CCTV videos and pipe reports and the manhole and drainage structure pictures are attached to those assets in the GIS map and are accessible via the computer and tablets.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 3.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 3 - NASSCO conditional assessment system

As previously mentioned, the gravity sanitary sewer piping was televised by CES. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman employees NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 1 and Figure 2 show the condition ratings for the storm sewer gravity main piping and the storm sewer manholes (respectively). Figure 3 and Figure 4 show the condition ratings for the sanitary sewer gravity main piping and the sanitary sewer manholes (respectively).

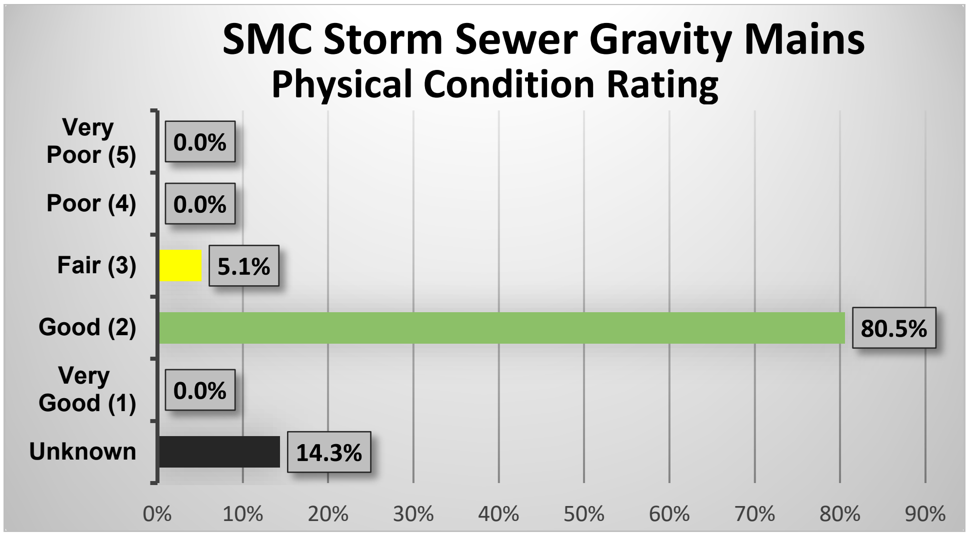

Figure 1 - Storm sewer gravity main physical condition rating

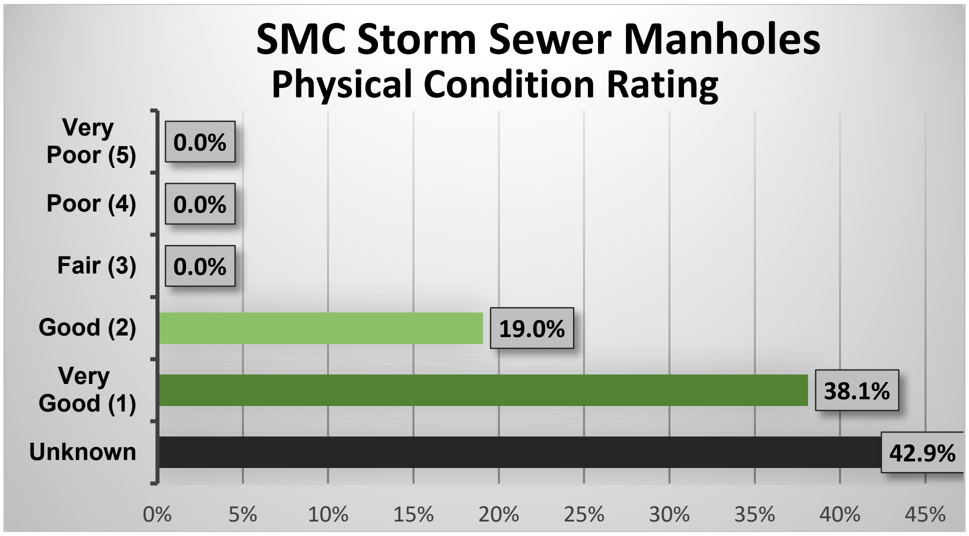

Figure 2 – Stormwater structure physical condition rating

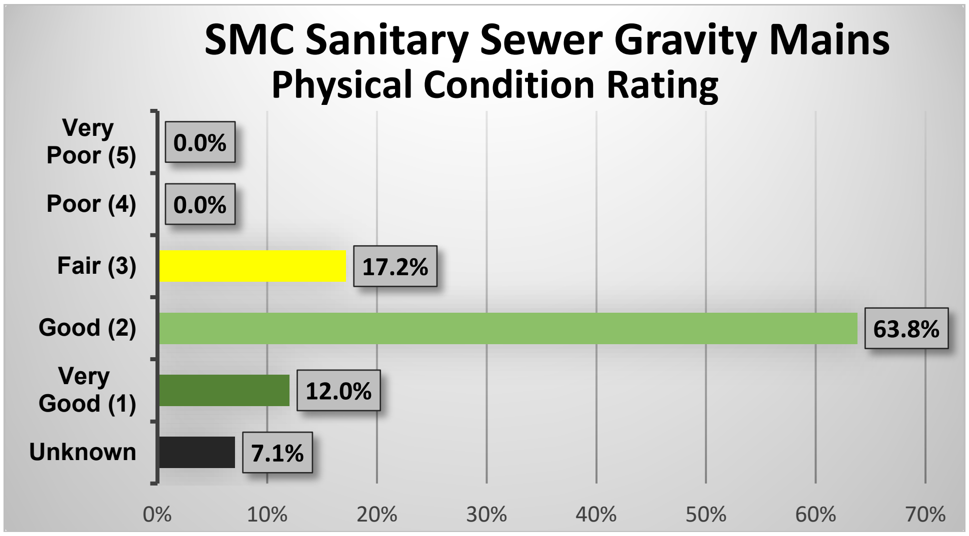

Figure 3 - Sanitary sewer gravity main physical condition rating

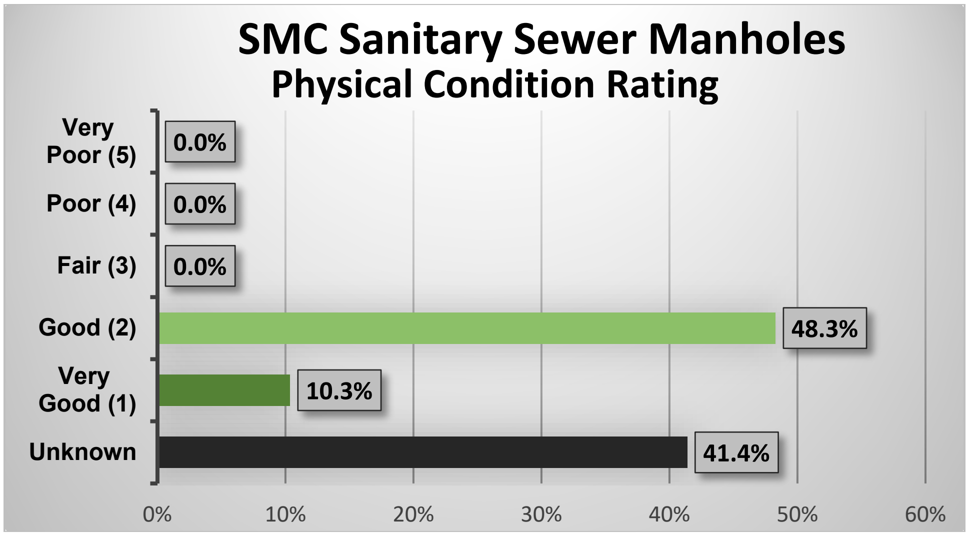

Figure 4 - Sanitary sewer manhole physical condition rating

The storm and sanitary assets with unknown physical condition were either unable to be physically or visually inspected due to size, location, inability to be opened, or they could not be found in the field. These assets were likely built with similar materials and installed at a similar time as other assets and were assumed to be in a similar condition.

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its users based on the owners's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 4 to define the desired level of service for the stormwater system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the environment.	Regular safety meetings – Monthly at a minimum. No MIOSHA safety violations.
Staff/Student Complaints	Provide excellent service.	Respond to staff/student complaints within 1 day and communicate through close of issue.
Response Time	Provide excellent service.	Respond to emergency calls within 4 hours at all times and non-emergency calls within 1 week during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from EGLE to all affected staff.
Collection System	Maintain the gravity sewers in good operating condition and prevent overflows and system back-ups.	All gravity storm sewers will be cleaned bi-annually.

Table 4 – Stormwater system level of service statements

The Asset Management Team developed the statements in Table 5 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the public health. Protect the environment.	Regular safety meetings – Monthly at a minimum.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	Ensure lids are installed on all manholes.
Staff/Student Complaints	Provide excellent service.	Respond to staff/student complaints within 1 day and communicate through close of issue.
Response Time	Provide excellent service.	Respond to emergency calls 4 hours at all times and non-emergency calls within 1 week during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from EGLE to all affected staff.
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review Dowagiac wastewater ordinances periodically – annually at a minimum.
Collection System	Maintain manholes and gravity sewers in good operating condition and prevent overflows and system back-ups.	All gravity sanitary sewers will be cleaned bi-annually.

Table 5 - Wastewater system level of service statements

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

C. Likelihood of Failure

For assets that were physically inspected, including gravity storm sewers, storm manholes, gravity sanitary sewers, and sanitary manholes, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 6. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section I.B. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 6.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 6 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

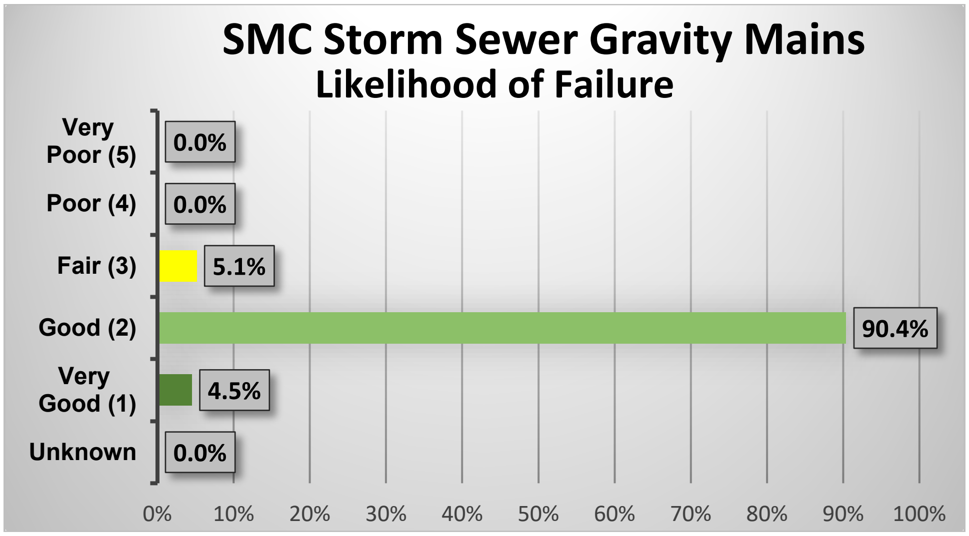

Figure 5 – Storm sewer gravity main Likelihood of Failure

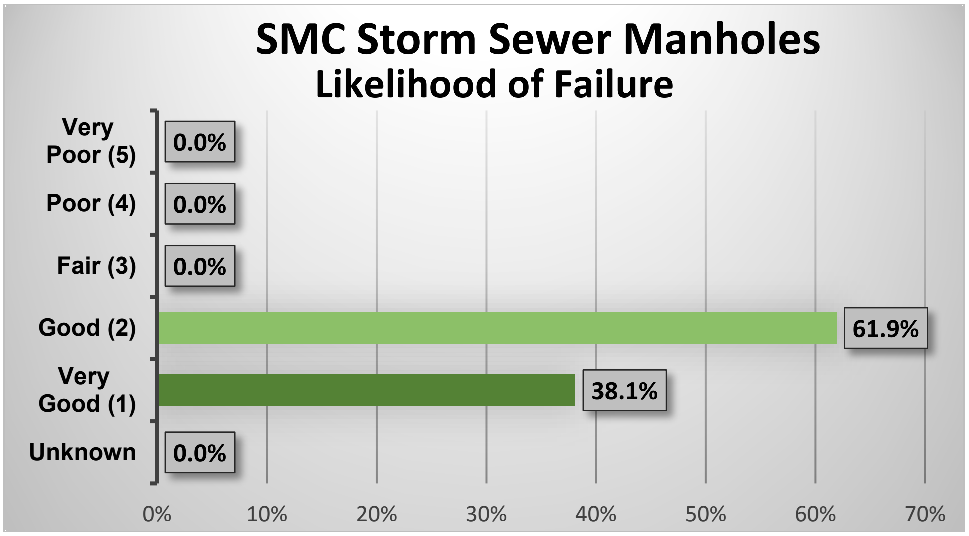

Figure 6 – Storm sewer manholes Likelihood of Failure

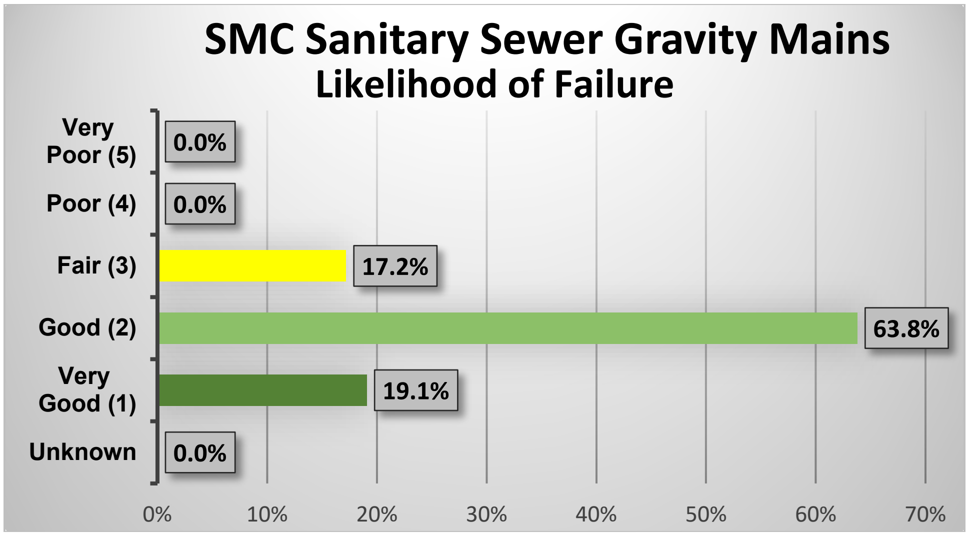

Figure 7 – Sanitary sewer gravity main Likelihood of Failure

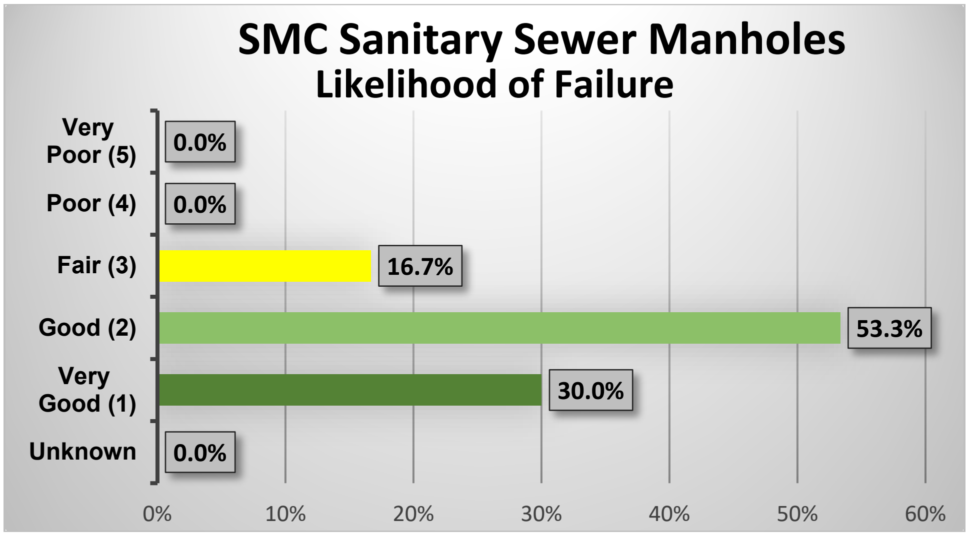

Figure 8 – Sanitary sewer manholes Likelihood of Failure

D. <u>Consequence of Failure</u>

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 7.

Consequence of Failure Rating	Social, Human, and Environmental Effects[1]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 7 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the stormwater and wastewater systems. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the stormwater and wastewater collection systems is shown in Figure 9 through Figure 12 below.

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[1] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

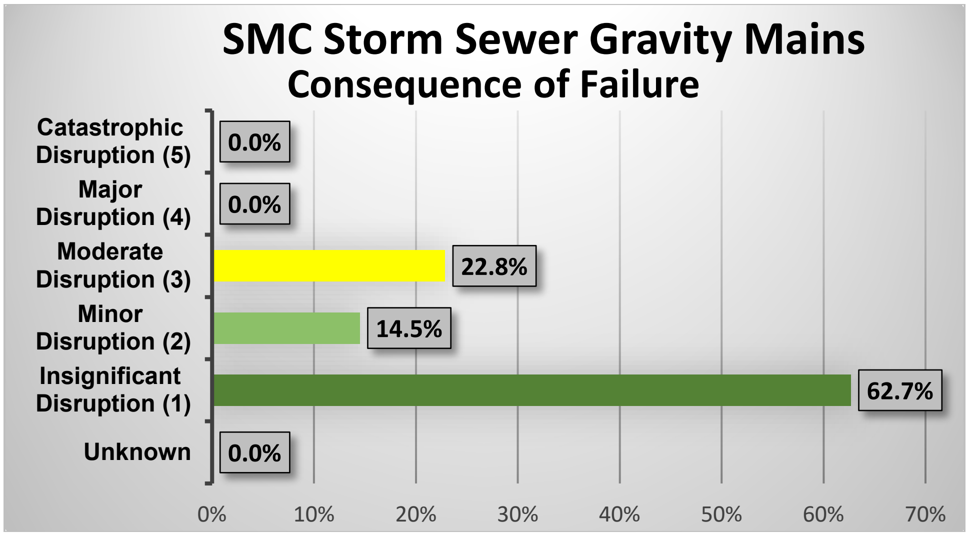

Figure 9 – Storm sewer gravity main consequence of failure rating

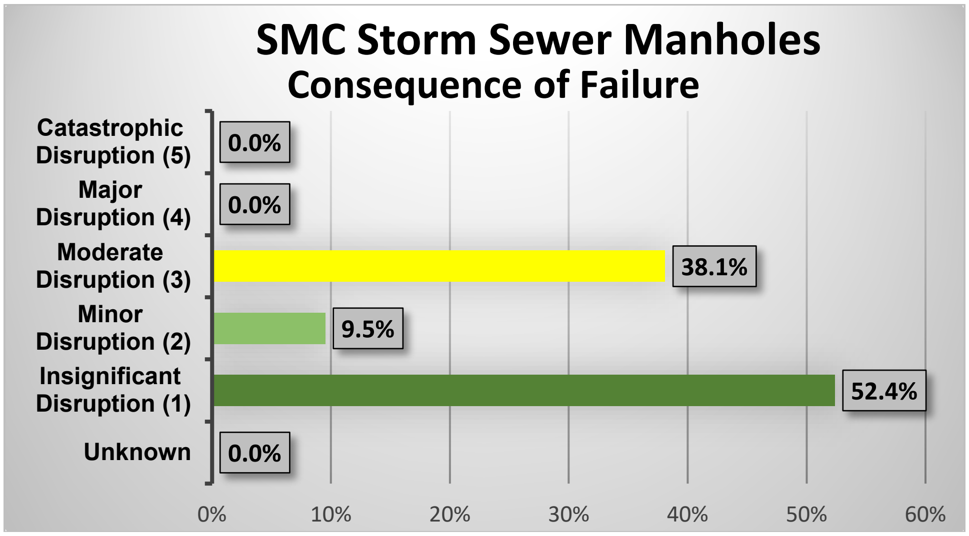

Figure 10 – Storm sewer manhole consequence of failure rating

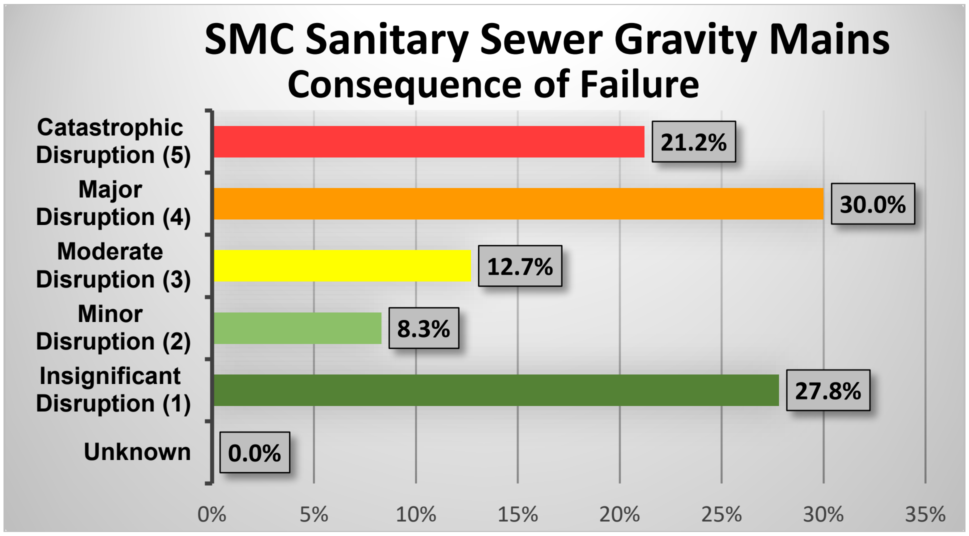

Figure 11 - Sanitary sewer gravity main consequence of failure rating

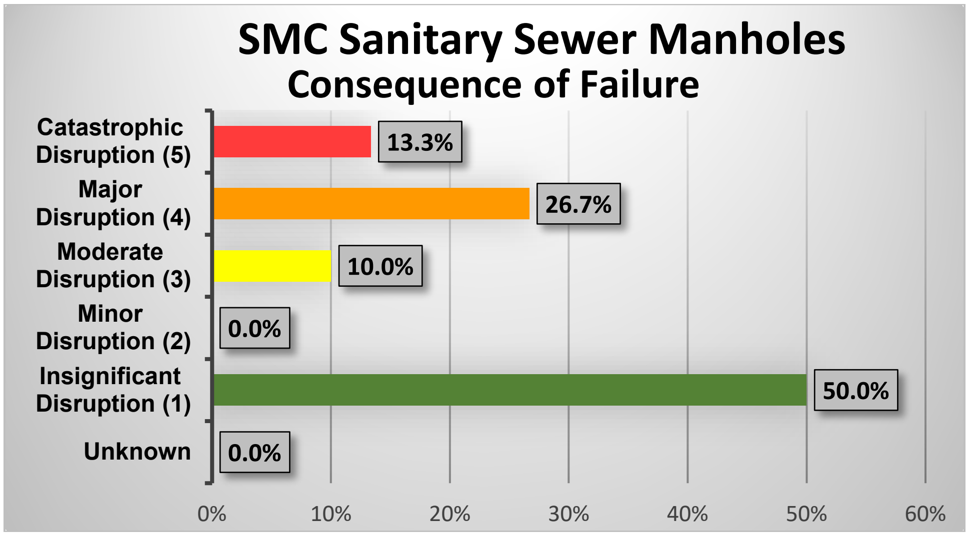

Figure 12 - Sanitary sewer manhole consequence of failure rating

The gravity sanitary sewer and manholes rated as 5 “Catastrophic Disruption” is due to the layout of the sanitary system. The collection system feeds through one pipe to the City of Dowagiac wastewater system, and therefore would have a significant effect on the SMC system if a failure were to occur in that area.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

One of the primary goals of Asset Management is to develop a long-term plan for revenues capable of supporting the required capital improvements in addition to routine O&M costs. However, due to the nature of this community, there is no dedicated stream of revenue allocated specifically for the stormwater and wastewater systems. Improvements to the storm sewer and sanitary sewer systems are funded as capital improvement projects and routine O&M costs are covered in the day-to-day operations of the DBG through the general fund.

Since there is no dedicated stream of regular revenue to the stormwater and wastewater systems, an in-depth asset management financial review (AMFR) could not be conducted. In addition, projections for the development of a revenue structure capable of supporting ongoing O&M and capital improvement costs cannot be developed as there are not dedicated rates for these services.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

E. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

F. Recommended Stormwater System Projects

Table 8 lists the recommended capital improvement projects over the next 20 years for the stormwater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix Where appropriate, the estimated project costs shown in Table 8 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 8 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Storm Sewer Replacement	$ 7,000
2	2025	Storm Sewer Replacement	$ 7,000
3	2028	Vacuum Catch Basin Sump	$ 6,000
4	2033	Trail Drainage Improvements	$ 51,000
5	2038	Vacuum Catch Basin Sump	$ 6,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 77,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) =	$ 98,000

Table 8 - Recommended stormwater system capital improvement projects

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

G. Recommended Wastewater System Projects

Table 9 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix. Where appropriate, the estimated project costs shown in Table 9 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 9 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2021	Replace Undersized Section	$ 4,000
2	2023	Sewer Cleaning	$ 9,000
3	2026	Cured in Place Pipe Lining	$ 10,000
4	2028	Sewer Cleaning	$ 9,000
5	2030	Polyurea Line Manhole	$ 4,000
6	2033	Sewer Cleaning	$ 9,000
7	2038	Sewer Cleaning	$ 9,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 54,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[3] costs) =	$ 68,000

Table 9 - Recommended wastewater system capital improvement projects

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[3] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **12/31/19**
(no later than 3 years from executed grant date)

The City of Wayland, Michigan *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1323-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Mr. Josh Eggleston at (269) 792-265 jeggleston@cityofwayland.org
Phone Number Email

12/16/19
Signature of Authorized Representative (Original Signature Required) Date

Josh Eggleston; City Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **November 15, 2019**
(no later than 3 years from executed grant date)

The City of Wayland, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1323-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Josh Eggleston at **(269) 792-2265** **jeggleston@cityofwayland.org**
Name Phone Number Email

12/16/19
Signature of Authorized Representative (Original Signature Required) Date

Mr. Josh Eggleston, City Manager
Print Name and Title of Authorized Representative

WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
City of Wayland, Michigan

Wastewater Sewer System

Date: December 12, 2019
To: Mr. Clarence Jones
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: City of Wayland: Summary of Wastewater Asset Management Plan

Grantee Information:
City of Wayland
103 S. Main St.
Wayland, MI 49348
Josh Eggleston: jeggelston@cityofwayland.org>
Mr. Josh Eggleston; City Manager
Ph: (269) 792-2265
SAW Project #: 1323-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$296,400	$125,300	$421,700

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

Wayland owns and operates a wastewater collection and treatment system consisting of nearly 17 miles of 6-inch through 24-inch gravity sewer pipe, more than 330 manholes, over 1,200 individual sewer service leads, and nearly 13,000 feet of 4-inch through 10-inch pressurized force mains. The bulk of the collection system is comprised of reinforced plastic and polyvinyl chloride (PVC) pipe and was installed beginning in the early 1970's. The system serves to convey an average of 359,000 gallons per day (gpd)[1] of wastewater from throughout the City to the Wayland Wastewater Treatment Facility (WWTF) for treatment. In addition to the pipes in the collection system, Wayland relies on one grinder lift station, three medium-sized sewage lift stations, and two large sewage lift stations to convey the wastewater through the system and to the WWTF. The City also manages and maintains another 3.8 miles of privately-owned gravity sewer and more than 80 privately-owned manholes.

The Wayland WWTF utilizes two well-mixed, high rate oxidation lagoons (Lagoon 1A and Lagoon 1B), followed by two partially mixed stabilization lagoons (Lagoon 2 and Lagoon 3) for biological treatment of the wastewater. Ferric chloride addition takes place between the two stabilization lagoons to chemically remove the remaining dissolved phosphorus from the wastewater by precipitating it in Lagoon 3. The effluent water from the lagoons is discharged to one of nine rapid infiltration beds (RIBs) which allow the substantially treated effluent water to be absorbed into the soil, where any remaining impurities are either retained by the soil or consumed by microorganisms in the soil. The treated water eventually works its way through the soil and into the groundwater under the infiltration beds. The majority of the WWTF was built in the early 1970's with a major upgrade and capacity expansion in 1999.

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[1] Annual average daily wastewater flow from January 2014 through April 2019 as recorded on the monthly Discharge Monitoring Reports filed with the Michigan Department of Environment, Great Lakes, and Energy by the WWTF.

Item	Quantity	Units
24-inch Sanitary Sewer	863	LF
18-inch Sanitary Sewer	1,330	LF
15-inch Sanitary Sewer	4,202	LF
12-inch Sanitary Sewer	2,290	LF
10-inch Sanitary Sewer	17,309	LF
8-inch Sanitary Sewer	63,017	LF
6-inch Sanitary Sewer	238	LF
20-inch Sewer Casing Pipe	102	LF
18-inch Sewer Casing Pipe	100	LF
4-foot Diameter Sanitary Manhole	332	EA
Service Lead, Complete	1,209	EA
Cleanout w/ Manhole Casting	10	EA
Flow Diversion Structure (Splash Pad)	1	EA
Lift Station – 500 gpm or Larger	2	EA
Lift Station – Less than 500 gpm	3	EA
Grinder Pump Station	1	EA
Lift Station Structures (Above Grade)	644	SF
Backup Generator – 100 kW or Larger	1	EA
Backup Generator – 30 to 90 kW	1	EA
Backup Generator – 25 kW or Smaller	1	EA
10-inch Force Main	8,902	LF
8-inch Force Main	244	LF
6-inch Force Main	2,086	LF
4-inch Force Main	1,456	LF
10-inch Gate Valve and Valve Box	1	EA
6-inch Control Valve w/ Vault	1	EA
Air Release Valve w/ Manhole	1	EA
Combination Air Release and Cleanout Manhole	2	EA
Force Main Cleanout w/ Manhole	9	EA

Table 1 - Wastewater collection system assets

Table 2, below and continued on the next page, contains a summary of the WWTF assets identified.

Item	Quantity	Units
Treatment Lagoon – Cell 1A	1.03	ACRE
Treatment Lagoon – Cell 1B	1.28	ACRE
Treatment Lagoon – Cell 2	16.00	ACRE
Treatment Lagoon – Cell 3	15.75	ACRE
WWTF Influent Flow Control Structure	1	LS
Lagoon 1A Discharge Structure	1	LS
Lagoon 1A Alternate Discharge Structure	1	LS
Lagoon 1B/Lagoon 2 Flow Control Structure	1	LS

Table 2 - Wastewater treatment facility assets

Item	Quantity	Units
Lagoon 2 Discharge/Lagoon 3 Influent Structure	1	LS
WWTF Effluent Flow Throttling Structure	1	LS
WWTF Effluent Flow Metering Structure	1	LS
20-inch Site Process Piping	1,362	LF
18-inch Site Process Piping	71	LF
16-inch Site Process Piping	3,818	LF
15-inch Site Process Piping	111	LF
12-inch Site Process Piping	67	LF
3/4-inch Chemical Pipe in 3-inch Carrier Pipe	84	LF
20-inch Gate Valve and Valve Box	1	EA
16-inch Gate Valve and Valve Box	18	EA
25 Horsepower Aerator	4	EA
5 Horsepower Aerator	2	EA
3 Horsepower Aerator	10	EA
Aerator Control System	1	EA
Chemical Feed Building	320	SF
Chemical Feed Equipment	1	LS
Chemical Feed Building Mechanical/Electrical	1	LS
Transformer and Site Electrical Equipment	1	LS
Filter/Infiltration Bed 1	3.29	ACRE
Filter/Infiltration Bed 2	3.44	ACRE
Filter/Infiltration Bed 3	3.37	ACRE
Filter/Infiltration Bed 4	3.40	ACRE
Filter/Infiltration Bed 5	3.33	ACRE
Filter/Infiltration Bed 6	3.40	ACRE
Filter/Infiltration Bed 7	3.40	ACRE
Filter/Infiltration Bed 8	3.69	ACRE
Filter/Infiltration Bed 9	3.43	ACRE
Monitoring Well	9	EA
Storage Garage	1,650	SF

Table 2 - Wastewater treatment facility assets (continued)

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman staff performed conditional assessments beginning with complete visual and physical inspection of all of the sanitary manholes in the wastewater collection system and visual and physical inspection coupled with performance testing at the two City-owned lagoons. Wightman staff also visually and physically inspected all of the assets at the lagoons.

All six lift stations owned and maintained by the City were inspected in detail and the equipment was assessed by Wightman employees, including drawdown testing to determine the condition of the pumping equipment and photographing the various assets comprising the lift station. Examples of some of these pictures are shown in Figure 7 through Figure 14. All photographs taken by Wightman employees are attached to the lift station assets in the GIS map and are accessible via the computer and tablets previously discussed.

During the field inspections discussed above, any manhole and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset’s remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 3.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 3 - NASSCO conditional assessment system

As previously mentioned, all the manholes in the wastewater collection system that could be located were physically inspected. They were rated using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 23 shows the condition ratings for the sanitary sewer manholes.

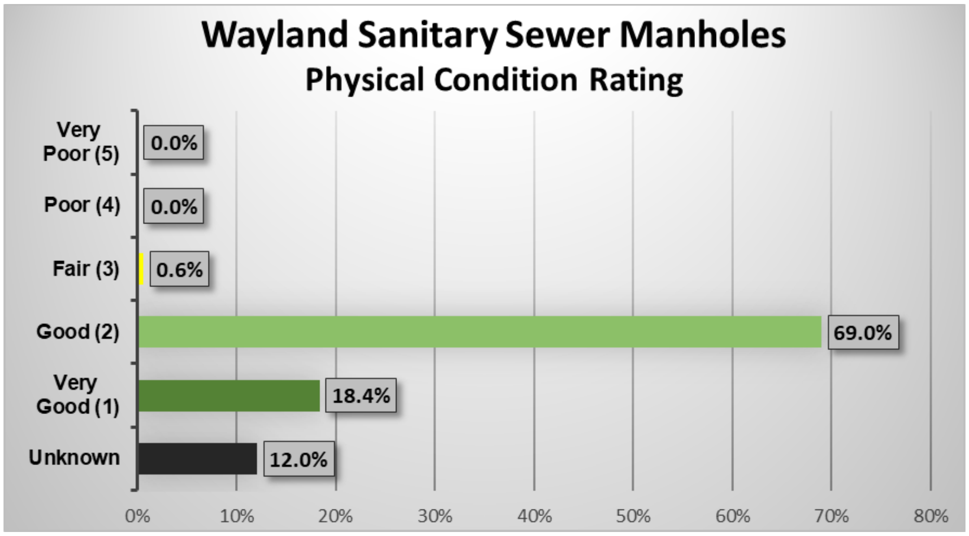

Figure 1 - Sanitary sewer manhole physical condition rating

Inspection at the lift stations included physical and visual inspections of all the major components along with drawdown tests to determine the performance of the pumping equipment, as previously discussed. Table 4 shows the design capacity, current pump rates, and the condition of the individual components of the lift stations.

Station	Pump Design Capacity (gpm)	Pump 1 Test Rate (gpm)	Pump 2 Test Rate (gpm)	Wet Well Condition	Pump Condition	Electrical & Controls Condition	Generator Condition
G.L.S.	150	173	888 *	Fair	Good	Fair	N/A
L.S. 1	1200	856	848	Good	Poor	Very Poor	Very Poor
L.S. 2	458	358	397	Good	Poor	Fair	Fair
L.S. 3	260	371	347	Good	Poor	Very Poor	N/A
L.S. 5	450	431	423	Fair	Good	Good	N/A
L.S. 7	820	835	700	Good	Fair	Poor	Poor

* There is no second pump in the Grinder Lift Station. The value input for the Pump 2 Test Rate on the Grinder Lift Station Row is the Pump 3 Test Rate for Lift Station 1.

Table 4 - Wastewater system lift station condition ratings

The Lagoons at the WWTF were tested to determine the amount of sludge that has collected at the bottom of the lagoons. In addition, all the equipment at the WWTF was visually and physically assessed. The resulting conditions of all the WWTF facilities and equipment are summarized in Table 5.

Equipment/Structure/Basin Name	Condition
Lagoon Cell 1A	Fair
Lagoon Cell 1B	Fair
Lagoon Cell 2	Fair
Lagoon Cell 3	Fair
Lagoon Aerators	Range from Very Good to Poor

Table 5 - Wastewater treatment facility condition ratings

Equipment/Structure/Basin Name	Condition
Aerator Controls	Poor
Influent Flow Control Structure	Very Poor
Influent Flow Control Valves	Very Poor
Lagoon 1A Discharge Structure	Good
Lagoon 1A Discharge Valve	Fair
Lagoon 1B Discharge Structure	Good
Lagoon 1B Discharge Valve	Fair
Lagoon 1B/Lagoon 2 Flow Control Structure	Good
Lagoon 1B/Lagoon 2 Flow Control Valves	Fair
Lagoon 2 Discharge/Lagoon 3 Influent Structure	Fair
Lagoon 2 Discharge/Lagoon 3 Influent Valves	Fair
Effluent Flow Throttling Structure	Good
Effluent Flow Throttling Valve	Poor
Effluent Flow Metering Structure	Good
Effluent Flow Meter	Poor
Site Process Piping	Good
Site Process Valves	Fair
Chemical Feed Building	Fair
Non-Potable Water System Pressure Tank	Poor
Non-Potable Water System Well Pump	Poor
Non-Potable Water System Piping	Good
Non-Potable Water System Valves	Fair
Chemical Feed Pump	Poor
Chemical Feed Piping	Good
Chemical Feed Valves	Fair
Chemical Feed Day Tank	Good
Chemical Feed Control Panel	Poor
Chemical Feed Bulk Storage Tank	Good
Chemical Transfer Pump	Very Poor
Chemical Transfer Piping	Good
Chemical Transfer Valves	Fair
Emergency Shower and Eye Wash	Poor
Chemical Feed Building Unit Heater	Poor
Transformer and Site Electrical Equipment	Poor
Filter Bed 1	Poor
Filter Bed 2	Good
Filter Bed 3	Good
Filter Bed 4	Fair
Filter Bed 5	Very Poor
Filter Bed 6	Good
Filter Bed 7	Fair
Filter Bed 8	Poor
Filter Bed 9	Very Poor
Monitoring Wells	Fair
Storage Garage	Fair

Table 5 - Wastewater treatment facility condition ratings (continued)

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 7 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	
Health and Safety	Provide a safe and injury free workplace. Protect the public health. Protect the environment.	Regular safety meetings – weekly at a minimum. No MIOSHA safety violations.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked at all times. All doors/entrances at WWTF will be locked at all times. All WWTF vaults will be padlocked at all times. Work with neighbors to create a "Neighborhood Watch" type program to enhance WWTF security.
Operator Certification and Training	Provisions for appropriately credentialed and experienced operators. Provide for opportunities for on-going professional development	City will maintain at least two "C" level operators at all times and will strive to ensure every senior DPW staff member is licensed. Certifications will be staggered such that not everyone's certification expires in the same year. Budget for and allow employees to attend at least one day of professional training or continuing education every year.

Table 6 - Level of service statements

Major Area	**Goals and Objectives**	**Level of Service Statements**
Administrative	Provide excellent customer service.	Produce accurate, timely billing. Review all discrepancies within one day. Have someone available between 8:00 a.m. and 5:00 p.m. Monday through Friday.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within two hours at all times and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within two hours at all times and non-emergency calls within one business day during normal business hours.
Reporting	Report any violations of permits and any other issues as required. Report all issues to City Manager. Report to City Council as requested.	Report violations within the timelines specified in the applicable permit. Report on a daily basis during normal business hours and report emergency issues as they occur.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Senior level DPW employees attend at least two continuing education programs annually. Route applicable correspondence from the EGLE to all affected staff.
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – annually at a minimum. Enforce provisions of wastewater ordinances.
Treatment Facility	Maintain all mechanical equipment – focus on preventative maintenance to prevent breakdowns. Treatment plant valve maintenance.	Maintain all mechanical equipment in accordance with Manufacturer's recommendations. Implement regular preventative maintenance program. Exercise all new valves annually (at a minimum) and look to replace old valves that are unreliable.

Table 7 - Level of service statements (continued)

Major Area	Goals and Objectives	Level of Service Statements
Emergency Power Source	Provide adequate emergency power in necessary locations.	Treatment facility shall have provisions for emergency power.
		Backup generators (permanent or mobile) shall be provided at all lift stations.
		Generators shall be maintained in accordance with Manufacturer's recommendations.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups:	
	Gravity sewers.	Gravity sanitary sewers will be cleaned on a rotational basis such that 20% of the system is cleaned annually resulting in the entire system being cleaned every five years.
	Force mains.	Force mains will be flushed annually with a sufficient volume to clean the entire main.
	Air release valves.	Air release valves will be maintained annually.
	Manholes and other structures.	Assess all wastewater system structures at least once every five years for issues in need of repair. Assess manholes in conjunction with the gravity sewer cleaning.
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent breakdowns.	Maintain all mechanical and electrical equipment in accordance with Manufacturer's recommendations.
		Visually inspect all components of each lift station weekly. Clean the equipment and verify it functions.
		Clean lift station wet wells quarterly to remove grease and sediment.
	Lift station valve maintenance.	Exercise new check valves and gate valves annually (at a minimum) and look to replace old valves that are unreliable.

Table 7 - Level of service statements (continued)

<u>Criticality of Assets:</u> *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including sanitary manholes, lift station components, and WWTP equipment, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 8. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets that were not physically assessed, such as the sanitary sewer gravity mains and force mains, was determined by the percentage of the useful life remaining for each asset in accordance with Table 8.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	15 to 29.9%
5	Very Poor	Less than 15%

Table 7 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.

- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 9.

Consequence of Failure Rating	Social, Human, and Environmental Effects[2]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 8 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater collection system is shown in Figure 31 through Figure 33 on the next page.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to help Wayland formulate policy in the areas of rate management, capital spending, and fund balance.

The AMFP is a living document. It is most effective as a tool used annually for budget and user rate decisions.

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[2] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

C. AMFP Methodology

A significant effort has been made by Wayland to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account. The AMFP is a four-step process:

1) Historical comparison with audits and budgets.
2) Test year, or normalized budget year, along with inflation assumptions for purposes of forecasting.
3) Proof of rate to revenue for reliance on customer data.
4) Cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance).

The analysis is a “cash basis” approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

1. Audit Comparison

One key indicator of financial health is found in Appendix F in the Comparative Statement of Net Position of the Sewer Fund. Wayland has maintained this cash and investment balance at around thirty months compared to the cash operating expenses. Management of the cash balance will be discussed further under Forecast – Cash Balance. The Sewer Fund audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (other than one-time expenditures).

2. Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

3. Proof of Rate to Revenue

Wayland bills its customers based on generally accepted methods. Customers are billed a ready-to-serve charge (RTS charge) based on meter size plus a commodity charge based on usage. The number of customers billed at the current rates tie to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

4. Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality as discussed previously. These are expenses not already included in the operating and maintenance budget. The forecast reflects a mix of cash-funding and debt-funding certain projects. This combination results in good maintenance of the cash balance and utilizing debt only when needed.

5. Forecast - Cash Balance

Our standard minimum target of cash and investment to operating expenses (net of depreciation) is six months. This minimum target is higher for a system of this size. Due to the size of the system and extent of capital improvements forecasted, the cash balance target is around fifteen months. With the right mix of cash and debt-funding capital improvements, and inflationary rate increases, the system will be able to maintain an adequate amount of cash to respond to unforeseen events.

6. Forecast - Rate Management

The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The cash flow forecast demonstrates a rate track with an immediate increase of $4.25 to the RTS charge and a $0.75 increase to the commodity charge with another increase of $3.00 to the RTS charge and $0.35 to the commodity charge for the start of the 2020/21 fiscal year. For each of the following two years there will be a $2.00 increase to the RTS charge and a $0.35 increase to the commodity charge followed by annual increases of 3.00% per year thereafter. Annual increases are highly recommended to keep up with expected rising expenses over time. If the City decides not to fund the additional preventative maintenance, the rate track looks identical to the rate track described above, except the immediate rate increase drops to $4.00 for the RTS charge and $0.50 to the commodity charge. All rate increases afterwards are the same as described above.

7. Management Summary

Rates (with preventative maintenance): Increase RTS charge and commodity charge as follows, respectively; $4.25 and $0.75 immediately, $3.00 and $0.35 for fiscal year 2020/21, $2.00 and $0.35 for each of the following two years, with annual inflationary increases of 3.00% per year thereafter (preliminary assumption). This will need to be updated as bonds are issued and final capital improvement scopes are defined.

Rates (without preventative maintenance): Increase RTS charge and commodity charge as follows, respectively; $4.00 and $0.50 immediately, $3.00 and $0.35 for fiscal year 2020/21, $2.00 and $0.35 for each of the following two years, with annual inflationary increases of 3.00% per year thereafter (preliminary assumption). This will need to be updated as bonds are issued and final capital improvement scopes are defined.

Cash Balance: Target of fifteen months compared to cash operating expenses over forecast period.

Capital Improvements: A mix of cash and debt funding in order to manage rates and cash effectively over time.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

D. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

E. Recommended Wastewater System Projects

Table 11 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 11 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 11 are in current costs (no inflation) unless otherwise noted.

Priority	CIP/Budget Year	Project Name	Estimated Cost
1	2019	Purchase a New Vactor Truck	$ 500,000
2	2019	Lift Station Telemetry Replacement	$ 32,000
3	2019	Chemical Transfer Pump Replacement	$ 3,000
4	2019	Lagoon 3 Aeration Timer Replacement	$ 7,000
5	2019	Lift Station and WWTF Rehabilitation - Study and Design	$ 315,000
6	2019	2019 Lift Station Cyclical Equipment Replacement	$ 134,000
7	2019	2019 WWTF Cyclical Equipment Replacement	$ 81,000
8	2020	Replace Half of Customer Water Meters - 2020	$ 200,000
9	2020	Final Lagoon Effluent Throttling Valve Replacement	$ 20,000
10	2020	Lift Station 3 Rehabilitation	$ 180,000
11	2020	Lift Station 1 - Lift Station and Force Main Replacement	$ 2,274,000
12	2020	Wastewater Treatment Facility Influent Manhole and Lagoon 1A Inlet	$ 107,000
13	2020	2020 WWTF Cyclical Equipment Replacement	$ 25,000
14	2021	Replace Half of Customer Water Meters - 2021	$ 200,000
15	2021	2021 Lift Station Cyclical Equipment Replacement	$ 147,000

Table 9 - Recommended wastewater system capital improvement projects

Priority	CIP/Budget Year	Project Name	Estimated Cost
16	2021	2021 WWTF Cyclical Equipment Replacement	$ 25,000
17	2022	Construction of New City Hall and Police Department Building	$ 200,000
18	2022	2022 WWTF Cyclical Equipment Replacement	$ 3,000
19	2023	Clean and Televise Concrete Interceptor Sewers	$ 13,000
20	2023	Grinder Lift Station Improvements	$ 16,000
21	2023	Lift Station 2 Improvements	$ 74,000
22	2023	Lift Station 5 Improvements	$ 10,000
23	2023	Lift Station 7 Improvements	$ 36,000
24	2023	Eliminate Lagoon 1B Short-Circuiting	$ 59,000
25	2023	2023 Lift Station Cyclical Equipment Replacement	$ 56,000
26	2024	Replace Gravity Sewer in Front of Wayland High School	$ 134,000
27	2024	Line Sanitary Manholes With Hydrogen Sulfide Damage	$ 47,000
28	2024	2024 Lift Station Cyclical Equipment Replacement	$ 4,000
29	2025	Wastewater Treatment Facility Electrical Feed Relocation	$ 193,000
30	2025	Replace Chemical Building and Garage Roofs	$ 15,000
31	2025	2025 WWTF Cyclical Equipment Replacement	$ 3,000
32	2026	Lagoon 1A Alternate Outlet Discharge Valve	$ 20,000
33	2026	Lagoon 3 Eastern Bank Reinforcement	$ 168,000
34	2026	2026 Lift Station Cyclical Equipment Replacement	$ 4,000
35	2027	Miscellaneous Manhole Repairs	$ 23,000
36	2028	2028 Lift Station Cyclical Equipment Replacement	$ 7,000
37	2028	2028 WWTF Cyclical Equipment Replacement	$ 3,000
38	2029	Lagoon Sludge Removal	$ 719,000
39	2029	2029 WWTF Cyclical Equipment Replacement	$ 21,000
40	2030	Manhole Root Removal and Joint Repair	$ 10,000
41	2031	2031 Lift Station Cyclical Equipment Replacement	$ 19,000
42	2031	2031 WWTF Cyclical Equipment Replacement	$ 3,000
43	2032	2032 Lift Station Cyclical Equipment Replacement	$ 4,000
44	2033	2033 Lift Station Cyclical Equipment Replacement	$ 112,000
45	2034	2034 WWTF Cyclical Equipment Replacement	$ 6,000
46	2035	Manhole Casting Adjustments and Repairs	$ 3,000
47	2036	2036 Lift Station Cyclical Equipment Replacement	$ 21,000
48	2037	2037 WWTF Cyclical Equipment Replacement	$ 3,000
49	2038	2038 WWTF Cyclical Equipment Replacement	$ 23,000
50	2039	2039 WWTF Cyclical Equipment Replacement	$ 79,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 6,361,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[3] costs) =	$ 6,827,000

Table 11 - Recommended wastewater system capital improvement projects (continued)

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[3] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

WIGHTMAN
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Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
City of Wayland, Michigan

Storm Water System

Date: December 12, 2019
To: Mr. Clarence Jones
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: City of Wayland: Summary of Storm Water Asset Management Plan

Grantee Information:
City of Wayland
103 S. Main St.
Wayland, MI 49348
Josh Eggleston: jeggelston@cityofwayland.org>
Mr. Josh Eggleston; City Manager
Ph: (269) 792-2265
SAW Project #: 1323-01
Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP)

1) Asset Inventory and Condition Assessment
2) Level of Service
3) Criticality of Assets
4) Capital Improvement Plan
5) Asset Management Financial Plan and Revenue Structure

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS)

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$296,400	$125,300	$421,700

Stormwater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

Wayland owns and operates a storm water collection and retention system consisting of over 14.5 miles of gravity sewer pipes ranging in diameter from 6-inch up to 54-inch and almost 800 buried structures (storm sewer manholes and storm water inlet structures). Several of the inlet structures are stand-alone or interconnected leaching basins, providing some local storm water storage and allowing the storm water to infiltrate directly into the ground. The remainder of the pipes and inlet structures serve to convey storm water to one of the 62 different public and private storm water discharge points throughout the City. Through these points, the storm water is discharged to one of the 21 public or privately-owned storm water retention basins that are operated by the City or to various other open ditches, waterways, or wetlands throughout the City.

In addition to the publicly owned portions of the storm water collection and retention system, the City also manages and maintains another 5.2 miles of privately-owned gravity storm sewer pipes and more than 200 privately-owned manholes and inlet structures. The storm water collection and retention system has been built over time, with known-age sections installed beginning in 1972 and continuing through today. There are also many sections of unknown age, which likely predate the 1972 portions of the system.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all storm water system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the storm water collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the storm water collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.

Table 1 contains a summary of the storm water system assets identified.

Item	Quantity	Units
54-inch Storm Sewer	879	LF
48-inch Storm Sewer	585	LF
36-inch Storm Sewer	1,902	LF
30-inch Storm Sewer	3,296	LF
27-inch Storm Sewer	715	LF
24-inch Storm Sewer	6,024	LF
21-inch Storm Sewer	2,599	LF
20-inch Storm Sewer	160	LF

Table 1 – Storm water system assets

Item	Quantity	Units
18-inch Storm Sewer	7,261	LF
16-inch Storm Sewer	178	LF
15-inch Storm Sewer	9,822	LF
12-inch Storm Sewer	34,036	LF
10-inch Storm Sewer	2,458	LF
8-inch Storm Sewer	4,471	LF
6-inch Storm Sewer	630	LF
Unknown Diameter Storm Sewer	2,443	LF
48-inch Storm Water Culvert	45	LF
12-inch Storm Water Culvert	179	LF
Unknown Diameter Storm Water Culvert	424	LF
12-inch Underdrain Pipe	155	LF
8-inch Underdrain Pipe	2,153	LF
6-inch Underdrain Pipe	335	LF
24-inch Storm Sewer Casing Pipe	110	LF
12-inch Storm Sewer Casing Pipe	108	LF
Open Storm Water Drain	12,076	LF
4-foot Diameter Storm Manhole	177	EA
Storm Water Inlet Structure	547	EA
Storm Water Leaching Basin	54	EA
Storm Water Discharge Point	33	EA
Storm Water Retention Pond – swDT-3	0.30	ACRE
Storm Water Retention Pond – swDT-4	1.53	ACRE
Storm Water Retention Pond – swDT-5	1.00	ACRE
Storm Water Retention Pond – swDT-6	1.99	ACRE
Storm Water Retention Pond – swDT-7	2.19	ACRE
Storm Water Retention Pond – swDT-9	1.55	ACRE
Storm Water Retention Pond – swDT-10	0.27	ACRE
Storm Water Retention Pond – swDT-11	0.63	ACRE
Storm Water Retention Pond – swDT-20	0.04	ACRE
Storm Water Retention Pond – swDT-21	0.03	ACRE

Table 1 – Storm water system assets (continued)

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Manholes and inlet structures that were able to be located were visually assessed and photographed by Wightman employees as depicted in Figure 1 through Figure 6. All the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

During the field inspections discussed above, any manhole or basin defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, all the manholes and inlet structures in the storm water collection system that could be located were physically inspected. They were rated using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 13 shows the condition ratings for the storm water manhole and inlet structures.

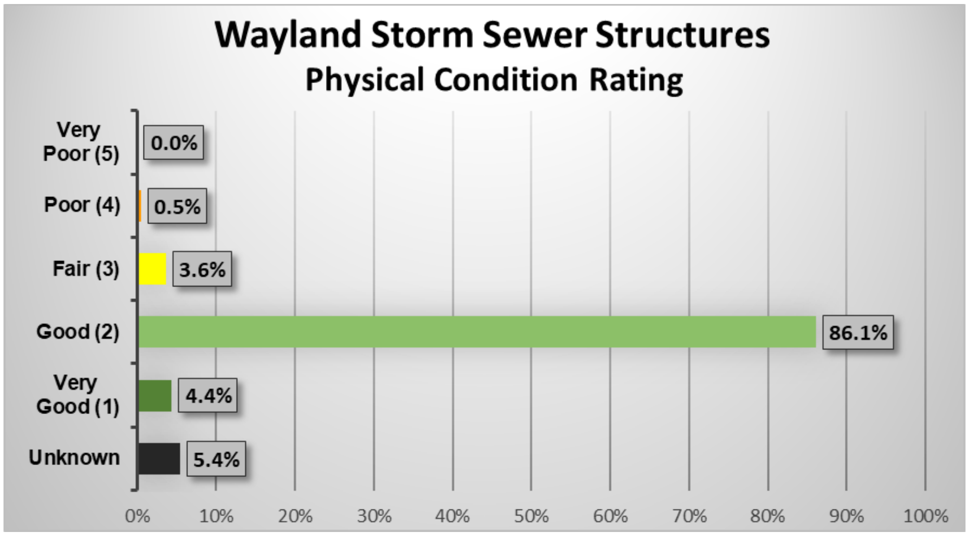


Figure 1 – Storm water structure physical condition rating

Inspection at the retention facilities included physical and visual inspections of all the major components, as previously discussed. All the components that able to be inspected were generally found to be in fair to good condition.

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the storm water system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 4 to define the desired level of service for the storm water system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free work place. Protect the public health. Protect the environment.	Regular safety meetings – weekly at a minimum. No MIOSHA safety violations.
Administrative	Provide excellent customer service.	Have someone available between 8:00 a.m. and 5:00 p.m. Monday through Friday.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within one day during normal business hours and communicate through close of issue.

Response Time	Provide excellent customer service.	Respond to emergency calls within two hours at all times and non-emergency calls within one business day during normal business hours.
Reporting	Report all issues to City Manager. Report to City Council as requested.	Report on a daily basis during normal business hours and report emergency issues as they occur.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Senior level DPW employees attend at least two continuing education programs annually. Route applicable correspondence from EGLE to all affected staff.

Table 3 - Level of service statements

Major Area	**Goals and Objectives**	**Level of Service Statements**
Rules and Regulations	Monitor and enforce all storm water provisions in the ordinances.	Review storm water provisions periodically – annually at a minimum. Enforce provisions of storm water ordinances.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups:	
	Gravity sewers.	Gravity sanitary sewers will be cleaned on a rotational basis such that 20% of the system is cleaned annually resulting in the entire system being cleaned every five years.
	Manholes and inlets.	Assess manholes and inlets in conjunction with the gravity sewer cleaning.

Table 4 - Level of service statements (continued)

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including storm manholes and inlet structures and the retention basins, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 5. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets that were not physically assessed, such as the storm sewer gravity mains, was determined by the percentage of the useful life remaining for each asset in accordance with Table 5.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 4 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.

- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a storm water asset, social costs and/or the costs of collateral damage caused by the failure can even outweigh the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 6.

Consequence of Failure Rating	Social Effects	Collateral Damage Effects
1 (Insignificant)	Minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	Minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	Limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	Moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	Extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 5 - Consequence of failure rating scheme for storm water assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the storm water system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the storm water collection system is shown in Figure 19 and Figure 20 below and on the following page.

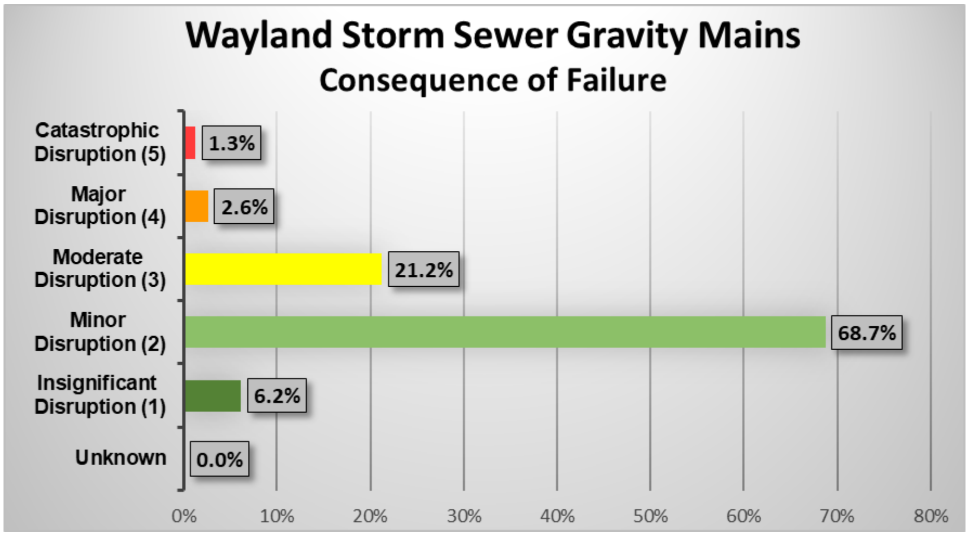
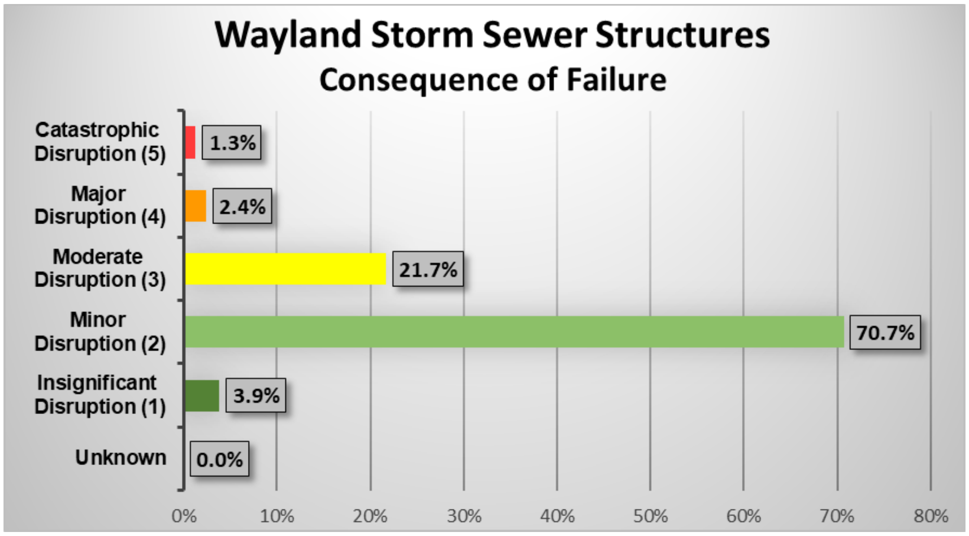


Figure 2 – Storm sewer gravity main consequence of failure rating



Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

As previously mentioned, one of the primary goals of an AMP is to develop a long-term plan for revenues capable of supporting the required capital improvements in addition to routine O&M costs. However, unlike a sanitary sewer AMP, where a source of revenue exists from sanitary sewer user fees, stormwater systems have no separate stream of revenue. Improvements to the stormwater system are usually funded as a part of a street improvement project and routine O&M costs are covered in the day-to-day operations of the Village. As such, an in-depth asset management financial review (AMFR) cannot be conducted and a revenue structure cannot be developed for the stormwater system.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Storm Water System Projects

Table 8, on the next page, lists the recommended capital improvement projects over the next 20 years for the storm water collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. The costs shown in Table 8 only include restoration of areas disturbed by installation of storm system assets. Thus, if the City desires to repave an entire street, instead of just patching the areas where storm sewer assets are installed, additional funds will be necessary to pay for the additional pavement. Where appropriate, the estimated project costs shown in Table 8 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 8 are in current costs (no inflation) unless otherwise noted.

In addition to the capital projects listed in Table 8, there were several assets (manholes and catch basins) that were not able to be located during the field work by Wightman staff. It is possible that these assets were covered in snow, are buried, paved over, not in the location indicated on the plans, or that they do not exist. Since the storm system was not televised, there was no independent verification as to whether they exist. It is recommended that the City DPW devote some time and effort to locating these assets, assessing them, and determining if there is the need for a capital project to address any further defects. Alternately, if the DPW staff determines these assets do not exist, they should be removed from the GIS model. The list of assets that were not located by Wightman staff is included in Appendix C.

Priority	CIP Year	Project Name	Estimated Cost
1	2019	Geneva Drive, Marlo Lane, and Galaxy Estates Upgrades	$ 169,000
2	2020	Drainage Issues at Plum Street and S. Locust Street	$ 25,000
3	2020	E. Elm Street Storm Sewer Extension	$ 324,000
4	2021	Park Street - Elm Street to Dahlia Street	$ 808,000
5	2022	S. Main Street Improvements (Locust to Pine)	$ 733,000
6	2023	New City Hall and Police Department	$ 38,000
7	2023	Pearl Street North of W. Sycamore Street	$ 176,000
8	2024	Miscellaneous Storm Structure Repairs	$ 17,000
9	2024	Upgrades to Sib Rumery from S. Locust St. to Meadow Dr.	$ 145,000
10	2025	W. Superior St. between S. Main St. and Church St.	$ 295,000
11	2026	Open Channel Ditch Maintenance on Reno Drive	$ 63,000
12	2027	Leaching Basins in Alley North of Superior Street	$ 61,000
13	2028	Park Street Extension to Cherry Street	$ 88,000
14	2029	Storm Structure Lining - 2029	$ 40,000
15	2030	Storm Structure Lining - 2030	$ 24,000
16	2031	Storm Structure Lining - 2031	$ 23,000
17	2032	Storm Structure Lining - 2032	$ 25,000
18	2033	Storm Structure Lining - 2033	$ 20,000
19	2034	Storm Structure Lining - 2034	$ 20,000
20	2035	Storm Structure Lining - 2035	$ 21,000
21	2036	Storm Structure Lining - 2036	$ 24,000

Total Estimated Project Cost for 20 Year CIP (current dollars) = $ 3,139,000
Total Estimated Project Cost for 20 Year CIP (inflation adjusted[1] costs) = $ 3,398,000

Table 6 - Recommended storm water system capital improvement projects

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[1] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **12/31/19**
(no later than 3 years from executed grant date)

The Village of Galien, Michigan *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1327-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Mr. Ken Chappell at *(269) 545-3647* *vofgalien@sbcglobal.net*
Phone Number Email

12/18/2019
Signature of Authorized Representative (Original Signature Required) Date

Ken Chappell; Village President
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 18, 2019**
(no later than 3 years from executed grant date)

The Village of Galien, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1327-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ___________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Ken Chappell	at	**(269) 545-3647**	**vofgalien@sbcglobal.net**
Name		Phone Number	Email

12/18/2019

Signature of Authorized Representative (Original Signature Required) Date

Mr. Ken Chappell, Village President

Print Name and Title of Authorized Representative

W+ WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Galien, Michigan

Storm Water Sewer System

Date: December 12, 2019
To: Mr. Clarence Jones
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Village of Galien - Summary of Storm Water Asset Management Plan

Grantee Information:
Village of Galien
121 S. Cleveland Ave.
Galien, MI 49113
Ken Chappell: vofgalien@sbcglobal.net
Mr. Ken Chappell; President
Ph: (269) 545-3647
SAW Project #: 1327-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$385,000	$162,000	$547,000

Storm Water Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The Village of Galien storm water system consists of 19,743 feet of gravity pipe, 61 of manholes, 93 inlet structures, and 5 discharge points.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all storm water system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the storm water collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the storm water collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.
Table 1 contains a summary of the storm water system assets identified.

Item	Quantity	Units
20-inch Storm Sewer	131	LF
15-inch Storm Sewer	1,614	LF
12-inch Storm Sewer	6,558	LF
10-inch Storm Sewer	1,738	LF
8-inch Storm Sewer	3,421	LF
6-inch Storm Sewer	478	LF
Unknown	5,803	LF
4-foot Diameter Storm Manhole	61	EA
Stormwater Inlet Structure	93	EA
Stormwater Discharge Point	5	EA

Table 1 – Storm water system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman performed limited conditional assessments on the manholes and inlet structures within the storm water collection system, including photographing them, as depicted in .. In addition, a large portion of the gravity storm piping was inspected using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging[1]. CCTV services were provided by Corby Energy Services, Inc (CES). All the CCTV videos and pipe reports and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

During the field inspections discussed above, any manhole and/or pipe defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, the gravity storm sewer piping was televised by CES. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman employees using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 1 and Figure 2 show the condition ratings for the storm water gravity main piping and the storm water structures (respectively).

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[1] Pipes with severe structural issues that could be exacerbated or cause complete failure due to the cleaning associated with CCTV activities and pipes younger than 20 years old were not televised.

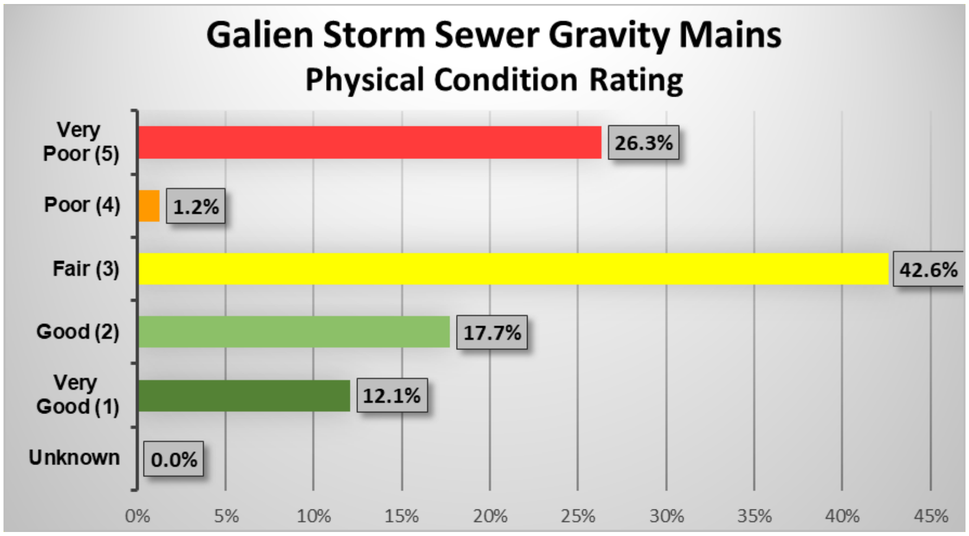

Figure 1 - Storm sewer gravity main physical condition rating

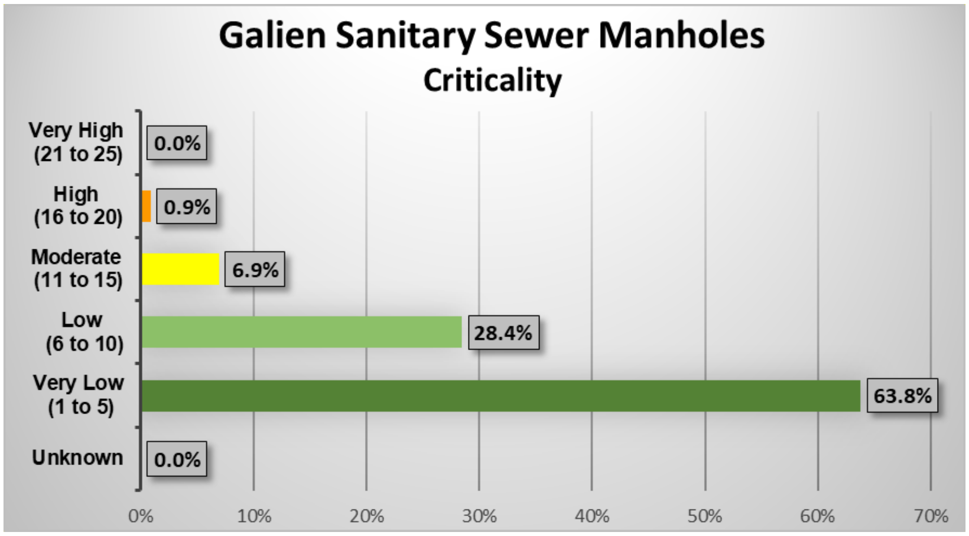

Figure 2 – Storm water structure physical condition rating

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the storm water system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 3 to define the desired level of service for the storm water system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the environment.	Regular safety meetings – monthly at a minimum. No MIOSHA safety violations.
Administrative	Provide excellent customer service.	Any administrative functions as part of the storm water system?
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within a 24-hour time frame and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within 1-hour time frame at all times and non-emergency calls within 24-hour time frame during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from EGLE to all affected staff.
Master Planning	All construction shall conform to the requirements of the Storm Water Master Plan.	Enforce the provisions of the Storm Water Master Plan.
Collection System	Maintain the gravity sewers in good operating condition and prevent overflows and system back-ups.	Gravity storm sewers will be cleaned on a rotational basis such that 20% of the system is cleaned annually resulting in the entire system being cleaned every 5 years.
Financial	Establish a revenue stream to operate and maintain the storm water system.	Explore options for storm sewer system funding.
Operating Reserves	Establish sufficient reserves to cover anticipated major expenses.	Once a funding stream is identified, maintain a minimum of six months' operating expenses in reserve accounts.

Table 3 - Level of service statements

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity storm sewers, storm manholes and inlet structures, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 4. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section .. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 4.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 4 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a storm water asset, social costs and/or the costs of collateral damage caused by the failure can even outweigh the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 5.

Consequence of Failure Rating	Social Effects	Collateral Damage Effects
1 (Insignificant)	Minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	Minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	Limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	Moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	Extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 5 - Consequence of failure rating scheme for storm water assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the storm water system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the storm water collection system is shown in Figure 3 and Figure 4 below.

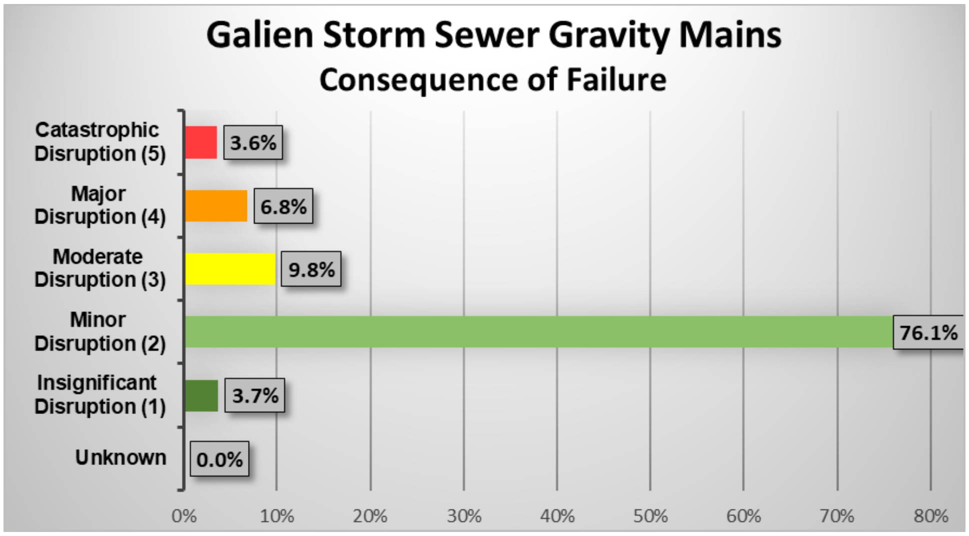

Figure 3 – Storm sewer gravity main consequence of failure rating

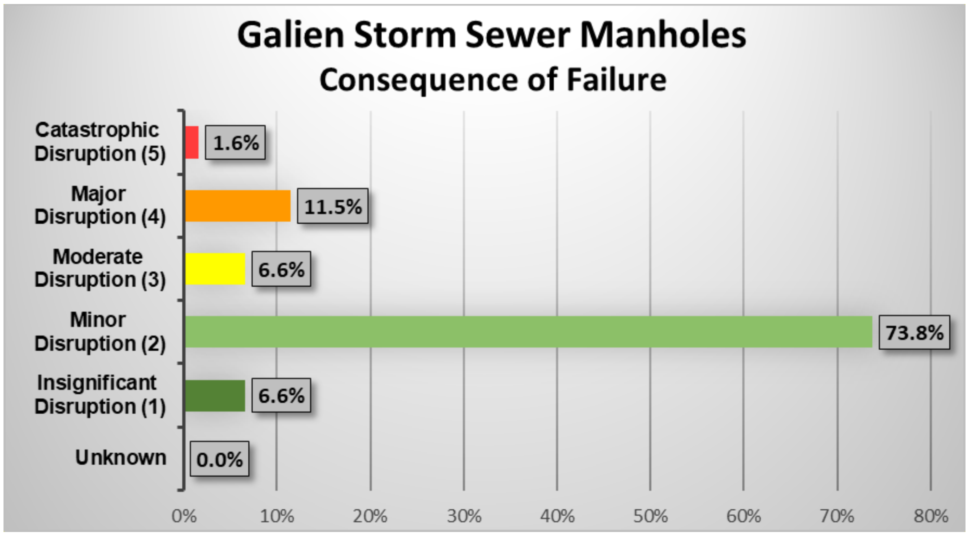

Figure 4 – Storm sewer manhole consequence of failure rating

Figure 3 and 10 show that the Village of Galien storm sewer system is laid out in such a way that there aren't many opportunities for catastrophic disruptions.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

As previously mentioned, one of the primary goals of Asset Management is to develop a long-term plan for revenues capable of supporting the required capital improvements in addition to routine O&M costs. However, unlike a sanitary sewer AMP, where a source of revenue exists from sanitary sewer user fees, most storm water systems have no separate stream of revenue. Improvements to the storm sewer system are usually funded as a part of a street improvement project and routine O&M costs are covered in the day-to-day operations of the DPW.

Such is the case for the Village of Galien. Since there is no stream of regular revenue to the storm sewer system, an in-depth asset management financial review (AMFR) cannot be conducted. In addition, projections for the development of a revenue structure capable of supporting ongoing O&M and capital improvement costs cannot be developed.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Storm Water System Projects

Table 6 lists the recommended capital improvement projects over the next 20 years for the storm water collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix. Where appropriate, the estimated project costs shown in Table 6 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 6 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Pipe Replacement Project	$ 42,000
2	2021	Lining Project 2	$ 151,000
3	2022	Pipe Lining Cleveland Ave	$ 113,000
4	2025	Pipe Lining Project 3	$ 124,000
5	2026	Spot Repairs	$ 57,000
6	2027	Manhole Maintenance and Repair	$ 17,000
7	2030	Pipe Lining Project 4	$ 78,000
8	2030	Pipe Replacement 2nd Street	$ 21,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 603,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) =	$ 671,000

Table 6 - Recommended storm water system capital improvement projects

The repairs included in these 8 projects are to keep the system functioning as it was designed to.

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Galien, Michigan

Wastewater Sewer System

Date: December 12, 2019
To: Mr. Clarence Jones
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Village of Galien - Summary of Wastewater Asset Management Plan

Grantee Information:
Village of Galien
121 S. Cleveland Ave.
Galien, MI 49113
Ken Chappell: vofgalien@sbcglobal.net
Mr. Ken Chappell; President
Ph: (269) 545-3647
SAW Project #: 1327-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$385,000	$162,000	$547,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The Village of Galien operates a wastewater collection system serving customers in the Village of Galien. The collection system consists of almost six miles of gravity sewer pipe ranging from 8-inch to 15-inch pipe and one- and three-quarter miles of pressurized force main in 4-inch and 8-inch diameter varieties. The gravity sewers work in conjunction with three lift stations to convey the wastewater from the village to the village's lagoons for treatment. The collection system includes 116 manholes and over 350 individual service leads or taps.

The treatment lagoons were installed in June of 1978 and have been functioning as expected. In order to keep the lagoons up to par with the current level of service, some work will have to be done to the eroding banks as well as the influent structure that is quickly degrading from the abundance of hydrogen sulfide.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the wastewater collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional info contains a summary of the wastewater system assets identified.

Item	Quantity	Units
15-inch Sanitary Sewer	2,704	LF
12-inch Sanitary Sewer	231	LF
10-inch Sanitary Sewer	5,625	LF
8-inch Sanitary Sewer	21,973	LF
4-foot Diameter Sanitary Manhole	116	EA
Lift Station – Less than 500 gpm	3	EA
8-inch Force Main	8,198	LF
4-inch Force Main	1,126	LF

Table 1 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Manholes were visually assessed and photographed by Wightman employees as depicted in. Most of the gravity sewer piping was inspected using closed-circuit televising (CCTV) equipment designed for use in sewer pipes[1]. CCTV services were provided by Corby Energy Services, Inc (CES). All the CCTV videos and pipe reports and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

All three lift stations owned and maintained by the Village of Galien were inspected in detail and the equipment was assessed by Wightman employees, including drawdown testing to determine the condition of the pumping equipment and photographing the various assets comprising the lift station. All photographs taken by Wightman employees are attached to the lift station assets in the GIS map and are accessible via the computer and tablets previously discussed.

All the equipment at the treatment lagoons was also inspected in detail by Wightman employees including photographing the various assets comprising the treatment system. Examples of some of these pictures are shown in .through .. As with the lift stations and manholes, all photographs taken by Wightman employees are attached to the treatment plant assets in the GIS map and are accessible via the computer and tablets discussed previously.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.
The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both

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[1] Pipes with severe structural issues that could be exacerbated or cause complete failure due to the cleaning associated with CCTV activities and pipes younger than 20 years old were not televised.

structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, the gravity sanitary sewer piping was televised by CES. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman employees using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 1 and Figure 2 show the condition ratings for the sanitary sewer gravity main piping and the sanitary sewer manholes (respectively).

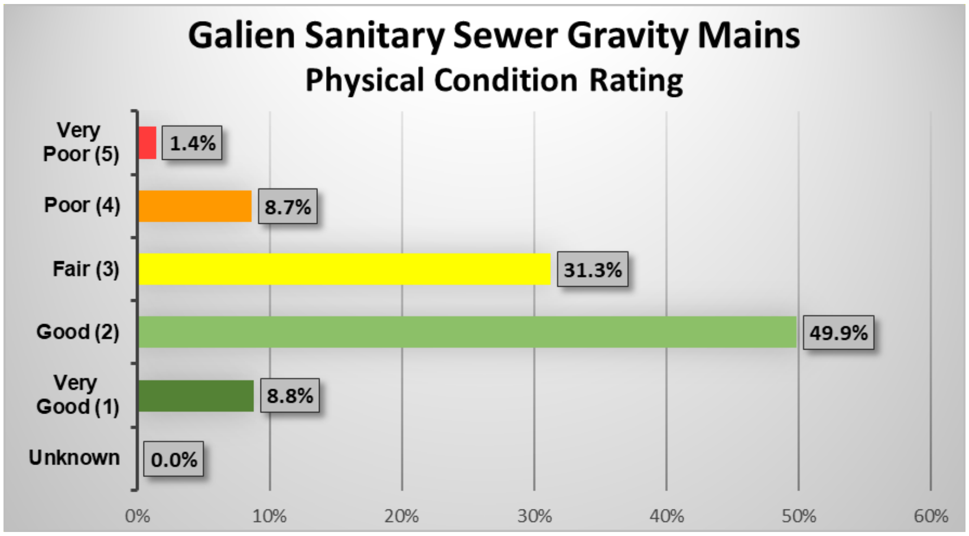

Figure 1 - Sanitary sewer gravity main physical condition rating

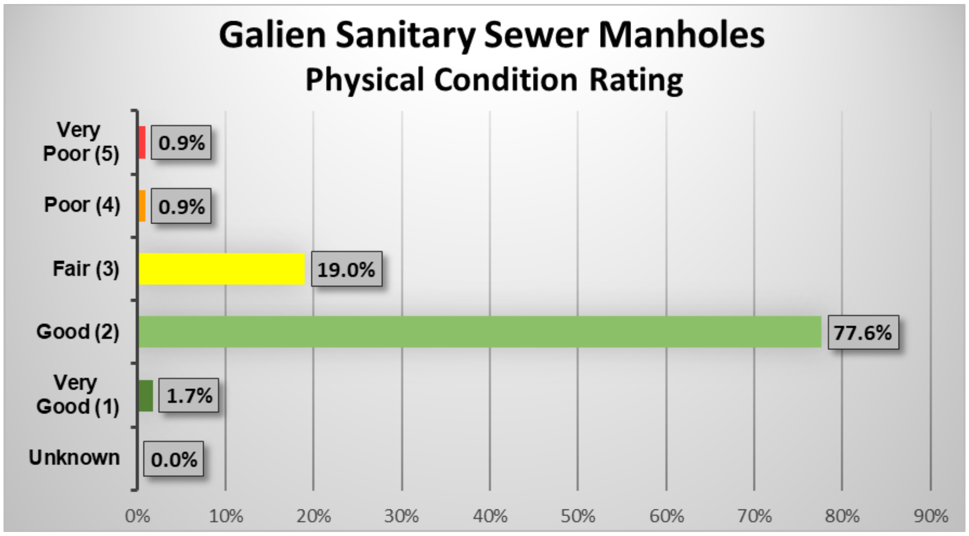

Figure 2 - Sanitary sewer manhole physical condition rating

As seen on the above charts, 21% of the manholes were unable to be physically inspected due to the inability to locate or access them. Although a physical inspection was not able to be done, based on known materials, it could be reasoned that the rest of the manholes are made of precast.2)

Inspection at the lift stations included physical and visual inspections of all the major components along with drawdown tests to determine the performance of the pumping equipment, as previously discussed. Table 3 shows the design capacity, current pump rates, and the condition of the individual components of the lift stations.

Station	Pump Design Capacity (gpm)	Pump 1 Test Rate (gpm)	Pump 2 Test Rate (gpm)	Design Head (ft)	Wet Well Condition	Pump Condition	Electrical & Controls Condition	Generator Condition
1	108	171.2	184	35.2	Good	Good	Good	N/A
2	350	661.5	531.15	49.65	Good	Very Good	Good	N/A
3	140	126.8	135.29	17.3	Good	Good	Good	N/A

Table 3 - Wastewater system lift station condition ratings

All the equipment at the lagoons was visually and physically assessed and the resulting conditions of all of the lagoon equipment are summarized in Table 4.

Treatment Process	Equipment Name	Condition
Influent Structure	ssMH-101	Very Poor
Control Structure	Control Structure	Fair
Cell 1	Lagoon 1	Fair
Cell 2	Lagoon 2	Fair
Cell 3	Lagoon 3	Fair
Discharge	Discharge Sewer Outfall	Good
Site Overall		

Table 4 - Wastewater treatment lagoons asset condition ratings

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 5 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	
Health and Safety	Provide a safe and injury free workplace. Protect the public health. Protect the environment.	Regular safety meetings – Monthly at a minimum.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels, wet wells, vaults, and gates at the treatment lagoons will be padlocked at all times.
Administrative	Provide excellent customer service.	Produce accurate, timely billing.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within twenty-four hours and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within one hour at all times and non-emergency calls within twenty-four during normal business hours.
Reporting		Provide the board with monthly reports
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs including regional and annual meetings as appropriate. Route applicable correspondence from EGLE to all affected staff.

Table 5 - Level of service statements

Major Area	Goals and Objectives	Level of Service Statements
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – annually at a minimum. Enforce provisions of wastewater ordinances.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are enough to meet wastewater budget annually. Review sewer rates every year.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months' operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Treatment facility shall have provisions for emergency power.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Force mains. Air release valves. General System Maintenance.	Gravity sanitary sewers will be cleaned on a rotational basis such that 20% of the system is cleaned annually resulting in the entire system being cleaned every 5 years.
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown.	Maintain all mechanical and electrical equipment weekly. Visually inspect all components of each lift station weekly. Clean the equipment and verify it functions. Clean lift station wet wells annually or as needed to remove grease and sediment. Exercise check valves and gate valves annually (at a minimum).

Table 5 - Level of service statements (continued)

<u>Criticality of Assets:</u> *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, lift station components, and treatment lagoons, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 6. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 6.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 6 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.

- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 7.

Consequence of Failure Rating	Social, Human, and Environmental Effects[2]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 7 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater collection system is
shown in Figure 3 through Figure 5 below.

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[2] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

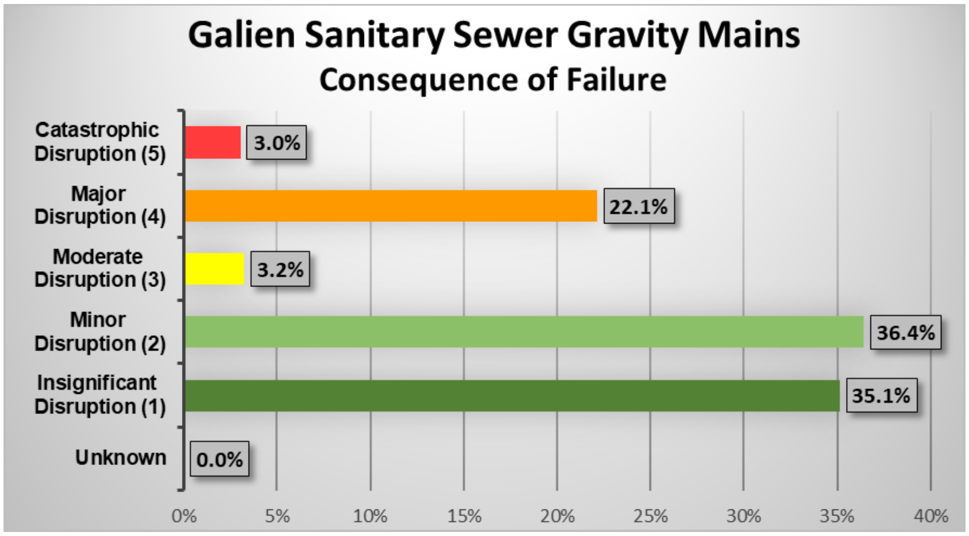

Figure 3 - Sanitary sewer gravity main consequence of failure rating

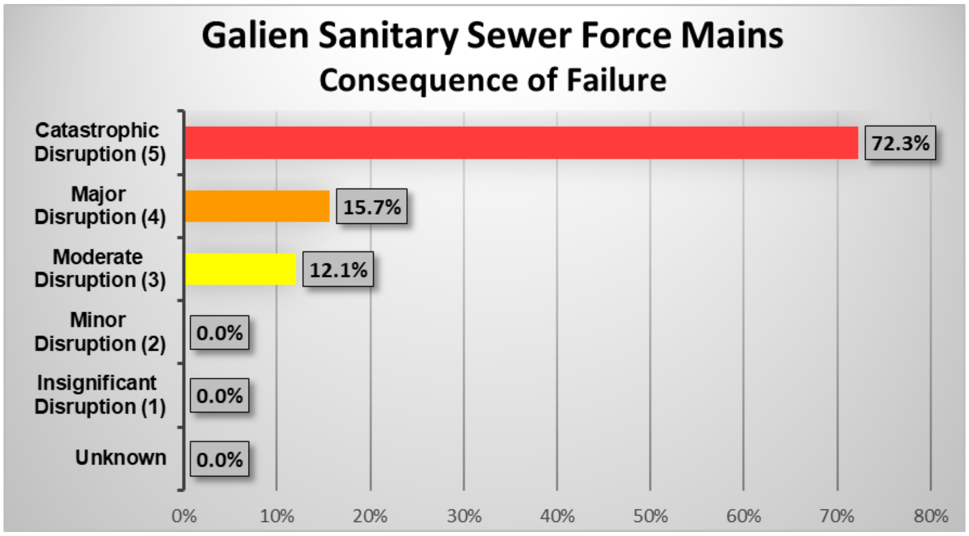

Figure 4 - Sanitary sewer force main consequence of failure rating

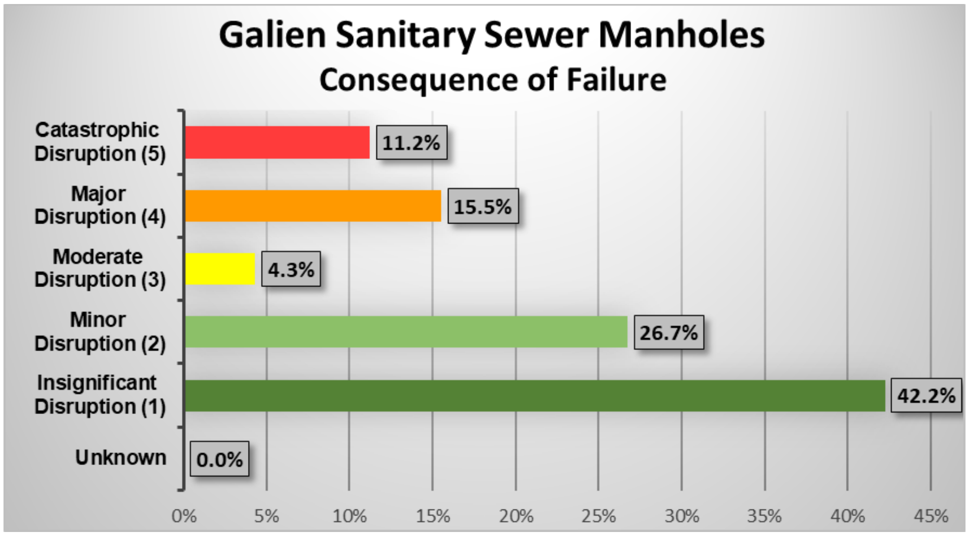

Figure 5 - Sanitary sewer manhole consequence of failure rating

While Figure 4 may appear alarming, due to the large amount of force main that shows as red (“Catastrophic Disruption”), it is noted that this is due to the layout of the Galien sanitary sewer system. Most of the force main length in the system is the discharge of Lift Station 2, which convey the sewage from the majority of the Village to the Treatment Lagoons. As such, a failure of one of these force mains would result in a nearly 90% loss of service. This force main represents 88% of the total force main length in the Galien sanitary sewer system and, as such, 88% of the force main shows as having a catastrophic consequence of failure. It is further stressed that the consequence of failure rating does not suggest in any way whether an asset is likely to fail, only the consequences of such a failure

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A significant effort has been made by the Village and their consulting engineers to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account.
The AMFP is a four step process: 1) historical comparison with audits and budgets, 2) test year, or normalized budget year, along with inflation assumptions for purposes of forecasting, 3) proof of rate to revenue for reliance on customer data, and 4) cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance). The analysis is a “cash basis” approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

Audit Comparison

One key indicator of financial health is the cash and investments found in the Comparative Statement of Net Position of the Sewer Fund. The Village has maintained this cash and investment balance at around four years compared to the cash operating expenses. Management of the cash balance will be discussed further under Forecast – Cash Balance.
The Sewer Fund audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (excluding one-time expenditures).

Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

Proof of Rate to Revenue

The customers are billed based on residential equivalent units. The number of residential equivalent units billed at the current rates tie to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. These are expenses not already included in the operating and maintenance budget. The forecast reflects a mix of cash-funding and debt-funding certain projects. This combination results in good maintenance of the cash balance and utilizing debt only when needed.

Forecast - Cash Balance

Our standard minimum target of cash and investments to operating expenses (net of depreciation) is six months. This minimum target is higher for a system of this size. Due to the size of the system and extent of capital improvements forecasted, the cash balance target is around three years. With the right mix of cash and debt-funding capital improvements, and inflationary rate increases, the system will be able to maintain an adequate amount of cash to respond to unforeseen events.

Forecast - Rate Management

The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The cash flow forecast demonstrates a rate track with annual increases of 3.50% per year. Annual increases are highly recommended to keep up with expected rising expenses over time.

Management Summary

- Rates: annual increases of 3.50% per year (preliminary assumption). This will need to be updated as bonds are issued and capital improvements are better known.
- Cash Balance: target of three years compared to cash operating expenses over forecast period.
- Capital Improvements: a mix of cash and debt funding in order to manage rates and cash effectively over time.
-

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.

- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Wastewater System Projects

Table 8 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix. Where appropriate, the estimated project costs shown in Table 8 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 8 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Pipe Lining Project 1	$ 71,000
2	2021	Adjust Castings of Various Manholes Throughout the System	$ 7,000
3	2022	Spot Lining Project 1	$ 51,000
4	2023	Lift Station Safety Project	$ 23,000
5	2024	Clean ssGM86	$ 3,000
6	2025	Pipe Lining Project 2	$ 73,000
7	2026	Treatment Lagoon Improvements	$ 985,000
8	2030	Lift Station Controls Install Project	$ 63,000
9	2030	Pipe Spot Liner Project 2	$ 58,000
10	2032	Pump Replacement at Lift Station 1	$ 36,000
11	2035	Treatment Lagoon Sludge Removal	$ 2,147,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 3,517,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[3] costs) =	$ 4,526,000

Table 8 - Recommended wastewater system capital improvement projects

A large portion of the capital cost consists of work,

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[3] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **November 13, 2019**
(no later than 3 years from executed grant date)

The Coloma Charter Township, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1328-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ **No**]
   If No - Date of the rate methodology approval letter: 5/14/19
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ms. Laura Baumeister at **(269)** 468-7212 lbaumeister@colomatownship.org
Name Phone Number Email

November 19, 2019
Signature of Authorized Representative (Original Signature Required) Date

Mr. Kenneth Parrigin, Township Supervisor
Print Name and Title of Authorized Representative

WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Coloma Charter Township, Michigan

Wastewater Sewer System

Date: October 24, 2019
To: Mr. David Worthington
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Coloma Charter Township: Summary of Wastewater Asset Management Plan

Grantee Information:
Coloma Charter Township
4919 Paw Paw Lake Road
Coloma, MI 49038
Laura Baumeister <lbaumeister@colomatownship.org>
Mr. Kenneth Parrigin; Supervisor
Ph: (269) 927-2251
SAW Project #: 1328-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

		Sanitary	Total
1)	Total Grant:	$745,000	$745,500
2)	Less: Match	$ 74,500	$ 74,500
3)	Net Grant:	$670,500	$670,500

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

Coloma Charter Township owns and operates a sanitary sewer collection system located in Coloma Township, Berrien County, in South Western Michigan. The Township system consists of approximately 1,800 service lead taps, 140,000 feet of gravity main, 14,000 feet of force main, 602 manholes, and 14 lift stations. The ‘core” of the Township system was constructed in the 1970s and consists of vitrified clay pipe and pre-cast manholes. Through service area extensions the Township system has expanded. Newer extensions are mainly constructed of PVC pipe. The Township system discharges to the Paw Paw Lake Area Wastewater Treatment Plant (PPLA WWTP) through interceptor running along the Paw Paw River. In addition to the Township, the PPLA WWTP also treats wastewater from City of Coloma, City of Watervliet and Watervliet Township. On average the Township discharges approximately 115,000,000 gallons annually to the PPLA WWTP.

The PPLA WWTP was constructed in 1973 and is located at 4689 Defield Road, Coloma Michigan. It provides secondary and tertiary wastewater treatment services to the four municipalities listed above. The facility is governed by an eight-member board of directors formed by two members appointed by each of the four municipalities.

With a thorough knowledge of the basic layout of the Coloma Township collection system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman staff performed conditional assessments beginning with complete visual and physical inspection of all of the sanitary manholes in the wastewater collection system and visual and physical inspection coupled with performance testing at a portion of the fourteen Township wastewater lift stations. In addition, a majority of the gravity sewer pipe in the wastewater system was videoed using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging.

During the field inspections, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects. Grades for both structural and operation and maintenance defects were assigned based on the severity of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical grading system uses numbers ranging from 1 (superficial or very minor defects) to 5 (defect requiring immediate action).

Once field inspections were completed for each asset and individual defects were graded, an overall condition rating was applied to each asset, again using a numerical system ranging from 1 (very good condition) to 5 (very poor condition). Overall condition ratings for pipes were based on NASSCO Pipeline Assessment Certification Program methodology. Overall condition ratings for manholes were based on NASSCO Manhole Assessment Certification Program Level 1 inspection methodology. Overall condition ratings for lift stations were based on physical inspection of the major components and drawdown testing to determine the performance of the pumping equipment.

Condition Rating	Description
1	New or Excellent (Very Good)
2	Minor Deterioration (Good)
3	Moderate Deterioration (Fair)
4	Significant Deterioration (Poor)
5	Unserviceable (Very Poor)

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future.

As with all components of the AMP, defining the desired level of service will be an ongoing process. The Asset Management Team developed the statements in Table 5 to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the public health. Protect the environment.	Regular safety meetings and certifications renewals as needed. First Aid and Confined Space Entry training. No MIOSHA violations and MSDS sheets readily available.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked at all times. Vehicular protection at most facilities. Fencing enclosers around lift stations as needed.
Administrative	Provide excellent customer service.	Produce accurate, timely billing. Bi-annual review of commercial and industrial customer classifications. Have someone available Monday through Friday between 9:00am and 5:00pm Provide continent and accessible processes for customers to make payments and submit requests.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within 48hr and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within 4hr at all times and non-emergency calls within 1hr during normal business hours.

Table 1 - Level of service statements

Major Area	Goals and Objectives	Level of Service Statements
Reporting	Follow all EGLE requirements	Understand and meet EGLE requirements.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend two continuing education programs annually or as required for certifications. Route applicable correspondence from the EGLE to all affected staff.
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances bi-annually at a minimum. Enforce provisions of wastewater ordinances.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are sufficient to meet wastewater budget annually and are inline with Asset Management Plan projections. Review sewer rates every three years and in coordination with the PPLA WWTP.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Backup generators shall be provided at all lift stations. A portable generator shall be provided. Generators shall be run regularly and maintained annually.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: • Gravity sewers. • Force mains. • Air release valves. • Manholes.	Gravity sanitary sewers will be cleaned on a rotational basis such that 25% of the system is cleaned annually resulting in the entire system being cleaned every 4 years. Force mains shall be flushed as needed. Increasing back pressures on the pumps may indicate the need for flushing. All manholes and air release valves shall be visually inspected annually.

Table 5 - Level of service statements (continued)

Major Area	Goals and Objectives	Level of Service Statements
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown. Lift station valve maintenance.	Maintain all mechanical and electrical equipment as needed. Visually inspect each lift station daily. Clean lift station wet wells to remove grease and sediment annually or as needed. Exercise all check valves and gate valves twice annually (at a minimum).

Table 5 - Level of service statements (continued)

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, and lift station components the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 6. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 6.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 2 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 7.

Consequence of Failure Rating	Social, Human, and Environmental Effects[1]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 3 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database.

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[1] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to help the Township formulate policy in the areas of rate management, capital spending, and fund balance.
The AMFP is a living document. It is most effective as a tool used annually for budget and user rate decisions.

C. AMFP Methodology

A significant effort has been made by the Township to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account. The AMFP is a four-step process:

1) Historical comparison with audits and budgets.
2) Test year, or normalized budget year, along with inflation assumptions for purposes of forecasting.
3) Proof of rate to revenue for reliance on customer data.
4) Cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance).

The analysis is "cash basis" approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

1. Audit Comparison

One key indicator of financial health is found in the Comparative Statement of Net Position of the Sewer Fund: "Cash and cash equivalents." the Township has maintained this cash and investment balance well for the size of their system. The cash and investments balance has exceeded 12 months compared to operating expenditures for the past few years. Management of the cash balance will be discussed further below under Forecast - Cash Balance. The Sewer Fund audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and corresponding annual operating expenses (other than one-time expenditures).

2. Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for the maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

3. Proof of Rate to Revenue

The Township bills its customers based on generally accepted methods. Customers are charged based on the residential equivalent unit (REU) method. The number of REU's billed tie to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

4. Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality as discussed previously. These are expenses not already included in the operating and maintenance budget. The forecast reflects a mix of cash-funding and debt-funding certain projects. The combination results in good maintenance of the cash balance and utilizing debt only when needed.

5. Forecast - Cash Balance

Our standard minimum target of cash and investment to operating expenses (net of depreciation) is six months. This minimum target is higher for a system of this size. Due to the size of the system and extent of capital improvements forecasted, the cash balance target is around nine to twelve months. With the right mix of cash and debt-funding capital improvements, and inflationary rate increases, the system will be able to maintain an adequate amount of cash to respond to unforeseen events.

6. Forecast - Rate Management

- The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The cash flow forecast demonstrates the need for a one-time rate increase of $17.95 in the quarterly REU charge in 2020/21.
- An additional increase of 3.65%, in the quarterly REU charge, per year beginning in 2021/22.
- Cash Balance: maintain cash balances between nine and twelve months compared to cash operating expenses over the forecast period.
- Capital Cost: a mix of cash and debt funding approach in order to manage rates and cash effectively over time as modeled in the cash flow analysis.

Annual increases are highly recommended to keep up with expected rising expenses over time due to inflationary forces.

7. Management Summary

Rates: increase by $17.95 per quarter for fiscal year 2020/21 with inflationary increases of 3.65% per year, thereafter (preliminary assumption). This will need to be adjusted as bonds are issued and capital improvements are better known.

Cash Balance: target of nine – twelve months compared to cash operating expenses over forecast period.
Capital Improvements: a mix of cash and debt funding in order to manage rates and cash effectively over time.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

I. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

II. Recommended Wastewater System Projects

Table 9 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 9 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 9 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Lift Station Replacements and Improvements Project	$2,317,000
2	2020	Manhole Lining Project	$27,000
3	2020	Pipe Lining Project	$42,000
4	2020	Spot Lining Project	$71,000
5	2021	2nd Street Spot Repair	$11,000
6	2021	Manhole Casting Adjustments and Replacements	$24,000
7	2021	Miscellaneous Manhole Repairs	$10,000
8	2022	Replace Crew Pickup Truck	$40,000
9	2022	SCADA System	$64,000
10	2023	Lift Station 13 Pump Replacements	$47,000
11	2024	Lift Station No. 10 Replacement	$385,000
12	2025	DPW Building Expansion	$116,000
13	2029	Replace Crew Truck with Crane Truck	$80,000
14	2032	Long Term Sanitary Sewer and Manhole Repairs - 2032	$60,000
15	2034	Long Term Sanitary Sewer and Manhole Repairs - 2034	$60,000
16	2036	Long Term Sanitary Sewer and Manhole Repairs - 2036	$60,000
17	2037	Lift Station 11 Rehabilitation	$65,000
18	2037	Lift Station 12 and 13 Rehabilitation	$123,000
19	2038	Lift Station No. 1 Replacement	$710,000
20	2040	Lift Station Rehabilitation - System Wide	$819,000
21	2040	Long Term Sanitary Sewer and Manhole Repairs - 2040	$ $60,000

Total Estimated Project Cost for 20 Year CIP (current dollars) = $ 5,191,000

Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) = $ 6,130,000

Table 4 - Recommended wastewater system capital improvement projects

Capital projects for year 2020 are intended to be bundled into a single USDA-RD bond issue and construction will take place in the 2020 construction year. If available, USDA-RD funds will be used to complete subsequent projects in the same year.

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

The table on the following page contains a summary of the Township's Assets:

Item	Quantity	Units
24-inch Sanitary Sewer	4,594	LF
18-inch Sanitary Sewer	3,952	LF
15-inch Sanitary Sewer	6,934	LF
12-inch Sanitary Sewer	9,624	LF
10-inch Sanitary Sewer	36,881	LF
8-inch Sanitary Sewer	76,494	LF
Sanitary Manholes	602	EA
Service Lead Taps	1,799	EA
Lift Station	14	EA
Backup Generator	14	EA
10-inch Force Main	2,856	LF
6-inch Force Main	7,803	LF
4-inch Force Main	3,494	LF
Air release Valve with Manhole	6	EA

Table 5 - Wastewater system assets

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date November 1, 2019
(no later than 3 years from executed grant date)

The Village of Carsonville *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1329-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Susan Heberling at 810.657.9400 carsonvilleclerk@gmail.com
Name Phone Number Email

x Don Pangburn 11/20/2019
Signature of Authorized Representative (Original Signature Required) Date

Don Pangburn Carsonville Village President
Print Name and Title of Authorized Representative

VILLAGE OF CARSONVILLE
STORMWATER ASSET MANAGEMENT PLAN (AMP)
EXECUTIVE SUMMARY

Municipality Address: Village of Carsonville
4101 East Chandler Street
Carsonville, MI 48419

Web Address: villageofcarsonville.org

Contact Name: Susan Heberling – Village Clerk
Phone Number: 810-657-9400

SAW Grant Project Number: 1329-01

Executive Summary

Summary of the project scope, including results and findings of activities covered by the grant.

The scope of the project in the Village of Carsonville was to complete an asset management plan (AMP) for both wastewater and storm water. The AMP included cleaning, televising and rating a portion of the storm sewer pipes, manholes and catchbasins. A new storm sewer map was developed after all the pipes, storm manholes, catch basins were located with high accuracy GPS equipment and added to the GIS map. All inspected pipes, manholes and were added to the SWAMP inventory, rating and budgeting document.

In total 16,899 feet of storm pipe, 103 storm catchbasins, and 19 storm manholes were inventoried and included in the SWAMP. All catchbasins, manholes, and 4,675 feet of pipe were inspected and rated.

The Village's knowledge of their storm sewer systems greatly increased regarding the location, condition, and importance of each component. New found pipes and catchbasins have now been added to the GIS system map. All drawings are now available electronically and in print and have also been hyperlinked to the GIS map.

Stormwater Asset Inventory

A summary of the system used to maintain an inventory of assets.

1) *System components included in the AMP*
    a) The entire stormwater collection system was inventoried. Including:
        i) All known pipes
        ii) Surface inlets and outlets
        iii) Storm sewers in the street right of way.
        iv) Manholes and catch basins.
2) *How the assets were located and identified.*
    a) The manholes, catch basins were located with GPS equipment that accurately records the location of the asset.
    b) Each asset was given a unique label and ID so that it could be accounted for, tracked and monitored.

3) *The platform used to develop and maintain the inventory of assets.*
    a) ESRI ArcGIS software is used to record and maintain the location of the assets in the wastewater and stormwater collection systems.
    b) An Excel spreadsheet was used to quantify and the assets.
    c) An Excel spreadsheet was used to summarize the collection system asset information regarding condition.

4) *The condition assessment process, including what methods were used.*
    a) The storm sewer pipes were first located and visually inspected to locate potential problem areas. Village and technical staff solicited input from residents regarding problem areas. These areas were then inspected in more detail with cleaning and video recording of the condition of these potential problem areas.
    b) The storm sewer system was inspected by remote camera. Al areas of inspected pipe are documented and included in the GIS inventory. Some of the pipes had to be cleaned before inspection using a commercial water jet cleaning service.
    c) All Manholes and catchbasins were visually inspected and rated. A simplified rating system was used that looked at all aspects of the structure from cover to structure to pipe connections.

5) *The results of the assessment*
    a) Stormwater System Results
        (a) Only a portion of the storm sewer system was inspected (4675 feet of 16.899' or 19.2%). and the results for the sections inspected are:

Ratings Legend

Storm Ratings Legend	
Ratings	Condition
1	Good
2	Minor damage or obstruction
3	Significant damage or obstruction
4	Severe damage or obstruction
5	Not functionalble
Not Rated	Not Inspected

Storm Pipe Ratings Results Table

Storm Mains	**Ratings**	**Length of Pipe (Feet)**	**Percent of inspected**	**Percent of total**
Totals (By Ratings)	1	108	2.3 %	0.6%
	2	624.9	13.8 %	3.8%
	3	2,604.3	55.7 %	15.4%
	4	1,132.2	24.2 %	6.7%
	5	188.2	4.0 %	1.1%
	Not Rated	12,223.3		72.3%
	TOTAL	16,898.7		100%
	Inspected	4,675.4	100%	

Storm Manhole Ratings Results Table

	Rating	**Number**	**Percent**
Storm Manhole Ratings	1	0	0%
	2	16	84%
	3	3	16%
	4	0	0%
	5	0	0%
	TOTAL	19	100%

Storm Catchbasins Ratings Results Table

	Rating	**Number**	**Percent**
Storm Manhole Ratings	1	1	1%
	2	72	69.9%
	3	22	21.4%
	4	6	5.8%
	5	2	1.9%
	TOTAL	103	100%

Criticality of Assets

1) Our method used to assess the criticality of assets considering the likelihood and consequence of failure included the following:
    a) The storm sewer system consists of pipes, manholes, catch basins and open drains within the Village limits.
    b) A detailed criticality analysis was not completed on this system because there are no pumps or controls such as valves that can fail. The only components that can fail are the pipes and structures themselves. When this happens to the storm system, flooding occurs which can be localized or wide spread. Regardless of the location of the flooding it has the potential for property damage.
    c) All storm sewer infrastructure is evaluated based on flooding occurrences and the duration of the flooding period.

Level of Service Determination

1) The Village used the following process to involve stakeholders in developing the level of service:
    a) The Village used to its advantage the fact that the SAW program was a three year endeavor. It made the public aware that the grant was in place and then worked with the residents, administration, DPW, and the engineering team to evaluate strengths and deficiencies in the system. The input from the public and their concerns forms the level of service the Village provides.
    b) The Village was then able to use the SAW to inspect specific areas of concerns in addition to the overall Village inventory/assessment program.
    c) The storm sewer system in Carsonville has been neglected to varying degrees for a number of years. The SAW grant inspections have made it clear that investments in time and material are going to have to be made to upgrade the stormwater system.

Revenue Structure

1) *A summary of the funding structure and rate methodology that provides sufficient resources to implement the asset management program.*

    a) The Village will continue to fund storm sewer improvements from the general fund and from the street fund.

Capital Improvement Plan

1) The Village does not have nor was a Capital Improvement Plan developed for the storm sewer system.

Recommendations

We feel that the stormwater system in the Village of Carsonville is designed well and will function to keep the properties within the village dry. We suggest that the Village management budget a small amount of money every year for pipe replacement and system maintenance and improvement.

List of Major Assets

The following lists of assets summarize the major components identified as part of the asset management plan for the Stormwater System.

Storm Sewer System

- 16,898.7 linear feet of storm sewer pipe
- 19 storm manholes
- 103 Storm Catchbasins

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date November 1, 2019
(no later than 3 years from executed grant date)

The Village of Carsonville *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1329-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 14, 2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Name		Phone Number	Email
Susan Heberling	at	810.657.9400	carsonvilleclerk@gmail.com

x Don Pangburn 11-20-2019
Signature of Authorized Representative (Original Signature Required) Date

Don Pangburn Carsonville Village President
Print Name and Title of Authorized Representative

VILLAGE OF CARSONVILLE
WASTEWATER ASSET MANAGEMENT PLAN (WWAMP)
EXECUTIVE SUMMARY

Municipality Address:	Village of Carsonville 4101 East Chandler Street Carsonville, MI 48419
Web Address:	villageofcarsonville.org
Contact Name:	Susan Heberling – Village Clerk
Phone Number:	810-657-9400
SAW Grant Project Number:	1329-01

Executive Summary

Summary of the project scope, including results and findings of activities covered by the grant.

The scope of the project in the Village of Carsonville was to complete an asset management plan (AMP) for both wastewater and storm water sewer systems. A new sanitary sewer map was developed after all of the collection and treatment assets were located with high accuracy GPS equipment and added to the GIS map and database. All pipes, manholes, collection, and treatment assets were added to the WWAMP inventory, rating and budgeting document.

Because the sanitary sewer system is relatively new there were no surprises as to location of assets. The village has a complete set of plans for the sanitary system as well as technical info and operating instructions for the more complex components of the system. Many manholes are buried in the roadway and were not accessible for inspection. Due to the age and good condition of the accessible parts of the system, the completeness of the maps and records on file, and the fact that inspection on the rest of the system did not result in any deviation from records, it was deemed unnecessary to dig up roadway for inspection of buried assets. All drawings are now available electronically in pdf format and have also been hyperlinked to the system features on the GIS map.

The Village of Carsonville has also purchased ESRI software and field ready electronics so they can have real time access to utility information in the field. This will help employees to correct any issues on site and create a much more thorough record keeping system for utility assets.

SAW funding has also helped to create a rating system and rating information for all assets in the sanitary sewer system in Carsonville. The rating system was in turn used to create a capital improvement plan. Budget information was analyzed and used to determine if rates are going to be adequate to maintain the system in years to come. A complete sanitary utility budget analysis and rate methodology are included with this report.

Wastewater Asset Inventory

A summary of the system used to maintain an inventory of assets.

1) *System components included in the AMP*
    a) The entire sanitary sewer collection system was inventoried and mapped.
    b) All accessible features were inspected and rated as to physical condition and functionality.
    c) The pump station and lagoon systems were fully inspected and inventoried.
2) *How the assets were located and identified.*
    a) The manholes were located with GPS equipment that accurately records the location of the asset.
    b) Each asset was given a unique label and ID so that it could be accounted for, tracked and monitored.
    c) The lagoon does not contain any equipment other than an effluent meter and some valves. All pumping to the lagoon is part of the collection system and the lagoon discharges by gravity.
3) *The platform used to develop and maintain the inventory of assets.*
    a) ESRI ArcGIS software is used to record and maintain the location of the assets in the wastewater collection system.
    b) An Excel spreadsheet was used to quantify and track the assets at the lagoon.
    c) An Excel spreadsheet was used to summarize the collection system asset information regarding condition.
4) *The condition assessment process, including what methods were used.*
    a) The sanitary sewer pipes are less than 20 years old and thus were not eligible for cleaning or video inspection.
    b) All accessible structures were visually inspected and rated. A simplified rating system was used that looked at all aspects of the structure from cover to structure to pipe connections.
    c) Pump Station was visually inspected and rated.
    d) The rating system used for the pump stations and all rated components of the lagoon system, was the one provided by EGLE with a 1 through 5 rating with 1 being New or Excellent Condition – Only normal maintenance required and a 5 rating being an Asset Unserviceable.

5) *The results of the assessment.*
    a) Wastewater Collection Assessment Results
        i) Due to the age of the sanitary sewer system none of the pipes were inspected. Components that were inspected were generally in good condition.

(1) Sanitary Structure Results Table

Sanitary Asset Management			
Assets	Districts	Ratings	# of Manholes
Sanitary Manholes	Carsonville	0	14
		1	30
		2	45
		3	9
		4	3
		5	0

(2) Sanitary Structure Rating Legend

Ratings (Rating = Manhole Condition)	
Rating	Condition
0	Not Rated
1	As New/Excellent
2	Minor infil/solids/damage
3	Significant infil/solids/damage
4	Severe infil/solids/damage
5	Not functioning

b) Lagoon System and Pump Station Results Table

i) The table below is an excerpt from the asset management spreadsheet used for the wastewater system of pump stations and treatment equipment. This table is sorted by the Business Risk which is the result of multiplying the Probability of Failure times the Criticality of Asset. The higher the business risk number, the more attention that asset should receive.

Assets	Condition	Probability of Failure	Criticality of Asset	Business Risk
Inlet structure A	2	2	4	8
Inlet Structure A valves (2 x 12")	N/A	2	3	6
Transfer station B	2	2	3	6
Transfer Station B valves (5 x 12")	N/A	2	3	6
Transfer station C	2	2	3	6
Transfer Structure C Valves (6 x 12")	N/A	2	3	6
Transfer Structure D	3	2	4	8
Transfer Structure D Valves (5 x 12")	N/A	2	3	6
Effluent meter and controls	5	3	2	6
Lagoons	1	2	4	8
Lagoon Liner	3	3	5	15
Wet well	2	1	5	5
Dry well	2	2	5	10
Sewage Pumps (2 x 6")	2	3	5	15
Air release/cleanout	3	4	3	12
Electrical controls for pumps	2	3	5	15
Electrical control panel	2	3	5	15
Pump station generator	2	2	5	8

ii) Lagoon System and Pump Station Rating Legends

(1) Condition Assessment Rating

Condition	***Assessment***
Condition Rating	**Description**
5	Asset Unserviceable - Over 50% of asset requires replacement
4	Significant deterioration - significant renewal/upgrade required (20 -40%)
3	Moderate deterioration - Significant maintenance required (10 -20%)
2	Minor Deterioration - Minor maintenance required (5%)
1	New or Excellent Condition - Only normal maintenance required

(2) Probability of Failure Rating

Probability of	***Failure***
Performance Rating	**Description**
5	Imminent - Likely to occur in the life of the item
4	Probable - Will occur several times in the life of an item
3	Occasional - Likely to occur some- time in the life of an item
2	Remote - Unlikely but possible to occur in the life of an item
1	Improbable - So unlikely, it can be assumed occurrence may not be experienced

(3) Criticality of Asset

Criticality of	***Asset ****
Performance Rating	**Description**
5	Catastrophic disruption
4	Major disruption
3	Moderate disruption
2	Minor disruption
1	Insignificant disruption

* consider safety/social, economic/financial, environmental

Criticality of Assets

A summary describing the method used to assess the criticality of assets considering the likelihood and consequence of failure.

1) Our method used to assess the criticality of assets considering the likelihood and consequence of failure included the following:
    a) As shown above we used the rating system from the EGLE guidance documents.
    b) As part of our determination we used the data collected and the past history of the asset to determine our rankings. Our Level of Service goals are exceeded when our actions result in a system operating unnoticeably.
    c) All items were reviewed with Village staff and then adjusted appropriately.
    d) Our goal in developing the list of the highest Business Risk was to make sure that certain items rose to the top of the list. Everything can be considered critical and probable of failing, but what should we and what do we have to focus on today and this week and year.

Level of Service Determination

A summary of the level of service goals the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations.

1) *The Village used the following process to involve stakeholders in developing the level of service:*
    a) Carsonville has had a problem in past years keeping certified water operators on staff. With the relatively high turnover rate in the DPW and a general decrease in revenues due to a shrinking tax base, it has been a challenge to maintain the levels of service once enjoyed by residents. Recently the village has contracted a water operator to oversee water service activities and train Village staff. Currently, DPW staff is taking steps to become operator certified soon. In this regard the Village has recognized the need to recruit and keep a local employee for utility service work.
    b) The Village is compliant with all EGLE regulatory compliance issues, has staff that live in the village to respond quickly to utility emergencies, and are working towards EGLE operator certification.
    c) Being a small community without a manager, the Level of Service goals originate from the public, elected officials, DPW, and the engineering team. The LOS goals are then implemented by the Village Board.
2) There are still challenges that limit the Village's ability to meet its desired level of service, but things have greatly improved.
    a) In the past and into the present the Village has struggled with:
        i) Hiring contractors to do work that could be performed internally. This was due to the small staff available, the cost of the tools and equipment to do the work, and staff workloads. Current staff are getting appropriate certifications and experience to do more work in house rather than contract outside help.
        ii) Funding the utility systems is a constant struggle for Village officials. The utility systems were built at a time when there was more tax revenue to work with. Past officials did not earmark enough money for proper maintenance of Village utility systems and as a result current officials find themselves in a position where the infrastructure needs increasing maintenance but there is less budget to work with. This SAW grant has helped identify financial shortfalls in the Village utility systems and officials are planning to take various measures to ensure a more adequate budgeting process moving forward.
3) How the level of service goals were determined.
    a) Level of Service goals are determined by evaluation of DPW abilities, budgets, and expectations of the residents and regulators. Categories considered when making LOS determination decisions include operator certification, response times, and regulatory compliance.

Revenue Structure

A summary of the funding structure and rate methodology that provides sufficient resources to implement the asset management program. Discussion may include:

1) *The rates, charges, or other means of revenue that were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP.*
    i) As determined in the rate deficit review the Village is operating the sanitary sewer system in a slight deficit. There will need to be a small increase in sanitary sewer rates in the Village in order to keep up with increasing operating and inflationary costs.
    ii) If need be, the Village will continue to leverage bonds, State funding sources such as SRF and Federal funding sources such as USDA – RD for major capital improvements.
    iii) As revenue allows, the Village will fund replacement items that are considered short lived assets and will begin to budget for items that need to be replaced in the longer term.
    iv) The Village will incorporate the AMP data for replacement and capital improvement in their rate analysis on an annual basis.
    v) The Village reviews the rates internally on an annual basis to assure its users that the cost of operations and replacement funds are available and adequate to be a self-sufficient enterprise account.
2) *If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*
    i.) In order to maintain current levels of service with the sanitary sewer system the village will need to raise utility rates by 5%. To build a contingency reserve of 50% in 10 years, the rates will need to be increased by at least 15%.

Capital Improvement Plan

A summary of the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP.

A capital improvement plan was developed for the Village that includes just one item, the lagoon liner.

a) All other utility components are smaller items that could be replaced with budgetary contingency funds if need be.
b) The remainder of the sanitary system is only 20 years old and requires only cleaning to function optimally.
c) The budget for this utility will be adjusted to accommodate any short and mid-term maintenance items
d) Village officials do not anticipate population growth in the future. No provisions are being made for future system expansion.

List of Major Assets

The following lists of assets summarize the major components identified as part of the asset management plan for the Wastewater System.

Wastewater Collection System

- 101 sanitary manholes
- 1 pump station
- Pipes are itemized by size for all gravity pipes (8”, 10”, and 12”), and the force mains are the pipes leaving the pump station and transfer the sewage to the lagoon.

Sanitary Asset Management		
Assets	Pipe Size	Length of Pipe, ft
Sanitary Sewer	8"	16,505
Sanitary Sewer	10"	3,861
Sanitary Sewer	12”	1,493
Force Main	6"	2,285

Lagoon System

- Three cell lagoon with membrane liner.
- Inlet, discharge, and transfer structures and valves
- Effluent Meter

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

C. HEIDI GRETHER
DIRECTOR

November 2, 2018

Mr. Gary Whittaker, Supervisor
Charter Township of Salem
9600 Six Mile Road
Salem, Michigan 48175

Dear Mr. Whittaker:

SUBJECT: Stormwater, Asset Management, and Wastewater (SAW) Grant Program
Charter Township of Salem
Wastewater Asset Management Plan
SAW Grant Project Number 1337-01

This letter is a helpful reminder regarding your SAW grant award for wastewater asset management plan (AMP) development. Your SAW grant agreement was executed in November or December of 2016. Legislation states awardees have three years to complete the grant requirements or risk grant payback. At this point in time, you should be making progress towards completing/identifying the five components of your asset management plan and determining whether a funding gap exists between current revenue and expenses. Below is a list of required AMP components:

1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality of Assets
4. Operation and Maintenance Strategies/Revenue Structure
5. Long-term Funding/Capital Improvement Plan

The SAW legislation requires development of the AMP, including a funding structure that provides sufficient resources to implement the AMP within the 3-year grant period. If a funding gap is identified (i.e., revenues are less than expenses), the applicant is required to adopt an initial rate increase. This initial rate increase must be adopted prior to the 3-year grant period expiring and must reduce the funding gap by at least 10 percent. A 5-year plan to completely eliminate the funding gap needs to be submitted as well. As you are aware, rate increases may need council/board approval and have the potential to become a lengthy process.

As explained in the SAW application, an awardee needs to submit a copy of their rate methodology within 2 ½ years of the executed grant. The attached Wastewater AMP Certification of Project Completeness (including the AMP summary, which identifies major assets in the plan and a contact for the public to obtain a copy of the AMP) must also be submitted by the 3-year expiration date. Our office will post the AMP Certification of Project Completeness to the DEQ Web site.

If you need assistance at any point in the AMP process, please contact me by phone at the number listed below; email at pocane@michigan.gov; or by mail at DEQ, P.O. Box 30817, Lansing, Michigan 48909-8311.

Sincerely,

Eric Pocan

Eric Pocan, Project Manager
Revolving Loan Section
Drinking Water and Municipal Assistance Division
517-284-5416

Attachment

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12-10-2019
(no later than 3 years from executed grant date)

The Salem Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1337-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or No
   If No - Date of the rate methodology approval letter: 10-28-2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Gary Whittaker at 248-909-3200 gary@salem-mi.org
Name Phone Number Email

12-10-2019
Signature of Authorized Representative (Original Signature Required) Date

Gary Whittaker, Supervisor
Print Name and Title of Authorized Representative

April 2017

Stantec

Wastewater Asset Management and Capital Improvement Plan

2075128701

December 9, 2019

Prepared for:

Salem Township
9600 Six Mile Road
Salem, MI 48175

Prepared by:

Stantec Consulting Michigan Inc.
3754 Ranchero Drive
Ann Arbor, Michigan 48108

Executive Summary

Salem Township (Township) was awarded a Stormwater, Asset Management and Wastewater (SAW) Grant administered by the Michigan Department of Environmental Quality (EGLE). The purpose of this grant is to assist communities in the development and/or upgrade of their Asset Management Program (AMP). The Township retained Stantec Consulting Michigan Inc. (Stantec) to compile major elements of its AMP within an Asset Management Plan (Plan) as listed below:

1. Asset Inventory
2. Criticality/Risk Assessment
3. Level of Service (LOS)
4. Capital Improvement Plan (CIP)
5. Revenue Structure (to be completed by others)

Included in this report is a description of the process undertaken by Stantec, using a combination of field investigations and data analysis, to evaluate the condition and criticality of the Township's assets, and develop a comprehensive AMP.

Asset Management Team

This Plan was developed in cooperation with the Township's Asset Management Team (AMT) which included:

- Gary Whittaker, Township Supervisor
- Dale Converse, Treasurer
- David Trent, Trustee
- The Salem Township Board of Trustees
- Highland Treatment; Operations Contractor
- Stantec, Asset Management Consultant

List of Major Assets Being Tracked

- Hamlet Wastewater Treatment Plant (WWTP)
- Two sanitary pump stations:
  - Salem Road PS
  - Six Mile Road PS
- Approximately 15,750 feet of High-Density Polyethylene (HDPE) force main piping (both low-pressure grinder pump network and pump station discharge) from 1½-inches to 4-inches in diameter;
- Approximately 9,140 feet of Polyvinyl Chloride PVC gravity sewer pipes with an 8-inch diameter;
- 43 Manhole structures including:
  - 5 Air/Vacuum Relief Valve (ARV) structures;
  - 38 gravity sewer manholes;
- 18 residential grinder pumps with their associated electrical panels and shutoff valves.

Asset Inventory Sustainability

The Township will endeavor to periodically update its inventory and Geographic Information System (GIS) as additional areas develop, or when existing wastewater system improvements are implemented.

Risk Assessment

Risk can be described as a function of the probability of failure and the consequences of failure, and is typically represented using the following formula:

Risk = [Probability of Failure] x [Consequence of Failure]

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Condition Assessment

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- 1 = Excellent: New or Excellent Condition - Only normal maintenance required;
- 2 = Good: Minor Deterioration - Minor maintenance required;
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There were several Hamlet wastewater system assets that were not inspected. Inspection of force mains is by nature invasive and was not included in the development of this plan. ARVs and residential grinder pumps were also not inspected. The Township elects to track the uninspected assets via desktop analysis methods. To assign a condition assessment rating to an uninspected asset, a condition score of 1 to 5 was assigned based on the age of the asset, or elapsed time since last rehab.

Facility Assets

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			Component Condition Ratings				
			1	2	3	4	5
Facility	**Average Condition Rating**	**Total # of Inspected Components**	**%**	**%**	**%**	**%**	**%**
Hamlet WWTP	3.1	47	0%	17%	57%	21%	4%
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Salem PS	4.0	31	0%	29%	61%	39%	0%

Force Mains

Based on desktop analysis methods, the force mains (including low-pressure sewers) were estimated to be in excellent condition. They are relatively new, having been installed within the last 20 years, and being constructed of HDPE, the pipes are not expected to have deteriorated significantly in that time. A summary of the findings is presented in the following table:

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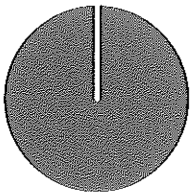
1	15,754	100%	
2	-	-	
3	-	-	
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5	-	-	
TOTAL	**15,754**	**100%**	

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Based on the inspection data collected by Young's Environmental, the Township's gravity sewers were found to be in generally good or excellent condition with a few exceptions. Initial evaluations indicate that the most severe defects could be repaired with point repairs or cured-in-place pipe (CIPP) lining. A summary of the findings is presented in the following table:

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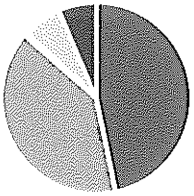
1	4,264	47%	
2	3,629	40%	
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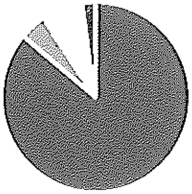
TOTAL	**9,141**	**100%**	

Manholes and ARVs

Based on the inspection data collected by Young's Environmental, the Township's gravity sewers manholes were found to be in generally good or excellent condition with a few exceptions. The ARVs were not inspected and based on desktop analysis are assumed to be in excellent condition like the force mains in the collection system. A summary of the findings is presented in the following table:

Manhole and ARV Condition Rating	#	%	Summary
1	37	86%	
2	2	5%	
3	3	7%	
4	0	0%	
5	1	2%	
TOTAL	**43**	**100%**	

Grinder Pumps

Grinder pumps were not physically inspected or assigned a condition rating but based on available records provided by Highland Treatment, there are 9 grinder pumps out of the 18 total that have reached or exceeded their expected service life. This means that 50% of the grinder pumps in the system need replacement.

Criticality Ratings

A criticality rating system was developed to analyze the consequence of failure for the Hamlet wastewater system assets and to determine the relative importance of the assets for the prioritization of future capital expenses. The criticality analysis was performed separately for the pump stations, Hamlet WWTP and the linear assets (gravity sewers and force mains), and uses a scale of 1 to 5, with 1 being the least critical, and 5 the most critical. Several key risk criteria were identified:

- Impact on Facility Operation
- Impact on Operator Health and Safety
- Cost of Repair
- Difficulty of Repair
- Number of Parcels Served

- Environmental/Public Risk
- Pipe Location and Size
- Redundancy

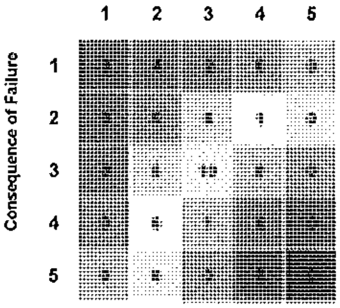
Each of the criticality criteria were assigned a weighting factor according to their relative importance as determined by the AMT. The consequence of failure for each asset was evaluated within this framework based on the qualities they possess, and an overall criticality rating was assigned to each by summing the weighted criticality scores for each of the risk criteria. For example, a large diameter force main crossing a major road would be considered more critical than a small diameter grinder pump service line in an unimproved right-of-way. It should be noted that the criticality of the gravity sewer manholes and ARV manholes was assigned based on the criticality of the adjacent pipe since those assets are essentially inseparable from the pipe and located in the same general vicinity of the critical features (i.e., major roads, railroads, wetlands, etc.).

Risk Summary

The risk to the Township associated with the failure of an asset was estimated based on the product of the condition rating and the criticality rating, with higher scores indicating greater risk. A map of the Hamlet wastewater collection system with the overall criticality of the force mains and gravity sewers are included in **Appendix B**. Heat maps summarizing the risk are also provided below. For the WWTP, each pump station, and linear asset type, the number of components is indicated for each combination of Probability of Failure (condition) and Consequence of Failure (criticality) score.

Salem Road PS

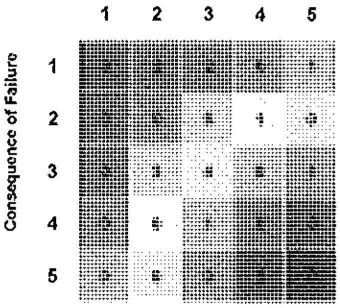
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Six Mile Road PS

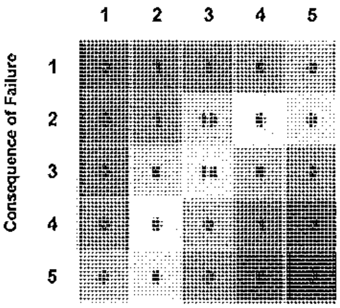
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Hamlet WWTP

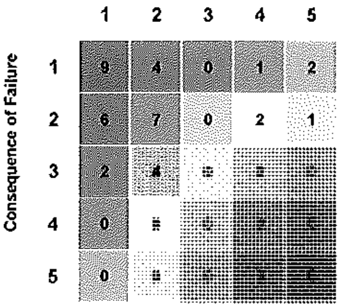
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Gravity Sewers

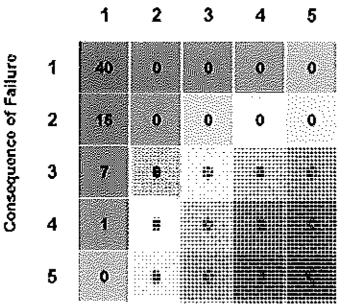
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	9	4	0	1	2
2	6	7	0	2	1
3	2	4	[illegible]	[illegible]	[illegible]
4	0	[illegible]	[illegible]	[illegible]	[illegible]
5	0	[illegible]	[illegible]	[illegible]	[illegible]

Force Mains

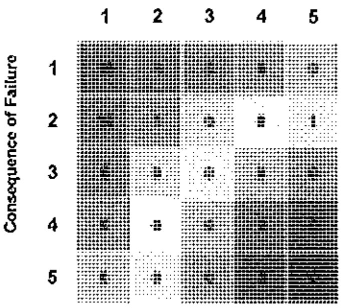
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	40	0	0	0	0
2	16	0	0	0	0
3	7	8	[illegible]	[illegible]	[illegible]
4	1	[illegible]	[illegible]	[illegible]	[illegible]
5	0	[illegible]	[illegible]	[illegible]	[illegible]

Manholes and ARVs

Probability of Failure



Consequence of Failure	1	2	3	4	5
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	1
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Risk Assessment Sustainability

To ensure the sustainability of the AMP, the Township plans to track the condition of their assets and update their condition ratings as necessary in the Asset Management Supplemental Analysis Tool (AMSAT); a spreadsheet tool developed to facilitate the AMP. The AMSAT will continue to be refined and updated moving forward by the Township AMT.

The Township plans to periodically inspect the WWTP and pump station facilities annually or as needed. Condition ratings will be tracked and updated as necessary.

For uninspected assets, the condition rating is driven by age, which will update automatically within the AMSAT, but the asset inventory and AMSAT will need to be updated if pipes or manholes are replaced, repaired, or added to the system.

Level of Service (LOS)

The Township's LOS goal is to maintain all critical assets as well as some less critical assets to provide enhanced reliability, with an emphasis on meeting the regulatory requirements set by EGLE. The AMT identified this goal as the starting point for guiding CIP and maintenance expenditures. Qualitatively, LOS can be described in three tiers: Low, Medium, and High. With a Low LOS, only the most critical components in the system, or those with the highest risk, would be proactively maintained, and with a High LOS, every asset would be maintained proactively. For the purpose of this AMP and projecting CIP expenditures, a High LOS has been assumed. Quantitatively, this correlation between LOS and criticality, is defined within the AMSAT and the Township's LOS goals have an impact on the projected CIP expenditures. The Township will continue to review and refine their LOS goals moving forward.

Level of Service Sustainability

The Township plans to review and update their stated LOS goals regularly and assess the performance of their system against those goals to identify any areas that may need improvement. The Township will also examine the impact of LOS on CIP projections and may alter the LOS goals as deemed necessary.

Capital Improvement Plan (CIP)

Assuming a high level of Service, a CIP has been developed using the results of the AMP analysis and is divided short-term (0-5 year) and long-term (20 year), and ongoing initiatives. A summary is provided in the table below, with initial conceptual cost opinions in 2020 dollars. It should be noted that the funding source (shown as TBD in the table) for the proposed CIP projects will be determined during the Rate Study Evaluation process. The Township will continue to review and refine these findings moving forward.

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source*
Short Term (0-5 years)	Hamlet WWTP	Overhaul WWTP including: Building architectural repairs, sand filter, clarifier, blowers, SCADA and controls upgrades throughout, generator	Service Life; Reliability	2020	$1,000,000	TBD
	Six-Mile PS	Controls and electrical upgrades	Service Life; Reliability	2021	$140,000	TBD
	Salem Pump Station	Controls and electrical upgrades including new generator	Service Life; Reliability	2021	$230,000	TBD
	Gravity Sewer Repairs	Point Repairs and CIPP Lining	Routine Maintenance; Reliability	2022	$33,570	TBD
	Six-Mile PS	Process upgrades: pumps, valves, etc.	Routine Maintenance; Reliability	2023	$38,000	TBD
	Salem Pump Station	Process upgrades: pumps, valves, etc.	Routine Maintenance; Reliability	2023	$103,000	TBD
	Hamlet WWTP	WWTP Rehab/Renewal including: Sludge tank, aeration system, flow meter, mudwell and backwash pumps	Service Life; Reliability	2024	$297,000	TBD
Long Term (5-20 years)	Hamlet WWTP	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$1,512,700	TBD
	Six-Mile Pump Station	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$212,000	TBD
	Salem Pump Station	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$295,600	TBD
	Gravity Sewer	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$108,680	TBD
	Force Main	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$0	N/A
	Manholes and ARVs	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$6,200	TBD
Ongoing	Grinder Pumps	Plan to replace 1-2 grinder pumps per year (est. $1,500 each)	Service Life	Ongoing	$2,250 (annually)	Fund Balance

**See AMSAT for details on projected annual expenditures*

CIP Sustainability

To maintain the sustainability of the AMP, the Township plans to update the CIP project list annually as part of the yearly budget process and as work is completed or new pertinent information is available (e.g., condition assessment and LOS updates).

Sign-off Sheet

This document entitled Wastewater Asset Management and Capital Improvement Plan was prepared by Stantec Consulting Michigan Inc. ("Stantec") for the account of Salem Township (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by ______________________________
(signature)

Spencer Cain, PE

Reviewed by ______________________________
(signature)

R. Brian Simons, PE

Approved by ______________________________
(signature)

Dima El-Gamal, Ph.D., PE, LEED® AP

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

EGLE
LIESL EICHLER CLARK
DIRECTOR

October 28, 2019

Mr. Gary Whittaker
Charter Township of Salem
9600 Six Mile Road
Salem, Michigan 48175

Dear Mr. Whittaker:

SUBJECT: Stormwater, Asset Management, Wastewater (SAW)
Charter Township of Salem
SAW Grant Project Number 1337-01

We have reviewed the information contained in the rate methodology dated August 13, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404, or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Mr. Eric Pocan, EGLE

CONSTITUTION HALL • 525 WEST ALLEGAN STREET • P.O. BOX 30473 • LANSING, MICHIGAN 48909-7973
Michigan.gov/EGLE • 800-662-9278

Stantec

Wastewater Asset Management and Capital Improvement Plan

SAW Grant No. 1337-01

December 9, 2019

Prepared for:

Salem Township
9600 Six Mile Road
Salem, MI 48175

Website: http://www.salem-mi.org/
Contact: Dale Converse, Gary Whittaker
(248)-349-1690

Prepared by:

Stantec Consulting Michigan Inc.
3754 Ranchero Drive
Ann Arbor, Michigan 48108

Executive Summary

Salem Township (Township) was awarded a Stormwater, Asset Management and Wastewater (SAW) Grant administered by the Michigan Department of Environmental Quality (EGLE). The purpose of this grant is to assist communities in the development and/or upgrade of their Asset Management Program (AMP). The Township retained Stantec Consulting Michigan Inc. (Stantec) to compile major elements of its AMP within an Asset Management Plan (Plan) as listed below:

1. Asset Inventory
2. Criticality/Risk Assessment
3. Level of Service (LOS)
4. Capital Improvement Plan (CIP)
5. Revenue Structure (to be completed by others)

Included in this report is a description of the process undertaken by Stantec, using a combination of field investigations and data analysis, to evaluate the condition and criticality of the Township's assets, and develop a comprehensive AMP.

Asset Management Team

This Plan was developed in cooperation with the Township's Asset Management Team (AMT) which included:

- Gary Whittaker, Township Supervisor
- Dale Converse, Treasurer
- David Trent, Trustee
- The Salem Township Board of Trustees
- Highland Treatment; Operations Contractor
- Stantec, Asset Management Consultant

List of Major Assets Being Tracked

- Hamlet Wastewater Treatment Plant (WWTP)
- Two sanitary pump stations:
    - Salem Road PS
    - Six Mile Road PS
- Approximately 15,750 feet of High-Density Polyethylene (HDPE) force main piping (both low-pressure grinder pump network and pump station discharge) from 1½-inches to 4-inches in diameter;
- Approximately 9,140 feet of Polyvinyl Chloride PVC gravity sewer pipes with an 8-inch diameter;
- 43 Manhole structures including:
    - 5 Air/Vacuum Relief Valve (ARV) structures;
    - 38 gravity sewer manholes;
- 18 residential grinder pumps with their associated electrical panels and shutoff valves.

Asset Inventory Sustainability

The Township will endeavor to periodically update its inventory and Geographic Information System (GIS) as additional areas develop, or when existing wastewater system improvements are implemented.

Risk Assessment

Risk can be described as a function of the probability of failure and the consequences of failure, and is typically represented using the following formula:

Risk = [Probability of Failure] x [Consequence of Failure]

The condition assessment that was completed as part of this effort helps to define the probability of failure for the wastewater collection system assets. The examination of several factors, such as: impact on facility operations, impact on operator health and safety, difficulty of repair, and cost of repair, helped in determining the potential consequence of failure, or criticality, for each pump station facility, as well as the Hamlet wastewater treatment plant, and their respective components. For the linear infrastructure (i.e., pipes, manholes, ARVs), factors such as number of parcels served, environmental/public risk, and difficulty of repair led to an assessment of the consequence of failure (criticality).

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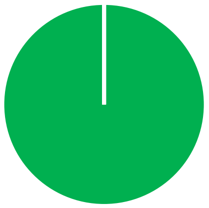
1	15,754	100%	
2	-	-	
3	-	-	
4	-	-	
5	-	-	
TOTAL	**15,754**	**100%**	

Gravity Sewers

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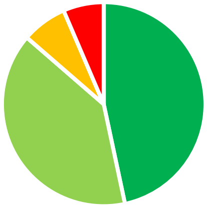
1	4,264	47%	
2	3,629	40%	
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5	590	6%	
TOTAL	**9,141**	**100%**	

Manholes and ARVs

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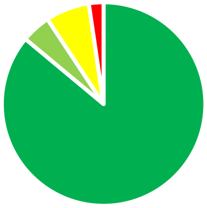
1	37	86%	
2	2	5%	
3	3	7%	
4	0	0%	
5	1	2%	
TOTAL	**43**	**100%**	

Grinder Pumps

Grinder pumps were not physically inspected or assigned a condition rating but based on available records provided by Highland Treatment, there are 9 grinder pumps out of the 18 total that have reached or exceeded their expected service life. This means that 50% of the grinder pumps in the system need replacement.

Criticality Ratings

A criticality rating system was developed to analyze the consequence of failure for the Hamlet wastewater system assets and to determine the relative importance of the assets for the prioritization of future capital expenses. The criticality analysis was performed separately for the pump stations, Hamlet WWTP and the linear assets (gravity sewers and force mains), and uses a scale of 1 to 5, with 1 being the least critical, and 5 the most critical. Several key risk criteria were identified:

- Impact on Facility Operation
- Impact on Operator Health and Safety
- Cost of Repair
- Difficulty of Repair
- Number of Parcels Served

- Environmental/Public Risk
- Pipe Location and Size
- Redundancy

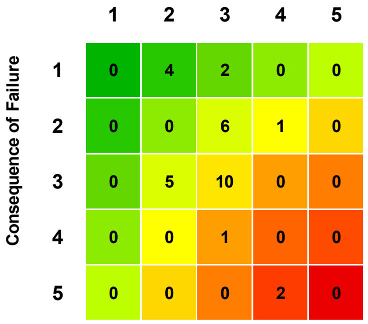
Each of the criticality criteria were assigned a weighting factor according to their relative importance as determined by the AMT. The consequence of failure for each asset was evaluated within this framework based on the qualities they possess, and an overall criticality rating was assigned to each by summing the weighted criticality scores for each of the risk criteria. For example, a large diameter force main crossing a major road would be considered more critical than a small diameter grinder pump service line in an unimproved right-of-way. It should be noted that the criticality of the gravity sewer manholes and ARV manholes was assigned based on the criticality of the adjacent pipe since those assets are essentially inseparable from the pipe and located in the same general vicinity of the critical features (i.e., major roads, railroads, wetlands, etc.).

Risk Summary

The risk to the Township associated with the failure of an asset was estimated based on the product of the condition rating and the criticality rating, with higher scores indicating greater risk. A map of the Hamlet wastewater collection system with the overall criticality of the force mains and gravity sewers are included in **Appendix B**. Heat maps summarizing the risk are also provided below. For the WWTP, each pump station, and linear asset type, the number of components is indicated for each combination of Probability of Failure (condition) and Consequence of Failure (criticality) score.

Salem Road PS

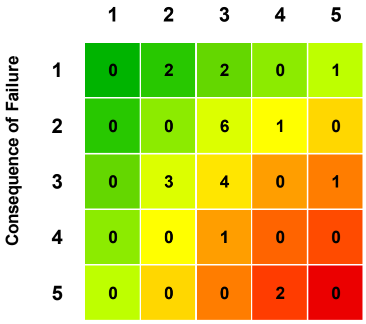
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	0	4	2	0	0
2	0	0	6	1	0
3	0	5	10	0	0
4	0	0	1	0	0
5	0	0	0	2	0

Six Mile Road PS

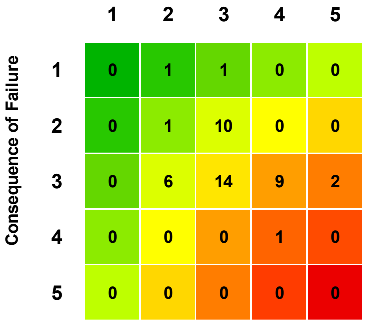
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	0	2	2	0	1
2	0	0	6	1	0
3	0	3	4	0	1
4	0	0	1	0	0
5	0	0	0	2	0

Hamlet WWTP

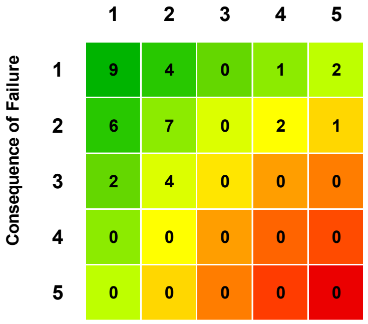
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	0	1	1	0	0
2	0	1	10	0	0
3	0	6	14	9	2
4	0	0	0	1	0
5	0	0	0	0	0

Gravity Sewers

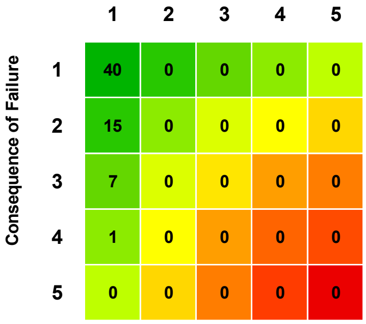
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	9	4	0	1	2
2	6	7	0	2	1
3	2	4	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0

Force Mains

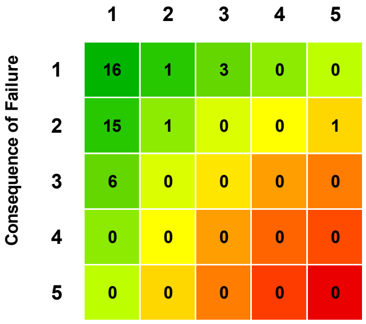
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	40	0	0	0	0
2	15	0	0	0	0
3	7	0	0	0	0
4	1	0	0	0	0
5	0	0	0	0	0

Manholes and ARVs

Probability of Failure



Consequence of Failure	1	2	3	4	5
1	16	1	3	0	0
2	15	1	0	0	1
3	6	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0

Risk Assessment Sustainability

To ensure the sustainability of the AMP, the Township plans to track the condition of their assets and update their condition ratings as necessary in the Asset Management Supplemental Analysis Tool (AMSAT); a spreadsheet tool developed to facilitate the AMP. The AMSAT will continue to be refined and updated moving forward by the Township AMT.

The Township plans to periodically inspect the WWTP and pump station facilities annually or as needed. Condition ratings will be tracked and updated as necessary.

For uninspected assets, the condition rating is driven by age, which will update automatically within the AMSAT, but the asset inventory and AMSAT will need to be updated if pipes or manholes are replaced, repaired, or added to the system.

Level of Service (LOS)

The Township's LOS goal is to maintain all critical assets as well as some less critical assets to provide enhanced reliability, with an emphasis on meeting the regulatory requirements set by EGLE. The AMT identified this goal as the starting point for guiding CIP and maintenance expenditures. Qualitatively, LOS can be described in three tiers: Low, Medium, and High. With a Low LOS, only the most critical components in the system, or those with the highest risk, would be proactively maintained, and with a High LOS, every asset would be maintained proactively. For the purpose of this AMP and projecting CIP expenditures, a High LOS has been assumed. Quantitatively, this correlation between LOS and criticality, is defined within the AMSAT and the Township's LOS goals have an impact on the projected CIP expenditures. The Township will continue to review and refine their LOS goals moving forward.

Level of Service Sustainability

The Township plans to review and update their stated LOS goals regularly and assess the performance of their system against those goals to identify any areas that may need improvement. The Township will also examine the impact of LOS on CIP projections and may alter the LOS goals as deemed necessary.

Capital Improvement Plan (CIP)

Assuming a high level of Service, a CIP has been developed using the results of the AMP analysis and is divided short-term (0-5 year) and long-term (20 year), and ongoing initiatives. A summary is provided in the table below, with initial conceptual cost opinions in 2020 dollars. It should be noted that the funding source (shown as TBD in the table) for the proposed CIP projects will be determined during the Rate Study Evaluation process. The Township will continue to review and refine these findings moving forward.

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source*
Short Term (0-5 years)	Hamlet WWTP	Overhaul WWTP including: Building architectural repairs, sand filter, clarifier, blowers, SCADA and controls upgrades throughout, generator	Service Life; Reliability	2020	$1,000,000	TBD
	Six-Mile PS	Controls and electrical upgrades	Service Life; Reliability	2021	$140,000	TBD
	Salem Pump Station	Controls and electrical upgrades including new generator	Service Life; Reliability	2021	$230,000	TBD
	Gravity Sewer Repairs	Point Repairs and CIPP Lining	Routine Maintenance; Reliability	2022	$33,570	TBD
	Six-Mile PS	Process upgrades: pumps, valves, etc.	Routine Maintenance; Reliability	2023	$38,000	TBD
	Salem Pump Station	Process upgrades: pumps, valves, etc.	Routine Maintenance; Reliability	2023	$103,000	TBD
	Hamlet WWTP	WWTP Rehab/Renewal including: Sludge tank, aeration system, flow meter, mudwell and backwash pumps	Service Life; Reliability	2024	$297,000	TBD
Long Term (5-20 years)	Hamlet WWTP	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$1,512,700	TBD
	Six-Mile Pump Station	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$212,000	TBD
	Salem Pump Station	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$295,600	TBD
	Gravity Sewer	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$108,680	TBD
	Force Main	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$0	N/A
	Manholes and ARVs	Miscellaneous repairs per AMSAT*	Routine Maintenance; Reliability	2025-2040	$6,200	TBD
Ongoing	Grinder Pumps	Plan to replace 1-2 grinder pumps per year (est. $1,500 each)	Service Life	Ongoing	$2,250 (annually)	Fund Balance

**See AMSAT for details on projected annual expenditures*

CIP Sustainability

To maintain the sustainability of the AMP, the Township plans to update the CIP project list annually as part of the yearly budget process and as work is completed or new pertinent information is available (e.g., condition assessment and LOS updates).

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date ____**December 19, 2019**_______
(no later than 3 years from executed grant date)

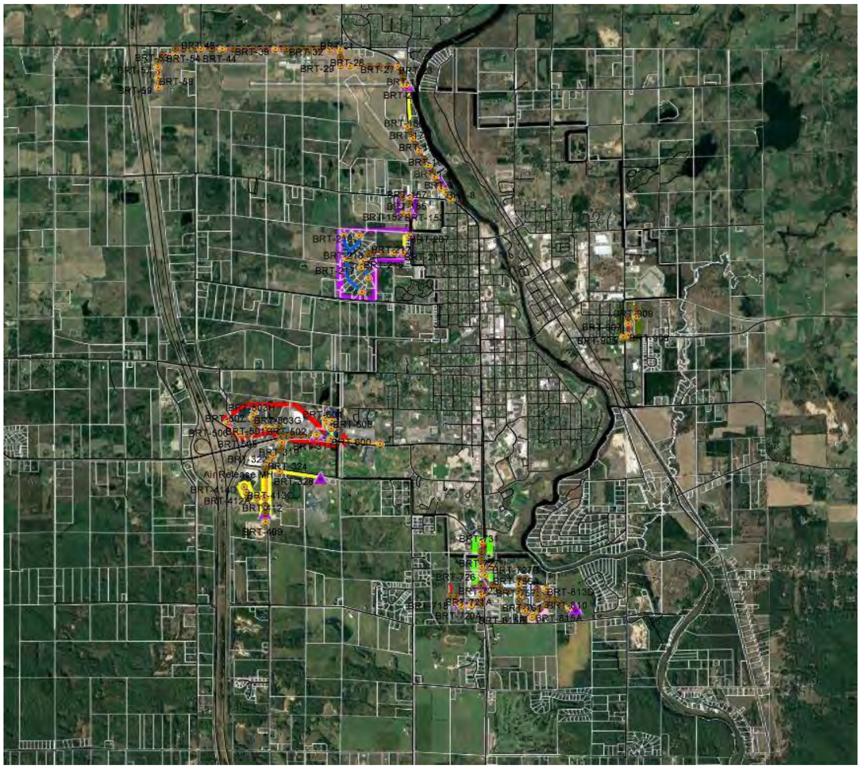
The Township of Big Rapids *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1355-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

__Mr. Bill Stanek (Supervisor)__at__231/796-3606____supervisorstanek@bigrapidstownship.net__
Name Phone Number Email

12/19/19
Signature of Authorized Representative (Original Signature Required) Date

WILLIAM STANEK, SUPERVISOR
Print Name and Title of Authorized Representative



Big Rapids Township Wastewater Evaluation

Big Rapids Township
14212 Northland Drive
Big Rapids, MI 49307

bigrapidstownship.net

Bill Stanek, Supervisor
(231) 796-3603

SAW Grant Project Number: #1355-01

SAW Grant Amount: $171,400

SAW Community Match: $0
(Disadvantaged for wastewater asset management plan; no local match required)

Prepared for:

Big Rapids Township
14212 Northland Drive
Big Rapids, MI 49307

Prepared by:

Progressive AE
1811 4 Mile Road NE
Grand Rapids, MI 49525
616/361-2664

January 3, 2020

Project No: 58516005.0

SAW Grant Executive Summary

Table of Contents

I. EXECUTIVE SUMMARY

Big Rapids Township, through the Stormwater, Asset Management, and Wastewater (SAW) Program from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), implemented an asset management plan (AMP). The goal of the asset management plan is to identify system components, understand their condition, plan for future maintenance and up-keep, and set rates to adequately fund that work.

The Big Rapids Township public wastewater system flows through trunk lines into the City of Big Rapids for treatment and discharge. This evaluation and plan pertain to the portions of sewer located in, and owned and operated by, Big Rapids Township. The AMP was separated into two sections: sewers and force mains, and lift stations. The wastewater system evaluation consisted of the following:

- Inventory of the existing system.
- An assessment of the current condition of its assets.
- Developing a rating system to establish priority service within the system.
- An analysis on the current and future capacity of the system.
- Capital improvement recommendations.

The following is the summary of the AMP, as required by the grant, and includes brief discussions of the five major AMP components and a list of major assets.

II. AMP COMPONENTS

The major components of the AMP are as follows:

A. Wastewater and/or Stormwater Asset Inventory

An inventory of the existing wastewater system was prepared using all provided documentation, as-built records, and field documentation. The inventory consists of the size, material, and construction year for all manholes, pipes, and force mains. Inverts and length of pipe are provided for manholes and pipes.

The wastewater system was grouped by as-built location, and all manholes were field verified with a Global Positioning System (GPS). The existing sanitary system and data were compiled using a Geographic Information System (GIS). A map of the entire system has been developed in ArcView/ArcMap. An online version of the map via ArcGIS can be found at http://arcg.is/18vK05. The full version has been installed on computers at Big Rapids Township.

Assets of the Big Rapids Township lift stations were inventoried for the asset management plan. An inventory of the pump station address, capacity, pump data, piping, structures, electrical equipment, etc., was collected for each pump station. Information was collected with all available documentation, and records were field verified. All lift station data was compiled and linked to the GIS map.

Televising was conducted to assess gravity sewers. NASSCO (National Association of Sewer Service Companies) standards were utilized to code defects, record videos, and take snapshots of defects within the pipe. Pipe graphic reports and footage are linked in the GIS. Where no closed-circuit TV (CCTV) footage was available, assumptions were made using the condition of adjacent manholes and pipes, and the age of the pipe. Using a score of 1 to 5, the gravity sewers were rated; 80% were rated in good condition (score if 1 or 2), and only 1% were in the worst condition (score of 5).

Since visual inspection or televising are not currently possible for force main, and access points to inspect exposed sections are rare, the force main pipe bases were rated based on pipe material type and break history. The force main in the township is considered to be in good condition.

A condition assessment was conducted on manholes by visual inspection from the top of the manhole structures using a pole-mounted GoPro camera. Observations were made on the condition and type of structure, condition of the steps and casting, and visible infiltration; 66% of the manholes were rated in good condition (score of 1 or 2), and only 1% were in the worst condition (score of 5).

During the lift station inspection phase of the asset management plan, lift station condition assessments were performed. Assessments were conducted in the field in August of 2017 with Northwest Kent Mechanical Company. Operation and maintenance manuals were collected during the inspection, photos were taken of the station and surrounding areas, and observations were recorded.

B. Criticality of Assets

A Risk of Failure (RoF) rating has been developed and used to rate the approximate likelihood of structural failure. Each manhole, gravity sewer pipe, pump station, and force main was assigned an RoF rating of 1 to 5, with 5 being the worst condition, or greatest risk of failure. Assignments are based upon the condition assessment date, as described in the previous section.

A Consequence of Failure (CoF) rating system was developed to rate the environmental, social, and economic impact of the sewer. Manholes, gravity sewer pipes, pump station, and force main pipes were assigned a rating of 1 to 5, with 5 being the worst condition, or greatest impact of failure.

Infrastructure located in high-traffic areas were given a high CoF rating because of the financial and social cost needed to make emergency repairs. Additionally, sewers carrying a large amount of flow, or sewers serving densely populated areas, were given a high CoF rating due to the number of people that would be impacted and significant release to the environment if failure occurred.

The RoF and CoF ratings were combined to establish the criticality of the system — a rating system that helps assign priority to recommendations for capital improvement. The RoF and CoF are multiplied, producing criticality ratings between 1 and 25, where a rating of 25 has the highest priority for improvement.

C. Level of Service Determination

Big Rapids Township strives to provide the quality sanitary service to its customers. Big Rapids Township has identified three primary goals for their sanitary system that focus on consistency, transmission, and growth.

Goal 1: Minimize Service Interruptions

Service interruptions are unavoidable in maintaining a sanitary sewer system. Power outages, equipment failure, clogs, and excessive flows can all lead to interruptions. Big Rapids Township understands the impact of these interruptions and plans to be proactive in managing and investing in their system to minimize them in the future.

Goal 2: Minimize Public Hazards

Force main breaks, sewer back-ups, and manhole overflows all can cause significant property damage and pose health threats. To minimize these risks, Big Rapids Township will plan to implement the Capital Improvement Recommendations which include multiple recommendations such as remote monitoring and alarms for the pump stations, which will directly help minimize public health hazards.

Goal 3: Minimize Infiltration and Inflow

Big Rapids Township is concerned with the potential in the system for infiltration. Their goal is to minimize the wet weather impacts to the sanitary system. Reducing the wet weather infiltration and inflow will minimize the flow from Big Rapids Township to the treatment plant in Big Rapids, and help reduce operating costs for the township and city.

D. Revenue Structure

Big Rapids Township partners with the City of Big Rapids in establishment of a rate structure to accomplish appropriate setting of sewer rates for both communities. Big Rapids Township has its own sewer collection system and is a wholesale customer of the City of Big Rapids for treatment of the collected sanitary waste. Big Rapids Township pays the City of Big Rapids for its participation in transmission of sewer flows to the city treatment plant through city-owned sewer pipes (that reside in the city). There are therefore, three mechanisms of the sewer system that the Township participates in:

1. Collection System: township-owned-and-operated gravity sewer pipe and lift station/force main system.
2. Transmission System: city-owned-and-operated gravity sewer pipe and lift station/force main system. Big Rapids Township is financially responsible for its flow-proportioned share of the system.
3. Wastewater Treatment System: city-owned-and-operated wastewater treatment system. The township is financially responsible for its flow-proportioned share of the system.

The City of Big Rapids, Big Rapids Township, and Green Township (the adjacent township on the north end of Big Rapids) collaborate on a rate analysis annually through a joint committee to ensure that the system is properly funded. The *Wastewater User Charge System 2019 Report* details the rate setting information. The report details cost and rate setting for each of the three entities, including the tie of shared system costs.

The following are the recommended rates for Big Rapids Township users, per the *Wastewater User Charge System 2019 Report*:

Base Rate	$10.61 per month per Residential Equivalent Units (REUs)
Variable Rate	$6.31 per 1,000 gallons of usage

The rate for Big Rapids Township is built from the following components:

- Big Rapids Collection System
    - Collection System O&M
    - Collection System Replacement Cost
    - Collection System Capital Reserve
    - Collection System Bond Debt Obligation

- Shared Collection System
    - Shared Collection System O&M

- Shared WWTP System
    - WWTP O&M

  - WWTP Replacement Costs
  - WWTP Debt Obligation
  - WWTP Administration

The shared components are allocated by use percentage (flow-proportioned) with the other two entities.

Through the AMP process, a list of recommended improvements has been developed. Big Rapids Township is committing to completing the improvements on an accelerated schedule in order improve the service level. In summary, the proposed improvements total an estimated $602,000. The township currently has a capital reserve account that totals $600,000 set aside in short-term CD investments. The Sewer Project Funding Schedule demonstrates the capacity of this account to accommodate the sewer improvements, while rebuilding the Capital Reserve account through the annual capital reserve set-aside that is funded in the rate structure, currently at $32,852 annually. It is also worth noting that the township has a fund set aside of $30,378.28 for replacement costs. This amount is set aside for unforeseen costs and serves to rebuild the capital reserve account.

Big Rapids Township has a rate structure in-place that is different than the rate structure recommended by the *Wastewater User Charge System 2019 Report*. However, the current rate structure in place produces revenue that is greater than what was planned for via the recommended structure. Accordingly, the township has chosen to leave the current rate structure in its present form. Following is the current rate:

Base Rate	$8.00 per month per Residential Equivalent Units (REUs)
Variable Rate	$9.06 per 1,000 gallons of usage

A comparison of the recommended rate versus the actual rate below demonstrates the revenue generated for each:

	Recommended Rate	**Actual Rate**
Base Rate Amount (At 1231 REUs)	$10.61 per month per REU $13,060.91 per month $156,730.92 per year	$8.00 per month per REU $9,848.00 per month $118,176.00 per year
Usage Rate (At 56,223 1k gal per year)	$6.31 per K gal $354,767.13 per year	$9.06 per K gal $509,380.38 per year
Total Revenue	**$511,498.05**	**$627,556.38**

Sewer revenues are currently $116,000 greater than needed for current obligations.

In summary, the township rates are set to adequately cover the obligations for operation and for maintenance and replacement of its sewer assets.

E. Capital Improvement Plan

The following capital improvements are recommended based on the condition assessment, criticality analysis, capacity model, and subsequent infiltration and inflow assessment. Improvements are grouped based on lift station sub-area. Recommendations are grouped into three categories: gravity and forcemain pipes, manholes, and lift stations.

1. Gravity Sewer and Forcemain

Investigate exact location of issue and address with better risers and caps.	$5,000

In-situ line 284 feet of concrete sewer pipe in the Sheridan Lift Station area.	$100,000
2. Manholes	
Construct flow channels in nine manholes	$18,000
Grout joints in nine manholes to eliminate infiltration	$18,000
Replace block manholes with 20 precast structures	$160,000
3. Lift Stations	
Upgrade Supervisors Lift Station to a submersible type lift station. Currently under contract. Work is being performed by and paid by the City of Big Rapids in an ownership transfer agreement	$200,000
Upgrade all 10 lift stations to a remote monitoring and alarm system from current alarm dialer	$50,000
Long-term — upgrade Sheridan Street Lift Station to a submersible type lift station	$300,000

III. RECOMMENDATIONS

In order to keep the progress made in the AMP, Big Rapids Township will be working to maintain the GIS mapping created as the sanitary system is updated. They will also be working to address the recommendations in the Capital Improvement Plan. The AMP will be reviewed periodically in the future to track progress on projects, forecast system needs, and anticipate funding needs.

A. List of Major Assets

The Big Rapids Township wastewater system consists of:

1. 152 Manholes.
2. Approximately 18,000 feet of gravity sewer ranging from 8 inches to 10 inches in diameter.
3. 11,000 feet of force main sewer ranging from 2 inches to 6 inches in diameter.
4. 10 pump stations: design flows range from 90 gpm to 400 gpm.
5. The age of the sewer ranges is 46 years old.
    a. The Oldest pipe was installed in 1973
    b. Newest pipe was installed in 2018.
6. The sanitary system consists primarily of PVC pipe. Exceptions are concrete pipe material located on Sheridan Street (BRT-158 to BRT-154) and Northland Drive (BRT-19 to BRT-8), which has subsequently been lined with a cast-in-place resin liner.
7. 5,500 linear feet of sewer pipes of interest were televised within the township's system.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date ____December 19, 2019______
(no later than 3 years from executed grant date)

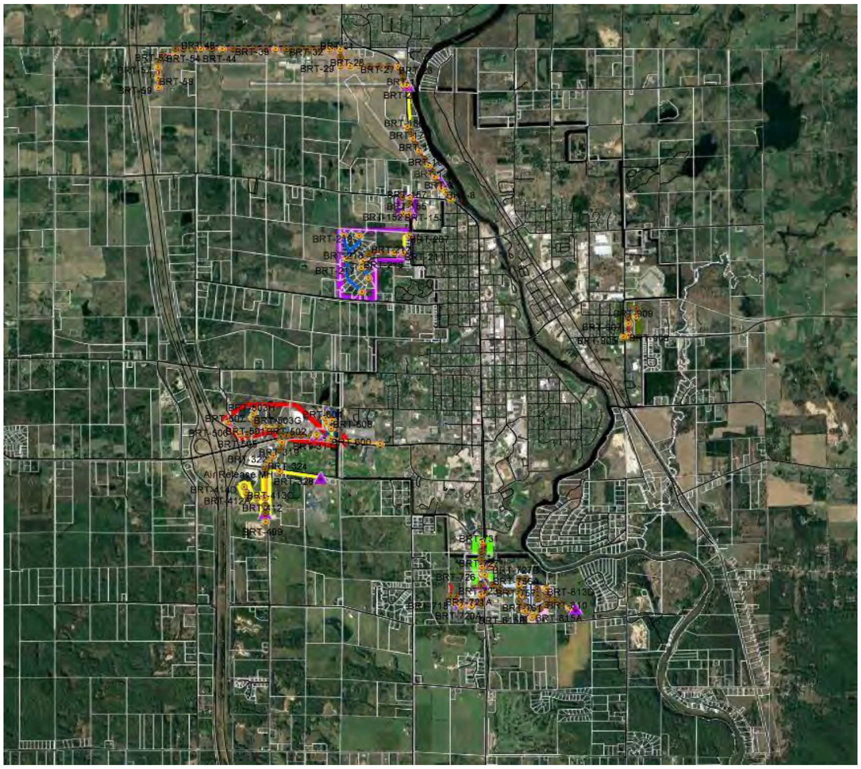
The Township of Big Rapids *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1355-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

__Mr. Bill Stanek (Supervisor)__at__231/796-3606____supervisorstanek@bigrapidstownship.net__
Name Phone Number Email

12/19/19
Signature of Authorized Representative (Original Signature Required) Date

WILLIAM STANEK, SUPERVISOR
Print Name and Title of Authorized Representative



Big Rapids Township Wastewater Evaluation

Big Rapids Township
14212 Northland Drive
Big Rapids, MI 49307

bigrapidstownship.net

Bill Stanek, Supervisor
(231) 796-3603

SAW Grant Project Number: #1355-01

SAW Grant Amount: $171,400

SAW Community Match: $0
(Disadvantaged for wastewater asset management plan; no local match required)

Prepared for:

Big Rapids Township
14212 Northland Drive
Big Rapids, MI 49307

Prepared by:

Progressive AE
1811 4 Mile Road NE
Grand Rapids, MI 49525
616/361-2664

January 3, 2020

Project No: 58516005.0

SAW Grant Executive Summary

Table of Contents

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- Capital improvement recommendations.

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B. Criticality of Assets

A Risk of Failure (RoF) rating has been developed and used to rate the approximate likelihood of structural failure. Each manhole, gravity sewer pipe, pump station, and force main was assigned an RoF rating of 1 to 5, with 5 being the worst condition, or greatest risk of failure. Assignments are based upon the condition assessment date, as described in the previous section.

A Consequence of Failure (CoF) rating system was developed to rate the environmental, social, and economic impact of the sewer. Manholes, gravity sewer pipes, pump station, and force main pipes were assigned a rating of 1 to 5, with 5 being the worst condition, or greatest impact of failure.

Infrastructure located in high-traffic areas were given a high CoF rating because of the financial and social cost needed to make emergency repairs. Additionally, sewers carrying a large amount of flow, or sewers serving densely populated areas, were given a high CoF rating due to the number of people that would be impacted and significant release to the environment if failure occurred.

The RoF and CoF ratings were combined to establish the criticality of the system — a rating system that helps assign priority to recommendations for capital improvement. The RoF and CoF are multiplied, producing criticality ratings between 1 and 25, where a rating of 25 has the highest priority for improvement.

C. Level of Service Determination

Big Rapids Township strives to provide the quality sanitary service to its customers. Big Rapids Township has identified three primary goals for their sanitary system that focus on consistency, transmission, and growth.

Goal 1: Minimize Service Interruptions

> Service interruptions are unavoidable in maintaining a sanitary sewer system. Power outages, equipment failure, clogs, and excessive flows can all lead to interruptions. Big Rapids Township understands the impact of these interruptions and plans to be proactive in managing and investing in their system to minimize them in the future.

Goal 2: Minimize Public Hazards

Force main breaks, sewer back-ups, and manhole overflows all can cause significant property damage and pose health threats. To minimize these risks, Big Rapids Township will plan to implement the Capital Improvement Recommendations which include multiple recommendations such as remote monitoring and alarms for the pump stations, which will directly help minimize public health hazards.

Goal 3: Minimize Infiltration and Inflow

Big Rapids Township is concerned with the potential in the system for infiltration. Their goal is to minimize the wet weather impacts to the sanitary system. Reducing the wet weather infiltration and inflow will minimize the flow from Big Rapids Township to the treatment plant in Big Rapids, and help reduce operating costs for the township and city.

D. Revenue Structure

Big Rapids Township partners with the City of Big Rapids in establishment of a rate structure to accomplish appropriate setting of sewer rates for both communities. Big Rapids Township has its own sewer collection system and is a wholesale customer of the City of Big Rapids for treatment of the collected sanitary waste. Big Rapids Township pays the City of Big Rapids for its participation in transmission of sewer flows to the city treatment plant through city-owned sewer pipes (that reside in the city). There are therefore, three mechanisms of the sewer system that the Township participates in:

1. Collection System: township-owned-and-operated gravity sewer pipe and lift station/force main system.
2. Transmission System: city-owned-and-operated gravity sewer pipe and lift station/force main system. Big Rapids Township is financially responsible for its flow-proportioned share of the system.
3. Wastewater Treatment System: city-owned-and-operated wastewater treatment system. The township is financially responsible for its flow-proportioned share of the system.

The City of Big Rapids, Big Rapids Township, and Green Township (the adjacent township on the north end of Big Rapids) collaborate on a rate analysis annually through a joint committee to ensure that the system is properly funded. The *Wastewater User Charge System 2019 Report* details the rate setting information. The report details cost and rate setting for each of the three entities, including the tie of shared system costs.

The following are the recommended rates for Big Rapids Township users, per the *Wastewater User Charge System 2019 Report*:

Base Rate	$10.61 per month per Residential Equivalent Units (REUs)
Variable Rate	$6.31 per 1,000 gallons of usage

The rate for Big Rapids Township is built from the following components:

- Big Rapids Collection System
  - Collection System O&M
  - Collection System Replacement Cost
  - Collection System Capital Reserve
  - Collection System Bond Debt Obligation

- Shared Collection System
  - Shared Collection System O&M

- Shared WWTP System
  - WWTP O&M

- WWTP Replacement Costs
- WWTP Debt Obligation
- WWTP Administration

The shared components are allocated by use percentage (flow-proportioned) with the other two entities.

Through the AMP process, a list of recommended improvements has been developed. Big Rapids Township is committing to completing the improvements on an accelerated schedule in order improve the service level. In summary, the proposed improvements total an estimated $602,000. The township currently has a capital reserve account that totals $600,000 set aside in short-term CD investments. The Sewer Project Funding Schedule demonstrates the capacity of this account to accommodate the sewer improvements, while rebuilding the Capital Reserve account through the annual capital reserve set-aside that is funded in the rate structure, currently at $32,852 annually. It is also worth noting that the township has a fund set aside of $30,378.28 for replacement costs. This amount is set aside for unforeseen costs and serves to rebuild the capital reserve account.

Big Rapids Township has a rate structure in-place that is different than the rate structure recommended by the *Wastewater User Charge System 2019 Report*. However, the current rate structure in place produces revenue that is greater than what was planned for via the recommended structure. Accordingly, the township has chosen to leave the current rate structure in its present form. Following is the current rate:

Base Rate	$8.00 per month per Residential Equivalent Units (REUs)
Variable Rate	$9.06 per 1,000 gallons of usage

A comparison of the recommended rate versus the actual rate below demonstrates the revenue generated for each:

	Recommended Rate	**Actual Rate**
Base Rate Amount (At 1231 REUs)	$10.61 per month per REU $13,060.91 per month $156,730.92 per year	$8.00 per month per REU $9,848.00 per month $118,176.00 per year
Usage Rate (At 56,223 1k gal per year)	$6.31 per K gal $354,767.13 per year	$9.06 per K gal $509,380.38 per year
Total Revenue	**$511,498.05**	**$627,556.38**

Sewer revenues are currently $116,000 greater than needed for current obligations.

In summary, the township rates are set to adequately cover the obligations for operation and for maintenance and replacement of its sewer assets.

E. Capital Improvement Plan

The following capital improvements are recommended based on the condition assessment, criticality analysis, capacity model, and subsequent infiltration and inflow assessment. Improvements are grouped based on lift station sub-area. Recommendations are grouped into three categories: gravity and forcemain pipes, manholes, and lift stations.

1. Gravity Sewer and Forcemain

Investigate exact location of issue and address with better risers and caps.	$5,000

	In-situ line 284 feet of concrete sewer pipe in the Sheridan Lift Station area.	$100,000
2.	Manholes	
	Construct flow channels in nine manholes	$18,000
	Grout joints in nine manholes to eliminate infiltration	$18,000
	Replace block manholes with 20 precast structures	$160,000
3.	Lift Stations	
	Upgrade Supervisors Lift Station to a submersible type lift station. Currently under contract. Work is being performed by and paid by the City of Big Rapids in an ownership transfer agreement	$200,000
	Upgrade all 10 lift stations to a remote monitoring and alarm system from current alarm dialer	$50,000
	Long-term — upgrade Sheridan Street Lift Station to a submersible type lift station	$300,000

III. RECOMMENDATIONS

In order to keep the progress made in the AMP, Big Rapids Township will be working to maintain the GIS mapping created as the sanitary system is updated. They will also be working to address the recommendations in the Capital Improvement Plan. The AMP will be reviewed periodically in the future to track progress on projects, forecast system needs, and anticipate funding needs.

A. List of Major Assets

The Big Rapids Township wastewater system consists of:

1. 152 Manholes.
2. Approximately 18,000 feet of gravity sewer ranging from 8 inches to 10 inches in diameter.
3. 11,000 feet of force main sewer ranging from 2 inches to 6 inches in diameter.
4. 10 pump stations: design flows range from 90 gpm to 400 gpm.
5. The age of the sewer ranges is 46 years old.
    a. The Oldest pipe was installed in 1973
    b. Newest pipe was installed in 2018.
6. The sanitary system consists primarily of PVC pipe. Exceptions are concrete pipe material located on Sheridan Street (BRT-158 to BRT-154) and Northland Drive (BRT-19 to BRT-8), which has subsequently been lined with a cast-in-place resin liner.
7. 5,500 linear feet of sewer pipes of interest were televised within the township’s system.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The Bay County Road Commission *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1356-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Name		Phone Number	Email
Erik Dziurka or James C. Lillo, PE	at	989-686-4610	edziurka@baycoroad.org jlillo@baycoroad.org

Signature of Authorized Representative (Original Signature Required)	Date
	12/31/2019

James C. Lillo, PE Engineer-Manager
Print Name and Title of Authorized Representative

COMMISSIONERS

EDWARD L. RIVET
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MICHAEL G. RIVARD
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Commissioner

Board of County Road Commissioners
County of Bay

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JAMES C. LILLO, P.E., ENGINEER-MANAGER

SAFETY and SERVICE

Storm Water Asset Management Plan and Program

SAW Grant Project Number – 1356-01 **December 31, 2019**

This document was prepared for the Michigan Department of Environment, Great Lakes and Energy (EGLE), referencing Section 603 of Public Act 84 of 2015, as required through receipt of funding through a fourth-round Stormwater, Asset Management and Wastewater Grant Program (SAW) award.

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Executive Summary

After the SAW lottery in March of 2014, the Bay County Road Commission (BCRC) found itself, basically sitting at the bottom of the SAW Grant Program list. Based on the number of applications verses the amount of funding allocated, the BCRC was reserved to the fact that it would not receive any funding through this program. The BCRC staff, with Board approval, moved forward without SAW assistance. Two civil consultants were hired and tasked with completing a GPS/GIS-based, storm water asset Pilot project that covered a total area of six (6) sections in Bangor and Monitor Townships. The Pilot project would become the GIS template for managing the BCRC's storm water assets once a funding source was identified. This was completed from mid-year to the end of 2015. Extrapolating the cost of completing the Pilot project by third-party consultants across the entire county, calculated to be a $4.0 million "plus" investment by the BCRC over a yet undetermined timeframe.

In August of 2016, the BCRC received notice that they were awarded funding through the SAW Grant Program, during fourth-round project selection. The amount approved was a total of $727,500, $654,750 being provided through the SAW Grant Program and the $72,750 balance by the BCRC. The scope of work approved included completing storm water asset identification, integrate GPS collected digital data into a GIS database, make that database readily available to the appropriate BCRC engineering and field staff and determine a process to cost-effectively manage the storm water system using the database. As a direct result of the SAW Grant Program funding, coupled with the BCRC's proactive approach in creating the templates during the Pilot project, the scope of work outlined above was completed in an expeditious fashion. The BCRC was able to allocate the majority of the SAW resources received to actual implementation of asset identification and condition.

Building on the Framework mapping provided by the State and through the associated RoadSoft software, BCRC field crews GPS located storm water assets. At the end of each day, the collected GPS coordinates were uploaded and integrated into the GIS database. Running concurrently with the location phase, BCRC crews, armed with digital tablets, inventoried the located assets, determining and recording system connectivity, condition, type, size and a host of other information. Again, the collected information was uploaded into the database. This exercise resulted in the identification and location of the assets listed in the Summary of the Stormwater Asset Inventory or system components on Page 5 of this document. The storm water assets presented on this page are now part of the BCRC's storm water GIS database.

The final major SAW activity was the implementation of CityWorks, a robust, GIS-based, work-order driven software that allows storm water asset recording, storage and retrieval capabilities for the entire BCRC staff. CityWorks also allows virtually anyone throughout Bay County to submit a concern or question through an internet-based portal. In addition, tablets are budgeted for purchase and are scheduled to be issued to staff by January 31, 2020. All the information gathered to date, citizen concerns and current work, will now be at the staff's fingertips no matter where they are.

The results achieved during this three-year process will benefit the BCRC throughout their existence. Previous to the SAW grant, the BCRC did not have an overall system map of their storm water assets, let alone, a database repository that held locations, types, sizes, connectivity and condition of the system. Through the grant activities, the BCRC now has a reliable, operating GIS, able to be utilized by their staff. By querying different attributes, maintenance crews can determine location and connectivity of the system in the field without returning to the office. Engineering staff can make initial decisions when estimating the cost of future projects. The two divisions are able to work together to address issues, as both now have the same information in from of them.

Further, the BCRC learned much about its overall storm water system. The overall system was found to be in Fair to Good condition, with no immediate locations of failure concern. This exercise also fostered thoughts regarding Level of Service, identification of critical assets, determining if and where the BCRC needs to allot future dollars and utilizing best practices during operation and maintenance of the system. These are covered in the following pages. Bottomline, completion of this overall project, asset GIS collection through CityWorks implementation, was made possible within a foreshortened timeline, due to SAW Grant Program funding.

Background

This document represents the Bay County Road Commission's (BCRC) Storm Water Asset Management Plan for drainage systems under its jurisdiction. The Storm Water Asset Management Plan or AMP defines the goals and guiding principles for operating and maintaining the BCRC's storm water system. The ultimate goal is to effectively improve, operate and maintain the system in a cost-effective manner by applying asset management techniques. Through the collection of system data by BCRC administration, field staff, elected officials and members of the community, the BCRC is able to efficiently maintain and operate its system. This document will be updated as necessary to verify its relevancy and effectiveness.

This AMP covers the storm water system assets owned and operated by the BCRC and does not include the management of private systems, those within city limits, drainage courses under the jurisdiction of the Bay County Drain Commissioner or those designated as Waters of the State.

Mission Statement

The Bay County Road Commission is committed to maintaining and improving the performance of its stormwater collection, transport and vehicular crossing systems, while optimizing costs and providing the level of service expected.

Asset Management Goals and Objectives

All infrastructure deteriorates with age and requires proactive management to operate, maintain, repair, and eventually replace each physical part, or asset. This progression over time from routine operation and maintenance through repairs and eventual replacement is the asset's life cycle. Waiting to perform maintenance or make repairs can save money in the short term but may decrease the lifespan of an asset. Replacing assets before they fail does not take full advantage of their value. It is this balance which puts decisions for operations, maintenance, repair, and replacement at the heart of asset management.

Asset management dictates needed actions after considering the condition of an asset, the consequences of its failure, and the action alternatives available. Asset Management drives those solutions with the lowest life cycle cost while maintaining the desired Level of Service (LoS).

Definition of the Assets

The BCRC owns, operates and maintains the following stormwater assets:

1. Storm Sewer Pipe
2. Catch Basins and associated Inlet Covers
3. Manholes and associated Solid Covers
4. Road Cross-Culverts
5. Open Drainage Channels (Roadside Ditches)
6. Open Drainage Channels (Within a Prescribed Easement)
7. Box Culverts (concrete)
8. Bridges

The BCRC does not own, nor maintain any retention or detention basins, stormwater pumps or any mechanically operated stormwater control devices.

Of the assets listed above that transport storm water over a long distance, with the exception of the Open Drainage Channels (#5 & #6), the assets are constructed of a wide variety of materials. Culverts and storm sewer range from vitrified tile, steel and concrete to multiple types of plastic. Each is operated and maintained to collect and/or channel storm water generated within the road right-of-way and transport it to a County Drain or Waters of the State.

Open Drainage Channels consist of "V" or flat-bottom roadside ditches that collect runoff from the road and road right-of-way, during rain and snow events. The ditches collect runoff and transport it downstream to an eventual outlet to a County Drain or Waters of the State. The channels are earthen in structure, with vegetation on the bottom, fore and back-slopes, used as a means to prevent soil erosion.

Bay County being a "bayside" county, is the recipient of storm runoff generated outside of its jurisdictional limits. Containing many large County Drains and three river basins, many vehicular crossings are needed to allow efficient movement of traffic throughout Bay County. Bridges are a key component in allowing this movement. Bridges under the BCRC's jurisdiction are defined by the Michigan Department of Transportation (MDOT) as any structure with a free span of over 20 feet. Short-span bridges, or those with a free span less than 20 feet, are also a large part of the BRC's vehicular crossing inventory. No matter the category, the bridges in Bay County are constructed of concrete, steel and timber or a combination of all three.

Maintaining these assets is the very essence of the BCRC's storm water management responsibility. Storm water management allows the motoring public to reach their destination without disruption due to deteriorated or undersized road crossings that cause disruption to the public's commute. Frequent failure of road stormwater crossings or water over-the-road conditions create a considerable travel inconvenience, negatively affecting both passenger and commercial traffic.

Keeping these assts in good working order also significantly benefit's the roadway itself. Having an efficient system to remove storm water runoff, either due to rainfall or snow melt, allows the roadway sub-pavement support layers to drain. This extends the lifespan of the roadway significantly, especially in Michigan, as a state that is subject to multiple freeze/thaw cycles every year.

List of Major Assets/Stormwater Asset Inventory

Below is a list of the stormwater assets the BCRC owns or has a responsibility to maintain to some degree. It is important to note, the BCRC is only fully responsible for maintaining, improving and replacing those assets that are located on or along a County Primary road. There currently are a total of 367 miles of Primary Roads in Bay County. In addition, the BCRC is responsible for maintenance, to a specifically defined degree, of the Local Secondary Road system or Township road system. This system is comprised of an additional 669 miles. Mileage of both systems are the current totals as of the date of this document. Collection of information related to roadside ditches was not part of the SAW grant scope of work. Again, assets include road cross-culverts, bridges and storm sewer systems, all of which are now part of the BCRC's GIS map and database.

Number or Length of:

Road Cross-Culverts, 12" to 24" – 949

Road Cross-Culverts, 25" to 48" – 382

Road Cross-Culverts, 49" to 60" – 137

Road Cross-Culverts, 60" and Greater – 355

Multi-plate (Steel) Culverts – 44

Bridges with Span Length GREATER than 20' – 76

Bridges with Span Length LESS than 20' – 144

Storm Sewer, 12" to 24" – 765,589 feet (145 miles)

Storm Sewer, 25" to 48" – 82,536 feet (15.6 miles)

Storm Sewer, 49" and Greater – 24,578 feet (4.7 miles)

Catch Basins/Manholes – 9,498

For Information Only

Open Ditches (Estimated) – 1969 miles

Collection of Storm Water Assets

The scope of the approved SAW Grant Program application included creating a database to track conditions of its stormwater assets. This required the BCRC to locate their existing storm sewer facilities, evaluate the conditions of structures, determine any connectivity between assets and create an interactive GIS storm water system map.

The BCRC contacted both Saginaw Valley State and Central Michigan University's GIS and Geography department faculty and determined that participating in the creation of the BRCR's storm water asset GIS database would count toward their GIS Certificate. Three college interns were hired and two stayed for the duration of the SAW Grant, with one being hired permanently to manage the GIS database. Further, the BCRC hired 6 to 8 college-aged temporary summer employees each year, to collect and evaluate it storm water assets.

GPS survey and associated collection equipment was purchased as a supplement to the equipment already owned by the BCRC. GPS receivers were used to locate storm water assets, along with computer software capable of processing the information gathered. The GPS enabled survey collection equipment allowed crews to three-dimensionally locate assets and record associated information for download into the GIS database.

Engineering and GIS staff incorporated existing construction plan information into the GIS database and map. This included adding storm water infrastructure information from existing scanned or hard copy documents by-hand into the database to be verified in the field. Digital as-built construction plans in AutoCAD or MicroStation format were converted and added into GIS database. The BCRC's road certification maps (approximately 80) were scanned, stretched and scaled to allow them to be included in the GIS map. The Bay County Drain Commissioner's office supplied approximately 400 historic Bay County flow maps that show storm water flow, section by section, throughout Bay County were also scanned, stretched and scaled to allow them to be included in the GIS map. RoadSoft GIS data integration is planned as part of the CityWorks implementation plan. Current aerial photograph of Bay County was added as a background to the GIS map, to assist in visualizing asset locations and surrounding drainage patterns.

In areas where crews were not able to document the condition or connectivity between manholes or catch basins due to debris, a third-party vendor was contracted to clean and televise the storm sewer in question. All televising and associated documentation was completed in accordance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program/Manhole Assessment Certification Program (PACP/MACP) requirements and by PACP/MACP certified personnel.

An outline of the location and collection methods used is presented on the next page.

Field Methods Used

Location and Collection

a. Locate and record existing storm water structure locations (x, y, z coordinates) using GPS enabled survey equipment.

b. Each structure was opened and the depth to pipe inverts, direction of flow for each invert and diameter of each invert was recorded.

c. For approximately 30% of the work in Item b., an additional worker was utilized to provide traffic control and implement safety procedures during data collection within the roadway

d. For 80% of the structures, the condition of the structure was recorded.

e. The field collected data was downloaded into the ESRI GIS database at the BCRC office.

Condition Assessment

a. Condition assessment included type, size, construction materials and condition evaluation. Conditions were based on Good, Fair, Poor ratings and those dependent on the type of material the structure was constructed of.

b. A condition assessment was made on approximately 80% of the 9,498 structures identified.

c. A condition assessment was made on approximately 20% of the 9,498 structures identified by certified personnel, as these were targeted as structures requiring a more in-depth inspection to determine condition. Approximately 30% of these were in the roadway and required an additional worker to provide traffic control, implement safety protocol and record the data.

d. Those areas within the system that were known to be in good condition (i.e., recently constructed or repaired portions) were not part of the assessment phase under the SAW grant.

e. The field collected data was downloaded into the ESRI GIS database at the BCRC office.

Criticality of Assets

Being a Great Lake shoreline county, all modes of storm water transport are critical to maintaining the public's ability to reach their destinations. However, it became apparent that certain aspects of the various BCRC storm water systems throughout the county were dependent on other agencies infrastructure.

With the exception of a few select areas, the BCRC's overall storm sewer systems are in Fair to Good working order. They collect the storm water or snow melt for the design storm event. In case, the design storm is a 10-year storm event or approximately 3.65 inches of rain within a 24-hour period. For these events, storm water is collected, transported and discharges to a County Drain or Waters of the State, virtually without any disruption to public travel. For events that do not follow the perfectly dispersed, 10-year storm, resulting in one or more periods of "downpours", the system is able to collect and transport the runoff. There are times when curb and gutter roadways will hold water, but rarely to the extent it requires a road closure. In other areas, storm runoff during these events will collect to the point where it will overtop roadways and cause temporary road closures, but they usually only last 24 to 36 hours.

Of more concern, is the realization that the numerous pump stations owned by the various drainage districts and operated by the Bay County Drain Commissioner's office staff, are the critical to drainage of the entire county. Without the pumps, water will collect and "back-up" causing substantial flooding of roads and property. Long-term power outages are of most concern, as generators are presently "shuttled" between stations, as each station does not have their own. Depending on the severity of the storm, the levels in Saginaw Bay/Lake Huron, wind direction and the length of a power outage, loss of the use of public roadways is a concern.

With regard to assets specific to the BCRC, the critical facilities are the bridges and road cross-culverts. Loss of any of these causes an immediate road closure and the inability to move traffic along that route. For the bridges, approximately one-third of the BCRC's 77 bridges are weight restricted. This means they are not able to withstand the legal operating loads as defined by the State of Michigan. For many, this is due to scouring or undermining of the footing on which the bridge sits. Large flows due to larger storms can exacerbate this condition, causing further restrictions on bridge vehicle weights able to cross them. Also, many are reaching their expected service life. Deteriorating concrete and steel further reduce the bridge's weight rating and its ability to handle traffic. Road cross-culverts are in a similar situation, although typically are not load restricted. Again, many of the cross-culverts are reaching or have exceeded their life expectancy.

For failure of these structures to occur due to a storm water related event, the event would need to be larger than those defined in the above paragraphs. One bordering on and including those that would qualify Bay County for emergency assistance from the State and/or FEMA would have to occur. Further, the event would have to be such that a multitude of cross-culverts and bridges, on multiple roadways, in an east/west or north/south direction, all become compromised at once, before travel would be significantly impacted. Not impossible, but fairly improbable. Bay County also has the benefit of US-10/M-15 as an east/west MDOT trunkline route and I-75 as a north/south trunkline route. These roadways are designed to withstand a much higher rain event that the roads under the BCRC's jurisdiction. However, one can envision a scenario in which traffic is severely impeded, which places the criticality of these assts at the top of the list.

Level of Service (LoS)

The very definition of the BCRC's LoS is the ability for the public to consistently utilize roadways under their jurisdiction. If constant road closures are occurring due to water over the road or failed infrastructure, the BCRC would, not only be chastised, but would not be doing their job as a road agency.

Much of what was discussed under the Criticality of Assets section above applies here. The BCRC can maintain an acceptable LoS to the motoring public and Bay County as a whole, for the facilities under their jurisdiction. What the BCRC cannot do is guarantee this LoS if the outlets for the storm water collected and transported are compromised. This includes the County Drain system (pump stations) and outlet to Waters of the State. The latter is highly susceptible to water elevation and wind strength and direction, two factors they have no control over.

As stated above and with very few exceptions, the storm water systems are being maintained and operated for the storm event they were designed. Constant maintenance includes cleaning, pipe repair and structure repair, coupled with new installations as part of road rehabilitation projects, keeps the system operating efficiently.

Although the BCRC currently has a system to receive stakeholder input or concerns, the operation and maintenance of the system will be greatly enhanced through the implementation of the various procedures and CityWorks software funded through the SAW grant. CityWorks will integrate citizen concerns into the database that also includes maintenance records, current and future projects and other on-going activities, thereby creating a "one-stop shop". Areas, locations or specific structures can be queried to determine condition, the last activity performed and if public concerns were received. Engineering staff can then target specific areas for inclusion in future budgets for repair/replacement.

Revenue Structure/Capital Improvement Plan

The BCRC's primary operating and maintenance funding source is the Michigan Transportation Fund (MTF) administered by the State of Michigan. The BCRC receives revenue from this fund on a monthly basis for use to maintain assets, complete improvement projects and operate the organization. MTF dollars increased significantly during the past several years due to State legislation passed in mid-2016. BCRC MTF revenues grew by $4.15 million or 52.4% between 2016 and the end of 2019.

Bridges (Spans Greater than 20')

Even though the new revenues outlined above have been a much-needed infusion, Primary and Local bridge conditions continued to deteriorate overall. After 11 years of minimal increases in MTF funding (2005 through 2016), the BCRC now finds itself desperately trying to "catch-up". Many of the Primary and Local bridge assets received minimal to no significant improvements during this 11-year timeframe. Thus, the good to fair rated bridges are now in the fair to poor categories and continue to deteriorate. Many are weight restricted to the point that only vehicles the size and weight of a school bus can legally cross them. Although the new revenue is appreciated, it will take over a decade to get the County bridge system back to a point where commercial and agricultural traffic can move about the County unimpeded by bridge weight restrictions.

Many of the bridges require a full replacement verses rehabilitation or preventative maintenance. Due to the extreme expense to replace a structure, averaging $900,000 to $1.0 million per location, the BCRC has relied on the Local Bridge Program top help offset construction costs. This program pays 95% of the construction costs while the BCRC covers the 5% construction cost balance, design, construction engineering and right-of-way acquisition. Unfortunately, this is a State-wide, competitive program, meaning that applying doesn't mean you will receive funding. Thus, the BCRC must analyze the bridges in need to determine which will score high enough to be selected for funding.

The BCRC scores the bridges based on specific criteria prior to completing an application for Local Bridge Program consideration. The structures condition, the roadway it serves, the type of traffic it carries and the amount, are some of the factors considered. Once the top four are determined, an application for each is prepared. Only four applications are allowed in any given year. It should be noted, ALL bridges are considered in this process, not just the worst ones. Preventative maintenance and rehabilitation are key to keep bridges in good to fair condition in good condition – "Keep the Good Bridges Good!". Thus, using an asset management approach assists in identifying, not only the worst bridges, but alerts the BCRC to those bridges that require less-expensive, less invasive repairs to extend their lifespan. As of the date of this document, the BCRC has received Local Bridge Program funding to replace one bridge in 2020, perform preventative maintenance on one bridge in 2021 and replace two bridges in 2022. Further, the BCRC has include the replacement of one bridge using MTF dollars in 2020. The BCRC plans to aggressively continue to chase Local Bridge Program funding and allocate available MTF dollars in future years to improve bridges throughout the County.

Bridges (Spans Less than 20')

Those bridges and culverts with a span less than 20', not considered a bridge as defined by the MDOT, have not faired any better. Many are load restricted and deteriorated at the same rate as the larger span bridges over the same 11-year period.

Maintenance and replacement of these bridges have been funded either solely by the BCRC or in cooperation with the township in which they reside. To date, if a bridge or large culvert fails, funding has been available to rehabilitate or replace it within a reasonable time period. Those that fail on high volume roadways are fast-tracked for replacement, whereas those on low traffic roadways may be delayed top take advantage of favorable weather conditions, contractor/BCRC crew availability. To date, the BCRC has not had a bridge out of service for more than three to four months and currently does not have any of these structures closed.

Based on previous history, which includes the 11-years of stagnant funding, the BCRC intends to continue budgeting dollars to fund repair or replacement of these bridges in their annual budgets.

Road Cross-Culverts

Thus far, these are replaced as they are identified, as they range from $5,000 to $25,000 to replace. These costs have been and currently are covered by MTF dollars and included in the yearly BCRC maintenance budget. The responsibility for replacement costs is further defined in the BCRC' "Building Better Local Roads Policy" which has been adopted annually by the Board since the mid-1990's. This policy includes a cost contribution component provided by the township in which they are located, when a large culvert is replaced on a Local road. This work is typically completed by BCRC crews.

Storm Sewer Systems

Again, these assets are repaired or replaced as they are identified. These costs have been and currently are covered by MTF dollars and included in the yearly BCRC maintenance budget. When a road construction project is in the design phase, drainage is a component that is thoroughly reviewed. All storm water assets within the project limits are evaluated and improvements made where needed. This includes review of the roadside ditch systems that can be the lead in or exit transport system for a storm sewer pipe and structure array. These improvement or replacement costs are included in the budget for the overall road construction project and are paid for with either BCRC MTF, Federal-Aid or State dollars. With the results of the storm sewer evaluation component of the SAW Grant project showing the BCRC's storm sewer systems are in good to fair condition, the BCRC intends to continue as it has in the past. Cost for improvement or replacement of system components will be covered through the use of yearly MTF and other governmental agency dollars.

Final Statement

With the increase in funding the BCRC has realized over the past three years due to legislative action, they have been able to gain significant ground improving storm water system assets. As the BCRC enters 2020, it now has robust five to ten-year road and bridge construction plan, directly derived from their respective asset management plans. Through the award of SAW Grant Program funding, the BCRC was able to add the beginnings of a five to ten-year Storm Water Asset Management Plan to compliment the road and bridge plans. For lack of better words, this is a "big deal"! As more and more information is gathered and added to the GIS map and database, the more efficient work will flow through the organization, track assets in real-time and easier it will be to complete future budgets. The BCRC thanks the State of Michigan and the Michigan Department of Environment, Great Lakes and Energy for selecting their SAW Grant Program application for funding and look forward to working with them in the future to address storm water needs.1356-0

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date November 30, 2019
(no later than 3 years from executed grant date)

The West Iron County Sewer Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1359-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: **October 7, 2019**.
2) Significant Progress Made: **Yes** or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: **N/A**.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on **N/A.**

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Chris Stachowicz at (906) 265-5209 wicsa@fast-air.net
Name Phone Number Email

12-12-2019
Signature of Authorized Representative (Original Signature Required) Date

Chris Stachowicz, Chairman
Print Name and Title of Authorized Representative

WEST IRON COUNTY SEWER AUTHORITY
SAW Grant Asset Management Project
Asset Management Plan Summary

West Iron County Sewer Authority
SAW Grant Asset Management Plan
Grant No. 1359-01
Chris Stachowicz, Board Chairman
2547 County Road 424
PO Box 246
Caspian, MI 49915
906.265.5209

Executive Summary

This sanitary sewer Asset Management Plan (AMP) is intended to provide an assessment of the sanitary sewer system assets and to provide an opinion of asset conditions and future needs. Operating, maintenance, and replacement costs are reviewed for system assets and the desired level of service of the major assets is defined for the utility.

The goal of an AMP is to use system-wide information to determine the life cycle cost for maintenance, repair, and replacements to maintain the desired level of service. By performing pre-emptive maintenance on the system, and timing repairs before they become emergencies, WICSA can make the most of their funds over the long term.

A summary of the sanitary sewer system assets is listed in Table 1.1 below:

Table 1.1: System Asset Summary		
Gravity Sewer Main	15,360	LFT
Sanitary Force-Main	1,350	LFT
Manholes	42	EACH
Treatment Plant Equipment	124	EACH
Laboratory Equipment	20	EACH
Service Buildings	6	EACH

Wastewater Collection System Asset Inventory

A complete inventory and condition assessment of all components of WICSA's Treatment Plant and Interceptor was conducted to gather information on the assets. These assets are broken down into four categories: manholes, pipes, equipment, and laboratory equipment. The inventory and condition assessments were performed through multiple methods. Records research was performed on existing drawings to get a general idea of system layout and asset locations, and where feasible, manual surveys were performed.

A Level 1 Manhole Assessment and Certification Program (MACP) inspection was performed on all manholes in the Interceptor system, with some additional Level 2 data logged. A Level 1 inspection provides basic condition assessment information to evaluate the general condition of a manhole, while Level 2 inspections gather and record detailed information to fully document all defects, determine condition of the asset, and provide the specific information needed to recommend corrective action. Data was logged using a custom tool for tablets, allowing for generation of a final inspection report for each manhole. GPS equipment was used to collect the location of each manhole for mapping. Measurements were made within each manhole to establish invert elevations of connecting pipes.

Sewer main evaluations were performed using the Pipe Assessment and Certification Program (PACP) methods for televising pipes. Reports and videos for each of the televised sections of pipe were prepared by PACP certified televising contractors and reviewed by GEI. Information gathered from televising, along with information from record drawings and other historical records was used to determine the condition of each section of pipe.

Treatment Plant and laboratory equipment were inspected and evaluated through various visual and analytical means. Records research was performed to collect and determine existing information for each component and a visual inspection was made. A review of the past operation performance and a review of the history of repairs was also completed. Vibration and infrared monitoring was initially performed, if applicable, to create baseline readings and to identify imminent potential failures. Subsequent readings were recorded yearly and changes and trends were noted and evaluated. These readings allowed staff to find and diagnose potential problems and to avoid future failures.

Table 6.1.1.1 provides a summary of the condition ratings that were used for all assets. After the asset was evaluated, a condition rating was assigned to each asset. Asset Inventory tables for Sanitary Sewer Manholes, Sanitary Sewer Pipes, Treatment Plant Equipment, Laboratory Equipment, and Service Buildings are enclosed with this summary. See attached Tables C-1, C-2, C-3, C-4, and C-5. These tables show the condition ratings that were assigned to each asset.

Table 6.1.1.1: Condition Assessment Ratings	
Condition Rating	**Description**
5	Asset Unserviceable - Over 50% of asset requires replacement
4	Significant deterioration - significant renewal/upgrade required (20 -40%)
3	Moderate deterioration - Significant maintenance required (10 -20%)
2	Minor Deterioration - Minor maintenance required (5%)
1	New or Excellent Condition - Only normal maintenance required

As part of the system study, a risk assessment was performed for each of the system assets. This risk assessment was completed using a combination of the asset's condition rating, as well as the asset's criticality, or consequence of failure rating. The Condition Rating number assigned varied between 1 and 5 with 1 being a minor defect grade and 5 being the most significant defect grade. The resulting condition rating allows WICSA to prioritize those items where both condition and consequence of failure are used to determine areas of concern and prioritize maintenance schedules. Table 1.3 shown below, summarizes the condition rating assigned to the asset types listed:

Table 1.3: Condition Ratings – System Assets

Asset Type	Rated Condition				
	1	2	3	4	5
Sanitary Sewer Main (LFT)	-	14,510	1,820	380	-
Manholes	-	38	4	-	-
Treatment Plant Equipment	5	86	33	-	-
Laboratory Equipment	5	13	2	-	-
Service Buildings	-	6	-	-	-

In addition to the above Condition Assessment Rating, a Business Risk Factor Rating is produced for each asset. This rating is the product of the condition and criticality ratings described above to give a Business Risk Factor Rating, which scales from 1 (least risk) to 25 (highest risk). A Business Risk Factor of one is an asset that has a low probability of failure and has a low criticality that poses an insignificant disruption to the System, while a Business Risk Factor of 25 is an asset that has a significant chance of failure and would cause a significant disruption in the system if it did fail. WICSA has identified any items with a Business Risk

Factor Rating of greater than 16 to be of sufficient risk to require a plan for repair or replacement. The Business Risk Factor for each asset is also listed in Tables C-1, C-2, C-3, C-4, and C-5 at the end of this summary.

Criticality of Assets

WICSA's Treatment Plant and Interceptor Sewer were evaluated, and a criticality rating was given to all sections of the system. The Criticality Ratings are based on a scale of 1 to 5, with 5 being the most critical. High criticality indicates that the system component is essential to the operation of the system and/or serves a critical customer or part of the system. Low criticality ratings indicate that the system component would cause minor disruptions if something were to happen and service was interrupted.

Table 6.1.1.3: Criticality of Asset

Performance Rating	Description
5	Catastrophic disruption
4	Major disruption
3	Moderate disruption
2	Minor disruption
1	Insignificant disruption

The majority of WICSA's Interceptor and Treatment System were given higher criticality ratings because disruptions to these components will severely affect the system's ability to transport and treat wastewater. All of the gravity interceptor, forcemain, and outfall piping were determined to be highly critical as without them service is likely disrupted. Typically, the Treatment Plant equipment located in the Plant has a second or third redundant backup which allows the system to remain in operation if one piece of equipment is affected. These pieces of equipment were rated as slightly less critical as operation can continue in the event of a breakdown. However, commonly the redundant piece of equipment is needed during times of high flow, so the majority of Treatment Plant equipment was given a higher criticality rating. Another factor in determining the criticality is that much of the Treatment Plant equipment is typically more expensive and difficult to repair. Pumps, compressor, gearboxes, and other equipment are not readily available and often times takes weeks to obtain replacement parts or new equipment thus extending the duration of the breakdown and increasing the disruption. Items of this system that were rated with lower criticality ratings were typically part of non-essential treatment processes, such as exterior tank covers, testing/sampling equipment, and laboratory equipment.

Level of Service Determination

The minimum level of service for WICSA has been set at being able to provide functional wastewater collection and treatment. Functional wastewater collection for flows from the surrounding member communities is to allow transport of wastewater to the Plant without disruption, overflow, discharge events, or violations of standard wastewater collection practices. Potential violations include sewer backups that cause wastewater to either come to surface or to back up into individual service lines and basements. In order to prevent sewer backups in the Interceptor and member community's collection systems, WICSA must maintain their lines in a minimum condition by repairing collapsed pipes, jetting and cleaning lines that pose additional risk due to sizing, slope, or condition concerns. The minimum Level of Service for the Treatment Plant is to provide sufficient wastewater treatment in order to avoid discharge of potentially harmful wastewater to the environment. This entails ensuring that all critical components of the Treatment Plant are in working order and operating as intended. Routine maintenance along with necessary capital improvements are necessary to ensure Treatment Plant equipment is fully operational, reliable, and has sufficient capacity to pump, transport, hold or treat expected wastewater flows. This also includes ensuring proper provisions are in place for backup power or bypass pumping to avoid backups during extensive power outages.

Revenue Structure

The majority of WICSA's income comes from its four-member communities which include the Cities of Iron River, Caspian and Gaastra and Iron River Township. There are also a small number of residential customers from Stambaugh Township on the system that provide some additional income as well as income from septage receiving and laboratory testing services.

Rates to the four-member communities are separated into an Operation, Maintenance, and Repair (OM&R) charge and Debt Service charge. The OMR user charges are generally used to cover operation, maintenance and repair costs while the debt service charges are used to cover bonding and other long-term debt costs.

OM&R charges are proportionally divided between the member communities based on an annual Equivalent Dwelling Unit (EDU) count of each community. This is referred to as the Percent of Corporation. This is periodically updated based on an EDU survey of each community. Below is a summary of the current EDU breakdowns along with the monthly and annual OM&R charges to each community.

Table 7.1.1: WICSA OM&R Sewer Rate

Community	Percent of Corporation	Monthly OM&R Charges	Annual OM&R Charges
Iron River City	61.4666%	$ 22,900	$ 274,800
City of Caspian	25.8077%	$ 9,615	$ 115,380
City of Gaastra	5.4562%	$ 2,033	$ 24,396
Iron River Township	7.2695%	$ 2,708	$ 32,496
Stambaugh Township	NA	$ 317	$ 3,804
	Totals =	**$ 37,573**	**$ 450,876**

Debt service charges are proportionally divided between the member communities based on a population count of each community. The population count is based on the most recent US Census data. Below is a summary of the current EDU breakdowns along with the monthly and annual OM&R charges to each community.

Table 7.1.2: WICSA Debt Service Revenues

Community	Percent of Corporation	Monthly Debt Service Charges	Annual Debt Service Charges
Iron River City	71.72%	$ 12,299	$ 147,588
City of Caspian	15.68%	$ 2,688	$ 32,256
City of Gaastra	6.39%	$ 1,095	$ 13,140
Iron River Township	6.22%	$ 1,066	$ 12,792
Stambaugh Township	NA	$ 219	$ 2,628
	Totals =	**$ 17,367**	**$ 208,404**

WICSA submitted their Sewer System Rate Methodology to the MDEQ on April 16, 2019. The submittal was reviewed by the DEQ and approved in a letter to WICSA on October 7, 2019.

Capital Improvement Plan

Table 7.4.3 is a summary of the capital improvements that WICSA intends to complete over the next twenty years. Note that the larger capital improvements are expected to be done through the assistance of one of the available grant/loan programs. This would reduce the annual cost for each by using grant funds and/or spreading out the expected costs over a longer period of time.

Table 7.4.3 Capital Improvements Summary	
0-10-Year Capital Improvements Summary	
Location	**Estimated Construction Cost**
Plant Washdown Connection	$5,200
Sludge Recirculation Pump Replacement	$58,500
Grit Pumping Improvements	$126,100
Interceptor Repair	$26,000
Digester Cap Stone Replacement	$19,500
Lift Station VFD Improvements	$52,000
Sludge and Scum Pumping Improvements	$187,200
RBC Gearbox Replacement (Phase I, 0-10 years)	$171,600
Chlorine Contact Chamber Catwalk	$20,800
0-10 Year Total ==>	**$666,900**
11-20-Year Capital Improvements Summary	
Location	
Main Lift Station Pump Upgrades	$191,100
RBC Gearbox Replacement (Phase II, 11-20 years)	$369,200
Final Effluent Sampling	$10,400
Plant Hydraulic Capacity Improvements	$75,400
Service Building Improvements	$261,300
Main Lift Station Hydrant Installation	$10,400
Septage Receiving Station	$806,000
Main Lift Station Inlet Screen	$1,036,000
11-20 Year Total ==>	**$2,759,800**
Total ==>	**$3,426,700**

Recommendations

In general, the majority of the assets that make up WICSA's Interceptor Sewer and Wastewater Treatment Plant are in fair to good condition. Two large capital improvements projects as well the regular maintenance performed by the operators and some strategic repairs over the last several years have kept the plant in good working condition. In general, the facility continues to be in good condition both physically and operationally.

Over the course of this study all components of the Interceptor Sewer System and Wastewater Treatment Plant have been evaluated by different means as described above. Upon conclusion of these evaluations, various summary reports were generated and presented to the Authority Board. The reports called out the deficiencies identified and included recommendations for correction. Some of these deficiencies have been corrected by WICSA over the past several years, while some are still unresolved. Included in Appendix L is a Summary of Recommended Repairs. This is a comprehensive list of the deficiencies identified during all the previous studies and evaluations and it is recommended that WICSA use this document as a guide to prioritize repairs.

WICSA's current rate structure provides sufficient funds to cover the current operation and maintenance costs of the system. However, if expenses continue to rise it can be expected that the operation and maintenance costs will exceed revenues in the coming years if there is not some type of rate increase. It is advised that WICSA review the current rate system annually and evaluate the need for a rate increase. It is recommended the Authority review past and future expenses including capital improvements projects outlined above when examining future rate increases to determine if they are sufficient to meet the expected future expenditures.

This Asset Management Plan should be considered a working plan and updated annually to reflect changes in the Interceptor Sewer System, Treatment Plant, rate structures, budgets, or other facets of the plan.

List of Major Assets

See the following enclosed figure and tables for a list of WICSA's major assets:

- Figure 1: Sanitary Sewer Interceptor Map
- Figure 2 – WICSA Treatment Plant – Below Grade Plan
- Figure 3 – WICSA Treatment Plant – Ground Level Plan
- Figure 4 – WICSA Treatment Plant – Upper Level Plan
- Figure 5 – WICSA Treatment Plant – Main Lift Station Plan
- Table C-1: Interceptor Sewer Manhole Inventory
- Table C-2: Interceptor Sewer Pipe Inventory
- Table C-3: Treatment Plant Equipment Inventory
- Table C-4: Laboratory Equipment Inventory
- Table C-5: Service Building Inventory

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/31/19
(no later than 3 years from executed grant date)

The City of Ishpeming *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1364-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Steve Snowaert	at 906 485-1091	citymanager@ishpemingcity.org
Name	Phone Number	Email

S. Snowaert 1/10/2020
Signature of Authorized Representative (Original Signature Required) Date

Steve Snowaert, Interim City Manager
Print Name and Title of Authorized Representative

Consulting
Engineers and
Scientists

Stormwater Asset Management Plan Executive Summary

City of Ishpeming

Prepared by
GEI Consultants of Michigan, P.C.
On behalf of :

Mr. Steve Snowaert, Interim City Manager
100 E Division Street
Ishpeming, MI 49849
(906) 485-1091

Revised
December 31, 2019

Project No. 1506660
SAW Grant No. 1364-01

Table of Contents

1. Executive Summary

This management plan is intended to provide an assessment of routine maintenance staffing requirements, and to provide an opinion of asset conditions and future needs. Operating, maintenance, and replacement costs are reviewed for all system assets, to provide a defined level of service for the utility.

The goal of an asset management plan is to use system wide information to determine the lowest life cycle cost for maintenance, repair, and replacements to maintain that level of service. By performing pre-emptive maintenance on the system, and timing repairs before they become emergencies, the City can make the most of their funds over the long term.

A summary of stormwater assets is listed in the tables below.

Table 1.1: System Asset Summary		
Total Storm Sewer Piping	118,260	LFT
Total Manholes	618	EA
Total Catch Basins	445	EA
Open Channel	3,000	LFT

The breakdown of sizing for the piping for the system is shown in Table 1.2.

Table 1.2: Storm Sewer Sizing Breakdown		
Pipe Diameter	**Length**	
6" and Smaller	14,200	LFT
8"-10"	36,000	LFT
12"	36,260	LFT
15”-24"	19,600	LFT
30”-36"	5,300	LFT
48"	3,100	LFT
Larger than 48"	3,800	LFT

The City has variable sizes of storm sewer in its system, with the Partridge Creek storm sewer as the major collector through the City. This collector takes both the bulk of the downtown storm sewer, as well as the runoff from Partridge Creek from the east. The discharge is back into Partridge Creek on the west side of the City, a channel that was reconstructed in 2012. The Partridge Creek channel discharges into Carp Creek downstream. The makeup of the storm sewer sizing is reflected in Figure 1.1 below:

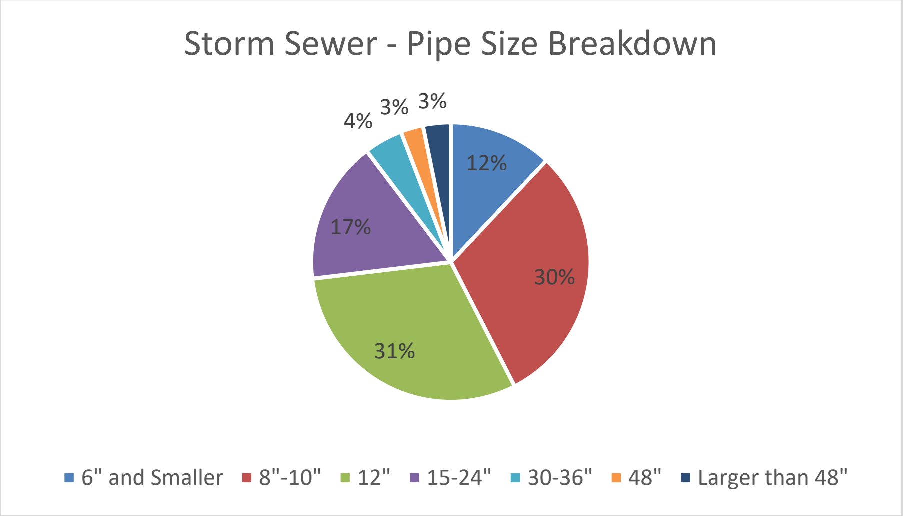


Figure 1.1: Storm Sewer Pipe Size

Table 1.3 indicates the quantity of each material making up the City's storm sewer system.

Table 1.3: Storm Sewer Pipe Material Summary		
Pipe Material	**Length**	
Polyvinyl Chloride Pipe (PVC)	25,200	LFT
Vitrified Clay Pipe (VCP)	43,560	LFT
Concrete Pipe (CP)	42,900	LFT
Brick	3,800	LFT
Other (Truss, CI, etc.)	2,800	LFT

The City replaced a section of their large diameter brick sewer with the 2019 Rural Development Water System improvements project. The City replaced a critical portion of their storm sewer with the Partridge Creek Phase 1 and Phase 2 projects in 2011 and 2012. These projects removed large diameter brick storm sewers along Cleveland Avenue, Front Street, Lake Street, and Division Street, and replaced them with new large diameter precast concrete pipe. The City had storm sewer work done in the 8th addition in 2003, which placed new reinforced concrete pipe throughout the neighborhood. Elsewhere the City has had smaller upgrade projects over the years that have left various materials throughout the system. Figure 1.2 provides a visual breakdown of the materials within the system.

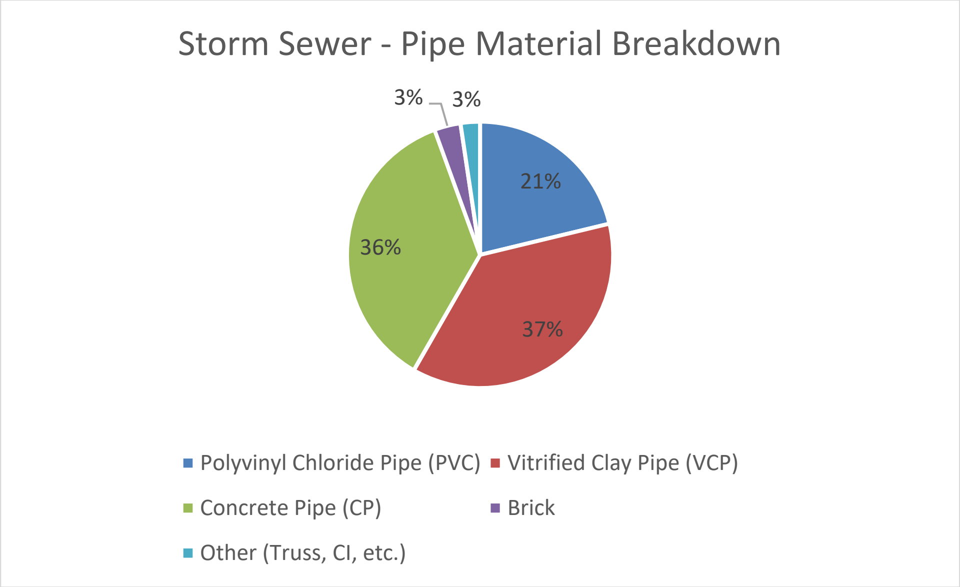


Figure 1.2: Storm Sewer Material

A condition assessment was performed on system assets. Where possible, manual and televising inspections and ratings were performed. For those assets which were not televised or not reachable from the surface, assessments of probable condition were made based on material, age, and history of the asset. Table 1.4 summarizes the condition range of system assets. As can be seen in the summary, while a large part of the system is in good condition, there is still a large amount of material that is in need of repair and replacement.

Table 1.4: Condition Ratings – System Assets

Asset Type	**Rated Condition**				
	1	**2**	**3**	**4**	**5**
Storm Sewer (LFT)	57,660	4,300	20,300	25,900	10,100
Manholes and Catch Basins	276	401	282	81	23

The information collected regarding the system has been used to project long range costs of maintaining the system in order to evaluate the current funding structure of the City. As can be seen in Table 1.5 below, the City will need approximately $447,000 to perform routine operations and maintenance. Also included in the table is a separate major capital improvements cost, which would be projected with a large scale improvements project. Typically these are funded through the combination of grant and loan programs, and as such are not included in the normal operation and maintenance budget.

Table 1.5: Estimated System Costs

Asset Type	Full Annualized Cost	Annualized Cost for Items Less than 20 Years Service Life
Storm Sewer	$ 714.999.92	$ 388,689.17
Manholes	$ 187,563.39	$ 58,357.14
Total	**$ 902,600.00**	**$ 447,000.00**

A good portion of the above outlined costs for those items with fewer than 20 years of service life is encompassed by the sections of brick sewer remaining within the City's system. Unlike sanitary sewer and water main, there is no separate funding mechanism for storm sewer projects. As such, the projects typically will only occur in conjunction with road projects or other utility improvements projects. With road funding also at a premium, it is generally difficult to put priority on replacing storm sewer. Table 1.6 below indicates those capital improvements projects that should be considered in the City's Capital Improvements planning efforts.

Table 1.6: Summary of Capital Improvements

Year	Project	Cost
2020-2029	Division Street Brick Storm Sewer	$ 970,000.00
	North 2nd Street and 3rd Street Brick	$ 1,770,000.00
	Total 2020-2029	**$ 2,740,000.00**

Each of these areas contain the remaining large diameter brick storm sewer network, ranging in size from 24" to 48". The City, between grant projects for Partridge Creek, as well as their own efforts, has managed to replace a vast majority of the brick sewer with reinforced concrete pipe. However, those remaining pieces do pose a risk, as we have seen with sinkholes opening up as a result of failure of the brick sewer.

Elsewhere in the City, because of the funding mechanism, it is not expected that the City will undertake capital improvements projects exclusively to fix their storm sewer issues. This guide should instead be used, along with the GIS mapping and televising data, to inform the City on locations where, if projects are undertaken, the condition of the storm sewer, expected life, and whether it should be replaced at the time of those projects. The City now has asset management systems for its roads, water main, sanitary sewer, and storm sewer, and has been working for the past 5-10 years on integrated asset management in order to accomplish this sort of efficient maintenance of their assets.

After review of the City's system, its operation, and evaluation of the system, the conclusion of this report is that the City does not, in general have capacity issues with their transmission piping. They do have many instances of material defect, but those are localized and identified in the tables above for repair and replacement.

Flooding events do occur in the City during regional storms that swell the outlet waters that the City depends on to receive their stormwater. This is due to the limited elevation differences from the outlet waters through the City's open channel Partridge Creek section, as well as the enclosed Partridge Creek waters. The lack of elevation difference pushes any stormwater backups back into the system, which prevent stormwater from running off and cause potential for backups of the entire system. A partial preventative measure to help reduce the impact of high water would be to maintain the sediment trap designed at the outlet of the storm sewer. If this area becomes overloaded with sediment, it raises water levels upstream.

Solutions to this could be considered, including pumping of stormwater, as well as the creation of storage basins to handle peak runoff. Both of these options would be expensive to operate, and would likely only provide partial solution for the cost. At this time, we do not recommend construction of these options. However, if water levels continue to rise with the environmental changes that we have seen over the last 10 years, it may become necessary to consider significant investment into removing the water from the City.

2. Inventory of Assets

In order to identify all of the assets within the system, a combination of investigations were performed. First, a map was created using all of the existing system information, including prior maps and construction plans. After that, the known manhole and sewer locations were identified and collected through topographic data collection.

The next step in asset identification was done during manhole condition assessment. As each manhole was identified, along with its connecting pipes, adjustments were made to the existing system mapping as necessary to accurately reflect the system.

Results of the inventory were outlined in Section 1 of this report.

3. Criticality of Assets

The list of assets were reviewed one by one in regards to the critical nature of their operation. For each asset, the consequences of failure were reviewed from the standpoint of both a financial risk, as well as the health risk. This included both the asset being reviewed, as well as the possible effects to other assets upon failure.

Once the criticality of all items were ranked, on a scale of 1-5, the condition of the asset was multiplied to determine the Business Risk Factor, which would have a scale of 1-25. Those assets with the highest ranking were considered the most critical for replacement or maintenance. The highest criticality assets are the 48” to 84” main sewer line that carries Partridge Creek, as well as a large portion of the City’s stormwater, to the Partridge Creek outlet, as well as the open channel that leads to Carp Creek. These were all replaced in the early 2010’s, so the service life for the most critical items is expected to be longer.

4. Level of Service Determination

The City of Ishpeming maintains the following level of service goals

The wastewater treatment facility maintains the following level of service goals:

1. Provide functional storm water collection and transmission.
2. Minimize flooding events that may cause property damage and hazardous conditions.
3. Perform maintenance and replacement as required in order to provide the lowest long term costs in maintaining a viable wastewater system.

The stakeholders of the system, City residents, are represented through the elected City Council. The Public Works Director works with the City Manager to develop the annual budget for the wastewater system, which is part of the City's overall budget process. The City Council approves the budget. Level of service goals were determined through the input of all of these stakeholders.

5. Revenue Structure

The City does not have a revenue structure for storm sewer. The City has routinely performed storm sewer improvements through grants, such as the EPA GLRI funding that was used to perform the two phases of the Partridge Creek Diversion Project, or the Army Corps funding which was used to provide improvements in the 8th Addition neighborhood, or through the use of their general fund. In addition, the City tried to provide storm sewer improvements as needed in conjunction with other utility projects, including their water system improvements projects and road improvements projects.

6. Capital Improvement Plan

Through the investigations and classifications accomplished by the SAW efforts, the City was able to identify multiple areas of future improvements, and to prioritize these areas for projects.

As discussed throughout the AMP, the City does not have a separate fund for storm sewer improvements, and any work must be through a rare grant opportunity, or through seizing the opportunity of other projects performing work in the area. This Stormwater Management Plan, then, along with the GIS mapping and condition data, should be used as a guide to identify whether storm sewer is in needed replacement when projects are completed within an area. This will provide the most efficient use of limited general fund money.

There are some areas that are of higher concern and higher risk than the rest of the system. Based on condition ratings, criticality, and past issues with parts of these lines, there are some remaining brick sewers that should be considered for replacement when the City can raise the funding to allocate for the projects.

The Division Street brick storm sewer is large diameter (30"), and it is buried deep in an area of high groundwater, along MDOT's right of way through the middle of the City. Due to the location and nature of this area, potential options include lining, or waiting for an MDOT full surface replacement project to perform this work at a more efficient cost. Attempts to replace this line recently were abandoned due to the high cost and difficulty combined with a short time frame to have the road back to paving level for an MDOT resurfacing project.

The other areas of brick sewer are in less sensitive locations and would just need the allocation of funds to perform these improvements.

The current capital improvement plan is as follows:

Summary of Capital Improvements		
Year	**Project**	**Cost**
2020-2029	Division Street Brick Storm Sewer	$ 970,000.00
	North 2nd Street and Pearl Street Brick	$ 1,770,000.00
	Total 2020-2029	**$ 2,740,000.00**

7. Recommendations

The City's system has showed some capacity issues over the past couple of years, however the capacity issues were caused by the high water level of the outlet waters. The sewers contain the capacity to drain the City reliably, however because of the connected nature to the receiving waters, flood conditions in the Carp River will cause issues with the City's storm water system capacity.

The Stormwater Asset Management Plan identified multiple areas where pipes and manholes should be replaced, if projects are performed in those areas. The plan, and its associated GIS mapping and condition ratings should be used as a guide when doing any project planning for other utility and road projects. In addition, there are a few areas where the old brick sewers remain. These are the areas where the City may consider performing capital improvements purely for the sake of the storm sewer system.

The good news is that the City has a lot of good piping in their collection system, and a majority of the pieces function well. The highest criticality portions of the system are nearly all new, installed in the early 2010's with the Partridge Creek Diversion Projects.

The City has multiple areas of their collection system that will need to be addressed over the next 20 years, and their current revenue structure should allow them, with minor adjustments, to make those repairs necessary. Their budget should allow them to afford minor projects annually to make those repairs, however economies of scale make a large project a more viable option.

Their sanitary sewer system has sufficient capacity for the wastewater flow, however high infiltration during spring snowmelt and rain events caused the system to be overburdened, resulting in the possibility of customer backups. With the amount and the widespread nature of the infiltration, a comprehensive project will be the most efficient approach to reducing infiltration to acceptable levels.

The good news is that a large portion of the collection system has been improved. The PVC piping installed throughout a large portion of the City with the 1984 project still shows good condition and expected service lives of these mains remain high. Much like the City's recent water project, a single significant investment should so high returns from a maintenance and system reliability standpoint.

8. List of Major Assets

Table 1: System Asset Summary		
Total Storm Sewer Piping	118000	LFT
Total Manholes	618	EA
Total Catch Basins	445	EA
Open Channel	3000	LFT

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/19
(no later than 3 years from executed grant date)

The City of Ishpeming *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1364-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: August 13, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name	Phone Number	Email
Steve Snowaert	at (906) 485-1091	citymanager@ishpemingcity.org

Signature of Authorized Representative (Original Signature Required)

Date: 1/8/2020

Steve Snowaert, City Manager
Print Name and Title of Authorized Representative

April 2017

GEI Consultants

Consulting
Engineers and
Scientists

Sanitary System Asset Management Plan Executive Summary

City of Ishpeming

Prepared by
GEI Consultants of Michigan, P.C.
On behalf of :

Mr. Steve Snowaert, Interim City Manager
100 E Division Street
Ishpeming, MI 49849
(906) 485-1091

Revised
December 31, 2019

Project No. 1506660
SAW Grant No. 1364-01

Table of Contents

1. Executive Summary

This Asset Management Plan is intended to provide an assessment of routine maintenance staffing requirements, and to provide an opinion of asset conditions and future needs. Operating, maintenance, and replacement costs are reviewed for all system assets, to provide a defined level of service for the utility.

The goal of an AMP is to use system wide information to determine the lowest life cycle cost for maintenance, repair, and replacements to maintain that level of service. By performing pre-emptive maintenance on the system, and timing repairs before they become emergencies, the City can make the most of their funds over the long term.

A summary of wastewater assets is listed in the tables below.

Table 1.1: System Asset Summary

Total Sanitary Sewer	204000	LFT
Total Manholes	929	
Lift Stations	3	
Grinder Pump Stations	5	

The breakdown of sizing for the piping for the system is shown in Table 1.2.

Table 1.2: Sanitary Sewer Sizing Breakdown

Pipe Diameter	Length	
Smaller than 6"	2154	LFT
6"	4404	LFT
8"	134510	LFT
10"	25798	LFT
12"	20373	LFT
15"	7283	LFT
18" and larger	9238	LFT

The City has a minor amount of undersized sewer main remaining, with approximately 1% of their system measuring less than 6”, and 3% of their system measuring less than 8”. Typically, new mains are not placed with smaller than 8” pipe due to the propensity for plugging issues. The makeup of the sanitary sewer sizing is reflected in Figure 1.1 below:

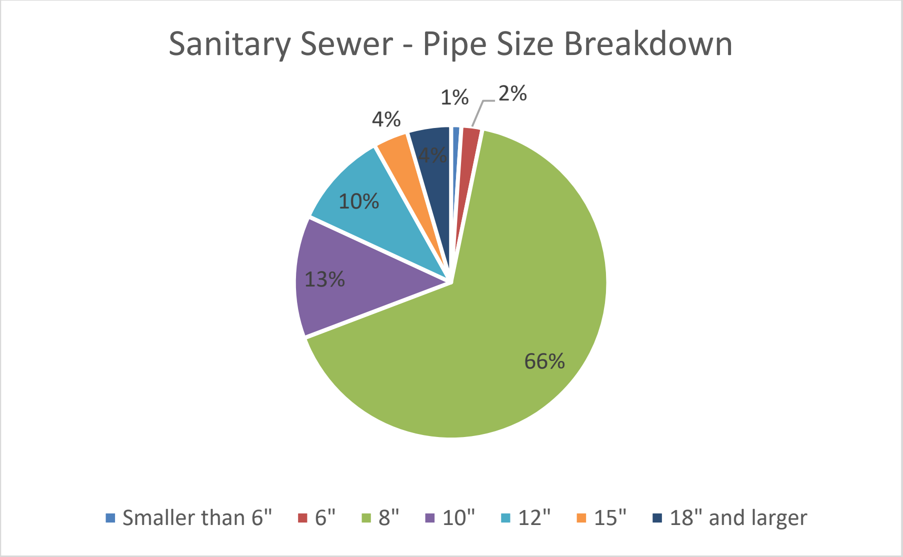


Figure 1.1: Sanitary Sewer Pipe Size

Table 1.3 indicates the quantity of each material making up the City's sanitary sewer system.

Table 1.3: Pipe Material Summary		
Pipe Material	**Length**	
Polyvinyl Chloride Pipe (PVC)	115184	LFT
Vitrified Clay Pipe (VCP)	40330	LFT
Concrete Pipe (CP)	38943	LFT
Other (Truss, Iron, Orangeburg)	9304	LFT

The city had a large portion of their system replaced in 1984 and has had small replacement projects in the years following. However, a large portion of the system remains VCP or other materials prone to infiltration. While over half their system is now PVC, there still remains 5% in other categories, 19% concrete pipe, and 20% clay sewer. The newer plastic piping has a lower possibility of catastrophic failure from collapse or breakage, and also typically means a newer pipe and longer service life remaining. Figure 1.2 provides a visual breakdown of the materials within the system.

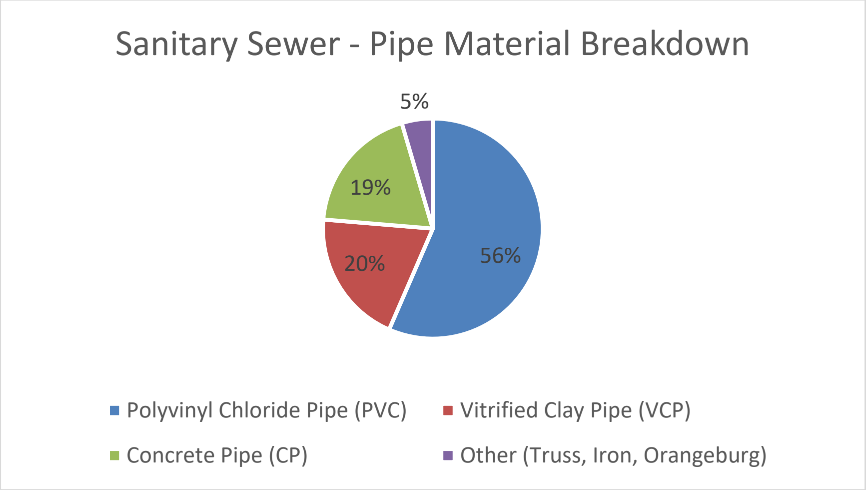


Figure 1.2 Sanitary Sewer Material

A condition assessment was performed on system assets. Where possible, manual and televising inspections and ratings were performed. For those assets which were not televised or not reachable from the surface, assessments of probable condition were made based on material, age, and history of the asset. Table 1.4 summarizes the condition range of system assets.

Table 1.4: Condition Ratings – System Assets

Asset Type	Rated Condition				
	1	2	3	4	5
Sanitary Sewer (LFT)	82740	45260	48665	12367	14730
Manholes	363	372	156	34	4
Lift Stations		2		1	
Grinder Stations		4	1		

The information collected regarding the system has been used to project long range costs of maintaining the system in order to evaluate the current funding structure of the City. As can be seen in Table 1.5 below, the City will need approximately $525,500 to perform routine operations and maintenance. Note that this table includes items which could be done under a capital improvements project, so that cost could be spread over a longer time period.

Table 1.5: Estimated System Costs

Asset Type	Full Annualized Cost	Annualized Cost for Items Less than 20 Years Service Life
Sanitary Sewer	$ 930,974.99	$ 404,208.85
Manholes	$ 150,116.96	$ 21,285.71
Lift Stations and Treatment	$ 135,000.00	$ 100,000.00
Total	**$ 1,216,100.00**	**$ 525,500.00**

The full annualized cost is the cost of the entire system and its service life. It is not typical for a community to have funding to cover this full annualized cost, as many items will go beyond their service lives. The amount does give a good indicator of how much annually the City would need to invest to fully replace their sewer system over its lifetime.

Based on the system assessment, we have put together a proposed capital improvements schedule to cover the City for the next 10 years. The table below outlines the recommended improvements. More detail on these recommendations can be found in Section 5.

Table 1.6: Summary of Capital Improvements

Year	Project	Cost
2020-2024	Park Street Lift Station and Area	$ 1,240,000.00
	Total 2017-2022	**$ 1,240,000.00**
2020-2029	8th Addition	$ 2,800,000.00
	Salisbury Location	$ 1,350,000.00
	Excelsior and South Pine	$ 1,020,000.00
	Juniper Street	$ 890,000.00
	Bessemer Street	$ 90,000.00
	New York Street	$ 490,000.00
	North Street	$ 160,000.00
	West Division and Washington	$ 370,000.00
	Cleveland Location	$ 900,000.00
	Empire Street	$ 400,000.00
	Johnson Street	$ 90,000.00
	Total 2020-2029	**$ 8,560,000.00**

Table 1.7 shows estimates based on the City's proposed 2019 budget.

Table 1.7: Projected Sewer Budget

Gross Income	$ 1,472,600.00
Expenses - O&M/Employee	$ 773,945.00
Expenses - Sewer Plant	$ 594,096.00
Net Income	**$ 104,559.00**

Based on the short term needs of the City, and the current sewer rates, the City's budget is positive, and over time would be capable of funding improvements projects. However, given immediate needs due to heavy infiltration and inflow, it is advised that the City invest in a large scale capital improvements project, with the impact spread out over a longer period. Possible funding mechanisms for this work include USDA Rural Development Water and Waste Grants and Loans, and SRF Wastewater Loans.

2. Inventory of Assets

In order to identify all of the assets within the system, a combination of investigations were performed. First, a map was created using all of the existing system information, including prior maps and construction plans. After that, the known manhole and sewer locations were identified and collected through topographic data collection.

The next step in asset identification was done during manhole condition assessment. As each manhole was identified, along with its connecting pipes, adjustments were made to the existing system mapping as necessary to accurately reflect the system.

Results of the inventory were outlined in Section 1 of this report.

3. Criticality of Assets

The list of assets were reviewed one by one in regards to the critical nature of their operation. For each asset, the consequences of failure were reviewed from the standpoint of both a financial risk, as well as the health risk. This included both the asset being reviewed, as well as the possible effects to other assets upon failure.

Once the criticality of all items were ranked, on a scale of 1-5, the condition of the asset was multiplied to determine the Business Risk Factor, which would have a scale of 1-25. Those assets with the highest ranking were considered the most critical for replacement or maintenance. The highest criticality assets are the large diameter mains near the wastewater treatment facility, as well as the main lift stations.

4. Level of Service Determination

The City of Ishpeming maintains the following level of service goals

The wastewater treatment facility maintains the following level of service goals:

1. Provide functional sewer service to all City customers.
2. No reportable events to the MDEQ.
3. Minimize sewer backups caused by preventable maintenance issues.
4. Perform maintenance and replacement as required in order to provide the lowest long term costs in maintaining a viable wastewater system.

The stakeholders of the system, City residents, are represented through the elected City Council. The Public Works Director works with the City Manager to develop the annual budget for the wastewater system, which is part of the City's overall budget process. The City Council approves the budget. Level of service goals were determined through the input of all of these stakeholders.

5. Revenue Structure

The City has sewer rates established per customer of $33.51 for the first 2,500 gallons of water used (per metered water volumes) and $13.50 for each additional 1,000 gallons. The City pays fees to the Ishpeming Area Joint Wastewater Treatment Authority for the treatment of their wastewater. Treatment costs are calculated based on both the volumes treated as well as the constituents present in the wastewater. Annual expenses are determined using historical operation and maintenance costs.

The City began raising funds to begin funding long term maintenance with a rate study in 2012. A 20-year budget has been created to lay out the expected expenses for the City during that time frame, along with budgeting based on their current revenue structure. It can be seen that projecting the asset repair costs for those items with less than 20 years of service life estimated to remain, the City will need to expend more funds than they are currently taking in, on average. While the budget is in healthy shape right now, major projects will need to be performed on the system.

6. Capital Improvement Plan

Through the investigations and classifications accomplished by the SAW efforts, the City was able to identify multiple areas of future improvements, and to prioritize these areas for projects. As was discussed through much of the AMP, the City's largest problem with the system is infiltration, and the metering performed showed that this was an issue across many areas of the system. As such, it was recommended that the City perform a large, single project to target the areas of infiltration so that the sewer system again functions as intended.

As it takes time to develop a larger project, one area that showed immediate concern, Park Street Lift Station and its surrounding gravity piping, was identified as a shorter term project to be completed with existing funds.

The current capital improvement plan is as follows:

Summary of Capital Improvements		
Year	**Project**	**Cost**
2020-2024	Park Street Lift Station and Area	$ 1,240,000.00
	Total 2020-2024	**$ 1,240,000.00**
2020-2029	8th Addition	$ 2,800,000.00
	Salisbury Location	$ 1,350,000.00
	Excelsior and South Pine	$ 1,020,000.00
	Juniper Street	$ 890,000.00
	Bessemer Street	$ 90,000.00
	New York Street	$ 490,000.00
	North Street	$ 160,000.00
	West Division and Washington	$ 370,000.00
	Cleveland Location	$ 900,000.00
	Empire Street	$ 400,000.00
	Johnson Street	$ 90,000.00
	Total 2020-2029	**$ 8,560,000.00**

7. Recommendations

The City has multiple areas of their collection system that will need to be addressed over the next 20 years, and their current revenue structure should allow them, with minor adjustments, to make those repairs necessary. Their budget should allow them to afford minor projects annually to make those repairs, however economies of scale make a large project a more viable option.

Their sanitary sewer system has sufficient capacity for the wastewater flow, however high infiltration during spring snowmelt and rain events caused the system to be overburdened, resulting in the possibility of customer backups. With the amount and the widespread nature of the infiltration, a comprehensive project will be the most efficient approach to reducing infiltration to acceptable levels.

The good news is that a large portion of the collection system has been improved. The PVC piping installed throughout a large portion of the City with the 1984 project still shows good condition and expected service lives of these mains remain high. Much like the City's recent water project, a single significant investment should so high returns from a maintenance and system reliability standpoint.

8. List of Major Assets

Table 8.1: System Asset Summary		
Total Sanitary Sewer	204000	LFT
Total Manholes	929	
Lift Stations	3	
Grinder Pump Stations	5	

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **January 30, 2020**
(no later than 3 years from executed grant date)

The **City of Sterling Heights** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1377-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Erik Skurda, DPW Operations Manager	**586-446-2441**	**eskurda@sterling-heights.net**
Name	Phone Number	Email

	1/22/20
Signature of Authorized Representative (Original Signature Required)	Date

Mark Vanderpool, City Manager
Print Name and Title of Authorized Representative

Stormwater Asset Management Plan

Prepared For

City of Sterling Heights

January 2020

AEW Project No. 0165-0008
EGLE SAW No. 1377-01

Prepared By:

ANDERSON, ECKSTEIN & WESTRICK, INC.
CIVIL ENGINEERS SURVEYORS ARCHITECTS

51301 SCHOENHERR RD. SHELBY TOWNSHIP, MI 48315
www.aewinc.com p(586)726-1234

EXECUTIVE SUMMARY

The City of Sterling Heights, per the Southeast Michigan Council of Governments (SEMCOG) as of July 2019, is home to 132,197 residents in an area of 36.7 square miles. The City of Sterling Heights owns, maintains and operates separate wastewater and stormwater conveyance systems for which the condition is not readily known. In 2012, the Michigan State Legislature adopted Public Acts 511, 560 and 562 creating the Stormwater, Asset Management and Wastewater (SAW) Grant Program administered by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) [*formerly the Michigan Department of Environmental Quality (MDEQ)*]. This grant program allowed communities to apply for up to $2,000,000 in grant funding with a local match to complete a thorough and detailed assessment of the existing conditions of their wastewater and stormwater system, complete an inventory of assets including the development of geographic information system (GIS) databases and to complete capital improvement planning over a period of twenty (20) years. Due to the structural condition of the wastewater and stormwater conveyance systems not being documented; in November 2013, the City of Sterling Heights applied for and was successful in obtaining $2,000,000 in SAW Grant funding.

The City of Sterling Heights was awarded their SAW Grant in December 2016 for the maximum allowed amount of $2,000,000 in addition to a local match of $444,444. The first $1,000,000 required a 10 percent match by the City and the second $1,000,000 received required a 25 percent match by the City. Of the total amount of the grant, $835,350 was utilized for the stormwater conveyance system. The SAW Grant Program was managed by the City of Sterling Heights Department of Public Works with assistance from the civil engineering consulting firm of Anderson, Eckstein and Westrick, Inc. (AEW) located in Shelby Township, Michigan to investigate the stormwater system and develop a Stormwater Asset Management Plan (AMP). Through development and implementation of this plan, the insight and understanding of the stormwater system can be significantly improved. The comprehensive investigation included:

- Commencement of a Storm Sewer Manhole Investigation Program
- Commencement of a Catch Basin Investigation Program
- Detailed Evaluation of Pump Stations
- Identify Future Programs for Cleaning and Televising of Storm Sewers
- Updating the Existing GIS Geodatabase
- Development of an Asset Management Plan, including 5 Year and 20 Year Capital Improvement Plans

This executive summary provides a summary of the Asset Management Plan for the City of Sterling Heights' stormwater conveyance system. AEW, with assistance from the City DPW staff prepared the Asset Management Plan with the goal of "meeting a required level of service in the most cost-effective way through the creation, acquisition , operation, maintenance, rehabilitation and disposal of assets to provide for present and future customers" in accordance with the International Infrastructure Management Manual.

Asset Inventory and Condition Assessment

Prior to the SAW Grant Program, the City of Sterling Heights had recently established a GIS geodatabase for the stormwater system. The asset inventory within the GIS was developed from existing record drawings and manuals, field notes, staff knowledge and site visits; in addition to field reconnaissance. Based upon available GIS records, the City of Sterling Heights' stormwater conveyance system consists of the following:

6"-12" Pipe	328.4	Miles
15"-21" Pipe	168.6	Miles
24"-36" Pipe	119.0	Miles
42"-48" Pipe	31.5	Miles
54"-66" Pipe	13.1	Miles
72"-78" Pipe	2.2	Miles
84"-96" Pipe	0.5	Miles
Total Pipe	***663.3***	***Miles***
Manholes	***8,923***	***Each***
Catch Basins	***27,460***	***Each***
Pump Stations	***14***	***Each***

All stormwater assets are located within existing road right-of-ways owned and maintained by the City of Sterling Heights or are located in dedicated utility easements to allow the City to access the facilities for continued maintenance and operation purposes. Those storm sewers within the right-of-ways of the Macomb County Department of Roads (MCDR) or Michigan Department of Transportation (MDOT) are owned and maintained by these jurisdictions. All stormwater ultimately discharges to an open drain owned and maintained by the Macomb County Public Works Office or directly to the Clinton River.

A detailed and thorough conditional assessment of storm sewer structures was performed at certain locations throughout the City's storm system with the available SAW Grant funding available. Of those assets that were analyzed, certain storm manholes and catch basins were evaluated and assessed by Manhole Assessment and Certification Program (MACP) certified personnel employed by AEW, randomly selected throughout the City. No sewer pipes were evaluated as part of the SAW Grant Program. In addition, the nine (9) pump stations within the storm sewer system that were installed prior to 1993 were evaluated and assessed by AEW staff.

The following is a summary of the assets that were evaluated as part of the SAW Grant Program. Based upon the evaluations performed, additional information not previously known prior to the evaluations was entered into the GIS geodatabase.

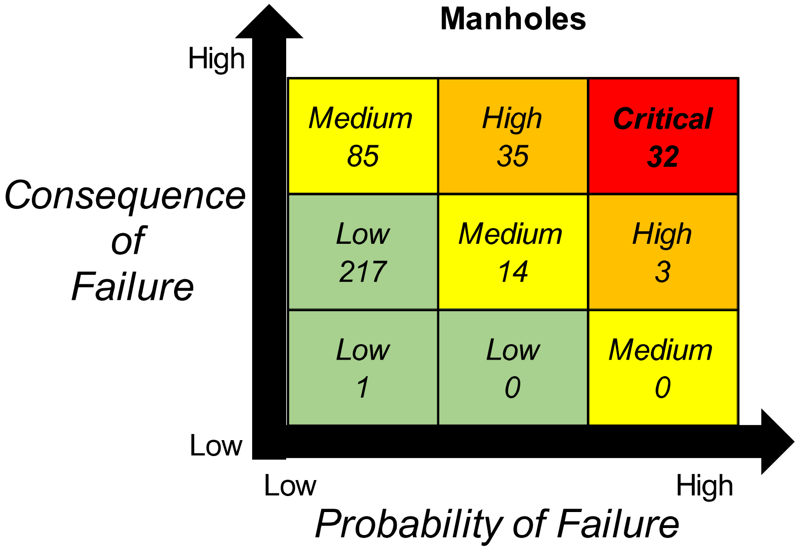
Manholes	445	Miles	5.0% of System
Catch Basins	391	Miles	1.4% of System
Pump Stations	9	Each	64.3% of System

A random sampling of manholes and catch basins with roughly the same quantity were identified for evaluation in each section of the City, each section being a square mile of the City. Evaluation of structures were based upon the National Association of Sewer Service Companies Manhole Assessment Certification Program (MACP). For manhole and catch basin assessment, an inventory is developed of each component of each structure and the structural condition noted of each component. An overall MACP rating is determined for each structure with a rating provided of one (1) through five (5), with five (5) being a critical rating. In addition, a detailed evaluation of each pump station installed prior to 1993 analyzing each component was conducted with an overall rating of each station provided one (1) through five (5), with five (5) being a critical rating and recommendations for the improvements of those components considered critical provided.

Criticality of Assets

Following the detailed and thorough analysis of assets, the Probability of Failure (POF) and Consequence of Failure (COF) were calculated for each asset evaluated. The POF is the measure of how likely an asset is to fail and takes into account the age of the system and the overall MACP condition rating while the COF is a measure of the impact of a potential failure of an asset and the system's ability to convey normal flows. The COF takes into account several weighted factors including the location of the asset, the size of the asset and the population served by the asset; in addition to financial, safety, and environmental impacts. POF and COF scores are multiplied together resulting in the Business Risk Exposure (BRE) score, also known as the criticality score. The BRE is used to prioritize which assets are most critically in need of repair. Any asset with a BRE score of 16 or greater is considered critical by EGLE.

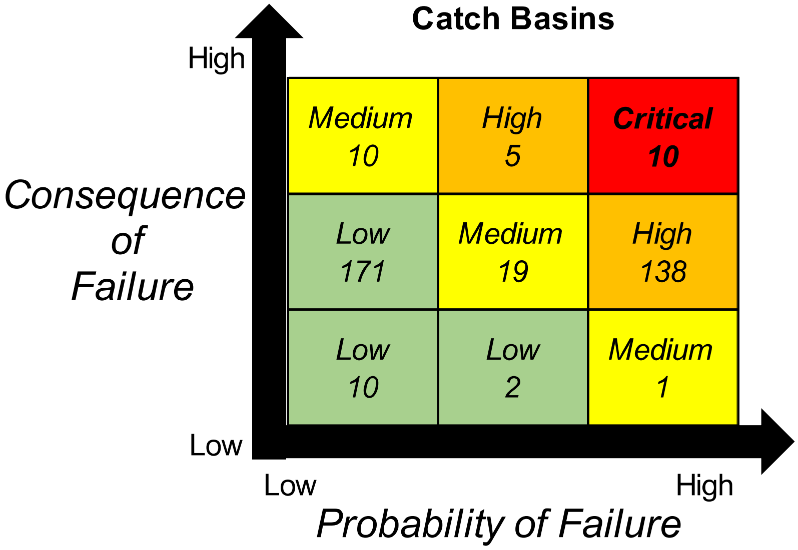
The City of Sterling Heights' stormwater system has very few assets with BRE scores considered critical exceeding a BRE score of 16. For the manhole structures, as can be seen in the below table, of 387 structures evaluated, the overall condition is mostly in fair condition with 29 structures (7.4%) rated in the critical range.



Manholes

Medium *85*	*High* *35*	***Critical*** ***32***
Low *217*	*Medium* *14*	*High* *3*
Low *1*	*Low* *0*	*Medium* *0*

For the catch basin structures, as can be seen in the below table, of 366 structures evaluated, the overall condition is in fair to poor condition with 17 structures (4.6%) rated in the critical range.



Medium *10*	*High* *5*	***Critical*** ***10***
Low *171*	*Medium* *19*	*High* *138*
Low *10*	*Low* *2*	*Medium* *1*

In addition, the nine (9) pump stations owned and maintained by the City of Sterling Heights installed prior to 1993 were evaluated and a detailed conditional assessment completed. Of the stations evaluated, three (3) of the stations were identified with a critical rating of 16 or higher. Recommendations have been provided to rehabilitate these pump stations over a seven (7) year period as part of this asset management plan. It is recommended that the pump stations be re-evaluated every five (5) years to identify changes to the structural condition of each asset within the pump station and to identify future capital improvement projects.

Capital Improvement Plan

Based upon the BRE evaluation, the City has developed short term (5 year) and long term (20 year) capital improvement plans providing recommendations for continued maintenance, investigation and evaluation of the stormwater system, in addition to structural improvements to the stormwater system. The BRE evaluation assisted with prioritizing all future capital improvement projects and to develop alternatives to fund these projects.

The following table provides the 5 Year Capital Improvement Program recommended for the stormwater system. Detailed 5 Year and 20 Year Capital Improvement

Programs are provided in the Appendices of the Asset Management Plan.

Fiscal Year	Projects	Project Cost	Total Project Costs
2020-21	Cleaning and Television Investigation	$814,460.00	$1,514,610.00
	Storm Sewer Structure Investigation	$106,650.00	
	Manhole Rehabilitation Program	$125,000.00	
	Catch Basin Rehabilitation Program	$375,000.00	
	Pump Station Improvements	$123,500.00	
2021-22	Cleaning and Television Investigation	$815,460.00	$1,515,110.00
	Storm Sewer Structure Investigation	$106,650.00	
	Manhole Rehabilitation Program	$125,000.00	
	Catch Basin Rehabilitation Program	$375,000.00	
	Pump Station Improvements	$130,000.00	
2022-2023	Cleaning and Television Investigation	$821,920.00	$1,583,070.00
	Storm Sewer Structure Investigation	$106,650.00	
	Manhole Rehabilitation Program	$125,000.00	
	Catch Basin Rehabilitation Program	$375,000.00	
	Pump Station Improvements	$95,000.00	
2023-2024	Cleaning and Television Investigation	$796,880.00	$1,574,530.00
	Storm Sewer Structure Investigation	$106,650.00	
	Manhole Rehabilitation Program	$125,000.00	
	Catch Basin Rehabilitation Program	$375,000.00	
	Pump Station Improvements	$96,500.00	
2024-2025	Cleaning and Television Investigation	$778,990.00	$1,490,640.00
	Storm Sewer Structure Investigation	$106,650.00	
	Pump Station Investigation	$25,000.00	
	Manhole Rehabilitation Program	$125,000.00	
	Catch Basin Investigation Program	$375,000.00	
	Pump Station Improvements	$53,500.00	

The findings and recommendations included in this report are not intended to change land use or policies of the City, but to provide guidance and affordable alternatives for managing the City's stormwater needs. While it is important to expeditiously complete studies and investigations, it is also imperative that staff, managers and users are allowed sufficient time to absorb the benefits of this program. Under this multi-phased approach, many of the phases are proposed concurrently with the completion of each phase to occur in a logical sequence.

This asset management plan should be revisited on an annual basis to account for maintenance, rehabilitative and capital improvement projects completed within a given year, to make adjustments to the plan based upon investigative work completed and to update cost estimates for future projects.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **January 30, 2020**
(no later than 3 years from executed grant date)

The **City of Sterling Heights** certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1377-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: **October 17, 2019**.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Erik Skurda, DPW Operations Manager	**586-446-2441**	**eskurda@sterling-heights.net**
Name	Phone Number	Email

1/22/20

Signature of Authorized Representative (Original Signature Required) Date

Mark Vanderpool, City Manager
Print Name and Title of Authorized Representative

April 2017

Wastewater Asset Management Plan

Prepared For

City of Sterling Heights

January 2020

AEW Project No. 0165-0007
EGLE SAW No. 1377-01

Prepared By:

ANDERSON, ECKSTEIN & WESTRICK, INC.
CIVIL ENGINEERS SURVEYORS ARCHITECTS

51301 SCHOENHERR RD. SHELBY TOWNSHIP, MI 48315
www.aewinc.com p(586)726-1234

EXECUTIVE SUMMARY

Overview of SAW Grant Program

The City of Sterling Heights, per the Southeast Michigan Council of Governments (SEMCOG) as of July 2019, is home to 132,197 residents in an area of 36.7 square miles. The City of Sterling Heights owns, maintains and operates separate wastewater and stormwater conveyance systems for which the condition is not readily known. In 2012, the Michigan State Legislature adopted Public Acts 511, 560 and 562 creating the Stormwater, Asset Management and Wastewater (SAW) Grant Program administered by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) [*formerly the Michigan Department of Environmental Quality (MDEQ)*]. This grant program allowed communities to apply for up to $2,000,000 in grant funding with a local match to complete a thorough and detailed assessment of the existing conditions of their wastewater and stormwater system, complete an inventory of assets and include in the development of a Geographic Information System (GIS) geodatabase and to complete capital improvement planning over a period of twenty (20) years. Due to the structural condition of the wastewater and stormwater conveyance systems not being documented; in November 2013, the City of Sterling Heights applied for and was successful in obtaining $2,000,000 in SAW Grant funding.

The City of Sterling Heights was awarded their SAW Grant in December 2016 for the maximum allowed amount of $2,000,000 in addition to a local match of $444,444. The first $1,000,000 required a 10 percent match by the City and the second $1,000,000 received required a 25 percent match by the City. Of the total amount of the grant, $1,609,100 was utilized for the wastewater conveyance system. The SAW Grant Program was managed by the City of Sterling Heights Department of Public Works with assistance from the civil engineering consulting firm of Anderson, Eckstein and Westrick, Inc. (AEW) located in Shelby Township, Michigan to investigate the wastewater system and develop this Wastewater Asset Management Plan (AMP). Through development and implementation of this plan, the insight and understanding of the wastewater system can be significantly improved. The comprehensive investigation included:

- Commencement of a Sanitary Sewer Cleaning and Television Investigation Program
- Commencement of a Sanitary Sewer Manhole Investigation Program
- Detailed Evaluation of Pump Stations
- Review of the Water and Sewer Rate Structure and Development of a Rate Methodology Report
- Updating the Existing GIS Geodatabase
- Development of an Asset Management Plan, including 5 Year and 20 Year Capital Improvement Plans

This executive summary provides a summary of the Asset Management Plan for the City of Sterling Heights' wastewater conveyance system. AEW, with assistance from the City DPW staff prepared this Asset Management Plan with the goal of "meeting a required level of service in the most cost-effective way through the creation, acquisition, operation, maintenance, rehabilitation and disposal of assets to provide for present and future customers in accordance with the International Infrastructure Management Manual.

Asset Inventory and Condition Assessment

Prior to the SAW Grant Program, the City of Sterling Heights had recently established a GIS geodatabase for the wastewater system. The asset inventory within the GIS was developed from existing record drawings and manuals, field notes, staff knowledge and site visits; in addition to field reconnaissance. Based upon available GIS records, the City of Sterling Heights' wastewater conveyance system consists of the following:

6"-12" Pipe	378.4	Miles
15"-21 Pipe	46.3	Miles
24"-36" Pipe	24.5	Miles
42"-48" Pipe	5.9	Miles
54" Pipe	1.5	Miles
Total Pipe	***456.6***	***Miles***
Manholes	***11,468***	***Each***
Pump Stations	***2***	***Each***

All wastewater assets are located within existing road right-of-ways, owned and maintained by the City of Sterling Heights, Macomb County Department of Roads (MCDR) or Michigan Department of Transportation (MDOT), or are located in dedicated utility easements to allow the City to access the facilities for continued maintenance and operation purposes. The City of Sterling Heights does not operate a wastewater treatment facility. All sewage is discharged into the Macomb County Interceptor System and ultimately discharges to the Great Lakes Water Authority (GLWA) system with sewage treated at their Water Resource Recovery Facility (WRRF) located in Southwest Detroit.

A detailed and thorough conditional assessment was performed at certain locations throughout the City’s sewer system with the available SAW Grant funding available. Of those assets that were analyzed, pipes were cleaned and investigated by means of Closed Circuit Television (CCTV) inspections performed by the City of Sterling Heights DPW and contracted through DVM Utilities of Sterling Heights, Michigan. The sanitary manhole and pump station assets evaluated were assessed by means of visual inspection by experienced staff from AEW.

The following is a summary of the assets that were evaluated as part of the SAW Grant Program. Based upon the evaluations performed, additional information not previously known prior to the evaluations was entered into the GIS geodatabase.

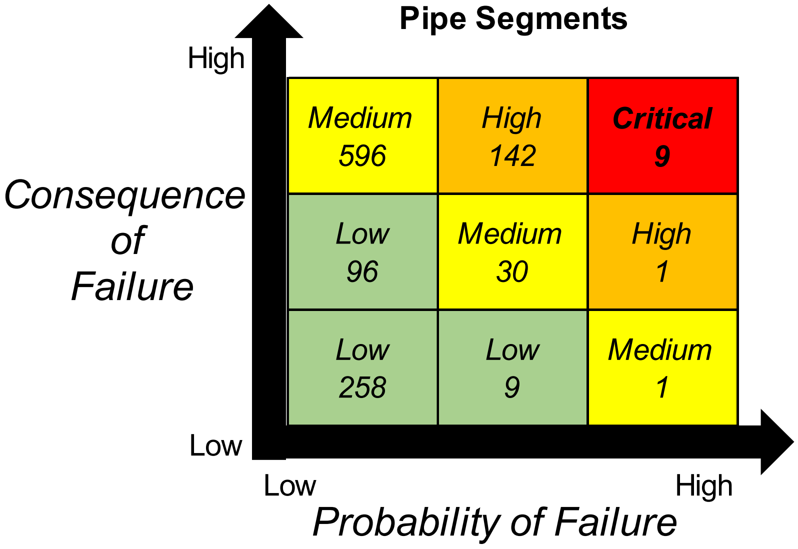
Pipe by City	16.5	Miles	3.6% of System
Pipe by DVM	36.5	Miles	8.0% of System
Manholes	782	Each	6.8% of System
Pump Stations	2	Each	

A random sampling of pipes and manholes with roughly the same quantity were identified for evaluation in each section of the City, each section being a square mile of the City. Evaluation of assets were based upon the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP). For pipeline assessment, each structural defect (i.e. cracked pipe, broken or collapsed pipe, interior surface deterioration, offset joints) and each operations and maintenance defect (i.e. infiltration through joints, root intrusion, mineral deposit encrustation, protruding service taps) is rated one (1) through five (5), with five (5) being a critical rating and an overall PACP rating is provided for each pipe segment. For the manhole assessment, an overall MACP rating is provided similar to the pipeline assessment. In addition, a detailed evaluation of each pump station analyzing each component of a pump station was conducted with an overall rating of each station provided one (1) through five (5), with five (5) being a critical rating and recommendations for the improvements of those components considered critical provided.

Criticality of Assets

Following the detailed and thorough analysis of assets, the Probability of Failure (POF) and Consequence of Failure (COF) were calculated for each asset evaluated. The POF is the measure of how likely an asset is to fail and takes into account the age of the system and the overall PACP or MACP condition rating while the COF is a measure of the impact of a potential failure of an asset and the system's ability to convey normal flows. The COF takes into account several weighted factors including the location of the asset, the size of the asset and the population served by the asset; in addition to financial, safety, and environmental impacts. POF and COF scores are multiplied together resulting in the Business Risk Exposure (BRE) score, also known as the criticality score. The BRE is used to prioritize which assets are most critically in need of repair. Any asset with a BRE score of 16 or greater is considered critical by EGLE. The City of Sterling Heights' wastewater system has very few assets with BRE scores considered critical exceeding a BRE score of 16.

For the evaluation of the sewer pipes, 1,142 pipe segments were evaluated totaling 53 miles of sewer. As can be seen in the below table, the overall condition of the pipe is in fair condition with 143 (12.5%) segments rated in the high range of criticality and only 9 (0.8%) segments rated in the critical range of criticality.

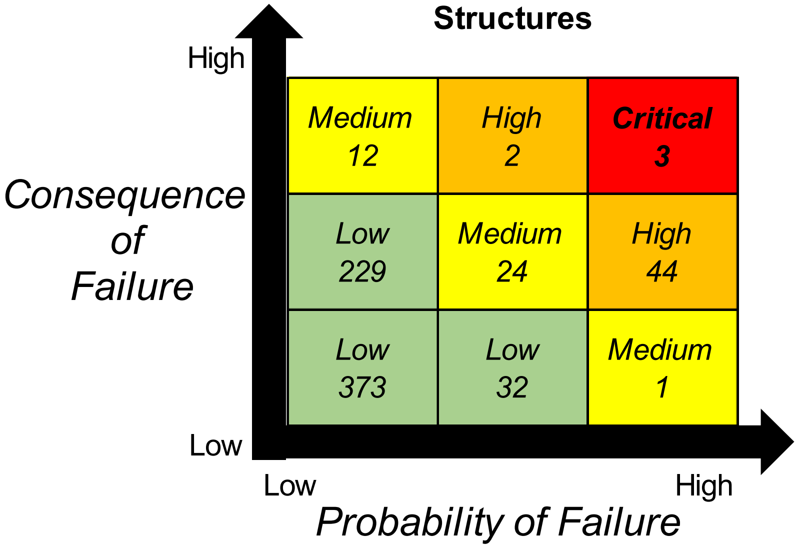


Pipe Segments

Consequence of Failure	Low		High
High	*Medium* *596*	*High* *142*	***Critical*** ***9***
	Low *96*	*Medium* *30*	*High* *1*
Low	*Low* *258*	*Low* *9*	*Medium* *1*

Probability of Failure

For the manhole structures as can be seen in the below table, of 720 structures evaluated, the overall condition is mostly in good condition with only 49 structures (6.7%) rated in the high to critical range of criticality.



Structures

Consequence of Failure \ Probability of Failure	Low		High
High	*Medium* *12*	*High* *2*	***Critical*** ***3***
	Low *229*	*Medium* *24*	*High* *44*
Low	*Low* *373*	*Low* *32*	*Medium* *1*

In addition, the two (2) pump stations owned and maintained by the City of Sterling Heights were evaluated and a detailed conditional assessment completed. Both pump stations, the Riverland Pump Station and the Viceroy Pump Station, were identified to be in good to fair condition. The improvements recommended for the Riverland Pump Station include the installation of a backup generator. Consumers Energy is currently extending natural gas service to this location for a natural gas fired backup generator to be installed. Also recommended for the Riverland Pump Station is replacement of the discharge piping, including installation of pressure transmitters, and replacement of the pump guide rail systems. The improvements recommended for the Viceroy Pump Station include replacement of discharge piping, including installation of pressure transmitters. Both pump stations are recommended for cleaning and recoating of their wet well and valve vaults. Additionally, it is recommended that the pump stations be re-evaluated every five (5) years to identify changes to the structural condition of each asset within the pump station and to identify future capital improvement projects.

Capital Improvement Plan

Based upon the BRE evaluation, the City has developed short term (5 year) and long term (20 year) capital improvement plans providing recommendations for continued maintenance, investigation and evaluation of the system, in addition to structural improvements to the sanitary conveyance system. The BRE evaluation assisted with prioritizing all future capital improvement projects and to develop a rate structure to fund these projects.

The following table provides the 5 Year Capital Improvement Program for the wastewater system. Detailed 5 Year and 20 Year Capital Improvement Programs are provided in the Appendices of the Asset Management Plan.

Fiscal Year	Projects	Project Cost	Total Project Costs
2020-21	Cleaning and Television Investigation - Contracted	$938,500.00	$3,102,630.00
	Cleaning and Television Investigation - City DPW Staff	$900,000.00	
	Sewer Lining Rehabilitation Program	$650,000.00	
	Manhole Rehabilitation Program	$500,000.00	
	Pump Station Improvements	$50,000.00	
	Manhole Investigation Program	$64,130.00	
2021-22	Cleaning and Television Investigation - Contracted	$938,500.00	$3,109,170.00
	Cleaning and Television Investigation - City DPW Staff	$900,000.00	
	Sewer Lining Rehabilitation Program	$650,000.00	
	Manhole Rehabilitation Program	$500,000.00	
	Pump Station Improvements	$56,540.00	
	Manhole Investigation Program	$64,130.00	
2022-23	Cleaning and Television Investigation - Contracted	$938,500.00	$3,106,430.00
	Cleaning and Television Investigation - City DPW Staff	$900,000.00	
	Sewer Lining Rehabilitation Program	$650,000.00	
	Manhole Rehabilitation Program	$500,000.00	
	Pump Station Improvements	$53,800.00	
	Manhole Investigation Program	$64,130.00	

Fiscal Year	Projects	Project Cost	Total Project Costs
2023-24	Cleaning and Television Investigation - Contracted	$938,500.00	$3,092,630.00
	Cleaning and Television Investigation - City DPW Staff	$900,000.00	
	Sewer Lining Rehabilitation Program	$650,000.00	
	Manhole Rehabilitation Program	$500,000.00	
	Pump Station Improvements	$40,000.00	
	Manhole Investigation Program	$64,130.00	
2024-25	Cleaning and Television Investigation - Contracted	$938,500.00	$3,102,630.00
	Cleaning and Television Investigation - City DPW Staff	$900,000.00	
	Sewer Lining Rehabilitation Program	$650,000.00	
	Manhole Rehabilitation Program	$500,000.00	
	Pump Station Improvements	$40,000.00	
	Manhole Investigation Program	$64,130.00	
	Pump Station Evaluation	$10,000.00	

The findings and recommendations included in this report are not intended to change land use or policies of the City, but to provide guidance and affordable alternatives for managing the City's wastewater needs. While it is important to expeditiously complete studies and investigations, it is also imperative that staff, managers and users are allowed sufficient time to absorb the benefits of this program. Under this multi-phased approach, many of the phases are proposed concurrently with the completion of each phase to occur in a logical sequence.

This asset management plan along with the rate methodology should be revisited on an annual basis to account for maintenance, rehabilitative and capital improvement projects completed within a given year, to make adjustments to the plan based upon investigative work completed and to update cost estimates for future projects.

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environmental, Great Lakes, and Energy (EGLE)
Revolving Loan Section
Att: Eric Pocan

From: Hubbell, Roth and Clark, Inc.

CC: City of Howell

Date: November 12, 2019

Re: City of Howell
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1379-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant work performed by the City of Howell. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows recent EGLE guidance.

GRANTEE INFORMATION

City of Howell
611 East Grand River Ave
Howell, Michigan 48843

SAW Grant Project #1379-01

Project Grant Amount: $1,657,244

Applicant Match Amount $247,644

Stormwater AMP Grant Amount: $714,000

Authorized Representative & DPS Contact:	DPW Contact:	Consultant Contact:
Erv Suida, Interim City Manager, DPS Director	Matt Davis, Interim DPW Superintendent,	Karyn Stickel, PE Hubbell, Roth & Clark
Phone: 517-546-7510	Phone: 517-546-7510	Phone: 248-454-6300
ESuida@CityofHowell.org	MDavis@CityofHowell.org	KStickel@hrcengr.com

EXECUTIVE SUMMARY

The City of Howell applied for and received a grant to further develop an Asset Management Plan (AMP) for its stormwater system through the Michigan Department of Environmental, Great Lakes, and Energy's (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, operates and maintains the storm sewer system and has various tools used to manage the assets, including an Esri Geographic Information System (GIS) geodatabase, condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review on the City's website for at least 15 years.

STORMWATER INVENTORY

The City of Howell uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through grant efforts, the City populated the information necessary to more effectively use the GIS, and participated in training.

GIS has been used in the City for the past number of years through a subscription with Esri ArcGIS software. However, the GIS was not updated actively. Using a Lidar Scan, GPS, and observations made during condition assessment, the data in the GIS was expanded and accuracy greatly improved using grant funds. Through the grant, the City purchased additional Esri desktop software subscriptions to provide key staff members the ability to update and manage the GIS. Tablet level Esri software was purchased for the staff to use GIS applications in the field. Training sessions were held for both the desktop software and the tablet software helping the Staff become more familiar with their device's new abilities.

The next page includes a table of the inventory in GIS.

Asset Type	Amount
2-inch sewer	118 feet
3-inch sewer	65 feet
4-inch sewer	769 feet
6-inch sewer	8,986 feet
8-inch sewer	41,402 feet
10-inch sewer	13,715 feet
12-inch sewer	49,427 feet
15-inch sewer	21,255 feet
18-inch sewer	17,227 feet
21-inch sewer	5,643 feet
24-inch sewer	15,392 feet
28-inch sewer	1,597 feet
30-inch sewer	8,498 feet
36-inch sewer	4,568 feet
42-inch sewer	5,246 feet
48-inch sewer	6,825 feet
54-inch sewer	1,449 feet
60-inch sewer	3,361 feet
72-inch sewer	85 feet
Unknown diameter sewer	4,343 feet
Outfall	63
Catch basin	1,551
Manholes	694

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For storm sewer assets, the NASSCO-compliant inspection information was collected during sewer televising. For manholes, NASSCO inspection protocol were used to collect data. The data is stored in the GIS system to share this data with Esri Workforce to develop inspection work orders to continue to evaluate and maintain assets, such as manholes and sewer pipes.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 116,320 lineal feet of storm sewer underwent condition assessment via cleaning and televising. Approximately 1,623 manholes and other related structures were evaluated using the NASSCO inspection protocol. The Contractor, Corby Environmental Services, continued to televise pipe segments after this report was written to maximize the City's available grant money enabling the City to gain more information about their system. The PACP reports and videos are linked to the pipes in the GIS system.

CRITICALITY OF ASSETS

The City of Howell developed baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.)

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk

Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of storm gravity mains was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material of the asset. The COF for horizontal assets was determined based on asset depth, size, surface type, proximity to wetlands, proximity to railroads, and proximity to roads and intersections.

Below is a list of BRE scores for the horizontal assets in the City's storm water system

Storm Pipes	
BRE Score	Percent of Manholes
<= 5	83%
5 <= 10	16%
10 <= 15	1%
15 <= 20	0%
20 <= 25	0%

Storm Manholes	
BRE Score	Percent of Manholes
<= 5	97%
5 <= 10	3%
10 <= 15	0%
15 <= 20	0%
20 <= 25	0%

LEVEL OF SERVICE DETERMINATION

The City of Howell reviewed a list of questions related to level of service and developed the following mission statement as part of the AMP:

> *It is the Mission of the City of Howell Department of Public Works to continue to serve our residents with effective stormwater management with an emphasis on prompt responses to concerns and professional customer service.*

The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. The City of Howell has chosen to continue their ongoing process rather than adopting specific goals. They will continue to consider the impact of to the public health and the system's ability to comply with any applicable regulations and operational needs.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City does not charge a stormwater utility rate; therefore, the revenue structure was not reviewed for the AMP. Improvements to the storm system, when needed, are primarily funded through the general or road maintenance funds.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City of Howell's stormwater system, using recommendations from the asset inspection process, and consideration of other system needs.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

In summary the horizontal CIP includes:

- 86 pipes have repairs that are recommended to be addressed within the next 0-5 years.
- 106 manholes have repairs that are recommended be addressed in the next 0-5 years.
- 86 pipes are recommended to be addressed in the next 5-20 years.
- 66 manholes have repairs that are recommended be addressed in the next 5-20 years.
- 21 manholes are recommended for cleaning and monitoring only.
- 89 manholes were not found and should investigated further.
- 26 manholes were located but were unable to be inspected because they were buried or access was unavailable.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis as part of the annual process to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Owner's major assets include:

- 209,970 feet of 2-72-inch storm sewer pipe
- 1551 storm catch basins
- 694 storm manholes

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Howell *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1379-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Ervin Suida	at 517-546-7510	ESuida@CityofHowell.org
Name	Phone Number	Email

12/17/19

Signature of Authorized Representative (Original Signature Required) Date

Ervin Suida, Interim City Manager, Director of Public Services
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environmental, Great Lakes, and Energy (EGLE)
Revolving Loan Section
Att: Eric Pocan

From: Hubbell, Roth and Clark, Inc.

CC: City of Howell

Date: November 12, 2019

Re: City of Howell
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1379-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant work performed by the City of Howell. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows recent EGLE guidance.

GRANTEE INFORMATION

City of Howell
611 East Grand River Ave
Howell, Michigan 48843

SAW Grant Project #1379-01

Project Grant Amount: $1,657,244

Applicant Match Amount $247,644

Wastewater Grant Amount: $943,244

Authorized Representative & DPS Contact:	Wastewater Operations:	Consultant Contact:
Erv Suida, Interim City Manager, DPS Director	Mike Spitler	Karyn Stickel, PE
	City of Howell	Hubbell, Roth & Clark
Phone: 517-546-7510	517-546-6230	Phone: 248-454-6300
ESuida@CityofHowell.org	MSpitler@CityofHowell.org	KStickel@hrcengr.com

EXECUTIVE SUMMARY

The City of Howell applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environmental, Great Lakes, and Energy's (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, operates and maintains the sanitary sewer system and has various tools used to manage the assets, including an Esri Geographic Information System (GIS) geodatabase, Allmax Antero Computer Maintenance Management System (CMMS), condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review on the City's website and at City Hall for at least 15 years.

WASTEWATER INVENTORY

The City of Howell uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through grant efforts, the City populated the information necessary to more effectively use the GIS, and participated in training.

The City reviewed additional CMMS options for the Department of Public Services before deciding to utilize Esri's Workforce software, which is included in their GIS subscription. Previous to the SAW grant, the City's wastewater treatment plant (WWTP) had implemented Allmax Antero as its CMMS software and will continue to utilize it in the future.

GIS has been used in the City for the past number of years through a subscription with Esri ArcGIS software. However, the GIS was not updated actively. Using a Lidar Scan, GPS, and observations made during condition assessment, the data in the GIS was expanded and accuracy greatly improved using grant funds. Through the grant, the City purchased additional Esri desktop software subscriptions to provide key staff members the ability to update and manage the GIS. Tablet level Esri software was purchased for the staff to use GIS applications in the field. Training sessions were held for both the desktop software and the tablet software helping the Staff become more familiar with their device's new abilities.

The next page includes a table of the asset inventory in GIS.

Asset Type	Amount
4-inch sewer	331 feet
6-inch sewer	1,375 feet
8-inch sewer	113,592 feet
10-inch sewer	19,358 feet
12-inch sewer	23,761 feet
15-inch sewer	6,478 feet
18-inch sewer	7,170 feet
24-inch sewer	1,238 feet
28-inch sewer	1,039 feet
30-inch sewer	5,045 feet
36-inch sewer	2,852 feet
42-inch sewer	27 feet
Unknown diameter sewer	1,080 feet
Manhole	778

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For sanitary sewer assets, the NASSCO-compliant inspection information was collected during sewer televising. For manholes, NASSCO inspection protocol were used to collect data. The data is stored in the GIS system to share this data with Esri Workforce to develop inspection work orders to continue to evaluate and maintain assets, such as manholes and sewer pipes.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 81,550 lineal feet of sanitary underwent condition assessment via cleaning and televising. Approximately 543 manholes were evaluated through manhole inspections, with 169 of the manhole inspections using optical manhole scanning technology.

The vertical assets inventory was updated at the WWTP and pump stations. Each piece of vertical facility equipment – defined as any Major Maintenance Item (MMI) shown on the process treatment schematics for the plant and any valve 4-inch or larger (schematic contained in Appendix B)–was catalogued. This consisted of entering all its basic information into the Asset Inventory Master Spreadsheet and resulted in approximately 250 total assets being identified. A table summarizing the inventory is provided in the Appendix B of the WWTP AMP found in Appendix B of the wastewater AMP.

A meter study was conducted to determine if the sanitary districts were contributing high rates of infiltration or inflow (I/I) to the WWTP. Three out of seven districts were ranked as Priority Districts with high rates of I/I. One of the districts was of significant size and required a subdividing approach to identify the areas within the district that are contributing to the high I/I rates. Of the sub-districts, one was identified as a Priority District and two as Potential Investigation Districts. High rates of I/I were also found at the Leachatte pump station. It is recommended to pursue the three High Priority districts and the Leachatte pump station with field investigations to identify the source(s) of excessive I/I and then investigate the two Potential Investigation Districts.

CRITICALITY OF ASSETS

The City of Howell developed baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations and storage and treatment facilities, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of sanitary gravity mains was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material of the asset. The COF for horizontal assets was determined based on asset depth, size, surface type, proximity to wetlands, proximity to railroads, and proximity to roads and intersections.

Below is a list of the BRE scores for the horizontal assets in the City's system

Sanitary Pipes	
BRE Score	Percent of Manholes
<= 5	82%
5 <= 10	15%
10 <= 15	2%
15 <= 20	1%
20 <= 25	0%

Sanitary Manholes	
BRE Score	Percent of Manholes
<= 5	85%
5 <= 10	13%
10 <= 15	1%
15 <= 20	1%
20 <= 25	0%

The current condition of each MMI at the WWTP was estimated based on age, input from staff, industry standards, review of record installation and repair data, and in some cases, detailed inspections. An estimate of remaining useful life was made for each asset based on its condition, typical expected life for the type of equipment, and other factors. Criticality review was also completed for the vertical assets located at the WWTP and pump stations, and is included in Appendix B, Section 5. The POF, COF, and BRE ratings for each asset were incorporated into an Asset Inventory Master Spreadsheet.

LEVEL OF SERVICE DETERMINATION

The City develops a Proposed Operating Budget document each year to summarize the previous and propose a budget for the upcoming fiscal year, which starts on July 1. Key factors in the list of goals that are developed are quality infrastructure and pro-active approaches to wastewater operations. As part of the asset management planning, it was determined the Level of Service currently being provided for the collection system is adequate. The City developed a Mission Statement as part of the AMP to summarize its goals. The following Mission Statement was used in developing the CIP as well:

> *It is the Mission of the City of Howell Wastewater Department to continue to serve our customers with effective sanitary sewage collections with an emphasis on prompt responses to concerns and professional customer service, all at a cost that is reasonable and competitive.*

The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. The City of Howell has chosen to continue their ongoing process rather than adopting specific goals. They will continue to consider the impact of to the public health and the system's ability to comply with any applicable regulations and operational needs.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City worked with Utility Financial Solutions, LLC (UFS, LLC) to confirm the system's current rate structures are sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to EGLE six months prior to the SAW grant end date. The analysis did not show any gap between the revenue and expenditures, therefore, a rate increase was not necessary

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City of Howell's sanitary sewer system, using recommendations from the asset inspection process, and consideration of other system needs.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated, and changes occur in prioritization, regulations, technology, cost and other data becomes available.

In summary the horizontal CIP includes:

- 35 pipes have repairs that are recommended to be addressed within the next 0-5 years.
- 76 manholes have repairs that are recommended be addressed in the next 0-5 years.
- 45 pipes are recommended to be addressed in the next 5-20 years.
- 65 manholes have repairs that are recommended be addressed in the next 5-20 years.
- 49 manholes are recommended for cleaning and monitoring
- 22 manholes were not found and should investigated further.
- 8 manholes were located but were unable to be inspected because they were buried or access was unavailable.

The horizontal assets' CIP has an average yearly cost of $133,400 per year for the first 5 years. For years 5 through 20, the cost estimate reduces to an average yearly cost of $82,200.

For the vertical assets' CIP, the WWTP is currently working on a rehabilitation project to upgrade many of the MMIs. The Michigan State Revolving Fund is one source of loan money that the City is planning to use for a portion of these capital improvements.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis as part of the annual process to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Owner's major assets include:

- 183,400 feet of 4-42-inch sanitary sewer pipe
- 778 sanitary manholes
- 140 assets across 13 collection system pump stations
- 250 assets at the WWTP

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Howell certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1379-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: December 19, 2018.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Ervin Suida	at 517-546-7510	ESuida@CityofHowell.org
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required) — 12/17/19 Date

Ervin Suida, Interim City Manager, Director of Public Services
Print Name and Title of Authorized Representative

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12-9-19
(no later than 3 years from executed grant date)

The City of Ithaca *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1380-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Aaron J. Wendzel, PE	at 989-772-2138	awendzel@rowepsc.com
Name	Phone Number	Email

	12/13/2019
Signature of Authorized Representative (Original Signature Required)	Date

Jamey Conn, City Manager

Print Name and Title of Authorized Representative

City of Ithaca

EGLE AMP Summary

December 2019

16M0145 1380-01

Prepared By:

ROWE PROFESSIONAL SERVICES COMPANY

REPRESENTATIVE: Jamey Conn, City Manager
ADDRESS: 129 W. Emerson Street, Ithaca, MI 48847
PHONE #: (989) 875-3200
EMAIL: manager@ithacami.com
PROJECT #: 1380-01

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ACRONYMS

AMP	Asset Management Plan
CIP	Capital Improvement Plan
DPW	Department of Public Works
EGLE	Michigan Department of Environment, Great Lakes, and Energy

EXECUTIVE SUMMARY

In accordance with the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the City of Ithaca has prepared an Asset Management Plan (AMP) for its storm sewer system. The purpose of the AMP is to define a method of cataloging, evaluating, and maintaining the system.

The storm sewer reports from the video survey shows the system is in working order. However, as can be seen from the inventory, several locations surveyed need maintenance. Issues can be seen ranging from debris to collapsed pipes. With proper maintenance and planned improvements, the system should continue to provide proper service for the city.

The City of Ithaca is committed to providing its residents and customers with quality infrastructure system that meet regulatory requirements and to providing excellent customer service in a timely and cost-efficient manner.

I. ASSET INVENTORY

The city's storm sewer system is a collection of pipes used to collect and transport water runoff. All the water collected is then discharged to county drains. To maintain efficient flow, the city plans to carry out a new storm system cleaning plan that would allow the pipe segments and catch basins to be cleaned on a 4-year rotation.

A. Collection

The city's storm sewer collection system totals 83,633 feet, with 977 drainage structures and is composed of the following list of storm sewer pipe.

Table 1: Storm Sewer Inventory Summary

Storm Sewer Diameter (in)	Length (ft)	Percent of Total
46	341	0.5%
41	2,030	2.5%
40	406	0.5%
36	145	0.2%
30	1,287	1.5%
24	3,202	3.8%
23	357	0.4%
21	936	1.1%
18	6,660	8%
15	4,886	5.8%
12	27,432	32.8%
10	5,858	7.0%
8	14,318	17.1%
6	15,314	18.3%
5	120	0.1%
4	341	0.4%
Total	**83,633**	**100%**

1. Sewer

The primary focus of this portion of the AMP was to develop a storm sewer system map. The goal of the project was to televise 100 percent of the storm collection system, however sewer 4 inches and less in diameter and some sections of failed pipes in the storm collection system could not be fully surveyed. The independent survey videoed 83,633 feet of storm collection system piping. An examination was performed on each gravity pipe televised with each defect being rated and the condition of the pipe being assigned an overall rating.

Reviewing the storm sewer reports from the video survey shows the system is mostly in working order with some areas requiring replacement. Issues can be seen ranging from debris in the pipe to crushed pipe segments. The system shall be continually upgraded and maintained with proper maintenance and planned improvements to work towards a properly working system for the city.

2. Manholes

Most of the storm manholes throughout the city were found to be in relatively sound condition. The primary maintenance needed for the manholes include repairs around pipe penetrations. Other minor issues discovered were minor root intrusion, weeping, and cleanup of some debris that has entered the structures.

II. CAPITAL IMPROVEMENT PROJECT PLAN

Maintaining a municipal system means always planning for future needs. The storm sewer system is no exception with growing and/or changing needs of the population it serves and the constant wear and tear of the system it undergoes providing its service.

A. 5-Year CIP

Evaluated assets with a consequence of failure rating of 17 or greater typically make up the projects proposed for the 5-year CIP. Fortunately for the city, there were only eleven storm sewer segments and no storm manholes that fell into this category. After reviewing the televising reports of the sections identified, each segment was given a recommended action and a cost opinion was developed which is shown in Table 2.

Table 2: 5-Year Capital Improvement Plan					
Project Number	**Pipe Segment**	**Existing Dia. (in)**	**Proposed Dia. (in)**	**Recommended Action**	**Cost Opinion**
1	ST-NW-058_ ST-NW-059	12	12	Replace pipe segment	$ 71,000
2	ST-NE-026_ RZ-838	12	12	Replace pipe segment	$ 216,000
	ST-NE-026_ ST-NE-032	12	18	Replace pipe segment	
	ST-NE-032_ RZ-830	12	18	Replace pipe segment	
3	ST-NE-040_ ST-NE-042	18	42	Replace pipe segment	$ 107,000
4	ST-NE-173_ ST-NE-174	21	48	Replace pipe segment	$ 37,000
5	ST-NE-210_ ST-NE-212	24	N/A	Clean sewer segment and fix tap intrusion	$ 18,000
6	ST-NE-244_ ST-NE-240	41	N/A	Clean sewer segment and line sewer pipe	$ 216,000
7	ST-NE-292_ ST-NE-031	18	24	Replace pipe segment	$ 48,000
8	ST-NE-325_ ST-NE-071	15	48	Replace pipe segment	$ 158,000
9	ST-SW-083_ ST-SW-097	24	N/A	Fix Tap Intrusion	$ 14,000
				5-Year CIP Subtotal	**$ 885,000**

Notes

1. Projects identified based on Consequence of Failure Rating
2. Cost Opinion determined from 2019 unit prices.
3. Cost Opinion determined on a project by project basis based on the recommended action. The costs include the minimal replacement of roadways and curb and gutter to replace the storm structures and system. The costs do not include engineering, survey, legal and administrative fees, or other incidental costs. The costs can vary based on fluctuation of material prices.

B. 20-Year Plan

A consequence of failure between 9 and 16 qualifies an asset as a potential 20-year project. These assets are important to the systems operation that have fallen out of its prime condition. These can vary from more deteriorated assets playing less critical roles in the system to less deteriorated assets in critical roles. As assets fall into this category, the city will have time to budget for the improvements.

Table 3: 20-Year Capital Improvement Plan Cost Opinion		
Storm Sewer		
Existing Dia. (in)	**Length of Sewer Replacement (ft)**	**Cost Opinion**
6	5,141	$ 1,996,000
8	3,666	$ 1,422,000
10	2,552	$ 991,000
12	12,214	$ 4,707,000
15	2,648	$ 1,098,000
18	3,358	$ 1,665,000
24	565	$ 326,000
42	1,031	$ 1,131,000
48	1,046	$ 1,232,000
Manholes		
Number of Manholes (ea)		**Cost Opinion**
62		$354,000
	20-Year CIP Subtotal	**$ 14,922,000**

Notes

1. Pipe segments and manholes identified based on Consequence of Failure Rating.
2. Cost Opinion assumes that manholes are replaced separately from storm sewer replacement.
3. Cost Opinion determined from 2019 unit prices.

Any important issues that are discovered while maintaining the system should be added to this plan. In addition, upgrades to the existing storm system should be considered an integral part of any road improvement project. Ultimately the 20-year CIP needs to plan and budget for the replacement of all storm sewers within a road improvement project.

III. REVENUE STRUCTURE

It is important to the City of Ithaca to maintain and improve its assets. The city's storm system is no exception. However, storm sewer systems do not have a funding mechanism or rate structure that fund its improvements, contrary to sanitary sewer and water systems that allow for a rate structure to be calculated based on operating costs and usage. Most often funds for storm sewer improvements are taken from the city's road or general funds. The city was presented other funding options that it could utilize to upgrade its storm system.

IV. CONCLUSION

Investigation and inventory of the City of Ithaca's storm system assets lay the groundwork for the successful management of the city's storm system assets. Assessment of these assets has allowed the city to understand the criticality of their assets and helped develop options for capital funding and financing options to put forth a plan to generate funds for expenses related to the investigation, maintenance, and replacement of the storm system in the future. This framework allows the City of Ithaca to cost-effectively provide its services to the residents.

Extensive investigation and analysis show the city's system to be in satisfactory condition overall. However, deficiencies throughout the storm system were evident. These deficiencies have been identified by showing the criticality of the assets to prioritize short and long-term needs.

The city has always strived to provide the best service for its community. This plan puts forth a framework to allow the DPW to continue its work and provide the citizens of the city with the services they expect in the most cost-effective manner.

williams&works
engineers | surveyors | planners

SAW Grant Number 1383-01
Mr. Steve Deer, Chairman
Green Lake Sewer Commission
4451 12th Street, Suite A
Wayland, MI 49348
www.leightontownship.org

December 20, 2019

Mr. David J. Worthington, Sr. Project Manager
Michigan Department of Environment, Great Lakes and Energy
Finance Division
Constitution Hall
525 West Allegan St.
Lansing, MI 48909

Re: Wastewater AMP Summary
SAW Grant Project Number 1383-01

Dear Mr. Worthington:

The following letter is a summary of the work completed to prepare an asset management plan (AMP) and capital improvement plan (CIP) for the Green Lake Sewer Commission. The sections are based on MDEQ guidance provided for this project.

The Green Lake Sewer Commission owns and maintains a wastewater collection and treatment system that encircles Green Lake and extends into the surrounding communities. The system currently collects and treats about 80,000 gallons of wastewater per day. The commission was awarded a SAW Grant in 2016 to inspect the wastewater system and develop an asset management plan. The total project cost was $40,000. The amount consisted of a grant of $36,000 and a 10% match of $4,000.

Asset Inventory

The first task in the project was to locate and inventory all the assets in the wastewater collection and treatment system. This was done with record drawings and field verification. All the assets were coded into ArcGIS. The value of the system was calculated to be approximately $12 million in 2019. The system varies in age and characteristics. Most of the sanitary sewer is made from polyvinyl chloride (PVC), but there are some areas of ductile iron and ABS truss pipe. The first phase of the sewer was installed in 1982. Subsequent projects were completed as recently as 2019 that added more sewer to the system.

There are 7 pump stations in the wastewater system. All of them are submersible duplex pump stations. The wastewater from the system travels to a wastewater treatment facility that discharges to the Tollenaar Drain. The facility has two lagoons, an effluent pump station, a phosphorus removal clarifier, and a maintenance building.

In order to evaluate the condition of the collection system, an inspection plan was created. The inspection plan included closed-circuit television (CCTV) inspection of strategically selected sewers and a visual inspection of critical manholes, pump stations, and the treatment facility. The sewers to be televised were selected based on records of age and site conditions. In addition, any areas with known operational issues were inspected. The manholes to be inspected were selected based on likelihood of sewer gas presence and system operator concerns. No force mains were inspected. The results of the condition assessment of the gravity system is shown in Table 1

Table 1: Condition Assessment of Wastewater System

Condition	Number of Pipes	Length of Pipe [ft]	Number of Manholes
Not Inspected	151	33,833	197
1	25	4,960	0
2	14	3,223	6
3	7	1,733	1
4	2	702	0
5	0	0	0

The lift stations were rated based on structural, mechanical and electrical defects. A condition report was completed for each one that details the findings.

The wastewater treatment facility was visually inspected and operator concerns were noted. A report was made that details the defects of the facility. The lagoons, pump station, and building are in good condition. The clarifier and some mechanical equipment are in poor condition.

Critical Assets

An assessment was performed to determine which parts of the system are critical. This assessment started with assigning each sewer pipe an “importance” factor based on the consequence associated with its failure. In general, the system in split into two halves. The halves feed Pump Station 5 from either side. This means that Pump Station 5 and the forcemain to the treatment plant are the most critical assets in the system. The assets increase in importance as they approach Pump Station 5. To assign assets a criticality rating, both the asset’s condition and importance were taken into account. The criticality rating was used to make the capital improvement plan; the higher criticality pipes were prioritized to be fixed first. In this way, both the likelihood and consequence of failure were considered.

Level of Service

The sewer system operates 24 hours per day, 7 days per week, 365 days per year. Each part of the system is functional at all times except when it is down for maintenance. The goal of the commission is to maintain the system well enough and monitor it so that backups never occur. In order to make sure this is possible, specific measures have been put into place. Each pump station has either an on-site generator or a generator connection, so a generator can be used to power the pump station when line power is out. Each pump station has a known amount of storage capacity, so if the downstream system is shut down, the pump station can be shut off for an estimated amount of time before backups begin. Each pump station also has a valve vault with a bypass pump connection. If a pump station is inoperable due to a component failure, bypass pumping to the force mains or tanker trucks can be used to keep it functional. The stations are equipped with cellular based dialers, high level alarms, and are inspected thrice weekly by B&B Water/Wastewater. B&B is on call at all times if there is a problem.

Revenue Structure

The revenue for the Wastewater sewer fund comes from sewer rates charged to township residents who are users of the system. The sewer commission reviews these rates on yearly basis. When reviewing the rates, the board keeps in mind the annual costs of running the system and paying B&B to operate and maintain it. They also look at future expansion and save money for future projects and ongoing maintenance costs. The current rates for a sewer user in the Green Lake system are $130 per quarter as of July 1st, 2019.

All money collected from these rates and fees goes into the wastewater sewer fund. The fund is used to pay for sewer system operation and maintenance, debt service, and capital improvements. In the 2018 budget, $150,800 was collected for operation and maintenance, $0 was collected for debt service, and $85,770 was collected for system repair and replacement.

Capital Improvement Plan

Based on this study, a recommended capital improvement plan was created. It breaks down the work that needs to be done based on the likelihood and consequence of failure. These are based on the condition and criticality ratings of the components. Engineering judgement was used to determine the method of repairing defects. Spot repairs were proposed for localized pipe problems, cured in place pipe (CIPP) liners were proposed for multiple pipe defects or infiltration, and pipe replacements were proposed for sags or significant structural defects in pipes.

The plan breaks down the recommended work for the next 20 years. It includes repairing all structural and operation and maintenance deficiencies as well as inspecting the rest of the sewer system not included in this project.

The overall cost of the 1-3 year plan is $780,000. It includes fixing problems with sewer near Pump Station #1, and repairing the clarifier mechanism at the WWSL. The sewer system operator indicated these problems and the necessity to fix them first. The severity of the problems in the collection system was confirmed by CCTV videos, and with the clarifier mechanism by visual inspection. Other problems found from the sewer inspection will be addressed in the 3-5 year plan. This plan totals $344,000 and includes fixing any condition 3 and 4 pipes. This should reduce infiltration into the collection system. The plan also includes adding standby generators to Pump Stations No. 3 and 5. The 5-10 year plan will cost approximately $1,010,000 and will repair most other known defects in the wastewater system. In this time frame, it will also be necessary to remove the sludge from the two ponds at the wastewater treatment facility. After any other defects are addressed, the 10-15 year plan will finish inspecting the rest of the sewer that was installed before 2000. This plan will also include rehabilitating Pump Stations No. 1 and 3 and will cost about $415,000. The 15-20 year plan will inspect all sewer installed after 2000, replace pumps in Pump Stations, No. 2, 3, and 5, and expand the wastewater treatment facility. This plan will cost about $3,345,000.

The current funding source should be adequate to pay for these improvements within the time frames specified. The spending plan decreases in the last the 10-15 year frames to account for unexpected expenditures and to allow unfinished projects to be moved into the next time frame.

Because of the funds provided from the SAW Grant, the Green Lake Sewer Commission was able to inventory, inspect, and plan to improve its wastewater collection and treatment system. The commission now has a strategy to maintain its system of the next 20 years and plan for future improvements. These improvements will help the wastewater system continue to last and serve the users of the system.

Sincerely,

Williams & Works

Brandon Mieras, P.E.
Principal/Project Manager

Enclosures: WWAMP Certification of Project Completeness
List of Major Assets

Cc: Nathan Breese, EIT, Williams & Works
File

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 20, 2019
(no later than 3 years from executed grant date)

The Green Lake Sewer Commission *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1383-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Nathan Breese	at	(616) 224-1500	breese@williams-works.com

Steve a Deer — 12-12-19
Signature of Authorized Representative (Original Signature Required) — Date

Steve Deer, Chairman
Print Name and Title of Authorized Representative

List of Major Assets

Green Lake Sewer Commission

Wastewater Collection and Treatment System

SAW Grant 1383-01

Table 1: Green Lake Sewer Commission Major Assets

Type	Amount	Unit	Price	Value
2-inch Forcemain	1,000	ft	$30	$30,000
3-inch Forcemain	4,300	ft	$35	$151,000
4-inch Forcemain	2,050	ft	$45	$92,000
6-inch Forcemain	2,500	ft	$60	$150,000
8-inch Forcemain	6,800	ft	$70	$476,000
8 inch Gravity	35,857	ft	$50	$1,793,000
12 inch Gravity	8,376	ft	$55	$461,000
15 inch Gravity	1,488	ft	$60	$89,000
Sanitary Laterals	14,680	ft	$40	$587,000
Manholes	204	ea	$3,000	$612,000
Grinder Pump Station	1	ea	$200,000	$200,000
Lift Stations	6	ea	$600,000	$3,600,000
WWTF	1	ea	$3,500,000	$3,500,000
Values in 2019 Dollars			**Total**	**$11,741,000**

williams&works
engineers | surveyors | planners

SAW Grant Number 1385-01
Steve Deer, DLWA Chairman
Dorr/Leighton Wastewater Authority
4451 12th St. Suite A
Wayland, MI 49348
https://dlwwa.org/

December 20, 2019

Mr. David J. Worthington, Sr. Project Manager
Michigan Department of Environment, Great Lakes and Energy
Finance Division
Constitution Hall
525 West Allegan St.
Lansing, MI 48909

Re: Wastewater AMP Summary
SAW Grant Project Number 1385-01

Dear Mr. Worthington:

The following letter is a summary of the work completed in preparing an asset management plan (AMP) and capital improvement plan (CIP) for the Dorr/Leighton Wastewater Authority. The sections are based on MDEQ guidance provided for this project.

The Dorr/Leighton Wastewater Authority was awarded a SAW Grant in 2016 to inspect its sanitary sewer system. The total project cost was $64,482. This consisted of a grant of $58,034 and a 10% match of $6,448.

Asset Inventory

The authority owns and maintains a sewer system serving over 4 square miles of area in Dorr Township and Leighton Township. The system includes gravity sewer, manholes, force main, lift stations, and a wastewater treatment plant and is maintained by the contract operator, B&B Water/Wastewater Consultants, Inc. The total replacement value of the system was approximately $18 million in 2019. The sewer is divided into five different Special Assessment Districts (SADs); these districts determine the rates that customers pay for trunkage fees. The gravity sewer is made up of two different materials and was installed over a range of years. In SAD 1, the sewer is primarily vitrified clay pipe (VCP) and Asbestos Cement (AC). In all the other SADs, the sewer is made of polyvinyl chloride (PVC). The first part of the system was installed in 1978 and subsequent additions to the sewer have been constructed as recently as 2010. The Dorr/Leighton Wastewater Authority owns and maintains 10 lift stations located in various locations around the townships. The sewer feeds into a wastewater treatment plant that discharges to Green Lake Creek.

In order to evaluate the condition of the collection system, an inspection plan was created. The inspection plan included a closed-circuit television (CCTV) inspection of strategically selected sewers and a visual inspection of critical manholes, lift stations, and the wastewater treatment plant. The sewers to be televised were selected based on records of age and site conditions. In addition, any areas with known operational issues were inspected. All inspected sewers were in SAD 1 or SAD 2. The manholes to be inspected were selected based on likelihood of sewer gas presence and system operator concerns. No force mains were inspected. A summary of the condition assessment of the gravity collection system is included in Table 1.

Table 1: Condition Assessment of Wastewater System

Condition	Number of Pipes	Length of Pipe [ft]	Number of Manholes
Not Inspected	283	64,994	279
1	5	1,799	8
2	24	7,164	5
3	11	3,180	5
4	6	1,480	1
5	4	1,288	0

The lift station inspections were compiled into reports. There were various structural, mechanical and electrical problems to be addressed. Some of the lift station have drainage issues that impede maintenance while others have aging components that should be replaced. Nine of the ten lift stations are without standby generators.

The wastewater treatment plant is currently operating adequately and meeting discharge permit limits. Although the plant is operating well, it needs to be expanded to treat increased flows expected in the next 10 to 15 years. In addition, a few areas of the plant are deteriorating and need some attention in order to continue to perform effectively. These areas include the sludge storage tank, basement south wall, ultraviolet disinfection system, air diffusers, and traveling bridge filters.

Critical Assets

An assessment was performed to determine which parts of the system are critical. This was done by assigning an importance factor to each system asset and compiling that with the condition of the asset. In general, the assets located closer to the wastewater treatment plant have a higher importance factor. Because many of the lift stations operate in series, the ones at the end of the series accumulate the importance of everything upstream. Lift Stations No. 1 and No. 4 have the highest importance factor of all the assets because they handle all the flow in the system. A failure of either of these stations would eliminate the sewer use for about 50% of the community. The headworks of the treatment plant is also very important because it handles all the flow in the system. Using both an asset's condition and importance, each one was assigned a criticality rating. These ratings determined where the asset ranked in the capital improvement plan. In this way, both the likelihood and consequence of failure were considered.

Level of Service

The sewer system operates 24 hours per day, 7 days per week, 365 days per year. Each part of the system is functional at all times except when it is down for maintenance. The goal of the authority is to maintain the system well enough and monitor it so that backups never occur. In order to make sure this is possible, specific measures have been put into place.

Each lift station has a redundant pump that can be used in the case of a pump failure or maintenance. Furthermore, each has either an on-site generator or generator connection, so a generator can be used to power the lift station when line power is out. All wet wells have a known amount of storage capacity, so if the downstream system is shut down, the lift station can be shut off for an estimated amount of time before backups begin. If a lift station is inoperable due to a component failure, each has a bypass connection, so pumps can be used to keep it functional. The stations are equipped with high level alarms and are inspected weekly by B&B Water/Wastewater. B&B is on call at all times if there is a problem.

The Wastewater Treatment Plant also has a backup generator to run the essential equipment in the case of power failure. The headworks channel is split to allow flow to bypass the main channel for maintenance. There is an equalization tank to contain high-flow events and limit overflows. There are redundant sequencing batch reactors, filters, and UV bulbs to allow for component failures. Also, because the plant is fed exclusively by lift stations, a failure of any component would not affect the sewer functionality of the rest of the system.

Revenue Structure

The revenue for the wastewater sewer fund comes from sewer rates charged to township residents who are sewer users. The rates are determined by a resolution adopted by the authority on December 1, 2013. The township sewer board reviews the resolution on yearly basis. When reviewing the rates, the board keeps in mind the annual costs of running the system and paying B&B Water/Wastewater to operate and maintain it. They also look at future growth and expansion and save money for future projects and ongoing maintenance costs. Table 2 shows the current rates and fees for Dorr/Leighton WWA.

Table 2: DLWA Sewer Fees

User Charge	$95 per REU	Quarterly
Debt Service Charge	$75 per REU	Quarterly
Connection Fee	$2,475 per REU	One-time
Trunkage Charge	Varies by SAD	One-Time
SAD 1	$1,475 per REU	All properties
SAD 2	$1,475 per REU	All properties
SAD 3	$1,475 per REU	All properties

SAD 4	$265 per REU $2,395 per REU	Properties included in SAD Prop not included in SAD
SAD 5	$0 per REU $7,820.05* per REU	Properties included in SAD Prop not included in SAD

*represents the amount as of 2013. This amount increases each year based on the interest paid on the special assessments in this district.

All money collected from these rates and fees goes into the wastewater sewer fund. The fund is used to pay for sewer system operation and maintenance, debt service, and capital improvements. In the 2018 budget, $753,889 was paid to operation and maintenance, $381,805 was paid to debt service, and $161,061 was paid to capital improvements.

Capital Improvement Plan

Based on this study, a recommended capital improvement plan was created. It breaks down the work that needs to be done based on the likelihood and consequence of failure. These are based on the condition and criticality ratings of the components. Engineering judgement was used to determine the method of repairing defects. Spot repairs were proposed for localized pipe problems, cured in place pipe (CIPP) liners were proposed for multiple pipe defects or infiltration, and pipe replacements were proposed for sags or significant structural defects in pipes.

The proposed plan breaks down the recommended work for the next 20 years. It includes repairing all structural and operation and maintenance deficiencies as well as inspecting the rest of the sewer system not included in this project. All the proposed repairs to sewer pipes are within SAD 1. The overall cost of the 1-3 year plan is $7,248,000. This includes $83,000 for pipeline improvements and $7,165,000 for a wastewater treatment plant (WWTP) expansion and upgrade. The pipeline improvements will fix any significant defects (Grade 5) in the sewer system. The WWTP expansion/upgrade will fix maintenance issues with the plant as well as expand it for future growth in this area. The money for the expansion will be funded by a USDA Rural Development loan of approximately $6,850,000. It will be paid back with 40 annual payments of approximately $270,000. The first 10 years of the loan will require annual contributions of $27,000 into a restricted debt reserve fund.

The 3-5 year plan will cost approximately $344,000 and will fix Grade 4 defects in sewer as well as rehabilitate Lift Station No. 2 and replace part of the forcemain from Lift Station No. 1. The 5-10 Year plan includes fixing all Grade 3 defects in the sewer as well as more of the Lift Station No. 1 forcemain and will cost close to $289,000. All other known defects in the sewer and forcemain will be addressed in the 10-15 year plan and should cost $619,000. The 15-20 year plan involves inspecting the rest of the sewer that was not included in this study. This should cost about $326,000. If any projects are not completed within the time frames listed, they can be delayed until the following time frame. The 5-10 year time frame has a purposefully smaller amount of work to allow contingency for previous projects to be finished.

Because of the funds provided from the SAW Grant, the Dorr/Leighton Wastewater Authority was able to inventory, inspect, and plan to improve its wastewater collection and treatment system. The authority now has a strategy to maintain its system of the next 20 years and plan for future improvements. These improvements will help the wastewater system continue to last and serve the residents of Dorr Township and Leighton Township.

Sincerely,

Williams & Works

Brandon Mieras, P.E.
Principal/Project Manager

Enclosures: WWAMP Certification of Project Completeness
List of Major Assets

Cc: Nathan Breese, EIT, Williams & Works
File

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 20, 2019
(no later than 3 years from executed grant date)

The Dorr/Leighton Wastewater Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1385-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes [✓ or No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name	Phone Number	Email
Nathan Breese	at (616) 224-1500	breese@williams-works.com

Steve Deer 12-12-19

Signature of Authorized Representative (Original Signature Required) Date

Steve Deer, Chairman

Print Name and Title of Authorized Representative

List of Major Assets

Dorr Leighton Wastewater Authority

Wastewater Collection and Treatment System

SAW Grant 1385-01

Table 1: Dorr/Leighton WWA Major Assets

Type	Amount	Unit	Price	Value
Force Main	29,912	ft	$70	$2,094,000
8 inch Gravity	48,339	ft	$50	$2,417,000
12 inch Gravity	22,308	ft	$55	$1,127,000
14 inch Gravity	65	ft	$60	$4,000
15 inch Gravity	9,388	ft	$65	$610,000
Sanitary Laterals	22,011	ft	$40	$880,000
Manholes	282	ea	$3,000	$846,000
Lift Stations	10	ea	$400,000	$4,000,000
Wastewater Treatment Plant	1	ea	$6,000,000	$6,000,000
*All costs in 2019 dollars			**Total**	**$18,078,000**

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December
(no later than 3 years from executed grant date)

The CHARTER TOWNSHIP OF GARFIELD *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1388-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: September 3, 2019.
2) Significant Progress Made: [✓ Yes] or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: N/A.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on N/A.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

CHUCK KORN at 231-941-1620 ckorn@garfield-twp.com
Name Phone Number Email

12-16-2019
Signature of Authorized Representative (Original Signature Required) Date

CHUCK KORN, TOWNSHIP SUPERVISOR
Print Name and Title of Authorized Representative

Charter Township of Garfield

Sanitary Sewer Asset Management Plan – Executive Summary

Chuck Korn, Township Supervisor

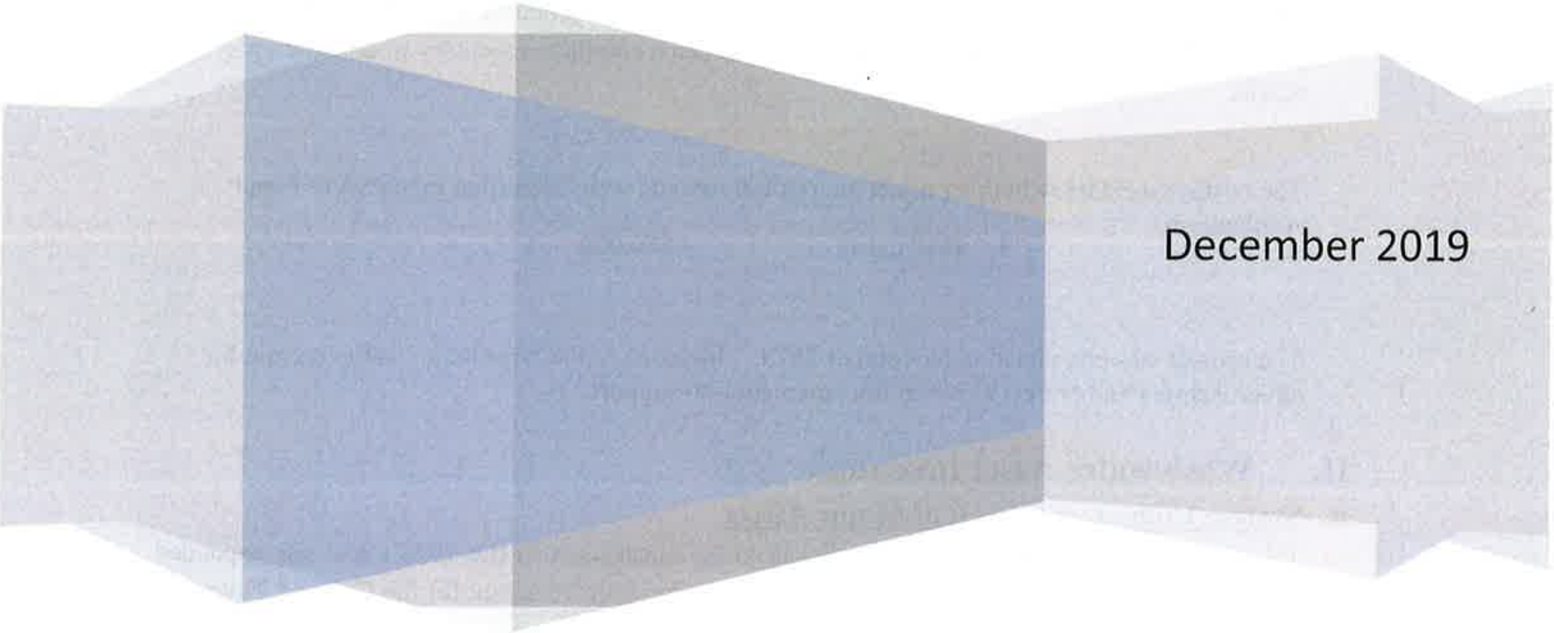
3848 Veterans Drive

Traverse City, MI 49684

Phone: (231) 941-1620

http://www.garfield-twp.com/

SAW Grant No. 1388-01



December 2019

I. Executive Summary

The scope of the project comprised of two (2) components: Planning & Design Activities and Asset Management Plan. A summary of each project scope is described below.

A. Planning & Design Activities

The proposed scope of work would include removal and replacement of components in the pump station as located in the concrete wetwell: pumps, control panel including motors, floats, mechanical piping and valves, and flowmeter. The geographic areas served by the station is a 20 acre residential apartment complex located in Garfield Township, Grand Traverse County. The complex consists of 265 single and double housing affordable housing units. Pump Station #3 with a rated capacity of 250 gallons per minute services the entire development providing collection and distribution of the sanitary sewer waste. Pump Station #3 was built in 1987 and within the last couple years the Township staff has spent many additional hours performing maintenance to unclog pumps and conduct repairs and replacement to related appurtenances (wear rings, fuses etc.) because of the plugging. In addition, other components in the station including the flowmeter, control panel, floats and electrical / controls were creating additional maintenance problems due their age and deteriorating condition. Overall this station was in poor working condition with components experiencing persistent operational problems.

The costs associated with this project area as follows and were identified in the SAW Grant Application.

1. Project Planning Costs	$2,000.00
2. Design Engineering Costs	$13,700.00

The project was designed, permitted, constructed and placed into operation in December 2016. Included in the Appendix 1 is the permit, bid advertisement and project closeout documentation to support.

B. Asset Management

The proposed scope of work included development and implementation of an Asset Management Plan (AMP) for the wastewater system. This included a complete inventory of all existing system assets.

The costs associated with this project area as follows and were identified in the SAW Grant Application.

1. AMP Costs	$84,900

The project was completed in November 2019. Included in the Appendix 1 is the permit, bid advertisement and project closeout documentation to support.

II. Wastewater Asset Inventory

A. System Components / List of Major Assets

The Garfield Township sewer system began to be constructed in the 1970's and has expanded through the years with the growth in population. Wastewater treatment for the Garfield Township is accomplished through a contractual relationship with the Traverse City Regional Wastewater Treatment Facility (TCRWWTF). The sole treatment source is provided by the City of Traverse

City through a Bulk Sewer Agreement regulated by the two (2) governmental entities Several mutual connection points between the City and Township systems are monitored utilizing Master Meters that are recorded monthly. The Township retains the use of Grand Traverse County Department of Public Works to operate, maintain and bill customers.

Currently there are 3,300 customer that are connected to the Garfield public sewer system. The system is comprised of eight (8) major sewer system districts. This infrastructure is comprised of twelve (12) pumping stations, 28,500 linear feet (5½ miles) force main, and approximately 72 miles of gravity (collection) piping.

Table 1: Pump Station Summary

Pump Stations			
Station #1	PS #1	3101	1576 Premier St, Traverse City, MI 49686
Station #2	PS #2	3102	1910 S South Airport Rd, Traverse City, MI 49686
Station #3	PS #3	3103	1795 Lake Pointe Dr, Traverse City, MI 49686
Station #4	PS #4	3104	2190 Hammond Pl E, Traverse City, MI 49686
Station #5	PS #5	3105	227 W South Airport Rd, Traverse City, MI 49686
Station #6	PS #6	3106	2378 US-31, Traverse City, MI 49684
Station #7	PS #7	3107	1748 Keane Dr, Traverse City, MI 49686
Station #8	PS #8	3108	5179 Liberty Dr, Traverse City, MI 49685
Station #9	PS #9	3109	2000 Traversefield Dr, Traverse City, MI 49686
Station #10	PS #10	3110	2730 E Crown Dr, Traverse City, MI 49686
Station #11	PS #11	3111	309 US-31, Traverse City, MI 49685
Station #12	PS #12		1050 W Hammond Rd, Traverse City, MI 49686
Master Meters			
MEIJER METER			Siphon
6th Street Meter			1298 6th St, Traverse City, MI 49684
Pump Station #1 Meter			1576 Premier St, Traverse City, MI 49686

Table 2: Main Sizes and Lengths

Sanitary Main Diameter (inches)	Approximate Length of Sanitary Main (feet)	Approximate Length of Sanitary Main (miles)	Percentage of Total (%)
8	287,656	55.32	76.90
10	36,403	7.00	9.73
12	19,557	3.76	5.23
15	25,852	4.91	6.91
18	4,594	0.88	1.23
TOTAL	374,062	71.87	100

Main Materials			
Type Distribution	**Approximate Length of Sanitary Main (feet)**	**Approximate Length of Sanitary Main (miles)**	**Percentage of Total (%)**
PVC	351,873	66.71	94.07
Steel	7,968	1.53	2.13
Concrete	5,275	1.01	1.41
HDPE	3,213	0.61	0.86
Vitrified Pipe	1,471	0.28	0.39
Unknown	4,262	0.82	1.14
TOTAL	374,062	70.97	100

B. Asset Inventory and Maintenance

The Township utilizes Word and Excel programs to generate template documents to manage fixed asset inventory, fixed asset assessments, and maintenance program. They currently do not have a formal Computerized Maintenance Management System (CMMS) program but are planning to migrate to this in near future. All of the sanitary sewer system assets (sewer lines, manholes, air release valves, and pump stations) are identified and accounted for in the inventory. The asset register was initially populated with asset information from various data sources (e.g., maintenance records and as built drawings). To further supplement the initial asset data, site visits were performed to collect and/or verify the asset data. Site visits were made for all pump stations. Additionally, staff knowledge was collected to identify capital improvement and maintenance activities.

The following information is established in excel spreadsheets as part of the fixed asset inventory and assessment:

- Brief description of the fixed asset
- Capacity
- Level of redundancy
- Location of asset
- Year fixed asset was installed
- Present condition of fixed asset
- Depreciated value of fixed asset
- Fixed asset replacement cost
- Fixed asset tag number/serial number/identification number
- Fixed asset criticality rating
- Fixed asset condition rating
- Probability of failure rating
- Size of asset

This information was also integrated into Townships GIS (Global Information System) System for all assets. This description identifies the location of the asset, type of asset with new and additional assets to be updated in the both the excel and GIS maps on an ongoing basis. This information is entered as assets are identified, added, and deleted. New records are added as projects are completed and closed out. This new information is updated as part of the record drawings process. This information is updated by the Engineer of Record. To date all major assets (pump stations) have been inventoried and assessed whereas the minor (sewer lines, manholes, and valves) are ongoing. DPW staff are collecting the later as time is available including closed circuit television inspections (CCTV). Long term goal is to implement a form CMMS capable to be used to schedule and generate work orders for maintenance, inspections, and repairs. Then when information is derived from maintenance, inspections, and repairs they would be recorded in the CMMS system along with updates to the asset information.

C. Condition Rating

The Township has a set procedure for determining the condition rating of its sanitary sewer assets. The sanitary sewer pump stations have all been inspected by the Engineer and sanitary sewer appurtenances are currently being inspected by the DPW personnel. During this process a condition rating is assigned based on a 1 – 5 rating scale (refer to Attachment 3) with one being the highest rating and five being the lowest rating. The asset maintenance and repair history are also used as a determining factor when assigning a condition rating.

Sanitary sewer lines and manholes are being televised and inspected by NASSCO certified contractors as part of the CCTV inspections program. The condition rating for the sanitary sewer lines and manholes are conducted by the NASSCO certified inspectors and are based on the NASSCO condition rating method. Condition grades for structural defects and O&M defects are assigned based on the risk of further deterioration or failure. The numerical system uses numbers ranging from 1 to 5 with 1 being a minor defect and 5 being a severe defect. The severity ranking considers the immediate defect, risk of failure, and rate of deterioration. These ratings will continue to be maintained and updated once the proposed CMMS system is implemented. In addition, as CCTV inspections and ratings are updated, the CMMS system will update as well.

The probability of failure of each asset was determined based on a rating scale of one to five (refer to Attachment 3) with one being the lowest and five being the highest. In assigning the probability of failure of an asset the following factors were considered and weighed equally:

- Physical Condition
- Age Factor/Useful Life
- O & M Protocols
- Repair/Maintenance History
- Current Operational Status

BRE=Probability of Failure x Criticality of Asset x Redundancy

1 = very low

25 = very high

D. Results

Capital improvement/rehabilitation decisions are often made solely on the assessment of an asset's probability of failure. Introducing the concept of the consequence of failure adds a new perspective to the decision-making process. An asset with high probability of failure, but low consequence of failure should have a lower priority than an asset of similar probability of failure, but with a higher consequence of failure. Without the combination of the two factors (probability and consequence of failure), the decision-making process is not optimized. Based on the results of the risk assessment, a risk-based management strategy can be created. The first priority is to focus on high risk assets. These are the assets that will soon fail and will cause the largest impact. The second priority is the medium risk assets. These assets require aggressive monitoring in order to gain a sound understanding of the timing to failure. Knowing when these assets transition from medium risk to high risk is essential to optimizing renewal decisions. Finally, the lowest priority is to focus on the low risk assets. These assets pose little immediate risk to the Township. However, monitoring should be performed to understand the general decay trend of the assets and to know when they transition to medium risk assets.

III. Criticality

The criticality of each asset is determined based on a rating scale of one to five (refer to Attachments 3) with one being the lowest and five being the highest. In assigning the criticality of an asset the following factors were considered and weighed:

IV. Level of Service

The Charter Township of Garfield Sanitary Sewer System Asset Management Plan (AMP) goals were established to ensure the best management practices for the sanitary sewer system and include:

- Provide uninterrupted sewer service to meet customers' desired service levels.
- Ensure adequate sewer capacity and for the Township to address the Township's planned growth.
- Sustain sewer infrastructures by implementing good preventative maintenance management program to extend asset lifecycle.
- Identify and establish a Capital Improvement Plan.
- Ensure adequate funding support and resources to sustain long-term asset management.

A. **Procedures**

Currently the DPW utilized Microsoft Word and Excel templates and spreadsheets to inventory assets and for preventative and operation maintenance procedures. The DPW has developed a unique identifier to maintain a history on each asset.

The goal once the collection and assessment of the minor assets is complete is to integrate this information in conjunction with the Geographic Information System (GIS) system/map into a CMMS program. Included with this would-be Closed-Circuit TV (CCTV) data in order to capture all of the information for the sanitary sewer lines and manholes.

Ultimately the DPW would use the proposed CMMS to maintain its operation and maintenance work order system and use this information to update asset information maintained in the CMMS. The CMMS program would be updated through the software developer as part of the yearly maintenance agreement. Department staff would attend on site training session in order to learn how to utilize, update and maintain the CMMS program. It would be installed on dedicated work stations as well as on in field tablets which are utilized by township and DPW staff daily.

Through this collective use of the DPWs maintenance programs, CMMS, GIS, CCTV records, NASSCO condition ratings, wastewater collection crews, management, and the Engineers the Township can address and plan for improvements to assets that have structural deficiencies beginning with the older portions of the system.

V. Revenue Structure

The Charter Township of Garfield's budget operates with a fiscal year commencing January 1 and ending on December 31 of each year. The Township Board of Public Works adopts a yearly operation, maintenance and capital improvements budget for the sanitary sewer system. The sanitary sewer budget is adopted prior to December 31st of the preceding year for the new fiscal year.

The adoption of the yearly sanitary sewer budget includes the adoption of sanitary sewer rates and other fees associated with the sanitary sewer system. Rate calculations demonstrating sufficient rates to support sewer operation, maintenance, replacement cost, and capital improvement projects will be conducted each year as part of the budget process (refer to Attachment 4).

VI. Capital Improvement Plan

For proper asset management planning long-range planning is required to fully capture the cyclic nature of the installation and replacement trends of the full asset register. Due to the enormous capital investment needs of infrastructure assets, an organization will not be able to financially prepare for the massive renewal requirements of future years without long-range consideration. Using the data in the asset register, estimated replacement/rehabilitation costs, and management strategies, a 20-year replacement and rehabilitation (renewal) projection was generated for the Township's sanitary sewer assets. The renewal projections which include replacement cost and useful life will ultimately be stored as part of the proposed CMMS for each record in the asset register. A yearly capital improvement project plan was generated for the sanitary sewer system each year. Maintenance, corrective action, capital improvement activities, and cost for these would be linked to each individual asset in the CMMS, and this data will be aggregated to create a long-term strategy for asset renewal and replacement.

VIII. Summary

In developing a first asset management plan, an organization will seldom have perfect data to support the asset analysis. Asset management is a process of continuous improvement. As the quantity and quality of data improves, the confidence level of the next draft of the asset management plan will increase. Through the asset management plan development process, the Township gained a better understanding of their data gaps and developed mitigation plans to improve the overall data collection and quality.

The Township's asset management plan implementation began in June 2014; the first step of the implementation was the creation of an interactive GIS based mapping system of the sanitary sewer collection and distribution system. The next crucial step was incorporating all the existing record drawings and reports into the map to house in one database for easy access. The next phase began in 2016 with collection and organization of assets, inspections and condition assessments for both major (pump stations) and minor (sewers, manholes and valves) assets. This information collected was incorporated into the GIS map along with tabulated in Excel spreadsheets. The Engineer collected the major assets whereas the DPW staff collects the minor using GPS equipment they purchased in 2016. Staff spent numerous months collecting GPS data points (manholes, air release structures, pump station components) for the sanitary sewer system and inputting this information into the existing GIS system. The inspection for major assets were completed as of November 2019 and the minor are ongoing as staff is available with a projected completion date of December 2021.

Long-term, the Township intends to purchase a CMMS program which will act as a repository for all of the asset information and data as well as track operation and maintenance information and cost for each asset. The vast number of assets present in the sanitary sewer system made it impossible to track this data and tie the operation, maintenance, and replacement information accurately without a CMMS program.

Charter Township of Garfield
Sanitary Sewer System Asset Management Plant
Attachments

Attachment 1	**Pump Station #3 Permit, Bid Advertisement and Closeout Paperwork**
Attachment 2	**Condition, Probability of Failure and Criticality of Asset Rating Scale**
Attachment 3	**Probability of Failure Weighting Factor**

Attachment 4 Rate Methodology and Acceptance Letter

ATTACHMENT 1

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION

PERMIT APPLICATION FOR WASTEWATER SYSTEMS

Construction - Alteration - Addition or Improvement as Described Herein
Required under the Authority of Part 41, Sewerage Systems, of 1994 PA 451, as amended (Act 451)

This application becomes a Part 41 Construction Permit only when signed and issued by authorized DEQ staff.

INSTRUCTIONS: Complete items 1 through 32 on this form and complete the Project Basis of Design (attached form EQP-4600A) or provide same information. Print or type all information except for signatures. Complete the Streamlined Checklist (EQP5937) for sewer projects that qualify; checklist available at www.michigan.gov/deq (select Water; then select Wastewater Construction). Complete the Non-Governmental Ownership Checklist (attached form EQP-4600C) for non-governmentally owned projects. Deliver complete application, plans and specifications, and attachments to the DEQ district office having jurisdiction for the project.

PROCESSING TIME FRAME: Part 13, Permits, of Act 451 allows 150 days for processing of an administratively complete Part 41 permit application, with extensions available when requested by the applicant. However, permits are generally processed within 45 days or less for routine projects. For information regarding recent permit processing time frames, refer to the WRD Metrics Web page (refer to metric B-9). For a fee, an expedited permit review process is available for applicants seeking quicker review time frames; information about this process is available at www.michigan.gov/deq (select Water; then select Wastewater Construction) or click here.

REQUIRED NOTIFICATIONS: The permittee shall provide Startup Notification (just prior to excavation) including permit number and date of issuance and Completion Notification (upon completion of the project) including permit number and date of issuance to the DEQ district office having jurisdiction for the project (attached form EQP-4600B).

PERMIT NUMBER (DEQ USE ONLY) P41000246	**DATE OF ISSUANCE** (DEQ USE ONLY) JUNE 30, 2016
1. **Municipality or Organization Name and Address** that will own the wastewater facilities to be constructed. This permit is to be issued to: Charter Township of Garfield 3848 Veterans Drive Traverse City, MI 49684	Permit Stamp Area (DEQ use only) WASTEWATER CONSTRUCTION PERMIT AUTHORIZED IN ACCORDANCE WITH ACT 451 PA. 1994, PART 41 PERMIT NUMBER P41000246 JUN 30 2016 MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
2. **Owner's Contact Person** (provide name for questions) Contact: Chuck Korn Phone: (231) 941-1620	

3. **Project Name** (Provide phase number if project is segmented) Pump Station No.3 Upgrades	4. **Project Location** Garfield Township	5. **County** (location of project) Grand Traverse County

ISSUED UNDER THE AUTHORITY OF THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENTAL QUALITY

Enclosed Plans and Specifications

cc: Gourdie-Fraser, Inc. w/Enclosures
Grand Traverse County Health Department

Issued by: ______________________
Brian W. Jankowski, P.E.

Reviewed by: ______________________
Jamie Wade, P.E.

☒ **If this box is marked see special conditions attached to this permit.**

GENERAL PERMIT CONDITIONS

a. This **PERMIT** only authorizes the construction, alteration, addition, or improvement of the wastewater system as described herein and is issued solely under the authority of Part 41 of Act 451.
b. Issuance of this **PERMIT** does not authorize any violation of federal, state, or local laws or regulations, nor does it obviate the need to obtain other permits or approvals from the DEQ or other units of government as may be required by law.
c. This **PERMIT** expires two (2) years after the above date of issuance unless construction starts prior to the expiration date in accordance with R 299.2939(2) of the Part 41 Administrative Rules.
d. Any portion of the herein described facilities constructed prior to the date of issuance is not authorized by this **PERMIT** and is a violation of Act 451.
e. No sewer shall be placed into service unless and until the outlet sewer has been constructed, tested, and placed into service.
f. Failure to meet any condition of this **PERMIT** or any requirement of Act 451 constitutes a violation of Act 451.
g. The applicant must provide notice of impending construction to public utilities and comply with the requirements of the Protection of Underground Facilities Act, 1974 PA 53, as amended (MISS DIG).
h. All earth changing activities must be conducted in accordance with Part 91, Soil Erosion and Sedimentation Control, of Act 451.
i. All construction activity impacting wetlands shall be conducted in accordance with Part 303, Wetlands Protection, of Act 451.
j. Intentionally providing false information in this application constitutes a violation of Section 249 of the Michigan Penal Code, 1931 PA 328, as amended.

6. **Facilities Description** In the space below, provide a detailed description of the proposed project in the format shown in the examples at the bottom of this page. Applications <u>with inadequate facilities descriptions</u> **will be returned**. Use additional sheets if needed.

Rehabilitation to the existing Sanitary Pump Station No. 3, including the following:

<u>Mechanical</u>
- Improvements to existing valve vault including removal and installation of piping, valves, flowmeter
- Improvements to existing wet well including removal and installation of pumps and rail assembly, access hatch, level controls and appurtenances, and associated piping

<u>Electrical</u>
- Removal & replacement of wet well junction box
- Removal & replacement of pump in existing control panel, flowmeter, level control & communication wiring
- Removal and replacement of panels, switches, and transformer
- Installation of level control system

Refer to Attached Plans & Specifications

EXAMPLES OF FACILITIES DESCRIPTIONS

Sanitary Sewers and/or Force Mains	250 feet of 10" sanitary sewer in Mark Avenue between John and Lincoln Streets. <u>**OR**</u> 250' of 10" sewer in an easement from the intersection of Mark Avenue and John Street to the north.
Pumping Stations	A wetwell/drywell, suction lift, submersible, etc. pumping station rated for 250 gpm at a TDH of 34' located at the northeast corner of Mark Avenue and Lincoln Street, and equipped with two pumps, backup power, pump around capability, and all other equipment as required for proper operation.
Wastewater Treatment Facilities	A 10 million gpd (avg. flow) facility located at the north end of Ronald Street including a 2.0 million gallon equalization basin, six 0.5 million gallon primary clarifiers, four 0.75 million gallon aeration basins with fine bubble aerators, four 0.8 million gallon circular secondary clarifiers, ultraviolet disinfection, and all necessary appurtenances and piping as shown on the plans and described in the specifications for the proper operation of the treatment facility to provide a discharge quality in compliance with the facility's discharge permit.

GENERAL PROJECT INFORMATION – Complete All Boxes Below

7. Design engineer's name, engineering firm, address, phone no., and e-mail address:
Eric Burtt, P.E. Gourdie-Fraser
123 W. Front St.
Traverse City, MI 49684
eric@gfa.tc

8. Indicate who will prepare "as-built" plans for this project:
☒ Design Engineer in Box 7
☐ Other - name, organization, address, and phone no.:

9. Indicate who will provide project construction inspection:
☒ Engineering firm listed in Box 7
☐ Other - name, organization, address, and phone no.:

10. Is groundwater dewatering expected for this project?
☐ YES ☒ NO
If YES, provide dewatering specifications.
If YES, will water wells or water bodies be impacted?
☐ YES ☐ NO

11. To which wastewater collection system will the project connect? Garfield Township Sanitary Sewer System

12. To which wastewater treatment system will the project connect? City of Traverse City Wastewater Treatment Facility
Final discharge is to: ☐ Groundwater ☒ Surface Water

13. Will this project be within 50 ft. of a private water well?
☐ YES ☒ NO If YES, locate on plans.

14. Will this project be within 200 ft. of a public water well?
☐ YES ☒ NO If YES, locate on plans.

15. Is the project construction activity within a wetland (as defined by Section 30301(p) of Part 303 of Act 451)?
☐ YES ☒ NO
If YES, has application been made for a wetland permit?
☐ YES ☐ NO

16. Is the project construction activity within a 100-year floodplain (as defined by Section 3101 of Part 31, Water Resources Protection, of Act 451, and the associated Administrative Rules)?
☐ YES ☒ NO
If YES, has application been made for a floodplain permit?
☐ YES ☐ NO

17. Is the project construction activity below the ordinary high water mark of an inland lake or stream (as defined by Section 30101(f) of Part 301 of Act 451)?
☐ YES ☒ NO
If YES, has application been made for an inland lakes and streams permit? ☐ YES ☐ NO

18. Is the project construction activity within 500 ft. of a lake, reservoir, or stream? ☒ YES ☐ NO
If YES, has application been made for a Soil Erosion and Sedimentation Control Permit? ☒ YES ☐ NO
Is owner listed in box 2 of this application an Authorized Public Agency (Section 9110 of Part 91 of Act 451)?
☐ YES ☒ NO

19. Will the proposed construction activity be part of a project involving the disturbance of five (5) or more acres of land?
☐ YES ☒ NO Please contact 517-284-5587 with questions regarding the storm water regulations.
If YES, is project regulated by the National Pollutant Discharge Elimination System (NPDES) storm water regulations?
☐ YES: Attach copy of application or NPDES authorization to discharge storm water from construction activities.
☐ NO: Describe why activity is not regulated:

20. Is the project in or adjacent to a site of known soil or groundwater contamination? ☐ YES ☒ NO
If YES, attach a copy of a plan acceptable to the DEQ for handling contaminated soils and/or groundwater disturbed during construction. Contact the local DEQ office for listings of Michigan sites of environmental contamination.

SEWER SYSTEM CAPACITY

		Flow Rate	Units
21. Are there any known capacity concerns in the collection system downstream of the proposed project? ☐ YES ☒ NO If YES, **include a full explanation with the application.**			
22. Proposed project peak design flow rate: ok		~~N/A~~	
23. Total capacity of the existing outlet sewer:		~~N/A~~	
24. Current peak hour flow into the existing outlet sewer:		~~N/A~~	
25. Design capacity of nearest downstream pumping station (largest pump out of service):	N.A. ☒		
26. Current peak hour flow into nearest downstream pump station:	N.A. ☒		

OVERFLOWS AND BASEMENT FLOODING – For Proposed Sewer Projects, Mark All Boxes That Apply

27. Has the downstream collection system overflowed or flooded basements in the past five years? ☐ YES ☒ NO
If YES, attach a listing of events in the past five years including date, location, cause, and corrective action.

28. Has the downstream collection system owner entered into an agreement satisfactory to the DEQ to address sanitary sewer overflows and flooding of basements? ☐ YES ☐ NO
If YES, enter agreement name and number:

29. **TREATED WASTEWATER DISCHARGE AUTHORIZATION** – Mark Boxes As Appropriate

A. Does project include a new treatment facility or expansion, a change in discharge method, or a new discharge location?
☐ YES – Complete B below ☒ NO – skip to item 30

B. If A is marked YES, indicate discharge authorization and provide the requested information:
1. NPDES or Groundwater Discharge Permit No: _____ Permit Authorized Flow Rate: _____ Units: _____
2. Local health department approval. **Include a copy of the approval with this application.**

30. **OWNERSHIP** – Mark A or B as Appropriate Below

☒ A. Ownership will be by a governmental entity **before the sewer is placed in service.**

☐ B. Ownership will be by a non-governmental entity, and a **completed Non-Governmental Ownership Checklist is included with this application.**

Note: A completed **Non-Governmental Ownership Checklist** (EQP-4600C) must be included with the application for **non-governmentally owned projects**. The checklist is attached to this application and the supporting information is available at www.michigan.gov/deq (select Water; then select Wastewater Construction).

31. **COMPLETE APPLICATION CHECKLIST** – Please confirm that this application is complete by using this checklist. Mark the box if the condition is met. This will help reduce DEQ review time and speed permit issuance.

☒ A. Items 1 to 30 of the application are completed.	☒ E. Owner's certification signed and complete (item 32).
☐ B. A contamination management plan is included for sites with known contamination (item 20). ☒ N.A.	☒ F. A detailed basis of design is included with the application. Form EQP-4600A (attached) or similar form is completed providing information required by Rule 35(3) of the Part 41 Administrative Rules of Act 451.
☐ C. For projects with local health department discharge authorization, a copy of the health department authorization is included (item 29). ☒ N.A.	
☐ D. For non-governmentally owned projects, provide the Non-Governmental Ownership Checklist and all documents required by the checklist (item 30). ☒ N.A.	☒ G. Final plans and specifications sealed and signed by a Michigan licensed professional engineer are provided.

32. **OWNER'S CERTIFICATION** – The owner of the proposed facilities or the owner's authorized representative shall complete the following owner's certification:

I, Chuck Korn (name), acting as the Supervisor (title/position) for Charter Township of Garfield (entity owning proposed facilities) certify that the information provided in and with this application is true and accurate to the best of my knowledge, and I certify that the plans and specifications and other documents submitted to the DEQ with the Part 41 Permit Application accurately represent what I intend to construct under the terms of the Part 41 Permit, once issued. Also, I certify that this proposed project as detailed in the plans and specifications submitted under this application is in compliance with the requirement of Rule 41(a) of the Part 41 Administrative Rules of Act 451, which states that "Proper devices are or will be available and are in satisfactory operation for the collection, transportation and treatment before discharge into any public watercourse, lake, drain, ditch or groundwater, of the sewage or wastes collected or conveyed by such systems, or a definite program or agreement satisfactory to the department leading to the construction and operation of such collection, transportation or treatment devices shall have been officially adopted by the applicant for such permit and filed in the offices of the department." Further, I hereby acknowledge the requirement to provide Startup Notification (just prior to excavation) with the permit number and date of issuance and Completion Notification (upon completion of the project) with the permit number and date of issuance to the DEQ district office having jurisdiction for the project.

SIGNATURE: ______________________ DATE: 4-14-2016

NAME (TYPED): CHUCK KORN PHONE: (231) 941-1620

The project owner (permittee) shall provide a copy of this permit to the general contractor and all applicable sub contractors before the start of construction. The permittee/owner shall review the conditions below that are applicable to contractors with all applicable contractors and subcontractors. The owner's engineering representative may perform this distribution and review in lieu of the owner at the owner's direction.

Any references below related to plans or specifications reference the permit set of plans and specifications stamped with the DEQ permit stamp.

Permit plans and specifications are on file with the Department of Environmental Quality (DEQ), subject to records retention policy).

Special Conditions:

The following special conditions apply to this project and represent corrections, revisions or clarifications as noted:

These conditions also reflect the clarifications and/or revisions to the permit plans that were received by the DEQ on April 20, 2016 and stamped with the DEQ permit stamp; as well as from e-mail responses from Gourdie-Fraser (June 30, 2016; June 29, 2016; June 27, 2016; June 20, 2016) and/or prior responses from same.

1. The Note 1 shown on page 7 of 11 of this permit shall replace Note 1 on Sheet E1.1 of the plan set received by the DEQ on April 20, 2016 and stamped with the DEQ permit stamp.

2. The Note 5 shown on page 7 of 11 of this permit shall replace Note 5 on Sheet E1.1 of the plan set received by the DEQ on April 20, 2016 and stamped with the DEQ permit stamp.

3. The details shown on page 8 of 11 of this permit, more specifically the areas within the revision cloud shall replace those portions of the Section Through Pump Station Detail on Sheet E1.1 of the plan set received by the DEQ on April 20, 2016 and stamped with the DEQ permit stamp.

4. The details shown on page 9 of 11 of this permit, more specifically the areas within the revision cloud shall replace those portions of the Proposed Electrical Riser Diagram Detail on Sheet E1.2 of the plan set received by the DEQ on April 20, 2016 and stamped with the DEQ permit stamp.

DO NOT WRITE BELOW THIS LINE

MDEQ USE ONLY

PERMIT #	DATE:	Project name:	ISSUED TO:
P41000246	***June 30, 2016***	**PUMP STATION No.3 UPGRADES**	**CHARTER TOWNSHIP OF GARFIELD**

5. The details shown on page 10 of 11 of this permit, more specifically the areas within the revision cloud shall replace those portions of the Section Through Pump Station Detail on Sheet E1.1 of the plan set received by the DEQ on April 20, 2016 and stamped with the DEQ permit stamp.

6. The specification section shown on page 11 of 11 of this permit, more specifically the area within the revision cloud shall replace that portion of Section 11310 – Sewage Pump Station Improvements, 2.01.B.3.d received by the DEQ on April 20, 2016 and stamped with the DEQ permit stamp.

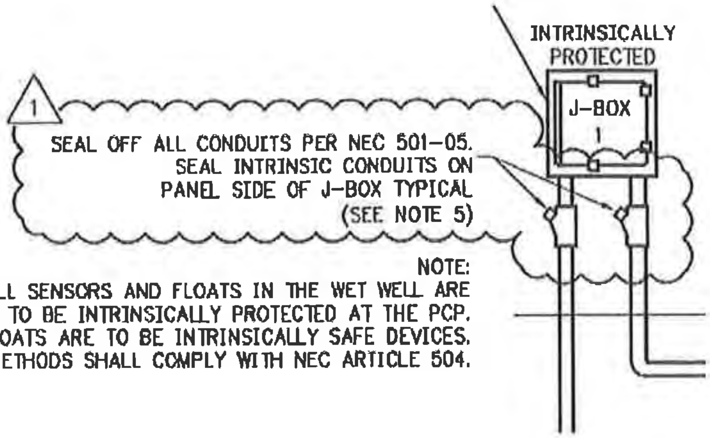
NOTES:

1. WET WELL CHAMBER IS CLASSIFIED AS CLASS 1 DIVISION 1 GROUP D, NEC STANDARDS. VALVE CHAMBER IS CLASSIFIED AS CLASS 1 DIVISIONS 2 GROUP D, NEC STANDARDS. ALL EQUIPMENT AND INSTALLATION IN THESE LOCATIONS TO COMPLY WITH SAME.
2. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK. ANY ADJUSTMENTS INCLUDING WIRING, CONDUIT, RACEWAYS, AND BOXES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO ADDITIONAL COST TO THE PROJECT.
3. CONTRACTOR IS RESPONSIBLE FOR PROVIDING, INSTALLING, ENERGIZING, AND CALIBRATING INSTRUMENTATION INCLUDING FLOWMETER, TRANSDUCER, CONDUIT, ELECTRICAL, AND COMMUNICATION WIRING. TERMINATION INTO SCADA PANEL AND PROGRAMMING TO BE PROVIDED BY OWNER CONTRACTED INTEGRATOR. CONTRACTOR TO COORDINATE. CONTACT BRANDON ELMORE AT WINDEMULLER: 231-935-4800
4. FLOW METER TO BE RATED TOTAL SUBMERGENCE & CLASS 1 DIVISION 2. ACCEPTABLE MANUFACTURE TO BE ENDRESS-HAUSER PROLINE PROMAG L-400 OR SIEMENS MAG 5100W OR ENGINEER APPROVED EQUAL.
5. ALL CONDUIT SEAL-OFFS SHALL BE GAS TIGHT AND SHALL BE PROVIDED FOR ALL CONDUITS BETWEEN THE WET WELL AND CONTROL PANEL, AND ALL CONDUITS BETWEEN THE VALVE CHAMBER AND CONTROL PANEL. CONDUIT SEALS ARE TO BE PROVIDED BETWEEN ALL NEC HAZARDOUS LOCATIONS AND THE CONTROL PANEL. CONDUIT SEALS ARE TO BE PLACED PER NEC.
6. ALL EQUIPMENT AND SWITCHES IN WET WELL TO BE INTRINSICALLY SAFE AND EXPLOSION PROOF.
7. INTRINSICALLY SAFE CIRCUITS SHALL BE SEPARATED FROM NON-INTRINSICALLY SAFE.
8. REFER TO MECHANICAL SHEETS FOR MECHANICAL UPGRADES.
9. CONTRACTOR TO COORDINATE WITH DPW ON JUNCTION BOX LOCATION.

DO NOT WRITE BELOW THIS LINE

MDEQ USE ONLY

PERMIT #	DATE:	Project name:	ISSUED TO:
P41000246	***June 30, 2016***	**PUMP STATION No.3 UPGRADES**	**CHARTER TOWNSHIP OF GARFIELD**



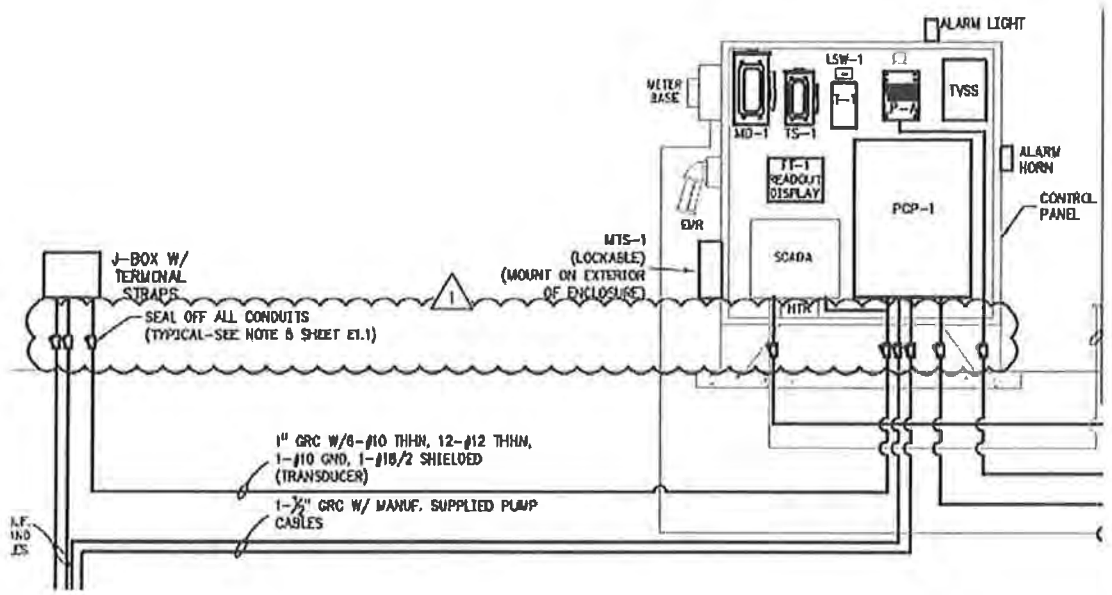
SEAL OFF ALL CONDUITS PER NEC 501-05.
SEAL INTRINSIC CONDUITS ON
PANEL SIDE OF J-BOX TYPICAL
(SEE NOTE 5)

NOTE:
ALL SENSORS AND FLOATS IN THE WET WELL ARE
TO BE INTRINSICALLY PROTECTED AT THE PCP.
ALL SENSORS AND FLOATS ARE TO BE INTRINSICALLY SAFE DEVICES.
WIRING METHODS SHALL COMPLY WITH NEC ARTICLE 504.

DO NOT WRITE BELOW THIS LINE

MDEQ USE ONLY

PERMIT #	DATE:	Project name:	ISSUED TO:
P41000246	***June 30, 2016***	**PUMP STATION No.3 UPGRADES**	**CHARTER TOWNSHIP OF GARFIELD**



DO NOT WRITE BELOW THIS LINE

MDEQ USE ONLY

PERMIT #	DATE:	Project name:	ISSUED TO:
P41000246	***June 30, 2016***	**PUMP STATION No.3 UPGRADES**	**CHARTER TOWNSHIP OF GARFIELD**

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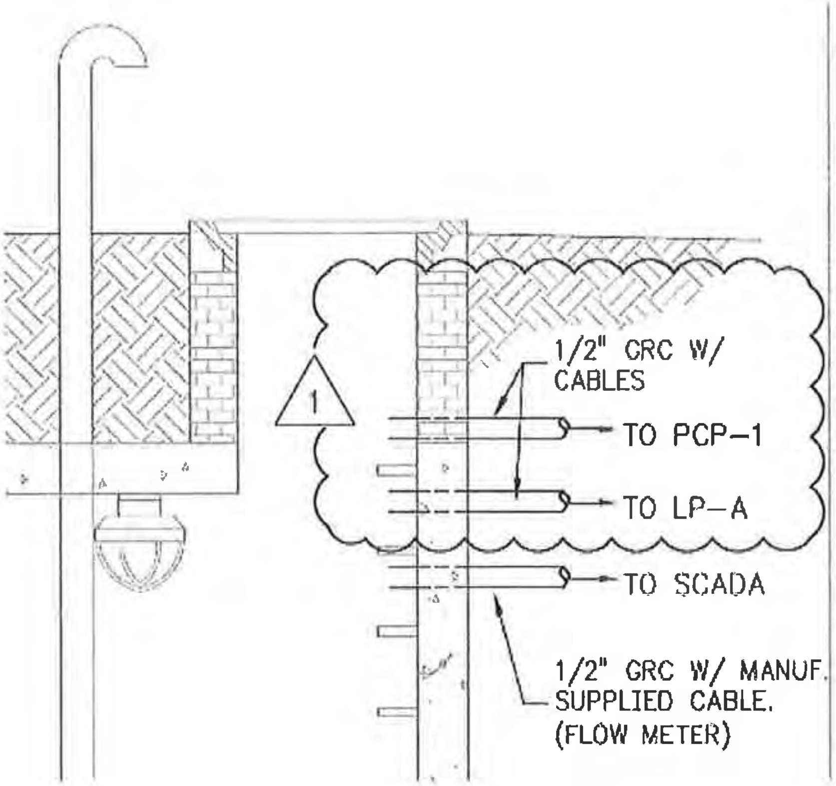


DO NOT WRITE BELOW THIS LINE

MDEQ USE ONLY

PERMIT #	DATE:	Project name:	ISSUED TO:
P41000246	***June 30, 2016***	**PUMP STATION No.3 UPGRADES**	**CHARTER TOWNSHIP OF GARFIELD**

B. Type and Scope

1. Furnish two (2) and install two (2) Flygt Explosion Proof Premium Efficient (IE3) Chopper Pumps Model FP 3127.850 or Engineer approved equal.
2. All components of the pumping unit shall be supplied by the same manufacturer.
3. Requirements:
    a. Guide rail system; stainless steel components.
    b. 4 inch discharge base
    c. Temperature and Seal failure sensors.
    d. Each pump motor shall be equipped with the necessary length of power and control cable(s) and shall meet the requirements of the National Electric Code for flexible cords in waste water pump stations.
    e. U6698A Duplex Control Panel (PCP-1) including: NEMA 3R stainless steel enclosure with aluminum inner door, motor starters with overloads, circuit breakers, transformer, phase monitor, alternator, HOA switches, run lights, elapsed time meter, alarm light and horn (for existing enclosure mounting), high temperature and seal fail relays, intrinsically safe float relays. Panel to be mounted inside the existing enclosure by the Contractor.
    f. 1.15 Service Factor.

DO NOT WRITE BELOW THIS LINE

MDEQ USE ONLY

PERMIT #	DATE:	Project name:	ISSUED TO:
P41000246	**June 30, 2016**	**PUMP STATION No.3 UPGRADES**	**CHARTER TOWNSHIP OF GARFIELD**

Project information

Project name: Sanitary Sewer Pump Station No. 3 Upgrades
Project owner: Charter Township of Garfield
Project location: Maple Ridge Way in Lake Pointe Apartments, Garfield Township, Grand Traverse County
Contract number: GFA #15107
Project highlights:

> Rehabilitation to the existing Garfield Sanitary Pump Station No. 3

Project description:

> Mechanical
> - Improvements to existing valve vault including removal and installation of piping, valves, flowmeter
> - Improvements to existing wet well including removal and installation of pumps and rail assembly, access hatch, level controls and appurtenances, and associated piping
>
> Electrical
> - Removal & replacement of wet well junction box
> - Removal & replacement of pump in existing control panel, flowmeter, level control & communication wiring
> - Removal and replacement of panels, switches, and transformer
> - Installation of level control system

Project estimate: n/a
Project categories: Electrical, Water & Sewer

Contact information

Contact name: Vicky Smith
Contact phone: 231-946-5874
Contact email: vicky@gfa.tc

Bid information

Bid open: May 3, 2016 11:00 AM
Location of bid opening: Township offices, 3848 Veterans Drive, Traverse City, MI 49684
Link to bid documents:
Plan holder's list: www.gfa.tc
How to obtain additional bid documents:

> Payment Schedule - Make checks payable to Gourdie-Fraser
> Plans and Specifications – Non-refundable Fee
> Paper copy $ 45.00
> C.D. version $ 20.00
>
> Payment must be received prior to release of Plans and Specifications. Faxed checks will not be accepted. We accept Visa, MasterCard, and Discover. If overnight shipping of Bid Package is requested by Contractor, the overnight additional fee will be charged to the Contractor.

Documents available starting: Apr 15, 2016 1:00 PM
Document fee: $45.00
Pre-bid meeting:
Meeting location: n/a

Deposit information

Deposit: None
Wages:

Additional information

Posted date: Apr 14, 2016 2:42 PM
Times viewed: 10

16-0015-11

AFFIDAVIT OF COMPLETION/CONSENT OF SURETY

Franklin Holwerda Company

Name of Contractor

2509 29th Street SW, Wyoming, MI 49519

Address of Contractor

being duly sworn, deposes and says that they entered into a Contract with Charter Twp of Garfield on the day of May 18th, 200 2016, for the Sanitary Sewer Pump Station No. 3 Upgrade Project.

Contractor further says that the said Contract has been completed and all indebtedness incurred by him to Subcontractors, Suppliers, and laborers in their employ has been paid in full Contractor further says that there are no outstanding or pending Claims, Liens or actions in Law involving this Contract. Contractor further says this affidavit is furnished as an inducement to the Owner to make final payment on said Contract.

WITNESSES:

Josh Whitcomb

Print

SIGNED: Franklin Holwerda Company

Micah Holt

Micah Holt

Print

Subscribed and sworn to before me this 28th day of December, 2016.

RAYMOND W. HOLT

Print Name

Raymond W. Holt

Notary Public Sign

SEAL

My commission expires: 4-27-2019

CONSENT OF SURETY

We, as Surety on the above-described Contract, hereby give our consent to the payment to the Contractor as indicated.

NAME OF SURETY COMPANY: Employers Mutual Casualty Company

PERFORMANCE AND PAYMENT BOND NO.: S447685

Date: December 8, 2016

Signed: Lori Fisher

Name: Lori Fisher, Attorney-in-Fact

THE FACE AND REVERSE OF THIS DOCUMENT HAVE A COLORED FLAG ON WHITE PAPER

EMC INSURANCE P.O. Box 712 • Des Moines, IA 50306-0712 No. B75043

CERTIFICATE OF AUTHORITY INDIVIDUAL ATTORNEY-IN-FACT

KNOW ALL MEN BY THESE PRESENTS, that:

1. **Employers Mutual Casualty Company, an Iowa Corporation**
2. **EMCASCO Insurance Company, an Iowa Corporation**
3. **Union Insurance Company of Providence, an Iowa Corporation**
4. **Illinois EMCASCO Insurance Company, an Iowa Corporation**
5. **Dakota Fire Insurance Company, a North Dakota Corporation**
6. **EMC Property & Casualty Company, an Iowa Corporation**
7. **Hamilton Mutual Insurance Company, an Iowa Corporation**

hereinafter referred to severally as "Company" and collectively as "Companies", each does, by these presents, make, constitute and appoint:
LAURA J. NORTHOUSE, JON LUNDERBERG, BRIAN L. MATTILA, PAUL S. BUITEN, V. JEAN NOLF, RANDAL J. BISHOP, LORI FISHER

its true and lawful attorney-in-fact, with full power and authority conferred to sign, seal, and execute its lawful bonds, undertakings, and other obligatory instruments of a similar nature as follows:

In an amount not exceeding Ten Million Dollars...$10,000,000.00

and to bind each Company thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of each such Company, and all of the acts of said attorney pursuant to the authority hereby given are hereby ratified and confirmed.

The authority hereby granted shall expire APRIL 1, 2019 unless sooner revoked.

AUTHORITY FOR POWER OF ATTORNEY

This Power-of-Attorney is made and executed pursuant to and by the authority of the following resolution of the Boards of Directors of each of the Companies at a regularly scheduled meeting of each company duly called and held in 1999:

RESOLVED: The President and Chief Executive Officer, any Vice President, the Treasurer and the Secretary of Employers Mutual Casualty Company shall have power and authority to (1) appoint attorneys-in-fact and authorize them to execute on behalf of each Company and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof; and (2) to remove any such attorney-in-fact at any time and revoke the power and authority given to him or her. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power-of-attorney issued to them, to execute and deliver on behalf of the Company, and to attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and any such instrument executed by any such attorney-in-fact shall be fully and in all respects binding upon the Company. Certification as to the validity of any power-of-attorney authorized herein made by an officer of Employers Mutual Casualty Company shall be fully and in all respects binding upon this Company. The facsimile or mechanically reproduced signature of such officer, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power-of-attorney of the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS THEREOF, the Companies have caused these presents to be signed for each by their officers as shown, and the Corporate seals to be hereto affixed this 14th day of NOVEMBER, 2016

Seals

SEAL 1863 IOWA 1953

SEAL SEAL SEAL

Bruce G. Kelley
Bruce G. Kelley, Chairman
of Companies 2, 3, 4, 5 & 6; President
of Company 1; Vice Chairman and
CEO of Company 7

Michael Freel
Michael Freel
Assistant Vice President

On this 14th day of NOVEMBER AD 2016 before me a Notary Public in and for the State of Iowa, personally appeared Bruce G. Kelley and Michael Freel, who, being by me duly sworn, did say that they are, and are known to me to be the Chairman, President, Vice Chairman and CEO, and/or Assistant Vice President, respectively, of each of The Companies above; that the seals affixed to this instrument are the seals of said corporations; that said instrument was signed and sealed on behalf of each of the Companies by authority of their respective Boards of Directors; and that the said Bruce G. Kelley and Michael Freel, as such officers, acknowledged the execution of said instrument to be the voluntary act and deed of each of the Companies.

My Commission Expires October 10, 2019

KATHY LOVERIDGE
Commission Number 780769
My Commission Expires
October 10, 2019

Kathy Loveridge
Notary Public in and for the State of Iowa

CERTIFICATE

I, James D. Clough, Vice President of the Companies, do hereby certify that the foregoing resolution of the Boards of Directors by each of the Companies, and this Power of Attorney issued pursuant thereto on NOVEMBER 14, 2016 on behalf of:
LAURA J. NORTHOUSE JON LUNDERBERG, BRIAN L MATTILA, PAUL S. BUITEN, V. JEAN NOLF, RANDAL J. BISHOP, LORI FISHER

are true and correct and are still in full force and effect.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 8th day of December 2016 Vice President

7832 (1-14) **"For verification of the authenticity of the Power of Attorney you may call (515) 345-2689."**

MAINTENANCE BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

Franklin Holwerda Company
2509 29th Street SW
Wyoming, MI 49519

OWNER (Name and Address):

Charter Township of Garfield
3848 Veterans Dr.
Traverse City, MI 49684

SURETY (Name and Address of Principal Place of Business):

Employers Mutual Casualty Company
1815 South Meyers Rd.
Oakbrook Terrace, IL 60181

CONTRACT

Date: May 18, 2016
Amount: **One Hundred Ninety Three Thousand One Hundred Fifty 00/100**($193,150.00)**
Project Description (Name and Location): Sanitary Sewer Pump Station No. 3 Upgrades

BOND

Date (1 year from date of Acceptance by the Municipality): November 17, 2016
Amount: **One Hundred Ninety Three Thousand One Hundred Fifty 00/100**($193,150.00)**
Bond Number: S447685

Surety and Contractor, intending to be legally bound hereby, subject to the following terms, to each cause this Maintenance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

KNOW ALL MEN BY THESE PRESENTS, That we, Franklin Holwerda Company as Principal, (hereinafter called Principal), and Empl Mut Cas as Surety (hereinafter called Surety), are held and firmly bound into Charter Twp. of Garfield as Obligee (hereinafter called Obligee), in the penal sum of ______ Dollars $ 193,150 for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents

WHEREAS, said Principal has by written Agreement, dated May 18, 2016 entered into a Contract with said Obligee for ______ in accordance with the General Conditions, the Drawings and Specifications, which Contract is by reference incorporated herein, and made a part hereof, and is referred to as the Contract..

NOW, THEREFORE, the condition of this obligation is such that, if said Principal shall maintain and remedy any defects due to faulty materials or workmanship, and pay for any damage to other Work resulting therefrom, and additional expense which shall appear within a period of 1 year(s) from the date of acceptance by the municipality of the Work provided for in the Contract, then this obligation to be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that said Obligee shall give Principal and Surety notice of observed defects with reasonable promptness.

Signed and sealed this 8th day of December, 2016

CONTRACTOR AS PRINCIPAL
Company: (Corp. Seal)
Franklin Holwerda Company

Signature:
Name and Title:

SURETY
Company: (Corp. Seal)
Employers Mutual Casualty Company

Signature: Lori Fisher
Name and Title: Lori Fisher, Attorney-in-Fact
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required).

CONTRACTOR AS PRINCIPAL
Company: (Corp. Seal)

Signature: ________________
Name and Title:

SURETY
Company: (Corp. Seal)

Signature: ________________
Name and Title:

NOTE: Date of Bond must not be prior to date of Substantial Completion. If Contractor is a Partnership, all partners should execute Bond.

IMPORTANT: Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

THE FACE AND REVERSE OF THIS DOCUMENT HAVE A COLORED FLAG ON WHITE PAPER

EMC INSURANCE

P.O. Box 712 • Des Moines, IA 50306-0712

No. B75042

CERTIFICATE OF AUTHORITY INDIVIDUAL ATTORNEY-IN-FACT

KNOW ALL MEN BY THESE PRESENTS, that:

1. **Employers Mutual Casualty Company, an Iowa Corporation**
2. **EMCASCO Insurance Company, an Iowa Corporation**
3. **Union Insurance Company of Providence, an Iowa Corporation**
4. **Illinois EMCASCO Insurance Company, an Iowa Corporation**
5. **Dakota Fire Insurance Company, a North Dakota Corporation**
6. **EMC Property & Casualty Company, an Iowa Corporation**
7. **Hamilton Mutual Insurance Company, an Iowa Corporation**

hereinafter referred to severally as "Company" and collectively as "Companies", each does, by these presents, make, constitute and appoint:
LAURA J. NORTHOUSE, JON LUNDERBERG, BRIAN L. MATTILA, PAUL S. BUITEN, V. JEAN NOLF, RANDAL J. BISHOP, LORI FISHER

its true and lawful attorney-in-fact, with full power and authority conferred to sign, seal, and execute its lawful bonds, undertakings, and other obligatory instruments of a similar nature as follows:

In an amount not exceeding Ten Million Dollars..$10,000,000.00

and to bind each Company thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of each such Company, and all of the acts of said attorney pursuant to the authority hereby given are hereby ratified and confirmed.

The authority hereby granted shall expire APRIL 1, 2019 unless sooner revoked.

AUTHORITY FOR POWER OF ATTORNEY

This Power-of-Attorney is made and executed pursuant to and by the authority of the following resolution of the Boards of Directors of each of the Companies at a regularly scheduled meeting of each company duly called and held in 1999:

RESOLVED: The President and Chief Executive Officer, any Vice President, the Treasurer and the Secretary of Employers Mutual Casualty Company shall have power and authority to (1) appoint attorneys-in-fact and authorize them to execute on behalf of each Company and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof; and (2) to remove any such attorney-in-fact at any time and revoke the power and authority given to him or her. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power-of-attorney issued to them, to execute and deliver on behalf of the Company, and to attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and any such instrument executed by any such attorney-in-fact shall be fully and in all respects binding upon the Company. Certification as to the validity of any power-of-attorney authorized herein made by an officer of Employers Mutual Casualty Company shall be fully and in all respects binding upon this Company. The facsimile or mechanically reproduced signature of such officer, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power-of-attorney of the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS THEREOF, the Companies have caused these presents to be signed for each by their officers as shown, and the Corporate seals to be hereto affixed this 14th day of NOVEMBER, 2016.

Seals

1863

1953

Bruce G. Kelley

Bruce G. Kelley, Chairman
of Companies 2, 3, 4, 5 & 6; President
of Company 1; Vice Chairman and
CEO of Company 7

Michael Freel

Michael Freel
Assistant Vice President

On this 14th day of NOVEMBER AD 2016 before me a Notary Public in and for the State of Iowa, personally appeared Bruce G. Kelley and Michael Freel, who, being by me duly sworn, did say that they are, and are known to me to be the Chairman, President, Vice Chairman and CEO, and/or Assistant Vice President, respectively, of each of The Companies above; that the seals affixed to this instrument are the seals of said corporations; that said instrument was signed and sealed on behalf of each of the Companies by authority of their respective Boards of Directors; and that the said Bruce G. Kelley and Michael Freel, as such officers, acknowledged the execution of said instrument to be the voluntary act and deed of each of the Companies.

My Commission Expires October 10, 2019

KATHY LOVERIDGE
Commission Number 780769
My Commission Expires
October 10, 2019

Kathy Loveridge

Notary Public in and for the State of Iowa

CERTIFICATE

I, James D. Clough, Vice President of the Companies, do hereby certify that the foregoing resolution of the Boards of Directors by each of the Companies, and this Power of Attorney issued pursuant thereto on NOVEMBER 14, 2016 on behalf of:
LAURA J. NORTHOUSE, JON LUNDERBERG, BRIAN L. MATTILA, PAUL S. BUITEN, V. JEAN NOLF, RANDAL J. BISHOP, LORI FISHER

are true and correct and are still in full force and effect.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 8th day of December 2016 Vice President

"For verification of the authenticity of the Power of Attorney you may call (515) 345-2689."

Certificate of Substantial Completion

Project: Pump Station No. 3 Upgrades	
Owner: The Charter Township of Garfield	Owner's Contract No.:
Contract:	Engineer's Project No.: 15107

This definitive Certificate of Substantial Completion applies to:

☒ All Work under the Contract Documents: ☐ The following specified portions of the Work:

November 17, 2016

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A definitive list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

☐ Amended Responsibilities ☒ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

Punch List Dated 11-17-2016

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by GFA ________ Date ________

________ 12/2/16

Accepted by Franklin Howerda Company ________ Date

________ ________

Accepted by Charter Township of Garfield ________ Date

gfa
Engineering
Surveying
Testing &
Operations

123 West Front Street
Traverse City, Michigan 49684
231 946 5874
231 946 3703

OWNER
Charter Township of Garfield
3848 Veterans Drive
Traverse City, MI 49686

CONTRACT AMOUNT
ORIGINAL: $194,050.00

REVISED: 12/28/2016

ENGINEER
Gourdie-Fraser
123 W. Front Street
Traverse City, MI 49684

COMPLETION DATE
ORIGINAL: 10/7/16

REVISED 1/8/17

CONTRACTOR
Franklin Holwerda
2506 29th Street, SW
Wyoming, MI 49519

DATES OF ESTIMATES
FROM: 11/27/2016

TO: 12/28/2016

APPLICATION FOR PROGRESS PAYMENT

Payment No. 3-FINAL

Project: Sanitary Sewer Pump Station No. 3 Upgrades

GFA Project No: 15107

Item	Description of Item	Unit	CONTRACT ITEMS (Original) Qty.	Cost/ Unit	Item Cost	Contract Items (Revised) Qty.	Cost/ Unit	Item Cost	THIS PERIOD Qty	Item Cost	%	TOTAL TO DATE Qty	Item Cost	%
1	Submersible Pumping System and Panel	LS	1	$77,250.00	$77,250.00	1	$77,250.00	$77,250.00				1	$77,250.00	100%
2	Wet Well Mechanical Improvements	LS	1	$27,700.00	$27,700.00	1	$27,700.00	$27,700.00				1	$27,700.00	100%
3	Valve Chamber Mechanical Improvements	LS	1	$24,200.00	$24,200.00	1	$23,300.00	$23,300.00	0.1	$2,330.00	10%	1	$23,300.00	100%
4	Wet Well Electrical Improvements	LS	1	$6,600.00	$6,600.00	1	$6,600.00	$6,600.00				1	$6,600.00	100%
5	Valve Chamber Electrical Improvements	LS	1	$8,200.00	$8,200.00	1	$8,200.00	$8,200.00				1	$8,200.00	100%
6	Site Electrical Improvements	LS	1	$9,600.00	$9,600.00	1	$9,600.00	$9,600.00				1	$9,600.00	100%
7	Bypass Pumping	LS	1	$37,000.00	$37,000.00	1	$37,000.00	$37,000.00				1	$37,000.00	100%
8	Site Restoration	LS	1	$3,500.00	$3,500.00	1	$1,084.00	$1,084.00				1	$1,084.00	100%
					$194,050.00			**$190,734.00**		**$2,330.00**			**$190,734.00**	

gfa
Engineering
Surveying
Testing &
Operations

123 West Front Street
Traverse City, Michigan 49684
231 946 5874 P
231 946 3703 F

FINAL

Project: **Sanitary Sewer Pump Station No. 3 Upgrades**

GFA Project No: 15107

The undersigned CONTRACTOR certifies that: (1) Any previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with Work covered by prior Applications for Payment; (2) title to all Work, materials, and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all liens, claims, security interest and encumbrances (except such as are covered by Bond acceptable to OWNER indemnifying OWNER against any such lien, claim, security interest, or encumbrance); (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not *defective* as that term is defined in the Contract Documents; (4) all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents and other documents in accordance with the Contract Documents have been delivered to the OWNER and Engineer; (5) all corrections, incomplete, and defective work have been completed to the acceptance of the Owner and Engineer; (6) the final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.4.13, (ii) consent of the surety, if any, to final payment, and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work; and (7) this final payment satisfies the Contract terms and conditions.

Eighteen Thousand Two Hundred Forty One and Eighty Cents
Payment of the above AMOUNT DUE THIS APPLICATION is recommended

Dated: 12/28/2016

GFA
(ENGINEER)

Authorized Signature

Date: 12/28/16

Franklin Holwerda Company
(CONTRACTOR)

Authorized Signature

Engineering
Surveying
Testing &
Operations

123 West Front Street
Traverse City, Michigan 49684
231 946 5874
231 946 3703

APPLICATION FOR PROGRESS PAYMENT

Payment No. 3-FINAL

Project: Sanitary Sewer Pump Station No. 3 Upgrades

GFA Project No: 15107

Original Contract Amount			**194,050.00**
Change Orders			**-3,316.00**
Adjusted Contract Amount to Date			**190,734.00**
Total Cost of Work Performed to date	**Percent Complete:**	**100%**	**190,734.00**
MINUS Retainage in Accordance with the Contract		**0%**	**0.00**
MINUS Additional Retainage		**0%**	
Net Amount Earned on Contract and Extra Work to Date			**190,734.00**
PLUS Value of Materials Stored at Close of This Period			
Subtotal			**190,734.00**
MINUS Amount of Previous Payments			**172,492.20**
BALANCE DUE THIS PAYMENT			**18,241.80**

CHANGE ORDERS

No./Date	Amount
1-11/8/16	$0.00
2-12/28/16	-$3,316.00
TOTAL	-$3,316.00

Payment No.	Amount
1	63,495.00
2	108,997.20
TOTAL	172,492.20

CONTRACT CHANGE ORDER NO 2
SUMMARY

DATE OF ISSUANCE: 28-Dec-16
OWNER: Charter Township of Garfield
CONTRACTOR: Franklin Holwerda
Project Name: Sanitary Sewer Pump Station No. 3 Upgrades
Project No: 15107
ENGINEER: Gourdie-Fraser

You are directed to make the following changes in the Contract Documents:

Description: Paint and Restoration Deductions

Reason for Change Order: Final Balancing

Attachments: See breakdown on Page 2

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
Original Contract Price: **$194,050.00**	Original Contract Times: Substantial Completion: ______ Ready for Final Payment: ______ (days or dates)
Net Increase (Decrease) from Previous: Change Orders ______ To ______	Contract Times prior to this Change Order: Substantial Completion: ______ Ready for Final Payment: ______ (days or dates)
Contract Price Prior to this Change Order: **$194,050.00**	Net Increase this Change Order: Substantial Completion: ______ Ready for Final Payment: ______ (days or dates)
Net ~~**Increase**~~ **(Decrease)** of this Change Order: **$3,316.00**	Contract Times with all Approved Change Orders: Substantial Completion: ______ Ready for Final Payment: ______ (days or dates)
Contract Price with all Approved Change Order: **$190,734.00**	

RECOMMENDED:	APPROVED:	ACCEPTED:
By:	By:	By:
ENGINEER (Authorized Signature)	OWNER (Authorized Signature)	CONTRACTOR (Authorized Signature
Date: 12-28-2016	Date:	Date:

CONTRACT CHANGE ORDER NO 2
(ATTACHMENT)

PROJECT: Sanitary Sewer Pump Station No. 3 Upgrades

CHANGE ORDER: #2

The following items summarize changes being made to the Contract Documents:

ITEM NO.	COMPLETE DESCRIPTION OF CHANGES	DECREASE CONTRACT	INCREASE CONTRACT
3	Valve Chamber Mechanical Improvements - Paint Deduction	$ 900.00	
8	Site Restoration - Deduct RotoRooter and Reaction Restoration Invoices for Lake Point Village Apartments (see attached)	$ 2,416.00	
	Total Decrease	$3,316.00	
	Net Decrease	**$3,316.00**	

The sum of **$3,316.00** is hereby deducted from the total Contract Price and the total adjusted Contract Price to date thereby is **$190,734.00** . The time provided for completion in the Contract is unchanged. This document shall become an amendment to the Contract and all provisions of the Contract will apply hereto.

Accepted by Contractor ____________ Date: 12/28/16

LETTER OF GUARANTEE

DATE: 12/3/16

PROJECT NO. 15107

OWNER: Charter Township of Garfield
3848 Veterans Drive
Traverse City, MI 49684

PROJECT: Sanitary Sewer Pump Station No. 3 Upgrades

Gentlemen:

As the Contractor for this Project, I hereby guarantee all materials and equipment furnished and all Work performed on this Project including any restoration Work necessary to be repaired or replaced.

With respect to this Project, to our personal knowledge, all payments have been made and there are no Liens on said system

This guarantee will remain in effect for a period of one (1) year from the date of Substantial ~~acceptance by the Municipality.~~ Completion, November 17, 2016

Signature:
(Contractor)

Title: Project Manager
(Please Print or Type)

Company Name:
Franklin Holwerda Company
(Please Print or Type)

Address:

ATTACHMENT 2

ATTACHMENT 3

Criticality of Asset *

Performance Rating	Description
5	Catastrophic disruption
4	Major disruption
3	Moderate disruption
2	Minor disruption
1	Insignificant disruption

* consider safety/social, economic/financial, environmental

Condition Assessment

Condition Rating	Description
5	Asset Unserviceable - Over 50% of asset requires replacement
4	Significant deterioration - significant renewal/upgrade required (20 -40%)
3	Moderate deterioration - Significant maintenance required (10 -20%)
2	Minor Deterioration - Minor maintenance required (5%)
1	New or Excellent Condition - Only normal maintenance required

Probability of Failure

Performance Rating	Description
5	Imminent - Likely to occur in the life of the item
4	Probable - Will occur several times in the life of an item
3	Occasional - Likely to occur some- time in the life of an item
2	Remote - Unlikely but possible to occur in the life of an item
1	Improbable - So unlikely, it can be assumed occurrence may not be experienced

ATTACHMENT 4

GARFIELD TOWNSHIP SEWER USER CHARGE SYSTEM

This User Rate Methodology System was developed to satisfy the requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Asset Management and Wastewater Grant Program (SAW)

Basic Requirements of a User Rate Methodology System

1. The community must require that adequate revenues are collected for the operation, maintenance and replacement (OM & R) of the sewer system. Replacement generally refers to equipment which has a useful life of less than 20 years.

2. Each user must pay its proportionate share of the OM & R costs based on the user's proportionate share of the total sewer usage from all users. Flat rate user rates are not acceptable, except in cases where the community does not have water meters.

3. Each user must be notified at least annually, in conjunction with a regular bill, of the rate and that portion of the user rate which is attributable to the OM & R cost for the system (i.e. debt retirement, if any, must be separate).

4. The user rate must be reviewed at least annually to ensure that it is accurate. This must be done for the life of the project.

5. The community must have an accurate record of revenues and expenditures for the wastewater treatment works, which must be kept separate from other utility budgets such as water, streets, etc.

6. The user rate must be enforceable; also, if there are other communities which are on the wastewater treatment system, those communities must also have a user rate system and it also must be enforceable.

7. The community must require that each user which discharges pollutants that cause an increase in the cost of managing the effluent or sludge from the treatment works shall pay for such increased cost.

8. The user rate must take precedence over any terms or conditions of agreement of contracts which are inconsistent with the requirements of Section 204(b)(1)(A) of the Act.

GENERAL INFORMATION

The Charter Township of Garfield is in Grand Traverse County in Northern Michigan. The Wastewater Treatment Plant is in the City of Traverse City. Garfield Township, along with the City of Traverse City and the Townships of Acme, Blair, East Bay, Peninsula, and Elmwood all send flows into this one facility for treatment. Each of these municipalities are parties to a Master Sewer Agreement which defines the allocation of costs and establishes certain rights and responsibilities with respect to the Wastewater Treatment Plant. There is currently one (1) bond issue for upgrades and improvements to the Plant that are backed by Grand Traverse County. The City of Traverse City is the exclusive manager of the Treatment Plant for the benefit of itself and the Townships. The facility services users with a total flow at the plant of 1.9 billion gallons per year. Garfield Township accounts for just over 24% of the total flow.

SANITARY SEWER OPERATING EXPENDITURES

The following table sets forth the operations and maintenance requirements of the Township's sewer system for 2020.

Wages & Benefits	$ 316,428
Office Expense	$ 92,227
Equipment Repair and Maintenance	$ 19,355
Sewer System Maint. & Supplies	$ 75,588
Utilities	$ 40,410
Contractual Services	$ 62,605
Equipment Purchase	$ 41,400
System Insurance	$ 11,290
Sewer Sys. Disposal (to the City)	$1,336,443
Total	**$1,995,746**

EQUIPMENT REPLACEMENT EXPENSE

The following table identifies the equipment items that are a part of the sewer collection system that require periodic replacement. Because the life cycle and cost of these items vary considerably, an annualized replacement expense of $32,900 has been developed. This methodology permits the ability to acquire replacement items as needed despite the outlay differential that occurs from year to year.

Garfield Sewer Replacement Reserve

Item	Quantity	Estimated Life (years)	Replacement Value	Annual Replacement Amount
Garfield #1 (Premier) - Pumps	2	25	$45,000	$3,600
Garfield #2 (Logan's Landing) - Pumps	2	25	$35,000	$2,800
Garfield #3 (Lakepointe Village) - Pumps	2	25	$15,000	$1,200
Garfield #4 (Hammond Place) - Pumps	2	25	$20,000	$1,600
Garfield #5 (South Airport) - Pumps	2	25	$15,000	$1,200
Garfield #6 (Applebee's) - Pumps	2	25	$20,000	$1,600
Garfield #7 (Heidbreder) - Pumps	2	25	$15,000	$1,200
Garfield #8 (Heritage) - Pumps	2	25	$12,500	$1,000
Garfield #9 (Traverse Field) - Pumps	2	25	$12,500	$1,000
Garfield #10 (Crown Drive) - Pumps	2	25	$15,000	$1,200
Garfield #11 (US 31 South) - Pumps	2	25	$12,500	$1,000
Garfield #12 (Hammond Road) - Pumps	2	20	$20,000	$2,000
Generators	3	30	$45,000	$4,500
Telemetering	12	10	$7,500	$9,000
Total Replacement Cost				$32,900

TOTAL OPERATION, MAINTENANCE AND REPLACEMENT EXPENSE

The total annual cost of operation, maintenance and equipment replacement is determined as follows:

Operating Expenses	$ 564,360
Wastewater Treatment	$ 1,336,443
Maintenance Expenses	$ 94,943
Replacement Expenses	$ 32,900
Total OM & R	**$ 2,028,646**

BASIS FOR USAGE CHARGES

Usage rates are based on a monthly fee per REU (residential equivalent unit). The sewer use rate is based on the number of REU's assigned to each user as established in Table 1 (Schedule of Residential Equivalents) of the Sewer Rate Ordinance, with a minimum charge of one REU per customer. Currently the Township has 11,385 sewer REU's. This method of cost recovery establishes known monthly revenue for the sanitary sewer system for operation and maintenance and replacement (including capital) costs and revenue based on projected use per REU. This method provides a stable, predictable revenue stream and an equitable, proven distribution of sanitary sewer system cost.

Garfield also utilizes a sewer metered rate for (12) twelve large volume users as determined by the Township Board. These users account for 1,080 REU's of the total amount of 11,385 mentioned above. The metered use charge is based upon flow at a rate of $2.55 per 1,000 gallons. The minimum flow charged to these metered customers is 149,600 gals (20,000 cu.ft.) per month ($381.48).

Projected billable sewer flows for the current year are as follows:

Annual flows over the minimum allotted amount of 149,600 gallons per month:	58,487,197 gals
Minimum flows charged to users (whether they use it or not) per year:	21,542,400 gals
	38,237,600 gals

CALCULATION OF USER RATES

Operation, Maintenance and Replacement

The total operation, maintenance and replacement cost of the sewer system to be recovered is $2,028,646. Miscellaneous operating revenue is approximately $ 437,000 per year leaving a balance of $1,591,646. This amount will be generated based on flat rate billing and metered flow as follows:

	REU's		Rate		Revenue
Flat Rate per REU:	11,385	x	$20.90	x12 mo. =	$2,855,358
Charge for Metered Customers:					
Minimum Charges: $381.48 x 12 x 12 mo. =					$ 53,922
Over Minimum: 58,487,197 x $2.55/1,000 =					$ 149,142
Total Revenue from Usage Rates:					$3,058,422

Amounts more than the cost of operation, maintenance and replacement will be applied to debt service on bonds and other capital improvement needs of the sewer system.

CAPITAL OUTLAY AND DEBT RETIREMENT

A review of the sewer collection system capital improvement needs prepared by the Township's consulting engineer indicates that an investment of approximately $ 1.1 million is required to address present sewer system needs. In terms of annual cost this represents an outlay of approximately $71,000 per year over the amortization period.

Garfield's share of the wastewater treatment plant debt and other existing sewer system debt that is not already supported by special assessments totals an estimated annual cost of $605,000.

SUMMARY OF EXPENSES AND REVENUES

Revenues:	User Charge for REU's	$ 2,855,358
	Metered Use Charges	$ 203,064
	Miscellaneous Revenues	$ 437,000
	Total Annual	$ 3,495,422
Expenses:	Operation, Maint. & Replacement	$ 2,028,646
	Existing Debt	$ 605,000
	New Capital Improvements	$ 71,000
	Total Annual	$ 2,704,646

Estimated Annual Balance: $ 790,776

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

EGLE
LIESL EICHLER CLARK
DIRECTOR

November 5, 2019

Mr. Chuck Korn, Supervisor
Charter Township of Garfield
3848 Veterans Drive
Traverse City, Michigan 49684

Dear Mr. Korn:

SUBJECT: Stormwater, Asset Management, and Wastewater (SAW) Grant Program
Charter Township of Garfield
Planning, Design Engineering and Wastewater Asset Management Plan
SAW Grant Project Number 1388-01

We have reviewed the information contained in the rate methodology dated September 3, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404, or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Mr. Clarence Jones, EGLE

CONSTITUTION HALL • 525 WEST ALLEGAN STREET • P.O. BOX 30473 • LANSING, MICHIGAN 48909-7973
Michigan.gov/EGLE • 800-662-9278

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Norway *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1400-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: October 7, 2019.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Ray D. Anderson, City Manager	at	906-563-9961	citymanager@norwaymi.gov

Ray D Anderson   12/31/19
Signature of Authorized Representative (Original Signature Required)   Date

Ray D. Anderson, City Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date: December 31, 2019
(no later than 3 years from executed grant date)

The City of Norway *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1400-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Ray Anderson, City Manager	at	906-563-9961	citymanager@norwaymi.gov
Name		Phone Number	Email

Ray D Anderson 12/31/19
Signature of Authorized Representative (Original Signature Required) Date

Ray D. Anderson, City Manager
Print Name and Title of Authorized Representative

City of Norway
915 Main Street
Norway, MI 49870
https://www.norwaymi.gov/

Mr. Ray Anderson, City Manager
Phone: 906-563-9961

SAW Grant Project No. 1400-01

Executive Summary

The City of Norway (City) received $66,684 in funding through the Michigan SAW grant program in December of 2016 to develop an Asset Management Plan for their storm sewer system.

An Asset Management Plan is a long-range planning document used to provide a rational framework for understanding and documenting City-owned assets, service levels, risks and financial investments. The intent of asset management is to ensure the long-term sustainability of the City. By assisting the City to make better decisions when to repair, replace or rehabilitate particular assets and by developing a long-term funding strategy, the City can ensure its ability to deliver the required level of service perpetually.

The major components of the Asset Management Plan include the following:

- Asset Inventory and Condition Assessment
- Level of Service
- Criticality (Consequence of Failure) of Assets
- Operation and Maintenance Strategies/Revenue Structure
- Long-term Funding/Capital Improvement Plan

Storm Sewer Asset Inventory

The City storm sewer system components consist of the following:

- Storm Sewer Pipe
- Catch Basins
- Manholes

The collection system assets were GPS located in the field and their location inserted on an aerial map to show the asset location in relation to easily referenced locations. Component specific information such as size, elevation, year constructed, material, condition rating, notes, etc. is located within the GIS system as well as in Excel spreadsheet format. Information modified or updated within the GIS system is readily available by users.

Condition Assessment

The storm sewer system asset condition was measured by the following ranking system:

Condition Rating	Description
5	Unserviceable
4	Significant Deterioration
3	Moderate Deterioration
2	Minor Deterioration
1	New or Excellent Condition

The assessed condition rating of City storm sewer pipe within the system ranges from 1 to 4. The weighted average condition rating of the storm sewer system pipe is 2.5, indicating minor to moderate deterioration of storm sewer pipe. The condition is based primarily on assumed condition. Assumed condition is based on other pipes with similar material, age and underground conditions.

The storm sewer manholes were inspected by manhole inspectors certified under the Pipeline Assessment Certification Program (PACP) and the Manhole Assessment and Certification Program (MACP) by the National Association of Sewer Service Companies (NASSCO). Each of the manhole components were given a rating of 1 to 5 using the ranking system noted above. An overall rating was given to the manhole based on the worst rating of the components evaluated. The storm sewer manholes within the collection system ranged from 2 to 4, with an average condition rating of 2.9. This indicates an overall condition between minor deterioration and moderate deterioration.

The storm sewer catch basins within the collection system ranged from 2 to 4, with an average condition rating of 3. This indicates an overall condition of moderate deterioration.

Level of Service Determination

Level of service defines the way in which the utility owners, managers and operators want the utility to perform over the long-term. The level of service includes technical, managerial and financial components. The level of service is a fundamental part of how the utility is operated.

The level of service needs to be evaluated and adjusted with time to match system performance, funding and changes in regulations.

The City's level of service statement is as follows:

- Comply with all State and Federal regulatory requirements at all times.
- Provide for the health and safety of all employees and customers.
- Provide for staff to attend workshops that will educate and present grant opportunities available to the City.
- Customers will receive written notice 24 hours in advance of any planned work that will affect service or access.
- Keep spare components and repair materials available at all times for critical assets.
- Respond to customer complaints within 24 hours of receipt 95% of the time.
- Track customer complaints and locations to identify trouble spots.

Criticality (Consequence of Failure) of Assets

To determine the consequence of failure, all possible costs must be considered. These costs include: cost of repair, social cost associated with loss of the asset, repair/replacement costs related to collateral damage caused by the failure, legal costs related to additional damage caused by failure, environmental costs created by the failure, loss of business revenue to the community and other associated costs or asset losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with failure.

Consequence of failure levels found in the table below shows the ranking system used for the consequence of failure. The description shown for each consequence will be a best fit of one of the items noted. Not all of the description items need to apply.

Consequence	Level	Description
Catastrophic disruption	5	Massive failure, severe health affect, or persistent and extensive damage
Major disruption	4	Major effect, major loss of system capacity, major health effects, major costs or important level of service compromised
Moderate disruption	3	Moderate effect, moderate loss of system capacity, moderate health effects or moderate costs, but important level of service still achieved
Minor disruption	2	Minor effect, minor loss of system capacity, minor health effects or minor costs
Insignificant disruption	1	Slight effect, slight loss of system capacity or slight health effects

Assessing business risk requires examination of the probability of failure, the consequence of the failure and redundancy. The assets that have the greatest probability of failure and the greatest consequences associated with the failure will be the assets that have the most business risk. An analysis of different assets will reveal which asset has the highest business risk and, therefore, which asset will require the most attention for either repair or replacement.

Business risk is the multiplication of the Probability of Failure number to the Consequence of Failure number. The resulting number provides a numeric value to business risk. Typically, an asset falling in the range of 1 to 8 would be considered low risk. An asset falling in the business risk range of 9 to 16 will be medium risk. An asset above 16 would be considered high risk.

A summary of business risk for each of the asset groups is shown in the table below:

	Risk Level		
Asset Group	Low Risk	Medium Risk	High Risk
Pipe	83.3%	16.7%	-
Catch Basins	82.6%	17.4%	-
Manholes	51.9%	48.1%	-
Storm Sewer System	**81.1%**	**18.9%**	**-**

As can be seen in the table, none of the system contains any asset components that are considered high risk, with the majority of the system in the low risk category.

Revenue Structure

In order to provide for long-term sustainability of the storm sewer system, a viable funding structure must be developed. City funding must be structured to provide adequate income to cover operation, maintenance, replacement, capital improvement projects and debt costs.

All maintenance, repairs and replacement of components of the storm sewer system is completed within the Department of Public Works. As such, no separate assessment, user fee or specific fund is setup for maintenance, repairs or replacement of only the storm sewer system. All work associated with the storm sewer system is considered part of the City streets.

Typically, when storm sewer components are replaced, it is completed in conjunction with a road project or sanitary sewer separation project and road funds or sanitary sewer funds are used to pay for storm sewer system work. The storm sewer system is essentially treated as a component of the roadway and follows that same funding mechanism as a road. Money needed for storm sewer system repair, rehabilitation or replacement is budgeted in the local streets fund or major streets fund and typically is derived from taxes levied by the City.

Funding of storm sewer replacement projects may also come from MDOT Local Agency Program for local streets. These projects are typically 80% funded by MDOT and 20% by the City.

Capital Improvement Plan

The City currently has no plans for storm sewer capital improvement projects.

List of Major Assets

The City’s storm sewer system major assets consist of the following:

- Storm Sewer Pipe Total: 42,276 Feet
- Storm Sewer Catch Basins: 421
- Storm Sewer Manholes: 86

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Norway *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1400-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: October 7, 2019.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ray D. Anderson, City Manager	at	906-563-9961	citymanager@norwaymi.gov
Name		Phone Number	Email

Ray D Anderson 12/31/19

Signature of Authorized Representative (Original Signature Required) Date

Ray D. Anderson, City Manager

Print Name and Title of Authorized Representative

Stormwater Asset Management and Wastewater (SAW)
Sanitary Sewer System Asset Management Plan Summary

City of Norway
915 Main Street
Norway, MI 49870
https://www.norwaymi.gov/

Mr. Ray Anderson, City Manager
Phone: 906-563-9961

SAW Grant Project No. 1400-01

Executive Summary

The City of Norway (City) received $523,058 in funding through the Michigan SAW grant program in December of 2016 to develop an Asset Management Plan for their sanitary sewer system.

An Asset Management Plan is a long-range planning document used to provide a rational framework for understanding and documenting City-owned assets, service levels, risks and financial investments. The intent of asset management is to ensure the long-term sustainability of the City. By assisting the City to make better decisions when to repair, replace or rehabilitate particular assets and by developing a long-term funding strategy, the City can ensure its ability to deliver the required level of service perpetually.

The major components of the Asset Management Plan include the following:

- Asset Inventory and Condition Assessment
- Level of Service
- Criticality (Consequence of Failure) of Assets
- Operation and Maintenance Strategies/Revenue Structure
- Long-term Funding/Capital Improvement Plan

Wastewater Asset Inventory

The City wastewater system components consist of the following:

- Collection System (force mains, gravity pipes, manholes)
- Collection System Mechanical (lift stations, CSO Facility)
- Wastewater Treatment Facility (WWTF)
- Mobile Assets

The collection system assets were GPS located in the field and their location inserted on an aerial map to show the asset location in relation to easily referenced locations. Component specific information such as size, elevation, year constructed, material, condition rating, notes, etc. is located within the GIS system as well as in Excel spreadsheet format. Information modified or updated within the GIS system is readily available by users.

Asset components, such as lift station components, WWTF asset components and mobile assets are located in Excel spreadsheets that are readily updated by the City.

Condition Assessment

The sanitary sewer system asset condition was measured by the following ranking system:

Condition Rating	Description
5	Unserviceable
4	Significant Deterioration
3	Moderate Deterioration
2	Minor Deterioration
1	New or Excellent Condition

The condition of the sanitary sewer gravity pipe is based on televising, smoke testing, flow metering and assumed condition. The assessed condition rating of City sanitary sewer gravity pipe, within the collection system, ranges from 1 to 5. The weighted average condition rating of the collection system gravity pipe is 2.8, indicating minor to moderate deterioration of sanitary sewer gravity pipe within the collection system.

The condition rating of sanitary sewer force main, within the collection system, is assumed to have a condition rating of either 2 or 3, indicating minor to moderate deterioration. Since televising of the force main and material testing of sections of force main is outside the scope of the project, assumptions were made regarding the condition of the force main based on material and age.

The sanitary sewer manholes were inspected by manhole inspectors certified under the Pipeline Assessment Certification Program (PACP) and the Manhole Assessment and Certification Program (MACP) by the National Association of Sewer Service Companies (NASSCO). Each of the manhole components were given a rating of 1 to 5 using the ranking system noted above. An overall rating was given to the manhole based on the worst rating of the components evaluated. The sanitary sewer manholes within the collection system ranged from 2 to 4, with an average condition rating of 3. This indicates an overall condition of moderate deterioration.

Sanitary system mechanical condition was ranked by individual components rather than as a whole since individual components are replaced or reconditioned at different timeframes. A spreadsheet listing the individual component ratings is included in the report. The weighted condition rating of the lift station assets is 2.6 indicating minor to moderate deterioration. The weighted condition rating of the CSO Facility assets is 3.0 indicating moderate deterioration.

WWTF condition was ranked by individual components rather than the WWTF as a whole since individual components are replaced or reconditioned at different timeframes. A spreadsheet listing the individual component ratings is included in the report. The condition rating and business risk was used to determine the repair, replacement and capital improvement projects. The weighted condition rating of the WWTF assets is 1.5 indicating new to minor deterioration.

A spreadsheet listing the individual component ratings of the mobile assets is included in the report. The weighted condition rating of the mobile assets is 2.8 indicating minor to moderate deterioration.

Level of Service Determination

Level of service defines the way in which the utility owners, managers and operators want the utility to perform over the long-term. The level of service includes technical, managerial and financial components. The level of service is a fundamental part of how the utility is operated.

The level of service needs to be evaluated and adjusted with time to match system performance, funding, and changes in regulations.

The City’s level of service statement is as follows:

- Comply with all State and Federal regulatory requirements at all times.
- Maintain proper operator certification.
- Provide for the health and safety of all employees and customers.

- Provide for regular operator training to be made aware of new regulations, take advantage of advances in new technology and system troubleshooting.
- Provide for staff to attend workshops that will educate and present grant opportunities available to the City.
- Customers will receive written notice 24 hours in advance of any planned work that will affect service or access.
- Keep spare pumps and parts available at all times for critical assets.
- Respond to customer complaints within 24 hours of receipt 95% of the time.
- Track customer complaints and locations to identify trouble spots.
- Rates will be reviewed and raised on an annual basis to keep rates in line with inflation and to avoid steady declines in revenue followed by massive rate increases.
- Identify areas of high infiltration and inflow (I&I) on a yearly basis by evaluating lift station data, flow monitoring, and/or televising. Follow-up with projects to reduce I&I.

Criticality (Consequence of Failure) of Assets

To determine the consequence of failure, all possible costs must be considered. These costs include: cost of repair, social cost associated with loss of the asset, repair/replacement costs related to collateral damage caused by the failure, legal costs related to additional damage caused by failure, environmental costs created by the failure, loss of business revenue to the community, and other associated costs or asset losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with failure.

Consequence of failure levels found in the table below shows the ranking system used for the consequence of failure. The description shown for each consequence will be a best fit of one of the items noted. Not all of the description items need to apply.

Consequence	Level	Description
Catastrophic disruption	5	Massive failure, severe health affect, or persistent and extensive damage
Major disruption	4	Major effect, major loss of system capacity, major health effects, major costs or important level of service compromised
Moderate disruption	3	Moderate effect, moderate loss of system capacity, moderate health effects or moderate costs, but important level of service still achieved
Minor disruption	2	Minor effect, minor loss of system capacity, minor health effects or minor costs
Insignificant disruption	1	Slight effect, slight loss of system capacity or slight health effects

Assessing business risk requires examination of the probability of failure, the consequence of the failure and redundancy. The assets that have the greatest probability of failure and the greatest consequences associated with the failure will be the assets that have the most business risk. An analysis of different assets will reveal which asset has the highest business risk and, therefore, which asset will require the most attention for either repair or replacement.

Business risk is the multiplication of the Probability of Failure number to the Consequence of Failure number and to the Redundancy Factor. The resulting number provides a numeric value to business risk. Typically, an asset falling in the range of 1 to 8 would be considered low risk. An asset falling in the business risk range of 9 to 16 will be medium risk. An asset above 16 would be considered high risk.

A summary of business risk for each of the asset groups is shown in the table below:

	Risk Level		
Asset Group	Low Risk	Medium Risk	High Risk
Gravity Pipe	70.9%	28.2%	0.9%
Force Main	27.1%	72.9%	-
Manholes	71.3%	27.2%	1.5%
Lift Stations	96.6%	3.4%	-
CSO Facility	54.8%	45.2%	-
WWTF	75.9%	24.1%	-
Mobile Assets	100.0%	-	-
Sanitary Sewer System	71.1%	28.1%	0.8%

As can be seen in the table, the majority of the sanitary sewer system in the low risk category.

Revenue Structure

A funding projection worksheet was developed to evaluate current and future projections based on operating income, operating expenses, non-operating income, non-operating expenses (including principal and interest payments, bond reserve payments and restricted fund payments), planned project dedicated fund expenditures and existing fund balances.

It was determined that the current rate structure does not provide sufficient funds to cover operation, maintenance, replacement and debt costs. While the City's sewer fund is currently showing a negative net cash flow, the City has reduced operating expenses to reduce the funding gap by 58%. The asset management plan recommends that the City increase rate income by a minimum of 10% effective with the 2020-2021 fiscal year, followed by 5% rate increases for a minimum of five years. After five years, rates should be reviewed on a yearly basis to verify adequacy and be increased by the inflation rate at a minimum. Rate increases proposed in the asset management plan are projected to produce a positive net cash flow for the 2020-2021 fiscal year. With the changes incorporated in the asset management plan and with scheduled yearly review and revision of the asset management plan, the future financial condition will ensure long-term stability of the City.

Capital Improvement Plan

The following capital improvement projects are planned for years 0-5:

Project	**Planned Project Year**	**Estimated Replacement Cost**	**Funding Source**
WWTF Upgrade Project	2020-2021	$50,000	RD RR&I Fund
Sewer Separation – Prospect Street	2021-2022	$10,000	Capital Pipe Fund
Sewer Separation – Fifth Avenue	2022-2023	$20,000	Capital Pipe Fund
Sewer Separation – Third Avenue	2023-2024	$30,000	Capital Pipe Fund
Lift Station No. 5 Project	2024-2025	$250,000	Capital Impr. Fund

* Estimated replacement cost is calculated for the current year and does not reflect the year of construction cost.

The following capital improvement projects are planned for years 6-20:

Project	Estimated Replacement Cost	Funding Source
Fifth Avenue (MH 11199 – MH 11201)	$40,000	Capital Pipe Fund
Easement Twelfth Ave. to Central Ave. (MH 1379 – MH 1380)	$60,000	Capital Pipe Fund
Alley between Saginaw St. & Brown St. (MH 1467 – MH 1468)	$70,000	Capital Pipe Fund
Chestnut St. (MH 3198 – MH 3200) & Fifth Ave. (MH 3198 – MH 8015 & MH 8015 – MH 9007)	$130,000	Capital Impr. Fund
Norway St. (MH 1369 – MH 1334)	$70,000	Capital Impr. Fund
Easement Brandt St. to Alley (MH 9051 – MH 1657)	$75,000	Capital Pipe Fund

* Estimated replacement cost is calculated for the current year and does not reflect the year of construction cost.

Projects are dependent on increased rates to fund Capital Pipe Replacement Fund (projects constructed with City labor) and Capital Improvement Fund (projects constructed with contracted labor).

<u>List of Major Assets</u>

The City's sanitary sewer system major assets consist of the following:

- Sanitary Sewer Gravity Pipe: 147,189 Feet
- Sanitary Sewer Force main: 11,012 Feet
- Sanitary Sewer Manholes: 646
- Lift Stations: Seven
- CSO Facility: One
- Wastewater Treatment Facility: 0.28 MGD Extended Aeration Facility

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Grand Rapids *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1403-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Michael Staal Name	at	616-456-3635 Phone Number	mstaal@grcity.us Email

1/26/20

Signature of Authorized Representative (Original Signature Required) Date

Mark Washington - City Manager

Print Name and Title of Authorized Representative

June 2014

CITY OF GRAND RAPIDS
300 MONROE AVE NW
GRAND RAPIDS, MI 49504
WWW.GRANDRAPIDSMI.GOV
ATTN: MICHAEL STAAL, P.E.
616-456-3635
SAW GRANT #1403-01
DECEMBER 2019

STORMWATER ASSET MANAGEMENT PLAN EXECUTIVE SUMMARY

1. EXECUTIVE SUMMARY

A 20-year citywide asset management plan was developed for the public stormwater infrastructure system. The plan demonstrates how the City's goal of establishing and delivering certain levels of service may be achieved through effective and sustainable management of the stormwater system. By developing a proactive long-term plan for stormwater asset management, the City will have a sustainable system ensuring the well-being of the community, environment and future generations.

This Asset Management Plan was provided as part of the Stormwater, Asset Management, and Wastewater (SAW) Grant requirements from the Michigan Department of Environment, Great Lakes, and Energy to the City of Grand Rapids. The SAW Grant provided $2 Million in grant funding with the City of Grand Rapids providing $695,361 in matching funds.

The general scope of the asset management plan consists of three major items:

- Assessment of the existing stormwater assets
- Evaluation of levels of service the stormwater asset will meet
- Summary of efforts necessary to meet the desired level of service

Following the completion of these items, a Capital Improvement Plan was developed which provides an additional level of detail for projects and activities required to meet the level of service identified in this report.

The current value of the stormwater drainage system is estimated at $523 million. Ninety-five percent (95%) of the current investment in the drainage system is represented by the separate storm sewers, manholes and catch basins. The remaining five percent (5%) is attributable to the pump stations, force mains, siphons, culverts, ditches, basins and green infrastructure components. Table 1-1 summarizes the quantity and baseline costs of each stormwater asset. Open channels, while utilized as part of the stormwater system, are primary natural watercourses and no original construction costs were available to assign a baseline cost. Baseline future system values for open channels and ditches were based on a proposed operation and maintenance program.

Table 1-1 Asset Summary and Cost

System Component	Quantity (unit)	Baseline System Value (Current Cost)	Baseline Future System Value (Replacement Cost at Failure)
Gravity Mains	2,030,660 feet	$365,757,000	$933,842,000
Manholes	10,748 each	$39,051,000	$105,349,000
Laterals	514,583 feet	$43,065,000	$113,942,000
Catch Basins	17,054 each	$55,910,000	$136,594,000
Pressurized Mains	664 feet	$131,000	$505,000
Siphons	339 feet	$250,000	$618,000
Culverts	3,600 feet	$1,649,000	$3,530,000
Outfalls	356 each	$1,669,000	$3,530,000
Open Channels	39.63 miles	NA	$2,570,000
Ditches	72 miles	$5,703,000	$1,223,000
Detention Basins	5 each	$1,725,000	$4,614,000
Pump Stations	11 each	$12,051,000	$26,236,000
Green Infrastructure	13 each	$1,842,000	$8,451,000
Total		**$528,803,000**	**$1,341,004,000**

NA = Not Available

The evaluation of risk and consequence of failure is primarily based on the age of the asset due to limited information. The intent is to transition the model from an age-based system to a condition-based system as additional investigation and assessment information is collected.

A major factor in the quality of community life is the quality of the community's facilities, services and amenities. Level of service is a measure of the amount and/or quality of the public facility which must be provided to meet that community's basic needs and expectations. Three levels of service (LOS) beyond the existing operating procedures were analyzed. Each LOS is defined by criteria established for each asset group found in the system and are briefly summarized below in Section 4.

These criteria are based on standardized best practices that were established by other municipalities, and were designed to meet regulatory requirements, goals for renewal, and operations and maintenance. Table 1-2 summarizes the annual funding requirements necessary to meet each level of service.

Table 1-2 Level of Service Funding Requirements

Level of Service	Annual Funding Requirement
A	$22,868,000
B	$14,726,000
C	$10,377,000
Existing	$3,597,000

A 20-year capital improvement plan was developed using an assumed Level of Service B annual funding. The capital plan provides recommendations of priority areas where the funding should be spent on stormwater infrastructure over the next 20 years. The priority areas are based on a risk exposure analysis.

Capital stormwater expenditures were aligned with planned spending by other City departments in order to maximize the City's investment dollars.

2. ASSET INVENTORY

SYSTEM COMPONENTS

This asset plan is focused on the separate stormwater drainage system which is used to manage the stormwater runoff that occurs as a result of rain and snow. The drainage system is comprised of both conveyance and storage components and includes:

- Pipes – gravity sewers and service laterals connecting to the catch basin inlets
- Structures
    - inlets such as catch basins which collect water from surface features (for example, roads and parking lots) and convey it to an underground drainage system
    - outlets which are located at points where the underground drainage system discharges to open channels or other waterbodies and commonly include flared end sections, grates, and gates
    - junction chambers, such as manholes, which connect various parts of the underground drainage system together
- Culverts and bridges connecting open channel sections typically under roadways
- Open channels and roadside ditches
- Storage basins including detention and retention basins
- Pump stations
- Green infrastructure practices such as bioretention, pervious pavement, and water harvesting systems

This stormwater asset management plan does not address riverine flood control components or issues. Assets commonly associated with river flood control include floodwalls, berms, levees, dams, and backflow preventers.

Base Information

Base information associated with each asset was populated from the GIS. Base information includes the asset type; physical characteristics such as size, material, and depth; installation date; and proximity information to other assets.

Incomplete Attribute Information

Assets with missing attribute information were populated based on assumptions. Where possible, information was assumed from adjacent resources. In situations where adjacent resource information was not available, attributes were assumed as follows:

- Material information was assumed for sewers by determining the date where most storm sewers changed from clay to concrete. Sewers installed prior to this date were assumed to be clay, and those installed after this date were assumed to be concrete. Concrete as a pipe material was also assumed for pipes greater than 42-inches in diameter. A similar process was completed for manholes and catch basins.
- Sewers with no diameter listed were spot-checked and generally found to be collector sewers. The majority of collector sewers were found to be 12-inch diameter. Therefore, sewers missing the

diameter attributes were assumed to be 12-inches. These assumptions were checked for consistency with adjacent sewers, and corrections were made where appropriate. All laterals with no diameter were assumed to be 12-inch.

- Relative depth information was sparse, as most manholes had no measure down, and no surveyed rim elevation. Some assets had an upstream and downstream invert, but no rim elevation to relate a depth. To maintain consistency with other asset groups, the depth was broken down into shallow, medium, and deep groups. Shallow was classified as 0 to 8 feet deep and was applied to all pipes 36-inches in diameter and less. Medium was classified as 8 to 15 feet deep and was applied to all pipes greater than 36-inches and up to 72-inches in diameter. Deep was classified as greater than 15 feet deep and was applied to pipes 72-inches in diameter and above. Manholes were then assigned a depth based on the connecting pipes. All catch basins and laterals were assumed to be shallow.

CONDITION ASSESSMENTS

Base Approach

A limited amount of condition assessments and investigations were conducted as a part of this project by both the City and the consultant. Assets investigated included manholes, sewers (as viewed through a zoom camera), open channels, stream crossings, storage basins, and pump stations. The information was used to develop condition assessment assumptions for the collection system. The condition assessment information was applied to the POF and COF evaluation factors.

Municipal Work Orders

The City has begun tracking maintenance calls and work orders in Cityworks®. Since this information is linked to specific assets in the GIS, selected information from Cityworks® may be read for use in the IO toolset. The data within the work order system was reviewed. The current dataset of information was too small and covered too many different categories to be of any significant use for this analysis. This could include creating a master list of common work orders and creating drop-down lists for staff to choose from to create consistency across the system.

Summary of Condition Assessments

Table 2-1 displays the summary of the condition assessments determined through this assessment management development.

Table 2-1 Summary of Condition Assessments

System Component	Percentage of Assets Exceeding EEL
Gravity Mains & Laterals	5%
Manholes	45.4%
Catch Basins	2.1%
Pressurized Mains	0%
Culverts	23%
Outfalls	10%
Open Channels	N/A
Ditches	N/A
Detention Basins	0%
Pump Stations	0%
Green Infrastructure	0%

3. CRITICALITY OF ASSETS

OVERVIEW

The asset management plan was developed in part by utilizing Infrastructure Optimization (IO) Toolset software developed by Woolpert, Inc. This toolset is an ESRI® ArcGIS extension package that leverages the City's GIS data. The IO toolset calculates a business risk exposure (BRE) for the various assets using probability of failure (POF) and consequence of failure (COF) factors established for the asset information. Determining critical components is one of the primary goals of asset management and toolset provides a consistent methodology for evaluating assets. A BRE also aids in predicting and prioritizing maintenance, rehabilitation and replacement activities. The BRE is expressed as follows:

Probability of Failure (POF) x Consequence of Failure (COF) x Redundancy Factor (R)
= Business Risk Exposure (BRE)

The redundancy factor (*R*) is set within the program based on the existing system conditions and is assumed to be equal to 1 for the majority of stormwater assets. Unique POF and COF factors are identified for each individual asset group utilizing attributes available in the GIS system. Each of these factors is assigned a weight with the sum of the weights equaling ten. These weighted factors are then used in calculating the rating. The factor weights for POF are based on the accuracy and level of confidence of the available data. The COF factors are based on characteristics relevant to the failure of an asset such as size and the proximity of the drainage asset to roads and buildings.

The first step was to review the data contained for each asset in the City's GIS database. A core piece of information needed to establish an asset in the system is the initial installation date, as discussed below under the effective life. The City populated the GIS with the install date based on record drawings and made assumptions where no records were available.

MAJOR VARIABLES

Estimated Effective Life

The installation date is used to track the percent consumed of an asset, defined as the age of the asset divided by the estimated effective life (EEL). The EEL is a user-defined value assigned to each asset based on the asset type and material of construction. The EEL for each type of asset was determined through review of existing data and based on manufacturer recommendations and other studies completed on the subject.

Adjustments may be made to the EEL on an individual asset based on available information. For example, most pipes are assumed to have an EEL of 100-years; if a 95-year old pipe is inspected and found to be in excellent condition, the EEL could be adjusted to 125-years. Preventive maintenance can also impact the EEL. If a sewer is lined with a material that has an EEL of 75-years, the new EEL of the sewer with the liner would be 75-years from the liner installation date.

Using the pipe installation date, the software calculates other information such as the Remaining Useful Life (RUL) and the Required Service Date. Table 3-1 provides the EEL assigned to various assets in the system.

Table 3-1 Estimated Effective Life for Various Assets

Asset	EEL (years)
Gravity Mains /Culverts (Concrete, Brick, Vitrified Clay, Ductile Iron)	100
Gravity Mains (HDPE, PVC, Truss Pipe)	75
Gravity Mains / Laterals /Culverts (Corrugated Metal)	65
Laterals (Concrete, Brick, Vitrified Clay, Ductile Iron)	50
Laterals (HDPE, PVC, Truss Pipe)	50
Pressurized Mains	75
Manholes (Brick and Concrete)	100
Catch Basins (Brick and Concrete)	50
Outfalls	75
Detention Basins - Open *	50
Infiltration Basins *	100
Pump Station – Pumps *	20
Pump Stations – Electrical *	50
Pump Stations – Mechanical *	50
Pump Stations – Structural *	50

*Asset type not in IO toolset

Some assets within the system have already reached or surpassed their EEL. In order to handle these assets within the toolset, the required service date was set to 2013. This reflects a current backlog of assets that have reached the end of their expected effective life and require assessment. Assessment of these assets should be given high priority. As condition assessments are performed, the EEL and required service dates should be adjusted accordingly.

Probability of Failure

The likelihood that an asset will fail is a function of various attributes such as the asset's condition, performance, reliability and maintenance history. Within the IO toolset attributes associated with the probability of failure are selected, assigned a numeric value, and assigned a weighting factor. Each of these factors is assigned a weight with the sum of the weights equaling ten. These weighted factors are then used in calculating the rating. The factor weights for POF are based on the accuracy and level of confidence of the available data. Table 3-2 provides a summary of the attributes, weights, and values assumed by asset types. Predominately the age, condition, and maintenance are used in the rating.

In some cases, a weight of zero is applied, for example with the force main condition. This is due to lack of information on the current condition.

Table 3-2 Probability of Failure Weights and Values by Asset Type

Attribute	Weights Linear System					Weights Structures			Values	
	Gravity Sewer	Lateral	Culvert	Force Main	Siphon	Manhole	Catch Basin	Outfall	Rating	Description
Percent Consumed	7.0	7.0	6.0	8.0	7.0	7.0	7.0	10.0	Age/EEL	Actual age divided by estimated effective life
Maintenance Condition	1.0	1.0	1.0	0.0	1.0	1.0	1.0	0.0	1	Excellent
									2	Good
									3	Fair
									4	Poor
									5	Failure Imminent
Structural Condition	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	1	Excellent
									2	Good
									3	Fair
									4	Poor
									5	Failure Imminent
Shape	NA	NA	1.0	NA	NA	NA	NA	NA	1	Box
									2	Round
									5	Elliptical
End Section	NA	NA	NA	NA	NA	NA	NA	0.0	0	No end section
									1	Has end section
Total	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		

NA = Not Applicable

Consequence of Failure

The COF is treated in a similar fashion as the POF. The COF is the financial or health and human safety cost resulting from asset failure. Examples of factors that might be associated with the COF include the proximity of the asset to critical facilities (e.g. hospitals), or the proximity to other infrastructure such as roads and buildings. The proximity to other infrastructure affects the COF due to the impact on repair costs (i.e. sewer pipes under roads cost more to fix than pipes under grassed fields). Within the IO toolset attributes associated with the COF are selected, assigned a numeric value, and assigned a weighting factor. The mathematics of how the weights and values are applied is the same as for the POF attributes. Table 3-3 lists the COF factors used below.

Table 3-3 List of COF Factors Used

Size	Depth	Proximity to Floodplains
Proximity to Environmental Hazards	Proximity to Buildings	Proximity to Roadways
Presence of Appurtenances	Destination	Location
Channel Bank Slope	Type of Stream/Open Channel	

CONTINUOUS IMPROVEMENT PROCESS

Use of the IO toolset is intended to be a continuous improvement process. As additional or updated inventory information becomes available, the data within the toolset is intended to be updated. As the scenarios within the IO toolset are rerun, they will continue to evolve along with the updated information.

Future Factors

For each asset, unique factors were selected for use in determining the POF and COF. Some of the factors were developed to rely on existing information, while others were created with the intent as placeholders for future data collection. Factors identified for future data collection were temporarily assigned a weight of zero until data is available. These potential factors were set up to encourage the collection of this data going forward. An example factor for future use is the maintenance condition of the force mains. No information was available at the time of the report on the condition of the force mains, hence a maintenance condition could not be applied. However, the condition should be included in the future. All of the factors are customizable and may be adjusted at any time. Future weighting factors are further discussed with each asset group description.

POF Based on Age versus Condition

Overall limited condition assessment information was available, which results in the POF being based principally on the age of the asset. In most asset management applications, once critical assets were identified, the age of the infrastructure is typically used to determine the order upon which to begin assessments. As the system is inspected and data is accumulated, the model should be converted to be based on the condition of the asset instead of the age. Managing assets based on their condition is a better long-term approach compared to managing based on age.

4. LEVEL OF SERVICE

A major factor in the quality of community life is the quality of the community's facilities, services and amenities. Level of service is a measure of the amount and/or quality of the public facility which must be provided to meet that community's basic needs and expectations.

The City is developing a Community Based Stormwater Program. The City, with the cooperation of the West Michigan Environmental Action Council (WMEAC), has developed a baseline for the existing level of service (LOS) offered by the City, and established the framework for proposed increased levels of service. Tetra Tech used the baseline condition and this framework to develop and expand three (3) different LOS for the stormwater system. The LOS recommended were based on a set of goals for the stormwater system which are summarized in the table below.

Table 4-1 Level of Service Goals

Community Outcomes	City Responsibility
Healthy natural resources. Rivers, streams and lakes.	Reducing volumes and pollutant loads in stormwater discharge.
Improved recreational opportunities for residents.	By reducing the impact of floods on housing, business and recreational areas.
A stronger economy.	Working with developers to provide cost effective stormwater solutions.
Making Grand Rapids even more attractive place to live.	Improving the operation, functionality, and usefulness of infrastructure and responding to concerns and problems as quickly as possible.

LEVEL OF SERVCE COMPONENTS

For the purposes of this asset management plan, various components are used in describing the level of service. These components include operation and maintenance activities of the various asset groups, system renewal of the asset groups, and other activities.

Operation and Maintenance

The operation and maintenance activities are further subdivided into the inspection, preventative maintenance, and corrective maintenance activities.

- Inspection. The initial assessment and ongoing inspection of the stormwater system are crucial components to implementing a comprehensive, sustainable O&M program. The initial assessment phase focuses on establishing a detailed inventory and assessment of the assets. In addition, reoccurring inspections are required to continue to evaluate the system.
- Preventative Maintenance. Preventative maintenance is work that is intended to extend the estimated service life through activities such as lining, root removals, sealing cracks and leaks, or installing pipe and manhole liners. Non-structural activities such as cleaning sediment and debris out of pipelines and cleaning out catch basin sumps can be identified as preventative maintenance as it improves the efficiency of operation.
- Corrective Maintenance. Corrective, or reactive, maintenance includes all repairs to correct defects or failures identified in the system during routine inspections. This may be the replacement of a failed pipe or structure, a point repair, or replacing a broken frame and cover on a structure. Anything shy of full replacement is intended to extend the service life of an asset and is considered corrective maintenance. Corrective maintenance is different from planned renewal, because there is no way to completely plan for all potential failures that may occur at any given time. Corrective maintenance costs were determined by identifying the assets that have already or will meet the end of their EEL during the inspection period and assuming that a percentage of those assets will fail over that timeframe.

System Renewal

System renewal addresses the replacement of an asset at the end of its estimated effective life. Table 3-1 identifies the assumed EEL. Various level of service categories assume that the EEL would be extended either through preventative or corrective maintenance activities. At some point, the system is assumed to be replaced. Average annual replacement costs are based on the total system replacement cost divided by the respective estimated effective lifespan of the individual assets.

Other Activities

Additional miscellaneous activities are included in the level of service categories and cost estimates. These include street sweeping, studies and planning projects, and regulatory and developmental compliance.

LEVEL OF SERVICE CATEGORIES

To achieve the goals above, levels of service were established that provide a reliable, responsive and sustainable stormwater system. The system must be capable of handling the current conditions and be able to grow and adapt to the changing needs.

Four levels of service are represented by increasing levels of annual spending requirements for the following basic services: capital/renewal projects, O&M, street sweeping, planning, regulatory compliance and development regulation. Below is a general description of each level of service.

- **Existing Level of Service.** This is the baseline level of service. The current funding level provides for minimum O&M activities and corrective action for only the most critically failed portions of the system. Capital funding is limited to work with other City department infrastructure projects and for assessments from the Kent County Drain Commissioner.
- **Level of Service A.** Assumes complete system replacement at the end of the assets estimated effective life (100-years for sewers and manholes); a 10-year cycle for full system assessment; corrective maintenance on 50 percent of assets currently beyond their effective life; preventative maintenance on 10 percent of inspected assets; and 30 percent of the capital investment is attributed to green infrastructure practices.
- **Level of Service B.** Assumes extending the effective life of infrastructure by 50 percent through rehabilitation methods before complete system replacement (125-years for sewers and manholes); a 10-year cycle for system assessment on infrastructure over 50-years old; corrective maintenance on 30 percent of assets currently beyond their effective life; preventative maintenance on 10 percent of inspected assets; and 20 percent of the capital investment is attributed to green infrastructure practices.
- **Level of Service C.** Assumes doubling the effective life of infrastructure through rehabilitation methods before complete system replacement (150-years for sewers and manholes); a 10-year cycle for system assessment on infrastructure over 75-years old; corrective maintenance on 15 percent of assets currently beyond their effective life; preventative maintenance on 10 percent of inspected assets; and 10 percent of the capital investment is attributed to green infrastructure practices.

5. SUSTAINABILITY

The City has charged their staff with adapting operations to become more sustainable with regards to natural and financial resources. The level of funding required to complete full system replacement is so large that a strategic, sustainable approach is required. With the City near full developmental capacity in most areas, and the existing stormwater infrastructure already exhibiting signs of strain, the City must adopt an approach that not only addresses inadequate and aging assets, but also moves towards stormwater reduction. To help meet goals of enhancing the quality of the natural environment, policies must promote improved stormwater quality.

Applying policies to provide incentive to homeowners and businesses to reduce the amount of discharge must be combined with high performing infrastructure. There are many acceptable techniques for replacing existing gray infrastructure with green infrastructure to both reduce the volume of stormwater runoff and improve the water quality discharged to the receiving waters. This will help achieve the triple bottom line for economic, social and environmental impact. This plan incorporates the benchmarks set in the sustainability plan in several ways, including:

ECONOMIC BENEFITS

- Reducing flow rates and eliminating the need for major capital improvements such as storage facilities and increases in pipe capacity.
- Proactive inspection and design policies coupled with effective O&M programs to reduce the number of emergency calls and allows for controlled approach to renewal.
- Increased implementation of green infrastructure best management practices leads to local job growth and talent attraction and retention.

SOCIAL BENEFITS

- Reduced runoff and a well-maintained system will reduce the occurrences of flooding and reduce complaints.
- Well planned, integrated capital improvement projects can minimize disruption to residents and businesses.
- Implementation of green infrastructure best management practices creates attractive, green public spaces, more trees, and cleaner streets.
- Improved local water quality helps maintain public health and safety and enhances recreational activities.

ENVIRONMENTAL BENEFITS

- Improved runoff quality can lead to higher water quality in surface waters.
- Reductions in stormwater runoff preserve and restore ecological habitats, biodiversity, and stream stability.

FUNDING

The funding guidelines below in Table 5-1 were adopted to meet Level of Service C. From 2016 to 2022, the funding would incrementally increase allowing for strategic steps towards Level of Service C to occur.

Table 5-1 Stormwater Investment Guidelines

Operations Sources	Level "C"	2016*	2017	2018	2019	2020	2021	2022
General Fund	1,276,000	601,597	713,998	826,398	938,799	1,051,199	1,163,600	1,276,000
Major Streets	525,000	294,179	332,650	371,120	409,590	448,060	486,530	525,000
Local Streets	975,000	546,333	617,778	689,222	760,667	832,111	903,556	975,000
Refuse (Street Sweeping)	1,020,000	985,714	991,429	997,143	1,002,857	1,008,571	1,014,286	1,020,000
Operations Total	**3,796,000**	**2,427,824**	**2,655,854**	**2,883,883**	**3,111,912**	**3,339,941**	**3,567,971**	**3,796,000**

Capital Sources								
Capital Reserve Fund	1,281,000	371,571	523,143	674,714	826,286	977,857	1,129,429	1,281,000
Green Infrastructure Street Capital	5,300,000	1,900,000	2,100,000	2,100,000	2,300,000	2,300,000	3,328,571	5,300,000
Capital Total	**6,581,000**	**2,271,571**	**2,623,143**	**2,774,714**	**3,126,286**	**3,277,857**	**4,458,000**	**6,581,000**
Investment Total	**10,377,000**	**4,699,396**	**5,278,996**	**5,658,597**	**6,238,198**	**6,617,799**	**8,025,971**	**10,377,000**

*All in 2013 dollars

During the time that the Stormwater Asset Management and Capital Improvement plan was being developed, the City was completing a Transformation Plan. The initiatives funded by the Transformation funds provided financial efficiencies that freed up money in the General Fund to step up stormwater funding per the above guidelines. In addition, the Vital Streets funding approved by voters in 2014 is the base for the funding noted as Green Infrastructure Street Capital above.

6. CAPITAL IMPROVEMENTS

INTRODUCTION

This section of the report identifies capital projects for assessment, design, and construction. A Level of Service B was selected as the baseline for developing projects and costs. Key differences between LOS B and existing operations include:

- Inspect all elements of the collection system including gravity mains, laterals, manholes, and catch basins over 50 years old within a 10-year period.
- Completion of a thorough inventory and inspection of all open channels and roadside ditches in the system, including culverts and outfalls found along each channel.
- Increased inspection and maintenance procedures for detention/retention basins, pump stations and green infrastructure.
- Implement a comprehensive system renewal program that repairs failed or failing infrastructure and includes systematic assessment and replacement or rehabilitation of aging assets.
- Emphasize low impact design and green infrastructure to assist in flow volume reduction and improvements to water quality

The activities were used to develop funding requirements to meet this level of service. Funding needed is summarized below in Table 6-1. The capital improvement plan was based on this cost, and activities and projects were selected to meet this level of annual spending.

Table 6-1 Projected Annual Cost Level of Service B Summary

Stormwater Activity	Annual Funding Requirement
Capital Renewal	$8,825,000
O&M	$3,651,000
Street Sweeping	$1,140,000
Planning	$600,000
Regulatory Compliance	$350,000
Development Regulation	$160,000

METHODOLOGY

Specific capital improvement projects were selected for the 20-year plan using various methods based on historical information, recent field investigations, and the results of the asset inventory and risk assessment. Three main categories of projects were identified, including:

- Capital projects initiated by other departments
- Previously identified stormwater projects
- Miscellaneous identified projects

Capital Projects for Other Utilities

The City had capital improvement projects scheduled through 2018. These already defined projects from the Streets, Sewage, and Water departments may overlap with potential stormwater improvement projects. Performing road, sewer, and water projects together may benefit the City by providing engineering and construction cost savings. Completing all needed improvements in an area also helps avoid issues such as a sewer failure beneath a recently resurfaced road.

Project Evaluation

The City has identified 307 proposed capital improvement projects through 2018. These projects were reviewed to determine if there were adjacent stormwater assets that may need renewal based on the EEL. This evaluation resulted in 44 projects likely requiring stormwater improvements. Planning level cost estimates were based on the renewal strategy discussed.

7. RECOMMENDATIONS

Asset management is a continuous improvement process. As stormwater assets are added or modified and as additional information is obtained, the City's GIS and IO Toolset should be updated. Maintaining up-to-date information is crucial to successfully managing the separate stormwater drainage system.

The next steps should include:

- Continuously update and improve the dataset of information. This includes the inventory and assessment information for the various assets stored in the City's GIS and subsequently linked to the IO Toolset.
- Transition the management approach from an age based to a condition-based system. The transition should occur as part of the proposed assessment program.
- As additional information is collected, periodically review and update the IO Toolset parameters. The parameters include: the weights and values assigned to the probability and consequence of failure variables; unit price cost information; planned project areas; and the renewal strategy variables.
- Use the IO Toolset as a planning and cost estimating tool for operation, maintenance, rehabilitation and renewal projects.
- Prepare and update financial budgets.

From a big picture perspective, a fundamental recommendation is to start proactively managing the stormwater system. Historically construction of the system has occurred with major development and major infrastructure projects such as the CSO program. Proactively managing the system will help level out the annual expenditures.

STREAMBANK EROSION STRATEGY

Proactively managing the stormwater system is extended to include the open channel system within the city limits. As observed during the assessment phase of this project, significant erosion is occurring in parts of the open channel system. Often streambank erosion is due to unstable hydrology resulting from poorly managed stormwater runoff from development. Much of the open channel system is designated as Waters of the State and is regulated by the State of Michigan and the Army Corp of Engineers. Complicating matters, the City often does not have legal easements of the land containing the open channels. Historically, the state and federal agencies have not taken a proactive role in resolving streambank erosion issues. Development of a long term strategy to manage eroding streambanks is recommended.

TRANSITION TO CONDITION BASED ASSET MANAGEMENT

As previously discussed, transitioning the age-based asset system to a condition-based system is recommended. Specific assessment and data management recommendations to address this issue are presented in the following sections.

Sewer Assessment

Establish an annual cleaning and CCTV inspection program designed to complete a full inspection of the entire system every 10 years. The present-day cost to clean and inspect all gravity mains in the system is approximately $4,819,000, barring potential additional costs like heavy cleaning. Catch basin laterals are not recommended for cleaning and CCTV. Cleaning and inspecting laterals would be an additional cost of approximately $804,000. CCTV inspections should be done using the PACP scoring system. PACP scoring provides for a consistent inspection and evaluation process, so all sewers inspected will have consistent structural and O&M condition information. The frequency of re-inspection can be modified based on results achieved from the initial investigation of the entire system. Cleaning and CCTV should be prioritized based on the risk assessment.

Manhole and Catch Basin Assessment

All existing manholes and catch basins should be inventoried, checked for connectivity and inspected using Manhole Assessment Certification Program (MACP). The MACP scoring system provides for a consistent inspection and evaluation process so that all structures inventoried have consistent structural and O&M condition ratings. The frequency of re-inspection can be modified based on results upon completion of the entire system.

Culvert Assessment

All stream crossings should be cleaned, and CCTV inspected using the PACP rating system. The frequency of re-inspection can be modified based on results upon completion of the entire system and the selected level of service. Estimated cost to clean and inspect the culverts in the system is approximately $20,000, not including potential extra work like heavy cleaning.

Outfall Assessment

An inspection and inventory of the outfalls is recommended. Information should be collected on the condition of both the outfall and adjacent stream bank. These inspections could be completed by the same crew tasked with performing open channel inspections. The estimated cost to inspect these assets individually is approximately $34,000 including time to travel to individual site locations. If these assets are inspected during open channel investigations, the inspection cost is approximately $19,000.

Open Channel and Ditch Inventory and Assessment

The open channels and roadside ditches should be inspected and assessed for condition. There is no attribute data currently entered for open channels and roadside ditch assets in the GIS database. The recommended first step is a full survey of all streams and open channels within the City limits. The survey should include points defining the beginning and ends, and representative cross-sections. It is recommended to conduct the survey based on the needs of a hydraulic model. This provides a consistent methodology and will minimize future data needs if a model analysis is performed. Breaking the assets into logical groupings such as segments between stream crossings, or other significant markers will also assist in managing particular lengths of the open channels. Problem locations should be recorded GPS coordinates. Inspections of the open channels may be done in conjunction with the recommended outfall inspections.

Green Infrastructure Assessment

The City has a limited number of green infrastructure installations to date. As more green infrastructure practices are implemented, having a program to track new installations and routine O&M activities performed will be crucial to the long-term performance and success of these practices. It is recommended that standard checklists be used for inspections. The *Low Impact Development Manual for Michigan* contains example checklists.

DATA MANAGEMENT

Collection of data is recommended to be completed through the use of electronic devices that run GIS Arc applications. This will allow field staff to have the system information readily available to confirm locations and asset inventory information. Data entry forms should be embedded in the application to ensure consistent and pertinent data collection with minimal post-processing.

Available attribute information such as date installed, material, size, shape, and elevations from existing record drawings or current inventories should be added to the GIS. Maintaining the information in a central database will ensure consistency and will help to minimize assumptions. Some of the information recommended for use may need to be obtained during asset inspections and inventories. Plans for gathering the data should be finalized, with a clear work plan for obtaining the correct information, and staff training to implement the program. This recommendation applies to all the various asset groups such as gravity mains, laterals, manholes, catch basins, stream crossings, culverts, outfalls, etc.

Various assets should be separated out from grouped features in GIS. For instance, culverts, siphons, and pressurized mains are all included under gravity mains. Pulling these subtypes out of the group will allow for flexibility in tailoring specific factors for each unique asset group.

Some assets such as siphons and pressurized mains are broken into several segments with unique asset IDs. While this may be useful for accurately portraying differences in slope, etc. it can be counterproductive in the IO tool and produce duplicate results when performing GIS queries. If multi-segment assets are maintained, comments should be included with references to the associated segments.

GIS information from other departments should be integrated together. It is reasonable to keep specific information unique to each department’s GIS database; however, information such as the actual road outline, pavement type, and thickness would be beneficial for use in compiling project specific costs.

Information regarding the capacity of conveyance (pipes, culverts and open channels) and storage basin elements could be kept in GIS and used as a potential factor in the IO software. If a stormwater system capacity analysis is completed, conveyance and storage elements that do not meet the requirements could be weighted higher for the probability of failure, consequence of failure, or be used to assume a larger system for a renewal strategy. For example, undersized culverts can lead to increased flooding and accelerated erosion at the inlet and outlet of the crossing.

For stream crossing and culverts, additional data such as the presence/type of end sections, headwalls, and permanent erosion control measures should be indicated.

Approximately 36 out of 465 outfalls do not have a size associated with them. The majority of the outfall sizes can be obtained by checking the size of the pipe they are attached to, but many are not connected to a pipe in GIS. The consistent feature of these assets was that they were all labeled as IDEP points. It is recommended that all outfalls are assigned the proper information, and to include a flag within the asset for IDEP to avoid confusion or create a separate layer for IDEP points. Several connections that were identified as open discharge points, were actually closed discharge points, or blind ties to culverts, and should be reviewed when clarifying the layer.

Seventy-two (72) miscellaneous blind ties and culvert end sections are noted to be a discharge point. A review of how these assets are classified is recommended in order to develop a better system for tracking the preferred asset attributes and ongoing programs like IDEP.

An asset class for storage basins is recommended to be added to the GIS database. Attribute data should be populated like any other asset group. How components such as inlets, outlets, sedimentation basins, and various chambers of the storage basins are recorded should be planned.

The City currently conducts inspections on the pumps and piping in each of their stormwater facilities on a bi-weekly basis. Documentation of these inspections is currently kept in the station along with pump run logs, but the data isn’t currently entered to the GIS system. A full station assessment should be conducted during a typical inspection and all pertinent data such as the pumps information and individual run times should be logged into the GIS system so that information can be readily available. A pump subtype should be added to the pump stations so that specific attributes relating to the pumps can be stored separately from the station facility itself. Information such as the pump curves and operating set points could also be linked to the assets in GIS.

The GIS database for green infrastructure should continue to be maintained and updated as new practices are constructed. As-built drawings should be maintained in a central location to access as needed.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The Sharkey Relief Inter-County Drain *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1404-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Brain Baker at (586) 469-5325 brian.baker@macombgov.org
Name Phone Number Email

12-17-19
Signature of Authorized Representative (Original Signature Required) Date

BRIAN BAKER CHIEF DEPUTY, MCPWO
Print Name and Title of Authorized Representative

Sharkey Relief Inter-County Drain
21777 Dunham Road
Clinton Township, Michigan 48036
(586) 469-5325
Brian Baker, brian.baker@macombgov.org
http://publicworks.macombgov.org/PublicWorks-Home

SAW Grant No. 1404-01

Overview

The Inter-County Drain Drainage Board (ICDB) for the Sharkey Relief Inter-County Drain Drainage District (District) currently owns and operates the Sharkey Drain which is a Chapter 21 drain established in accordance with the Michigan Drain Code of 1956. Pursuant to the terms of the Drain Code the Drainage Board is comprised of representatives from Michigan Department of Agriculture, the Macomb County Public Works Office (MCPWO), and the Oakland County Water Resources Commissioner (OCWRC).

The District was awarded a Stormwater, Asset Management, and Wastewater (SAW) grant to investigate and evaluate the Districts stormwater assets. With the grant the District engaged Anderson, Eckstein and Westrick (AEW) to investigate and develop a Stormwater Asset Management Plan (AMP). Through development and implementation of this plan, the insight and understanding of the stormwater system can be improved. A comprehensive investigation included inventory and inspection of stormwater assets, condition assessment of assets, and evaluating capital improvement needs.

Asset Inventory/Condition Assessment

The Sharkey Drain stormwater assets include 4.12 miles of enclosed storm sewer, 76 stormwater structures, and a siphon consisting of three large diameter horizontal pipes. Each structure was located using GPS and assigned an asset I.D. based on MCPWO's naming convention. Pipe I.D.'s were assigned based on their upstream and downstream structure I.D.'s. A condition assessment was performed on the storm sewer by means of Closed Circuit Television (CCTV) inspection while investigation of the stormwater structures and siphon were performed by means of visual assessment. Based on the condition assessment, pipes were assigned a Pipeline Assessment Certification Program (PACP) rating, based on the quick rating, ranging from 0 to 5, whereby 1 indicates new or excellent condition and 5 indicated failure or imminent attention required. Similarly, structures were rated by Manhole Assessment Certification Program (MACP) certified raters on 1 to 5 scale, whereby 1 indicates new or excellent condition and 5 indicated failure or imminent attention required.

Criticality Analysis

Assets were then analyzed to determine their Probability of Failure (POF) and Consequence of Failure (COF). The POF of an asset takes into account the condition rating while the COF takes into account the process, financial, safety, and community impacts. POF and COF scores were determined for each asset and then multiplied together resulting in the Business Risk Exposure (BRE) score, also known as the criticality score. The BRE score is used to prioritize what assets are most critically in need of repair. Any asset with a BRE score of 16 or greater is considered critical by the Department of Environment, Great Lakes & Energy (EGLE). Based on the current assessments, no asset is considered critical.

Level of Service

To reasonably serve the Sharkey Drain Drainage District a desired Level of Service (LOS) must be established. In terms of the Districts stormwater system, the LOS would be the satisfaction of the residents, business owners and property owners. There are many factors that can affect the perceived LOS of the system including sewer backups, which can result in both street, yard and basement flooding.

The Districts stormwater system is currently operating at a satisfactory LOS and will continue to do so through continued maintenance, rehabilitation and replacement of its assets as presented in the Asset Management Plan and Capital Improvement Plan.

Capital Improvement Plan

Based on the condition assessment and criticality analysis, a 20-year Capital Improvement Plan (CIP) was created. Through the condition assessment and criticality analysis calculations, no asset was found to be in immediate need of repair or rehabilitation. However, the majority of the system will reach the end of its recommended useful life shortly after the 20 year CIP period, therefore it is expected that over 20 years, some pipes and structures will require rehabilitation or replacement. The recommended CIP includes pipe and structure rehabilitation as well as continued CCTV, structure, and siphon inspection.

This summary provides a brief overview of the investigation, and evaluation of the system assets, condition, operation and needs. A more comprehensive analysis can be found in the Stormwater Asset Management Plan.

Sharkey Relief Inter-County Drain
21777 Dunham Road
Clinton Township, Michigan 48036
(586) 469-5325
Brian Baker, brian.baker@macombgov.org
http://publicworks.macombgov.org/PublicWorks-Home

SAW Grant No. 1404-01

ASSET LIST

STORM SEWER PIPES	STORM SEWER PIPES
353M006-353M007	353M075-353M078
353M005-353M006	353M083-353M084
353M004-353M005	353M084-353Z001
353M003-353M004	353M038-353M041
353M002-353M003	353M037-353M038
353M001-353M002	353M041-353M043
353M007-353M008	353M043-353M044
353M008-353M009	353M044-353M045
353M009-353M011	353M045-353M047
353M011-353M013	353M047-353M048
353M013-353M015	353M048-353M036
353M017-353M018	353M001-353M002
353M016-353M017	353M072-353M071
353M015-353M016	353C107-353M072
353M018-353M019	353C106-353C107
353M019-353M021	353C105-353C106
353M021-353M022	353C110-353C111
353M022-353M024	353C111-353C112
353M024-353M025	353C112-353C113
353M025-353M026	353C113-353C114
353M026-353M028	353C114-353M076
353M028-353M029	353C116-353M076
353M029-353M030	353C115-353C116
353M032-353M033	353M076-353M077
353M030-353M032	353M077-353M075
353M033-353M035	353C118-353M079
353M035-353M036	353M079-353M078
353M055-353M057	353M064-353M063
353M057-353M059	353C098-353M064
353M059-353M060	354M007-354Z001
353M060-353M061	354M006-354M007
353M061-353M062	354M005-354M006
353M062-353M063	354M004-354M005
353M067-353M069	354M003-354M004
353M063-353M067	354M002-354M003
353M069-353M071	354M001-354M002
353M071-353M073	353M052-353M055
353M073-353M075	353M053-353M055
353M080-353M083	353M054-353M055
353M078-353M080	

STORM SEWER STRUCTURES	STORM SEWER STRUCTURES
353C118	353M043
353C116	353M041
353C114	353M038
353C113	353M037
353C112	353M035
353C111	353M033
353C109	353M032
353C107	353M030
353C106	353M029
353C105	353M028
353C096	353M026
353M084	353M025
353M083	353M024
353M080	353M022
353M079	353M021
353M078	353M019
353M075	353M018
353M077	353M017
353M076	353M016
353M073	353M015
353M071	353M013
353M072	353M011
353M069	353M009
353M067	353M008
353M063	353M007
353M064	353M006
353M062	353M005
353M061	353M004
353M060	353M003
353M059	353M002
353M057	353M001
353M052	354M007
353M053	354M006
353M054	354M005
353M048	354M004
353M047	354M003
353M045	354M002
353M044	354M001

December 2019

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 13, 2019
(no later than 3 years from executed grant date)

The Charter Township of Ann Arbor *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1421-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: **No**
   If No - Date of the rate methodology approval letter: October 28, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Rick Judkins	at	(734) 663-3418	rjudkins@aatwp.org

Michael C Moran 12/30/19
Signature of Authorized Representative (Original Signature Required) Date

Michael Moran, Township Supervisor
Print Name and Title of Authorized Representative

WASTEWATER ASSET MANAGEMENT AND CAPITAL IMPROVEMENT PLAN

SAW Grant No. 1421-01

December 13, 2019

Prepared for:

Ann Arbor Charter Township
3792 Pontiac Trail
Ann Arbor, Michigan 48105

Website: aatwp.org
Contact: Rick Judkins (734)-663-3418

Prepared by:

Stantec Consulting Michigan Inc.
3754 Ranchero Drive
Ann Arbor, Michigan 48108

Executive Summary

Ann Arbor Charter Township (Township) was awarded a Stormwater, Asset Management and Wastewater (SAW) Grant administered by the Michigan Department of Environment Great Lakes and Energy (EGLE, formerly Michigan Department of Environmental Quality). The purpose of this grant is to assist communities in the development and/or upgrade of their Asset Management Program (AMP). The Township retained Stantec Consulting Michigan Inc. (Stantec) to compile and present major elements of its AMP within an Asset Management Plan (Plan) as listed below:

1. Asset Inventory
2. Criticality/Risk Assessment
3. Level of Service (LOS)
4. Capital Improvement Plan (CIP)
5. Funding (Revenue) Structure

Township Asset Management Team

This Plan was developed in cooperation with the Township Asset Management Team (AMT) which included:

- Township Utilities Committee
- Rick Judkins; Utilities Director
- The Woodhill Group; Financial Consultant
- Stantec; Asset Management Consultant

Asset Inventory

The Township utilizes ESRI's ArcGIS for their asset inventory, which includes a record for all documented Township-owned sewer lines, manholes, force mains, and pump stations (nearly 100% of assets). Other wastewater system appurtenances such as laterals, fittings, etc., are included in the inventory to the best of the Township's ability, but lack fully populated records. A review and update of this database was included in this project to ensure that the information was complete to the extent possible based on readily available information. This included further population of the attribute information for the manholes and pipes (i.e., ownership, material, install date, etc.), as well as updates to reflect the observed system configurations in the field. The pump station asset inventory was also developed further, including a vertical asset data structure for each, with several subsystems and components being related to each station (e.g., structural elements, valves, piping, etc.).

List of Major Assets Being Tracked

- Two Pump Stations:
    - Dixboro PS
    - Towsley PS
- Approximately 89,240 feet of gravity sewer pipes with diameters ranging from 8 to 18 inches, with the following material types:
    - ~33% Polyvinyl Chloride (PVC)
    - ~42% Vitrified Clay
    - ~20% Concrete
    - ~2% Ductile Iron
    - <1% High Density Polyethylene (HDPE)
    - ~3% Unknown
- Approximately 1,900 feet of force mains with diameters ranging from 4 to 12 inches, that are constructed of ductile iron
- Approximately 434 manholes

Inventory Sustainability

The Township will continue to update its GIS as additional areas develop or when existing wastewater system improvements are implemented. The Township will also continue the population of attributes related to existing assets as information becomes readily available.

Risk Assessment

Risk can be described as a function of the probability of failure and the consequences of failure, and is typically represented using the following formula:

Risk = [Probability of Failure] x [Consequence of Failure]

The condition assessment that was completed as part of this AMP helps to define the probability of failure for the sewer pipes, manholes, and pump station facility components. The examination of several factors including: impact on station operations, impact on operator health and safety, difficulty of repair, and cost of repair, helped to determine the potential consequence of failure, or criticality, for each pump station facility and their respective components. For the linear infrastructure (gravity sewers, manholes, and force mains), factors such as pipe size, potential risk to environment/public health, and location, led to an assessment of the consequence of failure (criticality).

Condition Ratings

As part of the AMP development, a condition rating was assigned to each of the tracked assets in the Township's wastewater system. Condition assessment ratings were used to determine the likelihood of failure for each asset and were assigned to the assets based on a scale from 1 to 5:

- 1 = Excellent: New or Excellent Condition - Only normal maintenance required;
- 2 = Good: Minor Deterioration - Minor maintenance required;

- 3 = Average: Moderate Deterioration - Moderate maintenance required;
- 4 = Fair: Significant Deterioration - Significant renewal/upgrade required;
- 5 = Poor: Asset Unserviceable - Replacement required OR asset poses safety risk.

Inspections

The Township hired a third-party contractor to carry out the condition assessment of the gravity sewer system between 2012-2019 using Closed Circuit Television (CCTV) inspection. Inspections were completed for approximately 90% of the system (over 80,600 linear feet of pipe and 250 manholes), the majority of which met the SAW eligibility requirement of being over 20 years old. The inspections were performed using the Pipe Assessment Certification Program (PACP) and Level 2 Manhole Assessment Certification Program (MACP) standards for condition ratings, which were developed by the National Association of Sewer Service Companies (NASSCO). Stantec evaluated the inspection data that was provided for the Township's system and used it as the basis of the condition assessment for the collection system.

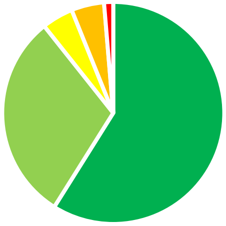
Also, as part of this project a field visit was made by Stantec in June of 2017, with the accompaniment of the Township staff, to both Township owned pump station facilities. Information on each pump station condition was gathered from visual inspection, conversations with operations staff, and record drawings to assess the condition of the facilities and their equipment, and to advance the population of the asset inventory database as described earlier.

Desktop Analysis

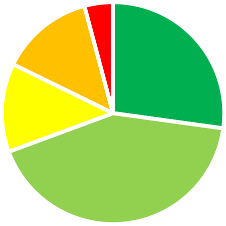
Though the pump station assets were all inspected for the condition assessment, only approximately 90% of the gravity sewer pipes, 58% of the manholes, and none of the force mains were physically inspected. For uninspected assets, the Township elects to track the condition of these items via desktop analysis methods. To assign a condition assessment rating to the uninspected assets, a condition score of 1 to 5 was assigned based on the age of the asset (or elapsed time since last rehab).

Tables summarizing the condition assessment of the Township's wastewater system are shown below:

			Component Condition Ratings				
			1	2	3	4	5
Pump Station Facility	**Average Condition Rating**	**Total # of Inspected Components**	**%**	**%**	**%**	**%**	**%**
Dixboro PS	1.3	48	69	29	2	-	-
Towsley PS	1.1	46	96	2	2	-	-

Sewer Condition* Rating	Length	%	
1	53,690	59%	
2	27,695	30%	
3	4,171	5%	
4	4,351	5%	
5	1,214	1%	
Total	**91,121**	**100%**	

**PACP and desktop condition ratings are both represented; includes 3 force main segments*

Manhole Condition* Rating	Count	%	
1	118	27%	
2	183	42%	
3	56	13%	
4	59	14%	
5	18	4%	
Total	**434**	**100%**	

**MACP and desktop condition ratings are both represented*

Criticality Ratings

A criticality rating system was developed to analyze the consequence of failure for the wastewater system assets and to determine the relative importance of the assets for the prioritization of future capital expenses. The criticality analysis was performed separately for the pump stations and the linear assets (gravity sewers, manholes, and force mains), and uses a scale of 1 to 5, with 1 being the least critical, and 5 the most critical. Several key risk criteria were identified:

- Impact on Facility Operation
- Impact on Operator Health and Safety
- Cost of Repair
- Difficulty of Repair
- Pipe Size
- Wastewater Asset Location
- Environmental/Public Health Risk

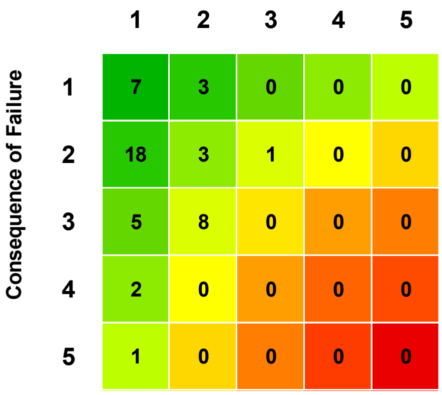
Each of the criticality criteria were assigned a weighting factor according to their relative importance as determined by the AMT. The consequence of failure for each asset was evaluated within this framework based on the qualities they possess, and an overall criticality rating was assigned to each by summing the weighted criticality scores for each of the risk criteria. For example, a large diameter trunk sewer crossing a major road would be considered more critical than a small diameter local collection sewer in an unimproved right-of-way. It should be noted that the criticality of the manholes was assigned based on the criticality of the adjacent pipe since those assets are essentially inseparable from the pipe and located in the same general vicinity of the critical features (i.e., major roads, railroads, wetlands, etc.).

Risk Summary

Heat maps summarizing risk are provided below. For each pump station and sewer asset type, the number of components is indicated for each combination of Probability of Failure (condition) and Consequence of Failure (criticality) rating.

Dixboro PS

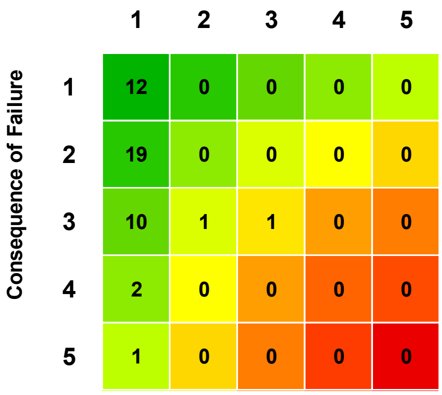
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	7	3	0	0	0
2	18	3	1	0	0
3	5	8	0	0	0
4	2	0	0	0	0
5	1	0	0	0	0

Towsley PS

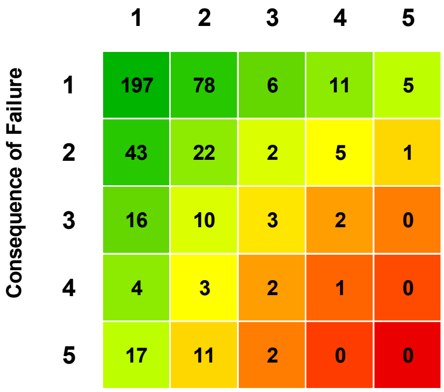
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	12	0	0	0	0
2	19	0	0	0	0
3	10	1	1	0	0
4	2	0	0	0	0
5	1	0	0	0	0

Gravity Sewer & Force Mains

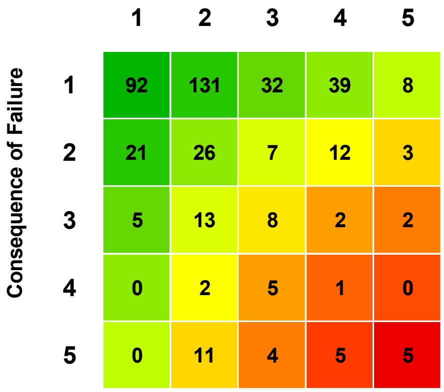
Probability of Failure



Consequence of Failure	1	2	3	4	5
1	197	78	6	11	5
2	43	22	2	5	1
3	16	10	3	2	0
4	4	3	2	1	0
5	17	11	2	0	0

Manholes and ARVs

Probability of Failure



Consequence of Failure	1	2	3	4	5
1	92	131	32	39	8
2	21	26	7	12	3
3	5	13	8	2	2
4	0	2	5	1	0
5	0	11	4	5	5

Risk Assessment Sustainability

To ensure the sustainability of the AMP, the Township plans to track the condition of their assets and update their condition ratings as necessary in the Asset Management Supplemental Analysis Tool (AMSAT); a spreadsheet tool developed to facilitate the AMP. For force mains, the condition rating is driven by pipe age, which will update automatically within the AMSAT. For the gravity sewers and manholes, the condition rating for the uninspected assets will be driven by age and update automatically but the AMSAT is configured for adding future inspection ratings as well. Continued system inspection is critical to maintaining a clear picture of the condition of the Township's assets. The asset inventory and AMSAT will need to be updated if sewers or manholes are replaced, repaired or added to the system. The Township also plans to periodically inspect the pump station facilities and sewer assets (annually or as needed). Condition ratings will be tracked and updated as necessary.

Level of Service (LOS)

LOS can be described as a qualitative measure of the requirements placed on a system or facility by a variety of entities that may be external (e.g., customers, legislators), or internal (management staff). Based on discussions with the Township's AMT, the LOS goal is to maintain all critical assets as well as some less critical assets to provide enhanced reliability, with an emphasis on meeting the regulatory requirements set by EGLE. This goal was identified by the AMT as the starting point for guiding CIP and maintenance expenditures.

Qualitatively, LOS can be described in three tiers: Low, Medium and High. With a Low LOS, only the most critical components in the system, or those with the highest risk, would be proactively maintained, and with a High LOS, every asset would be maintained proactively. The Township consistently endeavors to offer a High LOS. Therefore, based on AMT feedback and for the purposes of projecting CIP expenditures, a High LOS has been assumed. Quantitatively, this correlation between LOS and criticality, is defined within the AMSAT and the Township's LOS selection has an impact on the projected CIP expenditures. The Township will continue to review and refine their LOS goals moving forward.

Level of Service Sustainability

The Township plans to review and update their stated LOS goals regularly and assess the performance of their system against those goals to identify any areas that may need improvement. The Township will also examine the impact of LOS on CIP projections and may alter the LOS goals as deemed necessary.

Capital Improvement Plan (CIP)

A CIP has been developed using the results of the AMP analysis and is divided into short-term (0-5 year), and long-term (5-20 year) initiatives. A summary is provided in the table below with initial conceptual cost opinions in present day (2019) dollars. The short-term projects listed below have been included in the financial analysis included in **Appendix E**, but the long-term projects may be subject to change as the actual dates and dollar values could vary. The Township will continue to review and refine these findings moving forward.

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source
Short-term Projects (0-5 years)	Sewer and Manhole Repairs	Trenchless sewer repairs, and manhole rehabilitation	Reliability, Routine Maintenance and Repairs	2020	$92,000	Fund Balance
	Sewer and Manhole Repairs	Trenchless sewer repairs, and manhole rehabilitation	Reliability, Routine Maintenance and Repairs	2021	$40,000	Fund Balance
	Sewer and Manhole Repairs	Trenchless sewer repairs, and manhole rehabilitation (includes AMSAT 2023 values)	Reliability, Routine Maintenance and Repairs	2022	$42,000	Fund Balance
	Dixboro Pump Station Upgrades	Electrical Upgrades (starters and battery charger)	Reliability; Nearing End of Service Life	2023	$9,500	Fund Balance
	Sewer and Manhole Repairs	Trenchless sewer repairs, and manhole rehabilitation (includes AMSAT 2025 values)	Reliability, Routine Maintenance and Repairs	2024	$40,700	Fund Balance
	Towsley Pump Station Upgrades	Structural Upgrades (replace wet well access hatch)	Routine Maintenance and Repairs	2024	$4,000	Fund Balance
Long-term Projects (5-20 years)	Pump Station Upgrades (Dixboro and Towsley	Controls Upgrades (AMSAT predictions)	Reliability; Nearing End of Service Life	2025	$113,500	Fund Balance
	Miscellaneous Repairs	Sewer, Manhole, and Pump Station repairs (AMSAT predictions)	Reliability, Routine Maintenance and Repairs	2026	$2,200	Fund Balance
				2027	$14,300	
				2028	$100,150	
				2029	$146,900	
				2030	$288,200	
				2031	$3,500	
				2032	$191,100	
				2033	$113,500	
				2034	$80,450	
				2035	$424,600	
				2036	$24,200	
				2037	$36,350	

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source
				2038	$89,900	
				2039	$13,600	
				2040	$460,600	
Ongoing Initiative	Sewer Inspection Program	5-year Cycle of Ongoing PACP and MACP Inspections	Reliability, Level of Service	2020 and onward	$125,000 annually	Fund Balance

CIP Sustainability

To maintain the sustainability of the AMP, the Township plans to revise the CIP project list periodically as work is completed or as new pertinent information becomes available (e.g., condition assessment and LOS updates).

Funding Structure and Rate Methodology

The rate study and evaluation of the Township's funding structure has been performed separately by the Woodhill Group and is included in **Appendix E**. The review addresses the following:

- Annual operating budget
- Current approved rate structure
- Documentation of legal authority for setting rates
- Discussion of anticipated costs (operations and capital) against revenue
- Documentation showing no funding gap.

Funding Structure and Rate Methodology Sustainability

To maintain the sustainability of the AMP, the Township plans to revisit the funding structure and rate methodology periodically to ensure that the funding is available to meet the requirements of the Township's wastewater system.

This Plan will be presented to the Township Board of Trustees as the current recommended plan of action. Future updates will be listed here and attached as they become available.

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date: December 27, 2019

To: Valorie White

Company: Michigan Department of Environment, Great Lakes, and Energy (EGLE)

From: Barbara E. Marczak, P.E., Prein&Newhof

cc: Brad Whitney, Department of Public Works Superintendent;
Lynne Ladner, City Manager

Re: City of Hart, Oceana County, SAW Grant
Summary of Storm Water System Asset Management Plan

This memorandum provides the summary of the City of Hart's SAW Grant activities required under Section 603 of Public Act 84 of 2015. This SAW Grant is for the City of Hart Storm Water System. Headings and italicized quotes are from recent EGLE guidance.

Grantee Information

City of Hart
407 South State Street
Hart, Michigan 49420
www.cityofhart.org

Contact information for the grantee:

Ms. Lynne Ladner, City Manager
407 South State Street
Hart, Michigan 49420
Phone: 231-873-3546

SAW Grant Project Number: 1457-01

Executive Summary

The City of Hart received a SAW Grant in 2017 to prepare a Storm Water Asset Management Plan (AMP). The grant agreement indicated the following amounts:

	Grant Amount	Local Match
Storm Water AMP	$501,002	$0

The key components in the City's Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies
e. Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

Manhole, catch basin, sewer pipe, culvert, and open channel locations were plotted in a geographic information system (GIS) using record drawings, aerial imagery, and land contours. A majority of the system locations were field verified using survey-quality global positioning system (GPS), and locations were adjusted with the GPS coordinates.

Asset inventory data for storm sewers and culverts, including year of installation, material, size, pipe inverts, and manhole rim elevation were cataloged from record drawings and visually verified where needed. Asset inventory data is managed using GIS and asset spreadsheet databases.

The GIS and asset spreadsheets will all be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes and catch basins) or with in-line closed circuit television (CCTV) from structure to structure. The zoom camera method provided a very economical initial condition assessment of the pipes. Some pipes noted to have potentially significant deficiencies were flagged and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors such as joint conditions, observed roots, deposits, wall corrosion, infiltration, or other defect observations. Composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of length of pipe within each rating category

1	2	3	4	5
67%	9%	17%	4%	3%

Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, and structures.

Percentage of manholes within each rating category

1	2	3	4	5
27%	45%	21%	6%	1%

Catch basins were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, sumps, and structures.

Percentage of catch basins within each rating category

1	2	3	4	5
15%	54%	21%	6%	4%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

The City of Hart recognizes that the people served by the system are more than customers, they are the system owners. The City staff act as stewards of the system who strive to maintain the best system possible with the finances available. This is challenging because there is no dedicated revenue for storm water. The results of the inventory and assessments have been discussed at meetings with the City Manager, Biopure Treatment Facility staff, and Department of Public Works (DPW) staff. Based on the input received during those meetings, the following level of service goals were determined:

1. *Meet Regulatory Requirements*
2. *Minimize Flood Risk*
3. *Minimize Public Hazards*
4. *Minimize Storm Water Discharges to Wastewater system*
5. *Maintain Water Quality*
6. *Minimize Life Cycle Costs*

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking as well as root intrusions.

Assets were all given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential flooding was also a factor.

Assets with the higher rankings for consequence of failure were those that:

- *Provide service to a significant portion of the system*
- *Serve commercial and/or major industrial areas*
- *Are under major roads*
- *Are adjacent to critical utilities*

Consequence of failure and criticality should not be confused. Criticality is the product of an asset's risk of failure and consequence of failure. Criticality drives an asset's action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority).

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

The City of Hart has no specific revenue structure for storm water. Storm water projects are handled under sewer maintenance or with street improvement's through the City's General Fund. Projects or maintenance needed will be evaluated during the City's yearly budget cycle based on needs identified with the condition assessments and where they can be combined with other infrastructure improvement projects.

Capital Improvement Plan (CIP)

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

The City of Hart's storm water system covers most of the City. Twenty-four defects in the storm sewer system were identified that can be remedied with spot repairs. Four spot repairs are private utility pipe penetrations that can be fixed by others. Eight spot repairs are planned to be covered with other wastewater sewer system and water distribution system improvements and are identified in the CIP developed for the wastewater system. The remaining twelve spot repairs have a lower criticality and can be repaired by the City DPW as time and funds become available. No other major capital improvements were identified as being needed in the short term.

As projects involving other utilities and roads in proximity to storm water assets are identified, consideration will be given to assessment, rehabilitation, and replacement as needed. The risk of failure and criticality ratings will be used in prioritizing actions. Because the storm water collection system assets share physical space with other asset systems such as wastewater, roadway, and drinking water, it is imperative that any CIP process coordinate actions with other utility systems.

List of the major identified assets

- 59,433 feet of gravity storm sewer
- 163 manholes and 406 catch basins
- 62 storm water outlets
- 24 storm water culverts

Deliverables/Reports Prepared

Information and reports prepared and provided under this grant include:

1. *GIS mapping and database and ArcReader files*
2. *Asset management pipe spreadsheet*
3. *Sewer Flow Study – Storm Water Collection System and Capacity Analysis*
4. *Capital Improvement Plan*
5. *Storm Water System Evaluation*
6. *Storm Water Asset Management Plan*

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/27/2019
(no later than 3 years from executed grant date)

The City of Hart *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1457-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No
   If No - Date of the rate methodology approval letter: October 14, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ___________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Lynne Ladner	at	(231) 873 - 2488	lladner@cityofhart.org

Signature of Authorized Representative (Original Signature Required) — Date: 12/30/19

Lynne Ladner, City Manager
Print Name and Title of Authorized Representative

April 2017

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/27/2019
(no later than 3 years from executed grant date)

The City of Hart *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1457-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Lynne Ladner	at (231) 873-2488	lladner@cityofhart.org
Name	Phone Number	Email

12/30/19
Signature of Authorized Representative (Original Signature Required) Date

Lynne Ladner, City Manager
Print Name and Title of Authorized Representative

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	December 27, 2019
To:	Valorie White
Company:	Michigan Department of Environment, Great Lakes, and Energy (EGLE)
From:	Barbara E. Marczak, P.E., Prein&Newhof
cc:	Brad Whitney, Department of Public Works Superintendent; Paul Cutter, BioPure Treatment Facility Superintendent; Lynne Ladner, City Manager
Re:	City of Hart, Oceana County, SAW Grant Summary of Wastewater System Asset Management Plan

This memorandum provides the summary of the City of Hart's SAW Grant activities required under Section 603 of Public Act 84 of 2015. This SAW Grant is for the City of Hart Wastewater System. Headings and italicized quotes are from recent EGLE guidance.

Grantee Information

City of Hart
407 South State Street
Hart, Michigan 49420
www.cityofhart.org

Contact information for the grantee:

Ms. Lynne Ladner, City Manager
407 South State Street
Hart, Michigan 49420

Phone: 231-873-3546

SAW Grant Project Number: 1457-01

Executive Summary

The City of Hart received a SAW Grant in 2017 to prepare a Wastewater Asset Management Plan (AMP). The grant agreement indicated the following amounts:

	Grant Amount	Local Match
Waste Water AMP	$1,400,129	$0

The key components in their Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-Term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

Manhole, gravity sewer main, force main, and lift station locations were plotted in a geographic information system (GIS) using record drawings. Manhole and lift station locations were field verified, and locations were adjusted with Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, size, pipe inverts and manhole rim elevations were cataloged from record drawing and visually verified where needed. Asset inventory data is managed using GIS databases and asset spreadsheets.

The GIS and asset spreadsheets will be used to maintain asset inventory data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes) or with in-line closed circuit television (CCTV) from manhole to manhole. The zoom camera method provided a very economical initial condition assessment of the pipes. Some pipes noted to have potentially significant deficiencies were flagged, and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors such as joint conditions, observed roots, deposits, wall corrosion, and infiltration. Composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of length of pipe within each rating category

1	2	3	4	5
58%	5%	11%	13%	13%

Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, and structures.

Percentage of manholes within each rating category

1	2	3	4	5
50%	33%	11%	5%	1%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

The City of Hart recognizes that the people served by the system are more than customers, they are the system owners. The City staff act as stewards of the system who strive to maintain the best system possible with the finances available. The results of the inventory and assessments have been discussed at meetings with the City Manager, Biopure staff and Department of Public Works (DPW) staff. Based on the input received during those meetings, the following Level of Service Goals were determined:

The City has established the following basic Level of Service Goals:

- *Meet Regulatory Requirements*
- *Minimize Service Interruptions*

- *Minimize Public Hazards*
- *Manage Storm Water Inflow and Groundwater Infiltration*
- *Maintain Some Capacity for Community Growth*
- *Minimize Life Cycle Costs*
- *Assure Adequate Financial Reserves*
- *Review Asset Management Plan every 2 to 3 years*

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while lift station pumps considered factors such as design pumping rate vs actual pumping rate.

Assets were given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for consequence of failure were those that:

- *Provide service to a significant portion of the system*
- *Serve schools/hospitals/major industry*
- *Are under major roads*
- *Are adjacent to waterways or significant wetlands*

Consequence of failure and criticality should not be confused. Criticality is the product of an asset's risk of failure and consequence of failure. Criticality drives an asset's action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final criticality ratings were considered when the comprehensive Capital Improvement Plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

Historical operating expenses were reviewed using current audit and budget information. Based on that information, a "Test Year" was developed that reflected a baseline cost. The baseline cost included currently budgeted expenses, debt service, and leveling for base operating cost.

The customer base was reviewed, including the number of billable customers and volumetric sales. Other operating and non-operating revenues were also evaluated. Prediction of customer and volume counts were made including trending in system utilization, projection of operating costs, and anticipated inflation by expense category.

The CIP provided detailed cost projections for the first 10 years of the financial analysis. The annual investment cost was evaluated, and scenarios were developed for cash funding and debt financing. Based on this analysis, it is expected that a combination of future rate increases and debt financing will be needed to fund capital projects and additional operation and maintenance (O&M).

Capital Improvement Plan (CIP)

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once risk of failure ratings for the assets were assigned and actions prioritized using the criticality ratings, action timelines were predicted for maintenance, repair and replacement. Because the wastewater collection system assets share physical space with other asset systems such as storm water, roadway, and drinking water, the CIP process considered actions on these systems. A capital improvement plan showing project descriptions, cost estimates, and project timelines was developed for anticipated capital improvements needed within the next 5 to 10 years.

The following capital improvements and additional O&M planned for the next 10 years for the wastewater system out of the sewer fund include:

CIP and O&M Implementation Timeline

Planned Year (1)	**Project Title**	**Total Est. Cost from Sewer Fund** (2)
2021		
	Wastewater System Spot Repairs - Phase 1	$50,000
	Griswold Street Sanitary Sewer Replacement	$657,000
	Washington Street Sanitary Sewer and Water Main Improvements	$19,000
	WWTF North Irrigation Underdrain	$313,000
	2021 Total	**$1,039,000**
2022		
	Wastewater System Spot Repairs - Phase 2	$30,000
	Dryden/Jefferson Sanitary Sewer and Water Main Improvements	$696,000
	Griswold Lift Station Force Main Replacement	$1,003,000
	WWTF Polishing Pond Pump Station Improvements	$673,000
	Sanitary Sewer Cleaning and CCTV	$47,000
	2022 Total	**$2,449,000**
2023		
	Courtland/Wood Sanitary Sewer and Water Main Improvements	$896,000
	Washington Street Alley Sanitary Sewer Spot Repairs	$63,000
	Riverside Lift Station Replacement	$506,000
	East Main Lift Station Improvements	$61,000
	Griswold Lift Station Improvements	$173,000

Planned Year [(1)]	Project Title	Total Est. Cost from Sewer Fund [(2)]
2023 (cont.)		
	Griswold Lift Station Grit Removal	$706,000
	WWTF Headworks & Inlet/Splitter Box Improvements	$2,003,000
	WWTF Aeration Improvements	$1,821,000
	Sanitary Sewer Cleaning and CCTV	$48,000
	2023 Total	**$6,277,000**
2024		
	Hart/Wood Sanitary Sewer and Water Main Improvements	$629,000
	Courtland Street Reconstruction - Jefferson to Johnson	$22,000
	Polk Road Lift Station Improvements	$175,000
	Sanitary Sewer Cleaning and CCTV	$49,000
	2024 Total	**$875,000**
2025		
	Johnson Street Sanitary Sewer and Water Transmission Main Improvements	$465,000
	WWTF Storage Lagoon Berm Repair	$1,097,000
	Sanitary Sewer Cleaning and CCTV	$50,000
	2025 Total	**$1,612,000**
2026		
	Dryden/Church Sanitary Sewer and Water Main Improvements	$1,020,000
	Church Street Sanitary Sewer and Water Main Improvements	$287,000
	DPW Building	$1,493,000
	Sanitary Sewer Cleaning and CCTV	$51,000
	2026 Total	**$2,851,000**

Planned Year (1)	**Project Title**	**Total Est. Cost from Sewer Fund** (2)
2027		
	State Street and Chautauqua Street Transmission Main Improvements	$15,000
	Plum Lift Station Improvements	$14,000
	Creeks Lift Station Improvements	$7,000
	WWTF Storage Lagoon Control Structure Improvements	$277,000
	Griswold Lift Station Odor Control	$444,000
	Sanitary Sewer Cleaning and CCTV	$52,000
	2027 Total	**$809,000**
2028		
	West Main Sanitary Sewer Improvements	$1,214,000
	WWTF Aeration Diffuser Replacements	$60,000
	WWTF Control Building Improvements	$4,000
	Sanitary Sewer Cleaning and CCTV	$53,000
	2028 Total	**$1,331,000**
2029		
	Griswold Street Sanitary Sewer Extension	$131,000
	Apple Street Sanitary Sewer and Water Main Improvements	$377,000
	WWTF Storage Building Improvements	$5,000
	Sanitary Sewer Cleaning and CCTV	$54,000
	2029 Total	**$567,000**

Planned Year (1)	Project Title	Total Est. Cost from Sewer Fund (2)
2030		
	WWTF Clarifier Improvements	$122,000
	Wastewater System Spot Repairs - Phase 3	$87,000
	Sanitary Sewer Cleaning and CCTV	$55,000
	2030 Total	**$875,000**

Notes:

(1) Unplanned repairs may necessitate adjustments in priority.
(2) All costs estimated in 2019 dollars and include engineering, contingency and legal allowance. All costs also include inflation at 2% per year and rounded up to closest $1000.

The Capital Improvement Plan will be reviewed annually and adjusted based on current information, priorities and available funding.

List of the plan's major identified assets:

- 79,510 feet of sanitary gravity sewer
- 17,150 feet of sanitary force main sewer
- 359 sanitary manholes
- 6 sanitary lift stations
- 1.0 MGD average daily flow wastewater treatment facility (WWTF)
- 2 wastewater irrigation fields

Deliverables/Reports Prepared

Information and reports prepared and provided under this grant include:

1. *GIS mapping and database and ArcReader Files*
2. *Asset management pipe, lift station, and WWTF spreadsheets*
3. *Sewer Flow Study – Wastewater Collection System Capacity Assessment and Inflow/Infiltration Analysis*
4. *Wastewater System Evaluation*
5. *Capital Improvement Plan (including financial analysis)*
6. *Wastewater Asset Management Plan*

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date Dec. 31, 2019
(no later than 3 years from executed grant date)

The CITY OF IONIA *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1463-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Jason Eppler at (616)527-5776 jeppler@ci.ionia.mi.us
Name Phone Number Email

J Eppler Dec. 20, 2019
Signature of Authorized Representative (Original Signature Required) Date

Jason Eppler, City Manager
Print Name and Title of Authorized Representative

City of Ionia
Storm Water Asset Management Plan Summary

City of Ionia SAW Grant

114 North Kidd Street, Ionia, MI 48846

www.ci.ionia.mi.us

Contact information for the grantee:

Mr. Jason Eppler, City Manager

Address: 114 North Kidd Street, Ionia, MI 48846

Phone: 616-527-4170

SAW Grant Project Number: 1463-01

Executive Summary

The City of Ionia received a SAW Grant in 2016 to prepare a Storm Water Asset Management Plan. The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$839,000	$839,000	$0

The key components in their Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the storm water system have been inventoried.

- Collection system manholes, catch basins, and outlets were located using survey quality GPS.
- Detention basins and buildings were located using hand-held GPS equipment.

Locations for all assets are recorded in a geographic information system (GIS). Data including date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase.

Location of non-pipe assets such as building components and other equipment is compiled in an inventory spreadsheet maintained by the Department of Public Works. These assets were not mapped in GIS.

The GIS and asset inventory spreadsheet will be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes and catch basins) or with in-line closed circuit television (CCTV) from structure to structure. The zoom camera method provided a very economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors including joint condition, wall corrosion, and infiltration. Composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
69%	14%	8%	2%	7%

Manholes, catch basins, outlets, culverts, and detention basins were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, and structures.

Percentage of manholes/catch basins within each rating category

1	2	3	4	5
36%	51%	9%	2%	0%

No Rating: 2%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

We recognize that the people served by our system are more than customers; they are the system owners. Our staff act as stewards of the system. We have held a series of public meetings and workshops to present the results of our condition assessments, review the costs for meeting various levels of service, and review the budget impacts of those options. Based on the input received during those meetings, we have established the following level of service goals:

1. Meet Regulatory Requirements

   a. Maintain a specified number of certified operators
   b. Continue our Illicit Discharge Program

2. Minimize Flooding and Public Hazards
   a. Staff and equip crews sufficiently to perform specific routine maintenance items
   b. Perform regularly scheduled monitoring and maintenance on all of our storm water system assets
   c. Adopt a baseline 10-year, 24-hour design storm
3. Manage Storm Water Inflow and Ground Water Infiltration
   a. Monitor inflow and infiltration and implement capital improvement projects to meet EPA guidelines
4. Provide Capacity for Community Growth
5. Minimize Life Cycle Costs
6. Maintain Active Water Quality
   a. Establish a street sweeping and catch basin cleaning program
   b. Maintain our Illicit Discharge Program
   c. Perform regular maintenance on detention basins and outlets to ensure proper function

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking while detention basin ratings considered factors such as sediment accumulation and remaining working volume.

Assets were given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for consequence of failure were those that:

- Provide service to a significant portion of the system
- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to waterways or significant wetlands

Consequence of failure and criticality should not be confused. Criticality is the product of as asset's risk of failure and consequence of failure. Criticality drives an asset's action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final criticality ratings were considered when the comprehensive Capital Improvement Plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining life cycle of all assets. The annual investment cost was evaluated and demands on the City's General Fund and Street Fund were reviewed.

Based on that analysis, the CIP and funding allocations in the General Fund and Street Fund were adjusted so that both operations and maintenance activities and CIP actions could be funded. Public meetings were held to convey the results of the asset evaluation (risk of failure and criticality) along with the financial evaluation. We are moving forward with the budget adjustments required to provide our desired level of service.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once assets' risk of failure ratings were assigned and actions prioritized using the criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the storm water collection system assets share physical space with other asset systems such as wastewater, roadway, and drinking water, it was imperative that the CIP process include coordinated actions on these systems.

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Wastewater – based on the City's asset assessment
- Roadway - based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on the Water Reliability Study and Water Asset Management Plan

Individual project scopes for the comprehensive CIP were created to maximize coordination of work on various assets and minimize overall costs. The CIP projects include improvements to the storm water system, wastewater system (collection), drinking water system (distribution), and road system. A 10-year CIP document was created and will be available to the public.

Storm Water 10- Year CIP Projects Identified:

- Annual Cleaning and Televising of Storm Sewer System
- Steele Street (Adams to Dexter)
- Branch Street (State to End)
- Storm Sewer Spot Repairs
- Storm Sewer Lining (CIPP)
- Morse Street (Lincoln to City Limit)

- Cleveland St. Road Improvements (Main to bridge)
- Jefferson Street (E. Main to Lincoln), Adams west of Jefferson
- M-21/Lafayette Storm Connection
- Jackson Street Ph. 1 (Main to Railroad), Railroad (Jackson to Jefferson)
- Jackson Street Ph. 2 (E. Main to Lincoln)
- Hall Street (Lincoln to Forest)
- King Street (Hackett to Lincoln)
- Union Street (High to Lincoln)
- Abandon Cross Country Storm from Washington to Main (East of Mill)
- Storm Sewer in Easements between Dexter and Center, north of High
- Main Street (Dexter to City Limit)
- Mill Street Storm Outlet
- Main Street Storm (Library to Rich)
- Adams Street (Dexter to Hudson)

List of the plan’s major identified assets:

- 124,200 feet of gravity storm sewer
- 446 manholes and 1,011 catch basins
- 3 detention basins
- 56 storm water outlets

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date December 27, 2019
(no later than 3 years from executed grant date)

The Charter Township of Kalamazoo *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1466-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: August 27, 2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Donald Martin at (269) 381-8080 supervisor@ktwp.org
Name Phone Number Email

Donald Martin 12/27/2019
Signature of Authorized Representative (Original Signature Required) Date

Donald Martin, Township Supervisor
Print Name and Title of Authorized Representative

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	December 27, 2019
To:	Mr. Clarence Jones
Company:	Michigan Department of Environment, Great Lakes, and Energy
From:	Prein&Newhof
Project #:	2130338
Re:	Kalamazoo Charter Township SAW Grant: Summary of Wastewater Asset Management Plan

This memorandum provides the summary of the Kalamazoo Charter Township wastewater asset management plan SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent EGLE guidance.

Grantee Information

Grantee:
Kalamazoo Charter Township
1720 Riverview Drive
Kalamazoo, MI 49007
http://www.ktwp.org/

Contact: Mr. Donald Martin, Township Supervisor
Phone: 269-381-8080

SAW Grant Project Number: 1466-01

Executive Summary

Kalamazoo Charter Township received a SAW Grant in December 2016 to prepare Wastewater and Stormwater Asset Management Plans. The Grant agreement indicated the following amounts:

Project Total	Grant Amount	Local Match
$1,181,892	$1,181,892	$0
Project Total	Wastewater Costs	Stormwater Costs
$1,181,892	$1,181,892	$0

The Key components in the Asset Management Plan include:

1. Asset Inventory and Condition Assessment
2. Criticality of Assets
3. Level of Service
4. Operation and Maintenance Strategies/Revenue Structure
5. Long-term Funding/Capital Improvement Plan

Asset Inventory

"Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets."

All assets that are functionally or financially significant to the wastewater system have been inventoried. Manhole, gravity sewer main, force main, and lift station locations were plotted in a Geographic Information System (GIS) using record drawings. Manhole and lift station locations were field verified and adjusted with survey grade Global Positioning System (GPS) coordinates.

Asset inventory data including years of installation, materials, sizes, pipe inverts, and manhole rim elevations were cataloged from record drawing and visually verified where needed. Asset inventory data is managed using GIS databases.

Locations of non-pipe assets, such as, lift station components, building components, and other equipment are compiled in a package of inventory spreadsheets. These assets are not mapped in GIS.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

Gravity Sewer Mains: Inspections were made using either a pole mounted zoom camera (looking up or down each pipe from the manholes) or with in-line closed circuit television (CCTV) cameras. Pipes inspected with zoom camera methods were rated considering any observable roots, deposits, joint conditions, pipe wall conditions, infiltration, or other defect observations. Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system condition grading system. Composite Risk of Failure ratings of 1-5 were derived for each pipe.

Percentage of gravity sewer pipes in each rating category

1	2	3	4	5
85.3%	4.7%	7.0%	1.4%	1.6%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. Kalamazoo Township's force main data was compared with that of several other municipalities to establish a comparative reference. Ratings of 1-5 were developed for each force main.

Percentage of force main pipes in each rating category

1	2	3	4	5
8.4%	3.1%	85.7%	2.8%	0%

Manholes: Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of castings, steps, structures, and infiltration.

Percentage of manholes in each rating category

1	2	3	4	5
19.9%	66.7%	12.0%	1.0%	0.4%

Lift Stations: Visual inspection and performance testing were completed to evaluate asset condition. Lift station assets, including pumps, valves, piping, structures, electrical, controls, and other assets, were rated on a scale of 1-5. Composite ratings for the station as a whole were developed.

Number of lift stations in each rating category

1	2	3	4	5
0	0	0	7	1

Criticality of Assets

"A summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Discussion may include the method used to assess the criticality of assets considering the likelihood and consequence of failure and based on the condition of the assets and the determined risk tolerance, how were the assets ranked."

Assets were given a Risk of Failure (RoF) rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions as determined through condition assessments. Assets were given a Consequence of Failure (CoF) rating of 1-5 (5 being the worst) based on potential damage to adjacent utilities, transportation networks, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for Consequence of Failure were those that:

- Provide service to a significant portion of the system
- Serve schools / hospitals / major industry
- Are under major roads or are adjacent to other major utilities
- Are adjacent to waterways or significant wetlands

Criticality ratings were calculated as the product of an asset's RoF and CoF, producing criticality ratings ranging from 1-25 (25 being the most critical). The most critical assets were found to be gravity sewers primarily along Burdick Street, East Michigan Avenue, and Lake Street.

Level of Service Determination

"A summary of the level of service goals the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discussion may include the procedures used to involve stakeholders in the level of service discussion. The trade-offs for the service to be provided. This could include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. How the level of service goals were determined"

The Township recognizes that the people served by the system are more than customers, they are the system owners. Township staff act as stewards of the system. The Township has held numerous public meetings and workshops with the Township Staff and Board Members. Discussions at these meetings included the results of the condition assessments, the costs for various operations, maintenance and replacement strategies affecting the levels of service, and potential rate impacts. Based on the input received during these meetings, the following Level of Service Goals have been established:

1. Meet Regulatory Requirements
2. Minimize Service Interruptions
3. Minimize Public Hazards
4. Manage Storm Water Inflow and Ground Water Infiltration
5. Provide Capacity for Community Growth
6. Minimize Life Cycle Costs

Revenue Structure

"A summary of the funding structure and rate methodology that provides sufficient resources to implement the asset management program. Discussion may include the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made."

Historical operating expenses were reviewed using current audit and budget information. Based on that information, a "Test Year" was developed that reflected a baseline cost. The baseline costs included currently budgeted expenses, debt service, and leveling for base operating cost.

The customer base was reviewed, including the number of residential equivalent units in the system. Other operating and non-operating revenues were also evaluated. Prediction of customer connections was made including trending in system utilization, projection of operating costs, and anticipated inflation by expense category.

A forecasting system was developed and used to identify the estimated replacement investment for the remaining lifecycle of all assets, based on the asset inventory and condition assessment data. Project costs were estimated for capital improvements within the first 10 years. The annual investment cost was evaluated and scenarios developed for cash funding and debt financing. Based on this analysis, it is expected that a combination of future rate increases and debt financing will be needed to fund capital projects.

Capital Improvement Plan

"A summary or the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP."

A Capital Improvement Plan, CIP, showing project descriptions, cost estimates, and project timelines was developed for the capital improvements needed within a ten-year planning period. The major wastewater system projects identified in the CIP are:

- Thirty-Three (33) point repairs at various locations across the system
- CIPP / Replace gravity sewer in Lake Street (Olmstead Rd to Shakespeare Ave)
- Forcemain replacement for Texel and Lauderdale Lift Stations
- Retrofit / Upgrade 8 lift stations
- Develop the O&M for future CCTV and cleaning needs

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Kalamazoo Township's major assets include:

- 489,363 feet of 8" to 54" diameter gravity sewer
- 2,017 manholes
- 8 lift stations
- 6,812 feet of 2" to 6" diameter force main

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date: **December 31, 2019**
(no later than 3 years from executed grant date)

The *City of the Village of Douglas (legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1473-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Pamela Aalderink	at (269) 857-1438	clerk@ci.douglas.mi.us
Name	Phone Number	Email

Pamela Aalderink 12.30.19
Signature of Authorized Representative (Original Signature Required) Date

Pamela Aalderink, City Clerk
Print Name and Title of Authorized Representative

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

December 30, 2019
2130545

Mr. Clarence Jones, Project Manager
Michigan Department of Environment, Great Lakes, and Energy
Water Infrastructure Financing Section
P.O. Box 30457
Lansing, MI 48909-7957

RE: SAW Grant Project No. 1473-01
Storm Water Asset Management Plan
City of the Village of Douglas

Dear Mr. Jones:

Please find enclosed the required SAW Grant deliverables for the City of the Village of Douglas:

1. Certificate of Completion signed by City Clerk Pamela Aalderink.
2. Project executive summary including contact information and a brief discussion of each of the five major components of the Asset Management Plan.

The City of the Village of Douglas has completed its storm water asset management plan. We are submitting these documents prior to the December 31, 2019 round four deadline. It is our understanding that this will complete the City's obligations under the grant.

Please call our office if you have any questions.

Sincerely,

Prein&Newhof

Nathan Williams, P.E.

NDW/ndw

Enclosures

cc: Mr. Rich LaBombard, City of the Village of Douglas

City of the Village of Douglas
Storm Water Asset Management Plan Summary

City of the Village of Douglas SAW Grant
86 W. Center Street, Douglas, MI 49406
https://ci.douglas.mi.us/

Contact information for the grantee:
Mr. Rich LaBombard, City Manager
Address: 86 W. Center Street, Douglas, MI 49406
Phone: 269-857-1438

SAW Grant Project Number: 1473-01

Executive Summary

The City of the Village of Douglas received a SAW Grant in 2016 to prepare a Storm Water Asset Management Plan. The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$362,302	$326,072	$36,230

The key components in their Asset Management Plan include:

- a. Asset Inventory and Condition Assessment
- b. Level of Service
- c. Criticality of Assets
- d. Operation and Maintenance Strategies/Revenue Structure
- e. Long-Term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the storm water system have been inventoried.

- Infrastructure was identified in the field and added to the community's geographic information system (GIS).
- Collection system manholes, catch basins, and outlets were located using survey-quality GPS.

Locations for all assets are recorded in GIS. Data including date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase. The GIS maps will be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes and catch basins) or with in-line closed circuit television (CCTV) from structure to structure. The zoom camera method provided an economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged, and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors such as joint condition, wall corrosion, and infiltration. Composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
65%	22%	5%	4%	4%

Manholes, catch basins, outlets, culverts, and detention basins were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the casting, steps, and structure.

Percentage of manholes/catch basins within each rating category

1	2	3	4	5
32%	19%	16%	21%	13%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

We recognize that the people served by our system are more than customers; they are the system owners. Our City staff act as stewards of the system. We have discussed our system goals internally as well as publicly with our City Council at our regular City Council meetings. Based on the input we received throughout these discussions, we have established the following level of service goals:

1. Meet Regulatory Requirements
    a. Maintain a specified number of certified operators
    b. Continue our Illicit Discharge Program
2. Minimize Flooding and Public Hazards
    a. Staff and equip crews sufficiently to perform specific routine maintenance items

    b. Perform regularly scheduled monitoring and maintenance on all of our storm water system assets
3. Provide Capacity for Community Growth
4. Minimize Life Cycle Costs
5. Maintain Active Water Quality
    a. Establish a street sweeping and catch basin cleaning program
    b. Maintain our Illicit Discharge Program

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while detention basin ratings considered factors such as sediment accumulation and remaining working volume.

Assets were given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor. Assets with the higher rankings for consequence of failure were those that:

- Provide service to a significant portion of the system
- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to other utilities

The criticality of an asset was calculated as the product of as asset’s risk of failure and consequence of failure. Criticality drives an asset’s action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). The final criticality ratings were considered when the comprehensive Capital Improvement Plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining life cycle of all assets. The annual investment cost was evaluated and demands on the City's General Fund were reviewed.

Based on that analysis, the CIP and funding allocations in the General Fund were adjusted so that both operations and maintenance activities and CIP actions could be funded.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once assets' risk of failure ratings were assigned and actions prioritized using the criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the storm water collection system assets share physical space with other asset systems such as wastewater, drinking water, and roadway, other replacement needs were taken into consideration when creating the storm sewer capital improvement plan (CIP).

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Roadway – based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on planned water improvement projects and proximity to mains
- Sanitary Sewer – based on planned sewer improvement projects and proximity to gravity mains, force mains, and pump stations

Although other infrastructure was considered while creating the CIP, the revenue source for the storm water improvements will come from the General Fund, while water and sanitary sewer utilities will often be funded from other sources (developers, assessments, water/sewer fund, etc.). The focus of this CIP is related to the General Fund expenditures and their effects on the proposed storm sewer improvements and maintenance. A 10-year CIP document was created as part of this process. Major projects identified in the first five years of the CIP are:

- Campbell Road Drainage Improvements (2020) – Road reconstruction and storm sewer spot repairs
- McVea Drive Culvert Replacement (2020) – Replace and improve culvert crossing
- Center Street Storm Sewer Improvements (2020) – Replace storm sewer through the Blue Star Highway intersection
- Felkers Subdivision Storm Sewer Improvements (2021) – Place new storm sewer to improve level of service
- Hamilton Street Storm Sewer Replacement (2022) – Replace storm sewer to outlet
- Blue Star Highway Storm Sewer Improvements (2024) – Replace and repair storm sewer along Blue Star Highway
- Ferry Street Storm Sewer Improvements (2025) – Replace storm sewer along Ferry Street to Blue Star Highway intersection

List of Major Assets

Provide a general list of the major assets identified in the AMP.

The City of the Village of Douglas' major storm water assets include:

- 223 Storm sewer structures
- 22,400 feet of storm sewer pipe
- 2,100 feet of culvert pipe

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The Village of Sparta *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1477-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Name		Phone Number	Email
Julius Suchy	at	(616) 887-8251	jsuchy@spartami.org

Julius Suchy
Signature of Authorized Representative (Original Signature Required)

12/16/19
Date

Julius Suchy - Village Manager
Print Name and Title of Authorized Representative

Village of Sparta
Storm Water Asset Management Plan Summary

Village of Sparta SAW Grant
156 E. Division Street
Sparta, Michigan 49345
www.spartami.org

Contact information for the grantee:
Mr. Julius Suchy, Village Manager
Address: 156 E. Division Street, Sparta, MI 49345
Phone: 616-887-8251

SAW Grant Project Number: 1477-01

Executive Summary

The Village of Sparta received a SAW Grant in 2016 to prepare a Storm Water Asset Management Plan.

The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$250,888	$225,799	$25,089

The key components in their Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the storm water system have been inventoried.

- Collection system manholes, catch basins, and outlets were located using survey-quality GPS.
- Detention basins and buildings were located using hand-held GPS equipment.

Locations for all assets are recorded in a geographic information system (GIS). Data including date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase.

Location of non-pipe assets such as building components and other equipment is compiled in a package of inventory spreadsheets and a computerized maintenance management system (CMMS) database. These assets were not mapped in GIS.

The GIS, asset spreadsheets, and CMMS will all be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes and catch basins) or with in-line closed circuit television (CCTV) from structure to structure. The zoom camera method provided a very economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors including joint condition, wall corrosion, and infiltration. composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
65%	21%	8%	2%	4%

Manholes, catch basins, outlets, culverts, and detention basins were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the casting, step, and structure.

Percentage of manholes/catch basins within each rating category

1	2	3	4	5
33%	59%	5%	2%	1%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

We recognize that the people served by our system are more than customers; they are the system owners. Our staff act as stewards of the system. We have held a series of public meetings and workshops to present the results of our condition assessments, review the costs for meeting various levels of service, and review the budget impacts of those options. Based on the input received during those meetings, we have established the following level of service goals:

1. Meet Regulatory Requirements
    1. Maintain a specified number of certified operators
    2. Continue our Illicit Discharge Program
2. Minimize Flooding and Public Hazards
    1. Staff and equip crews sufficiently to perform specific routine maintenance items
    2. Perform regularly scheduled monitoring and maintenance on all of our storm water system assets
    3. Adopt a baseline 10-year, 24-hour design storm
3. Manage Storm Water Inflow and Ground Water Infiltration
    1. Monitor inflow and infiltration and implement capital improvement projects to meet EPA guidelines
4. Provide Capacity for Community Growth
5. Minimize Life Cycle Costs
6. Maintain Active Water Quality
    1. Continue our street sweeping and catch basin cleaning program
    2. Maintain our Illicit Discharge Program
    3. Maintain a relationship with the Lower Grand River Organization of Watersheds

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while detention basin ratings considered factors such as sediment accumulation and remaining working volume.

Assets were given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for consequence of failure were those that:

- Provide service to a significant portion of the system
- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to waterways or significant wetlands

Consequence of failure and criticality should not be confused. Criticality is the product of as asset's risk of failure and consequence of failure. Criticality drives an asset's action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final criticality ratings were considered when the comprehensive capital improvement plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining life cycle of all assets. The annual investment cost was evaluated and demands on the Village's General Fund were reviewed.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once assets' risk of failure ratings were assigned and actions prioritized using the criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the storm water collection system assets share physical space with other asset systems such as wastewater, roadway, and drinking water, it was imperative that the CIP process coordinated actions on these systems.

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Wastewater – based on Asset Management Plan work as part of SAW
- Roadway – based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on the Water Reliability Study.

Individual project scopes for the comprehensive CIP were created to maximize coordination of work on various assets and minimize overall costs. The CIP projects include improvements to the storm water system, wastewater system (collection and treatment), drinking water system (distribution and treatment), and road system. The CIP costs were incorporated into the revenue structure review. A 10-year CIP document was created and will be available to the public once the final rate structure has been adopted.

Stormwater CIP Projects Identified:

- Installation of New Storm Sewer on Maple St South of Federal Mogul
- Installation of New Storm Sewer on Pleasant St and Nash St
- Installation of New Storm Sewer on Cherry Street between Grove St and Gunn St
- Orchard Dr Storm Sewer Improvements
- Washington St Storm Sewer Improvements
- Amelia/Pine/Pleasant St Storm Sewer Replacement
- S. Union St from Spartan Dr to Leisure Acres
- S. Union St in Front of Tesa Tape, Inc

- Elm St from Alma St to Grove St
- Applewood Dr Outside Spartan Graphics
- Loomis St and Gunn St Intersection
- Balyeat Field Storm Sewer Outlet
- Installation of New Storm Sewer Along Aspen St and Hickory St
- Storm Sewer Spot Repairs (29 Total)

List of the plan's major identified assets:

- 68,855 Feet of Gravity Sanitary Sewer
- 289 Manholes and 497 Catch Basins
- 41 Storm Water Outlets

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Village of Sparta *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1477-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 17, 2019.
2) Significant Progress Made: [✓ Yes] or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Name	Phone Number	Email
Julius Suchy	at (616) 887-8251	jsuchy@spartami.org

Julius Suchy
Signature of Authorized Representative (Original Signature Required)

12/16/19
Date

Julius Suchy - Village Manager
Print Name and Title of Authorized Representative

Village of Sparta
Wastewater Asset Management Plan Summary

Village of Sparta SAW Grant
156 E. Division Street
Sparta, Michigan 49345
www.spartami.org

Contact information for the grantee:
Mr. Julius Suchy, Village Manager
Address: 156 E. Division Street, Sparta, MI 49345
Phone: 616-887-8251

SAW Grant Project Number: 1477-01

Executive Summary

The Village of Sparta received a SAW Grant in 2016 to prepare a Wastewater Asset Management Plan.

The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$808,357	$808,357	$0

The key components in their Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the wastewater system have been inventoried.

- Collection system manholes were located using survey-quality GPS.
- Lift stations and buildings were located using hand-held GPS equipment.
- Fixed assets within the wastewater treatment plant (WWTP) were mapped based on plant schematic and record drawings.

Locations for assets that have fixed geographic locations such as pipes, manholes, buildings, and major fixed equipment are recorded in a geographic information system (GIS). Data including date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase.

Location of non-pipe assets such as lift station components, WWTP components, building components, and other equipment is compiled in a package of inventory spreadsheets and a computerized maintenance management system (CMMS) database. These assets were not mapped in GIS.

The GIS, asset spreadsheets, and CMMS will all be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes) or with in-line closed circuit television (CCTV) from manhole to manhole. The zoom camera method provided a very economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors including joint condition, wall corrosion, and infiltration. Composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
63%	23%	7%	4%	3%

Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the casting, step, and structure.

Percentage of manholes within each rating category

1	2	3	4	5
71%	26%	3%	0%	0%

Equipment within lift stations and the WWTP were rated on a scale of 1-5 based on factors relating to physical condition and operating condition. Generally, the lift station and WWTP equipment is currently in fair condition and capital improvements are included in the CIP.

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

We recognize that the people served by our system are more than customers; they are the system owners. Our staff act as stewards of the system. We have established the following level of service goals:

1. Meet Regulatory Requirements
    a. Maintain a specified number of certified operators
    b. Maintain our in-house testing abilities
2. Minimize Service Interruptions
    a. Staff and equip crews sufficiently to perform specific routine maintenance items
    b. Repair and replace assets as required to limit emergency responses to 15 per year barring prohibitive circumstances
3. Minimize Public Hazards
    a. Staff and equip emergency response services for 24-hour per day service and 120-minute response times barring prohibitive circumstances
    b. Limit service interruptions to less than 6 hours barring prohibitive circumstances
4. Manage Storm Water Inflow and Groundwater Infiltration
    a. Monitor inflow and infiltration and implement capital improvement projects to meet EPA guidelines
5. Provide Capacity for Community Growth
6. Minimize Life Cycle Costs
7. Maintain Active Relationships with Our Partner Communities
    a. A Partnering Board consisting of the Village of Sparta and Algoma Township will review the service agreement and meet as needed to review operations and maintenance demands, the capital improvement plan, and the rate structure for the WWTP.

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while lift station pump ratings considered factors such as design pumping rate vs actual pumping rate.

Assets were given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for consequence of failure were those that:

- Provide service to a significant portion of the system
- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to waterways or significant wetlands

Consequence of failure and criticality should not be confused. Criticality is the product of as asset's risk of failure and consequence of failure. Criticality drives an asset's action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final criticality ratings were considered when the comprehensive capital improvement plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

Historical operating expenses were reviewed using current audit and budget information. Based on that information, a “Test Year” was developed that reflected a baseline cost. The baseline cost included currently budgeted expenses, debt service, and leveling for base operating cost.

The customer base was reviewed, including the number of billable customers and volumetric sales. Other operating and non-operating revenues were also evaluated. Prediction of customer and volume counts were made including trending in system utilization, projection of operating costs, and anticipated inflation by expense category. Refinancing and restructuring possibilities were also explored.

The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining life cycle of all assets. The annual investment cost was evaluated, and scenarios developed for cash funding and debt financing. Based on that analysis, rate adjustments are currently being evaluated and we are moving forward with final Village Council review/selection of the changes required to meet our desired Level of Service.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once assets’ risk of failure ratings were assigned and actions prioritized using the criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the wastewater collection system assets share physical space with other asset systems such as storm water, roadway, and drinking water, it was imperative that the CIP process coordinated actions on these systems.

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Storm Water – based on Asset Management Plan work as part of SAW
- Roadway – based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on the Water Reliability Study.

Individual project scopes for the comprehensive CIP were created to maximize coordination of work on various assets and minimize overall costs. The CIP projects include improvements to the wastewater system (both collection and treatment), storm water system, drinking water system (distribution and treatment), and road system. The CIP costs were incorporated into the revenue structure review. A 10-year CIP document was created and will be available to the public once the final rate structure has been adopted.

Wastewater CIP Projects Identified:

- E. Gardner St from Martindale to the Wastewater Treatment Plant
- E. Gardner St from Union St to Martindale St
- Pine St from Orchard Dr to Holy Family Catholic Church
- Grove St from Cherry St to River Rd
- Maple St from Gardner St to Centennial Ave
- Sanitary Sewer Spot Repairs (8 total spot repairs)
- Sanitary Sewer Lining Projects (Over 1600’ of sanitary sewer lining)
- Automation of Treatment Train #2
- Motor Control Center Improvements
- Permanent Hypochlorite Feed System
- Polishing Pond Sludge Removal
- River Road Lift Station Upgrade

List of the plan’s major identified assets

- 1.2 MGD Average Daily Flow Wastewater Treatment Plant

- 4 Lift Stations
- 5,438 Feet of Sanitary Force Main
- 112,164 Feet of Gravity Sanitary Sewer

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	December 20, 2019
To:	Mr. David Worthington
Company:	Michigan Department of Environment, Great Lakes, and Energy
From:	Prein&Newhof
Project #:	2130365
Re:	Benton Charter Township SAW Grant: Summary of Wastewater Asset Management Plan

Mr. Worthington:

This memorandum provides the summary of the Benton Charter Township wastewater asset management plan SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent EGLE guidance.

Grantee Information

SAW Grant Project Number: 1481-01

Grantee:

Benton Charter Township
1725 Territorial Road
Benton Harbor, MI 49022
https://bentonchartertwp.org

Contact: Ms. Carolyn Phillips, Clerk
Phone: 269-925-0616

Executive Summary

Benton Charter Township received a SAW Grant in 2016 to prepare a Wastewater Asset Management Plan. The Grant agreement indicated the following amounts:

Project Total	Grant Amount	Local Match
$2,000,000	$2,000,000	$0

The key components in the Asset Management Plan include:

1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality of Assets
4. Operation and Maintenance Strategies/Revenue Structure
5. Long-term Funding/Capital Improvement Plan

Asset Inventory

"Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets."

Manhole, gravity sewer main, force main, and lift station locations were plotted in a Geographic Information System (GIS) using record drawings. Manhole and lift station locations were field verified, and locations were adjusted with Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, size, pipe inverts and manhole rim elevation were cataloged from record drawing and visually verified where needed. Asset inventory data is managed using GIS databases.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

Gravity Sewer Mains: Inspections were made using either a pole-mounted zoom camera (looking up and down each pipe from the manholes) or with in-line closed circuit television (CCTV) cameras. Pipes inspected with zoom camera methods were rated considering any observable roots, deposits, joint conditions, pipe wall condition, infiltration, or other defect observations. Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program system condition grading system. Composite risk of failure ratings of 1-5 (5 being the worst) were derived for each pipe.

Percentage of gravity sewer pipes in each rating category

1	2	3	4	5
35%	23%	26%	6%	10%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. The Township's force main data was compared with that of several other municipalities to establish a comparative reference. Ratings of 1-5 were developed for each force main.

Percentage of force main pipes in each rating category

1	2	3	4	5
53%	8%	31%	8%	0%

Manholes: Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, structures, and infiltration.

Percentage of manholes in each rating category

1	2	3	4	5
37%	49%	13%	1%	0.4%

Lift Stations: Visual inspection and performance testing were completed to evaluate lift station asset condition. Lift station assets, including pumps, valves, piping, structures, electrical, controls, and other assets, were rated on a scale of 1-5. Composite ratings for the stations were developed.

Number of lift stations in each rating category

1	2	3	4	5
0	1	7	17	2

Level of Service Determination

"Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined."

The Township recognizes that the people served by the system are more than customers; they are the system owners. Township staff act as stewards of the system. The Township has held a series of public meetings and workshops with the Township Board. At these meetings, the results of the condition assessments were discussed, the costs for various operations, maintenance, and repair strategies affecting the levels of service were reviewed along with potential rate impacts. Based on the input received during these meetings, the following level of service goals have been established:

1. Minimize Service Interruptions
2. Minimize Public Hazards
3. Reduce Storm Water Inflow and Ground Water Infiltration
4. Support for Community Growth
5. Minimize Life Cycle Costs

Criticality of Assets

"Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?"

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions as determined through condition assessments. Assets were given a consequence of failure rating of 1-5 (5 being the worst) based on potential damage to adjacent utilities, transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for consequence of failure were those that provide service to a significant portion of the system, are under major roads, or are adjacent to other major utilities.

Criticality ratings were calculated as the product of an asset's risk and consequence of failure ratings, producing criticality ratings ranging from 1-25 (25 being the most critical). The most critical assets were found to be gravity sewers primarily along M-139, Pipestone Rd, Napier Ave, and M-63, as well as several sewers along Main St/BL I-94 and in the surrounding neighborhoods.

Revenue Structure

"Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made."

Historical operating expenses were reviewed using current audit and budget information. Based on that information, a "Test Year" was developed that reflected a baseline cost. The baseline costs included currently budgeted expenses, debt service, and leveling for base operating cost.

The customer base was reviewed, including the number of residential equivalent units in our system. Other operating and non-operating revenues were also evaluated. Prediction of customer connections were made including trending in system utilization, projection of operating costs, and anticipated inflation by expense category.

Project costs were estimated for capital improvements within the first 20 years. The annual investment cost was evaluated, and scenarios were developed for cash funding and debt financing. Based on this analysis, it was determined that rates will need be increased in order to continue providing the desired level of service. The Township Board has adopted an initial rate increase of 15% to be followed by annual increases of 4.5%.

Capital Improvement Plan

"Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects."

A capital improvement plan showing project descriptions, cost estimates, and project timelines was developed for the capital improvements needed within a 20 year planning period. The wastewater system projects identified in the capital improvement plan within the first five years are:

- Township-wide Sewer Point Repairs
- Park Ave Sewer Reconstruction (Higman Park Hill 1)
- Crystal and Main Sewer Reconfiguration
- Euclid Ave Sewer Reconstruction
- Napier Ave Sewer Point Repairs
- Force Main Construction for Future Pipestone LS Relocation
- Crystal Ave Sewer Reconstruction (Britain Ave to Empire Ave)
- Pipestone Lift Station Relocation
- Pilot and Greenly LS Eliminations
- Pipestone Rd, M-139, and Carlton Ave Sewer Reconstruction
- Napier Ave Sewer Reconstruction (Norton St to Plaza Dr)
- M-139 Sewer Reconstruction (Fairplain Dr Area)
- Eastman Ave and Francis Ave Sewer Reconstruction (Britain Ave to Blaine Ave)
- Britain Ave Sewer Reconstruction (Eastman Ave to Crystal Ave)
- Lake Michigan College LS Improvements

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Benton Charter Township's major assets include:

- 27 lift stations
- 421,800 feet of 6" to 48" diameter gravity sewer
- 67,200 feet of 4" to 24" diameter force main
- 1,440 manholes

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Charter Township of Benton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1481-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/17/2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Carolyn Phillips, Township Clerk at (269) 925-0616 cphillips@bentonchartertownship-mi.gov

Name | Phone Number | Email

Carolyn Phillips 12/12/2019

Signature of Authorized Representative (Original Signature Required) | Date

Carolyn Phillips, Township Clerk

Print Name and Title of Authorized Representative

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Charter Township of Benton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1481-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/17/2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Carolyn Phillips, Township Clerk at (269) 925-0616 cphillips@bentonchartertownship-mi.gov

Name Phone Number Email

Carolyn Phillips 12/12/2019

Signature of Authorized Representative (Original Signature Required) Date

Carolyn Phillips, Township Clerk

Print Name and Title of Authorized Representative

May 2019

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	December 20, 2019
To:	Mr. David Worthington
Company:	Michigan Department of Environment, Great Lakes, and Energy
From:	Prein&Newhof
Project #:	2130365
Re:	Benton Charter Township SAW Grant: Summary of Wastewater Asset Management Plan

Mr. Worthington:

This memorandum provides the summary of the Benton Charter Township wastewater asset management plan SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent EGLE guidance.

Grantee Information

SAW Grant Project Number: 1481-01

Grantee:

Benton Charter Township
1725 Territorial Road
Benton Harbor, MI 49022
https://bentonchartertwp.org

Contact: Ms. Carolyn Phillips, Clerk
Phone: 269-925-0616

Executive Summary

Benton Charter Township received a SAW Grant in 2016 to prepare a Wastewater Asset Management Plan. The Grant agreement indicated the following amounts:

Project Total	Grant Amount	Local Match
$2,000,000	$2,000,000	$0

The key components in the Asset Management Plan include:

1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality of Assets
4. Operation and Maintenance Strategies/Revenue Structure
5. Long-term Funding/Capital Improvement Plan

Asset Inventory

"Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets."

Manhole, gravity sewer main, force main, and lift station locations were plotted in a Geographic Information System (GIS) using record drawings. Manhole and lift station locations were field verified, and locations were adjusted with Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, size, pipe inverts and manhole rim elevation were cataloged from record drawing and visually verified where needed. Asset inventory data is managed using GIS databases.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

Gravity Sewer Mains: Inspections were made using either a pole-mounted zoom camera (looking up and down each pipe from the manholes) or with in-line closed circuit television (CCTV) cameras. Pipes inspected with zoom camera methods were rated considering any observable roots, deposits, joint conditions, pipe wall condition, infiltration, or other defect observations. Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program system condition grading system. Composite risk of failure ratings of 1-5 (5 being the worst) were derived for each pipe.

Percentage of gravity sewer pipes in each rating category

1	2	3	4	5
35%	23%	26%	6%	10%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. The Township's force main data was compared with that of several other municipalities to establish a comparative reference. Ratings of 1-5 were developed for each force main.

Percentage of force main pipes in each rating category

1	2	3	4	5
53%	8%	31%	8%	0%

Manholes: Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, structures, and infiltration.

Percentage of manholes in each rating category

1	2	3	4	5
37%	49%	13%	1%	0.4%

Lift Stations: Visual inspection and performance testing were completed to evaluate lift station asset condition. Lift station assets, including pumps, valves, piping, structures, electrical, controls, and other assets, were rated on a scale of 1-5. Composite ratings for the stations were developed.

Number of lift stations in each rating category

1	2	3	4	5
0	1	7	17	2

Level of Service Determination

"Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined."

The Township recognizes that the people served by the system are more than customers; they are the system owners. Township staff act as stewards of the system. The Township has held a series of public meetings and workshops with the Township Board. At these meetings, the results of the condition assessments were discussed, the costs for various operations, maintenance, and repair strategies affecting the levels of service were reviewed along with potential rate impacts. Based on the input received during these meetings, the following level of service goals have been established:

1. Minimize Service Interruptions
2. Minimize Public Hazards
3. Reduce Storm Water Inflow and Ground Water Infiltration
4. Support for Community Growth
5. Minimize Life Cycle Costs

Criticality of Assets

“Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?”

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions as determined through condition assessments. Assets were given a consequence of failure rating of 1-5 (5 being the worst) based on potential damage to adjacent utilities, transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for consequence of failure were those that provide service to a significant portion of the system, are under major roads, or are adjacent to other major utilities.

Criticality ratings were calculated as the product of an asset’s risk and consequence of failure ratings, producing criticality ratings ranging from 1-25 (25 being the most critical). The most critical assets were found to be gravity sewers primarily along M-139, Pipestone Rd, Napier Ave, and M-63, as well as several sewers along Main St/BL I-94 and in the surrounding neighborhoods.

Revenue Structure

“Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.”

Historical operating expenses were reviewed using current audit and budget information. Based on that information, a “Test Year” was developed that reflected a baseline cost. The baseline costs included currently budgeted expenses, debt service, and leveling for base operating cost.

The customer base was reviewed, including the number of residential equivalent units in our system. Other operating and non-operating revenues were also evaluated. Prediction of customer connections were made including trending in system utilization, projection of operating costs, and anticipated inflation by expense category.

Project costs were estimated for capital improvements within the first 20 years. The annual investment cost was evaluated, and scenarios were developed for cash funding and debt financing. Based on this analysis, it was determined that rates will need be increased in order to continue providing the desired level of service. The Township Board has adopted an initial rate increase of 15% to be followed by annual increases of 4.5%.

Capital Improvement Plan

"Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects."

A capital improvement plan showing project descriptions, cost estimates, and project timelines was developed for the capital improvements needed within a 20 year planning period. The wastewater system projects identified in the capital improvement plan within the first five years are:

- Township-wide Sewer Point Repairs
- Park Ave Sewer Reconstruction (Higman Park Hill 1)
- Crystal and Main Sewer Reconfiguration
- Euclid Ave Sewer Reconstruction
- Napier Ave Sewer Point Repairs
- Force Main Construction for Future Pipestone LS Relocation
- Crystal Ave Sewer Reconstruction (Britain Ave to Empire Ave)
- Pipestone Lift Station Relocation
- Pilot and Greenly LS Eliminations
- Pipestone Rd, M-139, and Carlton Ave Sewer Reconstruction
- Napier Ave Sewer Reconstruction (Norton St to Plaza Dr)
- M-139 Sewer Reconstruction (Fairplain Dr Area)
- Eastman Ave and Francis Ave Sewer Reconstruction (Britain Ave to Blaine Ave)
- Britain Ave Sewer Reconstruction (Eastman Ave to Crystal Ave)
- Lake Michigan College LS Improvements

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Benton Charter Township's major assets include:

- 27 lift stations
- 421,800 feet of 6" to 48" diameter gravity sewer
- 67,200 feet of 4" to 24" diameter force main
- 1,440 manholes

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/31/2019
(no later than 3 years from executed grant date)

The City of Stanton *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1494-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Vester Davis Jr.	at	989-831-4440	citymanager@stantononline.com
Name		Phone Number	Email

Vester Davis Jr. 12/20/19
Signature of Authorized Representative (Original Signature Required) Date

Vester Davis, Jr. City Manager
Print Name and Title of Authorized Representative

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The City of Stanton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1494-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/17/2019.
2) Significant Progress Made: [✓ Yes] or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Vester Davis Jr.	at 989-831-4440	citymanager@stantononline.com
Name	Phone Number	Email

Vester Davis Jr. 12/20/19
Signature of Authorized Representative (Original Signature Required) Date

Vester Davis, Jr. City Manager
Print Name and Title of Authorized Representative

City of Stanton
Wastewater Asset Management Plan Summary

City of Stanton SAW Grant

P.O. Box 449

225 S. Camburn Street

Stanton, Michigan 48888

www.stantononline.com

Contact information for the grantee:

Vester Davis Jr., City Manager

Address: 225 S. Camburn Street, Stanton, MI 48888

Phone: 989-831-4440

Email: citymanager@stantononline.com

SAW Grant Project Number: 1494-01

Executive Summary

The City of Stanton received a SAW Grant in 2016 to prepare a Wastewater Asset Management Plan.

The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$603,601	$603,601	$0

The key components in the Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-Term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the wastewater system have been inventoried.

- Collection system manholes were located using survey-quality GPS equipment.
- Lift stations and buildings were located using hand-held GPS equipment.
- Fixed assets within the wastewater treatment facility (WWTF) were mapped based on plant schematic and record drawings.

Locations for assets that have fixed geographic locations such as pipes, manholes, buildings, and major fixed equipment are recorded in a geographic information system (GIS). Data including date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase.

Location of non-pipe assets such as lift station components, WWTF components, building components, and other equipment is compiled in a package of inventory spreadsheets and a computerized maintenance management system (CMMS) database. These assets were not mapped in GIS.

The GIS, asset spreadsheets, and CMMS will all be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes) or with in-line closed circuit television (CCTV) from manhole to manhole. The zoom camera method provided a very economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged, and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors including joint condition, wall corrosion, and infiltration. Composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
53.6%	24.7%	17.1%	0.7%	3.9%

Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, and structures.

Percentage of manholes within each rating category

1	2	3	4	5
51.6%	34.2%	11.2%	2.5%	0.6%

Equipment within the grinder station, lift stations, and WWTF were rated on a scale of 1-5 based on factors relating to physical condition, age, and operating condition.

Percentage of grinder and lift station assets within each rating category

1	2	3	4	5
35.3%	32.9%	28.2%	2.4%	1.2%

Percentage of WWTF assets within each rating category

1	2	3	4	5
12.2%	48.8%	29.7%	6.4%	2.3%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

We recognize that the people served by our system are more than customers; they are the system owners. Our staff act as stewards of the system. We have held a series of public meetings and workshops to present the results of our condition assessments, review the costs for meeting various levels of service, and review the rate impacts of those options. Based on the input received during those meetings, we have established the following level of service goals:

1. Meet Regulatory Requirements
    a. Maintain a specified number of certified operators
    b. Perform testing through a certified laboratory
    c. Will adopt an Industrial Pretreatment Program if industry development occurs
2. Minimize Service Interruptions
    a. Staff and equip crews sufficiently to perform specific routine maintenance items
    b. Repair and replace assets as required to limit emergency responses to 10 per year
3. Minimize Public Hazards
    a. Staff and equip emergency response services for 24-hour per day service and 60-minute response times
    b. Limit service interruptions to less than 6 hours
4. Manage Storm Water Inflow and Ground Water Infiltration
    a. Monitor inflow and infiltration and implement capital improvement projects to meet EPA guidelines
5. Provide Capacity for Community Growth
6. Minimize Life Cycle Costs

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while lift station pump ratings considered factors such as design pumping rate vs. actual pumping rate.

Assets were given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for consequence of failure were those that:

- Provide service to a significant portion of the system
- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to waterways or significant wetlands

Consequence of failure and criticality should not be confused. Criticality is the product of as asset’s risk of failure and consequence of failure. Criticality drives an asset’s action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final criticality ratings were considered when the comprehensive Capital Improvement Plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

Historical operating expenses were reviewed using current audit and budget information. Based on that information, a “Test Year” was developed that reflected a baseline cost. The baseline cost included currently budgeted expenses, debt service, and leveling for base operating cost.
The customer base was reviewed, including the number of billable customers and volumetric sales. Other operating and non-operating revenues were also evaluated. Prediction of customer and volume counts were made, including trending in system utilization, projection of operating costs, and anticipated inflation by expense category. Refinancing and restructuring possibilities were also explored. The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining life cycle of all assets. The annual investment cost was evaluated, and scenarios were developed for cash funding and debt financing. Based on that analysis, rate adjustment options were identified. It was determined that the current rate structure was sufficient to cover operations and maintenance activities but that increases were needed to fully implement the desired CIP. Public meetings were held to convey the results of the asset evaluation (risk of failure and criticality) along with the financial evaluation. The City is moving forward with the rate changes required to provide the desired level of service.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once assets’ risk of failure ratings were assigned and actions prioritized using the criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the wastewater collection system assets share physical space with other asset systems such as storm water, roadway, and drinking water, it was imperative that the CIP process coordinated actions on these systems.

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Storm Water – based on Asset Management Plan work as part of SAW
- Roadway – based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on the Water Reliability Study.

Individual project scopes for the comprehensive CIP were created to maximize coordination of work on various assets and minimize overall costs. The CIP projects include improvements to the wastewater system (both collection and treatment), storm water system, drinking water system (distribution and treatment), and road system. The CIP costs were incorporated into the revenue structure review. A 10-year CIP document was created and will be available to the public once the final rate structure has been adopted.

Wastewater CIP Projects Identified:

- Sanitary Sewer Cleaning and Televising, and Septic Tank Cleaning
- Vine Force Main (and water main) Reconstruction
- Lincoln Street Sanitary (and storm and water)(Bradford to Main) Reconstruction
- Camburn Lift Station Improvements
- Lincoln Street (Cedar to Bradford) Sanitary Sewer Improvements
- WWTF Pond 2 Berm Repair
- State Street Sanitary Replacement
- West Lift Station Improvements
- North State Street Sanitary Lining
- WWTF Inlet Structure Improvements
- Sanitary Sewer Spot Repairs
- WWTF Pond 2 Bypass Pipe Construction
- Day Street Sanitary Sewer Improvements

- WWTF CMP Replacements

List of the plan’s major identified assets:

- 155,000 GPD Average Daily Flow Wastewater Treatment Facility
    - Current replacement value of $5,200,000
- 3 lift stations and 1 grinder station
    - Current replacement value of $1,100,000
- 15,100 feet of sanitary force main
    - Current replacement value of $2,265,000
- 43,300 feet of gravity sanitary sewer
    - Current replacement value of $6,495,000

City of Stanton
Storm Water Asset Management Plan Summary

City of Stanton SAW Grant
P.O. Box 449
225 S. Camburn Street
Stanton, Michigan 48888
www.stantononline.com

Contact information for the grantee:
Vester Davis Jr., City Manager
Address: 225 S. Camburn Street, Stanton, MI 48888
Phone: 989-831-4440
Email: citymanager@stantononline.com

SAW Grant Project Number: 1494-01

Executive Summary

The City of Stanton received a SAW Grant in 2016 to prepare a Storm Water Asset Management Plan.

The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$420,712	$420,712	$0

The key components in the Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-Term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the storm water system have been inventoried.

- Collection system manholes, catch basins, and outlets were located using survey-quality GPS equipment.
- Detention basins and buildings were located using hand-held GPS equipment.

Locations for all assets are recorded in a geographic information system (GIS). Data including date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase.

Location of non-pipe assets such as building components and other equipment is compiled in a package of inventory spreadsheets. These assets were not mapped in GIS.

The GIS and asset spreadsheets will be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes and catch basins) or with in-line closed circuit television (CCTV) from structure to structure. The zoom camera method provided a very economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged, and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors including joint condition, wall corrosion, and infiltration. Composite risk of failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite risk of failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
23%	43%	19%	5%	10%

Manholes, catch basins, outlets, culverts, and detention basins were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, and structures.

Percentage of manholes/catch basins within each rating category

1	2	3	4	5
56%	31%	6%	5%	2%

No Rating: 8%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

We recognize that the people served by our system are more than customers; they are the system owners. Our staff act as stewards of the system. We have held a series of public meetings and workshops to present the results of our condition assessments, review the costs for meeting various levels of service, and review the budget impacts of those options. Based on the input received during those meetings, we have established the following level of service goals:

1. Meet Regulatory Requirements
    a. Department of Public Works staff will provide inspection, quality control, and broadened institutional knowledge
    b. Continue to coordinate with Montcalm County to remove illicit discharge
2. Minimize Flooding and Public Hazards
    a. Staff and equip crews sufficiently to perform specific routine maintenance items
    b. Perform regularly scheduled monitoring and maintenance on all of our storm water system assets
    c. Adopt a baseline 10-year, 24-hour design storm
3. Manage Storm Water Inflow and Ground Water Infiltration
    a. Monitor inflow and infiltration and implement capital improvement projects to meet EPA guidelines
4. Provide Capacity for Community Growth
5. Minimize Life Cycle Costs
6. Maintain Active Water Quality
    a. Continue street sweeping and catch basin cleaning on a regular basis
    b. Continue to remove illicit discharge
    c. Maintain a relationship with the Montcalm County Drain Commission

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a risk of failure rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while detention basin ratings considered factors such as sediment accumulation and remaining working volume.

Assets were given a consequence of failure of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.
Assets with the higher rankings for consequence of failure were those that:

- Provide service to a significant portion of the system
- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to waterways or significant wetlands

Consequence of failure and criticality should not be confused. Criticality is the product of as asset's risk of failure and consequence of failure. Criticality drives an asset's action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final criticality ratings were considered when the comprehensive Capital Improvement Plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining lifecycle of all assets. The annual investment cost was evaluated and demands on the City's General Fund were reviewed.

Based on that analysis, the CIP and funding allocations in the General Fund were adjusted so that both operations and maintenance activities and CIP actions could be funded. Public meetings were held to convey the results of the asset evaluation (risk of failure and criticality) along with the financial evaluation. The City is moving forward with the budget adjustments required to provide the desired level of service.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once assets' risk of failure ratings were assigned and actions prioritized using the criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the storm water collection system assets share physical space with other asset systems such as wastewater, roadway, and drinking water, it was imperative that the CIP process coordinated actions on these systems.

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Wastewater – based on Asset Management Plan work as part of SAW
- Roadway – based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on the Water Reliability Study.

Individual project scopes for the comprehensive CIP were created to maximize coordination of work on various assets and minimize overall costs. The CIP projects include improvements to the storm water system, wastewater system (collection and treatment), drinking water system (distribution and treatment), and road system. The CIP costs were incorporated into the revenue structure review. A 10-year CIP document was created and will be available to the public once the final rate structure has been adopted.

Storm Water CIP Projects Identified:

- Yearly Storm Sewer Cleaning & Televising and Catch Basin Cleaning
- Pine Street Culvert and Storm Sewer Replacement
- Lincoln Street Storm, (also Sanitary and Water) Reconstruction

- West Side Storm Sewer Reconstruction and Detention Pond (Easement, Pine St., Bradford St., 2nd St.)
- Storm Lining on Camburn Street
- Storm Sewer Spot Repairs
- Mill Street Storm Reconstruction
- Camburn Street Storm Reconstruction, North and South

List of the plan's major identified assets:

- 15,700 feet of gravity storm sewer
    - Current replacement value of $2,355,000
- 30 manholes and 105 catch basins
    - Current replacement value of $472,500
- 20 Culverts
    - Current replacement value of $228,000

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Lowell *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1511-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Name		Phone Number	Email
Mike Burns	at	(616) 897-8457	mburns@ci.lowell.mi.us

Signature of Authorized Representative (Original Signature Required)

Date: 12-27-19

Mike Burns - City Manager
Print Name and Title of Authorized Representative

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant Wastewater Asset Management Plan Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Lowell *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1511-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 17, 2019.
2) Significant Progress Made: [✓ Yes] or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Mike Burns at (616) 897-8457 mburns@ci.lowell.mi.us
Name Phone Number Email

Signature of Authorized Representative (Original Signature Required) 12-27-19
Date

Mike Burns - City Manager
Print Name and Title of Authorized Representative

May 2019

City of Lowell
Wastewater Asset Management Plan Summary

City of Lowell SAW Grant
301 East Main Street, Lowell, MI 49331
www.ci.lowell.mi.us

Contact information for the grantee:
Mr. Michael Burns, City Manager
Address: 301 East Main Street, Lowell, MI 49331
Phone: 616-897-8457

SAW Grant Project Number: 1511-01

Executive Summary

The City of Lowell received a SAW Grant in 2016 to prepare a Wastewater Asset Management Plan. The grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$739,404	$665,464	$73,940

The key components in their Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-Term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the wastewater system have been inventoried.

- Collection system manholes were located using survey-quality GPS
- Lift stations and buildings were located using hand-held GPS equipment
- Fixed assets within the wastewater treatment plant (WWTP) were identified based on plant schematic and record drawings

Locations for assets that have fixed geographic locations such as pipes, manholes, buildings, and major fixed equipment are recorded in a geographic information system (GIS). Data regarding date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase. The GIS and asset spreadsheets will be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes) or with in-line closed circuit television (CCTV) from manhole to manhole. The zoom camera method provided a very economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged, and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors such as joint conditions, wall corrosion, and infiltration. Composite Risk of Failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite Risk of Failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
44%	29%	17%	1%	9%

Manholes were visually inspected and rated on a scale of 1-5 based on factors related to the condition of the castings, steps, and structures.

Percentage of manholes within each rating category

1	2	3	4	5
49%	37%	10%	3%	1%

Equipment within lift stations and the WWTP was rated on a scale of 1-5 based on factors relating to physical condition and operating condition. Generally, the lift station and WWTP equipment is currently in good condition with no major capital improvements needed at this time.

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

The City of Lowell recognizes that the people served by the wastewater system are more than customers; they are the system owners. City staff act as stewards of the system. A series of public meetings and workshops have been held to present the results of the condition assessments, review the costs for meeting various levels of service, and review the rate impacts of those options. Based on the input received during those meetings, the following Level of Service Goals have been established:

1. Meet Regulatory Requirements
    a. Maintain a specified number of Certified Operators
    b. Maintain in-house testing abilities
2. Minimize Service Interruptions
    a. Staff and equip crews sufficiently to perform specific routine maintenance items
    b. Repair and replace assets as required to limit emergency responses to 15 per year
3. Minimize Public Hazards
    a. Staff and equip emergency response services for 24-hour per day service and 60-minute response times
    b. Limit service interruptions to less than 6 hours
4. Manage Storm Water Inflow and Groundwater Infiltration
    a. Monitor inflow and infiltration and implement capital improvement projects to meet EPA guidelines
5. Provide Capacity for Community Growth
6. Minimize Life Cycle Costs
7. Maintain Active Relationships with Our Partner Community
    a. Meet annually with Lowell Township to review operations and maintenance (O&M) demands, the CIP, and the rate structure

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a Risk of Failure (RoF) rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while lift station pumps considered factors such as design pumping rate vs actual pumping rate.

Assets were given a Consequence of Failure (CoF) of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for Consequence of Failure were those that:

- Provide service to a significant portion of the system
- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to waterways or significant wetlands

Consequence of Failure and Criticality should not be confused. Criticality is the product of as asset’s Risk of Failure (RoF) and Consequence of Failure (CoF). Criticality drives an asset’s action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final Criticality ratings were considered when the comprehensive Capital Improvement Plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

Historical operating expenses were reviewed using current audit and budget information. Based on that information, a "Test Year" was developed that reflected a baseline cost. The baseline cost included currently budgeted expenses, debt service, and leveling for base operating cost. The customer base was reviewed, including the number of billable customers and volumetric sales. Other operating and non-operating revenues were also evaluated. Prediction of customer and volume counts were made, including trending in system utilization, projection of operating costs, and anticipated inflation by expense category. Refinancing and restructuring possibilities were also explored. The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining life cycle of all assets. The annual investment cost was evaluated, and scenarios were developed for cash funding and debt financing. Based on that analysis, rate adjustment options were identified. It was determined that the current rate structure was sufficient to cover O&M activities but that increases were needed to fully implement the desired CIP. The City is moving forward with evaluation of potential rate changes that may be required to provide our desired Level of Service.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once RoF ratings were assigned and actions prioritized using the Criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the wastewater collection system assets share physical space with other asset systems, such as storm water, roadway, and drinking water, it was imperative that the CIP process coordinated actions on these systems.

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Storm Water – based on Asset Management Plan work as part of SAW
- Roadway - based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on the Water Reliability Study.

Individual project scopes for the comprehensive CIP were created to maximize coordination of work on various assets and minimize overall costs. The CIP projects include improvements to the wastewater system (both collection and treatment), storm water system, drinking water system (distribution and treatment), and road system. The CIP costs were incorporated into the revenue structure review. A 10-year CIP document was created and will be available to the public once the final rate structure has been adopted.

Wastewater CIP Projects Include:

- Foreman St Sanitary Sewer Replacement
- Washington St Reconstruct
- Monroe St Reconstruct
- Lincoln Lake Ave & Amity St Sanitary Sewer Improvements
- West St from Bowes St to Main St
- Avery St from Jefferson St to Jackson St
- Lincoln Lake Ave from Elizabeth St to Mercer St
- Main St at Valley Vista Dr Sanitary Sewer Improvements
- Grindle Dr & Shepard Blvd Sanitary Sewer Improvements
- Sanitary Sewer Spot Repairs (33 dig & replace spot repairs)
- Sanitary Sewer Lining Contract (2,778 feet of lining)

City of Lowell
Wastewater Asset Management Plan Summary

List of the plan's major identified assets

- 1.42 MGD average daily flow wastewater treatment plant
- 3 lift stations
  - Current replacement value of $1,740,000
- 6,700 feet of sanitary force main
  - Current replacement value of $804,000
- 96,144 feet of gravity sanitary sewer
  - Current replacement value of $14,421,600

City of Lowell
Storm Water Asset Management Plan Summary

City of Lowell SAW Grant
301 East Main Street, Lowell, MI 49331
www.ci.lowell.mi.us

Contact information for the grantee:
Mr. Michael Burns, City Manager
Address: 301 East Main Street, Lowell, MI 49331
Phone: 616-897-8457

SAW Grant Project Number: 1511-01

Executive Summary

The City of Lowell received a SAW Grant in 2016 to prepare a Storm Water Asset Management Plan. The grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$240,783	$216,705	$24,078

The key components in their Asset Management Plan include:

a. Asset Inventory and Condition Assessment
b. Level of Service
c. Criticality of Assets
d. Operation and Maintenance Strategies/Revenue Structure
e. Long-Term Funding/Capital Improvement Plan

Asset Inventory

Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.

All assets that are functionally or financially significant to the storm water system have been inventoried.

- Collection system manholes, catch basins, and outlets were located using survey-quality GPS
- Detention basins and buildings were located using hand-held GPS equipment

Locations for all assets are recorded in a geographic information system (GIS). Data regarding date of installation, material, and other physical characteristics for each asset is incorporated into the GIS geodatabase. The GIS and asset spreadsheets will be used to maintain asset data in the future.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

The condition of collection system piping was documented with either a pole-mounted zoom camera (looking down each pipe from the manholes and catch basins) or with in-line closed circuit television (CCTV) from structure to structure. The zoom camera method provided an economical initial condition assessment of the pipes. Pipes noted to have potentially significant deficiencies were flagged, and follow-up inspections were performed with full in-line CCTV.

Using the zoom camera data, pipes were rated based on several factors such as joint conditions, wall corrosion, and infiltration. Composite Risk of Failure ratings of 1-5 (5 being the worst) were assigned to each pipe segment.

Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system. The PACP ratings were then used to derive a composite Risk of Failure rating of 1-5 for each pipe.

Percentage of pipes within each rating category

1	2	3	4	5
62%	32%	4%	1%	1%

Manholes, catch basins, outlets, culverts, and detention basins were visually inspected and rated on a scale of 1-5 based on factors related to the condition of castings, steps, and structures.

Percentage of manholes/catch basins within each rating category

1	2	3	4	5
13%	80%	6%	1%	0%

Level of Service Determination

Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality’s ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.

The City of Lowell recognizes that the people served by the storm water system are more than customers; they are the system owners. City staff act as stewards of the system. A series of public meetings and workshops have been held to present the results of the condition assessments, review the costs for meeting various levels of service, and review the budget impacts of those options. Based on the input received during those meetings, the following Level of Service Goals have been established:

1. Meet Regulatory Requirements
    a. Maintain a specified number of Certified Operators
    b. Continue our Illicit Discharge Program

2. Minimize Flooding and Public Hazards
    a. Staff and equip crews sufficiently to perform specific routine maintenance items
    b. Perform regularly scheduled monitoring and maintenance on all of our storm water system assets
    c. Adopt a baseline 10-year, 24-hour design storm
3. Manage Storm Water Inflow and Groundwater Infiltration
    a. Monitor inflow and infiltration and implement capital improvement projects to meet EPA guidelines
4. Provide Capacity for Community Growth
5. Minimize Life Cycle Costs
6. Maintain Active Water Quality
    a. Establish a street sweeping and catch basin cleaning program
    b. Maintain our Illicit Discharge Program
    c. Maintain a relationship with the Kent County Drain Commission Office

Criticality of Assets

Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?

Assets were given a Risk of Failure (RoF) rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by asset type and were tailored to identify both physical and functional deficiencies. For example, pipe ratings considered factors such as joint offsets and structural cracking, while detention basin ratings considered factors such as sediment accumulation and remaining working volume.

Assets were given a Consequence of Failure (CoF) of 1-5 (5 being the worst) based on potential damage to adjacent utilities, the transportation network, and the surrounding property/environment. The magnitude of the potential service disruption was also a factor.

Assets with the higher rankings for Consequence of Failure were those that:

- Provide service to a significant portion of the system

- Serve schools/hospitals/major industry
- Are under major roads
- Are adjacent to waterways or significant wetlands

Consequence of Failure and Criticality should not be confused. Criticality is the product of as asset's Risk of Failure (RoF) and Consequence of Failure (CoF). Criticality drives an asset's action priority.

Criticality ratings were calculated and ranged from 1-25 (25 being the highest priority). A Jenks Optimization was then run to create 5 primary groupings, each with a rank of 1-5 (5 being highest priority). The final Criticality ratings were considered when the comprehensive Capital Improvement Plan (CIP) was generated.

Revenue Structure

Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.

The CIP provided refined cost projections for the first 10 years of the financial analysis. The Asset Management System identified the estimated asset investment cost by year for the remaining life cycle of all assets. The annual investment cost was evaluated and demands on the City's General Fund were reviewed.

Based on that analysis, the CIP and funding allocations in the General Fund were adjusted so that both operations and maintenance activities and CIP actions could be funded. Public meetings were held to convey the results of the asset evaluation (RoF and Criticality) along with the financial evaluation. The City is moving forward with the budget adjustments required to provide our desired level of service.

Capital Improvement Plan

Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.

Once assets' RoF ratings were assigned and actions prioritized using the Criticality ratings, action timelines were predicted for maintenance, repair, and replacement. Because the storm water collection system assets share physical space with other asset systems, such as wastewater, roadway, and drinking water, it was imperative that the CIP process coordinated actions on these systems.

Scope of work and action timelines for the asset systems below were incorporated as follows:

- Wastewater – based on Asset Management Plan work as part of SAW
- Roadway – based on roadway Pavement Surface Evaluation and Rating evaluations
- Drinking Water – based on the Water Reliability Study.

Individual project scopes for the comprehensive CIP were created to maximize coordination of work on various assets and minimize overall costs. The CIP projects include improvements to the storm water system, wastewater system (collection and treatment), drinking water system (distribution and treatment), and road system. The CIP costs were incorporated into the revenue structure review. A 10-year CIP document was created and will be available to the public once the final rate structure has been adopted.

Storm Water CIP Projects Include:

- Monroe St Storm Reconstruct
- Storm Sewer Spot Repairs (13 dig & replace spot repairs)

List of the plan's major identified assets

- 83,900 feet of gravity sewer
    - Current replacement value of $10,068,000
- 293 manholes and 657 catch basins
    - Current replacement value of $2,339,500
- 32 storm water outlets

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 19, 2019**
(no later than 3 years from executed grant date)

The **City of Boyne City** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1525-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Michael Cain	at 231-582-0377	mcain@boynecity.com
Name	Phone Number	Email

12-9-19

Signature of Authorized Representative (Original Signature Required) Date

Michael Cain, City Manager

Print Name and Title of Authorized Representative

c2ae
architecture • engineering

123 W. Main St. Suite 200
Gaylord, MI 49735
O: 989.732.8131
www.c2ae.com

BOYNE CITY STORMWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

City of Boyne City
319 N. Lake Street
Boyne City, MI 49712
Michael Cain – City Manager, (231) 582-0377
SAW GRANT PROJECT NUMBER 1525-01

Executive Summary

The SAW agreement with the State of Michigan was signed in December, 2016 which began the overall SAW program.

The Grant agreement included the following funding amounts:

- Total Cost = $767,608
  - Grant Value = $690,847
  - Local Match = $76,761

The City of Boyne City is located in Charlevoix County in northwest lower peninsula of Michigan, approximately 60 miles south of the Mackinac Bridge. It is located on the east side of Lake Charlevoix and on M-75. Boyne City's storm sewer collection system has approximately 111,300 feet of storm sewer and approximately 1,430 storm manholes, catch basins and outfalls.

Stormwater Asset Inventory

This item which initiated the work included:

- Identifying and locating all of the manhole and mainline sewer assets.
  - A list of all assets to be monitored was obtained using a combination of historical system records, field data collection.
  - The GPS coordinates of the field assets were gathered.
  - An ESRI ArcGIS data set was completed to index the locations and attributes of assets.
  - Physical inspections were conducted for each asset.
    - Manholes – Field inventories and conditional assessments were completed in accordance with NASSCO MACP standards by NASSCO Certified personnel.
    - Sewers - Survey was completed by CCTV review in accordance with NASSCO PACP standards by NASSCO Certified personnel.
  - The asset information was included in the Asset Management Spreadsheet (AMS).
  - The AMS is used to quantify and sort the system asset information.
- The results of the assessment yielded the following percentages (1 being best and 5 being worst condition):
  - 13% of assets are 1's
  - 74% of assets are 2's
  - 9% of assets are 3's
  - 2% of assets are 4's
  - 2% of assets are 5's

Condition Assessment

Overall, the Boyne City storm sewer system is in good condition. There are a few recommendations for improvements in the Storm Sewer Capital Improvements Plan, but none are critical or urgent at this time. The City continues to upgrade its storm sewer system through its annual street/infrastructure improvement program and does a very good job of system maintenance.

- Structures assessment and inventories follow NASSCO MACP guidelines.
- Sewer pipe assessment and inventories follow NASSCO PACP guidelines.
- Asset age and material data was collected using historical project drawings.

Criticality of Assets

- The AMS was used to organize the asset classes. Several parameters were used to determine asset consequence of failure and probability of failure, rating each on a 1 to 5 scale.
  - Redundancy: Does the unit have system backup?
  - Criticality of the asset to the system and what level of impact to the system occurs in the event that the asset fails
  - Location of the asset and surrounding service areas were incorporated in determining the criticality of the asset
  - Probability of failure based on its age and condition
  - These items together result in a parameter identified as Business Risk.
- The AMS was used to prioritize the need for short term repair or maintenance, short term replacement, or long term maintenance.

Level of Service Determination

- A SAW Team was created to discuss the storm system direction.
- The SAW Team met and discussed a mission statement and desired Level of Service statement, which was then converted to a succinct list of items to follow for the future.
- The SAW Team will meet once a year to assess the system's service record and recommend improvements to the Level of Service Statement, if needed.

Revenue Structure

- The City storm drainage system is operated and maintained using City street funds.
- The current funding consists of a combination of Act 51 state tax funds and a local street funds. The future will require continued use of City and MDOT street funds, possible increase in MDOT transportation funds, and possible strategic pursuit of state and federal grant funds to continue system improvements.

Capital Improvement Plan

- The AMS identifies capital improvement projects for the future.
- The long term projects may be achieved through existing street funding sources, grants or future public borrowings.
- An estimate of project year and financial cost is generated from each capital improvement project.
- The following is the recommended project to be completed within the next five (5) years are as follow:
  - *Storm Structure repairs with a Business Risk greater than 16 or Probability of Failure of 4 or Wall, Cone, Chimney grade below "D" to be replaced.*
  - *Storm System Sewer Repairs with a Business Risk of 16+ or likely sewer collapse.*

- Additional projects recommended in the next 6 to 20 years are included in the Capital Improvement Plan.

List of Major Assets

- 1,430 Storm Manholes, Catch Basins, and Outfalls
- 111,300 feet of storm sewer

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date <u>December 19, 2019</u>
(no later than 3 years from executed grant date)

The **<u>City of Boyne City</u>** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1525-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes or~~ **No**
   If No - Date of the rate methodology approval letter: **<u>October 14, 2019</u>**.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Michael Cain	at 231-582-0377	mcain@boynecity.com
Name	Phone Number	Email

12-9-19

Signature of Authorized Representative (Original Signature Required) Date

Michael Cain, City Manager

Print Name and Title of Authorized Representative

123 W. Main St. Suite 200
Gaylord, MI 49735
O: 989.732.8131
www.c2ae.com

BOYNE CITY WASTEWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

City of Boyne City
319 N. Lake Street
Boyne City, MI 49712
Michael Cain – City Manager, (231) 582-0377
SAW GRANT PROJECT NUMBER 1525-01

Executive Summary

The SAW agreement with the State of Michigan was signed on December, 2016 which began the overall SAW program.

The Grant agreement included the following funding amounts:

- Total Cost = $767,608
    - Grant Value = $690,847
    - Local Match = $76,761

The City of Boyne City is located in Charlevoix County in northwest lower peninsula of Michigan, approximately 60 miles south of the Mackinac Bridge. It is located on the east side of Lake Charlevoix and on M-75. The City owns and operates an aerated lagoon, clarification, filtration Wastewater Treatment Plant with a rated capacity of 0.9 million gallon per day (MGD). The treatment plant discharges to the Lake Charlevoix under permit MI0021474. Boyne City's sanitary collection system has approximately 207,000 feet of sanitary sewer and force main, approximately 620 sanitary manholes and 6 lift stations that provides sewer services to the City and portions of Eveline Township.

Wastewater Asset Inventory

This item which initiated the work included:

- Identifying and locating all assets.
    - A list of all assets to be monitored was obtained using a combination of historical system records, field data collection.
    - The GPS coordinates of the field assets were gathered.
    - An ESRI ArcGIS data set was completed to index the locations and attributes of assets.
    - Physical inspections were conducted for each asset.
        - Manholes – Field inventories and conditional assessments were completed in accordance with NASSCO MACP standards by NASSCO Certified personnel.
        - Sewers - Survey was completed by CCTV review in accordance with NASSCO PACP standards by NASSCO Certified personnel.
        - Pump Stations – Field inventories were completed for each pump station recording and evaluating condition for the sub-parts of the lift station within the Pump Station Database. The sub-parts contained, but were not limited to, pumps, VFDs, wet well, electrical, and process piping.
        - Wastewater Treatment Facilities (WWTF) - Field inventories were completed for the WWTF recording and evaluating condition for the sub-parts of the WWTF within the WWTF workbook. The sub-parts contained, but were not limited to, pumps, VFDs, electrical, and process piping.
    - The asset information was included in the Asset Management Spreadsheet (AMS).
    - The AMS is used to quantify and sort the system asset information.

- The results of the assessment yielded the following percentages:
  - 41% of assets are 1's
  - 40% of assets are 2's
  - 13% of assets are 3's
  - 3% of assets are 4's
  - 3% of assets are 5's

Condition Assessment

The City of Boyne City's sanitary collection system is in good condition overall as noted by the above condition ratings. The City has been continuously upgrading the collection system along with its yearly street reconstruction projects. The wastewater treatment facility is in good condition, recently being upgraded in 2004. The plant is very well maintained. However, there are some upcoming equipment replacement needs and other capital improvements for the future that will help with improving the plant efficiency.

- Structures assessment and inventories follow NASSCO MACP guidelines.
- Sewer pipe assessment and inventories follow NASSCO PACP guidelines.
- WWTP equipment site condition assessment and inventory.
- Wastewater lift stations condition assessments and inventory.
- Asset age and material data was collected using historical project drawings.

Criticality of Assets

- The Asset Management Spreadsheet (AMS) was used to organize the asset classes. Several parameters were used to determine asset consequence of failure and probability of failure, rating each on a 1 to 5 scale.
  - Redundancy: Does the unit have system backup?
  - Criticality of the asset to the system and what level of impact to the system occurs in the event that the asset fails
  - Location of the asset and surrounding service areas were incorporated in determining the criticality of the asset
  - Probability of failure based on its age and condition
  - These items together result in a parameter identified as Business Risk.
- The AMS was used to prioritize the need for short term repair or maintenance, short term replacement, or long term maintenance.

Level of Service Determination

- A SAW Team was created to discuss the wastewater system direction.
- The SAW Team met and discussed a mission statement and desired Level of Service statement, which was then converted to a succinct list of items to follow for the future.
- The SAW Team will meet once a year to assess the system's service record and recommend improvements to the Level of Service Statement, if needed.

Revenue Structure

- The user charge report and the AMS are identified as the Rate Methodology and have been submitted previously to MDEQ and approved.
- No funding gap or rate increase was required per the grant agreement.
- Capital improvements for the sanitary sewer system are also partially funded through a road and infrastructure millage that is independent of the sewer rate structure.
- The rates, charges and other means of revenue are sufficient to cover system operation, maintenance, replacement, capital improvement and debt costs identified in the AMP.

Capital Improvement Plan

- The AMS identifies capital improvement projects for the future.
- The long term projects may be achieved through a combination of grants or future rate adjustments to support project funding.
- An estimate of project year and financial cost is generated for each capital improvement project.
- A List of recommended projects to be completed within the next five (5) years is as follows:
    - *Sanitary Structure repairs with a Business Risk greater than 16 or Probability of Failure of 4 or Wall, Cone, Chimney grade below "D" to be replaced (Manhole Project #3)*
    - *Sanitary System Sewer Repairs with a Business Risk of 16+ or likely sewer collapse (Sewer Project # 1) and replacement of the Main Pump Station sanitary force main.*
    - *Sanitary Collection System Lift Station repairs for Lift Station 002 (River Mouth Pump Station).*
- Additional projects recommended in the next 6 to 10 years and 11 to 20 years are included in the Capital Improvement Plan.

List of Major Assets

- 130,600 feet of sanitary sewer
- 76,900 feet of force main
- 617 sanitary manholes
- 6 lift stations
- 0.9 MGD Wastewater Treatment Plant

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Lansing *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1534-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]

   If No - Date of the rate methodology approval letter: May 13, 2019.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name	Phone Number	Email
Alec Malvetis	517-483-4459	alec.malvetis@lansingmi.gov

12/18/19

Signature of Authorized Representative (Original Signature Required) Date

Andrew K. Kilpatrick, P.E., Director of Public Service

Print Name and Title of Authorized Representative

April 2017

fishbeck
Engineers | Architects | Scientists | Constructors

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Lansing, Michigan 48911

517.882.0383 | fishbeck.com

Executive Summary

Stormwater, Asset Management, and Wastewater
Asset Management Program
City of Lansing
124 W. Michigan Avenue, 7th Floor
Lansing, MI 48933
https://lansingmi.gov/
Alec Malvetis, 517.483.4459
SAW Grant Project No. 1534-01

Executive Summary

The City of Lansing received a SAW Grant in December 2016 to implement a Wastewater Asset Management Program (AMP). The Grant was awarded in the following amount:

	Amount
Wastewater AMP	$2,000,000
Match	$0
Grant Amount	$2,000,000

The City had determined it to be in its best interest to implement a Wastewater AMP for the separated portion of its wastewater system, including the City's Wastewater Treatment Plant. The scope of the AMP was to inventory, assess, and identify areas of deficiency in the sanitary system in order to develop recommendations for prioritizing and budgeting improvements and maintenance.

Wastewater Asset Inventory

The City owns and operates a wastewater collection system. The City utilizes a Geographic Information System (GIS) to maintain the inventory of assets along with Cityworks, a GIS-centric enterprise asset management system. All assets in Cityworks have been assigned a unique identifier. The City's base map was created from as-builts. As part of the Grant, the manholes that were assessed were also GPS located to improve mapping. This will continue over time as the remaining manholes are assessed.

Condition Assessment

To identify areas of potential deficiency in the sanitary system, major components were inspected, including manholes and sewers. The City televised a portion of the sanitary sewer system between 2018 and 2019, in accordance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards, utilizing closed circuit television (CCTV). Approximately 8% of the overall sanitary system was televised. Of the overall system, 6% was of the sanitary collection system and 2% was of the sanitary interceptor system. Of the individual sanitary collection and sanitary interceptor system, 8% of the sanitary collection system was televised and 7% of the sanitary interceptor system was televised. Pipes noted to have significant deficiencies were identified for Capital Improvement Projects (CIP) though some repairs were completed at the time the discovery (in 2018). Manholes were inspected utilizing NASSCO Manhole Assessment Certification Program (MACP) Level 1. Visual inspections were performed from the top of the manholes. Level 1 inspections were completed on over 400 manholes out of approximately 9,964, which is approximately 4% of the sanitary system. The remaining manholes and sewers will be put on a schedule to finish their assessment based on their criticality. A Probability of Failure (POF) rating of 1 to 5 was assigned to each pipe and manhole. A rating of 1 indicated that the sewer or manhole were like new and a rating of 5 indicated that the sewer or manhole is about to fail. A summary of the condition of the inspected assets is presented in the following tables.

Sewer Condition Summary

POF Rating	Percentage of Televised System
1	57.5%
2	4.3%
3	21.7%
4	10.6%
5	5.9%

Manhole Condition Summary

POF Rating	Percentage of Inspected System
1	0.2%
2	12.9%
3	61.6%
4	23.7%
5	1.6%

The asset inventory and condition assessment of the pump station and wastewater treatment plant (WWTP) assets involved identifying the assets the City of Lansing owns and assigning them a condition rating between 1 and 5. A rating of 1 indicated that the equipment was new and a rating of 5 indicated that the equipment was inoperable. Valves from the WWTP were included in the asset list if they were 12 inches or greater (6 inches and greater in pump stations). Assets were included if they were $1,000 or greater for an estimated replacement cost.

Tetra Tech performed the condition assessment of the pump stations and WWTP by visually inspecting assets. In addition, the building structures at the pump stations and WWTP were assessed by DLZ. Following the visual inspection performed onsite, Tetra Tech consulted WWTP personnel to gather input on conditions of equipment not immediately obvious by visual inspection. The WWTP staff were able to identify vulnerable areas where equipment is either not used, inoperable, or has had many parts replaced. Since the staff is most familiar with the condition and operation of each asset and have observed these assets being used and maintained, this information is invaluable to the determination of condition of the assets. Assets that were determined to be inoperable or permanently out of use were included to insure an appropriate estimation of owned assets and replacement costs. A summary of the condition of the inspected assets is presented in the following tables.

Pump Station Condition Summary

Condition Rating	Number of Assets	Percentage of Inspected System
1	90	6.7
2	332	24.5
3	726	53.7
4	180	13.3
5	25	1.8
Total	1,353	100.0
Remaining to be Assessed	31	--

WWTP Condition Summary

Condition Rating	Number of Assets	Percentage of Inspected System
1	18	0.7
2	181	7.0
3	1,402	54.2
4	672	26.0
5	313*	12.1
Total	2,586	100.0
Remaining to be Assessed	159	--

* Of the 313 assets with a rating of 5, 126 assets are not currently in use and have no impact on the operation of the WWTP. The percentage of assets with a rating of 5 that are in use is 7.2.

Criticality of Assets

The POF rating represents the likelihood of the asset failing based on defects and deficiencies identified in the condition assessments. Each pipe segment, manhole, pump station, and asset at the WWTP was assigned a final POF score based on results from sewer televising and visual inspections utilizing PACP and MACP standard ratings.

The Consequence of Failure (COF) rating addresses the impact a failure of a component would have on the community. It represents the criticality of a specific component to the successful operation of the entire system or the potential difficulty in addressing a failure, if it were to occur. The three factors considered when calculating the collection system COF score include pipe diameter, physical location, and service area impact. Each pipe segment and structure was assigned a final COF score based on the average of these three factors.

The pipe diameter is a general measure of the size of the tributary area the pipe or structure serves. Therefore, it can be used as an indicator of the population affected by a failure or amount of industrial or commercial facilities affected. Larger pipes typically service larger tributary areas.

The physical location score indicates the difficulty of performing repairs in the event of a sewer failure. Repairs and replacements of sewers located under streams or railroads present difficulties and likely result in higher repair costs. Additionally, repairs in well-traveled roadways often create more disruption to the community. The physical location score is designed to help identify sewer lines that may face these issues if a failure were to occur.

The service area score indicates the sensitivity of the area that could be affected by a failure in the collection system. Some parts of town, such as in commercial areas, near schools or City facilities would likely experience greater disruption in the event of a sanitary sewer failure. The existing land use layer in the GIS was used to identify which sanitary sewers served the most sensitive areas. Care was taken to ensure proper classification of each parcel within the City.

Criticality of assets at the WWTP and pump stations were measured slightly different than that of the collection system. The COF for pumping and treatment assets considered the effect of an individual asset failure on system operations.

The POF is based on the condition of the asset. For the City's pumping and treatment assets, the age of the asset was identified and evaluated with additional information, such as staff observations and field condition analysis.

Redundancy was considered at the WWTP and pump station. Redundancy refers to the additional capacity that is provided beyond the design flow to allow for maintenance or repair of a critical asset. Redundancy is often considered in the design of tanks or pumps within the treatment process. Redundancy was determined based on a review of the Basis of Design for the WWTP expansion and the Operations and Maintenance Manual.

Business Risk Exposure

The Business Risk Exposure (BRE) score considers how critical each component is within the system in the event that the component fails. The BRE then factors in the consequence of such failure combined with the probability of the component failing based on the condition assessment. The *BRE* is calculated by the formula:

$$BRE = POF \times COF$$

The BRE for the WWTP was calculated by using the following formula: Business Risk Exposure = Consequence of Failure * Probability of Failure * (1 - Redundancy)

The *POF* and *COF* scores are both on a 1 to 5 rating scale, and therefore, *BRE* scores range from 1 to 25. If an asset has been physically inspected and given a POF rating of 5, it is assumed that the asset is near failure and is considered high priority regardless of the COF rating. The calculated BRE score is then used to prioritize the rehabilitation or replacement tasks.

Level of Service Determination

The overall objective of the City of Lansing Wastewater, Operation and Maintenance, and Engineering Departments is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this, the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with all local, state, and federal regulations.
- Actively maintain collection and treatment system assets in reliable working condition.
- Reduce inflow/ infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of the WWTP.
- Continue combined sewer separation as part of the Wet Weather Control Program and as agreed upon in the Administrative Consent Order with the State of Michigan.
- Continue to clean larger diameter sewers in the collection system to maintain capacity.
- Provide timely and effective emergency response services to customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for O&M and Wastewater staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of the wastewater system.

Revenue Structure

As required by Michigan Department of Environment, Great Lakes, and Energy (EGLE), the City was to provide an analysis of the current budget on a cash basis to determine if there is a revenue gap for its collection system. The rate methodology report shows, according to the budget, no revenue gap is projected for the fiscal year 2019. The City is currently budgeting to address the projects in its CIP, for the operation of its system and to continue its maintenance activities to meet its LOS goals.

Capital Improvement Plan

Based on the LOS goals and the condition of the wastewater system discovered during condition assessments, recommendations for repairs or maintenance needs were given for sewers, manholes, pump stations and at the WWTP. The following list of projects are in the 5-year capital improvement plan.

5-Year Project Plan	**2020**	**2021**	**2022**	**2023**	**2024**
Central Interceptor/ Sycamore-Lindbergh Interceptor Rehabilitation					
Willard Ave PS Improvements	░				
Siphon 2 Replacement	░				
CSO 016/017 Grand River Ave		▒			
Siphon 12 and Interceptor Replacement		░			
CSO 034D			░	░	
CSO 034E				▓	
CSO 015S				▒	▒
Sewer Repairs - Asset Management	░	░	░	░	░
Switchgear Building - WWTP					
East Jolly PS Pump Replacement	░				
Raw Sewage and Recyle Pump Stations - WWTP			░		
Sludge Handling Upgrade - WWTP				▓	

List of Major Assets

City of Lansing's major assets include:

- 429 miles of gravity sanitary sewer
- 118,990 feet of force main
- 9,965 manholes and structures
- 20 inverted siphons/ river crossings
- 29 pump stations
- 5.2 MG Equalization Basin
- 35 MGD WWTP

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 2019
(no later than 3 years from executed grant date)

The Fort Gratiot Charter Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1539-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: 10-07-2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: __________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Robert Crawford	at	810-385-9010	rcrawford@fortgratiot.us

Signature of Authorized Representative (Original Signature Required) — Date: 12/26/2019

Robert C. Crawford — Township Supervisor
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 2019
(no later than 3 years from executed grant date)

The Fort Gratiot Charter Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1539-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

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Name		Phone Number	Email
Robert Crawford	at	810-385-9010	rcrawford@fortgratiot.us

Signature of Authorized Representative (Original Signature Required)

12/26/2019
Date

Robert C. Crawford Township Supervisor
Print Name and Title of Authorized Representative

WASTEWATER ASSET MANAGEMENT PLAN

FORT GRATIOT CHARTER TOWNSHIP

ST. CLAIR COUNTY, MICHIGAN

DECEMBER 2019

BASED ON:

ASSET MANAGEMENT GUIDANCE FOR WASTEWATER

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, JULY 2013

STORMWATER, ASSET MANAGEMENT, AND WASTEWATER (SAW) GRANT

PROJECT NUMBER: 1539-01

PREPARED BY:

230 S. Washington Avenue
Saginaw, MI 48607

PROJECT ID NUMBER: **124372SG2017**

PART 1: INTRODUCTION AND BACKGROUND

SAW Grant Description

On December 27, 2012, Governor Snyder signed Public Act No. 511 of 2012 to create a grant and loan program aimed to assist public *Wastewater (SAW)* systems in the State of Michigan. According to the Act, $450 million in funds will be made available for the:

(i) *Development of an asset management program for a sewage collection and treatment system or a storm water system. For sewage collection and treatment systems, the program shall include the development of a funding structure and implementation schedule that provides sufficient resources to implement the program. The municipality shall coordinate, as feasible, with other infrastructure activities in the same geographic area. In addition, a disadvantaged community may expend not more than $500,000.00 in grant funds to implement projects identified in the asset management program.*

(ii) *Development of management plans for the treatment of storm water.*

(iii) *Planning and design of a sewage treatment works project or stormwater treatment project as defined in section 5301(n) or (o) or planning and design of construction activities designed to reduce nonpoint source pollution.*

(iv) *Project costs of a municipality related to the testing and demonstration of innovative wastewater and storm water technologies approved by the department.*

Communities could apply for up to $2,000,000 in funding under the SAW program, including a 90% grant with 10% local match for the first $1,000,000 and 75% grant with 25% local match for the second $1,000,000. A grant could be issued for up to 100% of the costs if the following conditions were met:

(A) *The municipality is a disadvantaged community as defined in part 53.*

(B) *The municipality is in receivership.*

(C) *The municipality is operating under an emergency manager or an emergency financial manager appointed under state law.*

(D) *The municipality is operating under a consent agreement as provided under the local government fiscal responsibility act, 1990 PA 72, MCL 141.1201 to 141.1291.*

Fort Gratiot Charter Township applied for $827,000 in funding to prepare a Wastewater Asset Management Plan (WWAMP). Round 1 of the SAW grant applications were due on December 2, 2013 and the Michigan Department of Environmental Quality (MDEQ) received 673 applications totaling $541 million in requests.

Due to the overwhelming response to the program, the MDEQ implemented a lottery process and published a list of the order that communities would be offered SAW grants.

In October of 2016, Fort Gratiot Charter Township received a Notice of Grant Application Approval as a Round 4 SAW Grant awardee from the Michigan Department of Environmental Quality (MDEQ) for the following:

WWAMP 90% Grant	$827,000
LESS Local Match	($82,700)
Total Grant Amount	$744,300

Objective/AMP Overview

The following is an excerpt from the MDEQ *Asset Management Guidance for Wastewater Systems*, July 2013 (Hereinafter called "*MDEQ Guide*"):

What is Asset Management?

Wastewater and stormwater systems are made up of assets; some are buried assets and "invisible," while the rest are visible. These are the physical components of the system and can include: pipe, valves, tanks, pumps, outfalls, storage basins, treatment facilities, and any other components that make up the system. The assets that make up a wastewater or stormwater system lose value over time as the system ages and deteriorates. As the assets deteriorate, the level of service the utility's customers desire may become compromised, operation and maintenance (O&M) costs can increase, and the utility may be faced with excessive costs it can no longer afford.

There is an approach to managing the assets of the system that can assist the utility with making better decisions on caring for these aging assets. This approach is called asset management. The International Infrastructure Management Manual defines the goal of asset management as meeting a required level of service in the most cost-effective way through the creation, acquisition, operation, maintenance, rehabilitation, and disposal of assets to provide for present and future customers. A wastewater or stormwater utility has a responsibility to manage its assets in a cost-effective manner for several reasons:

1) *these assets represent a major public investment*
2) *well-run utilities are important to economic development*
3) *proper operation and maintenance of a utility is essential for public health and safety*
4) *utility assets provide an essential customer service*
5) *asset management promotes efficiency in the operation of the system*
6) *properly managing the assets is the basis of self-sufficiency*

The intent of asset management is to ensure the long-term sustainability of the wastewater or stormwater utility. By helping a utility manager make better decisions on when it is most appropriate to repair, replace, or rehabilitate particular assets and by developing a long-term funding strategy, the utility can ensure its ability to deliver the required level of service perpetually.

Asset management is a set of procedures to manage assets through their life cycles, based on principles of life cycle costing. These procedures, to be effective, must be implemented in a programmatic way. Properly practiced, it involves all parts of the organization and entails a living set of asset performance goals to implement asset management. An Asset Management Plan is a tool to help the utility implement its Asset Management Program.

Core Components of an Asset Management Plan

Typically, there are five core components in an Asset Management Plan:

1) *Asset Inventory*
2) *Level of Service*
3) *Critical Assets*
4) *Revenue Structure*
5) *Capital Improvement Project Plan*

Effective asset management implementation is comprehensive. It may involve integrating a number of tools along with other existing systems (accounting, financial reporting, purchasing and stores, payroll, etc.) to create a comprehensive information system that will support an integrated Asset Management Program. An Asset Management Program will have a Mission Statement. This Mission Statement defines the program.

Asset Management Team

The *MDEQ Guide* states:

When assembling an Asset Management Team, consider current and past municipal staff (officials, board members, clerks, accountants, and engineers), current and past utility staff (operators and other service workers), and any other stakeholders that can help in assembling the information to develop your Asset Management Plan.

Fort Gratiot Charter Township
Robert Crawford, Supervisor
Bob Buechler, Clerk
Jamie Oprita, Treasurer
Scott Bradley, Trustee
Linda Bruckner, Trustee
George Kish, Trustee
Robert Montgomery, Trustee
Greg Randall, DPW Superintendent

Engineering, Geographical Information System, Condition Assessment, Asset Management Plan, and Grant Administration:

SPICER GROUP, INC.-TOWNSHIP ENGINEER
Don Scherzer, Principal in Charge
Steven R. Rutkowski, P.E., Project Manager
Sam Szaroletta, P.E., Project Engineer
Zachary Guerrero, Project Engineer
Mitchel Jacqmain, Design Engineer

Sewer Inventory, Cleaning, & Televising

MICHIGAN PIPE INSPECTIONS
Steve Patterson, President

Financial

STEWART, BEAUVAIS, & WHIPPLE, P.C.
Paul Bailey, CPA

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
Johnathan Berman, Project Manager

History

The original settlement of the Port Huron area, including what is now known as Fort Gratiot Charter Township, occurred in the latter portion of the 17th Century. This settlement was related to the location of the area along the St. Clair River at the southern end of Lake Huron. The location had an obvious strategic value for military, as well as commercial purposes. Direct access to the river and lake were major assets to the area's first major commercial activities: fur trading and lumbering. The emergence of the railroad as an important form of transportation in the mid-1800's also served as a catalyst to growth in the area as Port Huron was located on major rail corridors linking St. Clair County with other developing population centers, including Chicago and Detroit.

Fort Gratiot Charter Township became a recognized governmental unit in 1866. For most of the Township's history, it has played an ancillary role to Port Huron as the County's dominate City. Development in the Township for many years was limited to the establishment of homes along the Lake Huron shoreline and farming in the interior portions of the community. A limited amount of non-farm residential growth also occurred along the section line roads that served the Township.

During the second half of this century, the pace of growth accelerated in the Township. As was the case earlier, much of this development was concentrated along two of the Township's most scenic areas: the Lake Huron and Black River shorelines. The lake also attracted tourists to the area, many of whom eventually developed summer cottages in the Township. In 1979, the Township was changed from a General Law Township to a Charter Township.

In the last thirty years or so, extensions of water and sewer lines into the Township from Port Huron have allowed interior portions of the Township to be converted from farms to suburban residential subdivisions and to commercial developments. One of the most notable commercial developments is the Birchwood Mall, which opened in 1991. The mall is notable not just for being the largest commercial development in the County, but also for being the catalyst for extensive commercial development in the Township during the 1990's. As a result of these development, the automobile-oriented Fort Gratiot Charter Township has supplanted the 19th Century, pedestrian-oriented downtown Port Huron as the retail/commercial center of the County and the surrounding regions. In 2016, the new 22,000 square foot Fort Gratiot Municipal Center opened and is home to the township administration offices, fire department and St. Clair County Sheriff's Office Substation.

Population & Demographics

Fort Gratiot Charter Township has a population of 11,108 people, 4,076 households, and 2,946 families in the Township based on the 2010 census. The Township has a total land area of 16.1 square miles. It is a Charter Township located in St. Clair County.

Fort Gratiot Charter Township

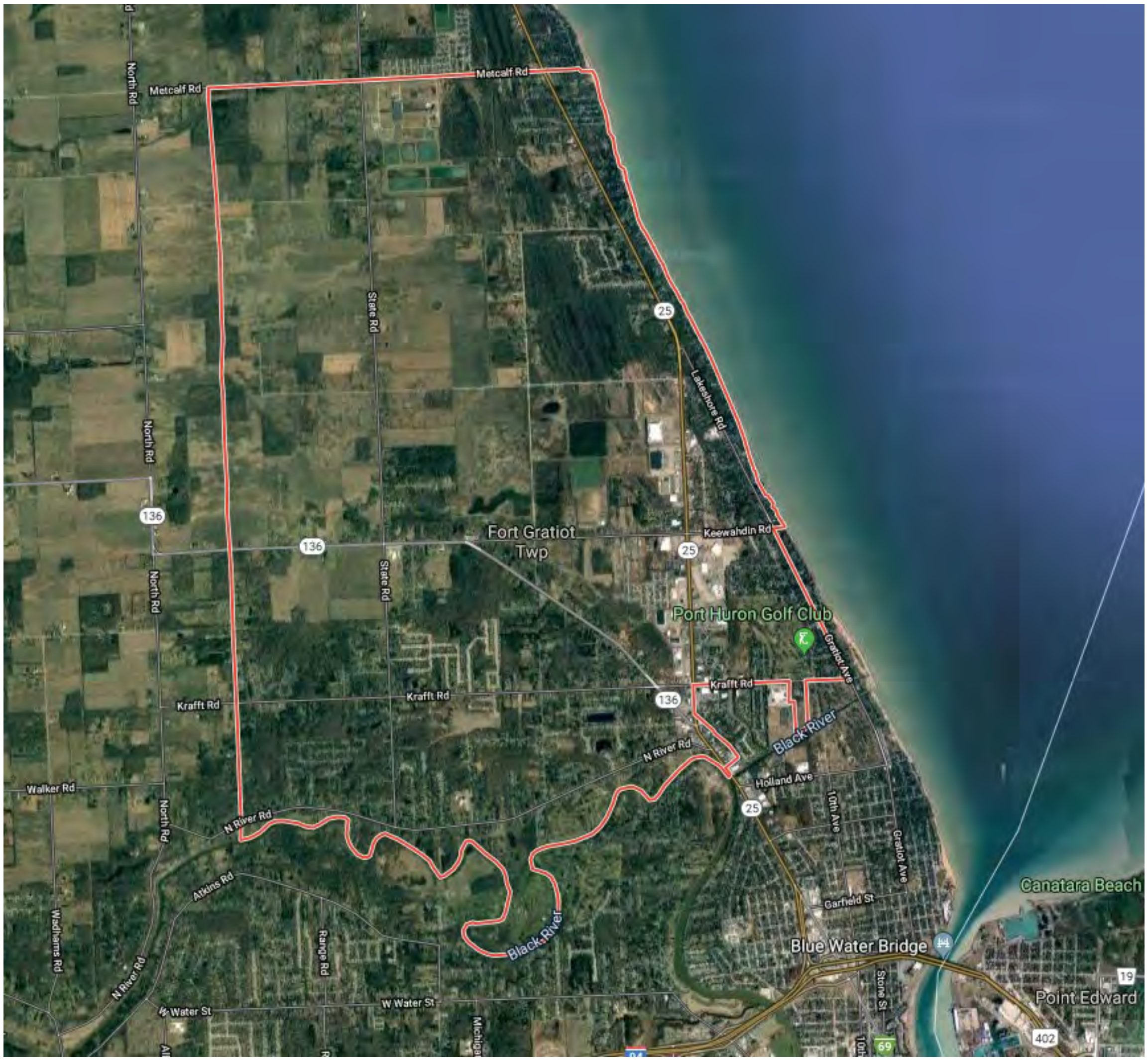


Table 4.1 Fort Gratiot Township US Census Bureau Information

Description	Measure	Source
Population		
Census 2010 Total Population	11,108	2010 Census Demographic Profile
Census 2000 Total Population	10,734	2000 Census Demographic Profile
Median Age	44.6	2010-2014 American Community Survey 5-Year Estimates
Total housing units	4,966	2010 Census Demographic Profile
Median Household Income	$55,982	2010-2014 American Community Survey 5-Year Estimates
Poverty Level	11.8%	2010-2014 American Community Survey 5-Year Estimates
Race and Hispanic Origin		
White alone	94.6%	2010-2014 American Community Survey 5-Year Estimates
Two or More	1.7%	2010-2014 American Community Survey 5-Year Estimates
Black	1.8%	2010-2014 American Community Survey 5-Year Estimates

Source: U.S. Census Bureau
https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk

Number of Customers

The Township currently has a total of 3,274 sewer customers that equates to 5,446 Residential Equivalent Units (REU). Below is a breakdown of the sewer customers by classification.

Customer	REU Count	Description
3040	3718.70	Residential
186	1118.70	Commercial
2	90.00	Schools
4	8.00	Churches
36	433.07	Restaurant
2	36.5	Hospital
4	41.49	Other
3,274	**5,446**	**Total Customers**

Description of the System

Collection System

Fort Gratiot Township's wastewater collection system consists of a network of 6" to 30" gravity sewer mains totaling 249,786 feet. In conjunction with sewer mains, sewer services or "leads" connect each customer from their building to the sewer mains. Typically, the Township owns and maintains the sewer lead from the sewer main to the edge of the Township-owned road right-of-way, and the customer owns and maintains the sewer lead from the road right-of-way to the building being connected. A base map of the sanitary sewer collection system is included in Appendix 2A.

Pumping Station & Force Main

These sewer mains collect wastewater from the Township's customers and convey the wastewater via gravity flow to the 15 pump stations throughout the Township. Each of the 15 pump stations are duplex, submersible pump stations with most having valve vaults that house isolation and check valves. Each station is equipped with a wet well that collects and stores wastewater flow from the gravity sanitary sewer system. As flow enters and fills the wet well, the controls at each station will automatically operate the pumps as the well level reaches predetermined on/off elevations. The flow is then pumped through a forcemain and delivered to a downstream collection system.

The northern half of the Township is pumped through various stations until it ultimately flows into Pump Station 7, where the western half of the township flows into Pump Station 12. The discharge from these two pump stations combine into one forcemain and is transported along one final stretch along Fairway Drive at Allied Veterans Cemetery and is discharged into the City of Port Huron's Collection System. The wastewater is then collected and treated by the City of Port Huron Wastewater Treatment Plant which discharges flow into the St. Clair River. The wastewater treatment plant is located at 100 Mercent Street, Port Huron, MI 48060.

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
230 S. Washington Avenue
Saginaw, MI 48607

Owner: **Fort Gratiot Charter Township**
3720 Keewahdin Road
Fort Gratiot, MI 48059
Robert Crawford, Supervisor

In October of 2016, Fort Gratiot Charter Township received a Notice of Grant Application Approval as a Round 4 SAW Grant awardee from the Michigan Department of Environmental Quality (MDEQ) the Township received the following grants:

Wastewater Asset Management Plan (WWAMP) 100%	$827,000
LESS Local Match	($82,700)
Total Grant Amount	$744,300

The Asset Management Plans (AMPs) needed to be completed within three years of the date of the Michigan Finance Authority (MFA) agreement; December 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Critical Assets (Risk)
- Level of Service Determination
- Revenue Structure
- Capital Improvement Plan

List of Major Assets

- 249,786 Feet of sanitary sewer pipes ranging in size from 6”-30”
- 1,020 Sanitary Sewer Manholes
- 15 Pumping Station

Wastewater Asset Inventory and Condition Assessment

The Township’s wastewater system consists of two main components: The collection system (pipes and manholes) and pump station/forcemain.

For the collection system, Spicer Group, Inc. completed a mobile mapping LiDAR survey of the entire Township and used the survey information to develop a comprehensive Geographic Information System (GIS). This GIS is located on a new computer in the Township office and is a detailed “smart” mapping system with databases, using the ArcGIS/Arc Online by ESRI platform. This system can be accessed and updated in the field by DPW staff from new iPads supplied as part of the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspections etc. can be accessed. This information can also be modified to provide specific lists and maps and can be updated easily when future improvements are made.

The Township presently has 249,786 feet of sanitary sewer pipe in the sanitary sewer collection system ranging in size from 6” to 30”, 1,020 sanitary sewer manholes, and 15 pumping stations. Michigan Pipe Inspection, from Port Huron completed a comprehensive cleaning and televising program of the sanitary sewer pipes using the NASSCO Pipeline Assessment Certification Program (PACP) to identify features and defects within the collection system. Spicer Group, Inc. completed a comprehensive inspection of the manholes using the NASSCO Manhole Assessment Certification Program (MACP) standards to identify features and defects within the manholes. The MACP/PACP system is used to standardize the scoring and to quantify the condition of the wastewater assets.

The next main component of the Township’s wastewater system is the fifteen pumping stations. Spicer Group completed an inspection and condition assessment on each station and provided recommendations for future improvements. Many of the pump stations have been upgraded in the past 10-20 years and are in good working condition with stringent maintenance programs extending the useful life of the pumps, valves, and electrical components. Pump Station #7 and #12 are the two main stations for the Township and underwent complete reconstruction in 2017. Pump Station #6 and #14 were the only two stations that were found to have recommended pump station upgrades as the components were past the recommended useful life.

Criticality (Risk)

For each asset in the Townships’ wastewater system, a criticality/risk analysis was performed to determine and prioritize the Township’s key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including all pipes, manholes and pumping stations. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences if that asset failed. Finally, the Criticality (Risk) score was calculated using:

LoF x CoF = RISK

Overall the Township’s collection system is in good condition. Most of the pipes had likelihood of failure scores under 3 indicating good condition. This contributed to low consequence of failure scores and overall low risk scores. The manholes were also in overall good condition, however a total of 75 structures were unable to be inspected therefore they received high LoF values due to current condition being unknown. Also, 58 manholes are below grade and need to be raised to grade so they are accessible for maintenance and emergency situations. Overall CoF and Risk values for the manholes were also very low for the majority of the manholes due to being in good condition. The pump stations were critically assessed and found to most components receiving low LoF scores indicating good working condition. Each pump station was assigned a consequence of failure pending the service area that drains to the station. Pump Station #7 and #12 are the main stations for the Township, therefore they received the highest CoF scores with the rest of the stations receiving lower scores respectively.

Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of service does the Township want to provide to its wastewater customers? How are projects going to be prioritized and included in the Capital Improvement Plan (CIP)? What cost is the Township willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Townships' Level of Service Goals are as follows:

Mission Statement

Fort Gratiot Township strives to develop a financially stable, high performing wastewater collection, pumping and treatment service that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.

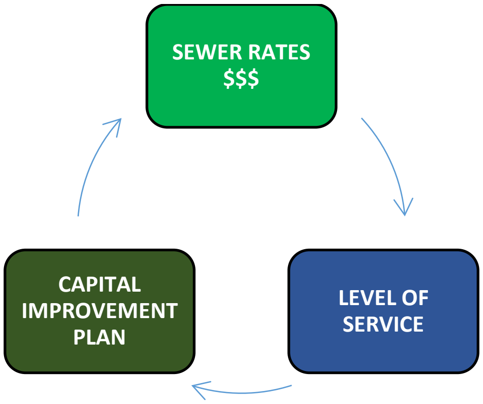
One of the basic goals is to review the capital improvement projects to determine the best value options for the Townships' customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Priority projects to meet the minimum local, State, and/or Federal regulations. Typically to be completed within the next 5 years.
- "**MEDIUM**" Level of Service – Projects that will need to be done eventually; typically when other infrastructure projects are happening.
- "**HIGH**" Level of Service – Projects that are on the long range radar that could spur future development and growth for the Township.

Generally, the "high" level of service projects will have a higher construction/initial cost but would provide a better long-term or life cycle cost for the Township. The "minimum" level of service projects would have a lower initial cost but would also have a shorter life span and higher overall life cycle costs.

As the AMP progressed, different scenarios were evaluated to show the relationship between the Townships' desired Level of Service and the costs of the capital improvement projects associated with that LOS, and the effect of that LOS on sewer rates.

Asset Management Plan Evaluation Process



The resulting capital improvement plan and revenue structure was one that met the Township's goals, addressed the improvements that need to be made, and is a sustainable rate structure for the Township's customers.

The Township chose to adopt a Minimum Level of Service.

Revenue Structure

In connection with the SAW grant the Township has contracted with Stewart, Beauvais, & Whipple P.C. certified public accountants, to assist the Township in determining the rates that will be necessary to make the recommended capital improvements to the system.

The Township's accounting firm prepared the revenue structure analysis for the AMP. Wastewater account balances, expenditures, revenues, etc. were reviewed and inputted into financial software to perform a gap analysis to determine if there were any deficiencies in the rates. The Township's current rate structure was found to have no deficiencies meaning the Township could fund current and future operations and maintenance of the system. However, the gap analysis did not consider any capital improvement projects required to maintain the selected LOS.

The Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion, and the rate structure to support those improvements was determined. Many iterations/scenarios were performed to come up with a rate structure that met the Township's Level of Service goals, complete the CIP projects that are needed, and had sustainable rates for the Township's customers. Based on the recommended CIP projects of approximately $283,000 annually for each of the next fifteen (15) years. the Township would need to increase the sewer rates approximately 15-20%. The Township Board and DPW staff are currently evaluating the recommended CIP projects identified by the engineers to determine which projects will be completed and the order that they will be done. It is being recommended that the Township Board increase sewer rates by 5% as of January 1, 2020 and another 3% as of January 1, 2021. This should provide approximately $200,000 to $250,000 for water and sewer capital improvements on an annual basis. The Board will continue to evaluate this annually as a part of the Townships' normal budgeting process and adjust the rates accordingly.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the wastewater system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. Various degrees of Level of Service and the associated CIP projects were evaluated and plugged into the Revenue Structure model, and the resulting sewer rates for that set of scenarios were reviewed. If the projected rates were too high, a lower LOS was chosen, and those CIP projects were plugged into the Revenue Structure model and the resulting rates were then reviewed. The process then continued with different CIP projects at varying LOS's until an acceptable rate structure, level of service, and capital improvement plan was developed. A CIP was developed that includes various collection system improvements. The table below summarizes the level of service projects that were included in the capital improvement plan.

Fort Gratiot Township Sanitary Sewer Capital Improvement Plan

Annual Maintenance

Annual Operation and Maintenance - Continue Cleaning and Televising (Known Problem Areas)	$25,000.00
Total Cost	**$25,000.00**

Collection System Projects

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
District #1					
1	Medium	MH 01.01 to 01.08	Lining Project	VCP Pipe	$315,000.00
District #2					
1	Medium	PS 2 to MH 02.18	Lining Project	RCP Pipe	$215,000.00
District #3					
1	Minimum	PS 3 to MH 3.48	Lining Project	RCP Pipe	$840,000.00
District #4					
1	Minimum	PS 4 to MH 4.018	Lining Project	RCP Pipe	$1,050,000.00
2	Minimum	PS 4 to MH 04.055	Lining Project	RCP Pipe	$216,000.00
3	Medium	MH 4.055 to MH 4.058, MH 4.018 to MH 4.023, & MH 3.13 to MH 3.14	Lining Project	RCP Pipe	$300,000.00
4	Medium	MH 4.029 to MH 4.034, MH 4.032 to MH 4.033, MH 4.030 to MH 4.031 & MH 4.035 to MH 4.037	Lining Project	VCP Pipe	$405,000.00
District #5					
1	Minimum	PS 5 to MH 5.061	Lining Project	RCP Pipe	$290,000.00
2	Medium	MH 5.011 to 5.047, MH 5.045 to MH 5.046, MH 5.049 to MH 5.047.2	Lining Project	VCP Pipe	$365,000.00
3	Medium	PS5 to MH 5.016, MH 5.002 to MH 5.024.1	Lining Project	RCP Pipe	$1,045,000.00
District #7					
1	Medium	MH 7.01 to 7.16	Lining Project	RCP Pipe	$1,510,000.00
District #8					
1	Medium	PS 8 to MH 8.32 & MH 8.02 to MH 8.06	Lining Project	RCP Pipe	$660,000.00
District #9					
1	Medium	PS 9 to MH 9.23	Lining Project	RCP Pipe	$1,125,000.00
2	Medium	MH 9.08 to MH 9.30	Lining Project	RCP Pipe	$335,000.00
District #10					
1	Medium	PS 10 to MH 10.10	Lining Project	RCP Pipe	$625,000.00
District #11					
1	Medium	PS 11 to MH 11.19	Lining Project	RCP Pipe	$1,245,000.00
2	Medium	MH 11.07 to MH 11.24	Lining Project	RCP Pipe	$335,000.00
District #12					
1	Minimum	MH 12.012 to MH 12.027	Lining Project	RCP Pipe, Aggregate Projecting	$515,000.00
2	Minimum	MH 12.087 to MH 12.085	Lining Project	Steel Pipe with Corrosion	$40,000.00
3	Minimum	MH 12.128 to MH 12.116	Lining Project	RCP Pipe	$445,000.00
4	Medium	MH 12.097 to MH 12.116 & MH 12.112 to MH 12.144	Lining Project	RCP Pipe	$820,000.00
5	Medium	PS 12 to MH 12.094	Lining Project	RCP Pipe	$805,000.00
6	Medium	MH 12.116 to MH 12.136	Lining Project	RCP Pipe	$425,000.00
District #13					
1	Medium	PS 13 to MH 13.4	Lining Project	ABS Pipe	$140,000.00

Collection System Point Repairs

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	Approximately 159' from MH 2.064	Point Liner	Gusher and fracture multiple	$6,000.00
2	Minimum	At MH 12.004	Point Liner	Gusher	$6,000.00
3	Minimum	MH 12.029 to 12.030 68' from MH 12.029	Point Liner	10' of Concrete Pipe	$8,000.00
4	Minimum	7.30 to 7.29	Point Liner	Hole	$6,000.00

Manhole Repair/Rehabilitation

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
M1	Minimum	Various (33)	Rebuild Chimney	Missing Bricks, Mortar, Displaced Bricks	$16,500.00
M2	Minimum	Various (9)	Adjust Frame	Offset Frame	$900.00
M3	Minimum	Various (42)	Remud Pipes	Missing Mortar	$21,000.00
M4	Minimum	Various (12)	Heavy Clean/ Vac Structures	Ragging/Obstructions in channel/Deposits	$6,000.00
M5	Minimum	MH 6.12, 6.15, 12.013, 12.016, 12.070, 12.111, 12.149, 12.095	Line	Aggregate Missing/Projecting/Hole	$32,000.00
M6	Minimum	MH 12.112	Remove Reinforcement	Reinforcement Wire Sticking into MH from where Tap was cored	$500.00
M7	Minimum	MH 3.55, 3.49, 4.023, 5.016, 7.16, 11.32, 6.15, 9.30, 10.10, 11.19, 11.36, 12.136, 5.087	Line PS Discharge Manholes	13 Structures	$52,000.00
M8	Minimum	Various (47)	Structure Adjusts	Buried Manholes	$14,100.00
M9	High	Various (75)	Inspect Manholes	Not inspected	

Additional O&M (Heavy Cleaning/Calcium Cutting)

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	7.29 to 7.28	Lateral Trimming	Protruding Tap	$1,000.00

Pump Station

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	PS#5	30kW generator plus ATS		$40,000.00
2	Minimum	PS#7/12	Cut in new Valves at Force main		$50,000.00
3	Medium	PS#7/12	New Flow Metering Manholes at both stations		$220,000.00
4	Medium	PS#6	Pump Station Rehab		$240,000.00
5	Medium	PS#14	Pump Station Rehab		$265,000.00
6	Medium	Deragger Technology	$10,000 per station		$40,000.00
				Annual Maintenance	**$25,000.00**
				Grand Total Minimum Level Service	**$3,641,900.00**
				Grand Total Medium Level Service	**$15,091,000.00**
				Grand Total High Level Service	**$15,091,000.00**

Conclusion

The Township's wastewater system is a typical, aging municipal infrastructure system. The DPW staff have taken a proactive approach to routine operation and maintenance of the system. Structurally, the system is very sound. However, 23% percent of the sanitary sewer system is constructed of Reinforced Concrete Pipe. RCP is susceptible to H_2SO_4 corrosion when used in sanitary sewer applications. In order to prevent the H_2SO_4 Corrosion the RCP must be lined or removed and replaced with materials not vulnerable to corrosion. The Capital Improvement Plan has lining projects associated with all Reinforced Concrete Pipe. There were several spots within the sanitary sewer system that need a Cured in Place point liner to fix a small structural defect. Various manholes need the chimneys rebuilt or some minor structural work to fix issues that the freeze thaw cycles, or traffic loading have generated.

Many of the pump stations have been upgraded in the past 10-20 years and are in good working condition with stringent maintenance programs extending the useful life of the pumps, valves, and electrical components. Pump Station #7 and #12 are the two main stations for the Township and underwent complete reconstruction in 2017. Pump Station #6 and #14 were the only two stations that were found to have recommended pump station upgrades as the components were past the recommended useful life. It is recommended the Township install a new generator at Pump Station #5 and install new valves on the force main from Pump Stations #7 and Pump Station #12 in order to maintain the minimum level of service. A rate increase of 5% for the next year and 3% in January 1, 2021 is recommended to cover the planned operating expenses, capital improvement projects, and inflation for the next three years. This will need to be reviewed annually during the Townships' normal budgeting process.

In accordance with the SAW Grant requirements, the Townships' Wastewater Asset Management Plan (WWAMP) needs to be kept available for citizen review for 15 years. The WWAMP should be reviewed annually, and the components updated and included in the Townships' annual budget process.

Executive Summary

The Benton Harbor – St. Joseph Joint (BHSJ) Wastewater Treatment Plant (WWTP) executed a Stormwater, Asset Management, and Wastewater (SAW) Grant for preparing a Wastewater Asset Management Plan (AMP) in December of 2016 which was to be completed in December 2019. The Grant was for $321,044 with a local match of $35,672 for a total project cost of $356,716. The AMP was prepared for the BHSJ WWTP Board of Commissioners (Board) and management staff by Jones & Henry Engineers Ltd. (J&H).

An AMP typically has the following five core components.

- Asset Inventory
- Level of Service
- Critical Assets
- Revenue Structure
- Capital Improvement Project Plan

The National Pollutant Discharge Elimination System Permit (NPDES Permit) that BHSJ operates under requires them to submit an AMP, which is being performed under this SAW Grant. There are several aspects of Asset Management that BHSJ has already completed with the AMP requirement being first required by their NPDES Permit in 2015. There have also been annual reporting requirements regarding the AMP since then that have been complied with. BHSJ has prepared an Asset Inventory for its WWTP and assessed the condition and criticality of those assets. The inventory and assessment are updated annually. The BHSJ staff has developed a mission statement and goals for accomplishing the Level of Service expectations along with their Board. The goals also include staffing analyses and planning. A Capital Improvement Plan and Rate Methodology are prepared and approved annually to assure that the operational, maintenance, and improvement requirements are funded.

The SAW Grant funds were used to gather the existing AMP components and supplement that information with further analyses to prepare a complete AMP for submittal to EGLE to meet the requirements of the NPDES Permit for the BHSJ WWTP. The record drawings for the influent sewers and WWTP were collected, organized, and scanned for electronic storage. An inventory of the influent sewers and associated structures was completed. The sewers and structures were inspected, and their conditions and criticality were assessed. There are four specific wastewater treatment activities that the BHSJ WWTP management and the Board have issues with and would like to see improved. These include the Ferrous Chloride Building for phosphorus removal, the Dissolved Air Flotation (DAF) System for solids handling, the Activated Sludge Process Controls, and Diagrams for the Operation & Maintenance (O&M) Manuals. Evaluations of these issues were conducted, and the findings and recommendations were incorporated into a consolidated AMP report.

Wastewater Asset Inventory

The system components included in the AMP are the Influent Sewers and the WWTP Equipment. The assets for the Influent Sewers were located and identified from record drawings. The sewer pipes and associated structures were video inspected and recorded by an environmental services contractor. The WWTP equipment was identified from record drawings and a consolidated map of the WWTP infrastructure. Inventories for the Influent Sewers and the WWTP Equipment were prepared by J&H and AECOM respectively, with assistance from the BHSJ staff. They include video and photographs of the assets. *National Association of Sewer Service Companies* (NASSCO) standards for assessment, maintenance, and rehabilitation were used for the evaluation of the Influent Sewers. The condition assessment process from the *July 2013 EGLE Asset Management Guidance for Wastewater and Stormwater Systems* was used for the WWTP Equipment.

J&H prepared the asset inventory for the Ferrous Chloride Building, the DAF System, and Activated Sludge Process Controls. The condition assessments for the assets were conducted based on observations, discussions with BHSJ management, and O&M records. Updates for the Operation & Maintenance Manual Diagrams were gathered from record drawings and site inspections.

The results of the assessments for each category are as follows.

Influent Sewers (based on feet of pipe)

- Good - 20%
- Fair - 50%
- Poor - 30%

Influent Structures (based on number of structures)

- Good - 90%
- Fair - 10%
- Poor - 0%

WWTP Equipment (based on number of equipment units)

- Good – 90%
- Fair – 10%
- Poor – 0%

Level of Service Determination

The Mission Statement of the BHSJ WWTP is *"To protect the local water resources through the development and use of sound operation and fiscal practices in the treatment of municipal wastewater."* The slogan provided on their information brochures is *"Producing Clean Water for the Environment."* These were developed by management staff; and presented to and accepted by the Board several years ago. The Plant Manager meets with the Board at their monthly meetings to discuss the business operations of the WWTP. The mission and goals for level of service are regularly discussed at those meetings but are most closely considered with the annual budget and rate setting process for wastewater services.

The Board and the Manager have strived to identify the desired level of service at the lowest life cycle cost for maintaining, rehabilitating, and replacing the assets associated with the wastewater system. J&H has provided suggestions for further defining level of service goals for added discussion between the BHSJ Board and management.

The Board consists of three representatives each from Benton Harbor and St. Joseph and one representative each from the other two governmental units that are served by the BHSJ WWTP. This assures that the stakeholders are involved in the level of service discussion and that their constituents will be considered in the development of goals that will serve their best interests.

The Joint Board of Commissioners have committed to “fund the plant’s mission objectives, operations, and capital improvements.” By accepting and implementing this AMP they can provide better wastewater services to meet the needs of their customers by managing the cost of operating, maintaining, and replacing their assets.

Revenue Structure

The Board considers a Revenue and Expense Budget along with Rates for Service annually. Rates are also projected for five years so that the tributary government units can plan for increases. The goal is to set rates at a level that will provide adequate funds for anticipated operations and maintenance, emergency reserves, and capital improvements.

BHSJ submitted a Rate Methodology that was approved by EGLE on October 28, 2019. It provides actual revenues and expenses for the past fiscal year, and projected revenues and expenses for the next five years, including the current one. The budgets for the past year and the next five years all present adequate revenues to provide for O&M, reserve, and capital expenses.

Revenues are mainly generated from the charges to tributary units for their metered flow to the WWTP. There are also industrial surcharges and miscellaneous fees that account for about 5% of the revenue. There are no proposed rate changes until 3% increases are applied in both FY 2022 and FY 2024. The current rate is $1,359 per million gallons.

The actual revenues for FY 2018 were $5,099,000. Expenses including O&M, capital equipment, and capital improvements were $5,093,000. The remaining balance from each year’s budget is applied to the reserve fund, which was $6,000 for FY 2018. The reserve balance was $8,804,000; of which four months of projected operating expenses or $848,000 were set aside for emergency reserves, and the rest or $7,956,000 was made available for capital improvements.

Capital Improvement Plan

AECOM prepared the 2015 Update to Strategic Capital Improvement Plan (SCIP) for BHSJ WWTP in response to the AMP requirements included in their NPDES Permit for operating the Plant. The Plan evaluated the processes at the WWTP and provided recommendations for a 10-year SCIP. The improvements are for Influent Pumping, Digester Gas Re-use, Primary Settling, Aeration System, Bio-Phosphorus Removal, Vertical Sump Pumps, Final Settling & RAS/WAS, DAF System, Anaerobic Digestion, Biosolids Dewatering, Polymer Feed System, and Miscellaneous Structural and Electrical. The estimated cost of these improvements is $20 million.

The BHSJ Staff evaluates the equipment at the WWTP annually and 95% of it is currently in good condition. The equipment will continue to be assessed and improvement needs will be added to the CIP as necessary. BHSJ management reviews and revises the CIP regularly to incorporate their recommendations based on experience with operating and maintaining the WWTP and knowing the issues with performing wastewater treatment within their NPDES Permit.

J&H evaluated the Influent Sewers, Ferrous Chloride System, DAF System, and Activated Sludge Process Controls for this AMP. The WWTP Operation & Maintenance Manual Diagrams were also updated. The total cost of the recommended improvements from this evaluation is $12 million.

These plans were combined and reevaluated to prepare a final CIP for the AMP. The final plan includes approximately $37 million worth the improvements over the next 20 years. Both the short-term and long-term Funding Structures and Rate Methodology must be evaluated to assure that adequate funds will be available to operate, maintain, and replace the infrastructure and at the BHSJ WWTP.

Recommendations

The Joint Plant Currently has an effective program to manage assets. The SCIP and AMP have provided information on needs that will now be incorporated into future planning efforts. The AMP identified some critical improvements for the Influent Sewers that need to be addressed soon.

Staffing needs have been identified and are being implemented as needs change and retirements approach for key positions. The Annual Report to the Board and the latest AMP Report to EGLE both address staffing issues. The Report to EGLE indicates staffing levels are adequate and that contractors are retained to assist as needed with maintenance and repair.

Continuing to update the Annual Report and maintaining the Maintenance Management Inventory and Business Risk Evaluation are the key components of maintaining the Asset Management Program.

List of Major Assets

Collection

- Meter Chambers (2)
- 36” Influent Sewers – 2500 feet
- St. Joseph River Siphons

WWTP – Liquid

- Mechanical Bar Screen
- Raw Sewage Pump Station (3)
- Submersible Pump Station (2)
- Fine Mechanical Bar Screens
- Grit Head Cell
- Influent Control Structure
- Pre-aeration Tanks
- Primary Settling Tanks (3)
- Overflow Tank
- Aeration Tanks (6)
- Final Tanks (2 plus 3)
- Chlorine Contact Tanks (2)

WWTP – Solids

- DAF Thickeners (2)
- Primary Digesters (2)
- Sludge Holding Tanks (3)

Benton Harbor – St. Joseph
Joint Wastewater Treatment Plant

Producing clean water for the environment

December 16, 2019

Cindy Clendenon
Michigan Department of Environment, Great Lakes, and
Energy (MI-EGLE)
Water Infrastructure Financing Section

Subject: Stormwater Asset Management and Wastewater (SAW)
Grant Program
Benton Harbor – St. Joseph
Joint Wastewater Treatment Plant
Wastewater Asset Management Plan
SAW Grant Project Number 1553-01

Via: E-mail

Dear Ms. Clendenon:

The Benton Harbor – St. Joseph Joint Wastewater Treatment Plant is pleased to have completed its Wastewater Asset Management Plan (AMP) under your Agency's SAW Grant Program. The AMP was prepared with the assistance of Jones & Henry Engineers Ltd., Kalamazoo, Michigan. The attached Grant Deliverables include a signed Certification of Project Completion form (including Rate Methodology Approval letter) and a summary as required under Section 603 of Public Act 84 of 2015. The AMP will be available to the MI-EGLE upon request and a copy of the plan will be available to the public for at least 15 years, through our office.

The AMP will provide our organization with guidance for operating, maintaining, and repairing our Wastewater System into the future. We appreciate the funding provided by your Agency for this endeavor. Please contact me at your convenience if you have any questions or comments.

Sincerely,

Benton Harbor-St. Joseph Joint Wastewater Treatment Plant

Timothy J. Lynch
Plant Manager

TJL/ckk

Cc: Aaron Davenport, Jones & Henry Engineers

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date: **December 16, 2019**
(no later than 3 years from executed grant date)

The Benton Harbor – St. Joseph Joint Wastewater Treatment Plant *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1553-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No
   If No - Date of the rate methodology approval letter: October 28, 2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Timothy J. Lynch, Plant Manager	at	269-983-7719	tlynch@qtm.net
Name		Phone Number	Email

12-16-2019
Signature of Authorized Representative (Original Signature Required) Date

Timothy J Lynch, Plant Manager
Print Name and Title of Authorized Representative

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

EGLE
LIESL EICHLER CLARK
DIRECTOR

October 28, 2019

Mr. Timothy Lynch
Benton Harbor - St. Joseph Joint WWTP
269 Anchors Way
St. Joseph, Michigan 49085

Dear Mr. Lynch:

SUBJECT: Stormwater, Asset Management, Wastewater (SAW)
Benton Harbor - St. Joseph Joint WWTP
SAW Grant Project Number 1553-01

We have reviewed the information contained in the rate methodology dated August 13, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404, or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Ms. Cindy Clendenon, EGLE

CONSTITUTION HALL • 525 WEST ALLEGAN STREET • P.O. BOX 30473 • LANSING, MICHIGAN 48909-7973
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www.jonesville.org
manager@jonesville.org

October 31, 2019

Clarence Jones
Project Manager/Environmental Quality Analyst
Michigan Department of Environment, Great Lakes, and Energy (MI-EGLE)
Water Infrastructure Financing Section
Constitution Hall
525 West Allegan Street
PO Box 30473
Lansing, Michigan 48909-7973

Via: E-mail (jonesc13@michigan.gov) and U.S. Mail

Subject: Stormwater Asset Management and Wastewater (SAW) Grant Program
City of Jonesville
Wastewater Asset Management Plan
SAW Grant Project Number 1556-01

Dear Mr. Jones:

The City of Jonesville is pleased to have completed its Wastewater Asset Management Plan (AMP) under your Agency's SAW Grant Program. The AMP was prepared with the assistance of Jones & Henry Engineers Ltd., Kalamazoo, Michigan. The attached Grant Deliverables include a signed Certification of Project Completion form (including Rate Methodology Approval letter) and a summary as required under Section 603 of Public Act 84 of 2015. The AMP will be available to the MI-EGLE upon request and a copy of the plan will be available to the public for at least 15 years, through my office.

The AMP will provide our City with guidance for operating, maintaining, and repairing our Wastewater System into the future. We appreciate the funding provided by your Agency for this endeavor. Please contact me at your convenience if you have any questions or comments.

Sincerely,

CITY OF JONESVILLE

Jeffrey M. Gray
City Manager

JMG/ckk

cc: Aaron Davenport, Jones & Henry Engineers
Rick Mahoney, Jonesville Water and Waste Water Superintendent

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date September 18, 2019
(no later than 3 years from executed grant date)

The City of Jonesville Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1556-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No

   If No - Date of the rate methodology approval letter: August 28, 2019 (Attached).

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jeffrey M. Gray, City Manager at 517-849-2104 manager@jonesville.org
Name Phone Number Email

10/31/19
Signature of Authorized Representative (Original Signature Required) Date

Jeffrey M. Gray, City Manager
Print Name and Title of Authorized Representative

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

EGLE

GRETCHEN WHITMER
GOVERNOR

LIESL EICHLER CLARK
DIRECTOR

August 28, 2019

Mr. Jeff Gray
City of Jonesville
265 East Chicago Street
Jonesville, Michigan 49250

Dear Mr. Gray:

SUBJECT: Stormwater, Asset Management, Wastewater (SAW)
City of Jonesville
SAW Grant Project Number 1556-01

We have reviewed the information contained in the rate methodology dated August 13, 2019. It has been demonstrated that significant progress has been made, as determined by the department, toward achieving the funding structure necessary to implement the program.

Accordingly, the applicant has fulfilled the significant progress requirement and complies with Section 5204e(3)(a), Part 52, Clean Water Assistance, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended.

If there are any questions regarding approval of the rate methodology, please contact Mr. Mark Conradi, Water Infrastructure Financing Section, Finance Division, by phone at 517-284-5404, or by mail at EGLE, P.O. Box 30457, Lansing, Michigan 48909-7957.

Sincerely,

Mark Conradi

Mark Conradi, Departmental Analyst
Water Infrastructure Financing Section
Finance Division
517-284-5404

cc: Mr. Clarence Jones, EGLE

CONSTITUTION HALL • 525 WEST ALLEGAN STREET • P.O. BOX 30473 • LANSING, MICHIGAN 48909-7973
Michigan.gov/EGLE • 800-662-9278

City of Jonesville, MI
Wastewater Asset Management Plan
Executive Summary
SAW Grant #1556-01

Executive Summary

Through the Stormwater, Asset Management, and Wastewater (SAW) Grant Program; MDEQ has provided grants for communities to accelerate the statewide asset management planning practices. Public Act 562 of 2012 allocated money for this program. The City of Jonesville received a grant do develop their Asset Management Plan (AMP) in the amount of $180,450, with a local match of $20,050 for a total project cost of $200,500. The SAW agreement was executed in December of 2016 and must be completed within three years. This report summarizes the AMP for the City's Wastewater system. The City, with assistance from Jones & Henry Engineers, completed a Wastewater Asset Management Plan which included an inventory and condition assessment of its collection system and Wastewater Treatment Plant (WWTP).

The contact person for the City of Jonesville AMP are:
Jeff Gray, City Manager
Address: 265 E. Chicago Street, Jonesville MI 49250
Phone Number: 517-849-2104

Email: manager@jonesville.org
Rick Mahoney, Water and Wastewater Superintendent
Address: 150 Ecology Drive, Jonesville MI 49250
Phone Number: 517-849-9450
Email: wastewater@jonesville.org

Asset Inventory

The WWTP inventory consists of treatment process structures, equipment, and controls. There are 13 miles of sewer mains that collect and transport wastewater to the treatment plant and the mains, along with manholes, were assessed. Record drawings and documents from the Water and Wastewater Department were assembled as a basis for completing the inventory. Field data collection was conducted to verify and expand on the attributes of each component of the wastewater system. The collected field survey data was reviewed and organized for the development of an overall map of the wastewater system. The locations of manholes were drawn in AutoCAD and a street map was used as a background to verify manhole locations.

Criticality of Assets

All assets in the City of Jonesville's wastewater system were evaluated and given a condition rating score based on age, number of defects, and severity of defects. A Business Risk Score (BRS)–was determined based on analyzing the condition, criticality, and redundancy of each asset.

Furthermore, smoke testing was performed on several sections of sanitary sewer in the downtown area to check for inflow to the sanitary sewer. Each sewer pipe segment has been reviewed and given a condition assessment. Existing televising videos and logs were used to rate the condition of the sewers. The WWTP structures and equipment were assessed individually by using maintenance records, field inspections, and pictures to perform the condition assessment.

Assessments were ranked on condition, probability of failure, and consequence of failure. Each were ranked on a 1-5 scale. For the condition assessment, a rating of 5 means asset unserviceable, 4 means significant deterioration, 3 means moderate deterioration, 2 means minor deterioration, and 1 means new of excellent condition. For the probability of failure ratings, a 5 means imminent, 4 means probable, 3 means occasional, 2 means remote, and 1 means improbable probability of failure. For the consequence of failure condition, a rating of 5 means catastrophic disruption, 4 means major, 3 means moderate, 2 means minor, and 1 means insignificant disruption.

Level of Service Determination

The Level of Service goals define the expectations a community develops and assist in determining the amount of funding that is required to maintain, renew, and upgrade the wastewater infrastructure to provide the customers with the Levels of Service specified. Level of Service goals are described as the characteristics of the utility's service performance such as "how much," "of what nature," and "how frequently." These questions and their accompanying goals are the foundation of an Asset Management Program. To track a Utility's performance, Key Performance Targets are developed to define how each Level of Service will be measured.

For the effluent water discharge, the level of service required is to meet the MDEQ NPDES Permit requirements to control the discharge of pollutants into surface water. For the collection system, the level of service required is to comply with MDEQ Sanitary Sewer Overflow Policy. Conforming with the MDEQ NPDES Permit and MDEG General Permit for Biosolids are the level of service requirements for the wastewater plant. The revenue level of service goals are to perform operation and maintenance, maintain emergency funds equivalent to 6 months of operating expenses, and providing adequate funding for capital improvements projects.

Revenue Structure

The sewer rate evaluation addresses the following requirements of the asset management program:

1. Annual Operating Budget
2. Capital Improvement Plan
3. Current, Approved Rate Structure
4. Legal Authority for Setting Rates
5. Weighs Anticipated Costs Against Revenue
6. Outlines Plan to Close Funding Gap, if Identified

The sewer rate evaluation weighs the anticipated operation and capital costs against projected revenue. Rates have been projected which recover operation and capital costs and eliminate funding gaps. The short-term projection requires 2.6 percent annual increases in the monthly base and commodity charges for the next 5 years. The long-range outlook requires 2.6 percent annual increases in the monthly base and commodity charges for years 6 through 20. The rate increases allow a replacement reserve to be established and maintained based on the estimated annual replacement cost for assets with an estimated useful life of 20 years or less.

Capital Improvement Plan

The CIP addresses the following requirements of the asset management program:

City of Jonesville, MI
Wastewater Asset Management Plan
Executive Summary
SAW Grant #1556-01

1. Identifies needs for both 5-year and 20-year planning periods.
2. Includes project name, cost, estimated completion date, and funding source.
3. Has been reviewed and approved by City Council.

Table 1
5-Year Capital Improvement Plan Summary

Fiscal Year	Item	Cost
2021	Laboratory upgrade.	$105,000
2023	Various sections of sanitary sewer cleaning; replace doors and disinfection components at WWTP.	$225,000
2025	Various sections of sanitary sewer rehabilitation.	$225,000

Table 2
20-Year Capital Improvement Plan Summary (includes items from 5-Year CIP)

Fiscal Year	Item	Cost
2021	Lab upgrade.	$105,000
2023	Various sections of sanitary sewer cleaning; replace doors and disinfection components at WWTP.	$225,000
2025	Various sections of sanitary sewer rehabilitation.	$225,000
2028	Replace channel monster in influent chamber, lab room components, locker/restroom components, storage room components, and other Service Building components; diesel tank; and make up air unit in solids handling area.	$429,000
2033	Replace Headworks Building components, filter backwash storage tank components, primary tank components, Administration Building components, final clarifier components, Sludge Pumping Building components, gas unit heaters in Biofiltration Building, pressure filter and filter backwash components, Service Garage components, alum room components, Administration Building electrical components, trickling filter components, solids handling components, and site fencing.	$5,279,000
2040	Various sections of sanitary sewer rehabilitation.	$856,000

City of Jonesville, MI
Wastewater Asset Management Plan
Executive Summary
SAW Grant #1556-01

List of Major Assets

1. 69,200 feet of sewers
2. Grit Collector and Fine Screen
3. 2 - Primary Tanks
4. 2 - Trickling Filters
5. 3 - Pressure Filter Tanks
6. 2 - Final Clarifiers
7. UV Disinfection
8. Anaerobic Digester
9. 3 - Solids Storage Tanks

City of Jonesville, MI
Wastewater Asset Management Plan
Executive Summary
SAW Grant #1556-01

Executive Summary

Through the Stormwater, Asset Management, and Wastewater (SAW) Grant Program; MDEQ has provided grants for communities to accelerate the statewide asset management planning practices. Public Act 562 of 2012 allocated money for this program. The City of Jonesville received a grant to develop their Asset Management Plan (AMP) in the amount of $269,660, with a local match of $26,966 for a total project cost of $242,694. The SAW agreement was executed in December of 2016 and must be completed within three years. This report summarizes the AMP for the City's Wastewater system. The City, with assistance from Jones & Henry Engineers, completed a Wastewater Asset Management Plan which included an inventory and condition assessment of its collection system and Wastewater Treatment Plant (WWTP).

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The CIP addresses the following requirements of the asset management program:

1. Identifies needs for both 5-year and 20-year planning periods.
2. Includes project name, cost, estimated completion date, and funding source.
3. Has been reviewed and approved by City Council.

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2025	Various sections of sanitary sewer rehabilitation.	$225,000

Table 2
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City of Jonesville, MI
Wastewater Asset Management Plan
Executive Summary
SAW Grant #1556-01

List of Major Assets

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2. Grit Collector and Fine Screen
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5. 3 - Pressure Filter Tanks
6. 2 - Final Clarifiers
7. UV Disinfection
8. Anaerobic Digester
9. 3 - Solids Storage Tanks

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Saugatuck

SAW Project No. 1557-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2017, the City of Saugatuck received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the City's publicly owned stormwater utility. Working with City staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact information for the SAW Grant AMP is:

City of Saugatuck
102 Butler Street, Saugatuck, MI 49453 / www.saugatuckcity.com
Scott Herbert / (269) 857-2603
SAW Grant #1557-01

ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 34,384 feet (6.51 miles) of storm sewers and 509 stormwater structures connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size, and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping, and further evaluation purposes.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field-based assessments were completed on all 509 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 10% of the gravity pipe. Capacity analysis and hydraulic modeling was not commissioned. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance: 33% of the system was recommended for inspection and/or cleaning due to it not being done as part of the SAW Grant. Rehabilitation accounted for 23% of the system identifying the need for replacement, point repairs and lining. The remaining 44% of assets were placed in the 20+ year category.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City Asset Management Team to develop the following LOS statement and goals.

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

The overall objective of the City of Saugatuck is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the City of Saugatuck

- Provide adequate stormwater collection system and conveyance capacity for all service areas
- Actively maintain stormwater collection and conveyance system assets in reliable working condition.
- Provide rapid and effective emergency response services to customers.
- Ensure maintenance and operations staff are properly trained.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, and evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula.

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

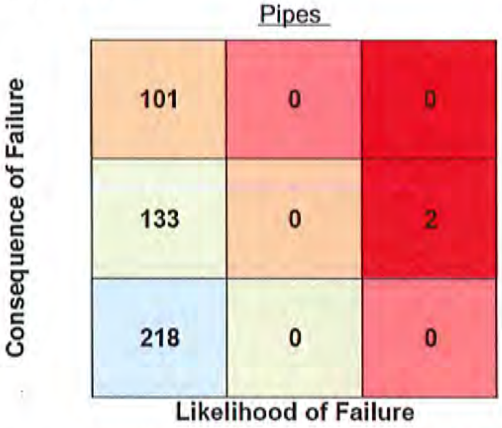
Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. Two pipe segments in the collection system have an extreme risk rating and are recommended to be further inspected with full lining recommended in the next 1-2 years.



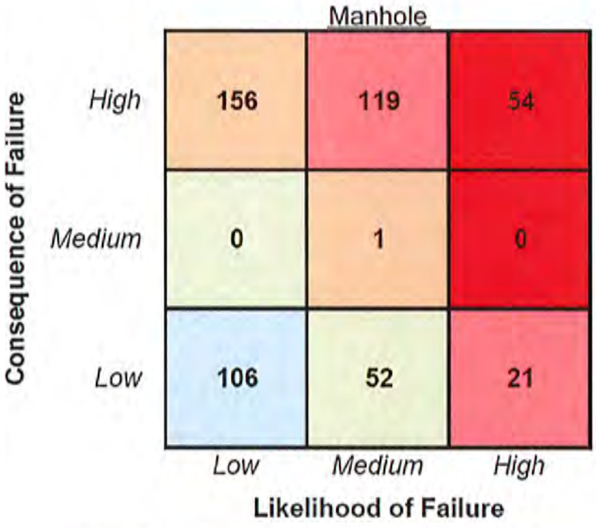
Pipes

Consequence of Failure			
	101	0	0
	133	0	2
	218	0	0

Likelihood of Failure

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Fifty-four structures are identified as extreme risk and are recommended for replacement or rehabilitation.



Manhole

Consequence of Failure	Low	Medium	High
High	156	119	54
Medium	0	1	0
Low	106	52	21

Likelihood of Failure

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

A spreadsheet providing asset criticality for each utility asset is included in the AMP detailed report for the stormwater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's stormwater utility assets based on the Business Risk evaluation. From the BRE, a short-term (1-5 year CIP) and long-term (6-20-year CIP) was developed for the utility. Table 1 shows detailed recommendations of the assets needing rehabilitation in the short term.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Pipe Replacement	$ 125,828	$ -	$ 129,603	$ -	$ -	$ -
Pipe Point Repair	$ 7,840	$ 7,840	$ -	$ -	$ -	$ -
Manhole Replacement	$ 416,970	$ -	$ 188,552	$ -	$ -	$ 263,268
Total	$ 550,638	$ 7,840	$ 318,155	$ -	$ -	$ 263,268

OPERATIONS & MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table 2 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 2. 5-Year Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Inspection	$ 18,757	$ -	$ -	$ -	$ 20,496	$ -
Manhole Cleaning	$ 110,058	$ 45,513	$ -	$ -	$ -	$ 72,646
CCTV and Cleaning	$ 122,289	$ -	$ -	$ 129,736	$ -	$ -
Total	$ 251,103	$ 45,513	$ -	$ 129,736	$ 20,496	$ 72,646

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Saugatuck *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1557-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

City of Saugatuck at (269) 857-2603 kirk@saugatuckcity.com
Name Phone Number Email

12-23-19
Signature of Authorized Representative (Original Signature Required) Date

Kirk Harrier – City Manager
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Three Rivers

SAW Project No. 1561-01

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

December 2019

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2016, The City of Three Rivers received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the City's publicly owned stormwater utility. Working with City staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Three Rivers AMP is:

Amy Roth, DPS Director
1015 S. Lincoln Avenue
Phone number: 269.273.1845
Email: aroth@threeriversmi.org

ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 197,813 feet (37.46 miles) of storm sewers and 2,250 stormwater structures connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into an updated (GIS) database and piping network for archiving, mapping, and further evaluation purposes.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field-based assessments were completed on 2,114 of the 2,250 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 26% of the gravity pipe. Recommendations for short-term (1-5 year) and long term (6-20 year) capital improvements identified the need for maintenance and rehabilitation: 50% of the system was recommended for further inspection and/or cleaning. Rehabilitation accounted for 9% of the of the system identifying the need for replacement, point repairs and lining. The remaining 41% of assets were placed in the 20+ year rehabilitation category.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City Asset Management Team to develop the following LOS statement and goals. The team first discussed the LOS statement at the SAW team progress meeting on June 4th, 2019 and subsequently a draft LOS was created and distributed for all team members to review. The draft LOS was again reviewed at the SAW team progress meeting on July 10th, 2019 where modifications were discussed and debated. The final LOS was approved by the team at the July 10th, 2019 team meeting.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

The overall objective of the City of Three Rivers is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the City of Three Rivers:

- Provide adequate stormwater collection system and conveyance capacity for all service areas
- Actively inspect, clean, service and maintain collection and treatment system components and keep them in reliable working condition.
- Provide rapid and effective emergency response services to customers.
- Ensure maintenance and operations staff are properly trained.
- Review health and safety procedures with staff to provide proper worker safety.
- Regularly review current and projected O&M and capital expenditures. Adjust user rates as necessary to provide sound financial management of the wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, and evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula.

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

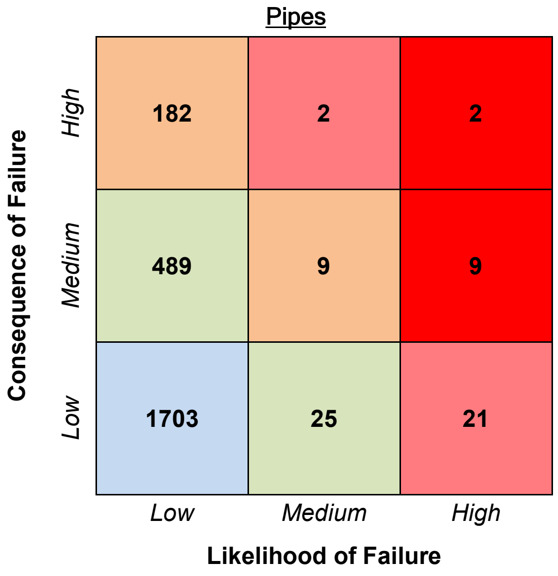
Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. Eleven pipe segments in the stormwater collection system have an extreme risk rating and are recommended to be rehabilitated in the short-term.

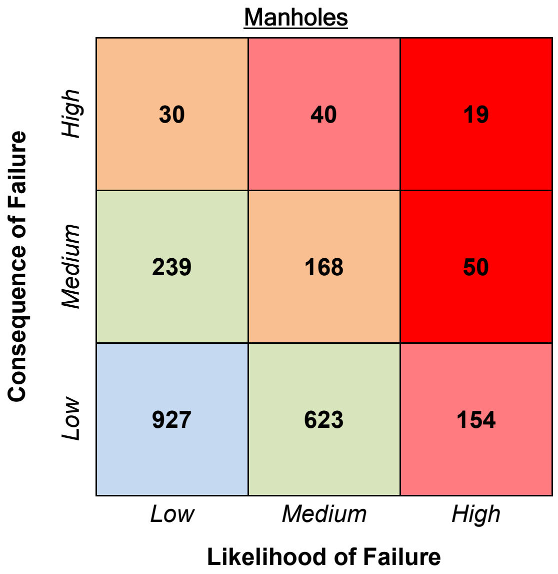


Pipes

Consequence of Failure				
	High	**182**	**2**	**2**
	Medium	**489**	**9**	**9**
	Low	**1703**	**25**	**21**
		Low	*Medium*	*High*
			Likelihood of Failure	

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Sixty-nine structures are identified as extreme risk and are recommended for replacement or rehabilitation.



Manholes

Consequence of Failure	Low	Medium	High
High	**30**	**40**	**19**
Medium	**239**	**168**	**50**
Low	**927**	**623**	**154**
	Likelihood of Failure		

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

A spreadsheet providing asset criticality for each utility asset is included in the AMP detailed report for the stormwater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's stormwater utility assets based on the Business Risk evaluation. From the BRE, a short-term (1-5 year CIP) and long-term (6-20-year CIP) was developed for the utility. Table 1 shows detailed recommendations of the assets needing rehabilitation in the short term.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Pipe Replacement	$ 632,819	-	$ 154,201	-	-	$ 543,745
Pipe Lining	$ 121,212	-	$ 104,473	-	$ 21,616	-
Pipe Point Repair	$ 728,699	$ 140,960	-	$ 623,532	-	-
Pipe Point Repair and Line	$ 81,429	-	$ 83,872	-	-	-
Manhole Replacement	$ 1,194,570	-	$ 336,779	-	-	$ 976,491
Total	$ 2,758,729	$ 140,960	$ 679,325	$ 623,532	$ 21,616	$ 1,520,236

OPERATIONS & MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table 2 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 2. 5-Year Capital Improvement Plan: Maintenance

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Inspection	$ 74,475	$ 2,207	-	-	$ 78,970	-
Manhole Cleaning	$ 76,130	$ 2,483	-	-	-	$ 82,891
CCTV and Cleaning	$ 572,293	$ 114,459	$ 117,892	$ 121,429	$ 125,072	$ 128,824
Total	$ 722,898	$ 4,689	$ 117,892	$ 121,429	$ 204,042	$ 211,715

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Three Rivers *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1561-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

269 273-1075
JOE BIPPUS at 269-506-3883 JBIPPUS@THREERIVERSMI.ORG
Name Phone Number Email

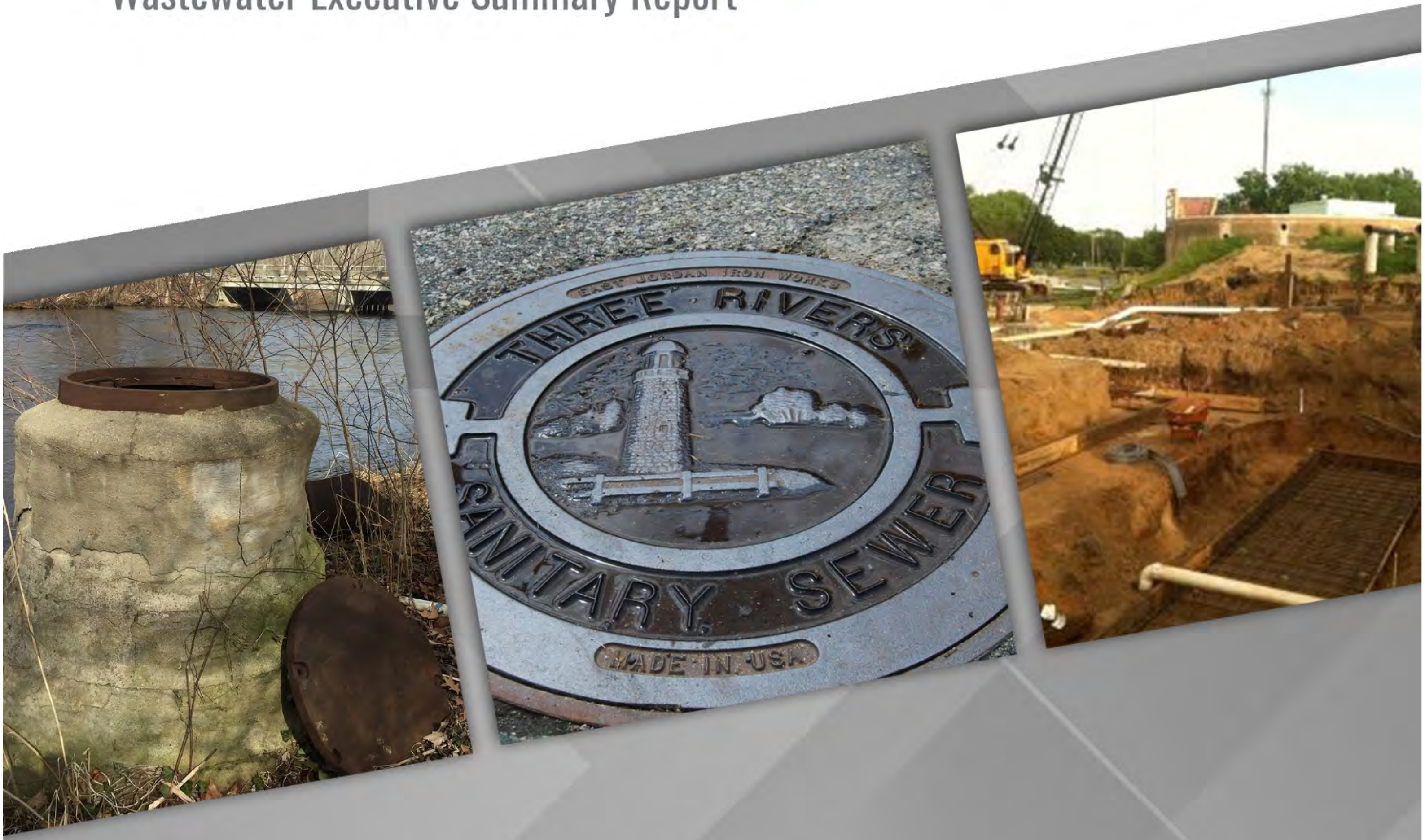
Joe Bippus 1-3-20
Signature of Authorized Representative (Original Signature Required) Date

JOE BIPPUS CITY MANAGER
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

City of Three Rivers

SAW Project No. 1561-01

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

December 2019

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In December 2016, The City received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1561-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Three Rivers AMP is:
Amy Roth, DPS Director
1015 S. Lincoln Avenue
Phone number: 269.273.1845
Email: aroth@threeriversmi.org

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the City's wastewater system, described further below, include:

- Collection system piping and manholes
- Wastewater Treatment Facility (WWTF)
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 274,000 feet (51.90 miles) of sanitary sewers (gravity pipe and force mains) and 998 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The WWTF currently includes the following treatment processes:

- influent screening
- grit removal
- primary settling
- activated sludge aeration
- final clarification
- chlorine contact for disinfection
- post aeration

The design capacity of the WWTF is 2.75 million gallons per day (mgd). The current annual average flow received by the facility is approximately 1.5 mgd. Treated effluent is seasonally discharged to the St. Joseph River in accordance with NPDES permit No. MI0020991.

There are 11 sanitary sewer lift stations located throughout the wastewater collection system. The stations are either wetwell/drywell style lift stations, prefabricated package lift stations, and grinder pump lift stations.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into an updated (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 400 WWTF assets, 70 Lift Station Assets, and 2,469 Collection System Assets.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on 956 of the 998 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 23% of the gravity pipe. Smoke Testing was performed on 100% of system to disclose location of inflow or infiltration. Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 53% of the system identified for further inspection and/or cleaning. Rehabilitation accounted for 11% of the system identifying the need for replacement, point repairs and lining. The remaining 36% of assets were placed in the 20+ year rehabilitation category.

Overall, the condition of the assets at the WWTF range from excellent to unserviceable. However, the majority of the infrastructure and equipment is in good condition. Those assets that are now near the end of their useful life due to age or deterioration are proposed to be addressed within the 20-year capital improvement plan.

The condition of the assets at the lift stations range from good to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems. Those assets that are now near the end of their useful life due to age or deterioration are proposed to be addressed within the 20-year capital improvement plan.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City Asset Management Team to develop the following LOS statement and goals. The team first discussed the LOS statement at the SAW team progress meeting on June 4th, 2019 and subsequently a draft LOS was created and distributed for all team members to review. The draft LOS was again reviewed at the SAW team progress meeting on July 10th, 2019 where modifications were discussed and debated. The final LOS was approved by the team at the July 10th, 2019 team meeting.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

LEVEL OF SERVICE STATEMENT

The overall objective of the City of Three Rivers is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals were adopted:

- Reduce inflow and infiltration into the wastewater system to mitigate potential for overloading the treatment facility, collection system overflows, basement backups and reduce energy consumption.
- Provide appropriate wastewater collection and treatment capacity for all service areas.
- Achieve or exceed all local, state and federal regulation for treated effluent quality from the treatment facility.
- Actively inspect, clean, service and maintain collection and treatment system components and keep them in reliable working condition.
- Provide rapid and effective emergency response services to customers.
- Employ staff that are properly certified and licensed and provide ongoing training.
- Review health and safety procedures with staff to provide proper worker safety.
- Regularly review current and projected O&M and capital expenditures. Adjust user rates as necessary to provide sound financial management of the wastewater system.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

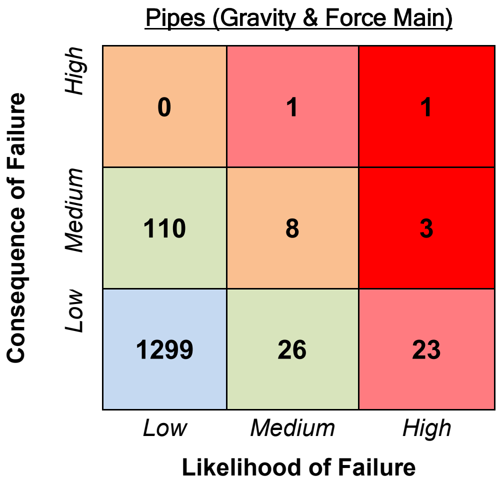
The WWTF and lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Four pipe segments in the collection system have an extreme risk rating and are recommended to be replaced, lined or repaired. Much of the collection system's gravity pipes, 96 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition.



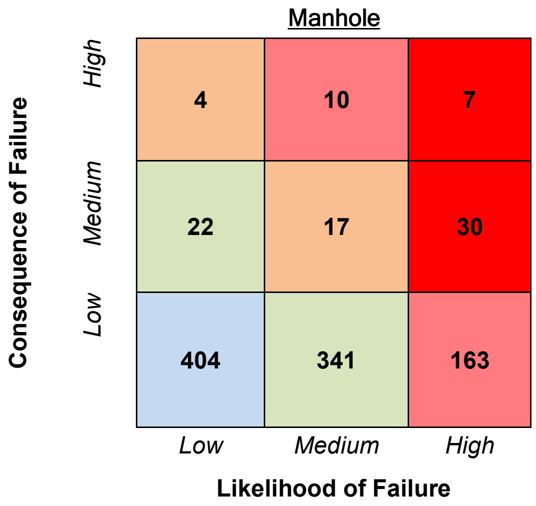
Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	0	1	1
Medium	110	8	3
Low	1299	26	23

Likelihood of Failure

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. 37 manholes are identified as extreme risk, and are recommended for replacement, lining, repairing, or a combination of both. Many manholes, 79 percent, are at negligible to medium risk and are indicative of pipes or manholes in relatively good condition.

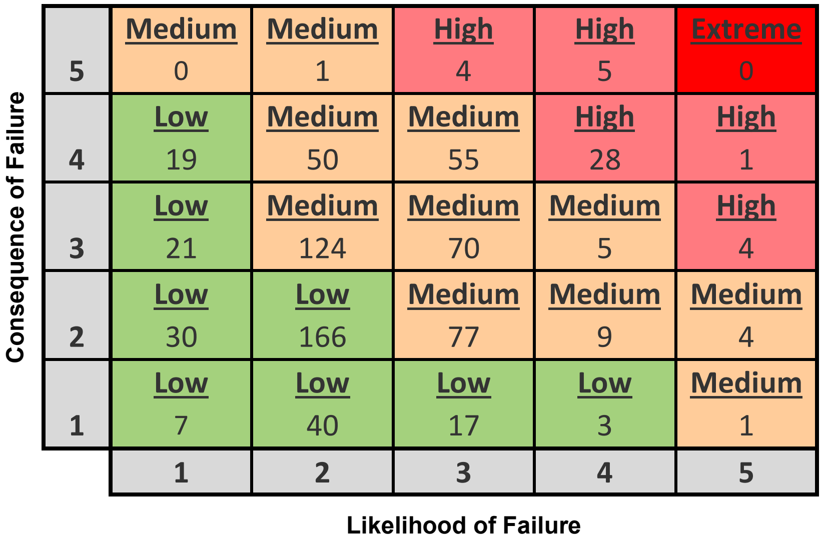


Manhole

Consequence of Failure / Likelihood of Failure	Low	Medium	High
High	4	10	7
Medium	22	17	30
Low	404	341	163

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTF and lift station assets. No assets are identified as extreme risk. The forty-two assets with high risk ratings should be addressed within the 20-year capital improvement plan.



Consequence of Failure / Likelihood of Failure	1	2	3	4	5
5	Medium 0	Medium 1	High 4	High 5	Extreme 0
4	Low 19	Medium 50	Medium 55	High 28	High 1
3	Low 21	Medium 124	Medium 70	Medium 5	High 4
2	Low 30	Low 166	Medium 77	Medium 9	Medium 4
1	Low 7	Low 40	Low 17	Low 3	Medium 1

Figure 3. Business Risk Matrix (Risk Rating) by Number of WWTF and Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection (Fleis & VandenBrink) and treatment systems (Jones & Henry).

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, WWTF and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility. Table 1 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Pipe Replacement	$ 2,334,370	$ -	$ 158,939	$ -	$ -	$ 2,453,678
Pipe Lining	$ 243,031	$ -	$ 96,753	$ -	$ 162,921	$ -
Pipe Upsize	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Point Repair	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Point Repair and Line	$ 70,782	$ -	$ -	$ 75,093	$ -	$ -
Manhole Replacement	$ 54,240	$ -	$ 41,900	$ -	$ -	$ 15,262
Manhole Clean, Line, Repair and Adjust	$ 19,125	$ -	$ -	$ -	$ 20,898	$ -
Manhole Clean, Line and Repair	$ 455,700	$ -	$ 55,878	$ -	$ 438,676	$ -
Manhole Repair, Line and Adjust	$ 11,095	$ -	$ -	$ -	$ 12,124	$ -
Manhole Repair and Line	$ 142,248	$ -	$ 14,364	$ -	$ 140,199	$ -
Manhole Clean and Line	$ 8,950	$ -	$ 4,609	$ -	$ 4,890	$ -
Manhole Clean and Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Total	$ 3,339,542	$ -	$ 372,443	$ 75,093	$ 779,708	$ 2,468,940

Table 2 shows detailed recommendations for the WWTF and lift station assets needing rehabilitation in the short-term CIP.

Table 2. Recommended Capital Improvements for WWTF and Lift Stations

Asset Description	Recommended Year of Replacement	Replacement Cost (2019 Dollars)	Replacement Cost (Inflated 3%/yr)
5-YEAR CIP PROJECTS			
Blower Building D.O. Analysis Equipment (Portable): LDO Benchtop Meter, LDO Probe	2023	$30,000	$33,765
Thickened Sludge Decant Well - Decant Well Slide Gate	2023	$20,000	$22,510
Digester Building - East and West Bar Racks	2023	$60,000	$67,531
Dewatering - Rotary Press Motor/Drive, Centrifuge Polymer Batch Tank, Polymer Supply Pump, Polymer Supply Pumps to Batch Tank (2)	2023	$80,000	$90,041
American Axle Package Lift Station – Replace with Package Pump Station and Reconstruct Piping to New Location (500' to 1000' east)	2024	$780,000	$904,234
Constantine Street Wetwell/Drywell Lift Station – Reconstruct with Submersible Style Pumps in Drywell at New Location (300' west) and Construct New Package Pump Station and Reconstruct Piping (3000')	2024	$1,690,000	$1,959,173

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 3. 5-Year Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Assessment	$ 30,342	$ 2,207	$ -	$ -	$ 31,269	$ -
Manhole Cleaning	$ 50,478	$ 1,655	$ -	$ -	$ -	$ 55,608
CCTV and Cleaning	$ 750,567	$ 150,113	$ 154,617	$ 159,255	$ 164,033	$ 168,954
Total	$ 831,386	$ 153,975	$ 154,617	$ 159,255	$ 195,302	$ 224,562

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations of the WWTF.

Below, in Table 4, is a proposed budget for the operations, maintenance and replacement of the lift station critical assets.

Table 4. 5-Year Capital Improvement Plan: Maintenance for Lift Stations

Maintenance Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
General Maintenance, Rehabilitation, or Replacement of Critical Items on all Lift Stations	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
Total	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

A study was conducted by the City's financial advisor (Cathy Lawson) to develop a 5-year financial projection to meet the Michigan Department of Environmental Quality SAW Grant requirements.

The rate methodology required by the MDEQ for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed by the City showed no revenue gap to be present for 2019, therefore, no rate increase is necessary.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Three Rivers *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1561-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: October 28, 2019.

2) Significant Progress Made: **Yes** or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: N/A.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on N/A.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

JOE BIPPUS at 269 273-1075 #103 JBIPPUS@THREERIVERSMI.ORG
Name Phone Number Email

Joe Bippus 1-3-20
Signature of Authorized Representative (Original Signature Required) Date

JOE BIPPUS CITY MANAGER
Print Name and Title of Authorized Representative

April 2017

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Springfield

SAW Project No. 1563-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2016, The City of Springfield received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the City's publicly owned stormwater utility. Working with City staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Springfield AMP is:
Terry Blaniar, Department of Public Services Director
601 Avenue A, Springfield, MI 49037
Phone number: 269.441.9277
Email: tblaniar@springfieldmich.com

ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 187,755 feet (35.56 miles) of storm sewers and 1792 stormwater structures connecting the gravity pipe. These assets are located in either existing public rights-of-way or in easements dedicated for the assets use and maintenance.

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new or updated (GIS) database and piping network for archiving, mapping, and further evaluation purposes.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed using the current National Association of Sewer Service Companies (NASSCO) standards. NASSCO-MACP structure field-based assessments were completed on 1,671 of the 1,792 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 12% of the gravity pipe. The system's Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance: 51% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 30% of the of the system identifying the need for replacement, point repairs and lining. The remaining 19% of assets were placed in the 20+ year category.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City Asset Management Team to develop the following LOS statement and goals. Meetings and discussions of the City Asset Management Team were utilized to formulate the LOS Statements and Goals.

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

The overall objective of the City of Springfield is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the City of Springfield:

- Provide adequate stormwater collection system and conveyance capacity for all drainage areas.
- Actively maintain stormwater collection and conveyance system assets in reliable working condition.
- Provide rapid and effective emergency response services to residents.
- Ensure maintenance and operations staff are properly trained.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, and evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula.

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

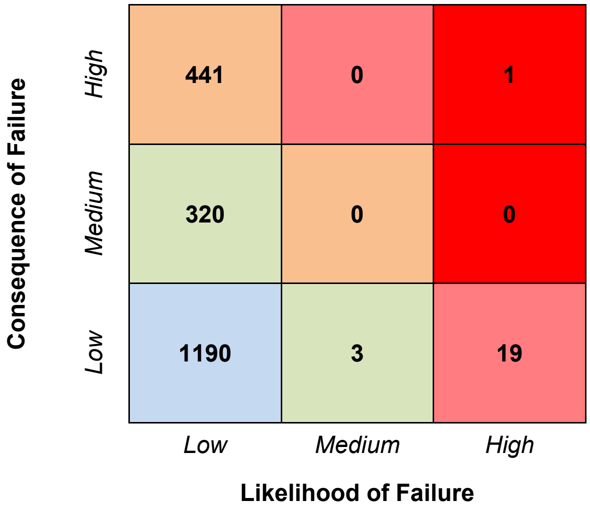
- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. 1 pipe segment in the collection system has an extreme risk rating and is recommended to be improved with a point repair in the next 1-2 years.

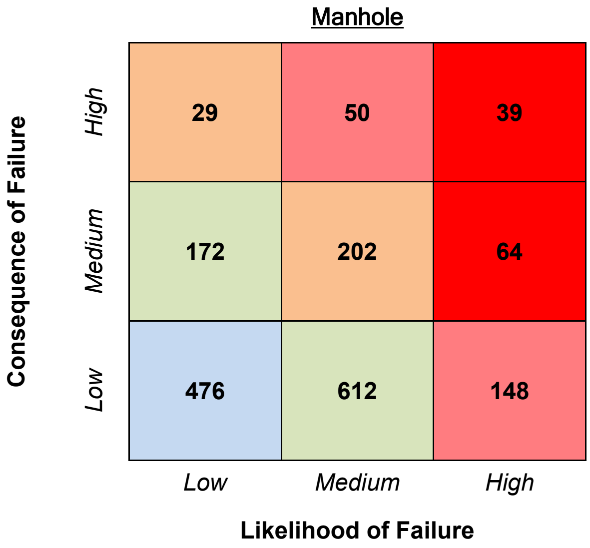
Pipes (Gravity & Force Main)



Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	441	0	1
Medium	320	0	0
Low	1190	3	19

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. 103 structures are identified as extreme risk and are recommended for replacement or repaired and lined.



Consequence of Failure	Low	Medium	High
High	29	50	39
Medium	172	202	64
Low	476	612	148

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

A spreadsheet providing asset criticality for each utility asset is included in the AMP detailed report for the stormwater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's stormwater utility assets based on the Business Risk evaluation. From the BRE, a short-term (1-5 year CIP) and long-term (6-20-year CIP) was developed for the utility. Table 1 shows detailed recommendations of the assets needing rehabilitation in the short term.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2019	2020	2021	2022	2023
Pipe Replacement	$551,580	-	-	-	-	$620,808
Pipe Lining	$26,291	-	-	-	$28,728	-
Pipe Point Repair	$120,500	$14,460	-	$112,498	-	-
Pipe Point Repair and Line	$59,451	-	-	$63,071	-	-
Manhole Replacement	$1,473,870	-	$596,772	-	-	$1,006,745
Total	$2,231,691	$14,460	$596,772	$175,569	$28,728	$1,627,553

OPERATIONS & MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table 2 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 2. 5-Year Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost (Current Year Dollars)	2019	2020	2021	2022	2023
Manhole Inspection	$16,550	-	-	$3,512	$14,468	-
Manhole Cleaning	$15,723	-	-	$2,634	$904	$13,970
CCTV and Cleaning	$607,199	-	-	$618,379	$8,411	$18,706
Total	$639,471	-	-	$624,524	$23,783	$32,676

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31st, 2019
(no later than 3 years from executed grant date)

The City of Springfield *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1563-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Terry Blaniar	at 269-441-9277	tblaniar@springfieldmich.com
Name	Phone Number	Email

Terry D. Blaniar 12-19-19
Signature of Authorized Representative (Original Signature Required) Date

Terry D. Blaniar OPS Director
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

City of Springfield

SAW Project No. 1563-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In November 2016, The City of Springfield received a Stormwater, Asset Management, and Wastewater (SAW) Grant from Michigan Department of Environment, Great Lakes, and Energy (EGLE, formerly called “MDEQ”), project no. 1563-01, to provide financial assistance for the development of a wastewater Asset Management Plan (AMP) for the City’s publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the City of Springfield AMP is:

Terry Blaniar, Department of Public Services Director
601 Avenue A, Springfield, MI 49037
Phone number: 269.441.9277
Email: tblaniar@springfieldmich.com

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the City’s wastewater system include:

- Collection system piping and manholes
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 218,637 feet (41.41 miles) of sanitary sewers (gravity pipe and force mains) and 965 wastewater manholes connecting the gravity pipe. These assets are located in either the existing street right-of-way or in easements dedicated for the assets use and maintenance.

There are 5 sanitary sewer lift stations located throughout the wastewater collection system. The City owns three submersible lift stations, one can-style built-in place station, and one dry well / wet well built in place station throughout the wastewater collection system.

The City of Springfield’s wastewater is treated by the City of Battle Creek’s Wastewater Treatment Facility. Springfield’s wastewater collection system is connected to Battle Creek’s wastewater system in 36 locations.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new GIS database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 78 Lift Station Assets and 2,161 Collection System Assets.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed using the current National Association of Sewer Service Companies (NASSCO) standards. NASSCO-MACP manhole field based assessments were completed on 895 of the 965 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 37% of the gravity pipe. Smoke Testing was not performed on the system. Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 45% of the system tagged for inspection and/or cleaning. Rehabilitation accounted for 16% of the system identifying the need for replacement, point repairs and lining. The remaining 39% of assets were placed in the 20+ year category.

The condition of the assets at the lift stations range from good to poor. Ongoing maintenance has preserved the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems.

The City owns and operates five lift stations with ten pumps. The pumps have an estimated operating life of 15-25 years. Based on the expected life of the pumps, about three pumps will be replaced in a five-year planning period. It is recommended to allocate funds to a pump replacement budget every 5 years in anticipation of replacement. Replacement of the valves in three of the stations (Building 633, Harmonia, and Beaver Dam) are in fair or poor condition and are at or beyond their expected useful life. Coating at the Harmonia Lift station is recommended to protect from corrosion. Three of the lift stations (Building 633, Harmonia, and Beaver Dam) include control panels that were installed prior to 1980. The electrical and control components in these stations are nearing the end of their expected useful life.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, allegations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City Asset Management Team to develop the following LOS statement and goals. Meetings and discussions of the City Asset Management Team were utilized to formulate the LOS Statements and Goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the City of Springfield's Department of Public Works is to provide reliable wastewater collection services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals have been adopted:

- Provide adequate collection system capacity for all service areas.
- Comply with all local, state and federal regulations.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of the collection system
- Provide rapid and effective emergency response services to customers.
- Ensure operations staff are properly licensed.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of the wastewater collection system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

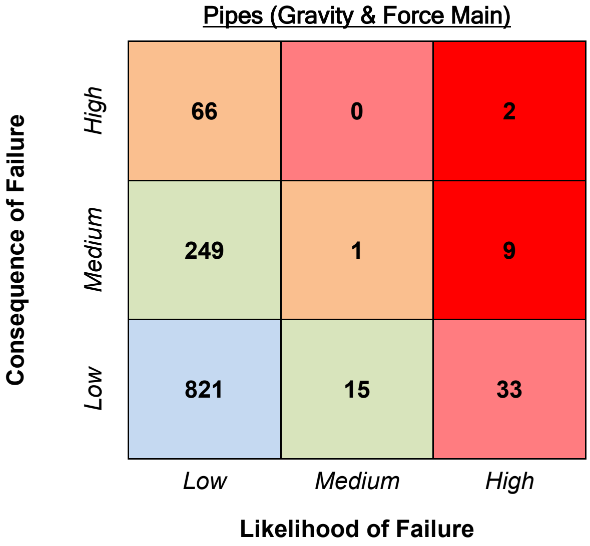
The WWTF and lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Eleven pipe segments in the collection system have an extreme risk rating and are recommended to be rehabilitated with a point repair, lining, and/or replacement. Much of the collection system's gravity pipes, 89 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes in relatively good condition.



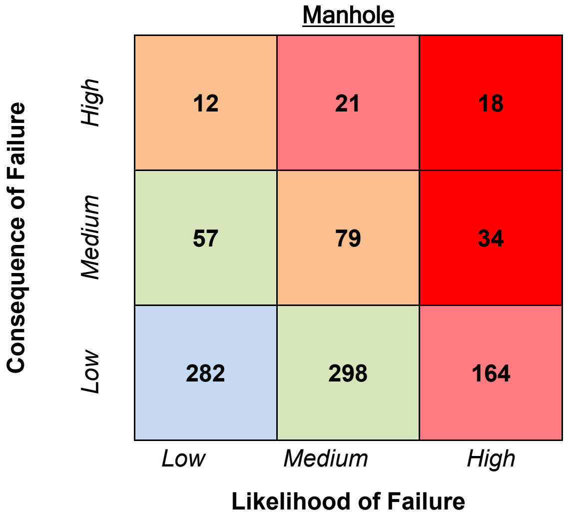
Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	66	0	2
Medium	249	1	9
Low	821	15	33

Likelihood of Failure

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. 52 manholes are identified as extreme risk, and are recommended for rehabilitations such as replacement, repair, lining, or cleaning. Many manholes, 75 percent, are at medium to negligible risk and are indicative of pipes or manholes in relatively good condition.



Manhole

Consequence of Failure	Low	Medium	High
High	12	21	18
Medium	57	79	34
Low	282	298	164

Likelihood of Failure

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The twelve assets with high risk ratings should be inspected at regular intervals.

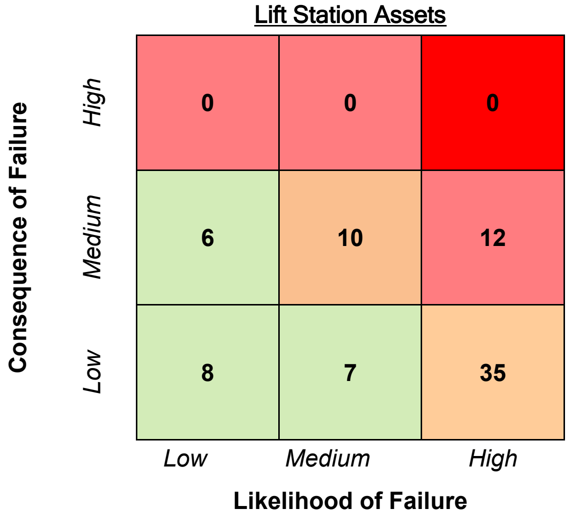


Figure 3. Business Risk Matrix (Risk Rating) by Number of WWTF and Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and lift stations.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility. Table 1 shows detailed recommendations for the collection system assets needing rehabilitation in the short-term CIP.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Pipe Replacement	$1,381,944	-	$97,218	-	-	$1,449,157
Pipe Lining	$646,042	-	$233,966	-	$457,733	-
Pipe Point Repair	$370,523	$134,481	-	$250,417	-	-
Pipe Point Repair and Line	$125,368	$98,562	-	$28,438	-	-
Manhole Replacement	$286,980	-	$50,429	-	-	$267,894
Manhole Clean, Line, Repair and Adjust	$98,825	-	-	-	$107,989	-
Manhole Clean, Line and Repair	$835,390	-	$206,501	-	$693,776	-
Manhole Repair and Line	$257,036	-	$80,927	-	$195,015	-
Manhole Clean and Line	$25,538	-	-	-	$27,906	-
Total	$4,027,646	$233,043	$669,041	$278,855	$1,482,419	$1,717,051

Table 2 shows detailed recommendations for the WWTF and lift station assets needing rehabilitation in the short-term CIP.

Table 2. Recommended Lift Station Improvements

Item No.	Improvement Description	Year	Estimated Cost (2019 Dollars)	Estimated Cost (Inflated 3%/yr)
	5-YEAR CIP PROJECTS			
1	Pump Replacement Budget (Every 5 Years)	2019	$35,000	$35,000
2	Lift Station Mechanical and Coating Upgrade	2023	$2,332,000	$2,625,000
	6-20 YEAR CIP PROJECTS			
3	Pump Replacement Budget (Every 5 Years)	2024	$35,000	$41,000
4	Lift Station Control Panel Replacement Project	2026	$207,000	$258,000
5	Pump Replacement Budget (Every 5 Years)	2029	$35,000	$47,000

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated, thereby preserving the substantial investment the community has in its collection system.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 3. 5-Year Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Assessment	$39,720	$552	-	-	$42,801	-
Manhole Cleaning	$55,443	$4,138	-	-	-	$57,744
CCTV and Cleaning	$537,789	-	-	$570,540	-	-
Total	$632,952	$4,689	-	$570,540	$42,801	$57,744

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Examples of existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs. The rate methodology required by the EGLE for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis was performed by Michigan Rural Water Association (MRWA) in 2019. The study found that revenues exceeded expenditures. As such, no financial gap was discovered through analysis of Springfield's current revenue structure. A follow-up rate analysis is scheduled for 2020 to confirm adequate funding for Capital Improvements.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Springfield *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1563-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Terry Blaniar	at 269-441-9277	tblaniar@springfieldmich.com
Name	Phone Number	Email

Terry D. Blaniar 12-19-19
Signature of Authorized Representative (Original Signature Required) Date

Terry D. Blaniar DPS Director
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

Village of Sand Lake

SAW Project No. 1567-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2016, the Village of Sand Lake received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the Village's publicly owned stormwater utility. Working with Village staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Village of Sand Lake AMP is:
Tracy J. Quinlan, President
2 East Maple Street, P.O. Box 139
Sand Lake, Michigan 49343
Phone number: 616-636-8854
Email: president@villageofsandlake.org

ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 11,956 feet (2.26 miles) of storm sewers and 162 stormwater structures connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

Stormwater Collection System	
Asset	**Footage/Number**
Sewer Pipe - 4 inch	100
Sewer Pipe - 6 inch	4662
Sewer Pipe - 8 inch	2598
Sewer Pipe - 10 inch	712
Sewer Pipe - 12 inch	4706
Sewer Pipe - 15 inch	3257
Sewer Pipe - 24 inch	121
Structure (Manhole/Catch Basin)	162

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed-Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new GIS based map and piping network for archiving, and further evaluation purposes.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field-based assessments were completed on 113 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on the gravity pipe that could be identified. Much of the system is in such poor condition that it could not be traced or perform CCTV. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for ongoing maintenance and eventual upgrade: 100% of the system was tagged for inspection and/or cleaning over a five-year period. Within that, 92% of the of the system was identified as needing for replacement within 20 years.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the Village Asset Management Team to develop the following LOS statement and goals.

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Sand Lake is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the Village of Sand Lake:

- Provide adequate stormwater collection system and conveyance capacity for all service areas
- Actively maintain stormwater collection and conveyance system assets in reliable working condition.
- Provide rapid and effective emergency response services to customers.
- Ensure maintenance and operations staff are properly trained.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Village from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, and evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula.

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset

- Remaining useful life (Age)
- Service History
- Operational status

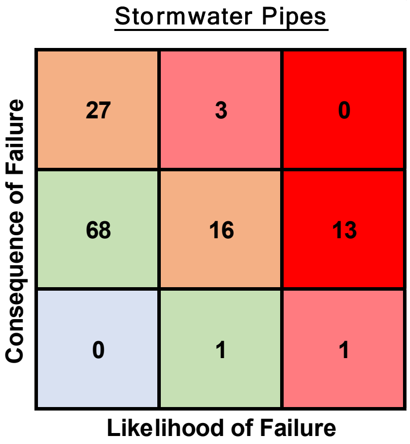
Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood graphical output.

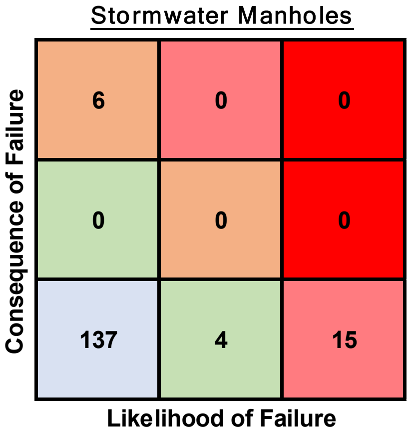
Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. Thirteen pipe segments in the stormwater collection system have an extreme risk rating and are recommended to be for near-term rehabilitation or replacement.



27	3	0
68	16	13
0	1	1

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Zero structures are identified as extreme risk.



6	0	0
0	0	0
137	4	15

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Village's stormwater utility assets based on the Business Risk evaluation. From the BRE, a short-term (1-5 year CIP) and long-term (6-20-year CIP) was developed for the utility. CIP Projects are identified in Table 1.

Table 1. Capital Improvement Plan

Project	Total Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
Reconstruct County Drain from Northland Drive to E. Outlet	$533,200	$533,200	$0	$0	$0	$0	$0
Reconstruct stormwater system on Oak Street from 5th Street to Couty Drain at Northland Drive	$231,600	$0	$0	$231,600	$0	$0	$0
Reconstruct stormwater system on 5th Street from from Lake Street to Oak Street	$330,350	$0	$0	$330,350	$0	$0	$0
Reconstruct stormwater system on 4th Street from from Lake Street to Maple Street	$428,000	$0	$0	$0	$0	$428,000	$0
Reconstruct stormwater system on 4th Street from from Maple Street to Pine Street	$276,800	$0	$0	$0	$0	$276,800	$0
Reconstruct stormwater system on 6th Street from from Lake Street to Oak Street	$191,600	$0	$0	$0	$0	$0	$191,600
Reconstruct stormwater system on Northland Drive from Oak Street to Maple Street	$679,000	$0	$0	$0	$0	$0	$679,000
TOTAL	**$2,670,550**	**$533,200**	**$0**	**$561,950**	**$0**	**$704,800**	**$870,600**

OPERATIONS & MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table 2 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 5. Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost	Year 1	Year 2	Year 3	Year 4	Year 5
CCTV	$36,000	$7,200	$7,200	$7,200	$7,200	$7,200
Manhole Cleaning and Inspection	$81,000	$16,200	$16,200	$16,200	$16,200	$16,200
TOTAL	**$117,000**	**$23,400**	**$23,400**	**$23,400**	**$23,400**	**$23,400**

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The Village of Sand Lake *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1567-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Tracy J. Quinlan at 616.636.8854 president@villageofsandlake.org
Name Phone Number Email

Tracy J. Quinlan 12/21/2019
Signature of Authorized Representative (Original Signature Required) Date

Tracy J. Quinlan, President of the Village of Sand Lake
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Village of Sand Lake

SAW Project No. 1567-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2016, The Village of Sand Lake received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1567-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Village's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Village of Sand Lake AMP is:

Tracy J. Quinlan, President
2 East Maple Street, P.O. Box 139
Sand Lake, Michigan 49343
Phone number: 616-636-8854
Email: president@villageofsandlake.org

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the Village's wastewater system, described further below, include:

- Collection system piping and manholes
- Wastewater Treatment Facility (WWTF)
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 18,240 feet (3.5 miles) of sanitary sewers (gravity pipe and force mains) and 70 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The WWTF currently includes the following treatment processes:

- Facultative lagoon
- Polishing/storage lagoons
- Center pivot irrigation system

Treated effluent is discharged center pivot irrigation system adjacent to the WWTF in accordance with NPDES permit No. GW1810228. The design capacity of the WWTF is 0.064 million gallons per day (mgd). The current annual average flow received by the facility is approximately 0.042 mgd.

There are 2 sanitary sewer lift stations located throughout the wastewater collection system. The stations are submersible style stations.

Wastewater Collection System	
Asset	**Footage/Number**
Forcemain - 4 inch	28
Forcemain - 6 inch	2000
Sewer Pipe - 8 inch	13920
Sewer Pipe - 10 inch	2222
Manhole Structures	70
Pump Stations	
Pump Station #1 Assets	**Number**
Wet Well	1
Control Panel	1
Generator	1
Flow Meter	1
Automatic Transfer Switch	1
Valve Vault	1
Check Valve	2
Gate Valve	8
Meter Manhole	1
Pump	2
Pump Station #2 Assets	**Number**
Wet Well	1
Control Panel	1
Valve Vault	1
Generator	1
Automatic Transfer Switch	1
Check Valve	2
Gate Valve	2
Pump	2

Wastewater Treatment Facility	
Asset	**Number/Footage**
Air Break Structure	1
Gate Valve	27
Lagoon	3
Mechanical Aerator	2
Control Panel	4
Transfer Structure	2
Outlet Structure	2
Pump Station Structure	2
Butterfly Valve	1
Flap Valve	1
VFD	2
Pump	2

Check Valve	2
Flow Meter	3
Catch Basin	1
Center Pivot	2
Plug Valve	2
Influent	3
Influent Bypass	1
Transfer Structure Piping	1
Overflow Piping	1
Effluent	1
Irrigation	1
Site Fencing	8500

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed-Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 69 WWTF assets, 42 Lift Station Assets, and 140 Collection System Assets.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field-based assessments were completed on all 70 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 95% of the gravity pipe. The remainder of the gravity pipe was cleaned and televised as part of a rural development improvement project in 2006. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 100% of the system tagged for inspection and/or cleaning. Rehabilitation accounted for 1% of the system identifying the need for replacement, point repairs and lining. The remaining 3% of assets were placed in the 20+ year category.

Overall, the condition of the assets at the WWTF are good. Ongoing repairs have helped to maintain the condition of many assets. A large WWTF improvement project was completed in 2012 which included lagoon berm repairs, replacement of control structures, valves and associated piping, and irrigation system improvements.

The condition of the assets at the lift stations are good. Ongoing maintenance has upheld the condition of many assets. 2012 and 2018 rehabilitation project replaced pumps, valves, control panels and access hatches.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer’s expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the Village Asset Management Team to develop the following LOS statement and goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Sand Lake Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with all local, state and federal regulations at all times for treated effluent from the WWTF.
- Actively maintain collection and treatment system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of treatment facility.
- Provide rapid and effective emergency response services to customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Village from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

The WWTF and lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Five pipe segments in the collection system have an extreme risk rating. Much of the collection system's gravity pipes, 77 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition. Overall, the collection system is in good condition. The risk ratings are heavily dependent on the Consequence of Failure and not the condition of the asset. A majority of the system was lined in 2012, therefore, very few improvements are recommended for the collection system.

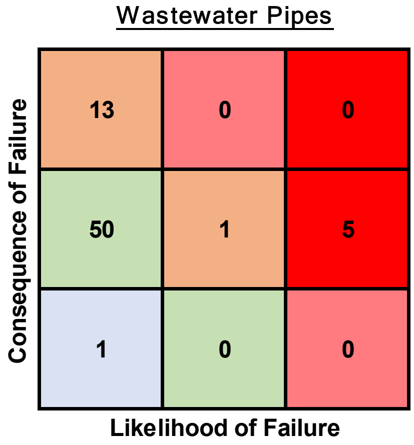
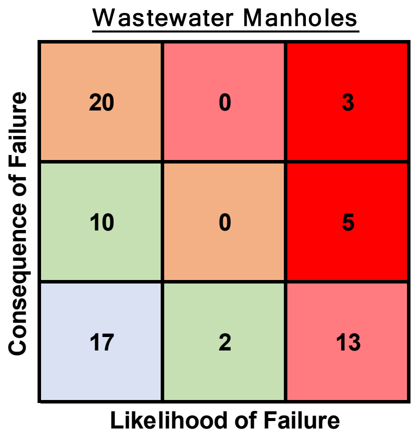


Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

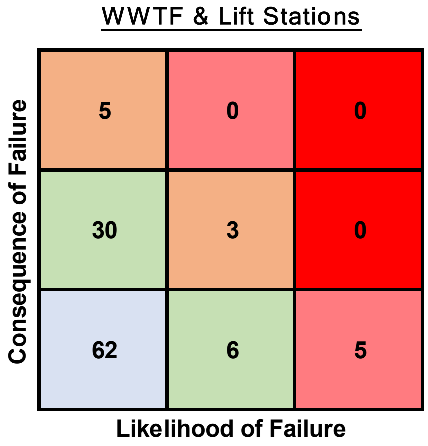
Figure 2 provides the risk rating for the collection system manholes. Eight manholes are identified as extreme risk and are recommended for replacement. Many manholes, 70 percent, are at low to medium risk and are indicative of pipes or manholes in relatively good condition.



20	0	3
10	0	5
17	2	13

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTF and lift station assets. No assets are identified as extreme risk. The five assets with high risk ratings should be inspected at regular intervals.



5	0	0
30	3	0
62	6	5

Figure 3. Business Risk Matrix (Risk Rating) by Number of WWTF and Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and treatment systems.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Village's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, WWTF and lift stations. From the BRE, a short-term (1-5-year CIP) and long-term (6-20-year CIP) was developed for the utility. There are no anticipated 1-5-year CIP projects. Table 1 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

Table 1. Capital Improvement Plan

Project	Total Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
Pipe Lining	$80,000						$80,000
Pipe Point Repair	$6,000						$6,000
Manhole Repair	$4,200						$4,200
TOTAL	**$90,200**	**$0**	**$0**	**$0**	**$0**	**$0**	**$90,200**

Table 2 shows detailed recommendations for the WWTF and lift station assets needing rehabilitation in the short-term CIP.

Table 2. Recommended Capital Improvements for WWTF and Lift Stations

Asset Description	Year Installed	Expected Useful Life (Years)	Anticipated Year of Replacement	Replacement Cost (2018 Dollars)	Replacement Cost (Inflated 3%/yr.)
5-YEAR CIP PROJECTS					
No anticipated capital improvement projects					
6-20-YEAR CIP PROJECTS					
Irrigation System Improvements	2011	25	2036	$347,000	$574,000
Lagoon No. 1 Biosolids Removal	2011	20-30	2036	$380,000	$628,000
Lagoon No. 2 Biosolids Removal	2011	20-30	2039	$127,000	$229,000
Lagoon No. 3 Biosolids Removal	2011	20-30	2039	$127,000	$229,000

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 3. Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost	Year 1	Year 2	Year 3	Year 4	Year 5
CCTV	$54,510	$10,902	$10,902	$10,902	$10,902	$10,902
Manhole Cleaning and Inspection	$35,000	$7,000	$7,000	$7,000	$7,000	$7,000
TOTAL	**$89,510**	**$17,902**	**$17,902**	**$17,902**	**$17,902**	**$17,902**

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology are an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

A study was conducted by an independent municipal financial advisor (Michigan Rural Water Association) to develop a 5-year financial projection to meet the Michigan Department of Environmental Quality SAW Grant requirements.

The rate methodology required by the MDEQ for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed by MRWA shows the revenue gap to be ($15,434) for 2019. A rate track is provided in the report to fully recover the revenue gap within five years using a 8.4% rate increase for year one, a 7.8% rate increase for year two, and a 2.0% rate increase for years 3 – 5.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Village of Sand Lake *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1567-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: [✓ Yes] or No
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: [✓ Yes] or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: June 4, 2019.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on March/April 2019.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Tracy J. Quinlan at 616-636-8854 president@villageofsandlake.org
Name / Phone Number / Email

Tracy J. Quinlan 12/21/2019
Signature of Authorized Representative (Original Signature Required) / Date

Tracy J. Quinlan, President of the Village of Sand Lake
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

ST. JOSEPH COUNTY
MICHIGAN

Prepared for:

St. Joseph County Drain Commissioner

SAW Project No. 1572-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

1.0 EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2017, The St. Joseph County Drain Commissioner (SJCDC) received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP). This report provides the Asset Management Plan (AMP) for the stormwater collection system(s). Working with drain staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system(s).

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The St. Joseph County Drain Commissioner has executed the "Certification of Project Completeness" for the storm water asset management plan and a copy has been provided at the end of this Executive Summary.

The contact person for the SJCDC AMP is:

Jeffery J. Wenzel – Drain Commissioner
612 E. Main St.
Centreville, MI 49032
Phone number: 269.467.5600
Email: wenzelj@stjosephcountymi.org

ASSET INVENTORY AND CONDITION ASSESSMENT

The St. Joseph County Drain Commissioner initially identified one (1) county drain with enclosed pipe networks needing to be cleaned, televised, and inspected. However, after further investigation, the Corey Lake Outlet was determined not to be an official County Drain. It was constructed by the County Commissioners in 1951, and never turned over to the Drain Commissioner.

Several dams were inspected under Part 307 and Part 315 of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. These include:

Lake Templene Dam, ID 470
Omena Lake Level Control Structure, ID 814
Clear Lake Level Control Structure, ID 939
Long Lake Level Control Structure, ID 940
Sand Lake Level Control Structure, ID 950
Corey Lake Level Control Structure, ID 2015
Klinger Lake Level Control Structure, ID 2016
Pleasant Lake Level Control Structure, ID 2017
Beaver Lake Level Control Structure, ID 2557
Fish Lake Level Control Structure, ID 2644
Kaiser Lake Level Control Structure, ID 4012
Eberhard Lake Level Control Structure, ID 4014

ASSET IDENTIFICATION AND LOCATION

A comprehensive stormwater system asset inventory was not developed due to the Corey Lake Outlet not being an official County Drain.

Condition Assessment and Expected Useful Life

For the Drain Commissioner, a comprehensive evaluation of the collection system was not performed. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were not conducted. Capacity analysis was not completed. This was all due to the determination of the Corey Lake Outlet not being an official County Drain.

Level of Service

Defining the Expected Level of Service (LOS)

Level of Service (LOS) defines the way in which the St. Joseph County stakeholders want the storm water system(s) to perform over the long term and is an MDEQ required component of an AMP. The LOS can include any technical, managerial, or financial components the County wishes, if all regulatory requirements are met. Throughout the development of this AMP, F&V worked with the County drain staff to develop the following LOS statement and goals.

STORMWATER – LEVEL OF SERVICE STATEMENT

> *To provide appropriate stormwater collection, diversion, and conveyance at a minimal cost, consistent with applicable Drain Code requirements. To achieve this the following Level of Service (LOS) goals are proposed for the St. Joseph County Drain Commissioner:*
>
> - *Provide adequate stormwater collection system(s) and conveyance capacity for all drainage districts.*
> - *Maintain stormwater collection and conveyance system(s) assets in reliable working condition.*
> - *Provide rapid and effective emergency response services to customers.*

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of the County change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the County Drain Commissioner from time to time to make sure they accurately reflect the desired operation of the storm water system(s).

Measuring Performance

Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. Evaluations of goals should be completed at least annually to determine if the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

Critical Assets

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors: 1) Likelihood (Probability) of Failure and 2) Consequence of Failure. Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and on the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

ASSESSING CRITICALITY

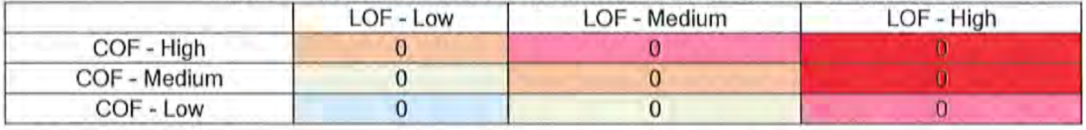
A Business Risk Evaluation (BRE) was not performed since there were no assets to evaluate.

The Business Risk score, also known as Criticality, is calculated for each asset using the following equation:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. Since no pipe segments were evaluated, so there is no Business Risk data.

Figure 1 - Business Risk Matrix (Risk Rating) by Number of Gravity Pipes



	LOF - Low	LOF - Medium	LOF - High
COF - High	0	0	0
COF - Medium	0	0	0
COF - Low	0	0	0

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

CAPITAL IMPROVEMENT PLAN

Due to the reactionary nature of how the Drain Commissioner operates, being held to follow the Drain Code, a Capital Improvement Plan was not created. Most projects are either done by petition, or under maintenance.

OPERATIONS AND MAINTENANCE

Drain Commissions are created and governed by state statutes. The Drain Code of 1956 is the primary statute governing level of service for each drain. Per statute, the Drain Commissioner is authorized to expend up to $5,000 per linear mile for maintenance per each drainage district. Expending more than the authorized rate needs additional review and a petition by a municipality and/or landowners.

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The St. Joseph County Drain Commissioner *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1572-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

St. Joseph County Drain Commissioner at	(269) 467-5600	drains@stjosephcountymi.org
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required) 12/18/19 Date

Jeffery J. Wenzel – St. Joseph County Drain Commissioner
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/16/2019
(no later than 3 years from executed grant date)

The GRANT TOWNSHIP *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1581-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/14/2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

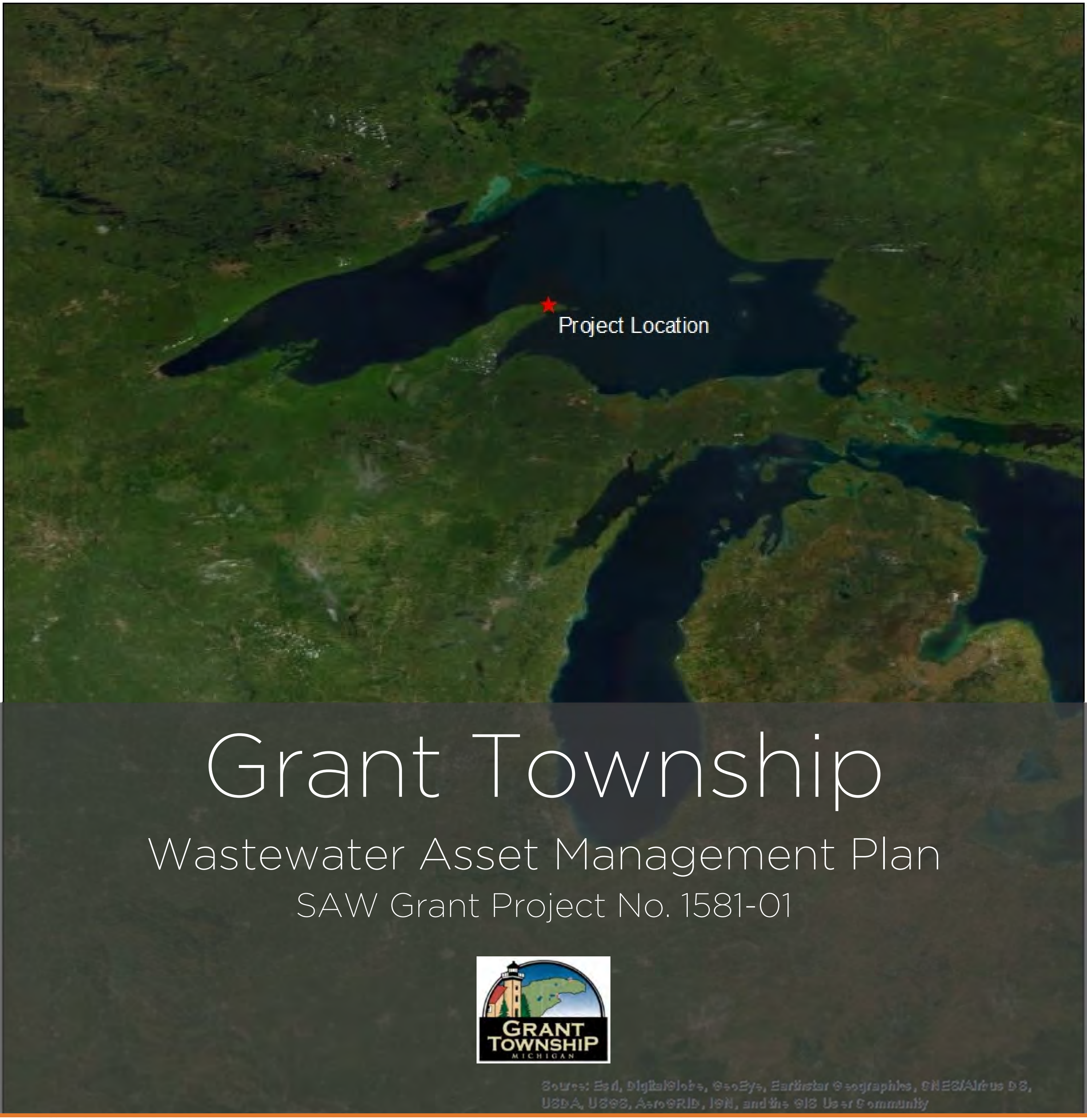
Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ken Stigers at (906)289-4292 grantsuper@pasty.com
Name Phone Number Email

Ken Stigers 12/18/19
Signature of Authorized Representative (Original Signature Required) Date

Ken Stigers, Supervisor
Print Name and Title of Authorized Representative

April 2017



Grant Township

Wastewater Asset Management Plan

SAW Grant Project No. 1581-01

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

OHM
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Executive Summary

Introduction

This document summarizes the Asset Management Plan (AMP) for Grant Township's sanitary sewer system and includes key recommendations for future funding levels. It includes details on the assessments completed by OHM Advisors with collaboration from the Township. The AMP was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program. $90,532 was allocated through the SAW Grant Program. Activities completed with these funds were intended to accomplish the following key goals:

- Provide the Township with a new framework for collecting, organizing, and storing data for their wastewater collection system using the latest available hardware and software.
- Survey key system components to develop a Geographic Information System (GIS) database and to allow future generations to access infrastructure data with greater ease.
- Add information for sewer material type, size, and age to the GIS database and the Wastewater Asset Management Plan Workbook.
- Evaluate the structural and operational condition of various system components and store the data in the GIS database and the Wastewater Asset Management Plan Workbook.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity.
- Provide recommendations for developing a prioritized Capital Improvement Plan.
- Analyze operating budgets and recommend revenue structure changes to facilitate the Township's long-term capital improvements plans.

The contact person for the Grant Township Wastewater AMP is:

Mr. Ken Stigers, Supervisor
Grant Township
220 Gratiot Street
PO Box 76
Copper Harbor, MI 49918
Phone: (906)289-4292

Asset Inventory

An asset inventory is a list of the Township's assets and their attributes. The Township, in partnership with OHM Advisors, has inventoried much of its sanitary sewer infrastructure. A GIS framework was developed as part of this effort, making it easier to store critical data for the location, size, material, age, and condition of each wastewater asset. The Township's sewer system is a low-pressure sewer system (LPS). The LPS is pressurized by point of entry grinder pumps and the collection system routes all wastewater to the Copper Harbor WWTP. Wastewater is treated in two aerated lagoons and undergoes UV disinfection prior to discharge into Lake Superior. The major assets of the Grant Township Wastewater System are listed in Figure A.

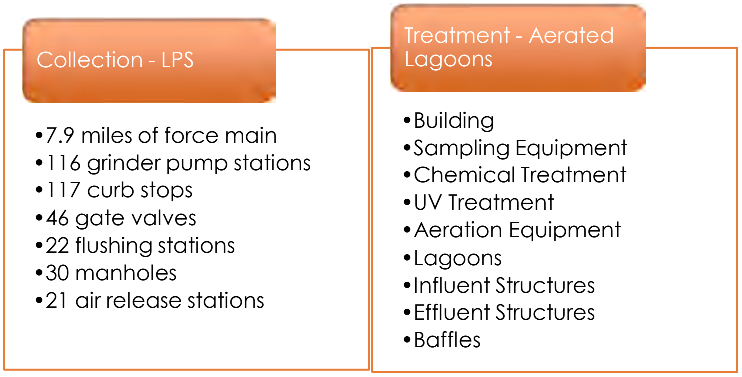

Figure A. Grant Township Wastewater Inventory Summary

Condition Assessment

The WWTP and all corresponding treatment appurtenances were inspected on site by engineers experienced in lift station and treatment facility design. The collection system was evaluated using a criticality-based risk assessment.

Level of Service

The Township has identified Level of Service (LOS) goals that will be used to guide the AMP and establish critical performance parameters. The LOS is bounded by the minimum regulatory requirements and the maximum capabilities of the assets. The Township's LOS goals are listed in Table A below.

Table A. Grant Township Wastewater Level of Service Goals

Key Service Criteria	Performance Indicator	Target Level of Service
Regulatory Compliance	Compliance with EGLE Policy and the Clean Water Act	Comply with EGLE Policy and the Clean Water Act
Service Delivery and Customer Communication	Customer complaints per year, request response time	Acknowledge customer complaints and requests within 24 hours of receipt Respond to customer complaints and requests within three business days
Capital Improvement Planning	Customer complaints per year, unexpected repair costs per year	Update the CIP annually using gathered information from customer complaints, history of emergency repairs, and inspection data.

Criticality and Risk

The Township's wastewater system was evaluated, and assets were assigned a Business Risk Exposure (BRE). The BRE is a product of an asset's probability of failure (POF) and its consequence of failure (COF). The equation is shown in Figure B.

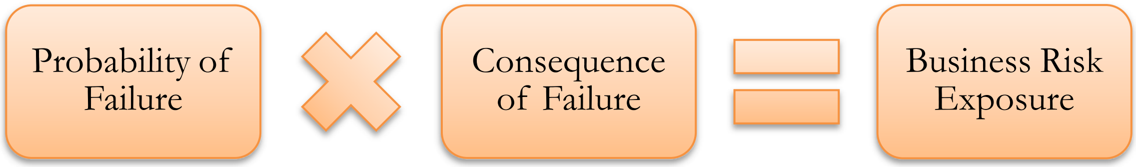

Figure B. Business Risk Exposure Summary

The POF is dependent on an asset's age and condition. A high POF represents an asset with significant deterioration, near the end of its expected useful life, with a low reliability for continued operation. As an asset ages, its condition generally worsens and its remaining useful life decreases. Because of the relationship between age and condition, the estimated percent of remaining useful life can be correlated to its probability of failure without a condition rating assigned by direct physical inspection. Due to the difficulty and expense of physical inspections on pressurized assets, which often require specialized technology and disruptions in service, the estimated percent of useful life was used to determine the POF for assets without an assigned condition rating.

The COF represents the economic, social, and environmental impacts of an asset's failure. COF is determined by factors including location or surface type, size or diameter, network position, and redundancy. Geoprocessing tools were used to assign COF factors to the collection network, while the treatment assets were evaluated individually during on-site inspections. The COF factors were combined using a weighted average to determine the overall COF rating for each asset. The overall COF and POF ratings were multiplied to determine the BRE. Average ratings for each asset group are shown in Table B.

Table B. Average BRE Ratings for Grant Township Wastewater Asset Groups

Asset Group	Average POF (1 good – 5 bad)	Average COF (1 good – 5 bad)	Average BRE (1 good – 25 bad)
Collection – Force Main	2.0	2.0	4
Collection – Valves (Curb/Gate/Air Release)	4.0	1.9	8
Collection – Grinder Pumps	5.0	1.4	7
Collection – Structures (Manhole/Flushing)	2.0	1.8	4
Treatment – Mechanical	2.5	2.7	7
Treatment – Electrical	1.7	3.3	6
Treatment – Site	1.0	3.0	3
Treatment – Building	2.1	2.9	6
Treatment – Valves and Piping	1.1	1.3	2
Treatment – Structures	2.6	3.2	8

As shown in Table B, the overall system BRE's range from low to medium. However, it should be noted that the POF for collection pumps and valves is high and indicative of system-wide significant deterioration of these asset groups. Even though their average COF ratings are relatively low and overall BRE is only medium, these assets should be prioritized for replacement.

Revenue Structure and Capital Improvement Plan

Current sanitary sewer funding sources may include Township reserves and operations and maintenance accounts, federal and state grant and loan programs, and other sources. The Township will make every effort to fund necessary improvements for collection assets through the Township's sewer maintenance budget. Major capital improvements to the WWTP are currently in progress under SRF Project No. 5674-01. The SRF project was initiated in response to a catastrophic failure in the primary lagoon in 2018. Rates have been raised significantly already to cover the cost of this 1.8-million-dollar project, and further large-scale capital improvements may be prohibitively expensive to residents. For this reason, the recommendations in the Capital Improvement Plan organize projects into improvements intended to limit the need for additional debt financing.

The Township plans to increase the ready-to-serve charge, commodity charge, and administration charge by 20% in 2020, 2021, and 2022 to meet necessary funding requirements. After 2022, an annual increase of 1% in these charges will offset inflation. For planning purposes, it is assumed that the Township will be able to allocate $20,000 annually from the DDA for sanitary sewer improvements. This funding strategy will allow the Township to achieve Capital Improvement Plan goals without securing additional debt financing, and while maintaining a forecasted minimum cash buffer of $44,000 for emergency repairs.

The current twenty-year estimate for the Township's sanitary sewer system Capital Improvement Plan is $1,210,000. Approximately $484,000 is needed for High Priority Capital Improvements in the next five years.

High Priority WWTP Capital Improvement Projects (2020 to 2024)	$221,900

High priority WWTP projects are those that rehabilitate treatment system assets that have a business risk exposure of 16-25 or have an expected remaining useful life of five years or less. The following work has been identified as high priority and should be completed within the next five years:

- (14) WWTP Components $221,900, incl. 40% engineering, administration and contingency.
    - Alum Feed Pumps*
    - Office Computer*
    - Building Grinder Pump
    - Building Water Supply
    - HVAC Fan
    - Effluent Sampler
    - Emergency Generator
    - Main Level Furnace
    - Motor Starters – Blowers and Water Supply
    - Original Aeration Diffusers
    - Transfer Switch
    - Unit Heater #1

    *The alum feed pumps and office computer were replaced in 2019 but have historically only lasted approximately 5 years and the Township may opt to budget for replacement every 5 years; in which case this item should be added to O&M budget.

High Priority Collection System Capital Improvement Projects (2020 to 2024) $96,400

High priority collection system projects are those that rehabilitate collection system assets with a business risk exposure of 16-25 and a total expected service life of 20 years or less. The following work has been identified as high priority and should be completed within the next five years:

- (4) Grinder Pump Stations (GP-40, GP-42, GP-49A, GP-49B) $72,000, incl. 20% contingency.
  Complete station replacements at locations with suspected leaking tanks.
- (1) Air Release Valve (ARV-12) $5,200 (material and install only)
  In-kind replacement of all associated mechanical fittings, couplings, and valves by Township staff. This replacement is for the 3-inch force main only; the 5-inch components were replaced in 2017.
- (10) Gate Valves (3-inch to 5-inch) $19,200 (material and install only)
  Replacement of LPS gate valves with ductile iron resilient wedge gate valves.

Grinder Pump Replacements (On-going) $33,000/year minimum

The Environment One (E/One) grinder pumps used by the township do not have an expected service life published by the manufacturer. In the experience of the regional E/One distributor, most 200-series pumps have an observed useful life of 17-18 years with replacement of the stator typical around year 10. The Township does not have the means to replace pumps every 17-18 years and based on the performance of the existing pumps the planned replacement interval may be extended. Useful life expectancies can vary based on volume of use, scope of maintenance activities, and other conditions. The Township is planning for grinder pump replacements on a 20-year recurrence interval. This means that the Township must plan for ongoing grinder pump replacements at an average rate of 5 percent per year. The alarm panels are expected to last approximately 20 years as well and should be replaced when upgrading the pumps to ensure compatibility; wiring replacement may also be required for compatibility.

To achieve this rate of replacement, the Township will need to budget a minimum of $26,000 per year in addition to current maintenance spending. This minimum amount does not include contracted construction or professional services, or additional Township labor costs, but does include a 20% contingency over the base material cost. The budgeted amount should be increased to $34,000 per year to include contracted construction services if the Township is unable to complete the work in-house.

The Township should plan for pump rebuilds to keep the original pumps in operation until they can be replaced. The Township has the capability to rebuild pumps at a cost to the Township of approximately $930 each. A complete pump rebuild includes stator, pressure switches, electronic relays, bearings, motor, and mechanical seals. It is assumed that a complete rebuild may last 5 to 10 years before additional service is required. The Township is currently budgeting approximately $7,000 per year for grinder pump maintenance; this is enough to rebuild roughly 5% of the pumps per year. Due to the volume of pump failures experienced over the past 12 months, the Township may consider increasing maintenance spending if rebuilding 5% per year is found to be inadequate.

Grant Township

Wastewater Asset Management Plan

SAW Grant Project No. 1581-01

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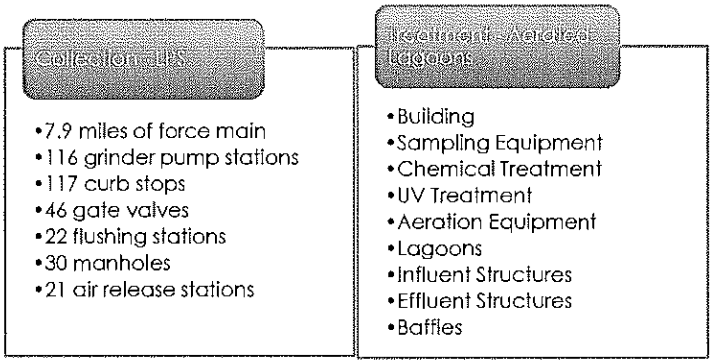

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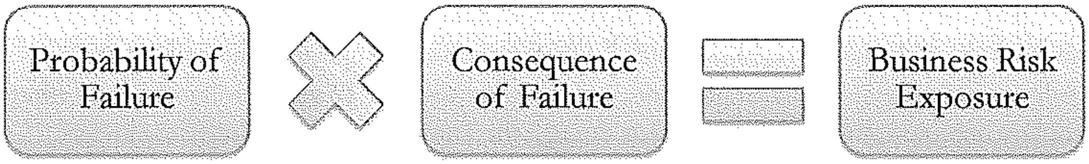

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Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

RECEIVED
DEC 20 2019
EGLE - FD - WIFS

Completion Date 12/16/2019
(no later than 3 years from executed grant date)

The GRANT TOWNSHIP *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1581-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/14/2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ken Stigers at (906)289-4292 grantsuper@pasty.com
Name Phone Number Email

Ken Stigers 12/18/19
Signature of Authorized Representative (Original Signature Required) Date

Ken Stigers, Supervisor
Print Name and Title of Authorized Representative

April 2017

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 18, 2019**
(no later than 3 years from executed grant date)

Silver Creek Township, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1598-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

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Mr. Bill Saunders at **(269) 424-3025** **billsaunders@sisterlakescable.com**
Name Phone Number Email

Bill Saunders 12-19-19
Signature of Authorized Representative (Original Signature Required) Date

Mr. Bill Saunders, Supervisor
Print Name and Title of Authorized Representative

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Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Silver Creek Township, Michigan

Wastewater Sewer System

Date: December 12, 2019
To: Valorie White
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Silver Creek Township - Summary of Wastewater Asset Management Plan

Grantee Information:
Silver Creek Township
32764 Dixon St.
Dowagiac, MI 49047
Bill Saunders: billsaunders@sisterlakescable.com
Mr. Bill Saunders; Supervisor
Ph: (269) 424-3025
SAW Project #: 1598-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Total
1) Total Grant:	$305,000	$305,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

Silver Creek Township operates a wastewater collection system consisting of 33,507 feet of gravity pipe and 30,425 feet of pressurized force mains convey the wastewater from the Silver Creek Township to the Dowagiac Wastewater Treatment Plant for treatment. In addition to the pipes in the collection system, Silver Creek Township relies on a series of sewage lift (pump) stations to convey the wastewater through the system. There are six smaller lift stations serving various sewer sub-districts or neighborhoods, and one large lift station that conveys wastewater that operate in series to convey all of the wastewater collected to the Dowagiac Wastewater Treatment Plant.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the wastewater collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.
Table 1 contains a summary of the wastewater system assets identified.

Item	Quantity	Units
10-inch Sanitary Sewer	2,671	LF
8-inch Sanitary Sewer	30,836	LF
4 foot Diameter Manhole	136	EA
Lift Station – Less Than 500 gpm	6	EA
Lift Station – Greater Than 500 gpm	1	EA
Service Lead, Complete	602	EA
10-inch Force Main	22,588	LF
6-inch Force Main	4,586	LF
4-inch Force Main	3,251	LF

Table 1 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Manholes were visually assessed and photographed by Wightman employees as depicted in Figure 3. Most of the gravity sewer piping was inspected using closed-circuit televising (CCTV) equipment designed for use in sewer pipes[1]. CCTV services were provided by Corby Energy Services (CES). All the CCTV videos and pipe reports and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

All seven lift stations owned and maintained by Silver Creek Township were inspected in detail and the equipment was assessed by Wightman employees, including drawdown testing to determine the condition of the pumping equipment and photographing the various assets comprising the lift station. Examples of some of these pictures are shown below. All photographs taken by Wightman employees are attached to the lift station assets in the GIS map and are accessible via the computer and tablets previously discussed.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, the gravity sanitary sewer piping was televised by Perceptive Services & Operations. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman staff using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 4 and Figure 5 show the condition ratings for the sanitary sewer gravity main piping and the sanitary sewer manholes (respectively).

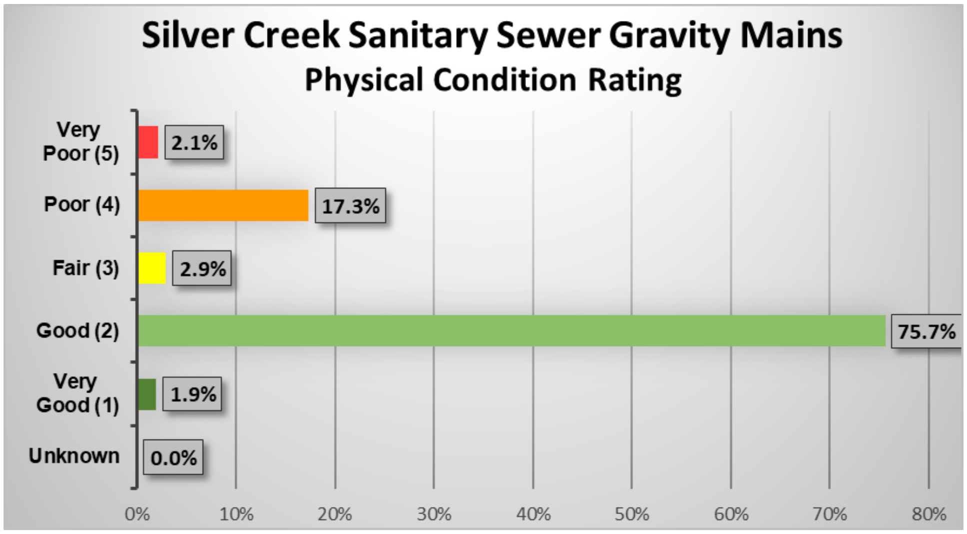

Figure 1 - Sanitary sewer gravity main physical condition rating

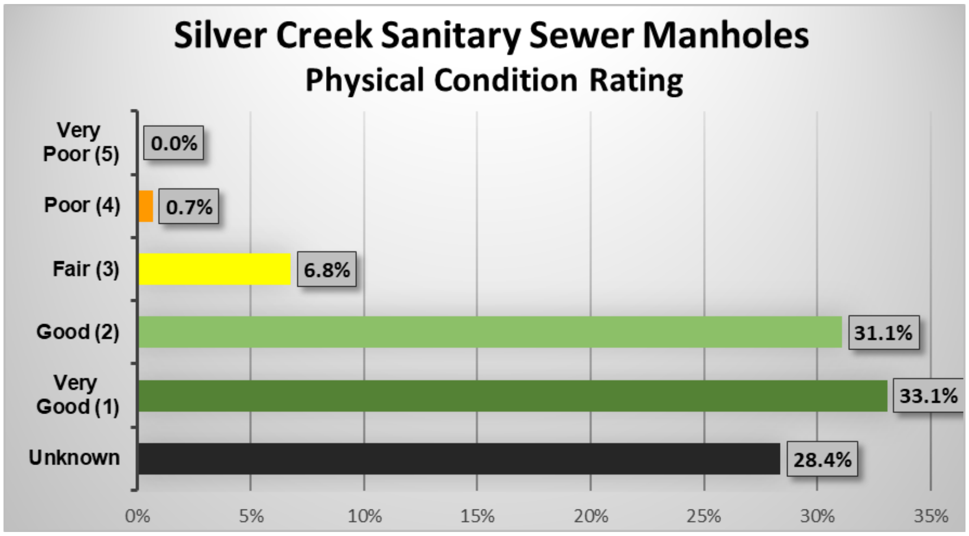

Figure 2 - Sanitary sewer manhole physical condition rating

Inspection at the lift stations included physical and visual inspections of all the major components along with drawdown tests to determine the performance of the pumping equipment, as previously discussed. Table 3 shows the design capacity, current pump rates, and the condition of the individual components of the lift stations.

Station	Pump Design Capacity (gpm)	Pump 1 Test Rate (gpm)	Pump 2 Test Rate (gpm)	Design Head (ft)	Wet Well Condition	Pump Condition	Electrical & Controls Condition	Generator Condition
1	570	469.7	413.6	55.0	Very Good	Fair	Good	Good
2	460	359.0	296.2	73.7	Good	Fair	Very Good	N/A
3	400	296.32	380.7	43.7	Very Good	Fair	Good	N/A
4	348	232.6	232.6	61.0	Good	Fair	Very Good	N/A
5	264	279.0	274.8	16.8	Fair	Very Good	Very Good	N/A
6	80	95.1	84.6	80.0	N/A	Very Good	Very Good	N/A
7	80	53.1	63.6	50.0	Good	Fair	Very Good	N/A

Table 3 - Wastewater system lift station condition ratings

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	Provide customers a system that meets the federal and state requirements.
Health and Safety	Provide a safe and injury free work place. Protect the public health. Protect the environment.	Regular safety meetings – Weekly at a minimum.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked at all times.
Operator Certification	Provisions for appropriately credentialed and experienced operators.	Contract operator shall maintain appropriately licensed operators and shall make provisions for back-up operators in all instances where primary operator is unable to fulfill required duties.
Administrative	Provide excellent customer service.	Produce accurate, timely billing.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within two working hours and communicate through close of issue.

Response Time	Provide excellent customer service.	Respond to emergency calls within two hours at all times and non-emergency calls within twenty-four hours during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from the MDEQ to all affected staff.

Major Area	Goals and Objectives	Level of Service Statements
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – Bi-annually at a minimum. Enforce provisions of wastewater ordinances.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are sufficient to meet wastewater budget annually. Review sewer rates every year.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months' operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Backup generators will be added at all lift stations under this capital improvement plan. Generators shall be maintained under an annual maintenance contract.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Force mains.	Gravity sanitary sewers will be cleaned on a rotational basis such that a minimum of 20% of the system is cleaned annually resulting in the entire system being cleaned every five years. Force mains shall be operated annually with both pumps in operation and supplemented with water from hydrant or truck to provide a vigorous flush of the force main where practical.
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown. Lift station valve maintenance.	Maintain all mechanical and electrical equipment as needed. Visually inspect all components of each lift station monthly. Clean the equipment and verify it functions. Clean lift station wet wells annually or more frequently as needed to remove grease and sediment. Exercise check valves and gate valves annually (at a minimum).

Table 5 - Level of service statements (continued)

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, lift station components, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 7. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 7.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 4 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.

- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 8.

Consequence of Failure Rating	Social, Human, and Environmental Effects[2]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 5 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater collection system is shown in 12 through Figure 14 below.

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[2] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

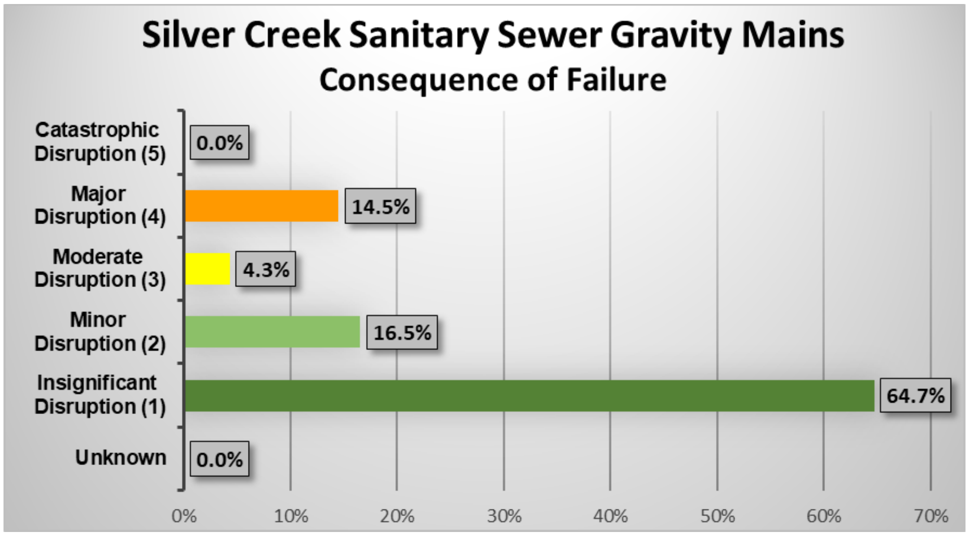

Figure 3 - Sanitary sewer gravity main consequence of failure rating

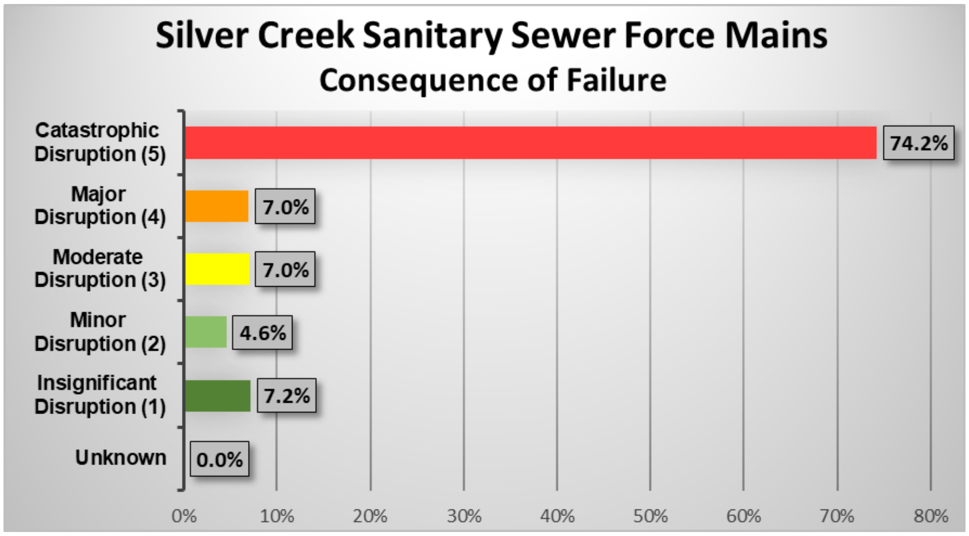

Figure 4 - Sanitary sewer force main consequence of failure rating

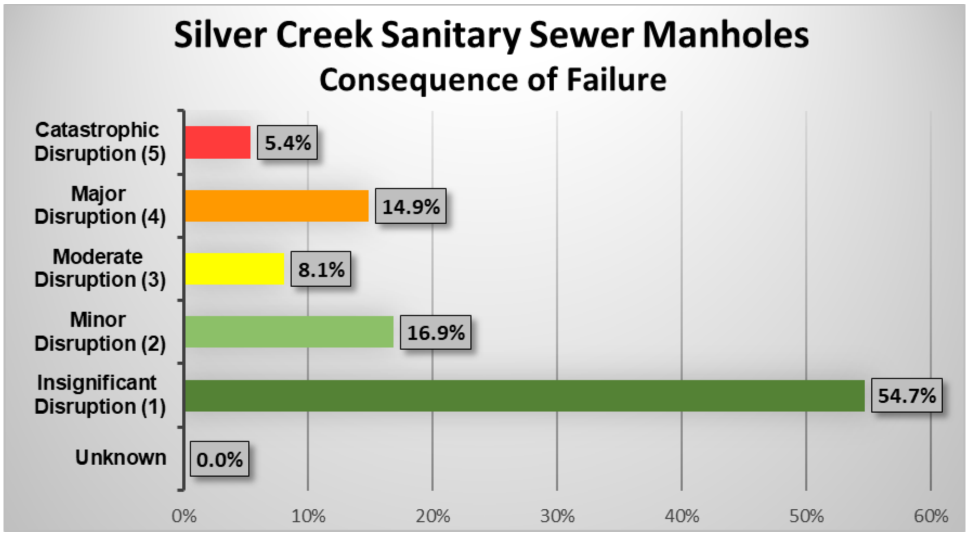

Figure 5 - Sanitary sewer manhole consequence of failure rating

While Figure 13 may appear alarming, due to the large amount of force main that shows as red ("Catastrophic Disruption"), it is noted that this is due to the layout of the Silver Creek sanitary sewer system. Most of the force main length in the system is the discharge of Lift Station 1, which conveys the sewage from the entirety of Indian Lake to the Dowagiac WWTP. As such, a failure of one of these force mains would result in a nearly 100% loss of service. This force main represents 74% of the total force main length in the Silver Creek sanitary sewer system and, as such, 74% of the force main shows as having a catastrophic consequence of failure. It is further stressed that the consequence of failure rating does not suggest in any way whether an asset is likely to fail, only the consequences of such a failure.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to summarize the policy formulation in the areas of rate management, capital spending, and fund balance.

Methodology

A significant effort has been made by the Township and their consulting engineers to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account. The AMFP is a four step process: 1) historical comparison with audits and budgets, 2) test year, or normalized budget year, along with inflation assumptions for purposes of forecasting, 3) proof of rate to revenue for reliance on customer data, and 4) cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance). The analysis is a "cash basis" approach as described in the AWWA Manual of Rate Making Practices.
From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

Audit Comparison

One key indicator of financial health is the cash and investments found in the Comparative Statement of Net Position of the Sewer Fund. The Township has maintained this cash and investment balance at around three years compared to the cash operating expenses. Management of the cash balance will be discussed further under Forecast – Cash Balance.

The Sewer Fund Audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (excluding one-time expenditures).

Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

Proof of Rate to Revenue

The Township bills customers based on generally accepted methods. The customers are billed a ready-to-serve charge based on meter size. The number of customers billed at the current rates tie to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. These are expenses not already included in the operating and maintenance budget. The forecast reflects cash-funding for all projects.

Forecast - Cash Balance

Our standard minimum target of cash and investment to operating expenses (net of depreciation) is six months. This minimum target is higher for a system of this size. Due to the size of the system and extent of capital improvements forecasted, the cash balance target is around three years. With cash funding capital improvements and inflationary rate increases, the system will be able to maintain an adequate amount of cash to respond to unforeseen events.

Forecast - Rate Management

The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The cash flow forecast demonstrates a rate track with a one-time increase of $20.00 to the Township's tri-annual bill starting in fiscal year 2021/22, recurring every five years thereafter.

Management Summary

- Rates: One-time increase of $20.00 to the tri-annual bill starting in fiscal year 2021/22, recurring every five years thereafter. This will need to be updated as bonds are issued, and capital improvements are better known.
- Cash Balance: target of three years compared to cash operating expenses over forecast period.
- Capital Improvements: cash funding all projects

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Wastewater System Projects

Table 10 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 10 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 10 are in current costs (no inflation) unless noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Install Emergency Generators at LS-5, LS-6, and LS-7	$ 61,000
2	2021	Indian Lake Road Utility Relocation Spot Repair	$ 13,000
3	2021	Install Emergency Generator at LS-2	$ 44,000
4	2021	Lift Station 4 Pump Replacement	$ 29,000
5	2021	Moody Drive Spot Repair	$ 13,000
6	2021	Park Lane Spot Repair	$ 12,000
7	2021	Spot Liner- Multiple Locations	$ 37,000
8	2022	Install Emergency Generators at LS-3 and LS-4	$ 48,000
9	2022	Lift Station 2 Pump Replacement	$ 41,000
10	2022	Manhole Lining – Force Main Discharges	$ 19,000
11	2022	Manhole Lining – Misc.	$ 35,000
12	2022	Manhole Maintenance	$ 9,000
13	2022	Manhole Repair	$ 6,000
14	2022	Site Lighting Improvement	$ 13,000
15	2023	Lift Station 1 Pump Replacement	$ 54,000
16	2024	Lift Station 7 Pump Replacement	$ 16,000
17	2025	Lift Station 3 Pump Replacement	$ 24,000
18	2026	Lift Station 5 Pump Replacement	$ 10,000
19	2027	Lift Station 6 Pump Replacement	$ 8,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 492,000

Total Estimated Project Cost for 20 Year CIP (inflation adjusted[3] costs) = $ 515,000

Table 6 - Recommended wastewater system capital improvement projects

For purposes of providing the total capital cost required over the 20-year planning period, the pump replacements have been estimated at replacing every pump over the course of the 20 period with the total cost amortized out on an annual basis. An estimate of $1,000 per horsepower was made and the total horsepower requirements of the system calculated and spread evenly over the planning period. The pump replacement dollars may vary year to year, and it is recommended the pumps are run to near failure and in a given year more or less than the average pump spend may be required. The intention of this would be to develop a dedicated pump replacement fund that can ebb and flow based on the annual needs as dictated by performance. This will allow Silver Creek Township to maximize the value from each pump and minimize early replacements when a pump may be performing better that estimated.

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[3] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 18, 2019**
(no later than 3 years from executed grant date)

Silver Creek Township, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1598-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Bill Saunders	at	**(269) 424-3025**	**billsaunders@sisterlakescable.com**
Name		Phone Number	Email

Bill Saunders 12-19-19

Signature of Authorized Representative (Original Signature Required) Date

Mr. Bill Saunders, Supervisor

Print Name and Title of Authorized Representative

Nov. 2019

it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Silver Creek Township, Michigan

Wastewater Sewer System

Date: December 12, 2019
To: Valorie White
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: Silver Creek Township - Summary of Wastewater Asset Management Plan

Grantee Information:
Silver Creek Township
32764 Dixon St.
Dowagiac, MI 49047
Bill Saunders: billsaunders@sisterlakescable.com
Mr. Bill Saunders; Supervisor
Ph: (269) 424-3025
SAW Project #: 1598-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Total
1) Total Grant:	$305,000	$305,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

Silver Creek Township operates a wastewater collection system consisting of 33,507 feet of gravity pipe and 30,425 feet of pressurized force mains convey the wastewater from the Silver Creek Township to the Dowagiac Wastewater Treatment Plant for treatment. In addition to the pipes in the collection system, Silver Creek Township relies on a series of sewage lift (pump) stations to convey the wastewater through the system. There are six smaller lift stations serving various sewer sub-districts or neighborhoods, and one large lift station that conveys wastewater that operate in series to convey all of the wastewater collected to the Dowagiac Wastewater Treatment Plant.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the wastewater collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.
Table 1 contains a summary of the wastewater system assets identified.

Item	Quantity	Units
10-inch Sanitary Sewer	2,671	LF
8-inch Sanitary Sewer	30,836	LF
4 foot Diameter Manhole	136	EA
Lift Station – Less Than 500 gpm	6	EA
Lift Station – Greater Than 500 gpm	1	EA
Service Lead, Complete	602	EA
10-inch Force Main	22,588	LF
6-inch Force Main	4,586	LF
4-inch Force Main	3,251	LF

Table 1 - Wastewater system assets

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5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, the gravity sanitary sewer piping was televised by Perceptive Services & Operations. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman staff using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 4 and Figure 5 show the condition ratings for the sanitary sewer gravity main piping and the sanitary sewer manholes (respectively).

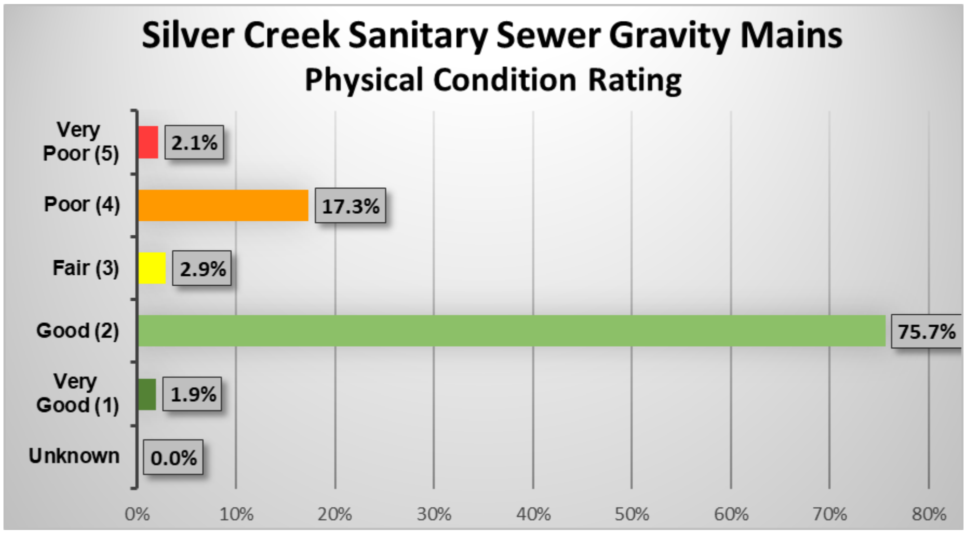

Figure 1 - Sanitary sewer gravity main physical condition rating

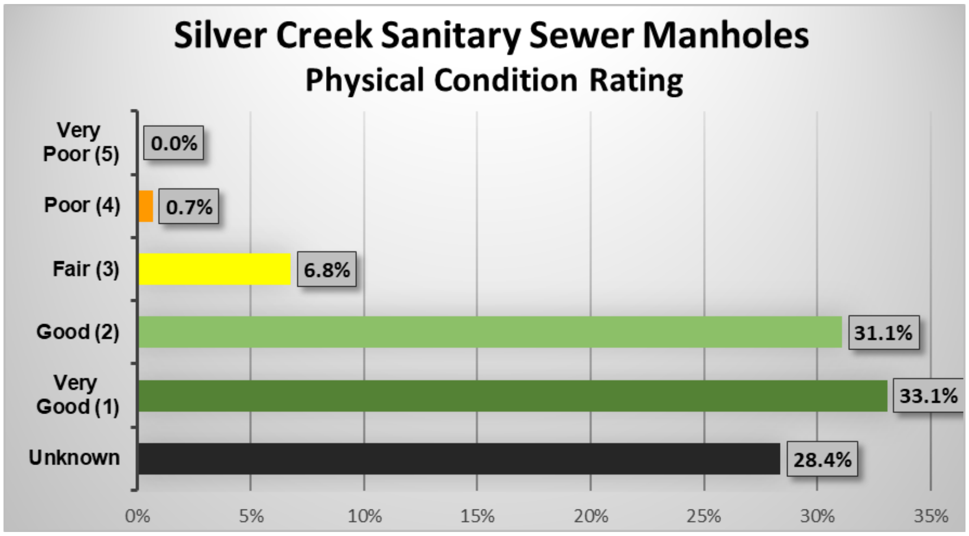

Figure 2 - Sanitary sewer manhole physical condition rating

Inspection at the lift stations included physical and visual inspections of all the major components along with drawdown tests to determine the performance of the pumping equipment, as previously discussed. Table 3 shows the design capacity, current pump rates, and the condition of the individual components of the lift stations.

Station	Pump Design Capacity (gpm)	Pump 1 Test Rate (gpm)	Pump 2 Test Rate (gpm)	Design Head (ft)	Wet Well Condition	Pump Condition	Electrical & Controls Condition	Generator Condition
1	570	469.7	413.6	55.0	Very Good	Fair	Good	Good
2	460	359.0	296.2	73.7	Good	Fair	Very Good	N/A
3	400	296.32	380.7	43.7	Very Good	Fair	Good	N/A
4	348	232.6	232.6	61.0	Good	Fair	Very Good	N/A
5	264	279.0	274.8	16.8	Fair	Very Good	Very Good	N/A
6	80	95.1	84.6	80.0	N/A	Very Good	Very Good	N/A
7	80	53.1	63.6	50.0	Good	Fair	Very Good	N/A

Table 3 - Wastewater system lift station condition ratings

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	Provide customers a system that meets the federal and state requirements.
Health and Safety	Provide a safe and injury free work place. Protect the public health. Protect the environment.	Regular safety meetings – Weekly at a minimum.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked at all times.
Operator Certification	Provisions for appropriately credentialed and experienced operators.	Contract operator shall maintain appropriately licensed operators and shall make provisions for back-up operators in all instances where primary operator is unable to fulfill required duties.
Administrative	Provide excellent customer service.	Produce accurate, timely billing.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within two working hours and communicate through close of issue.

Response Time	Provide excellent customer service.	Respond to emergency calls within two hours at all times and non-emergency calls within twenty-four hours during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from the MDEQ to all affected staff.

Major Area	**Goals and Objectives**	**Level of Service Statements**
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – Bi-annually at a minimum. Enforce provisions of wastewater ordinances.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are sufficient to meet wastewater budget annually. Review sewer rates every year.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months' operating expenses in reserve accounts.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Backup generators will be added at all lift stations under this capital improvement plan. Generators shall be maintained under an annual maintenance contract.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Force mains.	Gravity sanitary sewers will be cleaned on a rotational basis such that a minimum of 20% of the system is cleaned annually resulting in the entire system being cleaned every five years. Force mains shall be operated annually with both pumps in operation and supplemented with water from hydrant or truck to provide a vigorous flush of the force main where practical.
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown. Lift station valve maintenance.	Maintain all mechanical and electrical equipment as needed. Visually inspect all components of each lift station monthly. Clean the equipment and verify it functions. Clean lift station wet wells annually or more frequently as needed to remove grease and sediment. Exercise check valves and gate valves annually (at a minimum).

Table 5 - Level of service statements (continued)

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, lift station components, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 7. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 7.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 4 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.

- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 8.

Consequence of Failure Rating	Social, Human, and Environmental Effects[2]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 5 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater collection system is shown in 12 through Figure 14 below.

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[2] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

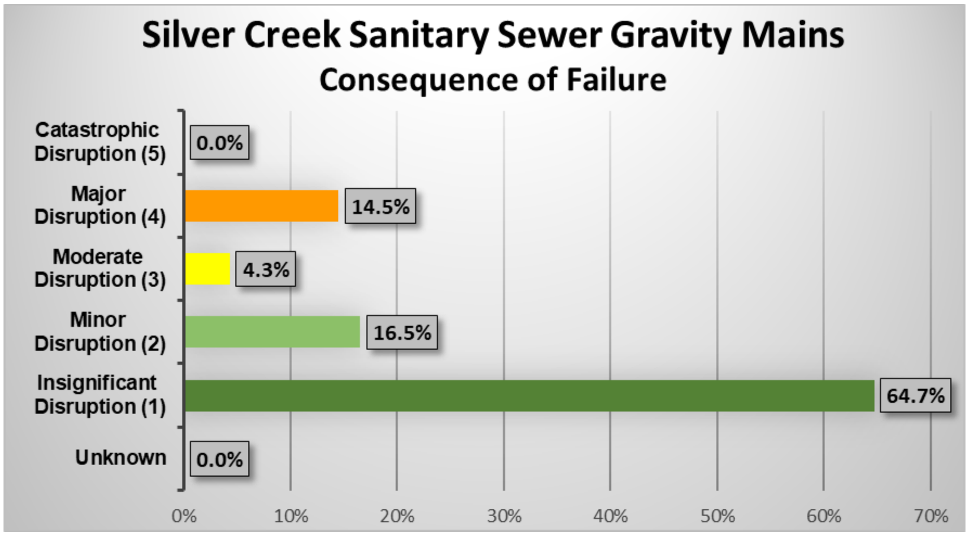

Figure 3 - Sanitary sewer gravity main consequence of failure rating

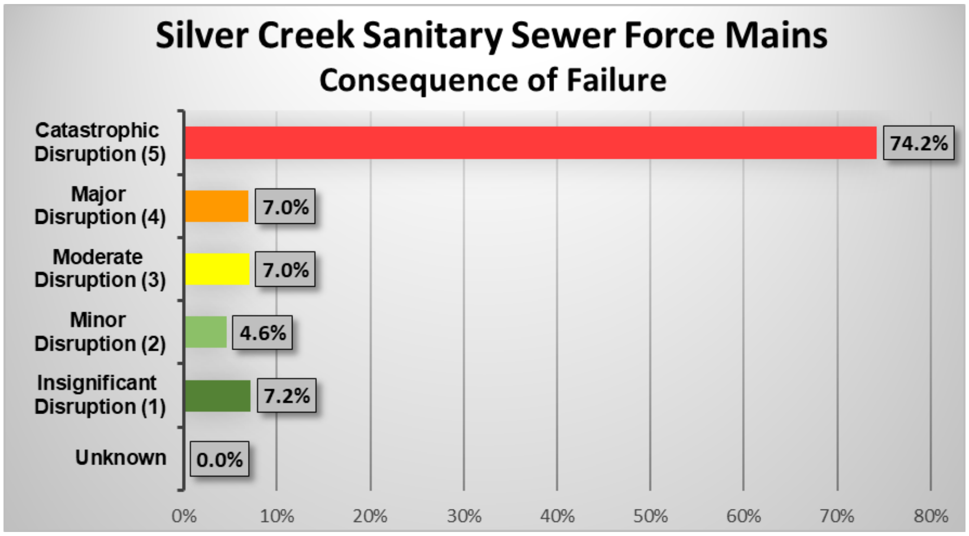

Figure 4 - Sanitary sewer force main consequence of failure rating

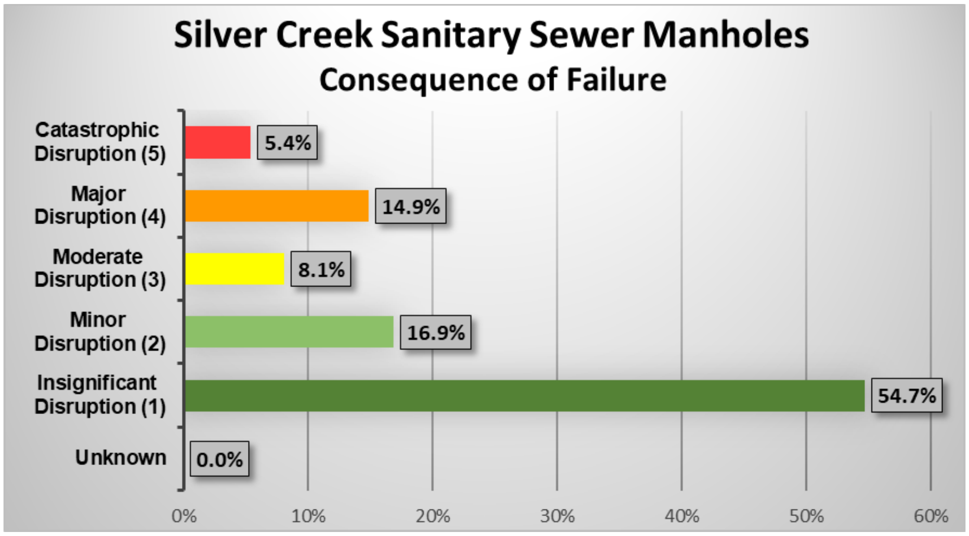

Figure 5 - Sanitary sewer manhole consequence of failure rating

While Figure 13 may appear alarming, due to the large amount of force main that shows as red ("Catastrophic Disruption"), it is noted that this is due to the layout of the Silver Creek sanitary sewer system. Most of the force main length in the system is the discharge of Lift Station 1, which conveys the sewage from the entirety of Indian Lake to the Dowagiac WWTP. As such, a failure of one of these force mains would result in a nearly 100% loss of service. This force main represents 74% of the total force main length in the Silver Creek sanitary sewer system and, as such, 74% of the force main shows as having a catastrophic consequence of failure. It is further stressed that the consequence of failure rating does not suggest in any way whether an asset is likely to fail, only the consequences of such a failure.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to summarize the policy formulation in the areas of rate management, capital spending, and fund balance.

Methodology

A significant effort has been made by the Township and their consulting engineers to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account. The AMFP is a four step process: 1) historical comparison with audits and budgets, 2) test year, or normalized budget year, along with inflation assumptions for purposes of forecasting, 3) proof of rate to revenue for reliance on customer data, and 4) cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance). The analysis is a "cash basis" approach as described in the AWWA Manual of Rate Making Practices.
From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

Audit Comparison

One key indicator of financial health is the cash and investments found in the Comparative Statement of Net Position of the Sewer Fund. The Township has maintained this cash and investment balance at around three years compared to the cash operating expenses. Management of the cash balance will be discussed further under Forecast – Cash Balance.

The Sewer Fund Audited Revenues, Expenses and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (excluding one-time expenditures).

Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

Proof of Rate to Revenue

The Township bills customers based on generally accepted methods. The customers are billed a ready-to-serve charge based on meter size. The number of customers billed at the current rates tie to the revenue reflected in the audit and budget, such that we can rely on the numbers in forecasting.

Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality. These are expenses not already included in the operating and maintenance budget. The forecast reflects cash-funding for all projects.

Forecast - Cash Balance

Our standard minimum target of cash and investment to operating expenses (net of depreciation) is six months. This minimum target is higher for a system of this size. Due to the size of the system and extent of capital improvements forecasted, the cash balance target is around three years. With cash funding capital improvements and inflationary rate increases, the system will be able to maintain an adequate amount of cash to respond to unforeseen events.

Forecast - Rate Management

The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The cash flow forecast demonstrates a rate track with a one-time increase of $20.00 to the Township's tri-annual bill starting in fiscal year 2021/22, recurring every five years thereafter.

Management Summary

- Rates: One-time increase of $20.00 to the tri-annual bill starting in fiscal year 2021/22, recurring every five years thereafter. This will need to be updated as bonds are issued, and capital improvements are better known.
- Cash Balance: target of three years compared to cash operating expenses over forecast period.
- Capital Improvements: cash funding all projects

<u>Capital Improvement Plan:</u> *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

C. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

D. Recommended Wastewater System Projects

Table 10 lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 10 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 10 are in current costs (no inflation) unless noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Install Emergency Generators at LS-5, LS-6, and LS-7	$ 61,000
2	2021	Indian Lake Road Utility Relocation Spot Repair	$ 13,000
3	2021	Install Emergency Generator at LS-2	$ 44,000
4	2021	Lift Station 4 Pump Replacement	$ 29,000
5	2021	Moody Drive Spot Repair	$ 13,000
6	2021	Park Lane Spot Repair	$ 12,000
7	2021	Spot Liner- Multiple Locations	$ 37,000
8	2022	Install Emergency Generators at LS-3 and LS-4	$ 48,000
9	2022	Lift Station 2 Pump Replacement	$ 41,000
10	2022	Manhole Lining – Force Main Discharges	$ 19,000
11	2022	Manhole Lining – Misc.	$ 35,000
12	2022	Manhole Maintenance	$ 9,000
13	2022	Manhole Repair	$ 6,000
14	2022	Site Lighting Improvement	$ 13,000
15	2023	Lift Station 1 Pump Replacement	$ 54,000
16	2024	Lift Station 7 Pump Replacement	$ 16,000
17	2025	Lift Station 3 Pump Replacement	$ 24,000
18	2026	Lift Station 5 Pump Replacement	$ 10,000
19	2027	Lift Station 6 Pump Replacement	$ 8,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 492,000

Total Estimated Project Cost for 20 Year CIP (inflation adjusted[3] costs) =	$	515,000

Table 6 - Recommended wastewater system capital improvement projects

For purposes of providing the total capital cost required over the 20-year planning period, the pump replacements have been estimated at replacing every pump over the course of the 20 period with the total cost amortized out on an annual basis. An estimate of $1,000 per horsepower was made and the total horsepower requirements of the system calculated and spread evenly over the planning period. The pump replacement dollars may vary year to year, and it is recommended the pumps are run to near failure and in a given year more or less than the average pump spend may be required. The intention of this would be to develop a dedicated pump replacement fund that can ebb and flow based on the annual needs as dictated by performance. This will allow Silver Creek Township to maximize the value from each pump and minimize early replacements when a pump may be performing better that estimated.

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[3] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **12/31/19**
(no later than 3 years from executed grant date)

The City of Bridgman, Michigan *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1600-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Mr. Juan Ganum at *(269) 465-5144* *Jganum@bridgman.org*
Phone Number Email

12-19-2019
Signature of Authorized Representative (Original Signature Required) Date

Juan Ganum; Manager
Print Name and Title of Authorized Representative

W+ WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
City of Bridgman, Michigan

Storm Water Sewer System

Date: December 27, 2019
To: Ms. Valorie White
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: City of Bridgman: Summary of Wastewater Asset Management Plan

Grantee Information:
City of Bridgman
9765 Maple St.
Bridgman, MI 49106
Juan Ganum: jganum@bridgman.org
Mr. Juan Ganum; Manager
Ph: (269) 465-5144
SAW Project #: 1600-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP)

1) Asset Inventory and Condition Assessment
2) Level of Service
3) Criticality of Assets
4) Capital Improvement Plan
5) Asset Management Financial Plan and Revenue Structure

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS)

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$241,000	$371,000	$612,000

Stormwater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

The City of Bridgman operates a storm water collection system consisting of over 72,000 lineal feet of storm sewer ranging from 4-inch to 72-inch sewer, along with 199 manhole structures and 588 inlet structures that convey the storm water from various portions of the City to over 50 surface discharge points into streams, creeks, channels and even Lake Michigan. There are also portions of the storm water system that only consist of storm water inlets without connecting sewers that allow for infiltration in the sandy areas, primarily west of the I-94 Interstate highway. The system utilizes a variety of materials for pipe construction and thus has a varying level of performance and expected remaining life on the storm sewer assets depending on the quality and characteristics of the materials used over time.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all storm water system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the storm water collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

Condition assessments, available record/as-built drawings, maintenance records, and other data are also accessible through the GIS mentioned above, allowing staff easy access to all records for the storm water collection system. This can also allow staff to access all available information while in the field with a hand-held device, eliminating the need to return to the office to gather additional information.
Table 1 contains a summary of the storm water system assets identified.

Item	Quantity		Units
74-inch Storm Sewer	74		LF
48-inch Storm Sewer	1,212		LF
36-inch Storm Sewer	2,000		LF
30-inch Storm Sewer	5,095		LF
27-inch Storm Sewer	9,096		LF
21-inch Storm Sewer	1,006		LF
18-inch Storm Sewer	9,472		LF
15-inch Storm Sewer	12,871		LF
12-inch Storm Sewer	29,509		LF
10-inch Storm Sewer	249		LF
8-inch Storm Sewer	818		LF
6-inch Storm Sewer	289		LF
4-inch Storm Sewer	151		LF
Unknown Storm Sewer (assumed 12-inch)	962		LF
Stormwater Culverts, 60-inch	61		LF
Stormwater Culverts, 48-inch	150		LF
Stormwater Culverts, 30-inch	83		LF
Stormwater Culverts, 24-inch	124		LF
Unknown Stormwater Culverts (assume 30-in)	468		LF
4 foot Diameter Storm Manhole	199		EA
Stormwater Inlet Structure	588		EA
Stormwater Discharge Point	53		EA

Table 1 – Storm water system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman staff performed limited conditional assessments on the manholes and inlet structures within the storm water collection system, including photographing them, as depicted in Figure 2. In addition, a large portion of the gravity storm piping was inspected using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging[1]. CCTV services were provided by Corby Energy Services, Inc (CES). All the CCTV videos and pipe reports and the manhole

During the field inspections discussed above, any manhole and/or pipe defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.

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[1] Pipes with severe structural issues that could be exacerbated or cause complete failure due to the cleaning associated with CCTV activities and pipes younger than 20 years old were not televised.

The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, the gravity storm sewer piping was televised by Corby Energy Systems (CES). They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. The manholes were rated by Wightman employees using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 3 and Figure 4 show the condition ratings for the storm water gravity main piping and the storm water structures (respectively).

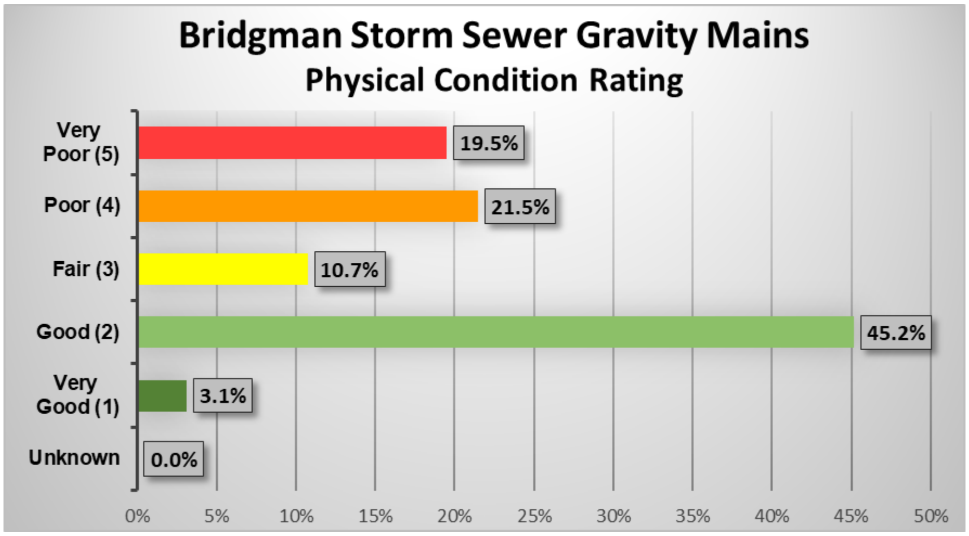

Figure 1 - Storm sewer gravity main physical condition rating

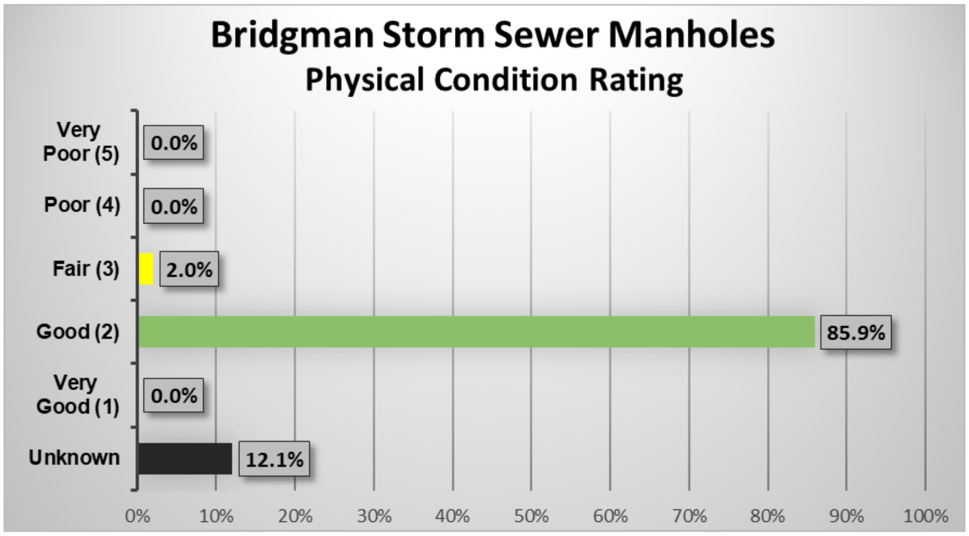

Figure 2 – Storm water structure physical condition rating

A. Remaining Useful Life

Remaining useful life estimation is another method commonly used to characterize the condition of assets – especially those assets that were not physically assessed (such as by visual inspection or utilizing CCTV inspection). Remaining useful life is defined as an estimate of the duration of time remaining until an unacceptable condition exists or an asset no longer meets its primary function. It does not mean that the asset will fail at that point in time, but rather that replacement of the asset should be budgeted for due to rising maintenance costs, inability to find replacement parts, increased unreliability, and/or the potential for failure.

Remaining useful life for storm sewers is dependent on the materials used in construction. Storm sewer pipe materials have evolved over the years. Early piping was generally constructed of brick and non-reinforced concrete and transitioned over the years to corrugated metal, clay, and reinforced concrete. Most storm sewers constructed today typically use reinforced concrete, plastic (truss pipe), high-density polyethylene (HDPE), and polyvinyl chloride (PVC) piping. Early manholes and inlet structures were generally constructed of bricks, cast-in-place concrete, or segmented block and transitioned over the years to precast reinforced concrete.

Figure 5 shows the percentages of the various pipe materials that are present in the gravity sewers throughout the storm water collection system. The pipe and manhole/inlet structure materials of construction are included as an attribute in each asset's entry in the electronic GIS mapping database.

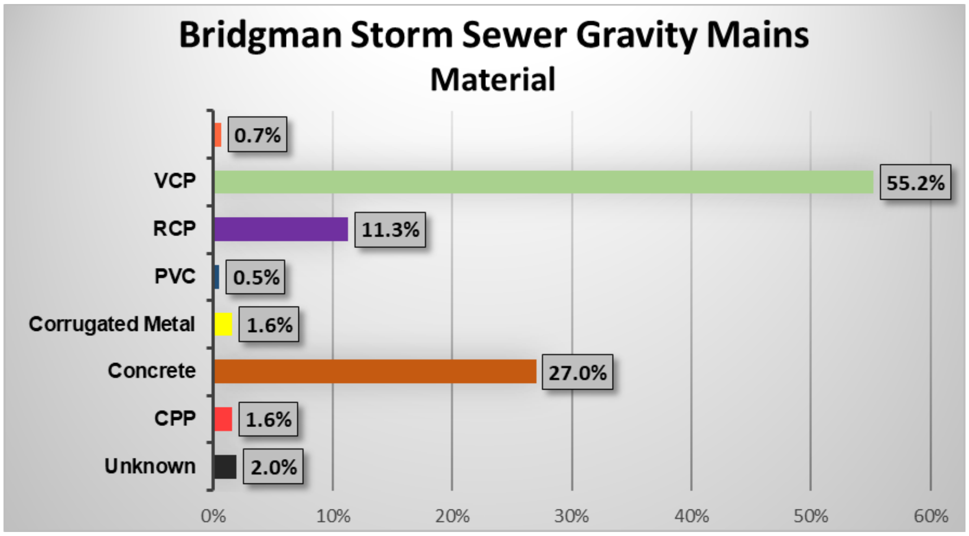

Figure 3 - Storm sewer gravity main pipe materials

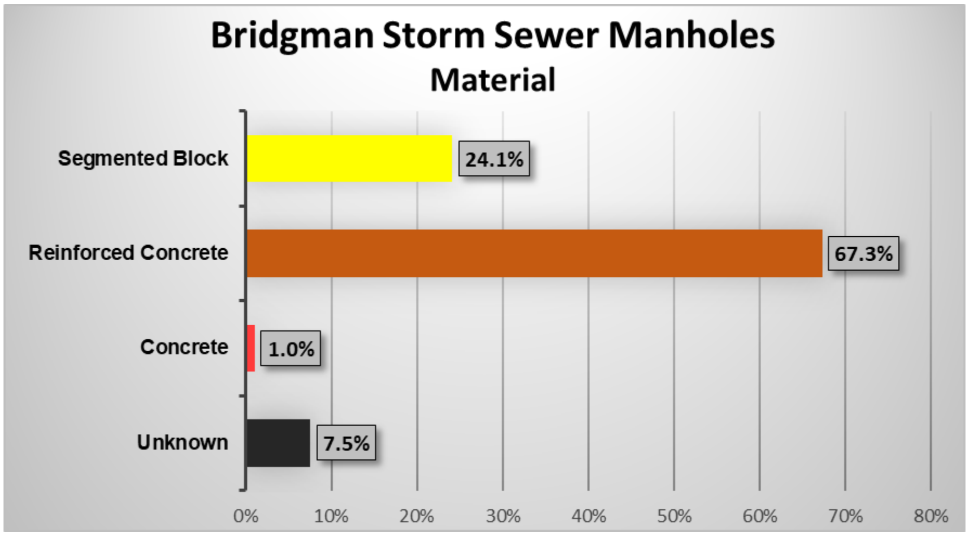

Figure 4 - Storm sewer manhole materials

There are several methods utilized to estimate the remaining useful life of an asset:

- The simplest method uses a typical useful life table, which lists the estimated total life of an asset type from its first day of use to when it is estimated to fail to function. Based upon the actual age of the asset, the remaining useful life is calculated. This method does not consider the current condition of the asset or any other factors.
- A second method utilizes a typical useful life table as well but applies a factor to the calculation based upon the current condition of the asset.
- A third method utilizes actual decay curves based upon the maintenance and failure experience of a specific asset or asset class for the utility in question. This is the most accurate method. However, most utilities do not have the historical data necessary to develop the decay curves.

Determining the useful life of an asset is as much art as it is science. For this AMP, the remaining useful life has been calculated using the second method discussed above – a typical useful life table modified by current condition factors. Table 3 presents the typical useful lives for the asset types included in the storm water system.

Asset Type	Typical Useful Life (years)
Gravity Sewer Pipe (HDPE, PVC, Truss Pipe, Vitrified Clay)	100
Gravity Sewer Pipe (ABS Plastic, Concrete, Brick)	75
Gravity Sewer Pipe (Corrugated Metal)	50
Manholes/Concrete Structures	80
Outfalls	75
Retention Basins – Open	50
Infiltration Basins	100
Land	Unlimited

Table 3 - Typical useful lives for storm water assets

<u>Level of Service Determination:</u> *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the storm water system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements in Table 4 to define the desired level of service for the storm water system:

Major Area	Goals and Objectives	Level of Service Statements
Health and Safety	Provide a safe and injury free workplace. Protect the environment.	Regular safety meetings – monthly at a minimum. No MIOSHA safety violations.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within 24 hours and communicate through close of issue.
Response Time	Provide excellent customer service.	Respond to emergency calls as soon as practical at all times and non-emergency calls within 24 hours during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Attend continuing education programs. Route applicable correspondence from the MDEQ to all affected staff.
Rules and Regulations	Monitor and enforce all storm water ordinances.	Review storm water provisions periodically – annually at a minimum.

		Enforce provisions of storm water ordinances.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Manholes and inlets.	Gravity storm sewers will be cleaned as needed. Assess manholes and inlets in conjunction with the gravity sewer cleaning.
Financial	Establish a revenue stream to operate and maintain the storm water system.	Explore options for storm sewer system funding including allocating funds from the City general fund.

Table 4 - Level of service statements

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

B. Likelihood of Failure

For assets that were physically inspected, including gravity storm sewers, storm manholes and inlet structures, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 5. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life was determined in accordance with Table 5.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 5 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is “Poor” or “Very Poor”. The opposite applies as well, with assets whose condition is rated as a “1” (Very Good) or “2” (Good) showing a likelihood of failure of “Very Good” or “Good”, again describing the condition of the asset rather than the likelihood that it will fail.

C. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a storm water asset, social costs and/or the costs of collateral damage caused by the failure can even outweigh the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 6.

Consequence of Failure Rating	**Social Effects**	**Collateral Damage Effects**
1 (Insignificant)	Minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	Minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	Limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	Moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	Extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 6 - Consequence of failure rating scheme for storm water assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the storm water system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the storm water collection system is shown in Figure 9 and Figure 10 below.

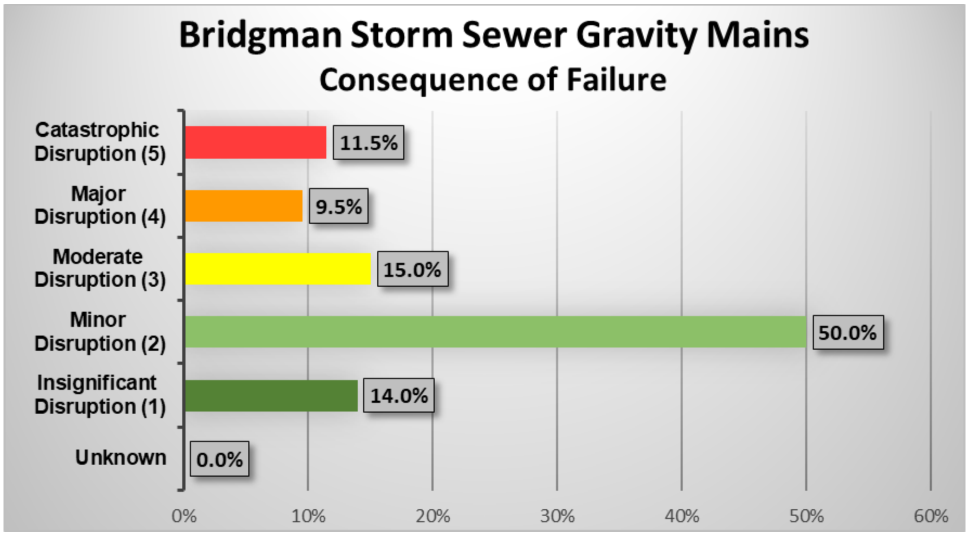

Figure 5 – Storm sewer gravity main consequence of failure rating

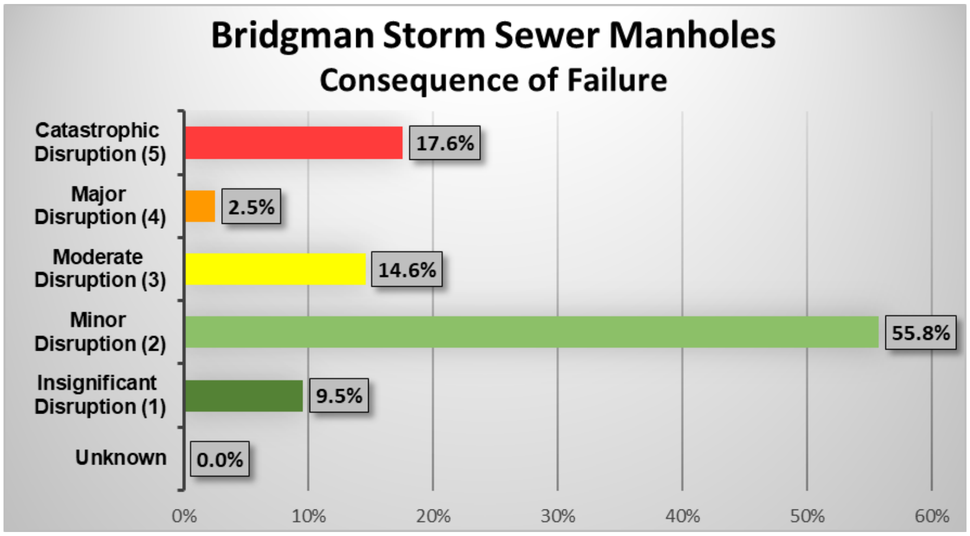

Figure 6 – Storm sewer manhole consequence of failure rating

While Figure 9 may appear alarming, due to the large amount of gravity main that shows as red (“Catastrophic Disruption”), it is noted that this is due to the layout of the Bridgman storm sewer system. There are small portions of the storm sewer that collect storm water from side streets, but some of the storm sewer is located under major roadways within the city. As such, a failure of one of these pipes would result in damage to the roadway and impact adjacent property owners in a negative fashion in the event of a failure. It should be stressed that the consequence of failure rating does not suggest in any way whether an asset is likely to fail, only the consequences of such a failure.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

As previously mentioned, one of the primary goals of Asset Management is to develop a long-term plan for revenues capable of supporting the required capital improvements in addition to routine O&M costs. However, unlike a sanitary sewer AMP, where a source of revenue exists from sanitary sewer user fees, most storm water systems have no separate stream of revenue. Improvements to the storm sewer system are usually funded as a part of a street improvement project and routine O&M costs are covered in the day-to-day operations of the DPW.

Such is the case for the City of Bridgman. Since there is no stream of regular revenue to the storm sewer system, an in-depth asset management financial review (AMFR) cannot be conducted. In addition, projections for the development of a revenue structure capable of supporting ongoing O&M and capital improvement costs cannot be developed.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

D. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

E. Recommended Storm Water System Projects

Table 8 lists the recommended capital improvement projects over the next 20 years for the storm water collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 8 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 8 are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2020	Cross Bore on Red Arrow Highway north of Rambo Road	$15,000
2	2021	24-inch pipe repair Red Arrow Highway near AEP site	$10,000
3	2021	Cross Bore under Red Arrow Highway near AEP site	$24,000
4	2022	Repairs on Baldwin Road at Cherry Extended	$25,000
5	2023	Pipe burst under railroad west of Church Street	$139,000
6	2023	Spot repair west of railraod at Church Street	$19,000
7	2024	Cross Bore near Red Arrow Highway north of Lake Street	$10,000
8	2025	Open cut repairs between Assembly Dr and Red Arrow behind Scoops	$10,000
9	2026	CIPP repairs on Willard Ave, Lake Street and Papalardo Street	$214,000
10	2027	Cross bore on Oak Street between Toth and Pine	$19,000
11	2028	Open Cut Repairs on Church Street at Lake Michigan Christian Center	$15,000
12	2029	Cross bore on Clark Street north of Lake Street	$19,000
Total Estimated Project Cost for 20 Year CIP (current dollars) =			$519,000
Total Estimated Project Cost for 20 Year CIP (inflation adjusted[2] costs) =			$572,000

Table 7 - Recommended storm water system capital improvement projects

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[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 2, 2019**
(no later than 3 years from executed grant date)

The City of Bridgman, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1600-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: 5/14/19

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Juan Ganum	at	**(269) 465-5144**	**jganum@bridgman.org**
Name		Phone Number	Email

12-19-2019

Signature of Authorized Representative (Original Signature Required) Date

Mr. Juan Ganum, Manager
Print Name and Title of Authorized Representative

Nov. 2019

WIGHTMAN
it's all about people

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan Executive Summary Guidance City of Bridgman, Michigan

Wastewater Sewer System

Date: December 17, 2019
To: Ms. Valorie White
Organization: Michigan Department of Environment, Great Lakes, and Energy
From: Wightman & Associates, Inc.
Re: City of Bridgman: Summary of Wastewater Asset Management Plan

Grantee Information:
City of Bridgman
9765 Maple St.
Bridgman, MI 49106
Juan Ganum: jganum@bridgman.org
Mr. Juan Ganum; Manager
Ph: (269) 465-5144
SAW Project #: 1600-01

Executive Summary: *Summary of the project scope, and grant and match amount, if applicable. List the key components that make up an Asset Management Plan (AMP).*

An asset management program is a tool for community leaders and utility managers to proactively decide when to repair, replace or rehabilitate assets and how those improvements will be funded to maintain a perpetual level of service. The Key Components of the Asset Management Program (AMP) are:

1) Asset Inventory and Condition Assessment.
2) Level of Service.
3) Criticality of Assets.
4) Capital Improvement Plan.
5) Asset Management Financial Plan and Revenue Structure.

The program is organized into three components that answer the following questions:

Asset Management Program (AMP):

- What level of service will be provided?
- What improvements need to be made and when?
- What changes to operations need to be made?
- How will these improvements and changes be funded?
- How is the plan implemented?

Geographic Information System (GIS):

- What do we own, where is it, what is the condition and what is the remaining life?
- What are the most critical assets?
- Where was maintenance performed and what was done?
- Where are improvements needed?

System User Manual:

- How will the asset management program tools be used?
- How will the asset management program be maintained and updated?
- How will the asset management program provide a guide for planning decisions?

	Sanitary	Storm	Total
1) Total Grant:	$241,000	$371,000	$612,000

Wastewater Asset Inventory: *Describe the system components included in the AMP. Discuss how they were located and identified, if applicable. Describe the platform used to develop and maintain the inventory of assets.*

Bridgman owns and operates a wastewater collection system consisting of over 14 miles of 6-inch through 12-inch gravity sewer pipe, 320 publicly owned manholes, approximately 875 individual sewer service leads, and more than 12,800 feet of 4-inch through 12-inch pressurized force mains. The bulk of the collection system is comprised of vitrified clay and polyvinyl chloride (PVC) pipe and was installed beginning as early as 1961 (and even earlier for some of the original concrete pipes). The system serves to convey an average of 313,000 gallons per day (gpd)[1] of wastewater from throughout the City to the Galien River Sanitary District (GRSD) regional Wastewater Treatment Plant (WWTP), which serves not only Bridgman, but the City of New Buffalo, New Buffalo Township, Chikaming Township, and Lake Charter Township as well. In addition to the pipes in the collection system, Bridgman relies on four private lift stations that pump wastewater from various housing or condo associations into the public sewer system, three smaller lift stations serving various sewer sub-districts or neighborhoods, and one large lift station that conveys all of the wastewater from the City to the GRSD interceptor sewer for transport to the GRSD WWTP for treatment.

Over 14 miles of gravity sewer, 320 manholes, and more than 12,800 feet of pressurized force mains that convey the wastewater from approximately 875 individual sewer services.

With a thorough knowledge of the basic layout of the collection system, a comprehensive inventory of all wastewater system assets was performed using as-built utility drawings and on-site Global Positioning System (GPS) field locations. Using the data collected, detailed maps of the wastewater collection system were prepared using Geographical Information System (GIS) software. The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for and accurately locate system assets in the field utilizing handheld GPS equipment. The ability to accurately locate utility assets will allow for quicker responses to and resolution of service calls, ensuring the highest level of customer service and ongoing efficiency in labor usage.

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[1] Annual average daily wastewater flow from January 2014 through November 2019 as recorded daily from the billing flow meter at the abandoned Bridgman wastewater treatment lagoons by the GRSD.

Table 1 contains a summary of the wastewater system assets identified. Note that, while the Bridgman Wastewater Treatment Facility lagoons and most of the rest of the equipment has been abandoned and is no longer in use, the infrastructure still exists and is still an asset of the City. As such, these assets were included in Table 1.

Item	Quantity	Units
12-inch Sanitary Sewer	6,506	Linear Feet
10-inch Sanitary Sewer	7,827	Linear Feet
8-inch Sanitary Sewer	59,378	Linear Feet
6-inch Sanitary Sewer	496	Linear Feet
8-inch Sewer Casing Pipe	60	Linear Feet
20-inch Sewer Casing Pipe	113	Linear Feet
24-inch Sewer Casing Pipe	307	Linear Feet
4-foot Diameter Sanitary Manhole	320	Each
Service Lead, Complete	875	Each
Lift Station - 500 gpm or Larger	1	Each
Lift Station - Less Than 500 gpm	3	Each
Backup Generator - 40 kW to 75 kW	2	Each
12-inch Force Main	6,850	Linear Feet
6-inch Force Main	4,343	Linear Feet
4-inch Force Main	1,619	Linear Feet
Air Release Valve with Manhole	4	Each
Force Main Cleanout with Manhole	7	Each
Flow Meter and Diversion Valve Vault	1	Each
Treatment Lagoon - Northern Cell	3.65	Acre
Treatment Lagoon - Central Cell	3.70	Acre
Treatment Lagoon - Southern Cell	4.75	Acre
Treatment Lagoon Ancillary Pipes/Equipment	1	Lump Sum

Table 1 - Wastewater system assets

Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After completing the comprehensive inventory of the utility system assets, conditional assessments of many of the asset components were performed. Condition assessments provide the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Manholes that were able to be located were visually assessed and photographed by Wightman employees as depicted in Figure 1 through Figure 6. Most of the gravity sanitary sewer piping was inspected using closed-circuit televising (CCTV) equipment designed for use in sewer pipes[2]. CCTV services were provided by Corby Energy Services, Inc. (CES). All the CCTV videos and pipe reports and the manhole pictures are attached to those assets in the GIS map and are accessible via the computer and tablets discussed above.

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[2] Pipes younger than 20 years old were televiased.

During the field inspections discussed above, any manhole, pipe, and/or equipment defects were noted and classified using a standard coding system discussed in more detail below. After the field inspections were complete, overall asset conditions were assessed using a systematic method to evaluate individual defects and produce consistent, useful information as to the overall asset condition. This information was used to make estimates of each asset's remaining useful life and its long-term performance. Furthermore, the information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections.
The conditional assessments of individual defects and overall asset conditions for all assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects and the condition of the asset. Condition grades for both structural and O&M defects were assigned based on the condition of the immediate defect and the likelihood of further defect deterioration or asset failure. The numerical system uses numbers ranging from 1 to 5 as shown in Table 2.

Condition Rating	Condition Description	Defect/Deterioration Description
1	Very Good	New asset, no or minor defects
2	Good	Defects that have not begun to deteriorate
3	Fair	Moderate defects that will continue to deteriorate
4	Poor	Severe defects with significant deterioration
5	Very Poor	Defect requires immediate action

Table 2 - NASSCO conditional assessment system

As previously mentioned, the gravity sanitary sewer piping was televised by CES. They graded any noted defects according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, Wightman employees applied an overall condition rating to each pipe based on NASSCO PACP methodology. All the manholes that could be located were physically inspected. They were rated by Wightman employees using NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection methodology. Figure 15 and Figure 16 show the condition ratings for the sanitary sewer gravity main piping and the sanitary sewer manholes (respectively).

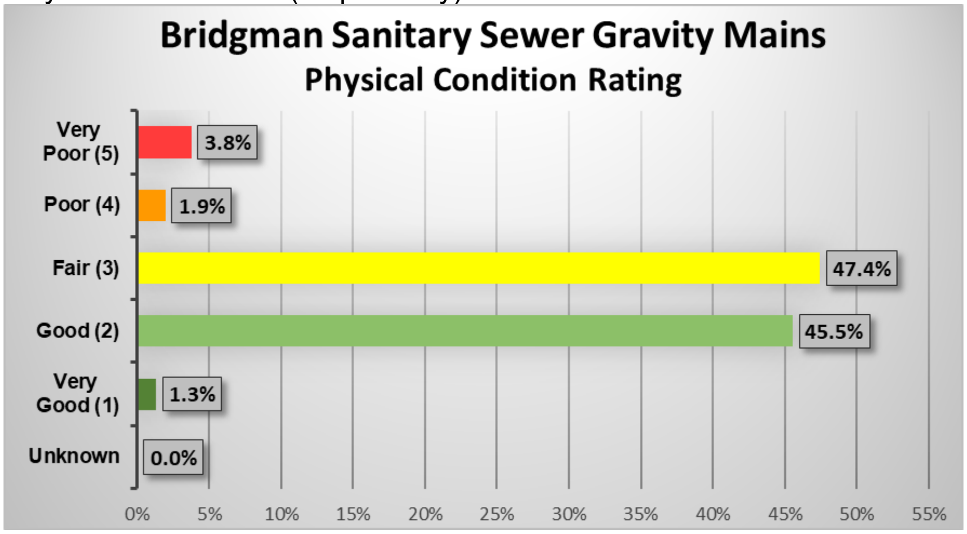


Figure 1 - Sanitary sewer gravity main physical condition rating

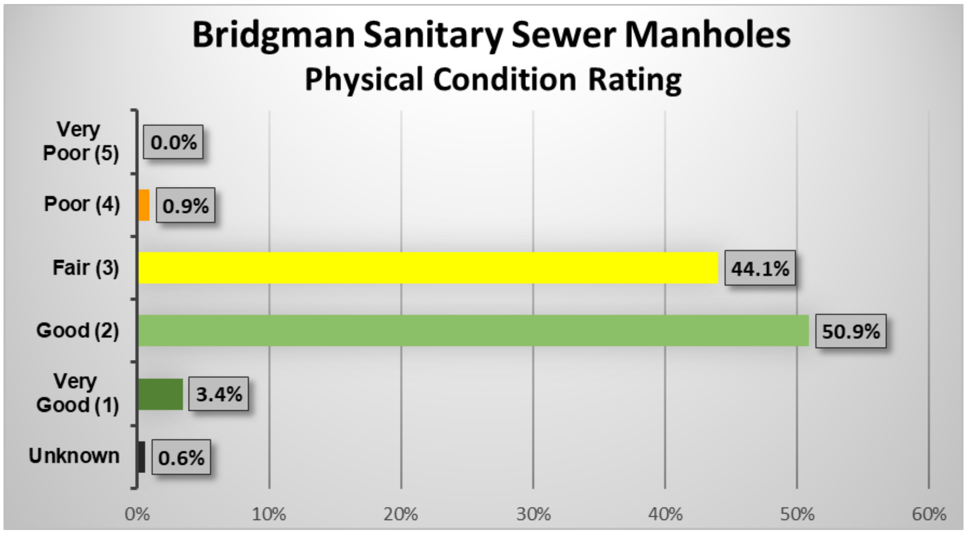


Figure 2 - Sanitary sewer manhole physical condition rating

Inspection at the lift stations included physical and visual inspections of all the major components along with drawdown tests to determine the performance of the pumping equipment, as previously discussed. Table 3, on the following page, shows the design capacity, current pump rates, and the condition of the major components or asset classes of the lift stations. The lift stations are labeled by their GRSD lift station numbers with those numbers corresponding to the more common name of the lift station as follows:

- Lift Station #47 – Red Arrow Lift Station
- Lift Station #48 – Lake Street Lift Station
- Lift Station #49 – Rambo Road Lift Station
- Lift Station #54 – Baldwin Road Lift Station

Station	Pump Design Capacity (gpm)	Pump 1 Test Rate (gpm)	Pump 2 Test Rate (gpm)	Design Head (ft)	Wet Well & Associated Equipment Condition	Pump Condition	Electrical & Controls Condition	Generator Condition
L.S. 47	180	144	182	19.3	Good	Fair	Poor	N/A
L.S. 48	250	259	276	63.0	Good	Good	Good	Poor
L.S. 49	80	97	115	33.2	Fair to Poor	Good	Good	N/A
L.S. 54	1,200	823	818	70.2	Very Good to Fair	Good	Very Good	Very Good

Table 3 - Wastewater system lift station condition ratings

As previously discussed, the wastewater collected from the City is pumped to the GRSD WWTP for treatment. The GRSD WWTP is not a City asset and was therefore not assessed as part of this AMP.

Level of Service Determination: *Discuss the level of service the municipality has determined that it wants to provide its customers based on the municipality's ability to provide the service and customer expectations. Discuss the procedures used to involve stakeholders in the AMP discussion. What are the trade-offs for the service to be provided? This may include any technical, managerial, health standard, safety, or financial restraints, as long as all regulatory requirements are met. Discuss how this was determined.*

The level of service defines the way in which the Owner desires the facility or utility to perform over the long term. The level of service should ensure that all regulatory requirements are met and should include any technical, managerial, health and safety, or financial components the Owner deems necessary to meet customer expectations. The level of service is a fundamental part in defining how the wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired level of service will be an ongoing process.

The Asset Management Team developed the statements to define the desired level of service for the wastewater system:

Major Area	Goals and Objectives	Level of Service Statements
Clean Effluent Water	All federal and state water quality regulations will be complied with.	
Health and Safety	Provide a safe and injury free work place. Protect the public health. Protect the environment.	Regular safety meetings – monthly at a minimum. No MIOSHA safety violations.
Security	Secure all wastewater facilities from unauthorized access and intrusions.	All control panels and vaults will be padlocked at all times.
Operator Certification and Training	Provide for opportunities for on-going professional development.	Budget for and allow employees to attend at least two (2) days of professional training or continuing education every year.
Administrative	Provide excellent customer service.	Produce accurate, timely billing. Review all discrepancies within 24 hours. Have someone available between 8:00 a.m. and 5:00 p.m. Monday through Friday.
Customer Complaints	Provide excellent customer service.	Respond to customer complaints within 24 hours and communicate through close of the issue.
Response Time	Provide excellent customer service.	Respond to emergency calls within one (1) hour at all times and non-emergency calls within 24 hours during normal business hours.
Regulatory Changes	Be aware of regulatory changes and be in position to comply with changes as they occur.	Route applicable correspondence from EGLE to all affected staff.

Table 4 - Level of service statements

Major Area	Goals and Objectives	Level of Service Statements
Reporting	Report any violations of permits and any other issues as required. Provide reports to City Council. Report all issues to City Manager	Report violations within the timelines specified in the applicable permit. Provide regular status updates and reports to the City Council on an as-needed basis Report on a daily basis during normal business hours and report emergency issues as they occur.
Rules and Regulations	Monitor and enforce all wastewater ordinances.	Review wastewater ordinances periodically – annually at a minimum. Enforce provisions of wastewater ordinances.
Emergency Power Source	Provide adequate emergency power in necessary locations.	Backup generators shall be provided at all lift stations that are rated at 250 gpm or more. Portable backup generators shall be provided for lift stations rated at less than 250 gpm. Generators shall be maintained under an annual maintenance contract.
Collection System	Maintain the following in good operating condition and prevent overflows and system back-ups: Gravity sewers. Air release valves. Manholes and other structures.	Gravity sanitary sewers will be cleaned on a rotational basis such that 25% of the system is cleaned annually resulting in the entire system being cleaned every four (4) years. Air release valves shall be maintained per Manufacturer recommendations. Assess all wastewater system structures at least once every four years for issues in need of repair. Assess manholes in conjunction with the gravity sewer cleaning.

Table 5 - Level of service statements (continued)

Major Area	Goals and Objectives	Level of Service Statements
Lift Stations	Maintain all pumps and related equipment – focus on preventative maintenance to prevent unscheduled breakdown. Lift station valve maintenance.	Maintain all lift station equipment under Contract with GRSD. Check valves and gate valves shall be exercised annually (at a minimum) under Contract with GRSD.
Financial	Maintain a financial plan to generate sufficient revenue to operate and maintain the wastewater system.	Confirm wastewater revenues are sufficient to meet wastewater budget annually. Review sewer rates every year.
Operating Reserves	Maintain sufficient reserves to cover anticipated major expense and potential unexpected breakdowns.	Maintain a minimum of six months operating expenses in reserve accounts.

Criticality of Assets: *Provide a summary of the method used to assess the criticality of assets considering the likelihood and consequence of failure. Based on the condition of the assets, and the determined risk tolerance, how were the assets ranked? What assets were considered most critical?*

Not all assets are equally important to a utility's operation. While some assets may have a high likelihood of failure, their failure may cause little to no disruption in the ability of the utility to meet their level of service. Correspondingly, some assets may be unlikely to fail but their failure may cause a catastrophic disruption to the utility's ability to meet their desired level of service. Criticality is a rating that is applied to the assets in an AMP that considers both the likelihood and the consequences of an asset failing.

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. In general, the higher the criticality of an asset, the more resources that should be allocated to maintain the asset, or the higher the priority that repairs to that asset should take. However, criticality is only one tool that can be utilized to analyze and prioritize capital improvements and its use is subject to careful evaluation of the asset(s) in question and sound engineering judgement.

A. Likelihood of Failure

For assets that were physically inspected, including gravity sanitary sewers, sanitary manholes, and lift station components, the likelihood of failure was determined by the conditional rating of the asset with consideration given to the remaining asset life as shown below in Table 6. The methodology of examining the asset conditions and assigning conditional ratings to noted defects was discussed previously in Section II.C. The likelihood of failure for all assets assessed based only on the remaining asset life, such as the force mains, was determined by the percentage of the useful life remaining for each asset in accordance with Table 6.

Likelihood of Failure Rating	Asset Condition/ Description	Remaining Useful Life
1	Very Good	More than 90%
2	Good	60 to 89.9%
3	Fair	30 to 59.9%
4	Poor	10 to 29.9%
5	Very Poor	Less than 10%

Table 5 – Likelihood of failure assessment methodology

It should be noted, however, that the condition descriptions are carried over in the GIS model as the likelihood of failure. In other words, if an asset's condition is rated as a "4" (Poor) or "5" (Very Poor), that same description carries over as the likelihood of failure indicating that the asset is in "Poor" or "Very Poor" condition rather than that the likelihood of failure is "Poor" or "Very Poor". The opposite applies as well, with assets whose condition is rated as a "1" (Very Good) or "2" (Good) showing a likelihood of failure of "Very Good" or "Good", again describing the condition of the asset rather than the likelihood that it will fail.

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include not only the monetary cost of the repair, but could also include:

- Social costs associated with the failure of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to damage caused by the failure.
- Regulatory fines resulting from a Sanitary Sewage Overflow (SSO) related to the failure.
- Environmental costs (and possible environmental cleanup costs) created by the failure.
- Loss of business revenue to the community caused by the failure.

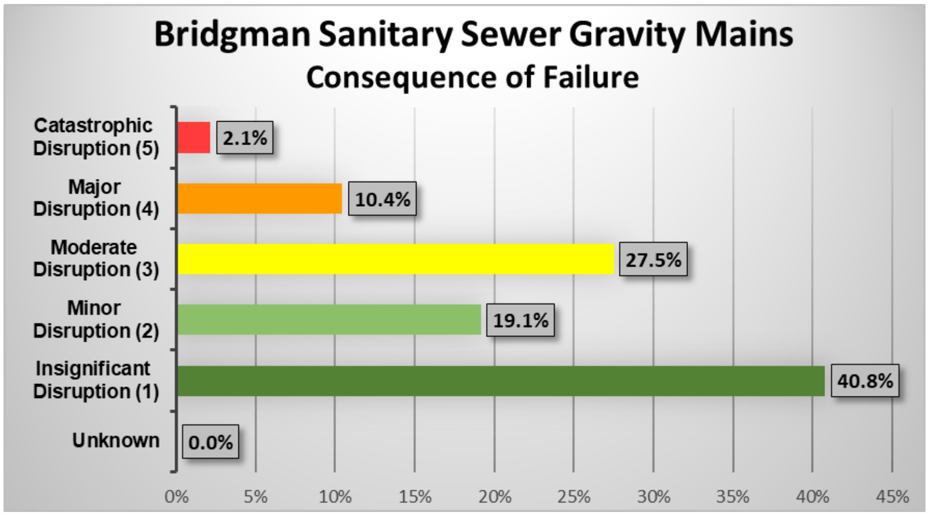
- Other miscellaneous costs associated with the asset failure.

The consequence of failure can be high if any one of these costs is significant or if the accumulation of several costs occurs due to a failure. In the case of the failure of a wastewater asset, the environmental, social, and legal costs can outweigh the costs of collateral damage and even the cost of repairing the failure itself. The consequence of failure was assessed using the criteria presented in Table 7.

Consequence of Failure Rating	Social, Human, and Environmental Effects[3]	Collateral Damage Effects
1 (Insignificant)	< 10% loss of service, limited potential for human contact with sewage, minimal property damage	Structure/pipe outside of road right-of-way (ROW), no impact to traffic or other structures
2 (Minor)	10% to 24% loss of service, potential for human contact with sewage, minimal property damage	Structure/pipe located under the pavement or curb of a residential or minor local road
3 (Moderate)	25% to 49% loss of service, potential for human contact with sewage, limited property damage, disruption to essential services/major industry	Structure/pipe located under the pavement or curb of a major collector roadway
4 (Major)	50% to 89% loss of service, likely human contact with sewage, moderate property damage, disruption to multiple industries/essential services	Structure/pipe located along state roadways, interstate highways, railroad ROW, or close enough to a building to cause collateral damage
5 (Catastrophic)	90+% loss of service, high potential of human contact with sewage, extensive property damage	Structure/pipe located under the pavement or curb of state roadways or interstate highways, under railroad tracks, or underneath a building

Table 6 - Consequence of failure rating scheme for wastewater assets

Utilizing the above ranking system, a thorough knowledge of the service area, and sound engineering judgement, a consequence of failure was assigned to each asset in the wastewater system. These consequence of failure values for each asset are included as an attribute for that asset in the GIS mapping database. The consequence of failure for the various asset classes in the wastewater collection system is shown in Figure 23 through Figure 25 on the next page.



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[3] Loss of service for the wastewater system refers to the number of service connections impacted due to a single failure.

Figure 3 - Sanitary sewer gravity main consequence of failure rating

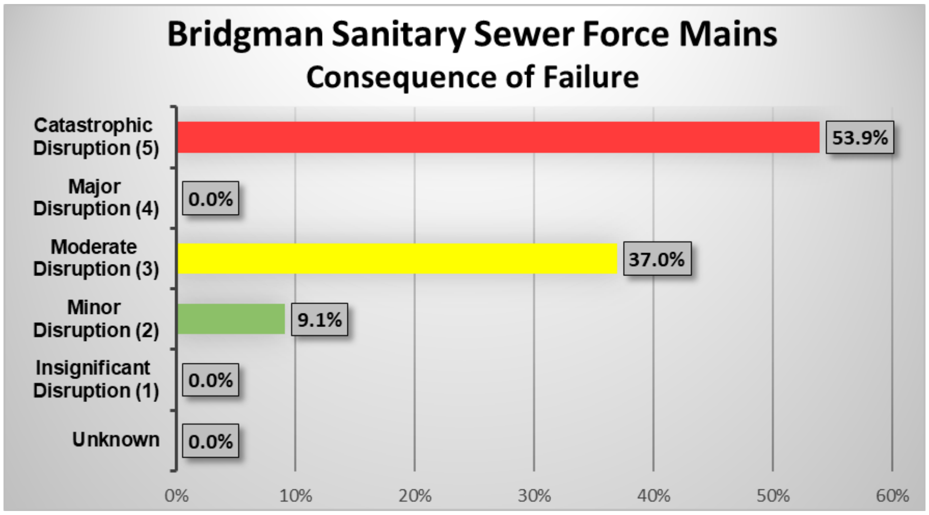

Figure 4 - Sanitary sewer force main consequence of failure rating

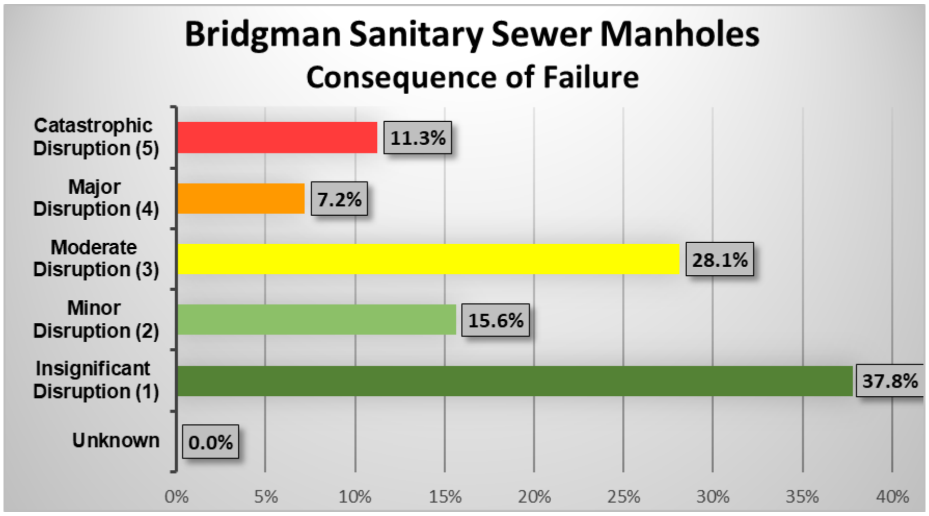

Figure 5 - Sanitary sewer manhole consequence of failure rating

While Figure 24 may appear alarming, due to the large amount of force main that shows as red (“Catastrophic Disruption”), it is noted that this is due to the layout of the Bridgman sanitary sewer system. Over half of the force main length in the system is in the discharge of the Belding Road Lift Station, which conveys the sewage from the entire City to the GRSD interceptor sewer south of the City. A failure of this force main would result in a 100% loss of service. This force main, combined with a small segment of the Rambo Road Lift Station force main that crosses under the railroad tracks (and thus also has a consequence of failure of “Catastrophic Disruption), represent 53.9% of the total force main length in the Bridgman sanitary sewer system. As such, 53.9% of the force main shows as having a catastrophic consequence of failure. It is further stressed that the consequence of failure rating does not suggest in any way whether an asset is likely to fail, only the consequences of such a failure.

Revenue Structure: *Discuss how the rates, charges, or other means of revenue were reviewed to determine if there will be sufficient funds to cover system operation, maintenance, replacement, capital improvement projects, and debt costs, identified in the AMP. If the current rate structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes were made.*

A primary goal of Asset Management is to develop a long-term plan for revenue support of capital improvements, as well as operating cost. The following Asset Management Financial Plan (AMFP) is intended to help Bridgman formulate policy in the areas of rate management, capital spending, and fund balance.
The AMFP is a living document. It is most effective as a tool used annually for budget and user rate decisions.

C. AMFP Methodology

A significant effort has been made by Bridgman to inventory assets, evaluate the infrastructure, and determine asset criticality. The result is the identification of asset investment cost by project and by year. The AMFP covers an extended forecast period to take this asset evaluation into account. The AMFP is a four-step process:

1) Historical comparison with audits and budgets.
2) Test year, or normalized budget year, along with inflation assumptions for purposes of forecasting.
3) Proof of rate to revenue for reliance on customer data.
4) Cash flow forecast including revenue, operating expense, capital spending, debt, and fund balance (i.e., actual cash and investment balance).

The analysis is "cash basis" approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFP may be used to implement policy regarding rate management and budgeting.

1. Audit Comparison

One key indicator of financial health is found in Appendix F in the Comparative Statement of Net Position of the Sewer Fund. Bridgman has maintained this cash and investment balance at around six months compared to the cash operating expenses. Management of the cash balance will be discussed further below under Forecast - Cash Balance. The Sewer Fund audited Revenues, Expenses, and Changes in Net Position comparison reveals consistency in annual revenues and in annual operating expenses (other than one-time expenditures).

2. Budget Comparison / Test Year

The current year budget is consistent with previous years. Certain adjustments have been made to reflect a normalized year for the maintenance expenses. This has been utilized to develop the Test Year budget including expected percent inflation factors.

3. Proof of Rate to Revenue

Bridgman bills its customers based on generally accepted methods. The customers are charged a ready-to-serve (RTS) charge based on their water meter size and on a commodity basis for the number of gallons of water used. The number of customers billed and commodity sold at the current rates tie to the revenue reflected in the audit and budget, such that these numbers can be relied on in forecasting.

4. Forecast - Capital Cost

Annual cost has been forecasted based on an engineering evaluation of asset inventory, condition assessment, and criticality as discussed previously. These are expenses not already included in the operating and maintenance budget. The forecast reflects cash-funding of all capital projects.

5. Forecast - Cash Balance

The standard minimum target of cash and investment to operating expenses (net of depreciation) is six months. Over the next ten years, it is estimated that the City can achieve this goal in addition to paying back the money that other funds have temporarily loaned to the sewer fund. With the use of cash-funding capital improvements and inflationary increases, the system will be able to maintain an adequate amount of cash to respond to unforeseen events.

6. Forecast - Rate Management

The revenue needs to support operations, debt, and capital improvements while solving to cash balance. The cash flow forecast demonstrates a rate track with annual increases of $1.00 to the monthly RTS charge and $0.25 to the commodity charge, after an initial increase of $8.25 to the RTS charge and $3.50 to the commodity charge. Annual increases are highly recommended to keep up with the expected rising expenses over time due to inflationary forces.

7. Management Summary

Rates: Annual increases of $1.00 and $0.25 to the RTS charge and commodity charge, respectively, following an initial increase of $8.25 to the RTS charge and $3.50 to the commodity charge.

Cash Balance: Minimum of six months compared to cash operating expenses over the forecast period to prepare for future capital improvements.

Capital Improvements: A cash, as opposed to debt, approach for funding all identified capital improvements for the forecast period.

Capital Improvement Plan: *Describe the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP. Provide a list of the identified improvements/projects.*

D. Description

Capital improvement projects are projects that a utility has an extended period of time to plan for and are typically projects that cover high-cost, non-recurring expenditures or high-cost recurring equipment replacement. To ensure that the desired level of service can be maintained, a long-term plan for required capital improvements, known as a Capital Improvement Plan (CIP), is required as part of an AMP. The CIP helps to ensure that the long-term reliability needs of the utility are met. The CIP is based upon planning for those capital improvements determined to be required or likely to be required due to the likelihood of failure of the assets and their criticality. There are two planning periods for a CIP:

- A 5-year planning period, generally consisting of projects on assets with high criticalities or that need to be completed in the immediate future to allow the utility to continue to meet its level of service goals.
- A 20-year planning period, consisting of projects that can be reasonably forecast to be needed in the foreseeable future to allow for the development of a rate structure adequate to finance those projects.

For the purposes of this AMP, both planning periods have been rolled together into a single CIP as shown below.

E. Recommended Wastewater System Projects

Table 9, on the following page, lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next 20 years for the wastewater collection system. Detailed descriptions and cost estimates for each project listed can be found in Appendix E. Where appropriate, the estimated project costs shown in Table 9 include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in Table 9 are in current costs (no inflation) unless otherwise noted.

Highlights of the capital improvement plan include:

- Replacement of all of the concrete pipe in the sanitary sewer system.
- Replacement or lining several of the segmented block manholes in the sanitary sewer system.
- Cyclical replacement of lift station equipment.
- Spot repairs to sanitary sewer pipes and manholes to remedy localized defects.
- Lining of the force main discharge manholes and manholes immediately downstream of the force main discharges to remedy hydrogen sulfide damage and prevent further deterioration.

Priority	CIP Year	Project Name	Estimated Cost
1	2019	Baldwin Road Lift Station Capital Improvements	$ 1,000
2	2020	GRSD Force Main Discharge Manhole Replacement	$ 54,000
3	2020	Lake Street Sanitary Spot Repair	$ 4,000
4	2021	Pipe Spot Repairs - Project 1	$ 59,000
5	2022	Rambo Road Lift Station Capital Improvements	$ 72,000
6	2023	Lake Street Sanitary Sewer Replacement and Lining	$ 203,000
7	2024	WWTF Flow Meter Vault Valve Replacement	$ 32,000
8	2025	Lake Street Lift Station Capital Improvements	$ 131,000
9	2026	Manhole Lining - Project 1	$ 48,000
10	2026	Miscellaneous Manhole Repairs - Project 1	$ 9,000
11	2027	Red Arrow Highway Lift Station Capital Improvements	$ 161,000
12	2028	Miscellaneous Manhole Repairs - Project 2	$ 9,000
13	2028	Pipe Spot Repairs - Project 2	$ 70,000
14	2029	Vine St., Vineyard St., and Oak St. Sanitary Sewer Repair	$ 85,000
15	2030	Manhole Lining - Project 2	$ 47,000
16	2031	Mathieu St. and Post Ct. Sanitary Sewer Replacement	$ 154,000
17	2032	2032 Lake St. Lift Sta. Cyclical Equipment Replacement	$ 27,000
18	2032	Miscellaneous Manhole Repairs - Project 3	$ 17,000
19	2033	Toth Street Sanitary Sewer Replacement	$ 100,000
20	2035	2035 Rambo Rd. L. S. Cyclical Equipment Replacement	$ 20,000
21	2036	2036 Lake St. Lift Sta. Cyclical Equipment Replacement	$ 27,000
22	2036	2036 Rambo Rd. L. S. Cyclical Equipment Replacement	$ 54,000
23	2036	Miscellaneous Manhole Repairs - Project 4	$ 9,000
24	2036	Miscellaneous Manhole Repairs - Project 5	$ 12,000
25	2037	2037 City WWTF Cyclical Equipment Replacement	$ 16,000
26	2037	2037 Rambo Rd. L. S. Cyclical Equipment Replacement	$ 53,000
27	2038	2038 Baldwin Rd. L. S. Cyclical Equipment Replacement	$ 218,000
28	2039	2039 City WWTF Cyclical Equipment Replacement	$ 15,000
29	2039	2039 Lake St. Lift Sta. Cyclical Equipment Replacement	$ 16,000
		Total Estimated Project Cost for 20 Year CIP (current dollars) =	$ 1,723,000
		Total Estimated Project Cost for 20 Year CIP (inflation adjusted[4] costs) =	$ 2,137,000

Table 7 - Recommended wastewater system capital improvement projects

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[4] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

Village of Clarksville

SAW Project No. 1603-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2016, the Village of Clarksville received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the Village's publicly owned stormwater utility. Working with Village staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Village of Clarksville AMP is:

Amy Byers, Village President
162 South Main
P.O. Box 118
Clarksville, MI 48815
Phone number: 616-693-2711
Email: clarksvillemi@clarksvillemi.org

ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 19,600 feet (3.7 miles) of storm sewers and 166 stormwater structures connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets' use and maintenance.

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and closed-circuit televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through global positioning system (GPS) field survey and a comprehensive evaluation of the gravity system. This information was organized into a new geographic information system (GIS) database and piping network for archiving, mapping, and further evaluation purposes.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field-based assessments were completed on 160 of the 166 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 74% of the gravity pipe. Hydraulic modeling was completed using the 1-year and 10-year, 24-hour design storms to identify capacity concerns. Recommendations for the short term (1-5 year) and long term (6-20 year) included upgrades, repairs, and maintenance. Specifically, 7% of the system was recommended for inspection and/or cleaning. Rehabilitation was recommended for 50% of the of the system, including replacement, point repairs and lining. The remaining 43% of assets were placed in the beyond 20-year rehabilitation category.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

F&V worked with the Village of Clarksville to develop the following LOS statement and goals, which were adopted by the Village Council at their regular meeting on December 2, 2019:

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

To provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the Village of Clarksville:

- *Provide adequate stormwater collection system and conveyance capacity for all service areas.*
- *Actively maintain stormwater collection and conveyance system assets in reliable working condition.*
- *Provide effective emergency response to Village residents promptly.*
- *Ensure maintenance and operations staff are to be properly trained.*

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change, or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Village from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, evaluation of goals should be completed at least annually to determine if the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors: Likelihood (Probability) of Failure and Consequence of Failure. The Business Risk Score of each asset is calculated using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (age)
- Service history
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and its importance to the system (from the standpoint of whether the system is able to function properly). CoF categories of the stormwater collection system include:

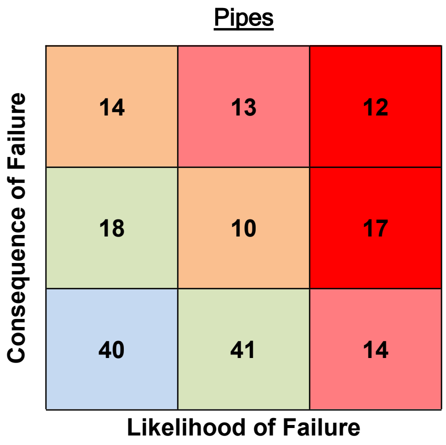
- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the Business Risk Evaluation are provided in easily understood tabular and graphical output.

Figure ES-1 provides the Risk Rating for storm sewer pipes by number of pipe segments. Extreme risk is red in the figure, high risk is light red, medium is orange, low is green, and negligible is blue. 29 pipe segments in the stormwater collection system have an extreme Risk Rating and are recommended for near-term rehabilitation or replacement.

Figure ES-2 provides the Risk Rating for the storm sewer structures. 23 structures are identified as extreme risk and are recommended for replacement or rehabilitation.



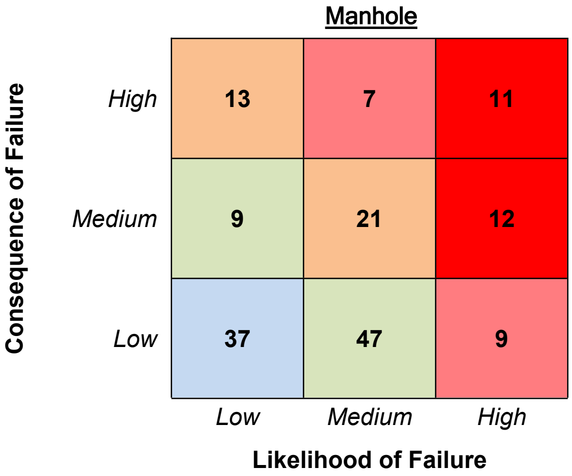
Pipes

Consequence of Failure

14	13	12
18	10	17
40	41	14

Likelihood of Failure

Figure ES-1: Risk Rating Matrix by Number of Gravity Pipes



Manhole

Consequence of Failure

	Low	Medium	High
High	13	7	11
Medium	9	21	12
Low	37	47	9

Likelihood of Failure

Figure ES-2: Risk Rating Matrix by Number of Structures

A spreadsheet listing asset criticality for each utility asset is included in the AMP detailed report for the stormwater collection system (specifically, Table G-1 of Appendix G).

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Village's stormwater utility assets based on the Business Risk Evaluation, from which short-term (1-5 year) and long-term (6-20-year) CIPs were developed. Table ES-1 summarizes recommended rehabilitation items for the 1-5 year term and associated estimated costs.

Table ES-1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Pipe Replacement	$ 780,023	-	$ 514,134	-	-	$ 316,115
Pipe Upsize	$ 982,509	-	$ 163,865	-	-	$ 926,762
Pipe Lining	$ 156,124	-	$ 105,690	-	$ 58,474	-
Pipe Point Repair	$ 47,928	$ 38,648	-	$ 9,845	-	-
Pipe Point Repair and Line	$ 223,381	-	$ 74,943	$ 159,793	-	-
Manhole Replacement	$ 83,910	-	$ 50,861	-	-	$ 38,864
Total	**$ 2,273,875**	**$ 38,648**	**$ 909,495**	**$ 169,638**	**$ 58,474**	**$ 1,281,741**

OPERATIONS & MAINTENANCE

Regular operation and maintenance (O&M) is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table ES-2 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) and associated estimated costs.

Table ES-2. 5-Year Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Inspection	$ 3,310	-	-	-	$ 3,617	-
Manhole Cleaning	$ 2,483	-	-	-	-	$ 2,794
CCTV and Cleaning	$ 5,610	-	$ 3,099	$ 2,760	-	-
Total	**$ 11,403**	**-**	**$ 3,099**	**$ 2,760**	**$ 3,617**	**$ 2,794**

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **12/31/19**
(no later than 3 years from executed grant date)

The Village of Clarksville *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1603-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Name		Phone Number	Email
Shari Clark, Village Clerk	at	616-693-2711	clarksvillemi@clarksvillemi.org

Amy Byers
Signature of Authorized Representative (Original Signature Required)

1/2/20
Date

Amy Byers, Village President
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

Branch County Drain Commissoner

SAW Project No. 1604-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

1.0 EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2017, The Branch County Drain Commissioner (BCDC) received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP). This report provides the Asset Management Plan (AMP) for the stormwater collection system(s). Working with drain staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system(s).

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The Branch County Drain Commissioner has executed the "Certification of Project Completeness" for the storm water asset management plan and a copy has been provided at the end of this Executive Summary.

The contact person for the BCDC AMP is:

Michael Hard – Drain Commissioner
31 Division St.
Coldwater, MI 49036
Phone number: 517.279.4310
Email: mhard@countyofbranch.com

ASSET INVENTORY AND CONDITION ASSESSMENT

The Branch County Drain Commissioner identified one (1) county drain with enclosed pipe networks needing to be cleaned, televised, and inspected. F&V assessed the pipe networks within the Williams #28 Drain collection system.

Also, several dams were inspected under Part 307 and Part 315 of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. These include:

Blossom Lake Dam, ID 4015
Rose Lake Dam, ID 1930
Marble Lake Dam, ID 1130
Hodunk Lake Dam, ID 21
Hanchett Lake Dam, ID 1928
Coldwater Lake Dam, ID 1927

ASSET IDENTIFICATION AND LOCATION

The Branch County Drain Commissioner has enclosed drains all across Branch County. Each drain is unique in its size, length, configuration and capacity.

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping and further evaluation purposes.

CONDITION ASSESSMENT AND EXPECTED USEFUL LIFE

For the Drain Commissioner, a comprehensive evaluation of the collection system was performed. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 6 sections of pipe totaling 555 feet. Based on discussions with the drain staff, there have not been any known capacity issues with the BCDC-owned stormwater system(s). Capacity analysis was not completed for the BCDC drains.

The assets of the storm water collection system(s) are in fair to good shape. Defects in the drains were identified and listed in the Asset Management Plan (AMP) Report. Due to the reactionary nature of how the Drain Commissioner operates, being held to follow the Drain Code, a Capital Improvement Plan was not created. Most projects are either done by petition, or under maintenance.

LEVEL OF SERVICE

DEFINING THE EXPECTED LEVEL OF SERVICE (LOS)

Level of Service (LOS) defines the way in which the Branch County stakeholders want the storm water system(s) to perform over the long term and is an MDEQ required component of an AMP. The LOS can include any technical, managerial, or financial components the County wishes, if all regulatory requirements are met. Throughout the development of this AMP, F&V worked with the County drain staff to develop the following LOS statement and goals.

STORMWATER – LEVEL OF SERVICE STATEMENT

To provide appropriate stormwater collection, diversion, and conveyance at a minimal cost, consistent with applicable Drain Code requirements. To achieve this the following Level of Service (LOS) goals are proposed for the Branch County Drain Commissioner:

- *Provide adequate stormwater collection system(s) and conveyance capacity for all drainage districts.*
- *Maintain stormwater collection and conveyance system(s) assets in reliable working condition.*
- *Provide rapid and effective emergency response services to customers.*

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of the County change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the County Drain Commissioner from time to time to make sure they accurately reflect the desired operation of the storm water system(s).

MEASURING PERFORMANCE

Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. Evaluations of goals should be completed at least annually to determine if the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

DETERMINING CRITICALITY

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors: 1) Likelihood (Probability) of Failure and 2) Consequence of Failure. Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and on the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

ASSESSING CRITICALITY

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset of the drain.

The Business Risk score, also known as Criticality, is calculated for each asset using the following equation:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. None of the pipe segments in the stormwater collection system(s) have an extreme risk rating.

Figure 1 - Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

	LOF - Low	LOF - Medium	LOF - High
COF - High	0	0	0
COF - Medium	3	0	0
COF - Low	0	3	0

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

CAPITAL IMPROVEMENT PLAN

Due to the reactionary nature of how the Drain Commissioner operates, being held to follow the Drain Code, a Capital Improvement Plan was not created. Most projects are either done by petition, or under maintenance.

OPERATIONS AND MAINTENANCE

Drain Commissions are created and governed by state statutes. The Drain Code of 1956 is the primary statute governing level of service for each drain. Per statute, the Drain Commissioner is authorized to expend up to $5,000 per linear mile for maintenance per each drainage district. Expending more than the authorized rate needs additional review and a petition by a municipality and/or landowners.

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The County of Branch *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1604-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Branch County Drain Commissioner at	(517) 279-4310	mhard@countyofbranch.com
Name	Phone Number	Email

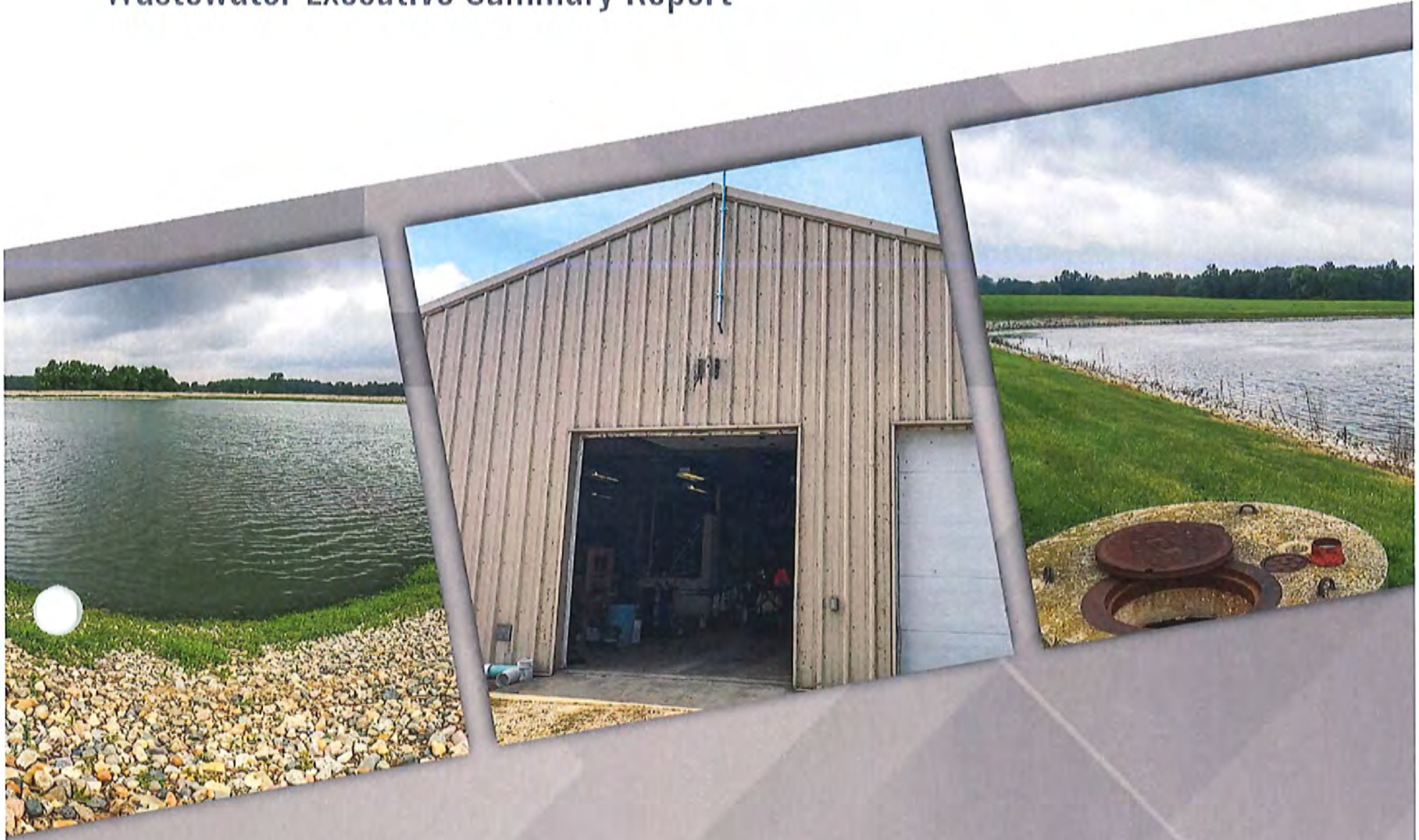
Michael Hard	12/23/19
Signature of Authorized Representative (Original Signature Required)	Date

Michael Hard – Branch County Drain Commissioner
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

Branch County Department of Public Works

SAW Project No. 1604-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In December 2016, The County received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1617-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the County's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Branch County AMP is:
Michael Hard, Director
Phone number: 517.279.4310
Address: 31 Division St. Coldwater, MI 49036

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the County's wastewater system, described further below, include:

- Collection system piping and manholes
- Wastewater Treatment Facility (WWTF)
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 121,774 feet (23.06 miles) of sanitary sewers (gravity pipe and force mains) and 328 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The WWTF currently includes the following treatment processes:

- Aerated lagoons
- Storage lagoons
- Ferric chloride addition
- Surface water discharge

Treated effluent is seasonally discharged to the Hilton Drain through Outfall 001 in accordance with NPDES permit No. MIG580000. The design capacity of the WWTF is 0.224 million gallons per day (mgd). The current annual average flow received by the facility is approximately 0.084 mgd.

There are 31 sanitary sewer lift stations located throughout the wastewater collection system. The stations are duplex submersible style stations.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes 140 WWTF assets, 425 Lift Station Assets, and 766 Collection System Assets.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field-based assessments were completed on 295 manhole structures. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance, with 100% of the system recommended for inspection and/or cleaning. Cleaning and CCTV work was not done as part of the SAW Grant because of the collection systems newer age. Rehabilitation accounted for 13% of the system identifying the need for replacement, point repairs and lining. The remaining 87% of assets were placed in the 20+ year recommendation category.

Overall, the condition of the assets at the WWTF and lift stations range from good to poor. Some assets that have not been replaced are now near the end of their useful life due to age or deterioration caused by harsh conditions associated with wastewater treatment.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the County Asset Management Team to develop the following LOS statement and goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Branch County Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with all local, state and federal regulations at all times for treated effluent from the WWTF.
- Actively maintain collection and treatment system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of treatment facility.
- Provide rapid and effective emergency response services to customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the County from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

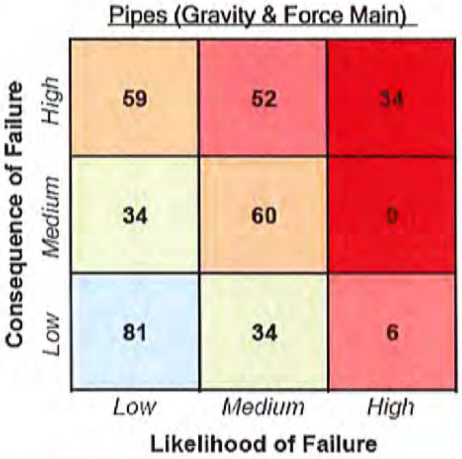
The WWTF and lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Thirty-four pipe segments in the collection system have an extreme risk rating and are recommended to be replaced.



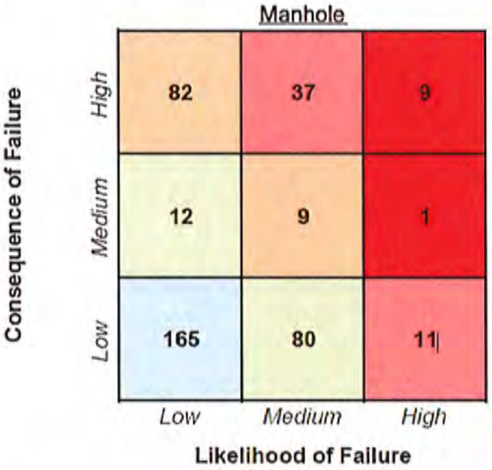
Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	59	52	34
Medium	34	60	0
Low	81	34	6

Likelihood of Failure

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. Ten manholes are identified as extreme risk and are recommended for replacement. Many manholes, 85 percent, are at low to medium risk and are indicative of pipes or manholes in relatively good condition.



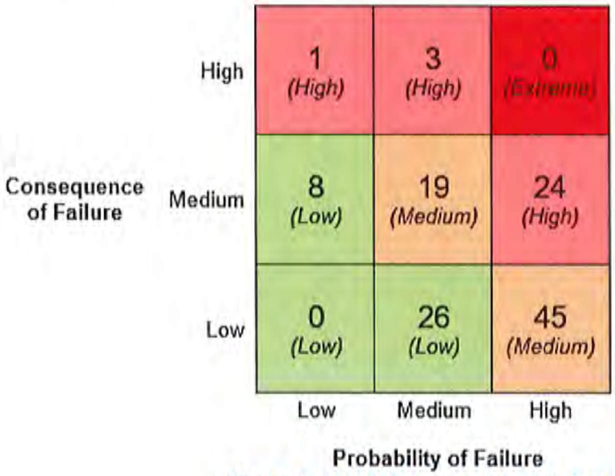
Manhole

Consequence of Failure	Low	Medium	High
High	82	37	9
Medium	12	9	1
Low	165	80	11

Likelihood of Failure

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

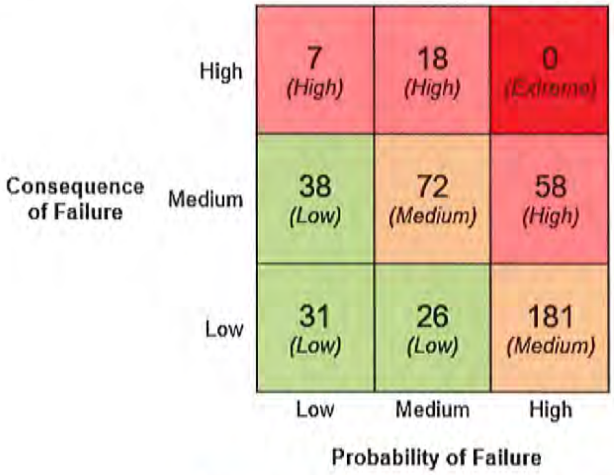
Figure 3 provides the risk ratings for the WWTF assets. No assets are identified as extreme risk. The 28 assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure	Low	Medium	High
High	1 *(High)*	3 *(High)*	0 *(Extreme)*
Medium	8 *(Low)*	19 *(Medium)*	24 *(High)*
Low	0 *(Low)*	26 *(Low)*	45 *(Medium)*
	Probability of Failure		

Figure 3. WWTF Assets by Risk Rating

Figure 4 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The 83 assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure	Low	Medium	High
High	7 *(High)*	18 *(High)*	0 *(Extreme)*
Medium	38 *(Low)*	72 *(Medium)*	58 *(High)*
Low	31 *(Low)*	26 *(Low)*	181 *(Medium)*
	Probability of Failure		

Figure 4. Lift Station Assets by Risk Rating

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and treatment systems.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the County's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, WWTF and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility. Table 1 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Clean, Line and Repair	$ 72,173	$ -	$ 32,139	$ -	$ 44,769	$ -
Manhole Repair, Line and Adjust	$ 8,418	$ -	$ -	$ -	$ 9,198	$ -
Manhole Repair and Line	$ 48,963	$ -	$ 24,583	$ -	$ 27,424	$ -
Manhole Clean and Line	$ 69,678	$ -	$ 6,528	$ -	$ 69,213	$ -
Manhole Clean and Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Total	$ 199,232	$ -	$ 63,250	$ -	$ 150,604	$ -

Table 2 shows detailed recommendations for the WWTF and lift station assets needing rehabilitation in the short-term CIP.

Table 2: Recommended Capital Improvements for WWTF and Lift Stations

Asset Description	Year Installed	Expected Useful Life (Years)	Anticipated Year of Replacement	Budget (2019 Dollars)	Budget (Year of Replacement)
5-YEAR CIP PROJECTS					
Biosolids Removal	1980	20-30	2020	$259,000	$275,000
Aerated Lagoon Improvements	1996	20	2020	$679,000	$720,000
Lift Station 2	1980	20-30	2020	$495,000	$525,000
Lift Station 9	1980	20-30	2021	$293,000	$320,000
Lift Station 10	1980	20-30	2021	$304,000	$332,000
Lift Station 4	1980	20-30	2022	$292,000	$329,000
Lift Station A-2	1994	20-30	2023	$146,000	$169,000
Lift Station C-2	1994	20-30	2023	$171,000	$198,000
Lift Station B-3	1994	20-30	2024	$199,000	$238,000

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 3. 5-Year Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Assessment	$ 46,340	$ 10,462	$ -	$ -	$ 39,184	$ -
Manhole Cleaning	$ 828	$ -	$ -	$ -	$ -	$ 931
CCTV and Cleaning	$ 316,276	$ -	$ 79,318	$ 253,840	$ -	$ -
Total	**$ 363,444**	$ 10,462	$ 79,318	$ 253,840	$ 39,184	$ 931

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs. The Michigan Department of EGLE requires that a rate study be performed to assure that there is sufficient revenue to cover current operation, maintenance and replacement costs of the wastewater utility. For the County of Branch, the rate study report was prepared by an independent municipal financial advisor (Utility Financial Solution, LLC) and submitted on March 6, 2019. It was subsequently approved on October 7, 2019 by EGLE showing that no revenue gap exists for current utility operations.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 1029
(no later than 3 years from executed grant date)

The County of Branch *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1604-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No
   If No - Date of the rate methodology approval letter: October 7, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Branch County Department of Public Works	at	(517) 279-4302	mhard@countyofbranch.com

Michael Hard 12/23/19
Signature of Authorized Representative (Original Signature Required) Date

Michael Hard – Director
Print Name and Title of Authorized Representative

April 2017

HENNESSEY
ENGINEERS, INC

December 27, 2019

Mr. Eric Pocan
Michigan Department of Environment, Great Lakes and Energy
Environmental Resource Management Division
Revolving Loan Section
PO Box 30241
Lansing, Michigan 48909-7741

Re: SAW Grant Completion
City of Lincoln Park
Hennessey Project No. 71108

Dear Mr. Pocan:

Attached please find the Project Completion Worksheet and Asset Management Plan Executive Summary to close out the SAW grant program for the City of Lincoln Park. A final disbursement request will be submitted to your attention prior to January 31, 2020.

If you have any questions, or require additional information, please contact Jim Hollandsworth at our office at your earliest convenience.

Very Truly Yours,

HENNESSEY ENGINEERS, INC

R. Ryan Kern, P.E.
Project Manager

cc: John Kozuh, Director of Public Services, City of Lincoln Park
James D. Hollandsworth, P.E., P.S., Hennessey Engineers, Inc.

File B.4

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 27, 2019
(no later than 3 years from executed grant date)

The City of Lincoln Park certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1609-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or No

   If No - Date of the rate methodology approval letter: **October 17, 2019**.

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ___________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

James D. Hollandsworth, P.E., P.S. at	**734-759-1600**	**jdhollandsworth@hengineers.com**
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required)

12/27/19
Date

John Kozuh, Director of Public Services
Print Name and Title of Authorized Representative

City of Lincoln Park

Mr. John Kozuh, Director of Public Services
City of Lincoln Park
500 Southfield Road
Lincoln Park, Michigan 48146
Phone – 313-386-9000
SAW Grant Project Number 1609-01

Executive Summary

1. Overview of SAW Grant Program

The City of Lincoln Park, Wayne County, Michigan was successful in obtaining a Storm Water, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environment, Great Lakes and Energy (EGLE) to complete a thorough, detailed, conditional analysis of the existing sanitary sewer collection system throughout certain areas of the City, develop capital improvement planning for the next 20 years and to develop a comprehensive asset management plan. The SAW grant study was managed by the City's engineering consultant, Hennessey Engineers, Inc. (HEI) of Southgate, Michigan. The following items of work were completed as a part of the SAW grant study:

- Cleaning and televising of sanitary sewers in certain areas of the City where television investigation had not taken place and are known to be problematic areas within the City or areas where frequent sewer surcharging or basement backups exist and be able to identify any structural defects within the sewer system and/or locations of infiltration through pipe joints.
- Inspection of all manholes along the sewers cleaned and televised to collect data on the structural components of each structure and rate the condition of each component in addition to noting any inflow and infiltration entering the sewer system through manhole structures.
- Developed a Geographic Information System (GIS) geodatabase of the entire sanitary sewer system based upon as-built records and cleaning and televising records.
- Evaluate all lift stations, pump stations and the retention treatment basin and rate the structural condition of all assets within these facilities and be able to prioritize improvements within a capital improvement program.

- Conducted flow monitoring and hydraulic modeling throughout the sanitary sewer system to identify districts of the City experiencing higher amounts of flow during wet weather events, identify locations where heavy infiltration and inflow exist, identify potential areas of the sanitary sewer system that may be exceeding capacity.
- Develop a comprehensive asset management plan and five (5) and twenty (20) year capital improvement programs to be able to prioritize future maintenance and large-scale capital improvements and to be able to cost effectively identify necessary improvements to the entire sanitary sewer system.

Results of the SAW grant program were as follows:

- During the cleaning and television investigation, several pipe segments were identified with longitudinal, circumferential and/or multiple cracking, offset joints, holes within the pipe, deformed pipe or broken or partially collapsed pipe.
- Several locations during the cleaning and television investigation were identified as having moderate to heavy infiltration through pipe joints.
- Manholes were identified as being in overall fair condition with minor to moderate structural defects and/or infiltration entering the sanitary sewer system.
- Illicit connections were identified throughout the system where bulkheads had failed or were missing that were installed during the sewer separation program completed in the 1980's; in addition to, catch basins that remained tied into the sanitary sewer system
- Flow monitoring conducted identified locations within the sanitary sewer system where a large amount of infiltration and inflow enters the system during large wet weather events. The large increase is attributable due to structurally deficient pipe, failing pipe joints, structural defects within manhole structures, structurally deficient sanitary service leads, illicit connections; however, is mostly attributable from footing drains as the majority of the homes in the City have footing drains tied into the sanitary sewer system.
- Flow monitoring and hydraulic modeling was able to verify deficiencies within the operations of the retention treatment basin that have now been corrected and was able to verify that the City is meeting their contractual capacity obligations with the Downriver Utility Wastewater Authority (DUWA).
- A thorough evaluation and inventory of all assets within the retention treatment basin, pump stations and lift stations identified those assets in poor condition and to be able to prioritize capital improvement projects over the next 20 years.

This report provides a summary of the Asset Management Plan (AMP) for the City's sanitary collection system. HEI, with assistance from City staff prepared the asset management plan for the sanitary sewer collection system. The goal of asset management is to meet a required level of service for the City's current and future users in the most cost effective and economical way through proper operation and maintenance techniques and the rehabilitation and/or replacement of assets within the sanitary sewer system to comply with State and Federal regulations.

2. Asset Inventory and Condition Assessment

The City of Lincoln Park has municipal water service and sanitary sewer service throughout the entire City. The water distribution and wastewater collection systems within the City are owned and maintained by the City's Department of Public Services. Water is purchased through the Great Lakes Water Authority (GLWA), formerly the Detroit Water and Sewerage Department (DWSD).

Sewage is discharged into the DUWA collection system at four (4) locations along the River Drive Interceptor located along the eastern boundary of the City. Overflow during wet weather events is diverted at the Emmons and Lincoln Pump Stations and directed to the 20.5 MG retention basin owned and operated by the City of Lincoln Park and stored until authorization is provided by DUWA to discharge the stored wastewater into the River Drive Interceptor. Sewage is treated at DUWA's wastewater treatment plant located in the City of Wyandotte, Wayne County. The sewage collection system within the City of Lincoln Park was first established in the early 1920's and primarily built out by the 1950's.

The wastewater collection system assets consist of 728,825 lineal feet (138.04 miles) of gravity sewers ranging in size from eight (8) inches to seventy-eight (78) inches in diameter and 2,708 sanitary manholes. The majority of the sewer pipes are clay and concrete pipes; however, the City's sanitary sewer maps and as-built records do not note the pipe material; therefore, the material of each pipe within the system is not necessarily known without completing a television investigation of the sewer. All sanitary sewer collection system assets are located in existing road right-of-ways owned and maintained by the City of Lincoln Park, Wayne County, the Michigan Department of Transportation (MDOT) or in dedicated utility easements to allow the City to access the facilities for continued maintenance and operation purposes. A summary of the pipe inventory is as follows:

Pipe Size (In)	Length (Ft)
8	47761
10	307064
12	161040
15	58528
18	23190
21	10195
24	20517
27	2504
30	13849
33	4866
36	37645
42	6560
48	12560
54	7217
60	8189
66	265
72	2187
78	4688
TOTAL	728825

Asset Identification and Location

A comprehensive sanitary sewer system asset inventory was developed from operation and maintenance manuals, including a review of existing record drawings, field notes, staff knowledge and site visits, in addition to field reconnaissance, cleaning and television investigation of sewers, visual inspections of manholes and flow monitoring. Information such as age, size and material were identified as best as possible from the cleaning and television investigation programs, as-built drawings and archived records. The physical location of assets with the sanitary collection system were collected with the use of Global Positioning System (GPS) technology and the pipe depth and invert elevations collected and compiled into a Geographic Information System (GIS) geodatabase. The GIS geodatabase will allow for better organization and record keeping, allow City personnel to better track required maintenance and allow the City to better prepare capital improvement programs and identify projects for the future.

Condition Assessment

As part of the SAW grant study, a comprehensive, detailed evaluation of the sanitary collection system was completed consisting of cleaning and televising of sewers and inspections of manholes. Evaluations were based on the National Association of Sewer Service Companies (NASSCO) Pipeline

Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP) rating assets one (1) through five (5), with five (5) being a severe rating. In addition, prior to the SAW Grant Program, the City also conducted cleaning and televising of the sanitary sewer system as part of the S2 Grant Program in 2012-2014. The cleaning and televising investigation of both grant programs consisted of approximately 229,500 lineal feet of sewer or 43.45 miles (31.5% of overall system) and the inspection of 988 manholes (36.5% of all manholes). No detailed evaluations had been conducted prior to these grant programs. The structural condition of the majority of the collection system was found to be in fair to poor condition with structural defects such as cracked and broken pipe found throughout the system, several locations where infiltration and inflow was entering the system through pipe joints and manholes and collapsed pipes found in sporadic locations throughout the City.

Based upon the results of the S2 Grant Program, the City proceeded in 2016 with a sewer rehabilitation program utilizing a Clean Water State Revolving Fund (SRF) loan in the amount of $1,160,000 to install cured-in-place pipe liners where severe structural defects existed and the sectional removal and replacement of existing sewers by traditional open cut excavation methods where sewers had severely broken or were partially collapsed. Since the S2 grant program, the City has also conducted additional sewer lining installations and sectional removal and replacement of sewers sporadically throughout the City where problematic issues arise within the system requiring immediate attention. These emergency issues have been funded through both the water and sewer fund and has utilized Community Block Grant Funding (CDBG) within low to moderate income neighborhoods where this funding can be utilized. In addition, in 2019, a sewer improvements program took place where 10 locations of collapsed sewer were removed and replaced and several failed or missing bulkheads were reinstated eliminating several illicit connections where storm water was entering the sanitary sewer system.

Based upon the results of the cleaning and televising that took place under the SAW grant study during the 2017 and 2018 construction seasons, the City has proceeded with applying for a Clean Water State Revolving Fund (SRF) Loan to assist with the funding of rehabilitating the collection system where structural defects rated a 4 or a 5 were identified at an estimated cost of $2,500,000. The loan for this work is expected to close in March 2020 and rehabilitation work to begin in April 2020. The City was able to get approximately $500,000 of this amount forgiven due to the City's financial status. Cleaning and televising of sewers also took place in the 2019 construction season and it is estimated that approximately $1,000,000 will be required to address structural defects within the sewers that were analyzed. This work along with improvements to the Emmons and Lincoln Pump Stations over the next five (5) years is expected to be completed by applying for another SRF loan in 2020 for construction to being in 2021. The loan will allow the City to complete this project and pay back the loan over a 20-year period at approximately 2.5 percent interest with the potential of principal forgiveness if the City qualifies for being a disadvantaged community.

Fishbeck, Thompson, Carr and Huber completed the conditional assessment and inventory of the vertical assets within the sanitary sewer system which include the retention basin, two (2) pump stations and six (6) lift stations. A total of 324 assets exist for the vertical assets and were thoroughly evaluated. An inventory of all assets at all facilities was completed to the extent possible based upon the existing information, as-built records and maintenance records and manuals available and on file with the City. Site visits were also conducted perform a visual inspection of the condition of each asset. These inspections were limited to assets that could be evaluated without confined space entry certification. Based upon the Business Risk Exposure (BRE) ratings provided to each asset, the assets of greatest concern are the control panel at the retention treatment basin, the main pumps at both pump stations. In addition, electrical and HVAC improvements are needed in the near future at both pump stations.

3. Level of Service

The City of Lincoln Park has developed overall level of service goals that the sanitary sewer system should provide. The primary objective is to provide a reliable and well-maintained sanitary sewer system in the most cost effective means and in compliance with State and Federal regulations. To meet these requirements, the level of service goals are proposed as the following:

- Provide adequate capacity within the sewer system and meet contractual capacity with the DUWA system
- Provide continued maintenance of the collection system and with all vertical assets to provide for a reliable working condition at all times
- Comply with all County, State and Federal health and environmental regulations
- Continually reduce or eliminate infiltration and inflow sources into the collection system to prevent sewer surcharging and potential basement backups
- Provide adequate customer service and have an effective emergency response plan in place
- Ensure that all Department of Public Services staff are regularly trained and certified to operate sanitary sewer facilities
- Regularly review safety procedures and provide necessary training to City staff
- Routinely review and evaluate the sanitary sewer system including pipes, manholes and wastewater facilities and update the asset management plan and capital improvement plan on an annual basis to allow the proper adjustment of water and sewer rates to fund future capital expenditures required to continually maintain a reliably working system
- Follow and regularly review and update standard operating procedures of the retention basin, pump stations and lift stations
- Regularly maintain and update the GIS geodatabase as additional work and improvements are completed and utilize this software to track maintenance and repairs of the system

Level of service requirements can be updated regularly to account for changes to the sanitary sewer system, changes in regulatory requirements, technology upgrades, significant decrease in population, staffing levels and financial capabilities.

4. Criticality of Assets

Determining Criticality of Assets

Business risk is the determination of criticality of each asset in the sanitary sewer system. Business Risk, also referred to as criticality, is determined based on two factors; the probability of failure and the consequence of failure. Defining an asset's business risk provides assistance to City staff in making important, cost effective decisions on how to allocate funds for the operation and maintenance of the sanitary sewer system and for future capital improvements.

The Probability of Failure is a measure of how likely an asset is to fail. Probability of Failure is based on weighted factors such as the physical or operational condition of the asset, age, service history and operational status.

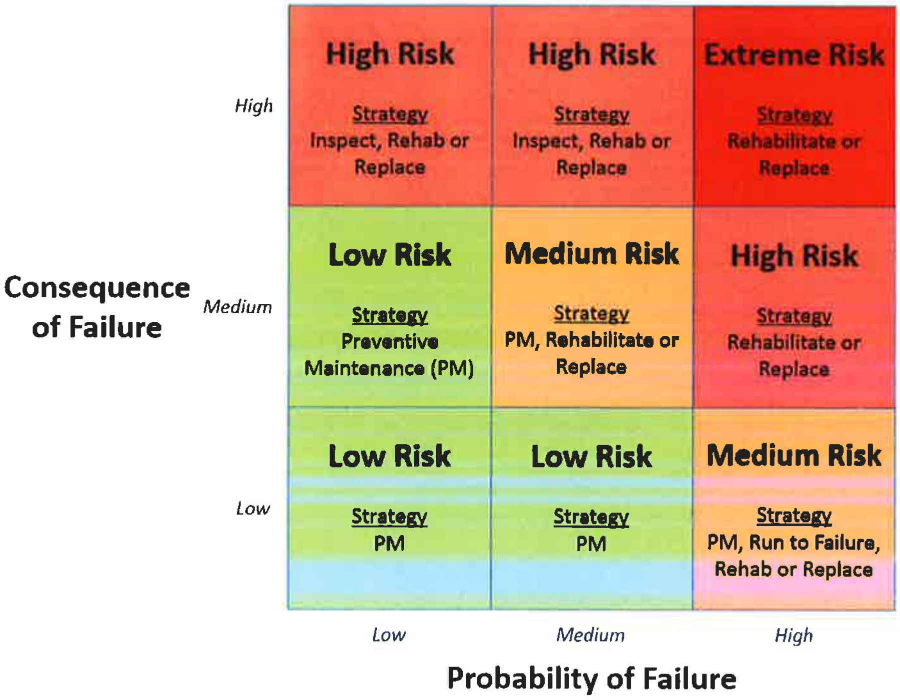
The Consequence of Failure is a measure of the impact of failure for an asset on the sanitary system's ability to convey and treat wastewater. Consequence of Failure is based on weighted factors such as location of asset, facilities or population served by the asset, size of the asset, safety concerns, regulatory issues and ability to respond to emergencies within the sanitary sewer system.

Assessing Criticality of Assets

The criticality of assets is assessed by calculating the "Business Risk Score", also known as Criticality, for each asset and is calculated by the following:

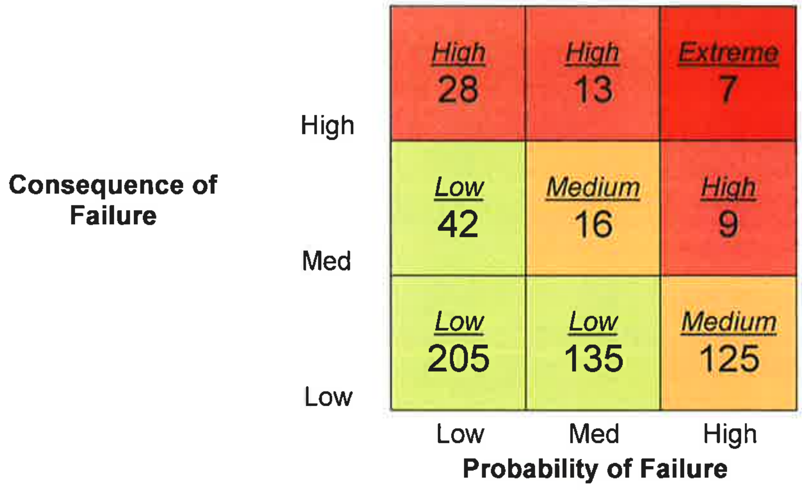
Business Risk = Probability of Failure Score x Consequence of Failure Score

Risk ratings are assigned to each asset based upon the above calculations and placed into the matrix to identify the risk of each asset. Risk ratings were calculated and compiled into a spreadsheet co to be able to analyze and assess business risk for each asset and assists with developing a capital improvement plan.



Consequence of Failure	Low	Medium	High
High	**High Risk** Strategy Inspect, Rehab or Replace	**High Risk** Strategy Inspect, Rehab or Replace	**Extreme Risk** Strategy Rehabilitate or Replace
Medium	**Low Risk** Strategy Preventive Maintenance (PM)	**Medium Risk** Strategy PM, Rehabilitate or Replace	**High Risk** Strategy Rehabilitate or Replace
Low	**Low Risk** Strategy PM	**Low Risk** Strategy PM	**Medium Risk** Strategy PM, Run to Failure, Rehab or Replace

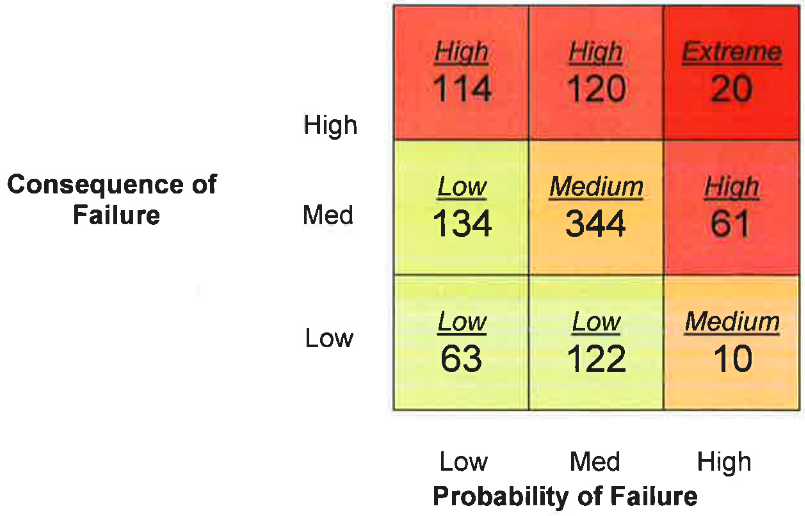
For the collection system, the pipe network and manholes currently have business risks ranging from low risk to high risk. The risk rating of an asset can be used to develop a risk-based strategy for asset rehabilitation or replacement. A summary of the business risk analysis for the 580 pipe assets analyzed within the collection system as part of the SAW Grant Program is shown below:



Consequence of Failure	Low	Med	High
High	*High* 28	*High* 13	*Extreme* 7
Med	*Low* 42	*Medium* 16	*High* 9
Low	*Low* 205	*Low* 135	*Medium* 125

Probability of Failure

A summary of the business risk analysis for the 988 manhole assets analyzed within the sanitary sewer system to date is shown below:



Consequence of Failure	Low	Med	High
High	*High* 114	*High* 120	*Extreme* 20
Med	*Low* 134	*Medium* 344	*High* 61
Low	*Low* 63	*Low* 122	*Medium* 10

Probability of Failure

In addition, Fishbeck, Thompson and Carr and Huber (Fishbeck) on behalf of the City evaluated the 20.5 MG retention basin, the Emmons and Lincoln Pump Stations and the six (6) lift stations located throughout the City. Fishbeck calculated business risk evaluation factors for each major asset of these facilities and in summary calculated the following:

Retention Treatment Basin:

Number of Assets	Low	Medium	High
177	77	100	0

Pump Stations:

Number of Assets	Low	Medium	High
41	19	21	2

Lift Stations:

Number of Assets	Low	Medium	High
96	61	45	0

5. Flow Monitoring

As part of the SAW Grant Program, an extensive flow monitoring program took place throughout the City's sanitary sewer system. Approximately 30 flow meters were installed at different times during the course of the SAW Grant Program for a significant period of time during the wet weather seasons to identify unusual flow characteristics throughout the City's system. The following has been accomplished through this intensive program:

- When the DUWA system was still owned and maintained by Wayne County, the County was insistent that the City of Lincoln Park was exceeding its contractual capacity to the County's River Drive Interceptor. The City of Lincoln Park discharges wastewater at four (4) locations along the River Drive Interceptor that are controlled with three (3) locations being controlled by a vortex valve and the fourth location having a weir plate to control the amount of flow discharged into the system. The four (4) outlets were analyzed and based upon the flow monitoring that was conducted, the City was able to prove that the City of Lincoln Park was not exceeding its contractual capacity, the four (4) discharge points were functioning properly and at times was not able to discharge to the contractual amount due to the County interceptor being surcharged.
- The flow monitoring was able to identify operating issues with the retention basin and how flow was being released from the retention basin into the County Interceptor prior to receiving authorization from the County to discharge the retention basin. Standard operating procedures

have been reviewed and updated and the discharge of the retention basin is now operated properly through authorization from DUWA.

- Several locations throughout the collection system were identified to have a large amount of groundwater infiltration and/or storm water inflow during large wet weather events. The City has been eliminating infiltration and inflow within the system as illicit connections present themselves, in particular, earlier this year with the reinstatement of several failed or missing bulkheads that were separating the storm sewers from the sanitary sewers and the sectional removal and replacement of broken sewers. It is the City's intent to continue to eliminate as many locations of infiltration and inflow from the system as possible as they are identified.

6. Capital Improvement Project Planning

Based upon the business risk evaluation, the City has developed short term (5 year) and long term (20 year) capital improvement plans providing recommendations for continued maintenance, investigation and evaluation and improvements to the sanitary sewer collection and treatment system. The business risk evaluation assisted the City to prioritize all future capital improvement projects and develop a rate structure to fund these projects.

For the collection system, immediate needs are to address those structural defects that were rated in poor to severe condition and to eliminate severe infiltration through pipe joints to eliminate the future risk of sewer surcharging and potential basement backups through the SRF rehabilitation program in 2020 and to continue evaluating areas of the City have not had a thorough analysis of the collection system to date to address structurally deficient sewers. It is also recommended to inspect the collection system; both sewers and manholes as well as all wastewater facilities and vertical assets within the sewer system every five (5) years to identify any new or potential problems and identify ways to address these problems. Therefore, it is recommended to perform a five (5) year cycle of annual sewer cleaning and televising of the system to be able to continually maintain the system and provide for a reliable system. Following the completion of the sewer cleaning and televising, the City should consider performing an annual sewer and manhole rehabilitation program addressing those sewers and manholes with severe defects and adjust sewer rates as necessary to perform these annual programs.

For the vertical assets, a 20-year capital improvement program has been developed and included in the asset management plan. For the first 5 years, the following projects have been proposed:

2021 – Sodium Hypochlorite Metering Pump Replacement at the Retention Basin
Concrete Wall Rehabilitation at the Retention Basin
General Maintenance throughout the System
2022 – Overhaul of Emmons Pump Station including Electrical and Controls and HVAC Replacement, Pump Replacement – Phase 1
2023 – Overhaul of Emmons Pump Station including Electrical and Controls and HVAC Replacement, Pump Replacement – Phase 2
2024 – Overhaul of Lincoln Pump Station including Electrical and Controls and HVAC

Replacement, Pump Replacement – Phase 1
2025 – Overhaul of Lincoln Pump Station including Electrical and Controls and HVAC Replacement, Pump Replacement – Phase 2

It is expected to cost approximately $4 million to overhaul each pump station.

7. Revenue Structure

A rate methodology report was submitted to the EGLE in June 2019 and approved by MDEQ staff on October 17, 2019. Costs for the proposed SRF improvements project, future improvement projects; in addition to future investigative work and frequency of routine maintenance such as cleaning and television investigation and manhole inspections will be figured into future rate adjustments. City staff; along with the Engineering consultant, determine if the rate structures are sufficient to meet the current needs of the City's sanitary sewer system. Over the course of time, adjustments may need to be made to the rate structure in order to fund future projects.

The asset management plan developed allows the City to calculate estimated costs for future projects and assist with future rate adjustments. Based upon the SAW grant study, there is an immediate need to rehabilitate sewers with poor to severe structural defects. Most of these immediate needs will be addressed through the SRF loan program with construction anticipated to begin in 2020. The estimated cost for this project is $2,500,000 with $500,000 being forgiven due to the financial status of the City. The expected annual payment of $128,295 for 20 years. Furthermore, the sewers with structural deficiencies that were evaluated in 2019 along with the pump station improvements will be included in in another SRF loan application to be submitted in 2020 for 2021 a construction start date. This loan is expected to be an approximate $9 million dollar loan with an annual payback of $577,325. In addition to the current needs, there will be additional needs in the future for the system within the next 20 years. It is recommended to clean and televise all sewers within a five (5) year rotating cycle. However, as the entire City has not yet been evaluated, it is recommended to complete the cleaning and television investigation of the remainder of the system estimated at approximately $1.3 million dollars to complete. Once the entire City has been evaluated, it is recommended to begin the five (5) year cycle of completing the entire City's system routinely. In addition, it is also recommended to re-evaluate all vertical assets every five (5) years.

The City's current sewer rate structure will be modified prior to the construction start of the SRF improvement projects and any other future projects. The costs for the proposed project was estimated based upon similar projects recently completed for other communities and also used to determine the required funds needed for future projects. All projects will be funded through future rate increases.

This asset management plan along with the rate methodology should be revisited on an annual basis and the asset management plan and rate methodology updated as needed on an annual basis to account for maintenance, rehabilitative and capital improvements projects completed within a given year and to update cost estimates for future projects.

City of Eaton Rapids
SAW Grant No. 1668-01
Stormwater System

December 30, 2019

The City of Eaton Rapids applied for and received a grant to develop an Asset Management Plan for its storm sewer systems through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for surface water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public to review at City Hall for at least 15 years.

A. Asset Inventory and Condition Assessment:

With the assistance of HRC, the City built a Geographic Information Systems (GIS) inventory and purchased the necessary hardware and software. The GIS includes key attributes with each asset such as installation date (age), size, material and other information as needed for a given asset type. Through grant efforts, the City digitized storm plans and hyperlinks to the plans are included in the GIS.

A summary of the asset inventory in GIS is shown in the following table.

Gravity Mains		
Asset	**Quantity**	**Length**
Unknown	71	5,318 feet
2-inch Storm	2	123 feet
3-inch Storm	2	136 feet
4-inch Storm	27	1,063 feet
6-inch Storm	130	5,969 feet
8-inch Storm	321	21,037 feet
10-inch Storm	17	2,697 feet
12-inch Storm	752	57,468 feet
15-inch Storm	66	7,434 feet
18-inch Storm	158	20,992 feet
21-inch Storm	4	469 feet
24-inch Storm	111	14,559 feet
30-inch Storm	23	2,654 feet
36-inch Storm	77	12,791 feet
42-inch Storm	6	887 feet
48-inch Storm	6	409 feet
60-inch Storm	8	797 feet
86-inch Storm	1	6 feet
Total		**154,809 feet**

Structures	
Asset	**Quantity**
Manholes	43
Catch Basins	1080
Outlets	86
Lift Stations	4

Pressurized Mains		
Asset	**Quantity**	**Length**
8-inch Storm	8	3,391 feet

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For storm sewer pipes, the NASSCO-compliant inspection information was collected during limited sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was created and critical attributes were populated. Approximately 46,615 of the 158,200 lineal feet of storm sewers underwent condition assessment via cleaning and televising. Approximately 255 of the 437 structures were evaluated through manhole inspections.

B. Criticality of Assets:

The City developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of storm gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score, remaining useful life, soil type and material are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material along with soil type. The COF for horizontal assets was determined based on asset depth, size, proximity to water, and proximity to roads and intersections. Approximately 33% of the storm pipes have a BRE between 1 and 5, 59% have a BRE between 6 and 10 and 8% have a BRE between 11 and 25.

C. Level of Service:

The City adopted a mission statement as part of the AMP as follows:

> *The City of Eaton Rapids is committed to maintaining the performance of our sanitary and stormwater collection systems to meet applicable local, state and federal regulations and to protect public health and the environment. We strive to develop, operate and maintain these systems in the most cost-effective way to provide sustainable systems for present and future customers.*

The City of Eaton Rapids choose to implement its mission statement as the defined Level of Service. The City's mission statement considers the impacts to public health and the system's ability to comply with regulations. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public works leaders choose to continue their ongoing processes rather than defining specific goals to track at this time. The City will review the mission statement and ongoing system activities annually to determine if the mission is not being successfully fulfilled and further measurement of the stated goals is necessary.

D. Revenue Structure:

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City does not charge a stormwater utility rate; therefore, the revenue structure was not reviewed for the AMP. Improvements to the storm water system, when needed, are primarily funding through the general or road maintenance funds.

E. Capital Improvement Plan:

A list of capital projects was developed for the City's storm sewer system, using recommendations from the asset inspection processes, and consideration of other system needs. The CIP was development based solely on the televised sewers.

Projects listed for implementation in the 0 to 10-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 10 to 20-year range are based solely on collect condition assessment data and costs are based on estimates. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated, and changes occur in prioritization, regulations, technology, cost and other data becomes available.

F. Recommendations:

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

G. Contact Information:

A signed Certification of Project Completeness form is enclosed. Contact information for the grantee including name, address, and phone number is included below:

Primary Contact and System Manager
City of Eaton Rapids
Aaron Desentz, City Manager
200 S. Main Street
Eaton Rapids, MI 48827
(517) 663-8113
adesentz@cityofeatonrapids.com

John Nobash, Director of Public Works
200 S. Main Street
Eaton Rapids, MI 48827
(517) 719-3203
jnobash@cityofeatonrapids.com

Consultant Name
Hubbell, Roth & Clark, Inc.
Mike Romkema, PE
(517) 292-1933
mromkema@hrcengr.com

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 31, 2019**
(no later than 3 years from executed grant date)

The City of Eaton Rapids certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1668-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Aaron Desentz	at	(517) 663-8118	adesentz@cityofeatonrapids.com
Name		Phone Number	Email

	12/23/2019
Signature of Authorized Representative (Original Signature Required)	Date

Aaron Desentz, City Manager
Print Name and Title of Authorized Representative

City of Eaton Rapids
SAW Grant No. 1668-01
Wastewater System

December 30, 2019

The City of Eaton Rapids applied for and received a grant to further develop its Asset Management Plan for its sanitary and storm sewer systems through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for surface water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public to review at City Hall for at least 15 years.

A. Asset Inventory and Condition Assessment:

With the assistance of HRC, the City built a Geographic Information Systems (GIS) inventory and purchased the necessary hardware and software. The GIS includes key attributes with each asset such as installation date (age), size, material and other information as needed for a given asset type. Through grant efforts, the City digitized wastewater plans and hyperlinks to the plans are included in the GIS.

The City of Eaton Rapids owns approximately 162,035 linear feet, or 30.69 miles, of sanitary sewer. The City sewers have been constructed over time as Eaton Rapids has grown with the oldest sewers currently in use being over 65 years old. Most of the sanitary sewer was constructed around 1954 when the Wastewater Treatment Plant (WWTP) was constructed for "primary" treatment. The City has inspected and rehabilitated sections of the sewers as there have been operational issues. The City previously has not had a maintenance program. As of 2012, the City has lined approximately 10% of the sanitary sewer system. Since the award of the SAW grant, the City televised approximately 66% of the City's sewer lines.

HRC inspected 504 of the 606 sanitary manholes. Representatives from HRC were physically able to access approximately 83% of the City's sanitary and storm manhole structures (there were a few manholes that were buried under pavement, landscaping and/or whose location was not known) and catch basins inventory.

The City of Eaton Rapids has its own Wastewater Treatment Plant (WWTP) originally constructed in 1954 for primary treatment with upgrades completed in 1978 for secondary treatment. Additional upgrades were completed between 2004 and 2007 that included the replacement of worn out equipment, a new secondary clarifier, a new equalization tank for temporary storage during high storm flows, and the installation of a Supervisory Control and Data Acquisition (SCADA) system. The WWTP was designed for the average daily flow of 1.2 MGD with a maximum flow rate of 2.1 MGD and currently has no capacity or operational issues.

A summary of the asset inventory in CIS is shown in the table on the following page.

Gravity Mains		
Asset	**Quantity**	**Length**
Unknown	2	114 feet
2-inch Sanitary	1	13 feet
4-inch Sanitary	41	1,766 feet
6-inch Sanitary	120	14,538 feet
8-inch Sanitary	520	101,009 feet
10-inch Sanitary	22	6,542 feet
12-inch Sanitary	88	22,653 feet
15-inch Sanitary	14	3,907 feet
18-inch Sanitary	21	4,785 feet
21-inch Sanitary	3	411 feet
24-inch Sanitary	11	2,063 feet
Total	**843**	**157,802 feet**

Structures	
Asset	**Quantity**
Manholes	606
Clean Outs	5
Pump Stations	5

Pressurized Mains		
Asset	**Quantity**	**Length**
2-inch Sanitary	1	299 feet
4-inch Sanitary	1	1,432 feet
6-inch Sanitary	6	2,029 feet
8-inch Sanitary	3	474 feet
Total	**11**	**4,233 feet**

B. Criticality of Assets:

The City developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

Factors were developed to determine how some assets are more critical than others. A Probability of Failure (POF) was estimated for assets with inspection data based on condition, age, and other factors using the PACP, MACP methodology, which City staff were trained to utilize. A Consequence of Failure (COF) was determined by several attributes of the asset. These attributes include diameter, depth, location, surface type, and critical users. The product of these factors is the overall Business Risk Evaluation (BRE). Approximately 39% of the City's sanitary sewer lines have a BRE score less than 5, 60% have a BRE between 6 and 10 and 2% have a BRE between 11 and 25. Approximately 50% of the sanitary manholes have a BRE less than 5, 45% have a BRE between 6 and 10 and 5% have a BRE between 11 and 25.

C. Level of Service:

The City adopted a mission statement as part of the AMP as follows:

> *The City of Eaton Rapids is committed to maintaining the performance of our sanitary and stormwater collection systems to meet applicable local, state and federal regulations and to protect public health and the environment. We strive to develop, operate and maintain these systems in the most cost-effective way to provide sustainable systems for present and future customers.*

The City of Eaton Rapids choose to implement its mission statement as the defined Level of Service. The City's mission statement considers the impacts to public health and the system's ability to comply with regulations. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public works leaders choose to continue their ongoing processes rather than defining specific goals to track at this time. The City will review the mission statement and ongoing system activities annually to determine if the mission is not being successfully fulfilled and further measurement of the stated goals is necessary.

D. Revenue Structure:

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City of Eaton Rapids employed Robert W. Baird Co., Inc. (Baird) to conduct the City's rate methodology study that was submitted on August 13, 2019, which was approved by the MEGLE on October 17, 2019. Baird demonstrated that current revenues, with the existing annual sewer maintenance budget, scheduled sewer rate increase and State Revolving Fund (SRF) bonds, are sufficient to meet anticipated expenses.

E. Capital Improvement Plan:

Capital Improvement Plans identify system upgrades and rehabilitation and replacement needs for the future, typically over a period of 20 years, with greater emphasis on the first five years of the plan. Typically, the City promptly plans and completes rehabilitation of sewer sections found to have deficiencies as they find them, whether the probability of failure is imminent, or rehabilitation is warranted due to other infrastructure projects proposed in the area. The City intends on continuing this practice. The City also intends to maintain a three (3) year sewer televising and cleaning cycle in which all the sewers in the City are continuously investigated.

There are several locations that have been identified in the sewer system for improvements within the first five years of the plan with a total estimated cost of $1,008,000. These projects are intended to be completed over the next five (5) years and paid for using a combination of sewer funds, SRF bonds and the projected annual sewer rate increase of 5% (beginning July 1, 2020). In addition, there are several locations that have been identified for future improvements over the next 5-20 years with a total estimated cost of $3,307,000 that will be paid for by the same funding sources listed above. The continuous televising and cleaning of the system will assist the City to identify areas for necessary capital improvements.

Improvement projects were also identified at the WWTP and Hospital Pump Station over the next five (5) years. Similar to the sanitary sewer improvements, the projects will be paid for using a combination of sewer funds, SRF bonds and the projected annual sewer rate increase. The first project at the WWTP includes upgrades to the plant's blower system. The second project at the WWTP is to upgrade the Supervisory Control and Data Acquisition (SCADA). The SCADA system can also be configured to communicate with the pump stations. Finally, improvements were identified at the Hospital Pump Station. A notice to proceed was issued December 30, 2019, for an amount of $280,850. Work is anticipated to be complete the first half of 2020.

F. Recommendations:

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

G. Contact Information:

A signed Certification of Project Completeness form is enclosed. Contact information for the grantee including name, address, and phone number is included below:

Primary Contact and System Manager
City of Eaton Rapids

Aaron Desentz, City Manager
200 S. Main Street
Eaton Rapids, MI 48827
(517) 663-8113
adesentz@cityofeatonrapids.com

John Nobash, Director of Public Works
200 S. Main Street
Eaton Rapids, MI 48827
(517) 719-3203
jnobash@cityofeatonrapids.com

Consultant Name
Hubbell, Roth & Clark, Inc.
Mike Romkema, PE
(517) 292-1933
mromkema@hrcengr.com

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 31, 2019**
(no later than 3 years from executed grant date)

The City of Eaton Rapids certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1668-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: October 17, 2019.

2) Significant Progress Made: Yes or No

   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Aaron Desentz	at (517) 663-8113	adesentz@cityofeatonrapids.com
Name	Phone Number	Email

	12/23/2019
Signature of Authorized Representative (Original Signature Required)	Date

Aaron Desentz, City Manager
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Environment, Great Lakes & Energy (EGLE) - State of Michigan
Revolving Loan Section
Attn: Clarence Jones

From: Hubbell, Roth and Clark, Inc.

CC: City of Hastings

Date: December 20, 2019

Re: City of Hastings
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1669-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) SAW Grant by the City of Hastings for their Wastewater Asset Management Plan. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount, match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows EGLE guidance.

GRANTEE INFORMATION

City of Hastings
201 E State St., Hastings, MI 49058

SAW Grant Project #1669-01

Project Grant Amount: $492,020

Applicant Match Amount $50,800

Authorized Representative:
Jerry Czarnecki – City Manager
jczarnecki@hastingsmi.org
Phone: 269-945-2468

City of Hastings Department of Public Service (DPS):
Matt Gergen- DPS Director
mgergen@hastingsmi.org
Phone: 248-945-2468

City of Hastings Department of Public Service (DPS):
Verne Robins- Utilities Superintendent
vrobins@hastingsmi.org
Phone: 248-945-2468

Consultant Contact:
Karyn Stickel, PE
Hubbell, Roth & Clark, Inc.
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Phone: 248-454-6566

Consultant Contact:
Dennis Benoit, PE
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dbenoit@hrcengr.com
Phone: 616-432-6195

Consultant Contact:
Lexie Burtt, EIT
Hubbell, Roth & Clark, Inc.
aburtt@hrcengr.com
Phone: 616-649-9429

EXECUTIVE SUMMARY

The City of Hastings applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, operates and maintains the sanitary sewer system and has various tools used to manage the assets, including a Geographic Information System (GIS) geodatabase, condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools were created with grant monies and are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated on a regular basis, which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the City Hall for at least 15 years.

WASTEWATER INVENTORY

The City uses its new GIS geodatabase created within the grant program for horizontal assets, which includes sewers, forcemains and structures. Allmax Antero CMMS software was obtained through the grant as a means to inventory the vertical assets at the Wastewater Treatment Plant and pump stations. Ultimately a spreadsheet was created for the vertical assets including pumps, motors, and other major equipment. The GIS and vertical asset spreadsheet include key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through grant efforts, the City digitalized sanitary sewer plans, created a GIS geodatabase, purchased hardware to utilize GIS and participated in training.

As the City completed scanning of paper plans of the collection systems the information was inputted into GIS including linking plans to the assets within GIS. Through the grant, the City purchased a scanner, multiple tablets and laptops allowing staff to use GIS, and an online subscription to Esri software. Using observations and inspection data made during condition assessment, the data in the GIS has greatly improved.

The next page includes a table of the asset inventory in GIS. The vertical asset spreadsheet for the WWTP and pump stations is included with the full report and available upon request.

Asset Type	Quantity
4-inch sewer	3 pipes, 292 feet
6-inch sewer	73 pipes, 15,992 feet
8-inch sewer	759 pipes, 174,944 feet
10-inch sewer	69 pipes, 16,824 feet
12-inch sewer	120 pipes, 26,144 feet
14 and 15-inch sewers	48 pipes, 7,859 feet
16 and 18-inch sewers	5 pipes, 1,030 feet
21-inch sewer	7 pipes, 2,128 feet
24-inch sewer	23 pipes, 3,558 feet
Manholes	1,100
Outlets	1 for WWTP Discharge to Thornapple River

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For sanitary sewer pipes, the NASSCO-compliant inspection information was collected during sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was created, and critical attributes were populated. Approximately 114,500 of the 248,800 lineal feet of sanitary sewers underwent condition assessment via cleaning and televising. Approximately 379 of the 1,020 structures were evaluated through manhole inspections.

CRITICALITY OF ASSETS

The City developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets. For the vertical assets equipment was reviewed as part of the grant work, with POF and COF factors determined and input into the asset inventory spreadsheet.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of wastewater gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score, remaining useful life, soil type and material are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material along with soil type. The COF for

horizontal assets was determined based on asset depth, size, proximity to water, and proximity to roads and intersections.

Below is a list of BRE scores for the horizontal assets in the City’s system:

- Sanitary Pipes:
    - 83% BRE 1-8
    - 15% BRE 9-15
    - 2% BRE 15-25
- Sanitary Manholes:
    - 84% BRE 1-8
    - 15% BRE 9-15
    - 1% BRE 16-25

For vertical assets, scores were assigned for Condition (POF) based on visual observations with the use of Equipment Condition Assessment Guides. Criticality (COF) was based on operator knowledge, and then a BRE score was calculated. These scores are stored in the asset inventory spreadsheet and are available upon request.

LEVEL OF SERVICE DETERMINATION

The City developed the following mission statement as part of the AMP:

> *The City of Hastings is committed to protecting and improving public health by maintaining the sanitary collection system, and wastewater treatment facilities. This will be accomplished by completing routine maintenance, adhering to regulatory requirements and investing money in the infrastructure promoting public health.*

The mission statement considers the impacts to the budget, infrastructure longevity, and public health. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public services leaders choose to continue their ongoing processes at this time rather than defining specific goals to track.

The City will review the mission statement and ongoing system activities periodically to determine if the mission is being successfully fulfilled and further measurement of the stated goals is necessary.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant

one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City worked with Baker Tilly Municipal Advisors, LLC to confirm that the system's current rate structures are sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEGLE six months prior to the SAW grant end date. The analysis did not show any gap between the revenue and expenditures, therefore, a rate increase was not necessary.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City's wastewater system, using recommendations from the asset inspection processes, and consideration of other system needs. The CIP for the wastewater sewer system was development based solely on the televised sewers. The CIP for the vertical assets at the wastewater treatment plant and pump stations is based on visual condition assessments of each asset.

For the wastewater sewer system, the CIP was separated by priority of recommended repairs in the 0 to 10-year range and 10-20 year range. Horizontal asset CIP projects are summarized below;

- 37 pipes have repairs that are recommended to be addressed within the next 0-10 years
- 39 pipes have repairs that are recommended to be addressed within the next 10-20 years.
- City shall continue to perform sewer cleaning and televising to identify areas of concern and prioritize based on discovered condition.

For vertical assets at the Wastewater Treatment Plant and pump stations, a CIP was development with projects listed over the next 20 years. The high priority concerns at the WWTP have been included within the WWTP Improvement Project scheduled to begin construction in 2020 for an estimated cost of $9.75 million with $9.25 million funded through MDEGLE SRF. The remaining CIP projects include $2.12 million recommended in the 5-20-year range, for installation of a sludge storage tank at the WWTP and replacement of the Railroad Pump Station.

Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Environment, Great Lakes & Energy (EGLE) - State of Michigan
Revolving Loan Section
Attn: Clarence Jones

From: Hubbell, Roth and Clark, Inc.

CC: City of Hastings

Date: December 18, 2019

Re: City of Hastings
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1669-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) SAW Grant by the City of Hastings for their Wastewater Asset Management Plan. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount, match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows EGLE guidance.

GRANTEE INFORMATION

City of Hastings
201 E State St., Hastings, MI 49058

SAW Grant Project #1669-01

Project Grant Amount: $492,020

Applicant Match Amount $50,800

Authorized Representative:
Jerry Czarnecki – City Manager
jczarnecki@hastingsmi.org
Phone: 269-945-2468

Consultant Contact:
Karyn Stickel, PE
Hubbell, Roth & Clark, Inc.
kstickel@hrcengr.com
Phone: 248-454-6566

City of Hastings Department of Public Service (DPS):
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aburtt@hrcengr.com
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EXECUTIVE SUMMARY

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> *The City of Hastings is committed to protecting and improving public health by maintaining the sanitary collection system, and wastewater treatment facilities. This will be accomplished by completing routine maintenance, adhering to regulatory requirements and investing money in the infrastructure promoting public health.*

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REVENUE STRUCTURE

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CAPITAL IMPROVEMENT PLAN

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- City shall continue to perform sewer cleaning and televising to identify areas of concern and prioritize based on discovered condition.

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Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 31, 2019**
(no later than 3 years from executed grant date)

The City of Hastings certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1669-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: October 17, 2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ___________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Jerry Czarnecki at 269-945-2468 jczarnecki@hastingsmi.org
Name Phone Number Email

12/18/19
Signature of Authorized Representative (Original Signature Required) Date

Jerry Czarnecki, City Manager
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Environment, Great Lakes & Energy (EGLE) - State of Michigan
Revolving Loan Section
Attn: Clarence Jones

From: Hubbell, Roth and Clark, Inc.

CC: City of Hastings

Date: December 20, 2019

Re: City of Hastings
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1669-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) SAW Grant by the City of Hastings for their Stormwater Asset Management Plan. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount, match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows EGLE guidance.

GRANTEE INFORMATION

City of Hastings
201 E State St., Hastings, MI 49058

SAW Grant Project #1669-01

Project Grant Amount: $224,132

Applicant Match Amount $24,686

Authorized Representative:
Jerry Czarnecki – City Manager
jczarnecki@hastingsmi.org
Phone: 269-945-2468

City of Hastings Department of Public Service (DPS):
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Phone: 248-945-2468

City of Hastings Department of Public Service (DPS):
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Consultant Contact:
Lexie Burtt, EIT
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aburtt@hrcengr.com
Phone: 616-649-9429

EXECUTIVE SUMMARY

The City of Hastings applied for and received a grant to further develop an Asset Management Plan (AMP) for its storm sewer system through the Michigan Department of Environment, Great Lakes & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, operates and maintains the storm sewer system outside of State roadways and has various tools used to manage the assets, including a Geographic Information System (GIS) geodatabase, condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the City Hall for at least 15 years.

STORMWATER INVENTORY

The City uses its new GIS geodatabase created within the grant program for horizontal assets, which includes sewers, and structures. The GIS includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through grant efforts, the City digitalized storm sewer plans, created a GIS geodatabase, purchased hardware to utilize GIS and participated in training.

As the City completed scanning of hard copy plans of the collection systems the information as inputted into GIS including linking plans to the assets within GIS. Through the grant, the City purchased a scanner, multiple tablets and laptops allowing staff to use GIS, and an online subscription to Esri software. Using observations and inspection data made during condition assessment, the data in the GIS was greatly improved.

The next page includes a table of the asset inventory in GIS.

Asset Type	Quantity
4-inch sewer	8 pipes, 847 feet
6-inch sewer	20 pipes, 3,452 feet
8-inch sewer	140 pipes, 17,008 feet
10-inch sewer	101 pipes, 10,843 feet
12-inch sewer	1,480 pipes, 93,501 feet
14 and 15-inch sewers	184 pipes, 30,652 feet
16 and 18-inch sewers	140 pipes, 25,810 feet
21-inch sewer	22 pipes, 3,747 feet
24-inch sewer	96 pipes, 17,378 feet
27 to 30-inch sewers	44 pipes, 8,963 feet
36 to 48-inch	62 pipes, 9,991 feet
60-inch sewer	2 pipes, 277 feet
7'+ Culvert	2,000 FT
Manholes	669
Inlets	1470
Outlets	105

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For storm sewer pipes, the NASSCO-compliant inspection information was collected during limited sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was created and critical attributes were populated. Approximately 26,600 of the 222,500 lineal feet of storm sewers underwent condition assessment via cleaning and televising. Approximately 107 of the 679 structures were evaluated through manhole inspections.

CRITICALITY OF ASSETS

The City developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of storm gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score, remaining useful life, soil type and material are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material along with soil type. The COF for horizontal assets was determined based on asset depth, size, proximity to water, and proximity to roads and intersections.

Below is a list of BRE scores for the horizontal assets in the City's system:

- Storm Pipes:
  - 84% BRE 1-8
  - 15% BRE 9-15
  - 1% BRE 15-25
- Storm Structures:
  - 77% BRE 1-8
  - 22% BRE 9-15
  - 1% BRE 16-25

LEVEL OF SERVICE DETERMINATION

The City developed the following mission statement as part of the AMP:

> *The City of Hastings is committed to protecting and improving public health by maintaining the storm water collection system. This will be accomplished by completing routine maintenance and investing money in the infrastructure promoting roadway longevity.*

The mission statement considers the impacts to the budget, longevity of the roads, and public health. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public services leaders choose to continue their ongoing processes at this time rather than defining specific goals to track.

The City will review the mission statement and ongoing system activities periodically to determine if the mission is being successfully fulfilled and further measurement of the stated goals is necessary.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City does not charge a stormwater utility rate; therefore, the revenue structure was not reviewed for the AMP. Improvements to the storm water system, when needed, are primarily funding through the general or road maintenance funds.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City's storm sewer system, using recommendations from the asset inspection processes, and consideration of other system needs. The CIP was development based solely on the televised sewers completed on 12% of the total stormwater system.

- 5 pipes have repairs that are recommended to be addressed within the next 0-10 years
- 8 pipes have repairs that are recommended to be addressed within the next 10-20 years.
- City shall continue to perform sewer cleaning and televising to identify areas of concern and prioritize based on discovered condition.

Projects listed for implementation in the 0 to 10-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 10 to 20-year range are based solely on collect condition assessment data and costs are based on estimates with 3% annual inflation included. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated, and changes occur in prioritization, regulations, technology, cost and other data becomes available.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 31, 2019**
(no later than 3 years from executed grant date)

The City of Hastings certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1669-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Jerry Czarnecki at 269-945-2468 jczarnecki@hastingsmi.org
Name Phone Number Email

12/18/19
Signature of Authorized Representative (Original Signature Required) Date

Jerry Czarnecki, City Manager
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Environment, Great Lakes & Energy (EGLE) - State of Michigan
Revolving Loan Section
Attn: Clarence Jones

From: Hubbell, Roth and Clark, Inc.

CC: City of Hastings

Date: December 20, 2019

Re: City of Hastings
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1669-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) SAW Grant by the City of Hastings for their Wastewater Asset Management Plan. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount, match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows EGLE guidance.

GRANTEE INFORMATION

City of Hastings
201 E State St., Hastings, MI 49058

SAW Grant Project #1669-01

Project Grant Amount: $492,020

Applicant Match Amount $50,800

Authorized Representative:
Jerry Czarnecki – City Manager
jczarnecki@hastingsmi.org
Phone: 269-945-2468

City of Hastings Department of Public Service (DPS):
Matt Gergen- DPS Director
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Phone: 616-432-6195

Consultant Contact:
Lexie Burtt, EIT
Hubbell, Roth & Clark, Inc.
aburtt@hrcengr.com
Phone: 616-649-9429

EXECUTIVE SUMMARY

The City of Hastings applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, operates and maintains the sanitary sewer system and has various tools used to manage the assets, including a Geographic Information System (GIS) geodatabase, condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools were created with grant monies and are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated on a regular basis, which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the City Hall for at least 15 years.

WASTEWATER INVENTORY

The City uses its new GIS geodatabase created within the grant program for horizontal assets, which includes sewers, forcemains and structures. Allmax Antero CMMS software was obtained through the grant as a means to inventory the vertical assets at the Wastewater Treatment Plant and pump stations. Ultimately a spreadsheet was created for the vertical assets including pumps, motors, and other major equipment. The GIS and vertical asset spreadsheet include key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through grant efforts, the City digitalized sanitary sewer plans, created a GIS geodatabase, purchased hardware to utilize GIS and participated in training.

As the City completed scanning of paper plans of the collection systems the information was inputted into GIS including linking plans to the assets within GIS. Through the grant, the City purchased a scanner, multiple tablets and laptops allowing staff to use GIS, and an online subscription to Esri software. Using observations and inspection data made during condition assessment, the data in the GIS has greatly improved.

The next page includes a table of the asset inventory in GIS. The vertical asset spreadsheet for the WWTP and pump stations is included with the full report and available upon request.

Asset Type	Quantity
4-inch sewer	3 pipes, 292 feet
6-inch sewer	73 pipes, 15,992 feet
8-inch sewer	759 pipes, 174,944 feet
10-inch sewer	69 pipes, 16,824 feet
12-inch sewer	120 pipes, 26,144 feet
14 and 15-inch sewers	48 pipes, 7,859 feet
16 and 18-inch sewers	5 pipes, 1,030 feet
21-inch sewer	7 pipes, 2,128 feet
24-inch sewer	23 pipes, 3,558 feet
Manholes	1,100
Outlets	1 for WWTP Discharge to Thornapple River

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For sanitary sewer pipes, the NASSCO-compliant inspection information was collected during sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was created, and critical attributes were populated. Approximately 114,500 of the 248,800 lineal feet of sanitary sewers underwent condition assessment via cleaning and televising. Approximately 379 of the 1,020 structures were evaluated through manhole inspections.

CRITICALITY OF ASSETS

The City developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets. For the vertical assets equipment was reviewed as part of the grant work, with POF and COF factors determined and input into the asset inventory spreadsheet.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of wastewater gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score, remaining useful life, soil type and material are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material along with soil type. The COF for

horizontal assets was determined based on asset depth, size, proximity to water, and proximity to roads and intersections.

Below is a list of BRE scores for the horizontal assets in the City's system:

- Sanitary Pipes:
    - 83% BRE 1-8
    - 15% BRE 9-15
    - 2% BRE 15-25
- Sanitary Manholes:
    - 84% BRE 1-8
    - 15% BRE 9-15
    - 1% BRE 16-25

For vertical assets, scores were assigned for Condition (POF) based on visual observations with the use of Equipment Condition Assessment Guides. Criticality (COF) was based on operator knowledge, and then a BRE score was calculated. These scores are stored in the asset inventory spreadsheet and are available upon request.

LEVEL OF SERVICE DETERMINATION

The City developed the following mission statement as part of the AMP:

> *The City of Hastings is committed to protecting and improving public health by maintaining the sanitary collection system, and wastewater treatment facilities. This will be accomplished by completing routine maintenance, adhering to regulatory requirements and investing money in the infrastructure promoting public health.*

The mission statement considers the impacts to the budget, infrastructure longevity, and public health. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public services leaders choose to continue their ongoing processes at this time rather than defining specific goals to track.

The City will review the mission statement and ongoing system activities periodically to determine if the mission is being successfully fulfilled and further measurement of the stated goals is necessary.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant

one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City worked with Baker Tilly Municipal Advisors, LLC to confirm that the system's current rate structures are sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEGLE six months prior to the SAW grant end date. The analysis did not show any gap between the revenue and expenditures, therefore, a rate increase was not necessary.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City's wastewater system, using recommendations from the asset inspection processes, and consideration of other system needs. The CIP for the wastewater sewer system was development based solely on the televised sewers. The CIP for the vertical assets at the wastewater treatment plant and pump stations is based on visual condition assessments of each asset.

For the wastewater sewer system, the CIP was separated by priority of recommended repairs in the 0 to 10-year range and 10-20 year range. Horizontal asset CIP projects are summarized below;

- 37 pipes have repairs that are recommended to be addressed within the next 0-10 years
- 39 pipes have repairs that are recommended to be addressed within the next 10-20 years.
- City shall continue to perform sewer cleaning and televising to identify areas of concern and prioritize based on discovered condition.

For vertical assets at the Wastewater Treatment Plant and pump stations, a CIP was development with projects listed over the next 20 years. The high priority concerns at the WWTP have been included within the WWTP Improvement Project scheduled to begin construction in 2020 for an estimated cost of $9.75 million with $9.25 million funded through MDEGLE SRF. The remaining CIP projects include $2.12 million recommended in the 5-20-year range, for installation of a sludge storage tank at the WWTP and replacement of the Railroad Pump Station.

Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Environment, Great Lakes & Energy (EGLE) - State of Michigan
Revolving Loan Section
Attn: Clarence Jones

From: Hubbell, Roth and Clark, Inc.

CC: City of Hastings

Date: December 18, 2019

Re: City of Hastings
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1669-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) SAW Grant by the City of Hastings for their Wastewater Asset Management Plan. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount, match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows EGLE guidance.

GRANTEE INFORMATION

City of Hastings
201 E State St., Hastings, MI 49058

SAW Grant Project #1669-01

Project Grant Amount: $492,020

Applicant Match Amount $50,800

Authorized Representative:
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EXECUTIVE SUMMARY

The City of Hastings applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, operates and maintains the sanitary sewer system and has various tools used to manage the assets, including a Geographic Information System (GIS) geodatabase, condition assessment methods, risk and prioritization models, and an operating and capital improvement project plan. These tools were created with grant monies and are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated on a regular basis, which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the City Hall for at least 15 years.

WASTEWATER INVENTORY

The City uses its new GIS geodatabase created within the grant program for horizontal assets, which includes sewers, forcemains and structures. Allmax Antero CMMS software was obtained through the grant as a means to inventory the vertical assets at the Wastewater Treatment Plant and pump stations. Ultimately a spreadsheet was created for the vertical assets including pumps, motors, and other major equipment. The GIS and vertical asset spreadsheet include key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. Through grant efforts, the City digitalized sanitary sewer plans, created a GIS geodatabase, purchased hardware to utilize GIS and participated in training.

As the City completed scanning of paper plans of the collection systems the information was inputted into GIS including linking plans to the assets within GIS. Through the grant, the City purchased a scanner, multiple tablets and laptops allowing staff to use GIS, and an online subscription to Esri software. Using observations and inspection data made during condition assessment, the data in the GIS has greatly improved.

The next page includes a table of the asset inventory in GIS. The vertical asset spreadsheet for the WWTP and pump stations is included with the full report and available upon request.

Asset Type	Quantity
4-inch sewer	3 pipes, 292 feet
6-inch sewer	73 pipes, 15,992 feet
8-inch sewer	759 pipes, 174,944 feet
10-inch sewer	69 pipes, 16,824 feet
12-inch sewer	120 pipes, 26,144 feet
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16 and 18-inch sewers	5 pipes, 1,030 feet
21-inch sewer	7 pipes, 2,128 feet
24-inch sewer	23 pipes, 3,558 feet
Manholes	1,100
Outlets	1 for WWTP Discharge to Thornapple River

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For sanitary sewer pipes, the NASSCO-compliant inspection information was collected during sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was created, and critical attributes were populated. Approximately 114,500 of the 248,800 lineal feet of sanitary sewers underwent condition assessment via cleaning and televising. Approximately 379 of the 1,020 structures were evaluated through manhole inspections.

CRITICALITY OF ASSETS

The City developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets. For the vertical assets equipment was reviewed as part of the grant work, with POF and COF factors determined and input into the asset inventory spreadsheet.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of wastewater gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score, remaining useful life, soil type and material are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material along with soil type. The COF for

horizontal assets was determined based on asset depth, size, proximity to water, and proximity to roads and intersections.

Below is a list of BRE scores for the horizontal assets in the City's system:

- Sanitary Pipes:
    - 83% BRE 1-8
    - 15% BRE 9-15
    - 2% BRE 15-25
- Sanitary Manholes:
    - 84% BRE 1-8
    - 15% BRE 9-15
    - 1% BRE 16-25

For vertical assets, scores were assigned for Condition (POF) based on visual observations with the use of Equipment Condition Assessment Guides. Criticality (COF) was based on operator knowledge, and then a BRE score was calculated. These scores are stored in the asset inventory spreadsheet and are available upon request.

LEVEL OF SERVICE DETERMINATION

The City developed the following mission statement as part of the AMP:

> *The City of Hastings is committed to protecting and improving public health by maintaining the sanitary collection system, and wastewater treatment facilities. This will be accomplished by completing routine maintenance, adhering to regulatory requirements and investing money in the infrastructure promoting public health.*

The mission statement considers the impacts to the budget, infrastructure longevity, and public health. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public services leaders choose to continue their ongoing processes at this time rather than defining specific goals to track.

The City will review the mission statement and ongoing system activities periodically to determine if the mission is being successfully fulfilled and further measurement of the stated goals is necessary.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant

one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City worked with Baker Tilly Municipal Advisors, LLC to confirm that the system's current rate structures are sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEGLE six months prior to the SAW grant end date. The analysis did not show any gap between the revenue and expenditures, therefore, a rate increase was not necessary.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City's wastewater system, using recommendations from the asset inspection processes, and consideration of other system needs. The CIP for the wastewater sewer system was development based solely on the televised sewers. The CIP for the vertical assets at the wastewater treatment plant and pump stations is based on visual condition assessments of each asset.

For the wastewater sewer system, the CIP was separated by priority of recommended repairs in the 0 to 10-year range and 10-20 year range. Horizontal asset CIP projects are summarized below;

- 37 pipes have repairs that are recommended to be addressed within the next 0-10 years
- 39 pipes have repairs that are recommended to be addressed within the next 10-20 years.
- City shall continue to perform sewer cleaning and televising to identify areas of concern and prioritize based on discovered condition.

For vertical assets at the Wastewater Treatment Plant and pump stations, a CIP was development with projects listed over the next 20 years. The high priority concerns at the WWTP have been included within the WWTP Improvement Project scheduled to begin construction in 2020 for an estimated cost of $9.75 million with $9.25 million funded through MDEGLE SRF. The remaining CIP projects include $2.12 million recommended in the 5-20-year range, for installation of a sludge storage tank at the WWTP and replacement of the Railroad Pump Station.

Projects listed for implementation in the 0 to 5-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20-year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 31, 2019**
(no later than 3 years from executed grant date)

The City of Hastings certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1669-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: October 17, 2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ___________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Jerry Czarnecki at 269-945-2468 jczarnecki@hastingsmi.org
Name Phone Number Email

12/18/19
Signature of Authorized Representative (Original Signature Required) Date

Jerry Czarnecki, City Manager
Print Name and Title of Authorized Representative

May 2019

City of Eaton Rapids
SAW Grant No. 1668-01
Stormwater System

December 30, 2019

The City of Eaton Rapids applied for and received a grant to develop an Asset Management Plan for its storm sewer systems through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for surface water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public to review at City Hall for at least 15 years.

A. Asset Inventory and Condition Assessment:

With the assistance of HRC, the City built a Geographic Information Systems (GIS) inventory and purchased the necessary hardware and software. The GIS includes key attributes with each asset such as installation date (age), size, material and other information as needed for a given asset type. Through grant efforts, the City digitized storm plans and hyperlinks to the plans are included in the GIS.

A summary of the asset inventory in GIS is shown in the following table.

Gravity Mains		
Asset	**Quantity**	**Length**
Unknown	71	5,318 feet
2-inch Storm	2	123 feet
3-inch Storm	2	136 feet
4-inch Storm	27	1,063 feet
6-inch Storm	130	5,969 feet
8-inch Storm	321	21,037 feet
10-inch Storm	17	2,697 feet
12-inch Storm	752	57,468 feet
15-inch Storm	66	7,434 feet
18-inch Storm	158	20,992 feet
21-inch Storm	4	469 feet
24-inch Storm	111	14,559 feet
30-inch Storm	23	2,654 feet
36-inch Storm	77	12,791 feet
42-inch Storm	6	887 feet
48-inch Storm	6	409 feet
60-inch Storm	8	797 feet
86-inch Storm	1	6 feet
Total		**154,809 feet**

Structures	
Asset	**Quantity**
Manholes	43
Catch Basins	1080
Outlets	86
Lift Stations	4

Pressurized Mains		
Asset	**Quantity**	**Length**
8-inch Storm	8	3,391 feet

Condition assessment tools and protocols were developed by the City to allow for efficient and consistent recording of asset condition. For storm sewer pipes, the NASSCO-compliant inspection information was collected during limited sewer televising. For manholes, NASSCO inspection protocol were used to collect data.

As part of the grant, the GIS geodatabase inventory was created and critical attributes were populated. Approximately 46,615 of the 158,200 lineal feet of storm sewers underwent condition assessment via cleaning and televising. Approximately 255 of the 437 structures were evaluated through manhole inspections.

B. Criticality of Assets:

The City developed Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF x COF = Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of storm gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score, remaining useful life, soil type and material are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material along with soil type. The COF for horizontal assets was determined based on asset depth, size, proximity to water, and proximity to roads and intersections. Approximately 33% of the storm pipes have a BRE between 1 and 5, 59% have a BRE between 6 and 10 and 8% have a BRE between 11 and 25.

C. Level of Service:

The City adopted a mission statement as part of the AMP as follows:

> *The City of Eaton Rapids is committed to maintaining the performance of our sanitary and stormwater collection systems to meet applicable local, state and federal regulations and to protect public health and the environment. We strive to develop, operate and maintain these systems in the most cost-effective way to provide sustainable systems for present and future customers.*

The City of Eaton Rapids choose to implement its mission statement as the defined Level of Service. The City's mission statement considers the impacts to public health and the system's ability to comply with regulations. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public works leaders choose to continue their ongoing processes rather than defining specific goals to track at this time. The City will review the mission statement and ongoing system activities annually to determine if the mission is not being successfully fulfilled and further measurement of the stated goals is necessary.

D. Revenue Structure:

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City does not charge a stormwater utility rate; therefore, the revenue structure was not reviewed for the AMP. Improvements to the storm water system, when needed, are primarily funding through the general or road maintenance funds.

E. Capital Improvement Plan:

A list of capital projects was developed for the City's storm sewer system, using recommendations from the asset inspection processes, and consideration of other system needs. The CIP was development based solely on the televised sewers.

Projects listed for implementation in the 0 to 10-year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 10 to 20-year range are based solely on collect condition assessment data and costs are based on estimates. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated, and changes occur in prioritization, regulations, technology, cost and other data becomes available.

F. Recommendations:

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

G. Contact Information:

A signed Certification of Project Completeness form is enclosed. Contact information for the grantee including name, address, and phone number is included below:

Primary Contact and System Manager
City of Eaton Rapids

Aaron Desentz, City Manager
200 S. Main Street
Eaton Rapids, MI 48827
(517) 663-8113
adesentz@cityofeatonrapids.com

John Nobash, Director of Public Works
200 S. Main Street
Eaton Rapids, MI 48827
(517) 719-3203
jnobash@cityofeatonrapids.com

Consultant Name
Hubbell, Roth & Clark, Inc.
Mike Romkema, PE
(517) 292-1933
mromkema@hrcengr.com

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 31, 2019**
(no later than 3 years from executed grant date)

The City of Eaton Rapids certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1668-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Aaron Desentz	at	(517) 663-8118	adesentz@cityofeatonrapids.com
Name		Phone Number	Email

12/23/2019
Signature of Authorized Representative (Original Signature Required) Date

Aaron Desentz, City Manager
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date October 2, 2019
(no later than 3 years from executed grant date)

The Village of Almont *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1196-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: January 9, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Mr. Michael Connors	at 810-798-8528	MConnors@Almontvillage.org
Name	Phone Number	Email

Michael Connors 10/7/2019
Signature of Authorized Representative (Original Signature Required) Date

Michael Connors, Village Manager
Print Name and Title of Authorized Representative

Village of Almont

EGLE AMP Summary

September 2019

17L0007 1196-01

Prepared By:

ROWE PROFESSIONAL
SERVICES COMPANY

REPRESENTATIVE: Michael Connors, Village Manager

ADDRESS: 817 N. Main Street, Almont, MI 48003

PHONE #: (810) 798-8528

EMAIL: mconnors@almontvillage.org

PROJECT #: 1196-01

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ACRONYMS

AMP	Asset Management Plan
CCTV	Closed Circuit Televised Video
CIP	Capital Improvement Plan
DPS	Department of Public Services
DPW	Department of Public Works
GPS	Global Positioning System
MACP	Manhole Assessment and Certification Program
PACP	Pipe Assessment and Certification Program
EGLE	Michigan Department of Environment, Great Lakes, and Energy
NASSCO	National Association of Sewer Service Companies
SCADA	supervisory control and data acquisition
USDA-RD	United States Department of Agriculture’s Rural Development
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

In accordance with the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the Village of Almont has prepared an Asset Management Plan (AMP) for their wastewater system. The purpose of the AMP is to use a defined method of cataloging, evaluating, and maintaining the wastewater system.

Extensive investigations and analysis show the village's system to be in good condition overall. With that, deficiencies throughout the system have been identified as recommended short- and long-term capital improvement projects. The village's rate structure may adequately address future improvements that have been identified in the AMP.

The Village of Almont is committed to improving and maintaining protection of the public health and performance of their wastewater collection utility assets, while minimizing the long-term cost of operating those assets. The village will strive to make the most cost-effective renewal and replacement investments and provide the highest quality customer service possible.

I. ASSET INVENTORY

The village's sanitary sewer system is comprised of a system of gravity sewer lines, four (4) lift stations and associated force mains, and a wastewater treatment plant. The gravity sewer pipes making up the bulk of the collection system range in size from 6 inches to 15 inches in diameter. Force mains make up only 10 percent of the collection system piping length and range in size from 4 to 6 inches in diameter. Once at the wastewater treatment plant, influent wastewater is treated, the effluent disinfected, and is then discharged into the north branch of the Clinton River.

The village's sanitary collection system was independently investigated through a Closed Circuit Televised Video (CCTV) survey in general accordance with the National Association of Sewer Service Companies (NASSCO) pipe rating system and a Level 1 criteria inventory on their manholes. All four (4) lift stations where reviewed and evaluated by the village's Department of Public Works (DPW) and a registered professional engineer. In addition, the wastewater treatment plant (WWTP) was evaluated based on a discussion with the WWTP operator on the existing condition and improvements necessary to the plant. The reports generated during these investigations were used to develop an inventory of the village's sanitary collection and treatment system assets.

A. Collection System

The village's sanitary sewer collection system totals 80,799 feet and is composed of the following list of assets:

- 3,390 feet of 6-inch sewer pipe
- 48,829 feet of 8-inch sewer pipe
- 5,217 feet of 10-inch sewer pipe
- 5,423 feet of 12-inch sewer pipe
- 3,339 feet of 15-inch sewer pipe
- 310 manholes
- 4 lift stations
- 8,050 feet force main
- 6,551 feet of not televised sewer pipe (estimated)

1. Sewer

The independent CCTV survey videoed 64,621 feet (±80%) of sanitary collection system piping. The remaining balance of pipe not selected for televising was because it was either newer, not identified as a problem area by DPW personnel, or consisted of force main. A detailed examination was performed on each gravity pipe televised with each defect being rated and the condition of the pipe being assigned an overall rating in accordance with NASSCO's Pipe Assessment and Certification Program (PACP) guidelines.

Reviewing the sanitary sewer reports from the video survey shows the overall system is in good working order. However, as can be seen from the inventory, several locations surveyed will likely need some maintenance in the near future. Issues range from minor deposits or encrustations on pipe joints and walls to sags in pipes. Through proper maintenance and planned improvements, the system should continue to provide an adequate level of service for the village's sewer customers.

2. Manholes

Prior to televising procedures of the sanitary system, 277 (90%) of the village's sanitary manholes were evaluated in general accordance with the NASSCO's Manhole Assessment and Certification Program (MACP) Level 1 inspection standards. As part of the evaluation, all sanitary manholes were Global Positioning System (GPS) located and assigned structure numbers corresponding to collection areas developed by Village of Almont DPW personnel. The remaining balance of manholes not inspected were inaccessible or newer and therefore were not critical for preparation of this report.

Most of the sanitary manholes throughout the village were found to be in relatively sound condition. The primary maintenance needed for manholes includes the repairs of deteriorating chimneys. Other minor issues discovered were root intrusion, weeping, infiltration around joints, and debris that has entered the structures.

Due to unforeseen circumstances, periodic structures may have to be repaired and replaced as needed. However, considering the current condition and maintenance being performed on the structures, a majority of them should be operational for an additional 50+ years.

B. Lift Stations

Although most of the village's wastewater needs are serviced through gravity sewer, there are four lift stations owned and maintained by the Village of Almont.

1. East St. Clair Lift Station

This lift station collects flows from the entire southeast quadrant of the village and transports them through a 6-inch force main (1,000 feet) to structure 4-25, approximately halfway between Kidder Road and Spring Street intersections along East St. Clair Street. This lift station was replaced in 2013 and requires minimal maintenance; therefore, no capital improvements are warranted at this time.

2. Howland Road Pump Station

Howland Road pump station is an older station, age unknown. The existing pumps are newer; pump 1 is reportedly 1 year old, however not many other updates have been done to this pump station. The valve chamber was found to be flooded at the time of inspection. The wet well is constructed of concrete and is 6-feet in diameter. Minor H_2S (Hydrogen Sulfide) deterioration and bracket corrosion was observed at the time or our inspection. This lift station collects flows from nearby commercial developments and the middle school at the north end of the village and transports them through a 4-inch force main (1,850 feet) to structure 3-37 along Howland Road north of Van Dyke Road intersection. The village should install a yard hydrant with a backflow preventer at the site and should consider heating the building.

3. June Drive Lift Station

This lift station collects flows from the southeast quadrant of the village and transports them through a 4-inch force main (1,520 feet) to structure 6-33 located at the intersection of Bernice and Allison Drives. The existing submersible pumps were rebuilt approximately 10 years ago. The valve chamber is constructed of fiberglass; the wet well is constructed of concrete and is 6 feet in diameter. Both the valve chamber and wet well were found to be in fair condition at the time of our inspection. The village should install a yard hydrant with a backflow preventer at the site. Even though the existing vent pipe appears to keep pipes relatively warm, there are various holes in the building that should be sealed and the village should consider installing a reliable heating unit in the building.

4. Jonathon Drive Lift Station
   This lift station is the least critical since it only collects flows from four units and transports them through a 4-inch force main (275 feet) to structure 5-25 located along the west end of Jonathon Drive. The system was constructed in 1996. This pump station has routine maintenances performed annually.

II. REVENUE STRUCTURE

It is important to Almont to maintain, operate, and improve their assets. The village's sanitary sewer system is no exception. To do this, the costs associated to own and operate the sanitary sewer system, both collection and treatment, must be fully understood. To cover these expenses and have funding for maintenance and improvements, rates must be structured to meet current and future expenditures. Although the future cannot be predicted, goals can be set and plans put into place to prepare for the village's future needs.

Establishing a rate structure to meet short- and long-term needs as well as customer expectations is a priority of the village. With that in mind, the financial management goals are as follows:

- Identify funding level necessary to meet level of service needs.
- Forecast schedule of when financial resources will be required.
- Establish user fees that will generate adequate revenue for financing future improvements.

Attached is the village's rate structure which was submitted and approved by EGLE in January of 2019.

III. CAPITAL IMPROVEMENT PROJECT PLAN

Maintaining a municipal system means always planning for future needs. The wastewater system is no exception with growing and/or changing needs of the population it serves and the constant wear and tear of the system providing service.

A. Five-Year Plan

Evaluated assets with a consequence of failure rating of 17 or greater typically make up the bulk of projects proposed for the five-year Capital Improvement Plan (CIP). Fortunately for the village, the sanitary system does not have any sewer or manholes with a consequence of failure ratings above 16. However, based on conversations with DPW personnel, a specific section of the system experienced several breaks in the last few years. Therefore, it is recommended the proposed five-year CIP focus on the specific area that the village has identified to be able to keep these assets working properly thus requiring them to be improved to a higher condition and functionality. The estimated budget for this work is $243,500.

1. Collection System Cost Breakdown by Street

June Drive force main replacement	$243,500
Collection System Subtotal	**$243,500**

Because the consequence of failure ratings for the proposed improvements are below 17, there is no urgency to construct the improvements within the first couple years. A list of treatment plant improvements is recommended, and the total anticipated cost of improvements ranges from $155,500 to $293,500. Some of these improvements are planned with funding already saved and specifically allocated for the WWTP over the next five years.

2. Treatment Plant Improvements Cost Breakdown

Replace UV System	$70,000
Rebuild/Replace Influent Pumps (3)	$36,000 to $105,000
Rebuild/Replace Activated Sludge Pumps (3)	$36,000 to $105,000
E. St. Clair Pump Station – New Yard Hydrant	$4,500
Howland Road Pump Station – New Yard Hydrant	$4,500
June Drive Pump Station – New Yard Hydrant	$4,500
Treatment Plant Subtotal	**$155,500 to $293,500**

FIVE-YEAR CIP SANITARY SYSTEM IMPROVEMENT TOTAL	**$399,000 to $537,000**

B. Twenty-Year Plan

A consequence of failure between 9 and 16 qualifies an asset for the 20-year CIP. These assets are important to the sanitary system operations that have fallen out of their prime condition. These can vary from more deteriorated assets playing less critical roles in the system to minor deteriorated assets in critical roles. As assets fall into this category, the village should have time to budget for the improvements.

1. Collection System Cost Breakdown by Street

Cross Country (Van Dyke to Berkshire)	$127,500
Bristol Street (Water Street to Stone Street)	$229,125
Farnum Drain (M-53 to Bristol Street)	$123,750
M-53 (west village limits to Teeds Avenue)	$592,500
Farnum Drain (M-53 to St. Clair Street)	$489,375
Farnum Drain (St. Clair Street to Amherst Lane)	$1,245,000
Branch Street (Teeds Avenue to Mill Street)	$241,875
Collection System Subtotal	**$3,049,125**

2. Treatment Plant Improvements Cost Breakdown

Upgrade/Replace WWTP Sand Filters	$600,000
SCADA Automation	$200,000
Treatment Plant Subtotal	**$800,000**

20-YEAR CIP SANITARY SYSTEM IMPROVEMENT TOTAL $3,849,125

The twenty-year CIP includes replacement projects throughout various areas of the village. The estimated budget for this work is $3,049,125. Also, treatment plant maintenance and SCADA automation are recommended to take place and will have an anticipated cost of $800,000. The village anticipates utilizing a combination of grant and low-interest loan through the United States Department of Agriculture's Rural Development (USDA-RD) program to fund the improvements. The village has successfully used this program on past projects where they have qualified for as much as 45 percent grant funding. The terms of this loan typically include a 4 percent interest rate financed over a 40-year period.

Developing a financial strategy to accommodate all short- and long-term needs of the sewer collection system is a priority of the village. The five- and twenty-year capital improvement budgets are summarized in Table III-1.

Table III-1: Capital Improvement Plan

Project	Cost	Years Until Project Begins
Sanitary Sewer Improvements	$3,292,625	5
Treatment Plant Upgrades	$955,500 to $1,093,500	Ongoing

It is recommended the village evaluate their rate structure on an annual basis and make adjustments in advance of future capital improvements to establish revenue needs for financing the proposed work.

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Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Charter Township of Au Sable *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1029.01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Ms. Lisa Sutton at (989) 739-9169 and at superintendent@ausabletownship.net
Name Phone Number Email

L Sutton 12/23/19
Signature of Authorized Representative (Original Signature Required) Date

Leisa L Sutton, Superintendent
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Charter Township of Au Sable

SAW Project No. 1029-01

Charter Township of AuSable

December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September of 2016, Au Sable Township received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1029-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Township's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for Au Sable Township AMP is:
Leisa Sutton, Superintendent
4420 N. US 23, Au Sable Township, MI 48750
Phone number: (989) 739-9169
Email: superintendent@ausabletownship.net

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the Township's wastewater system, described further below, include:

- Collection system piping and manholes
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 32,741 feet (6.2 miles) of sanitary sewers (gravity pipe and force mains) and 95 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The Township operates and maintains 5 sanitary sewer lift stations located throughout the wastewater collection system. 3 of the lift stations are submersible style and 2 lift stations are can (factory built) style stations.

Currently, Oscoda Township provides wastewater treatment for the Au Sable Township collection system.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 101 Lift Station Assets and 215 Collection System Assets.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on 100% of the visible manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 98% of the gravity pipe.

The condition of the assets at the lift stations range from good to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the Township Asset Management Team to develop the following LOS statement and goals. These were reviewed with the Au Sable Township Department of Public Works.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Township of Au Sable Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with all local, state and federal regulations.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of treatment facility.
- Provide rapid and effective emergency response services to customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Township from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score + Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

Lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

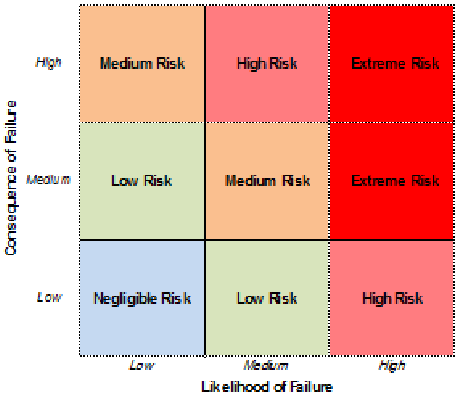
Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Assets with the greatest consequence of failure and the greatest likelihood of failure will be assets that are the most critical. Assets with the highest business risk score are likely candidates for near-term rehabilitation and replacement. Assets with lower scores should be monitored and analyzed to develop the best life cycle strategy.

Over time as more of the wastewater collection system is assessed and re-assessed, the likelihood of failure scores will continue to develop.

A 3x3 Business Risk Matrix identifies the relative "Criticality" of each asset based on their CoF and LoF scores to establish a "Risk Rating" for each asset. Asset rating categories range from Negligible to Extreme criticality based on position within the matrix and are color coded to better identify significance. Upper and lower CoF and LoF score "boundaries" are set for each matrix box to establish the Risk Rating for each asset and place each asset in the proper rating category. Business Risk is depicted visually in the risk matrix shown in Figure 1, and the Business Risk of each asset determines the appropriate strategy for risk management as shown in Table 1.



Consequence of Failure	Low	Medium	High
High	Medium Risk	High Risk	Extreme Risk
Medium	Low Risk	Medium Risk	Extreme Risk
Low	Negligible Risk	Low Risk	High Risk

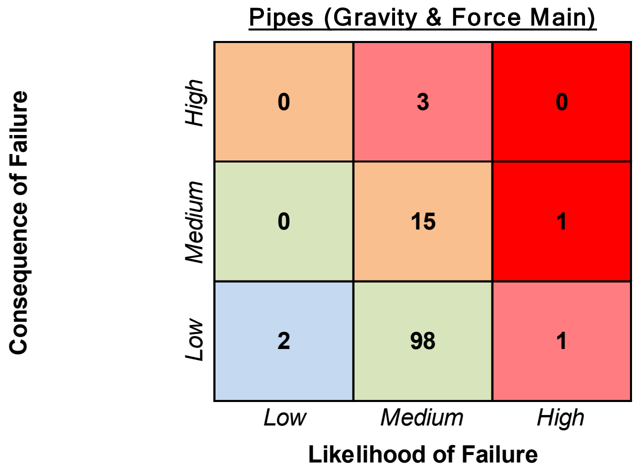
Likelihood of Failure

Figure 1. Business Risk Matrix (Risk Rating)

Table 1. Strategies for Asset Rehabilitation and Replacement

Risk Rating	Strategies for Asset Rehabilitation or Replacement
Extreme	Inspect immediately and develop 1-2 year rehabilitation plan
High	Inspect immediately and develop short to medium term rehabilitation plan
Medium	Inspect immediately and develop long term rehabilitation plan
Low	Develop short term inspection strategy and develop long term rehabilitation plan
Negligible	Develop long term inspection strategy

Figure 2 provides the risk rating for gravity and force main pipe by number of pipe segments. 1 pipe segment in the collection system has an extreme risk rating.



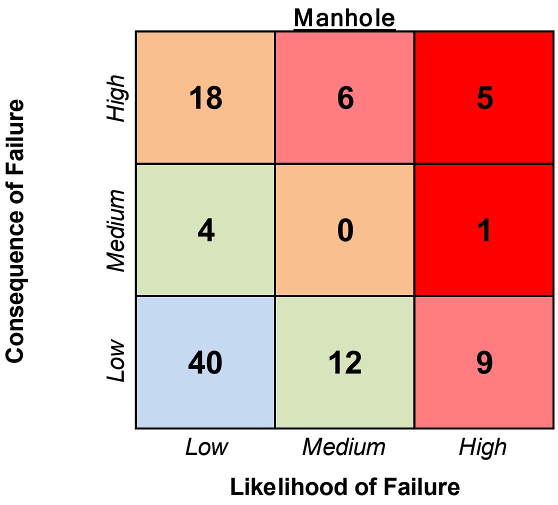
Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	0	3	0
Medium	0	15	1
Low	2	98	1

Likelihood of Failure

Figure 2. Business Risk Matrix (Risk Rating) by Number of Gravity and Forcemain Pipes

Figure 3 provides the risk rating for the collection system manholes. There are 6 manholes that have been identified as an extreme risk and are in need of some rehabilitation. These structures need frame and cover replacement, relined, grouted, grout injection, cleaned or seal replacement. This work will be scheduled over the next 5 years as funding becomes available. 61 percent of the collection system's manholes, as shown in Figure 3, have a low to negligible risk rating and are indicative of manholes in good condition.



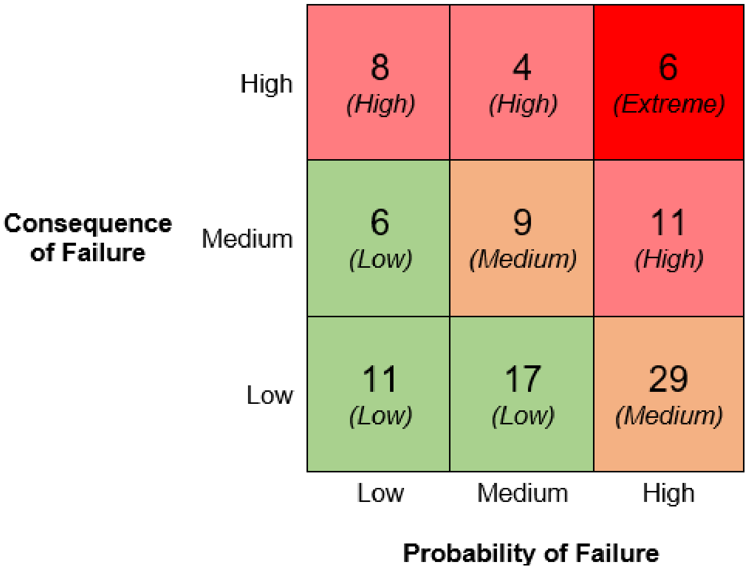
Manhole

Consequence of Failure	Low	Medium	High
High	18	6	5
Medium	4	0	1
Low	40	12	9

Likelihood of Failure

Figure 3. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 4 provides the risk ratings for the lift station assets. 6 assets are identified as extreme risk. The 23 assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure	Low	Medium	High
High	8 *(High)*	4 *(High)*	6 *(Extreme)*
Medium	6 *(Low)*	9 *(Medium)*	11 *(High)*
Low	11 *(Low)*	17 *(Low)*	29 *(Medium)*

Probability of Failure

Figure 4. Business Risk Matrix (Risk Rating) by Number of Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection system. See the Table 2, below, for a recap of the Extreme Risk rated items for Township lift stations.

Table 2. Lift Station Extreme Business Risk Assets

Asset Description	Location	Consequence of Failure	Probability of Failure	Business Risk
Control Panel	Huron Street	3.7	3.5	12.95
Control Panel	Lake Street	3.7	3.5	12.95
Control Panel	River Road	3.7	3.5	12.95
Control Panel	Mill Lane	3.7	3.5	12.95

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Township's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility. Table 3 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP (1-5 year).

Table 3. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action
Pipe Point Repair
Pipe Grout Joints
Manhole Grout Injection
Manhole Grout
Manhole Replace Frame and Cover
Manhole Replace Seal

Table 4 below summarizes the recommended improvements in the short-term CIP for lift stations. Detailed asset identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 4. 5-Year Capital Improvement Plan: Lift Stations

Rehabilitation Action
Huron Street Pump and Control Panel Replacement
Lake Street Pump and Control Panel Replacement

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

A preventative maintenance program to systematically clean and assess pipelines to NASSCO-certified standards is critical for a sound wastewater collection system. The process of cleaning and CCTV assessment of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation and replacement. The Township has been proactive in the maintenance of its infrastructure and the benefits of this preventative maintenance program are evident in the low risk ratings determined for the majority of the Townships's infrastructure. Once the entire system has been cleaned and televised, it is recommended that a maintenance schedule be set for future cleaning and televising. The required frequency of cleaning and televising over the next 20 years may depend on what is discovered in the initial assessment. The Township may desire to clean and televise certain areas more than others

Table 5 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 5. 5-Year Capital Improvement Plan: Rmaintenance

Rehabilitation Action
Manhole Assessment
Manhole Cleaning
CCTV and Cleaning

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by DPW staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

The sewer fund was deficient $43,964 in fiscal year 2017 and deficient $67,060 in fiscal year 2018.

The Township Board at its June 17, 2019 meeting increased the Readiness to Serve Charge 65.26% over the 2018 rate and increased the Commodity Rate 44.45% over the 2018 rate. This rate became effective August 1, 2019

It is projected to raise sewer rate revenues to $244,559 in the following year to cover expenditures estimated to be $230,000.

The Township will reevaluate sewer rates in 2021 to cover any revenue gap

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date: December 31, 2019
(no later than 3 years from executed grant date)

The **August Drain Drainage District** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1224-01** have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Jim Nash at 248-858-0958 wrc@oakgov.com
Name Phone Number Email

12-27-2019
Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Chairman of the Drainage Board and Oakland County Water Resources Commissioner
Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Revolving Loan Section
Attn: Karen Nickols

From: Hubbell, Roth and Clark, Inc.

CC: Oakland County Water Resources Commissioner
Augusta Drain Drainage District

Date: Submitted December 27, 2019, *Revised January 7, 2019*

Re: Augusta Drain Drainage District
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1224-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the EGLE, formerly MDEQ, SAW Grant work performed by the Augusta Drain Drainage District. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

Augusta Drain Drainage District

SAW Grant Project #1224-01

Project Grant Amount: $339,500

Applicant Match Amount: None (disadvantaged community)

Authorized Representative
Jim Nash, Chairman
Augusta Drain
One Public Works Drive
Building 95W
Waterford, MI 48328
(248) 858-0958
wrc@oakgov.com

Consultant Contact
Karyn Stickel, Associate
Hubbell, Roth & Clark, Inc.
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PO Box 824
Bloomfield Hills, MI 48303
kstickel@hrcengr.com

Oakland County Water Resources Commissioner's Office Contact
Mike McMahon, Chief Engineer
One Public Works Drive
Building 95W
Waterford, MI 48328
(248) 858-5397
mcmahonm@oakgov.com

EXECUTIVE SUMMARY

The Augusta Drain Drainage District (ADDD) applied for and received a grant to further develop an Asset Management Plan (AMP) for its stormwater system through the Michigan Department of Environment, Great Lakes, & Energy's (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Augusta Drain Drainage District Is operated and maintained by the Oakland County Water Resources Commissioner (WRC) on behalf of the Drainage Board of August Drain created under Chapter 20 in Oakland County under the Drain Code. The WRC has various tools used to manage the assets it owns or operates and maintains, including a GIS geodatabase, collaborative asset management system, hydraulic models, condition assessment methods, risk and prioritization models, capacity studies, asset deterioration models, and an operating and capital improvement project prioritization model. These tools are used to guide the short and long-term strategies for WRC to operate the various systems in a sustainable manner that meets the required level of service with a focus on prioritizing assets that are most critical and being cost-effective.

The WRC "Common to All" approach was generally followed in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

STORMWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS), which then collaborates with the GIS to present a single interface to the user via the Collaboration Asset Management System (CAMS). CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by Independence to allow for efficient and consistent recording of asset condition. For stormwater assets, the NASSCO-compliant inspection information was collected during televising. The data is stored in the GIS system and will integrate with the Cityworks software to share this data to develop inspection work orders to continue to evaluate and maintain assets, such as manholes, catch basins and pipes. No open channel or detention basin inspections were completed as part of this CIP review.

As part of the grant for Augusta Drain, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 27,672 lineal feet of storm pipes underwent condition assessment via cleaning and televising. Approximately 191 manhole and other related structures were evaluated using the NASSCO inspection protocol.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the "Common to All" Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (pipes and associated structures).

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (storm pipes) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition.

For manholes and other access structures, the POF is based primarily on the MACP fields cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based on just age.

The COF for mains and access points (storm and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

The asset optimization software uses various strategies to determine if the overall risk for an asset is acceptable over the planning period, and if not, to make recommendations for future interventions such as additional inspections, rehabilitation or repair, and/or replacement. Most assets in the Augusta Drain Drainage District were found to have acceptable risk over the planning period. The assets that were identified as exceeding the risk criteria over the planning period are included in the capital improvement plan with recommended actions to reduce the risk of failure of each asset.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual LRP process form additional elements of the LOS.

The WRC's current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to*

> *quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*
>
> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*
>
> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets. *(Note that this WRC strategic goal does not apply to drainage districts because reserve budgets are not developed for these stormwater systems.)*
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ polices. Measurable: Number of violations.
- Safety if Public Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score. Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the budgeting process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data and annual reporting of measurable and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real word” needs, including any improvements required due to capacity or regulation changes. The WRC typically uses this information as part of its existing Long Range Plan (LRP) process to prioritize projects and ensure adequate funding is available.

The LRP process is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term. The stormwater and Drainage District funds do not currently use the LRP rate process but the overall framework is set up to accommodate these systems in the future. Revenue for the drainage districts is generated through special assessments to the benefiting public entities according to percentages established by the Drainage Board in accordance with the Michigan Drain Code, Act 40 of 1956.

CAPITAL IMPROVEMENT PLAN

The assets that were identified as exceeding the risk criteria over the planning period are included in the capital improvement plan with recommended actions to reduce the risk of failure of each asset. The individual event recommendations were combined into projects and scheduled with budget amounts established. This information is then used to determine revenue needs to fund the project. A list of capital projects was developed for Augusta Drain, using recommendations from the asset optimization software, and consideration of other system needs. These projects will be constructed as funding allows.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 6 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

- Grout Joint – $1,000
- Spot Line – $24,100
- Manhole Repairs – $53,000
- Rehabilitation and/or replacement of the Drop Fall Chamber -- $100,000 to $150,000 for rehabilitation or replacement of the structure, respectively
- Rehabilitation of the Junction Chamber to extend its service life by repairing cracks using a structural pressure injected epoxy and patching spalls and leaks in the structure walls. -- $50,000

Capital Projects, 6 to 20 years:

- Manhole Replacement – $394,000
- No replacement or rehabilitation events for storm pipes; will be based on forecasted age-deterioration in PowerPlan – TBD

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, periodic review of the recommendations, status of current projects, and forecasted needs will be reviewed against any available and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations should be reviewed periodically to assist with determining the funds required for the required projects.

LIST OF MAJOR ASSETS

The system’s major assets include:

- 4,480’ of open channel drain
- 74 catch basins
- 135 manhole structures
- 13 inlets/no structure inlets
- 17 pipe outlets and special structures
- 24’ of Circular 10” pipe
- 3,255’ of Circular 12” pipe
- 1,617’ of Circular 15” pipe
- 1,347’ of Circular 18” pipe
- 976’ of Circular 21” pipe
- 1,004’ of Circular 24” pipe
- 563’ of Circular 27” pipe
- 712’ of Circular 30” pipe
- 2,082’ of Circular 36” pipe
- 1,307’ of Circular 42” pipe
- 367’ of Circular 60” pipe
- 47’ of Circular 72” pipe
- 1,103’ of Circular 78” pipe
- 7,179’ of Circular 126” pipe
- 3,577’ of Circular 144” pipe
- 1,087’ of Elliptical 103” x 71” pipe
- 950’ of Rectangular 120” x 120” pipe
- 411’ of Rectangular 126” x 126” pipe
- 71’ of 144” x 132” culvert pipe
- 420’ of 288” x 138” culvert pipe
- TOTAL of 28,099 enclosed pipe

PROJECT HIGHLIGHTS

The development of this Asset Management Program for the Augusta Drain Drainage District was led by HRC with assistance from WRC. The following highlights some of the more tangible outcomes from the

Program development:

- Updated GIS inventory of system to include all age, material, and size information.
- Inspected 27,672 lineal feet (98%) of the storm drain system.
- Inspected 191 catch basin or manhole structures.
- Developed list of high consequence crossings for incorporation into the GIS.
- Performed a structural evaluation of the Drop Fall Structure and Junction Chamber.
- Generated a 5 and 20-year Capital Improvement Plan (CIP) for the system.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12-30-19
(no later than 3 years from executed grant date)

The City of Birmingham *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1258-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Paul T. O'Meara at 248-530-1836
Name Phone Number Email
pomeara@bhamgov.org

Paul T. O 12-30-19
Signature of Authorized Representative (Original Signature Required) Date

Paul O'Meara, City Engineer
Print Name and Title of Authorized Representative

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MAILING: PO Box 824
Bloomfield Hills, MI 48303-0824

SHIPPING: 555 Hulet Drive
Bloomfield Hills, MI 48302-0360

PHONE: 248-454-6300
WEBSITE: hrcengr.com

Memorandum

To: State of Michigan
Department of Environment, Great Lakes, & Energy (EGLE)
Attn: Karen Nickols, Project Manager

From: Hubbell, Roth & Clark, Inc

Date: December 30, 2019

Subject: Re: Stormwater, Asset Management, and Wastewater (SAW) Grant Program
City of Birmingham
Summary of Stormwater Asset Management Plan
SAW Grant No. 1258-01 HRC Job No. 20130165

Our office is pleased to submit the summary of the work completed under the MDEQ SAW Grant awarded to the City of Birmingham for the stormwater sewer system. The memorandum covers project scope, results and findings related to activities performed during the Grant period, the grant amount (non-disadvantaged status), and contact information. This memorandum has been prepared as required under Section No 603 of Public Act 84 of 2015 and intended to follow guidance provided by EGLE. The City of Birmingham will retain a more detailed Asset Management Plan, which covers all work performed during the SAW grant period in greater detail. A copy will be available for public review at the City's Engineering Department office.

Table 1 - Grantee Information

Grantee Information	Authorized Representative	Consulting Engineer	Grant Amount
City of Birmingham 151 Martin Street, P.O. Box. 3001 Birmingham, MI 48012	Mr. Paul T. O'Meara, P.E. City Engineer	Hubbell, Roth & Clark, Inc.	$1,614,167 ($315,833 City Match)

Delhi Township
2101 Aurelius Rd.
Suite 2A
Holt, MI 48842
517-694-7760

Detroit
535 Griswold St.
Buhl Building, Ste 1650
Detroit, MI 48226
313-965-3330

Grand Rapids
801 Broadway NW
Suite 215
Grand Rapids, MI 49504
616-454-4286

Howell
105 W. Grand River
Howell, MI 48843
517-552-9199

Jackson
401 S. Mechanic St.
Suite B
Jackson, MI 49201
517-292-1295

Kalamazoo
834 King Highway
Suite 107
Kalamazoo, MI 49001
269-665-2005

Lansing
215 S. Washington SQ
Suite D
Lansing, MI 48933
517-292-1488

Table 2 - AMP Contact Information

City of Birmingham Contacts	Hubbell, Roth & Clark, Inc. Consulting Engineers
Austin Fletcher, P.E. City Engineer City of Birmingham Phone: (248) 530-1839 Email: afletcher@bhamgov.org	James Surhigh, P.E Hubbell, Roth & Clark, Inc. Associate Phone: (248) 454-6300 Email: jsurhigh@hrcengr.com
Theresa Bridges, P.E. Assistant City Engineer City of Birmingham Phone: (248) 530-1269 Email: tbridges@bhamgov.org	Karyn Stickel, P.E Hubbell, Roth & Clark, Inc. Associate Phone: (248) 454-6300 Email: kstickel@hrcengr.com
Lauren Wood, Department of Public Services City of Birmingham Phone: (248) 530-1700 Email: lwood@bhamgov.org	Helen Davis, P.E Hubbell, Roth & Clark, Inc. Project Engineer Phone: (248) 454-6300 Email: hdavis@hrcengr.com

Executive Summary

The City of Birmingham applied for and received a grant to further develop an Asset Management Plan (AMP) for its stormwater collection system through the Michigan Department of Environment, Great Lakes, & Energy (EGLE) (formally MDEQ) under the program for Stormwater, Asset Management, and Wastewater (SAW). Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant but are considered in analysis and recommendations where appropriate.

The City of Birmingham owns and operates a small amount of dedicated storm sewers that discharge in the Rouge River wastershed. Through the SAW Grant program the City was able to advance its GIS database of sewer related features and collect thousands of data points. The City was also able to select and implement a Computer Maintenance and Management software produced by Cartograph. The City was able to launch a large-scale condition assessment on its collection system using several methods and electronic tools. These tools are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated on a regular basis, which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City of Birmingham will retain and make the AMPs available to EGLE upon request, and a copy of the asset management plans will be available to the public review at the City's Engineering Department for at least 15 years.

Asset Inventory

The City of Birmingham was able to enhance their existing GIS database of their stormwater features. The database received upgrades to accommodate condition assessment data of sewers and manhole structures, attributes such as installation date, size, material, lined, structural scores, and several hundred additional fields. The City was able to inventory several hundred new structures not previously mapped. The City was able to digitize several hundred record drawings and hyperlink them to the GIS database.

The City reviewed CMMS options before selecting Cartograph as its choice CMMS software.

Table 3 - City of Birmingham Stormwater Asset Summary

Asset	Class	Number of Assets	Total Length (ft.)
Gravity Main	Storm	464	64,829
	Catch Basin Lead*	237	8,414
	Storm Culvert	3	124
Manhole	Storm	379	-
Inlet/Catch Basin*	All*	248	-
Storm Outfall	All	63	-

Source: Based on GIS Database Query DATE 11/13/2019. Due to ongoing database updates and construction projects, the numbers provided in this Table are approximate and should only be used for planning.
**Data Query represents Inlets and Catch Basins connected to dedicated storm sewer only*

Condition Assessment was performed over the course of two years. Approximately 58% of the City's stormwater manholes were assessed for structural condition using NASSCO's MACP Level 1 grading system. The City partnered with Doetsch Environmental Services, Inc., to clean and assess 31,308 feet of storm sewer using the NASSCO PACP grading system.

Asset Criticality

The City of Birmingham developed Probability of Failure (POF) and Consequence of Failure (COF) factors which were added to the City's GIS database and were used to estimate the overall risk of the horizontal assets. Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 being the highest probability or consequence of failure. The Business Risk Evaluation (BRE) score is the product of the POF and COF on a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets were determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of sanitary gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score and remaining useful life are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material. The COF for horizontal assets was determined based on diameter, road type, depth, proximity to water, proximity to railroad, accessibility, and select others.

Below are tables of BRE scores for the City's horizontal stormwater assets in the system:

Table 4 - Business Risk Evaluation Results - Pipes

BRE Rating	Number of Pipe Segments	Total Length (mi)	Percent of Total Length (%)
5 or less	344	8	68.3%
5 to 10	101	3	25.9%
10 to 15	18	1	5.2%
15 to 20	2	0.05	0.4%
20 to 25	1	0.03	0.3%

Table 5 - Business Risk Evaluation Results - Manhole Structures

BRE Rating	Number of Storm Manholes	Percent of Total (%)
5 or less	332	87.6%
5 to 10	43	11.3%
10 to 15	4	1.1%
15 to 20	0	0%
20 to 25	0	0%

Level of Service Determination

The City of Birmingham reviewed typical questions and criteria related to Level of Service and adopted goals as part of the process. Level of service goals were discussed during SAW Grant meetings on November 12, 2018 and October 22, 2019 with representatives from the Department of Public Service (DPS), Engineering Departments, and the City's consultant. The meetings included reviewing what the facility was already doing that was working well, and any areas where improvements were desired. The primary level of service goals are related to regulatory compliance and ensuring adequate revenue to support the long-term operation and maintenance of the facility. Additional goals include ensuring adequate employee staffing, training, and safety and maintaining communication with other departments and the public. A list of goals for the storm sewer system is provided:

1. Provide sound leadership and responsible government to maintain financial stability
    a. Continue to utilize public resources in an effective, efficient manner adapting to current and future economic trends and conditions.
    b. Balance community needs and desires with available resources.

2. Be innovative and responsive in how services are provided to the community.
    a. Seek new and collaborative approaches to improve the effectiveness and efficiency of service delivery within an environment of competing community interests.
    b. Continue to provide the highest levels of customer service in an economically sustainable manner.
3. Support the vitality of both the residential and business communities that depend upon each other for success.
    a. Continue to encourage and recognize citizen involvement for the common good.
    b. Support continued private investment throughout the City.
4. Cultivate a safe, healthy, and dynamic City.
    a. Foster an innovative and inclusive environment that attracts all people to live, work, shop and play.
    b. Maintain a vibrant and walkable community.
5. Continue to be proactive with infrastructure maintenance programs and reinvestment in cost-effective improvements to roads, sewers, water mains, parking, parks and public facilities.

Capital Improvement Plan

A list of capital projects was developed for the City’s stormwater sewer system using data collected during condition assessment and considerations of other strategies system wise.

For the system’s horizontal assets, the sanitary and combined CIP was separated by priority of recommended repairs into a 0 to 5 year, 5 to 10, and 10 to 20 year range. A CIP for the sanitary and combined manhole access structures included itemized lists of recommended rehabilitation methods based on the information coded during condition assessment.

The CIP plan include 26 sewer segments and 42 manhole structures with recommended rehabilitation methods.

The results of the capital improvement plans are based on the condition data only, and do not reflect economic climates, project grouping, legal and engineering costs, contingencies, effect of mobilization, and collaboration with other infrastructure improvements.

Recommendations

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12-30-19
(no later than 3 years from executed grant date)

The City of Birmingham *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1258-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: 10/17/2019.
2) Significant Progress Made: Yes or **No**
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: -.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on -.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Paul T. O'Meara at 248-530-1836
Name Phone Number Email
pomeara@bhamgov.org

Paul T. O 12-30-19
Signature of Authorized Representative (Original Signature Required) Date

Paul O'Meara, City Engineer
Print Name and Title of Authorized Representative

May 2019

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MAILING: PO Box 824
Bloomfield Hills, MI 48303-0824

SHIPPING: 555 Hulet Drive
Bloomfield Hills, MI 48302-0360

PHONE: 248-454-6300
WEBSITE: hrcengr.com

Memorandum

To: State of Michigan
Department of Environment, Great Lakes, & Energy (EGLE)
Attn: Karen Nickols, Project Manager

From: Hubbell, Roth & Clark, Inc

Date: December 30, 2019

Subject: Re: Stormwater, Asset Management, and Wastewater (SAW) Grant Program
City of Birmingham
Summary of Wastewater Asset Management Plan
SAW Grant No. 1258-01 HRC Job No. 20130165

Our office is pleased to submit the summary of the work completed under the MDEQ SAW Grant awarded to the City of Birmingham for the wastewater collection system. The memorandum covers project scope, results and findings related to activities performed during the Grant period, the grant amount (non-disadvantaged status), and contact information. This memorandum has been prepared as required under Section No 603 of Public Act 84 of 2015 and intended to follow guidance provided by EGLE. The City of Birmingham will retain a more detailed Asset Management Plan, which covers all work performed during the SAW grant period in greater detail. A copy will be available for public review at the City's Engineering Department.

Table 1 - Grantee Information

Grantee Information	Authorized Representative	Applicant's Finance Advisor	Consulting Engineer	Grant Amount
City of Birmingham 151 Martin Street, P.O. Box. 3001 Birmingham, MI 48012	Mr. Paul T. O'Meara, P.E. City Engineer	Mr. Mark Gerber City of Birmingham Finance Department	Hubbell, Roth & Clark, Inc.	$1,614,167 ($315,833 City Match)

Delhi Township
2101 Aurelius Rd.
Suite 2A
Holt, MI 48842
517-694-7760

Detroit
535 Griswold St.
Buhl Building, Ste 1650
Detroit, MI 48226
313-965-3330

Grand Rapids
801 Broadway NW
Suite 215
Grand Rapids, MI 49504
616-454-4286

Howell
105 W. Grand River
Howell, MI 48843
517-552-9199

Jackson
401 S. Mechanic St.
Suite B
Jackson, MI 49201
517-292-1295

Kalamazoo
834 King Highway
Suite 107
Kalamazoo, MI 49001
269-665-2005

Lansing
215 S. Washington SQ
Suite D
Lansing, MI 48933
517-292-1488

https://stateofmichigan-my.sharepoint.com/personal/hinesp1_michigan_gov/Documents/Kelley Green 09.22.2020/Birmingham, City of 1258-01 WWAMP Summary.docx

Appendix Item to the Birmingham Wastewater and Stormwater Asset Management Plan Reports

Table 2 - AMP Contact Information

City of Birmingham Contacts	Hubbell, Roth & Clark, Inc. Consulting Engineers
Austin Fletcher, P.E. City Engineer City of Birmingham Phone: (248) 530-1839 Email: afletcher@bhamgov.org	James Surhigh, P.E Hubbell, Roth & Clark, Inc. Associate Phone: (248) 454-6300 Email: jsurhigh@hrcengr.com
Theresa Bridges, P.E. Assistant City Engineer City of Birmingham Phone: (248) 530-1269 Email: tbridges@bhamgov.org	Karyn Stickel, P.E Hubbell, Roth & Clark, Inc. Associate Phone: (248) 454-6300 Email: kstickel@hrcengr.com
Lauren Wood, Department of Public Services City of Birmingham Phone: (248) 530-1700 Email: lwood@bhamgov.org	Helen Davis, P.E Hubbell, Roth & Clark, Inc. Project Engineer Phone: (248) 454-6300 Email: hdavis@hrcengr.com

Executive Summary

The City of Birmingham applied for and received a grant to further develop an Asset Management Plan (AMP) for its wastewater collection system through the Michigan Department of Environment, Great Lakes, & Energy (EGLE) (formally MDEQ) under the program for Stormwater, Asset Management, and Wastewater (SAW). Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant but are considered in analysis and recommendations where appropriate.

The City of Birmingham owns and operates a collection system of combined and sanitary sewers. Through the SAW Grant program the City was able to advance its GIS database of sewer related features and collect thousands of data points. The City was also able to select and implement a Computer Maintenance and Management software produced by Cartograph. The City was able to launch a large-scale condition assessment on its wastewater collection system using several methods and electronic tools. These tools are used to guide the short-term and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated on a regular basis, which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City of Birmingham will retain and make the AMPs available to EGLE upon request, and a copy of the asset management plans will be available to the public review at the City's Engineering Department for at least 15 years.

Asset Inventory

The City of Birmingham was able to enhance their existing GIS database of their wastewater features. The database received upgrades to accommodate condition assessment data of sewers and manhole structures, attributes such as installation date, size, material, lined, structural scores, and several hundred additional fields. The City was able to inventory several hundred new structures not previously mapped. The City was able to digitize several hundred record drawings and hyperlink them to the GIS database.

The City reviewed CMMS options before selecting Cartograph as its choice CMMS software.

Table 3 - City of Birmingham Wastewater Asset Summary

Asset	Subtype	Number of Assets	Total Length (ft.)
Sewer Gravity Main	Sanitary	477	113,490
	Combined	2,215	428,756
	Catch Basin Lead	2,502	76,435
Manhole	Combined	1,997	-
	Sanitary	448	-
Inlet/Catch Basin	Connected to Combined Sewers	2,519	-

Source: Based on GIS Database Query DATE 11/11/2019. Due to ongoing database updates and construction projects, the numbers provided in this Table are approximate and should only be used for planning.

Condition Assessment was performed over the course of two years. Approximately 54% of the City's manholes were assessed for structural condition using NASSCO's MACP Level 1 grading system. The City partnered with Doetsch Environmental Services, Inc., to clean and assess 97,076 feet of combined and sanitary sewer using the NASSCO PACP grading system.

Asset Criticality

The City of Birmingham developed Probability of Failure (POF) and Consequence of Failure (COF) factors which were added to the City's GIS database and were used to estimate the overall risk of the horizontal assets. Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 being the highest probability or consequence of failure. The Business Risk Evaluation (BRE) score is the product of the POF and COF on a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of sanitary gravity mains that were televised was the PACP Structural Quick Score. The PACP Maintenance Quick Score and remaining useful life are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life based on the age and material. The COF for horizontal assets was determined based on diameter, road type, depth, proximity to water, proximity to railroad, accessibility, and select others.

Below are tables of BRE scores for the City's horizontal wastewater assets in the system:

Table 4 - Business Risk Evaluation Results - Pipes

BRE Rating	Number of Pipe Segments	Total Length (mi)	Percent of Total Length (%)
5 or less	1436	50	51.8%
5 to 10	858	40	41.1%
10 to 15	67	3	3.6%
15 to 20	47	3	3%
20 to 25	10	0.5	0.5%

Table 5 - Business Risk Evaluation Results - Manhole Structures

BRE Rating	Number of Manholes	Percent of Total (%)
5 or less	1914	78.2%
5 to 10	498	20.3%
10 to 15	20	0.8%
15 to 20	15	0.6%
20 to 25	1	0.04%

Level of Service Determination

The City of Birmingham reviewed typical questions and criteria related to Level of Service and adopted goals as part of the process. Level of service goals were discussed during SAW Grant meetings on November 12, 2018 and October 22, 2019 with representatives from the Department of Public Service (DPS), Engineering Departments, and the City's consultant. The meetings included reviewing what the facility was already doing that was working well, and any areas where improvements were desired. The primary level of service goals are related to regulatory compliance and ensuring adequate revenue to support the long-term operation and maintenance of the facility. Additional goals include ensuring adequate employee staffing, training, and safety and maintaining communication with other departments and the public. A list of goals for the sanitary sewer and combined systems is provided:

- Meet all regulatory requirements
- Maintain open communication between the Department of Public Services (DPS) and Engineering
- Work collaboratively with neighboring jurisdictions and WRC
- Continue to be proactive with infrastructure maintenance programs and reinvestment in cost-effective improvements
- Ensuring adequate employee staffing, training, and safety
- Revaluate rate structure each year to ensure rates will cover operation, maintenance, and improvements.

- The City will review goals and ongoing activities annually to determine if the goals are being successfully fulfilled and further measurement of the stated goals are necessary.

Revenue Structure

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City worked with their internal finance department to confirm that the system's current rate structures are sufficient to meet the currents need for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the EGLE. The analysis did not show any gap between the revenue and expenditures, and therefore, a rate increase was not necessary.

Capital Improvement Plan

A list of capital projects was developed for the City's wastewater sewer system, using data collected during condition assessment and considerations of other strategies system wise.

For the system's horizontal assets, the sanitary and combined CIP was separated by priority of recommended repairs into a 0 to 5 year, 5 to 10, and 10 to 20 year range. A CIP for the sanitary and combined manhole access structures included itemized lists of recommended rehabilitation methods based on the information coded during condition assessment.

The CIP plan include 146 sewer segments in the 0 to 5 year range of prioritized rehabilitation, 165 sewer segments in the 5 to 10 year range, and 94 sewer segments in the 10 to 20 year range. The CIP also includes 307 manhole structures with recommended rehabilitation methods.

The results of the capital improvement plans are based on the condition data only, and do not reflect economic climates, project grouping, legal and engineering costs, contingencies, effect of mobilization, and collaboration with other infrastructure improvements.

Recommendations

In order to keep this AMP sustainable into the future, the review process will be undertaken on a regular basis to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis to ensure the availability of required funds for the projects.

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environmental, Great Lakes, and Energy's (EGLE)
Revolving Loan Section
Att: Karen Nickols

From: Hubbell, Roth and Clark, Inc.

CC: City of Bloomfield Hills

Date: December 2, 2019

Re: City of Bloomfield Hills
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1378-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environmental, Great Lakes, and Energy's (EGLE) SAW Grant by the City of Bloomfield Hills. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows EGLE guidance.

GRANTEE INFORMATION

City of Bloomfield Hills
45 East Long Lake
Bloomfield Hills, Michigan 48304

SAW Grant Project #1378-01

Project Grant Amount: $1,816,869

Applicant Match Amount $287,551

Stormwater Grant Amount: $511,513

Authorized Representative:
David Hendrickson, City Manager
dhendrickson@bloomfieldhillsmi.net
Phone: 248-644-1520

Keith Francis, Treasurer
kfrancis@bloomfieldhillsmi.net
Phone:248-530-1402

Jamie Spivy, DPW Foreman
Public Works: 1805 Kensington Road,
Bloomfield Hills, MI 48304
JSpivy@bloomfieldhillsmi.net
Phone: 248-530-1412

James Burton, PE, Consultant
Hubbell, Roth, and Clark, Inc.
555 Hulet Dr., Bloomfield Hills, MI 48302, jburton@hrcengr.com
Phone: 248-454-6363

Helen Davis, PE, LEED AP BD+C
Hubbell, Roth, and Clark, Inc.
hdavis@hrcengr.com
Phone: 248-454-6330

EXECUTIVE SUMMARY

The City of Bloomfield Hills applied for and received a grant to further develop an Asset Management Plan (AMP) for its storm sewer system through the Michigan Department of EGLE Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, operates and maintains the storm sewer system and has various tools used to manage the assets, including a GIS geodatabase, condition assessment methods, risk and prioritization models, an operation and maintenance program, and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the City Hall for at least 15 years.

STORM SYSTEM INVENTORY

The City of Bloomfield Hills uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

Condition assessment tools and protocols were developed to allow for efficient and consistent recording of asset condition. For storm sewer and storm structure assets, the NASSCO-compliant inspection information was collected during sewer televising and manhole inspections.

GIS has been used in the City for the past decade; however, the City did not have an active Esri GIS subscription; the data has been kept at Hubbell, Roth & Clark, Inc, the City's engineering consultant. Through the grant, the City set up access to the available Oakland County online subscription to Esri software and purchased computers, allowing staff to use the GIS. Using a Lidar Scan, GPS, and observations made during condition assessment, the data in the GIS was expanded and accuracy was greatly improved. A table of the summarized asset inventory in GIS is on the following page.

Asset Type	Amount
6-inch and smaller sewer	5266 feet
8-inch sewer	7737 feet
10-inch sewer	2662 feet
12-inch sewer	38,213 feet
15 and 16-inch sewer	8509 feet
18-inch sewer	7062 feet
21-inch sewer	1103 feet
24-inch sewer	2283 feet
27-inch sewer	1417 feet
30-inch sewer	2008 feet
36-inch sewer	164 feet
48-inch sewer	10 feet
65-inch sewer	22 feet
Sewers with unknown diameter	406 feet
Total Sewer	**76,861 feet / 14.56 miles**
Manhole	163
Catch Basin	530
Inlet	202
Special Structures	2
Additional structures	10
Total Structures	**907**
Outfalls	**79**

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 55,436 lineal feet of storm underwent condition assessment via cleaning and televising. Approximately 777 structures were evaluated using the NASSCO inspection protocol.

Other studies were completed to assess the condition of the system including: a culvert capacity study; inspections of culverts and outfalls; review of ordinances, standards, and details; and review of areas throughout the City with drainage concerns.

CRITICALITY OF ASSETS

The City of Bloomfield Hills developed baseline Probability of Failure (PoF) and Consequence of Failure (CoF) factors that were added to the GIS attributes. These factors were used to estimate the overall risk of the horizontal assets (sewers and associated structures.)

Both the PoF and CoF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets were determined using scoring values developed uniquely for each asset type, such as gravity mains and structures. The PoF and CoF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the PoF of gravity mains was the PACP Structural Quick Score. The PACP Maintenance Quick Score and remaining useful life were also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life calculated from asset age and material.

The COF for mains and access points were determined based on asset depth, size, and proximity to water, railroads and roads.

Below is a list of BRE scores for the horizontal assets in the City's system:

Storm Pipes	
BRE Score	**Percent of Pipes**
<= 5	78%
5 <= 10	20%
10 <= 15	2%
15 <= 20	0%
20 <= 25	0%

Storm Manholes	
BRE Score	**Percent of Manholes**
<= 5	83%
5 <= 10	14%
10 <= 15	3%
15 <= 20	0%
20 <= 25	0%

LEVEL OF SERVICE DETERMINATION

The City reviewed a list of questions related to level of service and developed the following mission statement as part of the AMP:

> *The City of Bloomfield Hills strives to cost effectively maintain its storm sewer system to reduce flooding risk and ensure the longevity of the roadways. The City will budget for capital improvements to make sure that the system continues to operate in a cost-effective manner, as well as doing routine operation and maintenance to keep the system in good working order.*

The City chose to implement its mission statement as the defined Level of Service. The mission statement considers the impacts to the budget, longevity of the roads, and public health. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public works leaders chose to continue their ongoing processes at this time rather than defining specific goals to track.

The City will review the mission statement and ongoing system activities annually to determine if the mission is being successfully fulfilled and if further measurement of the stated goals is necessary.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City does not charge a stormwater utility rate; therefore, the revenue structure was not reviewed for the AMP. Improvements to the storm water system, when needed, are primarily funded through the general or road maintenance funds.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City of Bloomfield Hills' storm sewer system, using recommendations from the asset inspection process, and consideration of other system needs.

The recommended projects are included in appendix H of the full report. Projects listed for implementation in the 0 to 10 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 10 to 20 year range are based on broad concepts only. Costs for the broad concepts are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

In summary the horizontal CIP includes:

- 21 pipes have repairs that are recommended to be addressed within the next 0-10 years.
- 99 manholes have repairs that are recommended be addressed in the next 0-10 years.
- 20 pipes are recommended to be addressed in the next 10-20 years.
- 63 manholes have repairs that are recommended be addressed in the next 10-20 years.
- 78 manholes are recommended for cleaning and monitoring only in the next 0-5 years.
- 39 manholes were not found and should investigated further in the next 0-5 years.
- 31 manholes were located but were unable to be inspected because they were buried, or access was unavailable. These should be investigated further in the next 0-5 years.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis as part of the annual process to ensure the availability of required funds for projects.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Bloomfield Hills certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1378-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

David Hendrickson at 248-644-1520 dhendrickson@bloomfieldhillsmi.net
Name Phone Number Email

12/27/19
Signature of Authorized Representative (Original Signature Required) Date

David Hendrickson, City Manager

Print Name and Title of Authorized Representative

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environmental, Great Lakes, and Energy's (EGLE)
Revolving Loan Section
Att: Karen Nickols

From: Hubbell, Roth and Clark, Inc.

CC: City of Bloomfield Hills

Date: December 9, 2019

Re: City of Bloomfield Hills
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1378-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the Michigan Department of Environmental, Great Lakes, and Energy's (EGLE) SAW Grant by the City of Bloomfield Hills. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows EGLE guidance.

GRANTEE INFORMATION

City of Bloomfield Hills
45 East Long Lake
Bloomfield Hills, Michigan 48304

SAW Grant Project #1378-01

Project Grant Amount: $1,816,869

Applicant Match Amount $287,551

Wastewater Grant Amount: $1,305,356

Authorized Representative:
David Hendrickson, City Manager
dhendrickson@bloomfieldhillsmi.net,
Phone: 248-644-1520

Keith Francis, Treasurer
kfrancis@bloomfieldhillsmi.net
Phone:248-530-1402

Jamie Spivy, DPW Foreman
Public Works: 1805 Kensington Road,
Bloomfield Hills, MI 48304
JSpivy@bloomfieldhillsmi.net
Phone: 248-530-1412

Jamie Burton, PE, Consultant
Hubbell, Roth, and Clark, Inc.,
555 Hulet Dr., Bloomfield Hills, MI
48302, jburton@hrcengr.com
Phone: 248-454-6363

Helen Davis, PE, LEED AP BD+C
Hubbell, Roth, and Clark, Inc.
hdavis@hrcengr.com
Phone: 248-454-6330

EXECUTIVE SUMMARY

The City of Bloomfield Hills applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary and combined systems through the Michigan Department of Environmental Quality's (MDEQ) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The City owns, the sanitary and combined sewer system, and in conjunction with Oakland County Water Resources Commissioner, operates and maintains the system. The City has various tools used to manage the assets, including a GIS geodatabase, hydraulic model, condition assessment methods, risk and prioritization models, capacity studies, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant. The City's AMPs will be available to EGLE upon request, and a copy of the plan will be available to the public review at the City Hall for at least 15 years.

WASTEWATER/COMBINED INVENTORY

The City of Bloomfield Hills uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type. The City does not own any vertical assets such as a treatment plant or pump stations.

Condition assessment tools and protocols were developed to allow for efficient and consistent recording of asset condition. For sanitary sewer and manhole assets, the NASSCO-compliant inspection information was collected during sewer televising.

GIS has been used in the City for the past decade; however, the City did not have an active Esri GIS subscription; the data has been kept at Hubbell, Roth & Clark, Inc. Through the grant, the City set up access to the available Oakland County online subscription to Esri software and purchased computers, allowing staff to use the GIS. Using a Lidar Scan, GPS, and observations made during condition assessment, the data in the GIS was expanded and accuracy greatly improved. On the next page are tables of the asset inventories for sanitary and combined sewers in GIS.

Asset Type	Amount
Unknown diameter sewer	58 feet
8-inch sewer	168,723 feet
10-inch sewer	10,607 feet
12-inch sewer	5,362 feet
15-inch sewer	142 feet
Total Sewer	**183,556 feet / 34.8 miles**
Manhole	**948**

Table 1: Sanitary Inventory Summary

Asset Type	Amount
Unknown diameter sewer	58 feet
8-inch sewer	3628 feet
10-inch sewer	1552 feet
12-inch sewer	577 feet
15-inch sewer	754 feet
18-inch sewer	1756 feet
24-inch sewer	51 feet
Total Sewer	**8,376 feet / 1.6 miles**
Manhole	**35**

Table 2: Combined Inventory Summary

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 152,663 lineal feet of sanitary and combined sewer pipe underwent condition assessment via cleaning and televising. Approximately 716 manholes and other related structures were evaluated using the NASSCO inspection protocol and assigned a good, fair, or poor rating.

Other studies were completed to assess the condition of the system including: modeling the system to identify potential capacity issues; placing meters to quantify inflow and infiltration (I&I); and review of standards, ordinances, and details.

CRITICALITY OF ASSETS

The City of Bloomfield Hills developed baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that were added to the GIS attributes, and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.)

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity mains and structures. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the recent cleaning and televising, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains was the PACP Structural Quick Score. The PACP Maintenance Quick Score and remaining useful life are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on remaining useful life calculated from asset age and material.

The COF for mains and access points was determined based on pipe diameter, road type, depth, railroad proximity, water/wetland proximity.

Below is a list of BRE scores for the horizontal assets in the City's system:

Sanitary Pipes	
BRE Score	**Percent of Pipes**
<= 5	98%
5 <= 10	2%
10 <= 15	0%
15 <= 20	0%
20 <= 25	0%

Sanitary Manholes	
BRE Score	**Percent of Manholes**
<= 5	92%
5 <= 10	7%
10 <= 15	1%
15 <= 20	0%
20 <= 25	0%

LEVEL OF SERVICE DETERMINATION

The City reviewed a list of questions related to level of service and developed the following mission statement as part of the AMP:

> *The City of Bloomfield Hills works with Oakland County Water Resource Commissioner to provide its sanitary sewer customers with a reliable service at the lowest cost possible. The City works to ensure that all compliance and water quality issues are met and has developed a strong emergency response plan in order to assure that customer service disruptions are minimized. While the City strives to minimize service interruptions, the DPW and WRC staff will continue to work with residents when service interruptions are necessary and will continue to update notification processes as communication techniques evolve. The City will keep rates stable for customers by performing preventative maintenance and budgeting for capital improvements.*

The City chose to implement its mission statement as the defined Level of Service. The mission statement considers the impacts to the budget, longevity of the roads, and public health. The current procedures and ongoing operations of the City have successfully fulfilled this mission and will continue to be implemented. Because the level of service provided to date has been adequate, public works leaders chose to continue their ongoing processes at this time rather than defining specific goals to track.

The City will review the mission statement and ongoing system activities annual to determine if the mission is not being successfully fulfilled and further measurement of the stated goals is necessary

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The City annually determines if the system's current rate structures are sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the EGLE six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN

A list of capital projects was developed for the City of Bloomfield Hills' sanitary and combined sewer systems, using recommendations from the asset inspection process, and consideration of other system needs.

The recommended projects are included in an appendix of the full report. Projects listed for implementation in the 0 to 10 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 10 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

In summary the horizontal CIP includes:

- 30 pipes have repairs that are recommended to be addressed within the next 0-10 years.
- 22 manholes have repairs that are recommended be addressed in the next 0-10 years.
- 12 pipes are recommended to be addressed in the next 10-20 years.
- 16 manholes have repairs that are recommended be addressed in the next 10-20 years.
- 48 manholes are recommended for cleaning and monitoring in the next 0-5 years.
- 107 manholes were not found and should investigated further in the next 0-5 years.
- 30 manholes were located but were unable to be inspected because they were buried or access was unavailable. These should be investigated further in the next 0-5 years.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the review process will be undertaken regularly to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset information will be regularly updated to incorporate any new

GIS and operational and condition data. The information can be reviewed to update recommended rehabilitation and replacement strategies, and capital projects. The updated recommendations will be reviewed on a regular basis as part of the process to ensure the availability of required funds for the projects.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Bloomfield Hills *(legal name of grantee)* certifies that all wastewater asset management plan (WWAMP) activities specified in SAW Grant No. 1378-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the WWAMP and that significant progress toward achieving the funding structure necessary to implement the WWAMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 17, 2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

Attached to this certification is a brief summary of the WWAMP that includes a list of major assets. Copies of the WWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

David Hendrickson at 248-644-1520 dhendrickson@bloomfieldhillsmi.net
Name Phone Number Email

12/27/19
Signature of Authorized Representative (Original Signature Required) Date

David Hendrickson, City Manager

Print Name and Title of Authorized Representative

May 2019

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 31, 2019**
(no later than 3 years from executed grant date)

The **Drainage Board of the Bloomfield Village CSO Drain Drainage District** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1149-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: **No**

   If No - Date of the rate methodology approval letter: **December 12, 2018**

2) Significant Progress Made: Yes or No **N/A**

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ______________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jim Nash at **248-858-0958** **wrc@oakgov.com**
Name Phone Number Email

12-27-19
Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Oakland County Water Resources Commissioner
Print Name and Title of Authorized Representative

April 2017

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Water Infrastructure Financing Section
Attention: Karen Nickols

From: Sally Duffy, P.E.
Hubbell, Roth and Clark, Inc.

CC: Mr. Gary Nigro, P.E.
Oakland County Water Resource Commissioner (WRC)

Date: December 31, 2019

Re: Bloomfield Village CSO Drainage District
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1149-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant work performed by the Oakland County Water Resources Commissioner's office on behalf of the Bloomfield Village CSO Drainage District. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

Bloomfield Village CSO Drainage District, SAW Grant Project #1149-01

Project Grant Amount: $1,160,000

Applicant Match Amount $123,333

Authorized Representative
Jim Nash, Bloomfield Village
Drainage District, Chairman
Oakland County Water
Resources Commissioner
One Public Works Drive,
Building 95 West
Waterford, MI 48328
(248) 858-0958
wrc@oakgov.com

Consultant Contact
Sally Duffy, Sr. Project Eng.
Hubbell, Roth & Clark, Inc.,
555 Hulet Drive
PO Box 824
Bloomfield Hills, MI 48303
(248) 454-6300
sduffy@hrcengr.com

WRC Project Manager
Gary Nigro, Chief Engineer
Oakland County Water
Resources Commissioner
One Public Works Drive
Building 95 West
Waterford, MI 48328
nigrog@oakgov.com
mailto:devischr@oakgov.com

EXECUTIVE SUMMARY

The Oakland County Water Resource Commissioner (WRC) on behalf of the Bloomfield Village CSO Drainage District applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes, & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Bloomfield Village CSO Drainage District was established pursuant to Chapter 20 of the Michigan Drain Code of 1956. As such, it is governed by the Drainage Board of the Bloomfield Village CSO Drainage District and is operated and maintained by WRC in accordance with applicable provisions of the Drain Code. WRC has various tools used to manage the assets, including a GIS geodatabase, hydraulic model, condition assessment methods, risk and prioritization models, capacity studies, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The WRC “Common to All” approach was generally followed in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan’s major identified assets, and contact information for the grant.

WASTEWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS). CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by WRC to allow for efficient and consistent recording of asset condition. For sanitary, combined, and stormwater sewer assets, a NASSCO-compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS system. Inspection work orders in the CAMS system are used for evaluation of other types of assets, such as manholes and other collection system structures, and for most vertical asset types, such as pumps, valves, structures, etc.

As part of the grant for Bloomfield Village CSO Drainage District, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 71,640 lineal feet of combined sewer CCTV data underwent condition assessment via cleaning and televising.

Approximately 277 manhole and other related structures were evaluated using the CAMS inspection work orders. Vertical assets, which includes the CSO storage facility and regulator structure, were inventoried using a WRC hierarchy template and condition assessment data was collected and input into the CAMS system.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the “Common to All” Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations and storage and treatment facilities, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, non-gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the CAMS system, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (sanitary and storm sewers) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition. For force mains, the POF was based on age. For manholes and other access structures, the POF is based primarily on the MACP field cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based on just age.

The COF for mains and access points (sanitary sewers, force mains, and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

The POF and COF of vertical assets were calculated using a scoring matrix. The POF for vertical assets was calculated using a combination of age and physical condition collected from inspections performed. O&M protocol and performance factors were also scored and used in the calculation. In the absence of any other data, age was used to estimate POF. The COF for vertical assets was scored using a matrix of factors including: safety of public and employees, financial impact, public confidence, regulatory compliance, and firm capacity.

In general, the assets with the highest consequence of failure were associated with the disinfection system at the RTB, because of its impact on protection of public health and permit compliance, and larger diameter sewers and associated structures located in or near major roadways. In general, most of these assets were currently found to have lower probability of failure based on their current condition, so the overall system risk is currently within the desired level of service.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual Long Range Plan (LRP) rate process form additional elements of the LOS.

The WRC's current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*
>
> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*
>
> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real world” needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing LRP rate process to prioritize projects and ensure adequate funding is available.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.
- Capital Reserve for replacement of pipes or equipment in kind or with alternate technology.

WRC worked with its internal fiscal staff to determine if the system’s current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system’s current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN

The asset optimization software forecasts and prioritizes assets that require replacement in the planning period. The individual replacements can be combined into projects and scheduled with budget amounts established. This information is then used in the LRP process to determine rate needs for funding the project established. A list of capital projects was developed, using recommendations from the asset optimization software, and consideration of other system needs. This information is then used in the LRP process to determine rate needs for funding the projects established.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

• Sewer Repair:	$0
• Manhole Repair (Chimney, Adjust F&C, Inspection, etc.):	$20,000
• Replacement and Rehabilitation of Mechanical, Electrical and Instrumentation Equipment (Reline Hypo Tanks, H&V System, Valves, etc.) at the RTB:	$890,000
• Structural Repairs in Basin (Cracks and Joint Issues, etc.):	$130,000
TOTAL 0-5 YEAR CIP COSTS	**$1,040,000**

Capital Projects, 6 to 20 years:

• Sewer Repair (Lining, Rehab, etc.):	$5,720,000
• Manhole Repair (Chimney, Cone or Wall Defects, etc.):	$60,000
• Continued Replacement and Rehabilitation of Mechanical, Electrical and Instrumentation Equipment at the RTB:	$2,870,000
• Estimate of Structural Repairs in Basin:	$300,000
TOTAL 6-20 YEAR CIP COSTS	**$8,950,000**

The cost estimate provided in the 6 to 20 year capital planning period was developed using WRC's asset optimization tool. It makes recommendations based on the specified parameters configured for the various "triggers", "events", and "strategies". The recommendations do not take into account the effect of WRC's regular preventative or predictive maintenance programs. The asset optimization tool also recommends additional "inspection" events where the condition of individual assets will be reviewed periodically (typically annually), and if condition is still found to be good, recommended replacements will be deferred and may then fall outside the 20 year planning period. These conservative costs are provided for future planning needs only, and will continue to be monitored and adjusted through WRC's annual LRP process. Maintenance and repair history, along with condition of assets, will be reviewed at least annually as part of the rate review process using data and deterioration modeling provided by WRC's CAMS system and asset optimization tool. The estimated costs provided may also change in response to future regulatory needs, affordability criteria, or other considerations that are not foreseeable at this time.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the LRP process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Bloomfield Village CSO Drainage District's major assets include:

- Approximately 72,773 lineal feet of combined sewer, ranging in size from 8" to 144" diameter
- Approximately 279 combined sewer manholes, inlets and access structures
- One 10 Million Gallon Retention Treatment Basin with dry weather pumping station. This facility includes approximately 134 major assets.

PROJECT HIGHLIGHTS

The development of this Asset Management Program for the Bloomfield Village CSO Drainage District was led by WRC with assistance from HRC. The following highlights some of the more tangible outcomes from the Program development:

- Updated and corrected GIS inventory of system
- Created asset hierarchy for the vertical assets
- Cleaned and televised approximately 71,640 lineal feet of combined sewer ranging in size from 18" to 132" in diameter for condition assessment using NASSCO PACP
- Assessed approximately 277 manhole structures using NASSCO MACP
- Repairs were made to correct the most defects found in the collection system pipes and manholes that were recommended to be corrected within the first five years. The pipes were also re-televised to update the CAMS system. (Note, the repair work and post-repair CCTV work was completed without SAW Grant funding as construction was not eligible as part of the grant.)
- Performed condition assessment of 134 discrete RTB assets (generally mechanical and electrical equipment.)
- The gravity dewatering piping located under the RTB and the groundwater drainage system piping was televised.
- A detailed structural evaluation of the RTB was made.
- A detailed study of the RTB heating and ventilation equipment (H&V) was also conducted.
- A 3D laser scan of the Regulator Structure was performed to document as-built dimensions and evaluate its structural condition.
- An assessment of the chlorine disinfection system was made using computational fluid dynamics. The assessment was able to verify influent hydraulic conditions during high inflow conditions, identify dead zones and short-circuiting pathways, estimate Residence Time Distribution to determine a rating for the mixing and plug flow characteristics, and conceptually develop alternatives to improve conditions and treatment in the RTB.
- Reviewed future repair, rehabilitation and replacement needs for capital improvements.

HRC
HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, & Energy (EGLE)
Water Infrastructure Financing Section
Attention: Karen Nickols

From: Sally Duffy, P.E.
Hubbell, Roth and Clark, Inc.

CC: Mr. Gary Nigro, P.E.
Oakland County Water Resource Commissioner (WRC)

Date: December 31, 2019

Re: Bloomfield Village CSO Drainage District
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1149-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant work performed by the Oakland County Water Resources Commissioner's office on behalf of the Bloomfield Village CSO Drainage District. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015 and follows recent EGLE guidance.

GRANTEE INFORMATION

Bloomfield Village CSO Drainage District, SAW Grant Project #1149-01

Project Grant Amount: $1,160,000

Applicant Match Amount $123,333

Authorized Representative
Jim Nash, Bloomfield Village Drainage District, Chairman
Oakland County Water
Resources Commissioner
One Public Works Drive,
Building 95 West
Waterford, MI 48328
(248) 858-0958
wrc@oakgov.com

Consultant Contact
Sally Duffy, Sr. Project Eng.
Hubbell, Roth & Clark, Inc.,
555 Hulet Drive
PO Box 824
Bloomfield Hills, MI 48303
(248) 454-6300
sduffy@hrcengr.com

WRC Project Manager
Gary Nigro, Chief Engineer
Oakland County Water
Resources Commissioner
One Public Works Drive
Building 95 West
Waterford, MI 48328
nigrog@oakgov.com
mailto:devischr@oakgov.com

EXECUTIVE SUMMARY

The Oakland County Water Resource Commissioner (WRC) on behalf of the Bloomfield Village CSO Drainage District applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary system through the Michigan Department of Environment, Great Lakes, & Energy (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Bloomfield Village CSO Drainage District was established pursuant to Chapter 20 of the Michigan Drain Code of 1956. As such, it is governed by the Drainage Board of the Bloomfield Village CSO Drainage District and is operated and maintained by WRC in accordance with applicable provisions of the Drain Code. WRC has various tools used to manage the assets, including a GIS geodatabase, hydraulic model, condition assessment methods, risk and prioritization models, capacity studies, and an operating and capital improvement project plan. These tools are used to guide the short and long-term strategies to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy is also evaluated annually which includes a review of the current rate structure, fund balances and anticipated future funding needs.

The WRC “Common to All” approach was generally followed in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan’s major identified assets, and contact information for the grant.

WASTEWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS). CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by WRC to allow for efficient and consistent recording of asset condition. For sanitary, combined, and stormwater sewer assets, a NASSCO-compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS system. Inspection work orders in the CAMS system are used for evaluation of other types of assets, such as manholes and other collection system structures, and for most vertical asset types, such as pumps, valves, structures, etc.

As part of the grant for Bloomfield Village CSO Drainage District, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 71,640 lineal feet of combined sewer CCTV data underwent condition assessment via cleaning and televising.

Approximately 277 manhole and other related structures were evaluated using the CAMS inspection work orders. Vertical assets, which includes the CSO storage facility and regulator structure, were inventoried using a WRC hierarchy template and condition assessment data was collected and input into the CAMS system.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the “Common to All” Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations and storage and treatment facilities, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, non-gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the CAMS system, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (sanitary and storm sewers) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition. For force mains, the POF was based on age. For manholes and other access structures, the POF is based primarily on the MACP field cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based on just age.

The COF for mains and access points (sanitary sewers, force mains, and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

The POF and COF of vertical assets were calculated using a scoring matrix. The POF for vertical assets was calculated using a combination of age and physical condition collected from inspections performed. O&M protocol and performance factors were also scored and used in the calculation. In the absence of any other data, age was used to estimate POF. The COF for vertical assets was scored using a matrix of factors including: safety of public and employees, financial impact, public confidence, regulatory compliance, and firm capacity.

In general, the assets with the highest consequence of failure were associated with the disinfection system at the RTB, because of its impact on protection of public health and permit compliance, and larger diameter sewers and associated structures located in or near major roadways. In general, most of these assets were currently found to have lower probability of failure based on their current condition, so the overall system risk is currently within the desired level of service.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual Long Range Plan (LRP) rate process form additional elements of the LOS.

The WRC's current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*
>
> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*
>
> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real world” needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing LRP rate process to prioritize projects and ensure adequate funding is available.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.
- Capital Reserve for replacement of pipes or equipment in kind or with alternate technology.

WRC worked with its internal fiscal staff to determine if the system’s current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system’s current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN

The asset optimization software forecasts and prioritizes assets that require replacement in the planning period. The individual replacements can be combined into projects and scheduled with budget amounts established. This information is then used in the LRP process to determine rate needs for funding the project established. A list of capital projects was developed, using recommendations from the asset optimization software, and consideration of other system needs. This information is then used in the LRP process to determine rate needs for funding the projects established.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

• Sewer Repair:	$0
• Manhole Repair (Chimney, Adjust F&C, Inspection, etc.):	$20,000
• Replacement and Rehabilitation of Mechanical, Electrical and Instrumentation Equipment (Reline Hypo Tanks, H&V System, Valves, etc.) at the RTB:	$890,000
• Structural Repairs in Basin (Cracks and Joint Issues, etc.):	$130,000
TOTAL 0-5 YEAR CIP COSTS	**$1,040,000**

Capital Projects, 6 to 20 years:

• Sewer Repair (Lining, Rehab, etc.):	$5,720,000
• Manhole Repair (Chimney, Cone or Wall Defects, etc.):	$60,000
• Continued Replacement and Rehabilitation of Mechanical, Electrical and Instrumentation Equipment at the RTB:	$2,870,000
• Estimate of Structural Repairs in Basin:	$300,000
TOTAL 6-20 YEAR CIP COSTS	**$8,950,000**

The cost estimate provided in the 6 to 20 year capital planning period was developed using WRC's asset optimization tool. It makes recommendations based on the specified parameters configured for the various "triggers", "events", and "strategies". The recommendations do not take into account the effect of WRC's regular preventative or predictive maintenance programs. The asset optimization tool also recommends additional "inspection" events where the condition of individual assets will be reviewed periodically (typically annually), and if condition is still found to be good, recommended replacements will be deferred and may then fall outside the 20 year planning period. These conservative costs are provided for future planning needs only, and will continue to be monitored and adjusted through WRC's annual LRP process. Maintenance and repair history, along with condition of assets, will be reviewed at least annually as part of the rate review process using data and deterioration modeling provided by WRC's CAMS system and asset optimization tool. The estimated costs provided may also change in response to future regulatory needs, affordability criteria, or other considerations that are not foreseeable at this time.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the LRP process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The Bloomfield Village CSO Drainage District's major assets include:

- Approximately 72,773 lineal feet of combined sewer, ranging in size from 8" to 144" diameter
- Approximately 279 combined sewer manholes, inlets and access structures
- One 10 Million Gallon Retention Treatment Basin with dry weather pumping station. This facility includes approximately 134 major assets.

PROJECT HIGHLIGHTS

The development of this Asset Management Program for the Bloomfield Village CSO Drainage District was led by WRC with assistance from HRC. The following highlights some of the more tangible outcomes from the Program development:

- Updated and corrected GIS inventory of system
- Created asset hierarchy for the vertical assets
- Cleaned and televised approximately 71,640 lineal feet of combined sewer ranging in size from 18" to 132" in diameter for condition assessment using NASSCO PACP
- Assessed approximately 277 manhole structures using NASSCO MACP
- Repairs were made to correct the most defects found in the collection system pipes and manholes that were recommended to be corrected within the first five years. The pipes were also re-televised to update the CAMS system. (Note, the repair work and post-repair CCTV work was completed without SAW Grant funding as construction was not eligible as part of the grant.)
- Performed condition assessment of 134 discrete RTB assets (generally mechanical and electrical equipment.)
- The gravity dewatering piping located under the RTB and the groundwater drainage system piping was televised.
- A detailed structural evaluation of the RTB was made.
- A detailed study of the RTB heating and ventilation equipment (H&V) was also conducted.
- A 3D laser scan of the Regulator Structure was performed to document as-built dimensions and evaluate its structural condition.
- An assessment of the chlorine disinfection system was made using computational fluid dynamics. The assessment was able to verify influent hydraulic conditions during high inflow conditions, identify dead zones and short-circuiting pathways, estimate Residence Time Distribution to determine a rating for the mixing and plug flow characteristics, and conceptually develop alternatives to improve conditions and treatment in the RTB.
- Reviewed future repair, rehabilitation and replacement needs for capital improvements.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date **December 31, 2019**
(no later than 3 years from executed grant date)

The **Drainage Board of the Bloomfield Village CSO Drain Drainage District** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1149-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: **No**

   If No - Date of the rate methodology approval letter: **December 12, 2018**

2) Significant Progress Made: Yes or No **N/A**

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jim Nash at **248-858-0958** **wrc@oakgov.com**
Name Phone Number Email

12-27-19
Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Oakland County Water Resources Commissioner
Print Name and Title of Authorized Representative

April 2017

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The Village of Brooklyn *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1160-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 14 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: __________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name: Jae Guetschow at Phone Number: 517.592.2591 Email: manager@villageofbrooklyn.com

Signature of Authorized Representative (Original Signature Required)

Date: 12/26/2019

JAE GUETSCHOW, VILLAGE MANAGER
Print Name and Title of Authorized Representative

Village of Brooklyn

Sanitary Sewer System

Asset Management Plan

SAW Grant No. 1160-01

121 N. Main Street, PO Box 90, Brooklyn, MI 49230

(517) 592-2591

December 2019

OHM Advisors®

EXECUTIVE SUMMARY

The wastewater infrastructure system of the Village of Brooklyn (Village) provides a critical service to its 1200 residents and 180 businesses, providing the collection and conveyance of wastewater to the nearby Leoni Wastewater Treatment Plant and protecting local water resources by discharging clean water through an advanced treatment process. Recognizing the importance of this wastewater system, the Village initiated a comprehensive assessment of its wastewater infrastructure.

This Asset Management Plan (AMP) summarizes this assessment and includes key recommendations for future funding levels. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program, with a total wastewater budget of $344,683 inclusive of local match.

The AMP was intended to accomplish the following key goals:

- Provide the Village with new framework for collecting, organizing, and storing data for their wastewater collection system using the latest available hardware and software.
- Gather field information about key system components to create the Village's Geographic Information System (GIS) database and to make it easy for future generations to access infrastructure data.
- Add information for sewer material type, size, and depth to the newly created GIS database.
- Physically evaluate the structural condition of the majority of the publicly owned system components, including wastewater pumping stations, sewer pipes and manholes, and store the data in the Village's GIS database.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
    - Regularly scheduled sewer inspection (televising) and cleaning
    - Repair and rehabilitation to address structural problems resulting from aging infrastructure
- Provide recommendations for a prioritized Capital Improvement Plan (CIP) to be funded through the Village's water and sewer fund.

Mission Statement

One important element to an Asset Management Program (AMP) is a mission statement, which identifies the overarching purpose of the Village's AMP. The purpose of the Village's Asset Management Program is summarized by the following mission statement:

We are committed to providing and maintaining high quality wastewater sewer collection services to our existing and future customers in a cost-effective manner while protecting human health and the environment.

Asset Management Team Leader

The Asset Management Team leader listed in Figure 1 is committed to the Asset Management Mission Statement and were instrumental in the progress made and findings outlined in this report. Further questions on the Village's AMP can be directed to him.

Jae Guetschow

- Village Manager
- 121 N Main St PO Box 90, Brooklyn, MI 49230
- manager@villageofbrooklyn.com
- 517.592-2591

Figure 1: Asset Management Team Leader

Infrastructure Technology

The Village has made investments to create a GIS database mapping their wastewater system with the intent of making it easier for future generations to access infrastructure knowledge. These GIS database investments included the following:

- Located key system components and created the Village's GIS database,
- Added information for sewer material type, size, and depth to the created GIS database,
- Purchased tablets to improve access to real-time asset information and enhance field data collection, and
- Provided staff training on new hardware and software.

Asset Inventory

An asset inventory is a list of the Village's assets and their attributes. The majority of the Village's wastewater sewer infrastructure, including assets within pumping stations, manholes and sewers, were inventoried and digitized. The Village has populated the attributes of the inventory using observations in the field while performing condition assessment. This inventory resides in the Village's newly created GIS database. The GIS framework was created as part of this effort, making it easier for the Village to store critical data for the location, size, material, and condition of each wastewater asset.

List of Major Assets

The major assets included in this report are approximated in the text below. The full AMP report contains additional details on the distribution of sizes and conditions.

- 208 sanitary manholes,
- 9.5 miles of wastewater sewer ranging from 8 to 15-inch in diameter,
- 3 pump stations (M-50, Lansing and Colbrook)

Condition Assessment

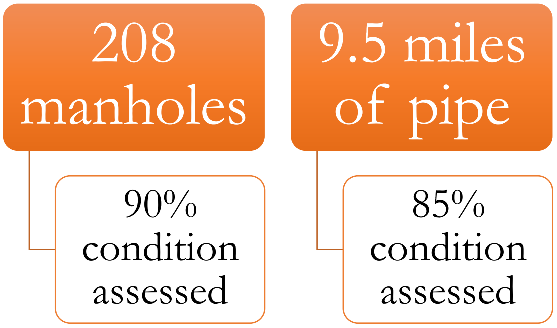


Figure 2 : Portion of Sewer System Assessed

With the intent of assessing majority of the wastewater system, the Village's wastewater sewer infrastructure (wastewater sewer pipes and manholes) has been assessed. The condition of the infrastructure is based on the National Association of Sewer Service Companies (NASSCO) condition grading system, which uses a scale of zero to five. Zero indicates the infrastructure is in very good or new condition, while five indicates the infrastructure is in very poor condition or has already failed. About 90% of the 208-structure manhole structure and about 85% of the approximately 8.1 miles of wastewater sewer pipe infrastructure has been condition assessed. There are two main pumping stations within the Village that were inventoried or assessed as part of this Asset Management Plan.

It was also observed that:

- Manhole infrastructure has an average structural rating of approximately 0.7 and average O&M rating of 0.40. Structural manhole defects were predominately related to brickwork. O&M manhole issues were driven by infiltration and roots.
- Sewer infrastructure has an average structural rating of 1.30 and average O&M rating of 1.25. Structural infrastructure defects were predominately related to fracture and cracks. O&M infrastructure defects were driven by deposits and roots.
- The infrastructure will continue to degrade over time. For example, the overall average condition of the pipe infrastructure is between a score of 1 (new or like new) and 2 (Minimal to Moderate wear but still functional), per the 2019 assessment data. Only 2% of the manholes has a condition rating of 5 (marginal functionality with failure imminent); this percentage will grow over time.

The current condition of the pump stations is assigned based on the judgement of experienced facility design engineers. The condition ratings range from 1 to 5 with 1 being the best condition and 5 being the worst condition. The assets within the Lansing and Colbrook stations all have condition ratings ranging from 1 to 3. The M-50 pump station is scheduled for a complete replacement in 2020. No additional work on the M-50 station is anticipated in the next 20 years. Therefore, the annual replacement cost of $16,000 is required for the Lansing and Colbrook pump-stations. The table below represents the estimated costs for the recommended rehabilitations in this CIP as a result of the inspections:

Table 1: Estimated Cost for Pump Station Rehab Recommendations

Timeline	Estimated Cost
Years 1-5	$80,000
Years 6-10	$10,900
Years 11-20	$91,900

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the determination of Business Risk Exposure (BRE), which is identified as the combination of the Probability of Failure (PoF) as well as the Consequence of Failure (CoF) as shown in Figure 3.

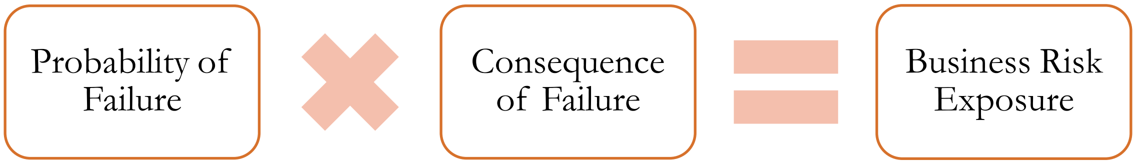


Figure 3 : Risk Equation

The PoF is related to the physical condition of an asset. The CoF focuses on the economic losses and impacts to society due to an asset's failure. The following factors were combined to determine the consequence of failure for manholes and wastewater sewer:

- Diameter/size – the relative size of the asset with respect to the rest of the system,
- High consequence crossings – refers to pipes that cross over major roads, railroads, or water bodies, and
- Environment – proximity to sensitive environmental features like rivers and lakes.

Level of Service

The Village adopted Level of Service (LoS) criteria, which it plans to use as guidelines to manage the wastewater sewer system. The LoS criteria is summarized in Table 2.

Table 2: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	PACP & MACP Inspections per Year*	• MACP inspect a minimum of 20% of the system per year. • PACP inspect a minimum of 20% of the system per year.
GIS Asset Inventory	GIS Completion Level	• Update GIS data when assets are repaired or replaced, or new information is available
Regulatory Compliance	Compliance with EGLE Sanitary Sewer Overflow (SSO) Policy and the Clean Water Act	Continue to comply with the EGLE SSO policy and The Clean Water Act
Service Delivery and Customer Communication	Response to Sanitary Sewer Complaints	Respond to customer complaints and requests within one business day
O&M Optimization	Regular cleaning and maintenance of the collection system	• Clean and maintain 20% percentage of the manholes per year • Clean and maintain 20% percentage of the sewer pipes per year

***Pipe Assessment Certification Program (PACP), to assess wastewater sewer condition, Manholes Assessment Certification Program (MACP), to assess manhole condition**

Revenue Structure and Capital Improvement Plan

The condition assessment helped identify capital improvements that will allow the Village to operate at its maximum potential. As of 2019, the Village has allocated almost $25,000 per year for point repairs of the sanitary sewer systems. The identified funding needed to address the rehabilitation and repair of sewers in the first 20 years of the sanitary CIP are detailed in Table 3. It should also be noted that the Village is already undertaking a major pump station replacement project on the M-50 station using low interest loans.

Table 3: Summary of Capital Improvement Plan

Project year	Estimated Costs
2020	$147,135
2021	$147,264
2022	$176,746
2023	$147,748
2024	$200,075
2025-2029	$746,211
2030-2039	$1,454,585
Total Estimated Cost	**$3,019,764**

Additional long-term operations and maintenance strategies will provide the means to maintain a sound structural condition into perpetuity, including:

- Regularly scheduled sewer and manhole inspections, and
- Rehabilitation or replacement to address structural problems resulting from aging infrastructure.

Annual cash reserves are to be set aside annually to replace assets for managing the Village's pump stations. The annual reserve needed is based on the assets' replacement cost divided by the expected asset life. The total capital cost is that of replacing the asset at the year of failure. As communities like Brooklyn have developed and aged, the underground infrastructure is deteriorating. The Village shall begin to systematically repair, rehabilitate, and/or replace these aging components so that Village residents and businesses experience a consistent level of service in order to avoid the following:

- Increased threat of property damage, public health, and safety,
- Increased potential for environmental damage, and
- Increased potential for impassable roadways due to failed infrastructure.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Township of Bruce *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1129-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: No

   If No - Date of the rate methodology approval letter: November 5, 2019

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Richard Cory	at	586.752.~~3870~~ 4585	rcory@brucetwp.org
Name		Phone Number	Email

Richard Cory — 1-5-2020
Signature of Authorized Representative (Original Signature Required) — Date

Richard Cory, Township Supervisor
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Bruce Township

SAW Project No. 1129-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized funding for a Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In November 2016, Bruce Township received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), previously the Department of Environmental Quality (DEQ), Project No. 1129-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Township's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Bruce Township AMP is:
Richard Cory, Supervisor
223 East Gates Street, Romeo, MI 48065
Phone Number: 586.752.4585 Ext. 115
Email: rcory@brucetwp.org

MAJOR ASSET INVENTORY & CONDITION ASSESSMENT

Below is a list of the major assets in the Township's wastewater collection system identified in the AMP:

List of Major Assets

- Gravity Sewer (8" to 18" diameter)…….. 58,384 feet
- Force Main (4" and 10" diameter)……… 2,311 feet
- Manholes…………………………………. 253
- Pump (Lift) Stations……………………… 4

These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The Township's wastewater collection system discharges to the Romeo Waste Water Treatment Plant.

Asset Identification & Location

A comprehensive wastewater system asset inventory was developed from existing record drawings, field notes, staff knowledge, site visits, and field survey work. Asset material, size, and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Manhole and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into the GIS database for efficient management of the collection system assets.

Condition Assessment & Expected Useful Life

NASSCO-MACP manhole field based assessments were completed on 136 manhole structures, which represents approximately 54% of the manholes in the collection system. Pipeline cleaning and NASSCO-PACP CCTV field based assessments were also conducted on 54% of the gravity pipe.

The collection system pipe and manhole assets were generally found to be in good condition with only a few minor defects. Structural defects such as cracks, fractures, and offset pipe joints were limited. Only one pipe segment was noted for rehabilitation in the short term. The manhole assessments identified a number of structures with signs of infiltration of varying degree. Based on the assessments completed, recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. Maintenance recommendations include continuing to clean and televise the wastewater collection system. As additional assessments are completed they will be used to further evaluate structural and O&M defects in the system and refine the short and long term maintenance and capital improvement plan.

The condition of the assets at the pump stations were generally found to be in good condition. This is a result of regular maintenance and proactive rehabilitation and replacement of equipment.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

The overall objective of the Township is to provide reliable wastewater collection services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this, the following Level of Service (LOS) goals are proposed:

LEVEL OF SERVICE STATEMENT

- Provide adequate collection system capacity for all service areas.
- Comply with regulatory requirements.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of the treatment facility.
- Provide rapid and effective emergency response services to customers.
- Regularly review projected O&M and capital expenditures.
- Maintain sound financial management to generate sufficient revenue and adequate financial reserves for O&M and capital improvements. Adjust user rates as necessary.
- Utilize GIS to provide efficient and sustainable management of the wastewater collection infrastructure.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Township from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors: 1) Likelihood (Probability) of Failure, and 2) Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utility's ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset

The pump station categories for CoF are:

- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

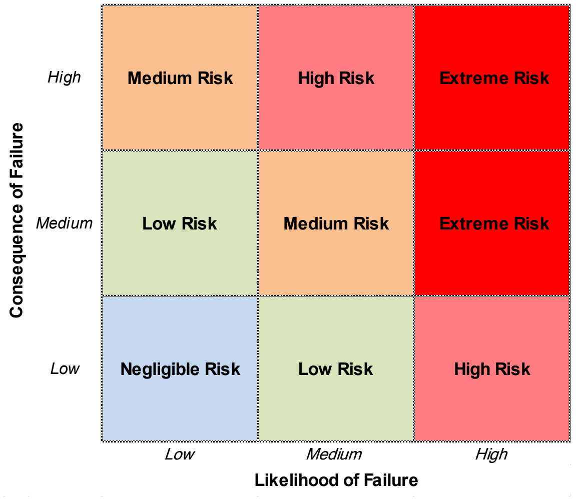
Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and aids in developing a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Assets with the greatest consequence of failure and the greatest likelihood of failure will be assets that are the most critical. Assets with the highest business risk score are likely candidates for near-term rehabilitation and replacement. Assets with lower scores should be monitored and analyzed to develop the best life cycle strategy.

Over time as more of the wastewater collection system is assessed and re-assessed, the likelihood of failure scores will continue to develop.

A 3x3 Business Risk Matrix identifies the relative “Criticality” of each asset based on their CoF and LoF scores to establish a “Risk Rating” for each asset. Asset rating categories range from *Negligible* to *Extreme* criticality based on position within the matrix and are color coded to better identify significance. Upper and lower CoF and LoF score “boundaries” are set for each matrix box to establish the Risk Rating for each asset and place each asset in the proper rating category. Business Risk is depicted visually in the risk matrix shown in Figure 1, and the Business Risk of each asset determines the appropriate strategy for risk management as shown in Table 1.



Consequence of Failure / Likelihood of Failure	Low	Medium	High
High	Medium Risk	High Risk	Extreme Risk
Medium	Low Risk	Medium Risk	Extreme Risk
Low	Negligible Risk	Low Risk	High Risk

Figure 1. Business Risk Matrix (Risk Rating)

Table 1. Strategies for Asset Rehabilitation and Replacement

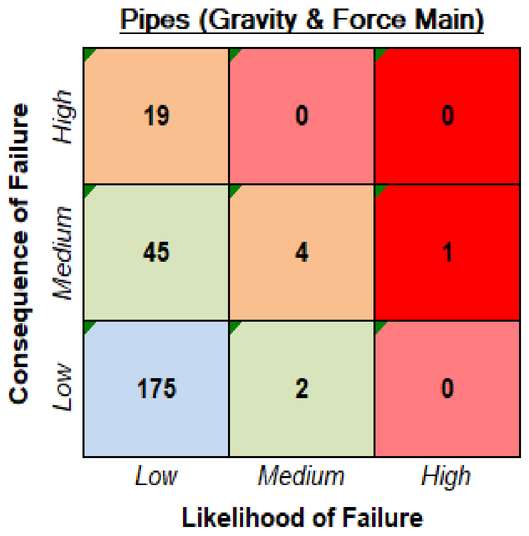
Risk Rating	Strategies for Asset Rehabilitation or Replacement
Extreme	Inspect immediately and develop 1-2 year rehabilitation plan
High	Inspect immediately and develop short to medium term rehabilitation plan
Medium	Inspect immediately and develop long term rehabilitation plan
Low	Develop short term inspection strategy and develop long term rehabilitation plan
Negligible	Develop long term inspection strategy

Risk ratings can also be thought of as priorities since they are only relevant to Bruce Township. An extreme risk in one community could be a low risk in another depending on the overall condition of their infrastructure. Below is a simple correlation between risk rating and priority.

Risk Rating	Priority
High / Extreme	Essential
Medium	Desirable
Low	Acceptable
Negligible	Deferrable

Figure 2 below provides the risk rating for gravity and force main pipe in Bruce Township by number of pipe segments. Pipes not televised and assessed use only age and material as a preliminary likelihood of failure score since the condition of the pipe is unknown. Most of these pipes received an initial risk rating of negligible based on their remaining service life and the known condition of other pipes in the collection system. This risk rating will be further evaluated as more pipe segments are cleaned and assessed.

The majority of the pipes have a low or negligible risk rating and are indicative of pipes in relatively good condition. The one pipe segment with an extreme risk rating is recommended for rehabilitation in the short term.



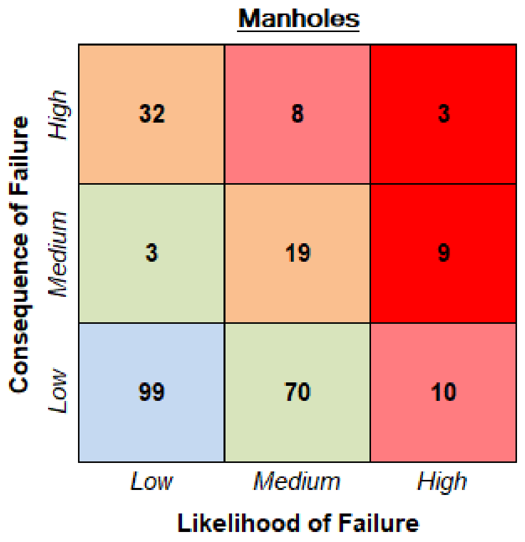
Pipes (Gravity & Force Main)

Consequence of Failure	Low	Medium	High
High	19	0	0
Medium	45	4	1
Low	175	2	0

Likelihood of Failure

Figure 2. Business Risk Matric (Risk Rating)
By Number of Gravity and Force Main Pipes

Figure 3 provides the risk rating for the collection system manholes in Bruce Township. The majority of the manholes have a medium, low, or negligible risk rating and are indicative of manholes in relatively good condition. The manholes identified as high and extreme risk primarily showed signs of infiltration and are recommended to be further evaluated for consideration of rehabilitation in the short term.



Manholes

Consequence of Failure	Low	Medium	High
High	32	8	3
Medium	3	19	9
Low	99	70	10

Likelihood of Failure

Figure 3. Business Risk Matrix (Risk Rating)
By Number of Manholes

The Township's pump station major assets were determined to have a medium to low risk rating and are in relatively good condition as a result of regular maintenance and proactive rehabilitation and replacement of equipment.

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the wastewater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Township's wastewater collection utility assets based on the Business Risk evaluation which prioritized the capital improvement projects. The CIP consists of short-term (1-5 year) and long-term (6-20 year) improvements to address the needs of the utility.

Table 2 below summarizes the recommended improvements in the short-term CIP. Detailed asset identification, rehabilitation measures, and costs of the recommended short and long term capital improvements are provided in the AMP.

Table 2. 5-Year Capital Improvement Plan Summary

Rehabilitation Action
Pipe Lining
Manhole Clean, Line, Repair and Adjust
Manhole Clean, Line and Repair
Manhole Clean and Line

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance, infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated, preserving the substantial investment the community has in its collection system.

A preventative maintenance program to systematically clean and assess pipelines to NASSCO-certified standards is critical for a sound wastewater collection system. The process of cleaning and CCTV assessment of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation and replacement. The Township has been proactive in the maintenance of its infrastructure and the benefits of this preventative maintenance program are evident in the low risk ratings determined for the majority of the Township's infrastructure. Once the entire system has been cleaned and televised, it is recommended that a maintenance schedule be set for future cleaning and televising. The required frequency of cleaning and televising over the next 20 years may depend on what is discovered in the initial assessment. The Township may desire to clean and televise certain areas more than others.

Table 3 below summarizes the recommended preventative maintenance in the short-term (1-5 years). Detailed asset identification, maintenance measures, and costs of the recommended preventative maintenance program are provided in the AMP.

Table 3. 5-Year Maintenance Summary

Maintenance Action
CCTV and Pipe Cleaning
Manhole Assessments

An annual equipment replacement fund should be maintained to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds. Existing disposable materials include wear parts in pumps and motors associated with the pump stations. The Township's existing OM&R fund is sufficient for the current OM&R needs.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs. A rate methodology dated September 19, 2019 was completed and it was determined that the existing rates provide sufficient funds for the day-to-day maintenance and operations of the wastewater system. EGLE reviewed the information contained in the rate methodology and determined in a letter dated November 5, 2019 that significant progress has been made toward achieving the funding structure necessary to implement the program.

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Village of Carleton

SAW Project No. 1032-01

October 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In November 2016, The Village of Carleton received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) now known as the Michigan Department of Environment, Great Lakes, and Energy (EGLE), project no. 1032-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Village's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Village of Carleton AMP is:

Larry Buckingham, Village President
1230 Monroe Street
Carleton, Michigan 48117
Phone number: 734.654.6255
Email: president@carletonmi.org

ASSET INVENTORY AND CONDITION ASSESSMENT

A list of the major assets in the Village's wastewater system, described further below, include:

- Collection system piping system and manholes
- Wastewater Treatment Facility (WWTF)
- Sanitary sewer lift stations in the collection system

The wastewater collection system assets consist of approximately 48,917 feet (9.26 miles) of sanitary sewers (gravity pipe and force mains) and 164 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The WWTF currently includes the following treatment processes:

- headworks with mechanical screen and grit removal
- flow equalization
- oxidation ditches
- secondary clarifiers with polymer addition
- tertiary sand filters
- UV disinfection
- effluent reaeration

Treated effluent is seasonally discharged to the mitigated wetland (formerly lagoon cell #6) and then to the tributary to the Swan Creek in accordance with NPDES permit No. MI0022543. The design capacity of the WWTF is 0.74 million gallons per day (mgd). The current annual average flow received by the facility is approximately 0.53 mgd.

There are two sanitary sewer lift stations located throughout the wastewater collection system, including the Main Lift Station located on Grafton Road east of the WWTF. The stations are all wet well/dry well style stations. The second lift station on Ford Road collects flow in the southeast quadrant of the Village and discharges flow to the gravity sewer at the southern end of Grafton Road at the Ford Road intersection.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance manuals included a review of existing record drawings, field notes, staff knowledge through FVOP Operations, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed-Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity and force main system. This information was organized into a new GIS database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 195 WWTF assets, 38 Lift Station Assets, and 323 Collection System Assets.

Condition Assessment and Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field-based assessments were completed on 164 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 99% of the gravity pipe. Smoke Testing was previously performed on 99% of system to disclose location of inflow or infiltration I&I). Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance, with 1% of the system tagged for additional inspection and/or cleaning. Rehabilitation accounted for 72% of the existing sanitary structures and 76% of the sanitary sewer pipe system identified as needing point repairs and lining. The remaining assets were placed in the 20+ year category.

Overall, the condition of the assets at the WWTF range from good to poor. Repair needs over the last 20 years when identified, have helped to maintain the condition of many assets and successfully keep up with sewage treatment demands in the system, however with an increase of I&I and aging collection and treatment assets, there are key assets identified that require future upgrades or replacement due to age or deterioration caused by harsh conditions associated with wastewater treatment.

The condition of the assets at the lift stations range from good to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems. The recommendations for short- and long-term improvements are relatively extensive for both the WWTF and the two lift stations.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

Throughout the development of this AMP, F&V worked with the Village President, Council, DPW and Sewer Committee to develop the following LOS statement and goals. The Village and community stakeholders are proactively pursuing future steps to improve the collection system and WWTF from findings of the AMP and routinely held discussions and updates with the Sewer Committee and at monthly Council meetings.

The overall objective of the Village Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this, the following Level of Service (LOS) goals are proposed:

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Stockbridge Wastewater Department is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with all local, state and federal regulations at all times for treated effluent from the WWTF.
- Actively maintain collection and treatment system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of treatment plant.
- Provide rapid and effective emergency response services to customers.
- Ensure operations staff are properly certified.
- Regularly review health and safety procedures for operations staff to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Village from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

In order to assure that LOS goals are met, performance measurements are recommended. Performance measurements are specific metrics designed to assess whether the Level of Service objectives are being met. If implemented, an evaluation of goals should be completed annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements and technology. During the LOS review with the community the need for performance measurements was reviewed and prompted discussions for future system rehabilitation and capital improvement plan needs.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size and location of asset within the utility network
- Type of asset.

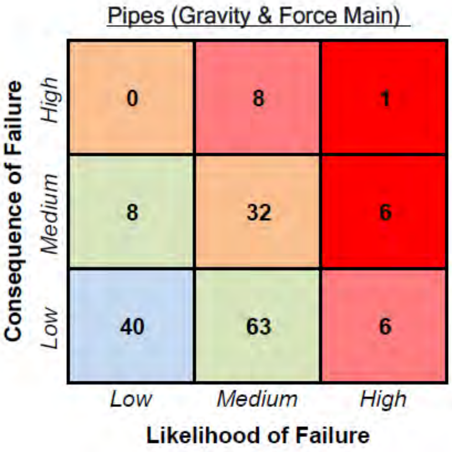
The WWTF and Lift Station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Seven pipe segments in the collection system have an extreme structural risk rating and are recommended to be replaced, lined or point repairs. Additionally, Inflow and Infiltration (I/I) has been identified in many other segments that are within the medium risk and have been identified within the 1-5 year rehabilitation to assist and alleviate some of the additional I/I flow effecting the ability to process sewage at the WWTF. and Approximately 1/4 (24%) of the collection system's gravity pipes as shown in Figure 1, have a lesser negligible risk rating and are indicative of pipes or manholes in relatively good condition.

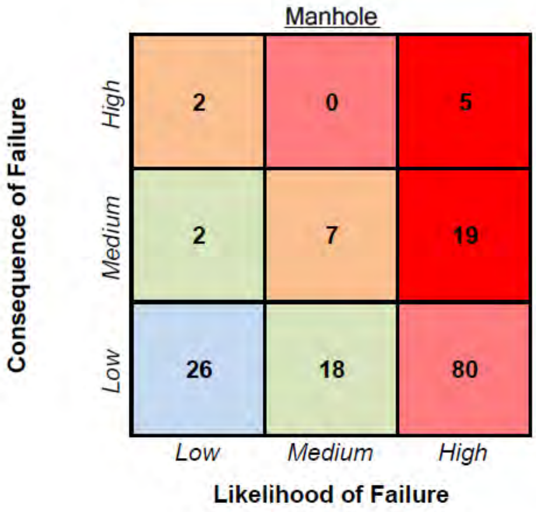


Pipes (Gravity & Force Main)

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	0	8	1
Medium	8	32	6
Low	40	63	6

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. Twenty-four manholes are identified as extreme risk, and are recommended for replacement or to be cleaned, lined and repaired. Approximately 1/3 of the system manholes are at low to medium risk and recommended to be included in a long-term 6-20-year rehabilitation strategy (35 percent).

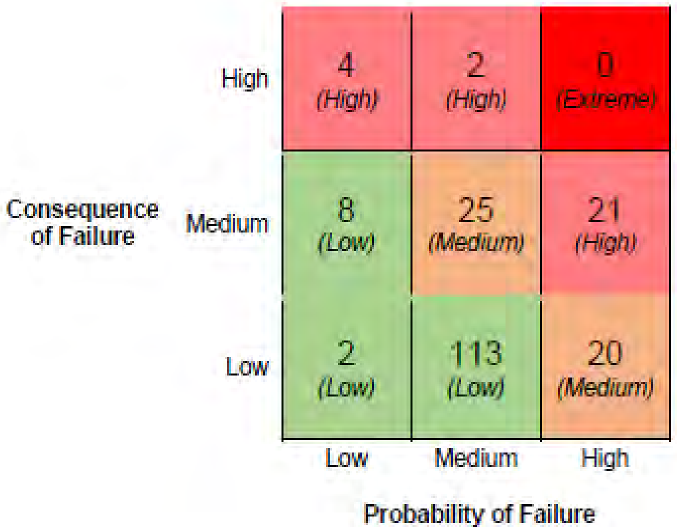


Manhole

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	2	0	5
Medium	2	7	19
Low	26	18	80

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

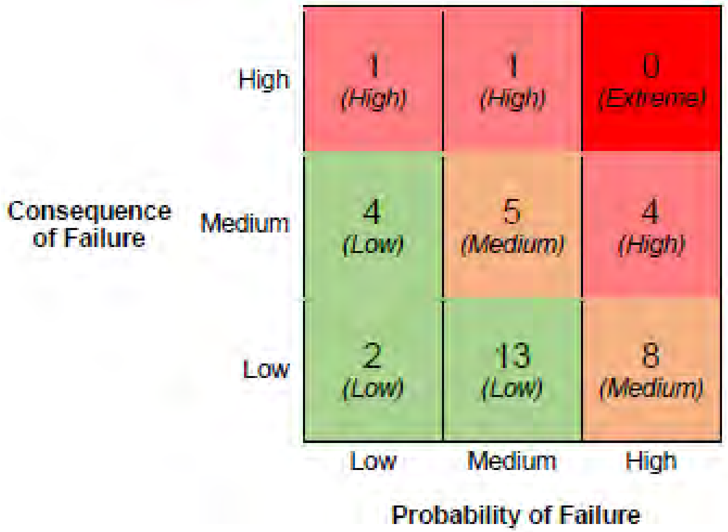
Figure 3 provides the risk ratings for the WWTF assets. No assets are identified as extreme risk. The twenty-seven assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure		Probability of Failure: Low	Probability of Failure: Medium	Probability of Failure: High
	High	4 *(High)*	2 *(High)*	0 *(Extreme)*
	Medium	8 *(Low)*	25 *(Medium)*	21 *(High)*
	Low	2 *(Low)*	113 *(Low)*	20 *(Medium)*

Figure 3. Business Risk Matrix (Risk Rating) for WWTF assets

Figure 4 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The six assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure		Probability of Failure: Low	Probability of Failure: Medium	Probability of Failure: High
	High	1 *(High)*	1 *(High)*	0 *(Extreme)*
	Medium	4 *(Low)*	5 *(Medium)*	4 *(High)*
	Low	2 *(Low)*	13 *(Low)*	8 *(Medium)*

Figure 4. Business Risk Matrix (Risk Rating) for the Lift Station assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and treatment systems.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Village's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, wastewater treatment facility and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility.

Table 4 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

Table 4. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2019	2020	2021	2022	2023
Pipe Replacement	$ 1,068,836	$ -	$ 144,962	$ -	$ -	$ 1,044,580
Pipe Lining	$ 187,503	$ -	$ 193,128	$ -	$ -	$ -
Pipe Upsize	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Point Repair	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Point Repair and Line	$ 1,517,716	$ 137,907	$ -	$ 1,463,839	$ -	$ -
Manhole Replacement	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Clean, Line, Repair and Adjust	$ 120,965	$ -	$ 76,138	$ -	$ 51,407	$ -
Manhole Clean, Line and Repair	$ 159,663	$ -	$ 44,808	$ -	$ 126,931	$ -
Manhole Repair, Line and Adjust	$ 197,460	$ -	$ 66,378	$ -	$ 145,349	$ -
Manhole Repair and Line	$ 377,426	$ -	$ 57,272	$ -	$ 351,663	$ -
Manhole Clean and Line	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Clean and Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Manhole Adjust	$ -	$ -	$ -	$ -	$ -	$ -
Total	$ 3,629,569	$ 137,907	$ 582,687	$ 1,463,839	$ 675,351	$ 1,044,580

Table 5 shows a detailed recommendation for the WWTF assets needing rehabilitation in the short-term CIP.

Table 5: WWTP High Business Risk Assets

Asset Description	Location	Consequence of Failure	Probability of Failure	Business Risk
Dewatering Screw	Headworks building	3.0	4.4	13.20
Grit Vortex	Headworks Building	3.4	3.8	12.92
Blower 2	Blower Room	2.8	4.6	12.88
Sludge Pump 1	Sludge Wet Well	3.2	3.9	12.48
Ferric Feed Pump 2	Chemical Storage Room	2.8	4.3	12.04
Sludge Pump 2	Sludge Wet Well	3.2	3.7	11.84
North Oxidation Ditch	North Oxidation Ditch	3.8	3.0	11.40
UV Lamp Bank 1	Filter Building	3.0	3.4	10.20
UV Lamp Bank 2	Filter Building	3.0	3.4	10.20
Fine Screen	Headworks Building	3.4	3.3	11.22
North Clarifier Drive	North Clarifier	3.2	3.5	11.20
South Clarifier Drive	South Clarifier	3.2	3.5	11.20
Sludge Day Tank	Yard east of Admin. Building	3.0	3.6	10.80
EQ Cell 4	Old Carleton Lagoon	3.0	3.4	10.20
Grit Classifier	Headworks Building	2.6	3.9	10.14
Effluent Water Pump	Filter Building	2.8	3.6	10.08
Equalization Pump 1	EQ Pump Station	2.8	3.4	9.52
Equalization Pump 2	EQ Pump Station	2.8	3.4	9.52
Polymer Mix Unit	Chemical Storage Room	2.8	3.3	9.24
Polymer Mix Unit	Chemical Storage Room	2.8	3.3	9.24
Sludge Storage Tank	Yard east of Admin. Building	3.8	2.4	9.12
Grit System Control Panel	Headworks Building	2.6	3.5	9.10
EQ Cell 3	Old Carleton Lagoon	2.6	3.4	8.84
South Oxidation Ditch	South Oxidation Ditch	3.8	2.0	7.60
Filter 1	Filter Building	3.8	2.0	7.60
Filter 2	Filter Building	3.8	2.0	7.60
Filter 3	Filter Building	3.8	2.0	7.60

Table 6 shows a detailed recommendation for the lift station system assets needing rehabilitation in the short-term CIP

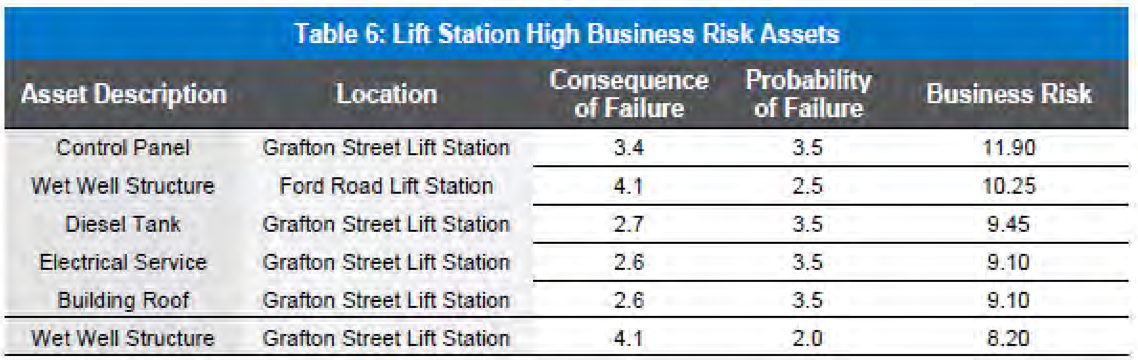


Table 6: Lift Station High Business Risk Assets

Asset Description	Location	Consequence of Failure	Probability of Failure	Business Risk
Control Panel	Grafton Street Lift Station	3.4	3.5	11.90
Wet Well Structure	Ford Road Lift Station	4.1	2.5	10.25
Diesel Tank	Grafton Street Lift Station	2.7	3.5	9.45
Electrical Service	Grafton Street Lift Station	2.6	3.5	9.10
Building Roof	Grafton Street Lift Station	2.6	3.5	9.10
Wet Well Structure	Grafton Street Lift Station	4.1	2.0	8.20

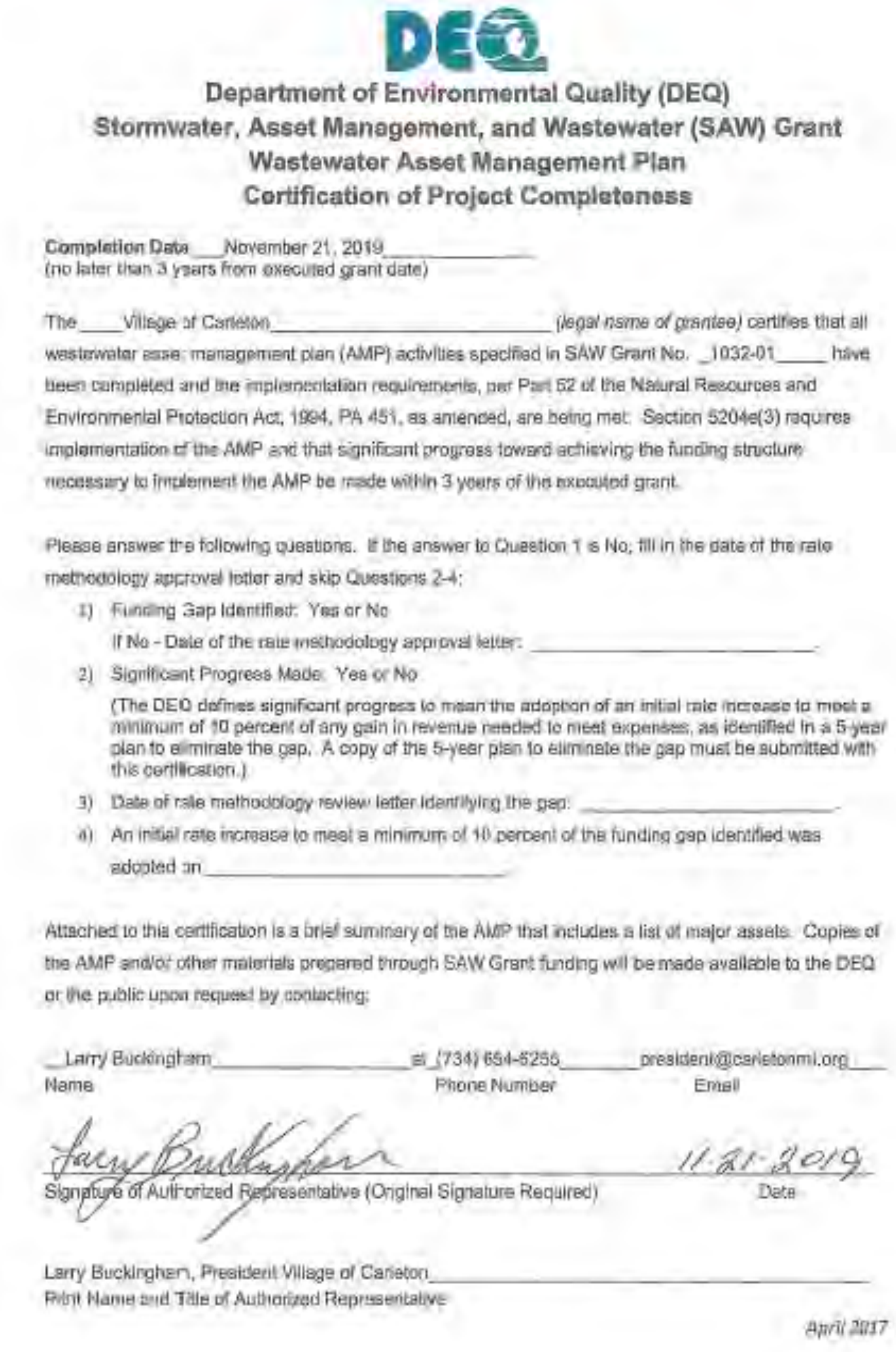
OPERATIONS, MAINTENANCE AND REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system.

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The MDEQ (EGLE) requires that a rate study be performed to assure that there is sufficient revenue to cover current operation, maintenance and replacement costs of the wastewater utility. For the Village of Carleton, the rate study report was prepared by Bakertilly Municipal Advisors and approved by the MDEQ (EGLE) on June 27, 2019.



Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date___November 21, 2019______________
(no later than 3 years from executed grant date)

The ____Village of Carleton__________________________ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. _1032-01_____ have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or No
   If No - Date of the rate methodology approval letter: ____________________________.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: _________________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on_____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

__Larry Buckingham___________________at_(734) 654-6255________president@carletonmi.org___
Name Phone Number Email

Larry Buckingham 11-21-2019
Signature of Authorized Representative (Original Signature Required) Date

Larry Buckingham, President Village of Carleton_________________________________
Print Name and Title of Authorized Representative

April 2017

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/16/2019
(no later than 3 years from executed grant date)

The City of Dexter *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1269-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Courtney Nicholls at 734-580-2229 cnicholls@dextermi.~~org~~ gov
Name Phone Number Email

Courtney Nicholls 12/17/19
Signature of Authorized Representative (Original Signature Required) Date

Courtney Nicholls - City Manager
Print Name and Title of Authorized Representative

City of Dexter

Stormwater
Asset Management Plan

SAW Grant Project No. 1269-01

Courtney Nicholls
8123 Main Street, 2nd Floor, Dexter, MI 48130
(734) 426-8303

December 2019

OHM Advisors®

Executive Summary

In November 2013, the City of Dexter applied for a Stormwater, Asset Management, and Wastewater (SAW) grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) in order to develop an Asset Management Program or Plan (AMP) for the City's stormwater system. This report summarizes the progress and findings of the AMP.

The stormwater infrastructure system of Dexter was built as the City developed. That infrastructure collects and conveys the water from rainfall so that private property is protected from flooding. Recognizing the importance of this stormwater system in protecting property from damage, maintaining property values, and maintaining the water quality in Mill Creek and the Huron River, the City initiated a comprehensive assessment of its stormwater infrastructure, as well as modifications to local development standards to address water quality and channel protection.

This Asset Management Plan summarizes this assessment and includes key recommendations for future funding levels and alternatives for funding mechanisms. This document was prepared using grant funding from the State of Michigan Stormwater Asset Management and Wastewater (SAW) Grant Program, with a total stormwater budget of $340,755 including a 10% local match required by the City. This grant was also used to prepare a companion Stormwater Management Plan. A separate AMP with an additional budget was prepared for the wastewater collection system.

The AMP was intended to accomplish the following key goals:

- Provide the City with a new framework for collecting, organizing, and storing data for their stormwater collection system using the latest available hardware and software.
- Survey key system components to augment the City's existing GIS database and to make it easier for future generations to access infrastructure data.
- Add information for sewer material type, age, and depth to the GIS database.
- Physically evaluate the structural condition of all publicly-owned system components, including storm sewer pipes, manholes, catch basins, and outfalls. Store the data in the City's GIS database.
- Analyze the flow capacity of the City's storm sewer pipes and identify where pipes should be enlarged to minimize flood potential to a reasonable level.
- Identify other capital improvements that will allow the City to reduce annual flow volumes and pollutant loadings to Mill Creek and the Huron River.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity.

Mission Statement

One important element to an asset management program is a mission statement, which identifies the overarching purpose of the City's asset management program. The purpose of the City's asset management program is defined by the Department of Public Works (DPW) as:

> ***The City is committed to enhancing the safety, health, and quality of life for the people serviced by the wastewater and stormwater systems through effective management and maintenance of its infrastructure.***

Asset Management Team Leaders

The Asset Management Team listed in Figure 1 is committed to the asset management mission statement and were instrumental in the progress made and findings outlined in this report. Further questions on the City's AMP can be directed to these team members.

Courtney Nicholls

- City Manager
- 734-580-2229

Dan Schlaff

- Superintendent of Public Services
- 734-426-4572

Figure 1: Asset Management Team Leaders

Asset Inventory

An asset inventory is a list of a community's assets and their characteristics. The City of Dexter had 4.7-miles of stormwater sewer cleaned and televised in the process of creating this inventory. The City recorded and digitized most of its storm sewer collection system, including manholes and storm sewer pipes. Special attention was given to include a variety of asset sizes, materials, and install dates in the sample set. The City populated the attributes of the inventory using the field collected information. This inventory resides in the City's GIS framework that was enhanced as part of this effort. The City also inventoried and assessed its outfalls and detention ponds as part of the Stormwater Management Plan.

List of Major Assets

The total number of major assets in the storm sewer system are listed below. The full AMP report contains additional details of the inspected assets and their conditions.

- 358 manholes
- 21.8 miles of storm sewer
- 48 detention ponds
- 24 outfalls

Condition Assessment

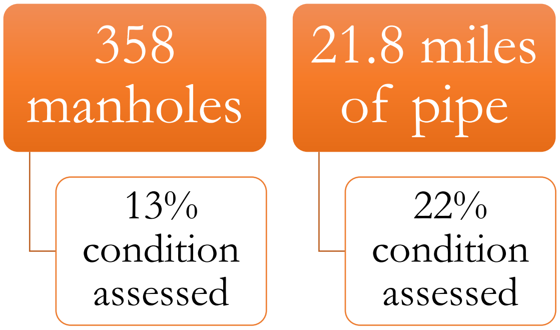


Figure 2 : Portion of Sewer System Assessed

With the intent of assessing a representative sample of the stormwater system, the City's storm sewer infrastructure (stormwater pipes and manholes) has been assessed. The condition of the infrastructure is based on the National Association of Sewer Service Companies (NASSCO) condition grading system, which uses a scale of one (1) to five (5). One (1) indicates the infrastructure is in very good condition or new, while five (5) indicates the infrastructure is in very poor condition or has already failed. A weighted condition rating was used to summarize the condition of the pipe and manhole assets. This rating was calculated by multiplying each of the scores by the percentage of pipe length or manholes assigned that score, and then summing the products. As seen in Figure 2, about 13% of the 358-structure manhole network and about 22% of the approximately 22- miles of stormwater pipe infrastructure has been condition assessed. The condition assessment revealed that the overall system is in fair condition but will benefit from continued inspection and maintenance.

It was observed that:

- Manhole infrastructure has an average structural rating of 2.13 and an average O&M rating of 1.02. Structural manhole defects were predominately related to brickwork and cracks. O&M manhole issues were driven by deposits and infiltration.
- Sewer infrastructure has an average structural rating of 2.09 and an average O&M rating of 1.81. Structural defects as observed in the storm system are cracks and surface damage, while the most common O&M defects in the surveyed system are deposits.
- The weighted overall rating of the manhole infrastructure is 2.15, which equates to an overall good condition.
- The weighted overall rating of the sewer pipe infrastructure is 2.51, which equates to an overall good condition.
- The infrastructure will continue to degrade over time. Therefore, Key Service Criteria were identified to locate and fix infrastructure before they deteriorate.

Hydrologic and Hydraulic Modeling

As part of the Stormwater Management Plan, the hydrologic/hydraulic modeling program EPASWMM version 5.1 was used to calculate peak flow rates and determine the hydraulic capacity of identified portions of Dexter's stormwater collection system for the 10-year recurrence interval storm event. The larger (trunk) storm sewers were modeled during this effort. The stormwater model revealed that some of the City's sewers are too small to provide a reasonable level of service. Although immediate replacement is not recommended, this Asset Management Plan identifies opportunities to replace these sewers as adjacent road replacement projects and/or sanitary improvement projects are implemented. Detailed information regarding the model and results are available in the Stormwater Management Plan.

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the determination of Business Risk Exposure (BRE), which is identified as the combination of the Probability of Failure (PoF) as well as the Consequence of Failure (CoF) as shown in Figure 3.

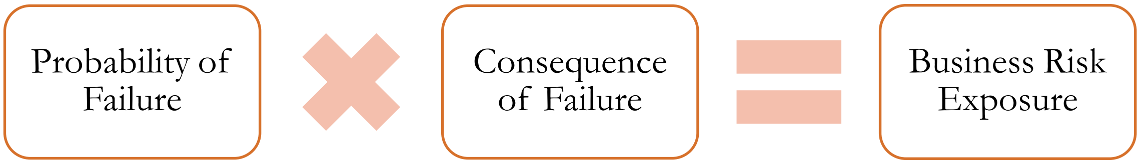


Figure 3 : Risk Equation

The PoF is based on the infrastructure condition (NASSCO score). The CoF focuses on the economic losses and impacts to society due to an asset's failure. The CoF considers the pipe diameter, network position, location, number of top users, and proximity to environmentally sensitive features. The assets that present the greatest business risk are the focus of the capital improvement plan.

The BRE scores show that about 49% of the pipes are low priority, 44% are medium priority, and only 7% are high priority. High priority pipes indicate that they are in less than good condition and have a relatively high criticality. This BRE distribution is consistent with the overall pipe condition rating of 2.51 (good condition). Alternatively, the BRE scores for manholes show that about 60% of the manholes are low priority, 24% are medium priority, and 16% are high priority. This BRE distribution is consistent with the overall manhole condition rating of 2.15 (good condition). The assets that present the greatest business risk are the focus of the capital improvement plan.

Level of Service

The City adopted a level of service criteria that is in line with its mission statement (outlined earlier). These criteria provide the guidelines to manage the storm sewer asset infrastructure and are summarized in Table 1.

Table 1: Key Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	Annual outfall & MACP* inspections	• MACP inspection of 20% of manholes/catch basins per year. • Annual inspection of outfalls
GIS Asset Inventory	Tracking asset conditions in the GIS geodatabase	• Maintain a continuously updated GIS geodatabase
Service Delivery	Response to stormwater complaints	• Respond to complaints efficiently
Cost Control	Provide cost effective service to minimize rate increases	• Proactively inspect and maintain infrastructure to maximize useful life

* Manholes Assessment Certification Program (MACP), to assess manhole condition

Capital Improvement Plan and Funding Feasibility

The condition assessment helped identify capital improvements that will allow the City to operate at its maximum potential. Additional long-term operations and maintenance strategies will provide the means to maintain a sound structural condition into perpetuity, including:

- Regularly-scheduled sewer, manhole, detention pond, and outfall inspection
- Repair and rehabilitation to address structural problems resulting from aging infrastructure

As communities like Dexter have developed and aged, the buried infrastructure has deteriorated. The City should begin to systematically repair, rehabilitate, and/or replace these aging components so that City residents and businesses experience a consistent level of service and avoid the following:

- Increased threat of property damage and loss due to flooding
- Increased potential for impassable roadways during heavy rainfall events
- Increased pollutant loading to Mill Creek and the Huron River.

The Capital Improvement Plan and subsequent Funding Feasibility Analysis identified that the City of Dexter has a significant funding gap for their stormwater system. The needs identified in this Asset Management Plan exceed available local funding under the City's current budget framework. This is largely due to the City, like most Michigan communities, having no dedicated funding source for stormwater infrastructure. Unlike water and wastewater systems which have fee-based programs to fund the operation and maintenance of infrastructure, stormwater has no clear path to dedicated funding, largely due to judicial precedent which exposes communities to unnecessary legal risk when they attempt to establish stormwater enterprise funds.

This Asset Management Plan recommends a dedicated funding source be established to collect annual revenues of $227,000 to meet identified needs. This funding mechanism will likely be required into perpetuity and may need to be adjusted if the City changes its expectations for level of service or if other priorities change. The key components of the recommended stormwater program are listed below.

Table 2: Proposed Stormwater Program

Items	Annual Cost
Manholes	$ 11,000
Storm Sewer Pipes	$ 78,000
Detention Ponds	$ 10,000
Outfalls	$ 4,000
Proposed Improvements	$ 124,000
Total	**$ 227,000**

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/16/2019
(no later than 3 years from executed grant date)

The City of Dexter *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1269-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/14/19.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ____________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Courtney Nicholls at 734-580-2229 cnicholls@dextermi.~~org~~gov
Name Phone Number Email

Courtney Nicholls 12/17/19
Signature of Authorized Representative (Original Signature Required) Date

Courtney Nicholls - City Manager
Print Name and Title of Authorized Representative

City of Dexter

Sanitary Sewer System

Asset Management Plan Summary

SAW Grant No. 1269-01

Courtney Nicholls
8123 Main Street, 2nd Floor, Dexter, MI 48130
(734) 426-8303

December 2019

OHM Advisors®

I. Introduction & Executive Summary

In November 2013, the City of Dexter applied for a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to develop an Asset Management Program for the City's sanitary sewer system. This report summarizes the progress and findings of the sanitary sewer asset management program.

This Asset Management Plan (AMP) was prepared using grant funding from the SAW Grant Program, with a total wastewater budget of $300,300 including a 10% local match required by the City. A separate AMP with an additional budget was prepared for the stormwater system.

The AMP was intended to accomplish the following key goals:

- Gather field information about key system components to update the City's Geographic Information System (GIS) database and to make it easy for future generations to access infrastructure data.
- Add information for sewer material type, size, and depth to the GIS database.
- Physically evaluate the structural condition of a portion of the publicly owned system components, including wastewater sewer pipes and manholes, and store the data in the City's GIS database.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
    - Regularly scheduled sewer inspection (televising)
    - Repair and rehabilitation to address structural problems resulting from aging infrastructure.
- Provide recommendations for a prioritized Capital Improvement Plan (CIP) to be funded through the City's sewer fund.

Mission Statement

One important element to an asset management program is a mission statement, which identifies the overarching purpose of the City's asset management program. The purpose of the City's asset management program is defined by the Department of Public Works (DPW) as:

> ***The City of Dexter is committed to enhancing the safety, health, and quality of life for the people serviced by the wastewater and storm water systems through effective management and maintenance of its infrastructure.***

Asset Management Team Leaders

The team leaders listed in Figure 1 are committed to the asset management mission statement and were instrumental in the progress made and findings outlined in this report. Further questions on the City's asset management program can be directed to these team members.

Courtney Nicholls

- City Manager
- 734-580-2229

Dan Schlaff

- Superintendent of Public Services
- 734-426-4572

FIGURE 1. ASSET MANAGEMENT TEAM LEADERS

Asset Inventory

An asset inventory is a list of a community's assets and their characteristics. The City of Dexter had 4.4 miles of sanitary sewer cleaned and televised in the process of creating this inventory. The City updated its digitized records of the pipes and manholes within the sanitary sewer collection system with the information collected from the inspections. This inventory resides in the City GIS framework that was enhanced as part of this effort. The City also inventoried its four pump stations and assessed the condition of each station and its assets. The four pump stations include Huron, Dexter Crossings, Industrial, and Westridge.

List of Major Assets

The total number of major assets within the City's sanitary sewer system are listed below. The full AMP report contains additional details of the inspected assets and their conditions.

- 22 miles of sanitary sewer
- 569 sanitary sewer manholes
- 4 lift (pump) stations

Condition Assessment

The City assessed a representative sample of sanitary sewer infrastructure including sanitary sewer pipes and manholes. The condition of all four pump stations was also assessed. The assets were rated on a scale of zero to 5 based on the National Association of Sewer Service Companies' (NASSCO's) nationally recognized "Condition Grading System". Zero indicates the infrastructure is in good condition, while 5 indicates the infrastructure is in poor condition or has already failed. A weighted condition rating was used to summarize the condition of the pipe and manhole assets. This rating was calculated by multiplying each of the scores by the percentage of pipe length or manholes assigned that score, and then summing the products. About 11% of the 569 manholes and about 20% of the 22 miles of sanitary sewer pipes were able to be condition assessed within the project schedule and budget (Figure 2). The condition assessment revealed that the system is in fair condition, but will benefit from continued inspection and maintenance.

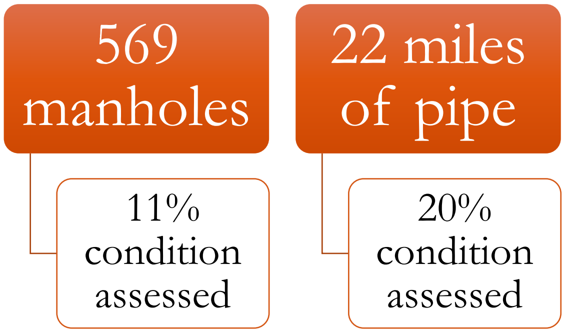


FIGURE 2: PORTION OF SYSTEM ASSESSED

It was observed that:

- Manhole infrastructure has a weighted structural rating of approximately 1.9 and weighted O&M rating of 1.2. Structural manhole defects were predominately related to cracks and brickwork. O&M manhole issues were driven by deposits and obstructions.
- Sewer infrastructure has a weighted structural rating of 2.3 and weighted O&M rating of 2.4. Structural sewer defects were predominantly related to cracks and pipe sag. O&M defects were predominantly related to deposits and roots.
- The weighted overall rating of the manhole infrastructure is 2, which equates to an overall good condition.
- The weighted overall rating of the sewer pipe infrastructure is 3, which equates to an overall fair condition.
- Most of the assets at each pump station have condition ratings of 2 or 3, indicating that they are in good or fair condition. No major issues were identified with any of the assets besides typical deterioration expected over the lifecycle of the asset.
- The infrastructure will continue to degrade over time. Therefore, Key Service Criteria were identified to locate and fix infrastructure before they deteriorate.

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the determination of Business Risk Exposure (BRE), which is identified as the combination of the Probability of Failure (PoF) as well as the Consequence of Failure (CoF) as shown in Figure 3.

FIGURE 3 : RISK EQUATION

The PoF is related to the physical condition of an asset. The CoF focuses on the economic losses and impacts to society due to an asset's failure. The CoF takes into account the pipe diameter, network position, location, proximity to top users, and proximity to environmentally sensitive features.

The BRE scores show that about 38% of the pipes are low priority, 35% are medium priority, and 27% are high priority. High priority pipes indicate that they are in less than good condition and have a relatively high criticality. This BRE distribution is consistent with the overall pipe condition rating of 3 (fair condition). Alternatively, the BRE scores for manholes show that about 50% of the manholes are low priority, 45% are medium priority, and only 5% are high priority. This BRE distribution is consistent with the overall manhole condition rating of 2 (good condition). The assets that present the greatest business risk are the focus of the capital improvement plan.

Level of Service

The City adopted a level of service criteria that is in line with its mission statement (outlined earlier). These criteria provide the guidelines to manage the sanitary sewer asset infrastructure and are summarized in Table 1.

TABLE 1. KEY SERVICE CRITERIA

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	Annual PACP* & MACP** Inspections	• MACP inspection of 10% of manholes per year • PACP inspection of 10% of sewer pipes per year
GIS Asset Inventory	Tracking asset conditions in the GIS geodatabase	Maintain a continuously updated GIS geodatabase
Service Delivery	Response to Sanitary Sewer Complaints	Respond to complaints and service outages efficiently
Cost Control	Provide Cost Effective Service to Minimize Rate Increases	Proactively inspect and maintain infrastructure to maximize useful life

*PACP = Pipeline Assessment Certification Program
**MACP = Manhole Assessment Certification Program

Revenue Structure and Capital Improvement Plan

The condition assessment helped identify capital improvements that will allow the City to operate at its maximum potential. Additional long-term operations and maintenance strategies will provide the means to maintain a sound structural condition into perpetuity, including:

- Regularly scheduled sewer and manhole inspections, and
- Rehabilitation or replacement to address structural problems resulting from aging infrastructure.

As communities like Dexter have developed and aged, the underground infrastructure continues to deteriorate. The City shall begin to systematically repair, rehabilitate, and/or replace these aging components so that City residents and businesses experience a consistent level of service in order to avoid the following:

- Increased threat of property damage, public health, and safety,
- Increased potential for environmental damage, and
- Increased potential for impassable roadways due to failed infrastructure.

Rates and charges were reviewed, and it was determined that the City currently has sufficient funding with no funding gap identified. The City is also performing a rate analysis to determine if there are adequate funds to implement the proposed CIP. This analysis will be completed after the conclusion of the SAW Grant.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 2019**
(no later than 3 years from executed grant date)

The Village of Elkton *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1228-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Phyllis A. Baranski at 989-375-2270 elktonclerk@comcast.net
Name Phone Number Email

12-23-2019
Signature of Authorized Representative (Original Signature Required) Date

Phyllis A. Baranski Village Clerk
Print Name and Title of Authorized Representative

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **December 2019**
(no later than 3 years from executed grant date)

The Village of Elkton *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1228-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

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Phyllis A. Baranski	at	989-375-2270	elktonclerk@comcast.net
Name		Phone Number	Email

12-23-2019
Signature of Authorized Representative (Original Signature Required) Date

Phyllis A. Baranski Village Clerk
Print Name and Title of Authorized Representative

STORMWATER ASSET MANAGEMENT PLAN

VILLAGE OF ELKTON

HURON COUNTY, MICHIGAN

DECEMBER 2019

BASED ON:

***ASSET MANAGEMENT GUIDANCE FOR WASTEWATER AND STORMWATER SYSTEMS*, MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, JULY 2013**

STORMWATER, ASSET MANAGEMENT, AND WASTEWATER (SAW) GRANT

PROJECT NUMBER: 1228-01

PREPARED BY:

230 S. Washington Avenue
Saginaw, MI 48607

PROJECT ID NUMBER: 124041SG2016

VILLAGE OF ELKTON
SAW Grant Project No. 1228-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
230 S. Washington
Saginaw, MI 48607
Phone: (989)-754-4717

Owner: **VILLAGE OF ELKTON**
57 N. Main Street
Elkton, MI 48731
Phone: (989) 375-2270
Randy Haley, Village President

The Village of Elkton entered into an agreement with the Michigan Department of Environmental Quality and the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. The Village received the follow grants:

*Wastewater Asset Management Plan (WWAMP) – 100% Grant	$242,250
Stormwater Asset Management Plan (SWAMP) – 90% Grant	***$182,750***
Eligible Cost Subtotal	$425,000
LESS Local Match	($18,275)
Total Grant Amount	$406,725

Disadvantaged for Wastewater Asset Management Plans, no match required.

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; December 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

List of Major Assets

- 29,754 feet of storm sewer ranging in size from 6” to 30”
- 208 Village Storm Structures

Storm Water Asset Inventory and Condition Assessment

The Village of Elkton’s storm water collection system consists of a series of 6” to 30” pipes. These pipes or “storm sewers” collect storm water from “catch basins”, footing drains/sump systems (sump leads), open inlets, roadside drainage, roof drains, groundwater infiltration etc. A base map of the system is included in Appendix 2.

For the collection system, Spicer Group, Inc. completed a mobile mapping LiDAR survey of the entire Village and used the survey information to develop a comprehensive Geographic Information System (GIS). This GIS is located on a new computer in the Village office and is detailed "smart" mapping system with databases, using the ArcGIS/Arc Online by ESRI platform. This system can be accessed and updated in the field by DPW staff from any of two new iPads or two new desktop computers supplied as part of the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspection etc. can be accessed. This information can also be queried to provide specific lists and maps, and updated easily when future improvements are made.

The Village currently has around 5.6 miles of storm sewer pipes ranging in size from 6" to 30". Below is a table showing the diameter and materials of the storm sewer piping:

Table ES-1 – Village-Owned Storm Water Pipes by Diameter and Material

	PE	PVC	RCP	VCP	UNKNOWN	TOTAL
6"	278		65	37		380
8"	552	1893	5694	1284	469	9892
10"	6	589	1256		191	2325
12"	925	206	6936	6		8073
15"		736	2885	1249		4870
18"	374		1251			1625
24"			1599			1599
30"			1273			1273
TOTAL (ft):	2135	3424	20959	2576	660	29,754
Percent By Material:	7%	11%	69%	9%	4%	100.00%

Below is a table showing a breakdown of ownership for storm water assets located inside the Village limits of Elkton. The Michigan Department of Transportation has storm water drainage along Pigeon Road (M-142).

PE – Polyethylene Pipe

PVC – Polyvinyl Chloride Pipe

RCP – Reinforced Concrete Pipe

VCP – Vitrified Clay Pipe

Table ES-2: Storm Water Assets by Owner

Ownership	Length (Feet)	% of System
Village of Elkton	29,754	82.3%
County Drain	561	1.6%
MDOT	5814	16.1%
Total	36129	100.0%

Michigan Pipe Inspection from Port Huron completed a cleaning and televising program for the storm sewer pipes. Spicer Group, Inc. completed a comprehensive inspection of all the storm water structures owned by the Village. The NASSCO Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards were used to identify and code the defects and was used to standardize the scoring and quantify the condition of the storm water assets.

There are several County Drains within the Village limits that are owned, operated, and maintained by drainage districts through the Huron County Drain Commissioner's office. These County Drains benefit the residents within each respective drainage district but are not considered to be Village-owned storm water assets. The County Drains are as follows:

- Gilbert Drain
- Elkton Drain
- East Elkton Drain

All storm sewers in the Village discharge to either Gilbert, Elkton or East Elkton Drain. From there, storm water flows to the Pinnebog River and ultimately ends up in the Saginaw Bay.

Criticality (Risk)

For each asset in the Village's storm water system, a criticality/risk analysis was performed to determine and prioritize the Village's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including all pipes, manholes, drainage structures, etc. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences, if that asset failed. Finally, the Criticality (Risk) score was calculated using:

RISK = LoF x CoF

For the Village's storm water collection system, there were thirty-eight (38) pipe locations and thirty (30) structure locations identified with high LoF scores. A total of one (1) pipe location had a high COF score while nine (9) locations had somewhat medium COF scores. When analyzing the overall risk, four (4) pipe locations had a high risk. Eleven (11) storm structures locations had a medium risk level. These scores were evaluated and incorporated into the resulting Capital Improvement Plan.

Level of Service

Mission Statement

The Village of Elkton strives to maintain a basic storm water collection system service that *addresses* the residents' wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our residents.

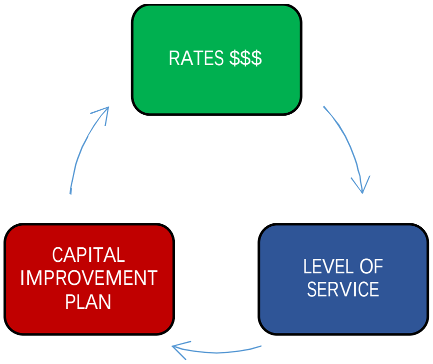
Basic goals:

- Operate and maintain the storm water system to minimize flooding and property damage.
- Provide rapid and effective emergency response service.
- Review the condition of storm water assets as a part of other infrastructure construction projects.
- Seek a funding source for operation & maintenance and repair/replacement of storm water assets.
- Review the maintenance and capital improvement plans/projects annually to determine the lowest cost options for our residents:
    - **"MINIMUM"** Level of Service – Address resident complaints as they come in.
    - **"MEDIUM"** Level of Service – Point repairs to the existing system that have been identified. Mainly projects that the cleaning and televising crew had to abandon the inspection due to obstructions, collapses, holes etc.
    - **"HIGH"** Level of Service – Lining or replacement projects to be completed with other infrastructure improvement projects.

Performance Measurements:

- Review annual performance goals for storm sewer system operation & maintenance, rehabilitation, and capital improvements.
- Annually review the number and severity of resident complaints.
- Annually review the amount of storm sewer assets that have been repaired or replaced.
- Review and update the Storm Water Asset Management Plan, GIS, and Capital Improvement Plan annually.

ES-2: Asset Management Plan Evaluation Process



Since Michigan has not created a climate which would allow municipalities to create either an enterprise fund or a utility fee for storm water asset improvements, funding comes from the Village's Local and Major Street funds. The Village has fixed sources of revenues from a combination of State, County, Village, and Village taxes. These limited funds are in some ways restricted on their use in that they are primarily designated for road improvements.

Since there is no real funding mechanism for storm water assets, the Village has been maintaining a minimum Level of Service. The storm sewer system is cleaned annually and repairs to pipes or catch basins are made as needed. When residents notify the Village of flooding or drainage issues, the DPW will address the issue on a case-by-case basis. When the Village has street resurfacing or replacement projects, the storm water system is inspected, evaluated, and appropriate repairs and/or replacement is done based on the funding available.

Revenue Structure

Spicer Group teamed with Municipal Analytics for the revenue structure analysis for the AMP. Since Michigan has not created a climate which would allow municipalities to create either an enterprise fund or a utility fee for storm water asset improvements, funding comes from the Village's general fund. Act 51 funds received from the State for street/road improvements could also be used for storm water improvements that affect the street projects directly. However, Act 51 funding is very limited. Another mechanism for funding large storm water improvements is through the Huron County Drain Commissioner's office, using the Drain Code, PA 40 of 1956.

The financial impact analysis found that the Village's streets/general fund does not have sufficient revenue to meet medium and high Level of Service storm water capital improvement projects identified and does not have a mechanism to collect rates/fees to provide storm water collection services. The Village will strive to maintain a minimum level of service and seek outside grants and funding for storm water infrastructure capital improvements. The Village should continue to update this analysis on an annual basis to determine if funds become available to address the proposed capital improvement projects.

Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the stormwater system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP.

Until a funding mechanism for storm water improvements is found, the Village is forced to continue its *reactionary* policy. In order to have some sort of financial mechanism for the Village to *proactively* improve the storm water system, we recommended a minimal discretionary budgetary line item of $2,500 per year for the Village to continue cleaning & televising, lining, root treatment, and misc. repairs. With this discretionary budget line item, many smaller "Minimum" Level of Service projects can be slowly completed.

Conclusion

The Village of Elkton's storm water system is a typical, aging municipal infrastructure system. Since there is no real funding mechanism for storm water assets, the Village has been maintaining a very minimum Level of Service for its residents. This has resulted in a reactionary operation and maintenance practice. When residents notify the Village of flooding or drainage issues, the DPW will address the issue on a case-by-case basis. When the Village is planning for street resurfacing or replacement projects, the storm water system is inspected, evaluated, and appropriate repairs and/or replacement is done based on the funding available.

In order to have some sort of financial mechanism for the Village to proactively improve the storm water system, we recommend a minimal discretionary budgetary line item of $2,500 per year for the Village to continue cleaning & televising, lining, root treatment, and misc. repairs.

Until a funding mechanism for storm water improvements is found, the Village is forced to continue this reactionary policy. The Village should continue to urge its State legislators to develop a plan to fund municipal storm water improvements, such as supporting HB 5991.

In accordance with the SAW Grant requirements, the Village's Storm Water Asset Management Plan (SWAMP) needs to be kept available for citizen review for 15 years. The SWAMP should be reviewed annually, and the components updated and included in the Village's annual budget process.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 2019
(no later than 3 years from executed grant date)

The Village of Elkton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1228-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: 10-07-2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Phyllis A Baranksi at 989-375-2270 elktonclerk@comcast.net
Name Phone Number Email

12-23-2019
Signature of Authorized Representative (Original Signature Required) Date

Phyllis A. Baranski Village Clerk
Print Name and Title of Authorized Representative

VILLAGE OF ELKTON
SAW Grant Project No. 1228-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
230 S. Washington Avenue
Saginaw, MI 48607

Owner: **VILLAGE OF ELKTON**
57 N. Main Street
Elkton, MI 48731
Randy Haley, Village President
989-375-2270

On September 23, 2016, The Village of Elkton received a Notice of Grant Application Approval as a Round 4 SAW Grant awardee from the Michigan Department of Environmental Quality (MDEQ) the Village received the following grants:

*Wastewater Asset Management Plan (WWAMP) 100%	$242,250
Storm Water Asset Management Plan (SWAMP) 90%	$187,750
Eligible Cost Subtotal	$425,000
LESS Local Match	($18,750)
Total Grant Amount	$406,725

*Disadvantaged for Wastewater Asset Management Plans; no match required

The Asset Management Plans (AMPs) needed to be completed within three years of the date of the Michigan Finance Authority (MFA) agreement; December 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Critical Assets (Risk)
- Level of Service Determination
- Revenue Structure
- Capital Improvement Plan

List of Major Assets

- 28,168 Feet of sanitary sewer pipes ranging in size from 8”-10”
- 103 Sanitary Sewer Manholes
- 1 pumping station
- 3-cell lagoon treatment facility

Wastewater Asset Inventory and Condition Assessment

The Village’s wastewater system consists of three main components: The collection system (pipes and manholes), pump station/forcemain and the wastewater treatment facility lagoon.

For the collection system, Spicer Group, Inc. completed a mobile mapping LiDAR survey of the entire Village and used the survey information to develop a comprehensive Geographic Information System (GIS). This GIS is located on a new computer in the Village office and is a detailed "smart" mapping system with databases, using the ArcGIS/Arc Online by ESRI platform. This system can be accessed and updated in the field by DPW staff from new iPads supplied as part of the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspections etc. can be accessed. This information can also be modified to provide specific lists and maps, and can be updated easily when future improvements are made.

The Village currently has 28,168 feet of sanitary sewer pipes in the entire sanitary sewer collection system ranging in size from 8-10", 103 sanitary sewer manholes, and 342 service connections. Michigan Pipe Inspection, from Port Huron completed a comprehensive cleaning and televising program of the sanitary sewer pipes using the NASSCO Pipeline Assessment Certification Program (PACP) to identify features and defects within the collection system. Spicer Group, Inc. completed a comprehensive inspection of the manholes using the NASSCO Manhole Assessment Certification Program (MACP) standards to identify features and defects within the manholes. The MACP/PACP system is used to standardize the scoring and to quantify the condition of the wastewater assets.

The next main component of the Village's wastewater system is one pumping station. Spicer Group completed an inspection and condition assessment on the station and provided recommendations for future improvements. Many of the components of the pump station were past their useful life but appeared to be working. It was recommended that the Village start budgeting for these future upgrades.

The last main component of the Village's wastewater system is the wastewater treatment facility lagoon (WWTL) located northeast of the Village limits. Spicer Group completed an inspection and assessment of the lagoon. Nusystems, LLC performed a sludge judge and chemical analysis of the bio solids. Results from the lab found the material meets the MDEQ requirements for a Residuals Management Plan (RMP) and the material can be recycled in a beneficial reuse program such as land application.

Criticality (Risk)

For each asset in the Villages' wastewater system, a criticality/risk analysis was performed to determine and prioritize the Village's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including all pipes, manholes and pumping stations. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences if that asset failed. Finally, the Criticality (Risk) score was calculated using:

LoF x CoF = RISK

The collection system had 4 pipes with a LoF of 5 or above. The collection system also had 3 structures with an LoF of 5.1. The collection system only had 11 pipes that fell into the Moderate to Major Disruption CoF category. Pipe segment 007-006 had the highest overall CoF value of 3.7. All other pipe segments had CoF scores of below 3.5 which puts them into the moderate disruption category. There were four manholes with scores of 10.5-13.6 which indicates medium risk. These manholes (72, 80, 78, 88) have a poor condition rating due to a high LoF and a medium economic factor contributing to the structure's CoF. These factors cause the overall risk to be moderately high. All the Village's other manholes are considered to be "low" risk assets. Overall, one pipe in the Village of Elkton fell into the high-risk category. This was pipe segment 007-006 with an overall risk score of 18.8. Another 6 pipe segments fell into the medium risk category. The remaining pipe segments all fell into the low risk category.

Overall the Village of Elkton's collection system is in very good condition. Most of the pipes had likelihood of failure scores under 3 indicating good condition. This contributed to low consequence of failure scores and overall low risk scores. The manholes were also in overall good condition, however a total of three structures were unable to be inspected therefore they received high LoF values due to current condition being unknown. Also, four manholes are below grade and need to be raised to grade so they are accessible for maintenance and emergency situations. Three manholes could not be opened for various reasons addressed in the Capital Improvement plan. Overall CoF and Risk values for the manholes were also very low for the majority of the manholes due to being in good condition. The pump station was critically assessed and was found to have some components receiving low to medium LoF scores indicating some rehabilitation should occur. Since the pump station handles wastewater flow for the entire system, most components received very high CoF scores. The high CoF and low to medium LoF scores for many of the pump station components led to an overall medium to high-risk value for the pump station.

Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of service does the Village want to provide to its wastewater customers? How are projects going to be prioritized and included in the Capital Improvement Plan (CIP)? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Villages' Level of Service Goals are as follows:

Mission Statement

The Village of Elkton strives to develop a financially stable, high performing wastewater collection, pumping and treatment service that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.

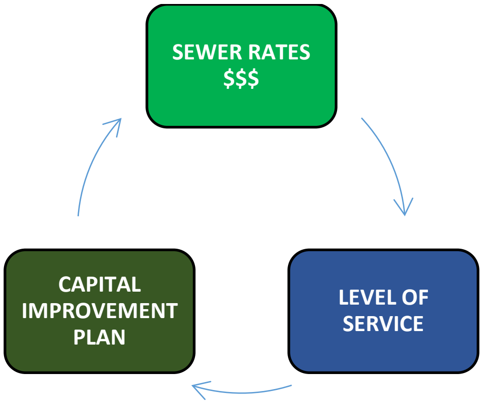
One of the basic goals is to review the capital improvement projects to determine the best value options for the Villages' customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Priority projects to meet the minimum local, State, and/or Federal regulations. Typically to be completed within the next 5 years.
- "**MEDIUM**" Level of Service – Projects that will need to be done eventually; typically when other infrastructure projects are happening.
- "**HIGH**" Level of Service – Projects that are on the long range radar that could spur future development and growth for the Township.

Generally, the "high" level of service projects will have a higher construction/initial cost but would provide a better long-term or life cycle cost for the Village. The "minimum" level of service projects would have a lower initial cost, but would also have a shorter life span and higher overall life cycle costs.

As the AMP progressed, different scenarios were evaluated to show the relationship between the Villages' desired Level of Service and the costs of the capital improvement projects associated with that LOS, and the effect of that LOS on sewer rates.

Asset Management Plan Evaluation Process



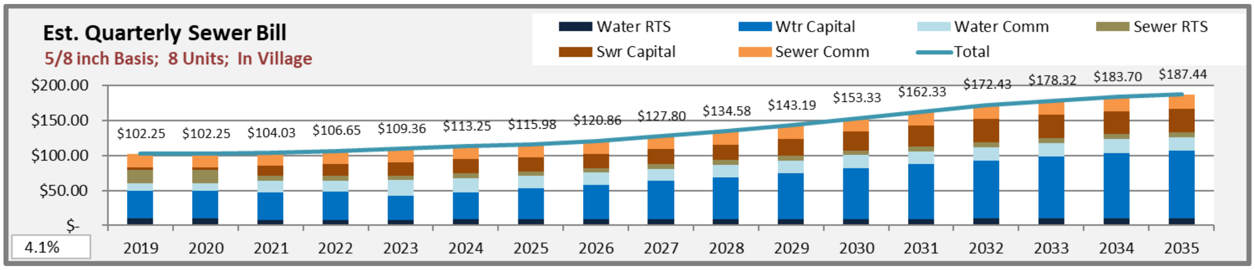
The resulting capital improvement plan and revenue structure was one that met the Villages' goals, addressed the improvements that need to be made, and is a sustainable rate structure for the Village's customers.

The Village chose to adopt a Minimum Level of Service.

<u>Revenue Structure</u>

Spicer Group teamed with Municipal Analytics for the revenue structure analysis for the AMP. Wastewater account balances, expenditures, revenues, etc. were reviewed and inputted into financial software to perform a gap analysis to determine if there were any deficiencies in the rates. The recommended rate structure includes a quarterly readiness-to-serve charge and a capital/debt charge based on meter size. The commodity rate is based on 1,000 gallons of metered water. The meter-based RTS charge is intended to recover a larger portion of the fixed operating costs of the system, and it reflects the extra capacity demand placed on the system by larger users. The capital/debt charge is intended to recover the estimated costs of future capital investment in the water and sewer systems, whether those investments are funded with cash or debt.

The Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion, and the rate structure to support those improvements was determined. Many iterations/scenarios were performed to come up with a rate structure that met the Villages' Level of Service goals, completed the CIP projects that are needed, and had sustainable rates for the Village's customers. Additional testing and analysis were performed to arrive at a "smoothed" rate strategy, as illustrated below. The impact on typical residential ratepayers is expected to average 4.1% per year through 2035. Of course, future rate requirements may differ from the forecasted rates in this report, due to increasing costs, unexpected emergency repairs or new regulations. This should be reviewed annually as a part of the Villages' normal budgeting process. Exact amounts of annual rate increase by year can be seen in the table below.



Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the wastewater system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. Various degrees of Level of Service and the associated CIP projects were evaluated and plugged into the Revenue Structure model, and the resulting sewer rates for that set of scenarios were reviewed. If the projected rates were too high, a lower LOS was chosen and those CIP projects were plugged into the Revenue Structure model and the resulting rates were then reviewed. The process then continued with different CIP projects at varying LOS's until an acceptable rate structure, level of service, and capital improvement plan was developed. A 5-year and 20-year CIP was developed that includes various collection system improvements. The table below summarizes the minimum service level projects that were included in the 5-year capital improvement plan.

Elkton Sanitary Sewer Capital Improvement Plan

Annual Maintenance

Annual Operation and Maintenance - Continue Cleaning and Televising (Know Problem Areas)	$5,000.00
Total Cost	**$5,000.00**

Collection System Pipe Repairs

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	York Street, Between Manhole #22 and #23 (+/- 128' downstream MH #23)	Point Repair	Broken pipe at joint. Gusher, sitting water	$17,500.00
2	Minimum	Mill Street, 110' West of Manhole #62	Lateral Trim & Lateral T Liner	Intruding Lateral	$8,000.00
3	Minimum	Brown Street, +/- 196' downstream MH 97	Lateral Trim & Lateral T Liner	Intruding Lateral	$8,000.00
4	Minimum	McKinley Street, MH #84 to #83	Point Repair	Defective Laterals	$22,000.00
5	Medium	Mullen Street, Manhole #5 to Manhole #47	Open Cut Repair	Sag in line, holding water, surcharging	$492,000.00

Manhole Repair/Rehabilitation

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
M1	Minimum	MH 62 Mill Street	Line Manhole	Aggregate Projecting	$7,500.00
M2	Minimum	Various	Misc. Manhole Repairs		$15,000.00

Additional Heavy Cleaning/Calcium Cutting

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	York Street, MH #23 to #22	Heavy Cleaning	Deposits settled (Gravel)	$2,000.00
2	Minimum	Main Street, Manhole #82 to #90	Heavy Cleaning/Calcium Removal	Calcium build ups (10%) and deposits settled gravel (10%)	$2,500.00
3	Minimum	Railroad Street, MH #6 to #8	Heavy Cleaning	Deposits settled (5%-40%)	$2,000.00
4	Minimum	Mill Street, MH #65, 13' outside of MH	Calcium Removal	Calcium Deposits at manhole (25%)	$1,000.00
5	Minimum	Clark Street, MH #73 to #74	Calcium Removal	Calcium Deposit (30%)	$1,000.00
6	Minimum	Main Street, MH #53 to #52	Calcium Removal	Calcium Deposit (10%)	$1,000.00
7	Minimum	Mullen Street, MH #2 to #3	Calcium Removal	Calcium Deposits at manhole (5-15%)	$1,000.00
8	Minimum	Hoffman Street, MH #13 to #12	Heavy Cleaning	Deposits settled gravel (5%)	$2,000.00
9	Minimum	Main Street, MH #72 to MH #71	Calcium Removal	Calcium Deposits (10%)	$1,000.00
10	Minimum	Whalen Street, MH #15	Calcium Removal	Calcium Deposit (10%)	$1,000.00
11	Minimum	Whalen Street, MH #78 to #79	Cleaning	Ragging, deposits settled	$1,500.00
12	Minimum	Maude Street, MH #57 to #56	Cleaning	Ragging, deposits settled	$1,500.00
13	Minimum	Renn Street, MH #41 to #42	Cleaning	Ragging, deposits settled	$1,500.00

Pump Station

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
P1	Medium	Village of Elkton Pump Station	Pump Station Rehabilitation		$420,000.00

Lagoon

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
L1	Medium	Village of Elkton Lagoons	Phosphorous Cell and Outlet Replacement		$1,360,000.00

Annual Maintenance	**$5,000.00**
Grand Total Minimum Level Service	**$97,000.00**
Grand Total Medium Level Service	**$2,369,000.00**
Grand Total High Level Service	**$2,369,000.00**

Conclusion

The Village of Elkton's wastewater system is a typical, aging municipal infrastructure system. The DPW staff have taken a proactive approach to routine operation and maintenance of the system. Structurally the system is very sound. There are several locations within the system that need a point liner or T liner at specific locations to fix structural defects. Along with the point liners, there are several locations that need calcium and deposits removed as part operations and maintenance of the system. Many of the components of the lagoon pumping station are operating past their useful life. Routine maintenance has allowed the station to function successfully however it is recommended the pump station be rehabilitated. The Village should also start budgeting for improvements to the lagoons including the addition of a phosphorus cell and outlet structure replacement. An increase to sewer rates by approximately 4.1% to be implemented at the beginning of the fiscal year is recommended along with recommended rate structure which includes a quarterly readiness-to-serve charge and a capital/debt charge based on meter size. The average 4.1% increase per year is expected to impact the typical residential rate payer through year 2035. After these improvements are made to the system, the asset management plan should be updated to show these improvements. Also, the rates should be reviewed annually during the Village's normal budgeting process.

In accordance with the SAW Grant requirements, the Villages' Wastewater Asset Management Plan (WWAMP) needs to be kept available for citizen review for 15 years. The WWAMP should be reviewed annually, and the components updated and included in the Villages' annual budget process.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/13/2019
(no later than 3 years from executed grant date)

The City of Evart *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1650-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Sarah Dvoracek	at	231-734-2181	sarah.dvoracek@evart.org
Name		Phone Number	Email

Sarah J. Dvoracek 12-13-2019
Signature of Authorized Representative (Original Signature Required) Date

Sarah S. Dvoracek, City Manager
Print Name and Title of Authorized Representative

City of Evart

Stormwater System

Asset Management Plan Summary

SAW Grant No. 1650-01

5814 100th Avenue, Evart, MI 48631

(231) 734-2181

December 2019

OHM Advisors®

EXECUTIVE SUMMARY

The City of Evart has initiated a comprehensive assessment of its stormwater infrastructure using funding from the State of Michigan Stormwater, Asset Management, and Wastewater (SAW) Grant Program. This report details the results of that assessment and contains recommendations for future stormwater projects as well as potential funding sources for those proposed projects. This Asset Management Plan (AMP) has been created in order to an address existing concerns and prevent future issues within the stormwater system

This Asset Management Plan (AMP) summarizes this assessment and includes key recommendations for future funding levels. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program, with a total stormwater budget of $332,937. A separate AMP with an additional budget was prepared for the wastewater management system.

The key goals for the Asset Management Plan are:

- Provide the City with a new framework for collecting, organizing, and storing data for their stormwater collection system using the latest available hardware and software.
- Survey key system components to develop a Geographic Information System (GIS) database and to allow future generations to access infrastructure data with greater ease.
- Add information for storm sewer material type, size, and age to the GIS database.
- Evaluate the structural and operational condition of various system components and store the data in the GIS database.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
    - Regularly scheduled sewer inspection (televising) and cleaning
    - Repair and rehabilitation to address structural problems resulting from aging infrastructure
- Provide recommendations for developing a prioritized Capital Improvement Plan.
- Analyze operating budgets and recommend revenue structure changes to facilitate the City's long-term capital improvement plans.

Mission Statement

One important element to an Asset Management Program (AMP) is a mission statement, which identifies the overarching purpose of the City's AMP. The purpose of the City's Asset Management Program is summarized by the following mission statement:

Enhance the safety, health, and quality of life for the people of Evart through the effective management and maintenance of its stormwater infrastructure.

Asset Management Team Leaders

The Asset Management Team listed in Figure 1 is committed to the Asset Management Mission Statement and were instrumental in the progress made and findings outlined in this report. Further questions on the City's AMP can be directed to these team members.

Patrick Muczynski

- Lead Water/ Wastewater Operator
- patrick.muczynski@evart.org
- 231.734.5793

Sarah Dvoracek

- City Manager
- sarah.dvoracek@evart.org
- 231-734-2181

Mark Wilson

- Dept. of Public Works Supervisor
- Mark.wilson@evart.org
- 231-734-2181

Figure 1 : Asset Management Team Leaders

Infrastructure Technology & Know-How

The City has made investments to create a GIS database mapping their stormwater system with the intent of making it easier for future generations to access infrastructure knowledge. These GIS database investments included the following:

- Located key system components and created the City's GIS database,
- Added information for sewer material type, size, and depth to the created GIS database,
- Purchased tablets to improve access to real-time asset information and enhance field data collection, and
- Provided staff training on new hardware and software.

Asset Inventory

This asset management plan includes an inventory of the City's existing stormwater infrastructure and compiles that information into a GIS geodatabase for ease of access. Each pipe, culvert, manhole, and catch basin in the system was assigned a unique identifier that is used to track its physical attributes and any assessments performed on it as part of this study. The GIS geodatabase includes information for each asset such as installation year, material of construction, size, ownership, and inspection status. The asset inventory also contains the scores assigned to each asset based on their current condition.

List of Major Assets

The major assets included in this report are approximated in the text below. The full AMP report contains additional details on the distribution of sizes and conditions.

- 8.4 miles of storm sewer (44,260 feet)
- 139 manholes
- 346 catch basins

Condition Assessment

Through a methodical sampling procedure, a representative sample of the City of Evart's storm sewer infrastructure (storm sewer pipes, manholes, and inlets) was physically assessed. The condition of the infrastructure was assessed using the National Association of Sewer Service Companies (NASSCO) condition grading system, which uses a scale of zero to five. Zero indicates the infrastructure is in very good condition, while five indicates the infrastructure is in very poor condition or has already failed. The two primary scoring metrics commonly used to describe asset conditions are the Ratings Index and the Quick Rating. The Ratings Index is an average of defect grades within an asset, and the Quick Rating describes the asset's highest defect grades. Figure 2 describes the portion of the storm sewer system that has been inspected. In addition to the NASSCO inspections, a select number of storm structures were assessed using a non-MACP inspection method, which obtained less detailed inspection information in order to save costs on low criticality catch basins. The non-MACP condition assessment also used a general grading system on a scale of zero to five.

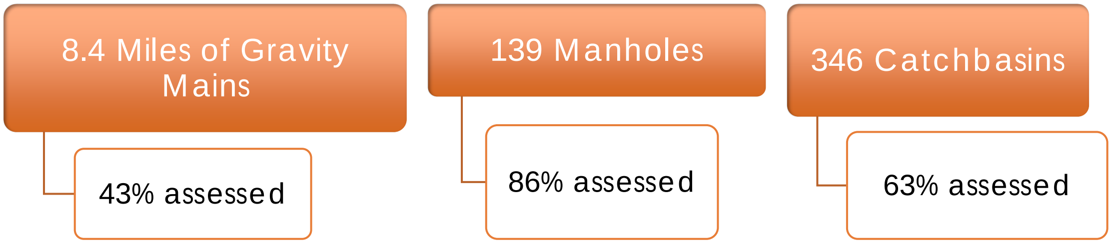


Figure 2 : Portion of Sewer System Assessed

From this condition assessment, it was observed that:

- The inspected City manholes were found to have an average weighted structural rating of approximately 1.7, an average weighted O&M rating of 0.5, and an average weighted overall rating of 1.6. The defects most affecting manhole Structural Ratings are comprised of brickwork and surface damage. The defects most affecting O&M Ratings are comprised of deposits.
- The inspected City stormsewer pipes were found to have an average weighted structural rating of approximately 1.2, an average weighted O&M rating of 1.7, and an average weighted overall rating of 1.8. The defects most affecting Structural Ratings are primarily comprised of cracks, while the defects most affecting O&M Ratings are comprised of deposits.

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the determination of Business Risk Exposure (BRE), which is identified as the combination of the Probability of Failure (PoF) as well as the Consequence of Failure (CoF) as shown in Figure 3.

Figure 3 : Risk Equation

The PoF is related to the physical condition of an asset. The CoF focuses on the economic losses and impacts to society due to an asset's failure. The following factors were combined to determine the consequence of failure for manholes and stormwater sewer:

- Diameter/size – the relative size of the asset with respect to the rest of the system,
- High consequence crossings – refers to pipes that cross over major roads, railroads or water bodies, and
- Environment – proximity to sensitive environmental features like rivers and lakes.

Level of Service

The City adopted Level of Service (LoS) criteria, which it plans to use as guidelines to manage the stormwater sewer system. The LoS criteria is summarized in Table 1.

Table 1: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment and Maintenance	PACP & MACP Inspections per Year*	Inspected and Clean a minimum of 10% of the stormsewer pipes and 10% of the manholes each year. This will equate to approximately: • 4,400 feet of pipe • 14 manholes
GIS Asset Inventory	GIS Completion Level	Update GIS data when pipes and manholes are repaired or replaced
Regulatory Compliance	Compliance with EGLE and the Clean Water Act	Comply with EGLE Policy and the Clean Water Act
Service Delivery and Customer Communication	Response to Storm Sewer Complaints	Respond to customer complaints and requests within one business day

*Pipe Assessment Certification Program (PACP), to assess storm sewer condition, Manholes Assessment Certification Program (MACP), to assess manhole condition

Revenue Structure and Capital Improvement Plan

The condition assessment helped identify capital improvements that will allow the City to operate at its maximum potential. As of 2019, the City has allocated $270,000 per year for capital improvements to the sanitary and storm sewer systems. The identified funding needed to address the rehabilitation and repair of sewers in the first ten years of the stormwater CIP are detailed on an annual basis in Table 2.

Table 2: Summary of Capital Improvement Plan

Project Year	Estimated Costs
Year 1-2020	$161,092
Year 2-2021	$193,313
Year 3-2022	$81,666
Year 4-2023	$54,716
Year 5-2024	$66,862
Year 6-10 2025-2029	$14,000
CIP Total Estimated Cost	**$571,649**

Additional long-term operations and maintenance strategies will provide the means to maintain a sound structural condition into perpetuity, including:

- Regularly scheduled sewer and manhole inspections, cleaning, and
- Rehabilitation or replacement to address structural problems resulting from aging infrastructure.

As communities like Evart have developed and aged, the underground infrastructure is deteriorating. The City shall begin to systematically repair, rehabilitate, and/or replace these aging components so that City residents and businesses experience a consistent level of service in order to avoid the following:

- Increased threat of property damage, public health, and safety,
- Increased potential for environmental damage, and
- Increased potential for impassable roadways due to failed infrastructure and flooding.

The Capital Improvement Plan and subsequent Funding Feasibility Analysis identified that the City of Evart has a significant funding gap for their stormwater system. The needs identified in this Asset Management Plan exceed available local funding under the City's current budget framework, considering the sanitary system also has funding needs.

This gap in funding for the stormwater system is largely due to the City having no dedicated funding source for stormwater infrastructure. Unlike water and wastewater systems which have fee-based programs to fund the operation and maintenance of infrastructure, stormwater has no clear path to dedicated funding, largely due to judicial precedent which exposes communities to unnecessary legal risk when they attempt to establish stormwater enterprise funds.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/13/2019
(no later than 3 years from executed grant date)

The City of Evart *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1650-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10/28/2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Sarah Dvoracek at 231-734-2181 sarah.dvoracek@evart.org
Name Phone Number Email

Sarah A. Dvoracek 12-13-2019
Signature of Authorized Representative (Original Signature Required) Date

Sarah J. Dvoracek City Manager
Print Name and Title of Authorized Representative

April 2017

City of Evart

Sanitary Sewer System

Asset Management Plan Summary

SAW Grant No. 1650-01

5814 100th Avenue, Evart, MI 48631

(231) 734-2181

December 2019

OHM Advisors®

EXECUTIVE SUMMARY

The wastewater infrastructure system of Evart provides a critical service to its residents and businesses, providing the collection and treatment of wastewater and protecting local water resources by discharging clean water through an advanced treatment process. Recognizing the importance of this wastewater system, Evart initiated a comprehensive assessment of its wastewater infrastructure.

This Asset Management Plan (AMP) summarizes this assessment and includes key recommendations for future funding levels. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management and Wastewater (SAW) Grant Program, with a total wastewater budget of $710,037.00 as a 100% grant requiring no local match. A separate AMP with an additional budget was prepared for the stormwater management system.

The AMP was intended to accomplish the following key goals:

- Provide the City with new framework for collecting, organizing, and storing data for their wastewater collection system using the latest available hardware and software.
- Gather field information about key system components to create the City's Geographic Information System (GIS) database and to make it easy for future generations to access infrastructure data.
- Add information for sewer material type, size, and depth to the newly created GIS database.
- Physically evaluate the structural condition of the majority of the publicly owned system components, including wastewater sewer pipes and manholes, and store the data in the City's GIS database.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
    - Regularly scheduled sewer inspection (televising),
    - Regularly scheduled sewer cleaning based on the CCTV, and
    - Repair and rehabilitation to address structural problems resulting from aging infrastructure.
- Provide recommendations for a prioritized Capital Improvement Plan (CIP) to be funded through the City's water and sewer fund.

Mission Statement

One important element to an Asset Management Program (AMP) is a mission statement, which identifies the overarching purpose of the City's AMP. The purpose of the City's Asset Management Program is summarized by the following mission statement:

Enhance the safety, health, and quality of life for the people of Evart through the effective management and maintenance of its wastewater infrastructure.

Asset Management Team Leaders

The Asset Management Team listed in Figure 1 is committed to the Asset Management Mission Statement and were instrumental in the progress made and findings outlined in this report. Further questions on the City's AMP can be directed to these team members.

Patrick Muczynski

- Lead Water/ Wastewater Operator
- patrick.muczynski@evart.org
- 231.734.5793

Sarah Dvoracek

- City Manager
- sarah.dvoracek@evart.org
- 231-734-2181

Mark Wilson

- Dept. of Public Works Supervisor
- Mark.wilson@evart.org
- 231-734-2181

Figure 1: Asset Management Team Leaders

Infrastructure Technology

The City has made investments to create a GIS database mapping their wastewater system with the intent of making it easier for future generations to access infrastructure knowledge. These GIS database investments included the following:

- Located key system components and created the City's GIS database,
- Added information for sewer material type, size, and depth to the created GIS database,
- Purchased tablets to improve access to real-time asset information and enhance field data collection, and
- Provided staff training on new hardware and software.

Asset Inventory

An asset inventory is a list of the City's assets and their attributes. The majority of the City's wastewater sewer infrastructure, including manholes and wastewater sewers, were inventoried and digitized. The City has populated the attributes of the inventory using observations in the field while performing condition assessment. This inventory resides in the City's newly created GIS database. The GIS framework was created as part of this effort, making it easier for the City to store critical data for the location, size, material, and condition of each wastewater asset.

List of Major Assets

The major assets included in this report are approximated in the text below. The full AMP report contains additional details on the distribution of sizes and conditions.

- 195 manholes,
- 10.7 miles of wastewater sewer ranging from 8 to 18-inch in diameter,
- 4 pump stations, and
- 1 wastewater treatment plant.

Condition Assessment

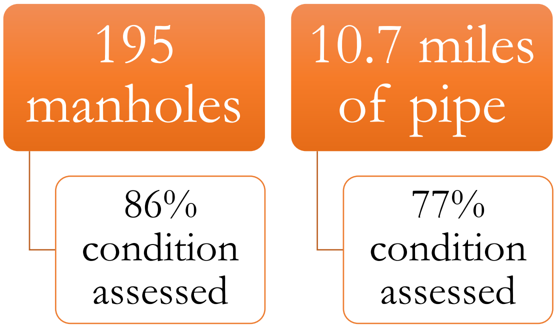


Figure 2 : Portion of Sewer System Assessed

With the intent of assessing majority of the wastewater system, the City's wastewater sewer infrastructure (wastewater sewer pipes and manholes) has been assessed. The condition of the infrastructure is based on the National Association of Sewer Service Companies (NASSCO) condition grading system, which uses a scale of zero to five. Zero indicates the infrastructure is in very good or new condition, while five indicates the infrastructure is in very poor condition or has already failed. About 86% of the 195-structure manhole network and about 77% of the approximately 11 miles of wastewater sewer pipe infrastructure has been condition assessed.

It was also observed that:

- Model results predict that no pipes should experience capacity constraints during a 10-year peak flow event. The existing pipes shall have capacity to handle the expected flows. The pipes have the hydraulic capacity to handle the design flow.
- Manhole infrastructure has an average structural rating of approximately 1.80 and average O&M rating of 1.40. Structural manhole defects were predominately related to brickwork. O&M manhole issues were driven by deposits.
- Sewer infrastructure has an average structural rating of 1.10 and average O&M rating of 1.70. Structural infrastructure defects were predominately related to point repair and cracks. O&M infrastructure defects were driven by deposits and roots.
- The infrastructure will continue to degrade over time. For example, the overall average condition of the manhole infrastructure is between a score of 2 (moderate wear but still functional) and 3 (failure unlikely in near future), per the 2019 assessment data. A small percent of the infrastructure has a condition rating of 5 (marginal functionality with failure imminent); this percentage will grow over time.

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the determination of Business Risk Exposure (BRE), which is identified as the combination of the Probability of Failure (PoF) as well as the Consequence of Failure (CoF) as shown in Figure 3.

Figure 3 : Risk Equation

The PoF is related to the physical condition of an asset. The CoF focuses on the economic losses and impacts to society due to an asset's failure. The following factors were combined to determine the consequence of failure for manholes and wastewater sewer:

- Diameter/size – the relative size of the asset with respect to the rest of the system,
- High consequence crossings – refers to pipes that cross over major roads, railroads, or water bodies, and
- Environment – proximity to sensitive environmental features like rivers and lakes.

Level of Service

The City adopted Level of Service (LOS) criteria, which it plans to use as guidelines to manage the wastewater sewer system. The LOS criteria is summarized in Table 1.

Table 1: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	PACP & MACP Inspections per Year*	• MACP inspect a minimum of 10% of the system per year. • PACP inspect a minimum of 10% of the system per year.
Asset Inventory	GIS Completion Level	• Update GIS data when pipes are repaired or replaced • Estimate pipe installation dates within next 2 years
Regulatory Compliance	Compliance with EGLE Sanitary Sewer Overflow (SSO) Policy and the Clean Water Act	Continue to comply with the EGLE SSO policy and The Clean Water Act
Service Delivery and Customer Communication	Response to Sanitary Sewer Complaints	Respond to customer complaints and requests within one business day
O&M Optimization	Regular cleaning and maintenance of the collection system	• Clean and maintain 5% of the manholes per year • Clean and maintain 5% of the sewer pipes per year

***Pipe Assessment Certification Program (PACP), to assess wastewater sewer condition, Manholes Assessment Certification Program (MACP), to assess manhole condition**

Revenue Structure and Capital Improvement Plan

The condition assessment helped identify capital improvements that will allow the City to operate at its maximum potential. Additional long-term operations and maintenance strategies will provide the means to maintain a sound structural condition into perpetuity, including:

- Regularly scheduled sewer and manhole inspections, and
- Rehabilitation or replacement to address structural problems resulting from aging infrastructure.

As communities like Evart have developed and aged, the underground infrastructure is deteriorating. The City shall begin to systematically repair, rehabilitate, and/or replace these aging components so that City residents and businesses experience a consistent level of service in order to avoid the following:

- Increased threat of property damage, public health, and safety,
- Increased potential for environmental damage, and
- Increased potential for impassable roadways due to failed infrastructure.

The rates were reviewed and determined sufficient to meet operating costs. The City is working on a rate study which will be completed after the conclusion of the SAW Grant.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date August 1, 2019
(no later than 3 years from executed grant date)

The Village of Grosse Pointe Shores, A Michigan City *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1414-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: August 28, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Brett E. Smith, Director of Public Works	at	(313) 886-0020	bsmith@gpshoresmi.gov
Name		Phone Number	Email

9-30-19
Signature of Authorized Representative (Original Signature Required) Date

Mark Wollenweber, City Manager
Print Name and Title of Authorized Representative

April 2017

Village of Grosse Pointe Shores, A Michigan City

Summary of Wastewater Asset Management Plan
SAW No. 1414-01

Village of Grosse Pointe Shores, A Michigan City
795 Lake Shore Road; **www.gpshoresmi.gov**
Grosse Pointe Shores, MI 48236
Brett E. Smith, Director of Public Works; 313-886-0020
Saw Grant No. 1414-01

This summary of the Wastewater Asset Management Plan for the Village of Grosse Pointe Shores, A Michigan City (Village) is submitted in compliance with Section 603 of Public Act 84 of 2015 and guidance issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on May 22, 2019.

Overview

The Village was awarded a Michigan Department of Environmental Quality (now EGLE) grant through the Stormwater, Asset Management, and Wastewater (SAW) Program on December 16, 2016. Grant funds were awarded to aid in the development of a wastewater asset management plan (AMP). The executed Grant Agreement established the following:

Grant Amount:	$548,820
Local Match:	$60,980
Project Total:	$609,800

This AMP, prepared by Anderson, Eckstein & Westrick, Inc. (AEW), has been completed. Copies are on file and available at City Hall and the Department of Public Works office. The core components in the AMP include:

1) Asset Inventory and Condition Assessment
2) Level of Service
3) Criticality Assessment
4) Funding Structure and Rate Methodology
5) Capital Improvement Plan

Summaries of these core components follow.

Asset Inventory and Condition Assessment

The Village owns and operates a wastewater collection system only. Assets include sanitary sewers, manholes, pump stations and control structures. The collection system was originally constructed as a combined (sanitary and storm) system until separation was performed in the 1960's. At time of SAW Grant application, the Village had an asset inventory mapped in GIS based upon old plans and the knowledge of Village personnel, but the condition of these assets was not readily known.

A comprehensive investigation was performed to ascertain the current condition of all assets. All sanitary sewers were cleaned and televised and a PACP report was generated and reviewed. Manholes were visually inspected from the surface and a level 1 MACP report was generated and reviewed. Pump Stations and Control Structures were inspected via confined space entries and condition assessment reports generated. These condition assessments were used to assign a Probability of Failure (POF) score of 1-5 to each asset.

Subsequent to the investigative efforts, the GIS was updated to include the new data. Each asset has been assigned a unique identification number. The GIS now includes mapping, database, and system information. Additionally, each sewer segment links to a pdf of the PACP inspection report and a video file of the CCTV footage. Similarly, each manhole includes all field inspection information and digital copies of manhole photographs.

Criticality Assessment

Each individual asset was examined to determine the Consequence of Failure (COF) score of 1-5 for each asset. Factors considered in assigning the COF score included financial, safety and environmental impacts as well as the number of residents that would be impacted.

The POF (discussed under Asset Inventory and Condition Assessment above) and COF scores were then multiplied together to determine the Business Risk Exposure (BRE) score, or criticality. Any asset with a Criticality score of 16 or greater is considered critical. Criticality analysis determined 0.0% of sanitary sewers and 1.5% of sanitary manholes (7) are critical in the Village. Neither of the Pump Stations or any of the Control Structures scored greater than 16.

Level of Service

The Village ultimately determined the Level of Service (LOS) is best defined by the 2011 International Infrastructure Management Manual, namely “the outputs a customer receives from the organization”. In terms of the Village’s wastewater system, the LOS would be the satisfaction of the residents, business owners and property owners. These customers expect safe, continuous conveyance of their wastewater in compliance with applicable laws and environmental regulations. Therefore, the primary goal is to minimize customer complaints. There are many factors that can affect the perceived LOS of the system, including sewer backups which can result in street, yard and basement flooding.

The DPW receives a few customer complaints each year and always investigates. In recent years, all investigations have determined the issue to be associated with the service lateral on private property or with the internal plumbing. The Village’s wastewater system is currently operating at a satisfactory LOS, based upon field reports and a lack of residential complaints determined to be the result of issues with the wastewater collection system. However, this LOS can be maintained and improved with scheduled maintenance, rehabilitation and replacement of aging assets.

Funding Structure and Rate Methodology

The year-end annual Water and Sewer Fund was reviewed for the fiscal years 2015/16 through 2018/19 along with proposed budgets for 2019/20 through 2023/24. These annual Water and Sewer Fund line-item budgets and the rate structure were submitted to EGLE. The rate methodology was approved by EGLE in a letter dated August 28, 2019. The Village’s revenues sufficiently cover all expenditures and a funding gap does not exist. The existing rate structure is adequate for continued operation of the wastewater system, including future cleaning and televising of the sanitary sewers as well as sanitary structure, pump station and control structure inspections recurring on an approximately 10 year recurring cycle. Additionally, the existing rate structure is adequate to address replacement or rehabilitation of all assets with a criticality score greater than 16 as well as address additional desired replacement or rehabilitation needs over the next 20 years, when evaluated on an average annual cost.

Capital Improvement Plan
As discussed under Criticality Assessment, above, only seven (7) manholes received a Criticality score of 16 or greater. No sewers, pump stations or control structures exceeded the scoring threshold, but several assets were identified as either vital to operation of the system/providing an acceptable LOS, or exhibiting structural concerns indicating a trend toward future criticality in excess of 16. The Village intends to investigate and rehabilitate these assets as available budget permits.

The proposed long term Capital Improvement Plan is as follows:

Capital Improvement, Year 1

- Repair/rehabilitate sanitary structures with a BRE score greater than 16.
- Perform a hydraulic study of the sanitary sewer system to determine the on-going need for the four (4) control structures.
- Begin repair/rehabilitation and/or abandonment of control structures based upon results of the hydraulic study, if budget permits.

Capital Improvement, Years 2 to 5, as budget permits

- Rehabilitation & upgrades to Cook Road Pump Station.
- Rehabilitation & upgrades to Robert John Pump Station.
- Complete repair/rehabilitation and/or abandonment of control structures based upon results of the hydraulic study.

Capital Improvement, Years 6 to 10, as budget permits

- Repair/rehabilitate sanitary sewers with a BRE score of less than 16, but receiving a structural PACP score of 4 or 5.
- Repair/replace sanitary sewer structures with a BRE score of less than 16, but receiving a MACP score of 4 or 5.
- Locate, raise above grade if necessary, and inspect sanitary sewer structures that were previously unable to be located.

Capital Improvement, Years 11 to 20, as budget permits

- Perform a condition assessment of pipes, structures, pump stations and control structures on an approximately ten year recurring cycle.
- Perform a replacement/repair/rehabilitation program to address issues identified during recurring condition assessments.
- Develop and adopt policies to assess repair or replacement of wastewater assets concurrent with other infrastructure construction projects.
- Review the AMP annually and update the AMP upon completion of recurrent condition assessments.

It is understood this draft implementation schedule will be subject to frequent revision as additional information becomes available or conditions change.

List of Major Assets

Sanitary Sewer

- 6-12” Diameter – 32,851 feet
- 15-21” Diameter – 28,143 feet
- 24-36” Diameter – 20,621 feet
- 42-54” Diameter – 6,868 feet
- Total – 88,483 feet = 16.8 miles

Sanitary Manholes

- 36” Diameter – 23 Manholes
- 42” Diameter – 29 Manholes
- 48” Diameter – 370 Manholes
- 60” Diameter – 26 Manholes
- 72” Diameter – 6 Manholes

Pump Stations

- PS-1 Cook Road Pump Station
- PS-2 Robert John Pump Station

Control Structures

- CS-A Overflow Chamber “A”
- CS-B Overflow Chamber “B”
- CS-C Overflow Chamber “C”
- CS-D Regulator Chamber “D”

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Grosse Pointe Woods *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1415-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ **No**]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Bruce J. Smith, City Administrator	at	(313) 343-2440	bsmith@gpwmi.gov

Signature of Authorized Representative (Original Signature Required)

12/31/2019
Date

Bruce J. Smith, City Administrator
Print Name and Title of Authorized Representative

April 2017

Grosse Pointe Woods
20025 Mack Plaza Drive
Grosse Pointe Woods, Michigan 48236
(313) 343-2440
Bruce Smith, City Administrator, bsmith@gpwmi.gov
http://www.gpwmi.us/

SAW Grant No. 1415-01

This summary of the Wastewater Asset Management Plan for the City of Grosse Pointe Woods is submitted in compliance with Section 603 of Public Act 84 of 2015 and guidance issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

Overview

The City of Grosse Pointe Woods was awarded a Michigan Department of Environmental Quality (EGLE) grant through the Stormwater, Asset Management, and Wastewater (SAW) Program in December, 2016. Grant funds were awarded to aid in the development of a wastewater asset management plan (AMP). The executed Grant Agreement established the following:

Grant Amount:	$993,060
Local Match:	$110,340
Project Total:	$1,103,400

This AMP, prepared by Anderson, Eckstein & Westrick, Inc. (AEW), has been completed. Copies are on file and available at City Hall and the Department of Public Works office. The core components in the AMP include:

1) Asset Inventory and Condition Assessment
2) Level of Service
3) Criticality Assessment
4) Funding Structure and Rate Methodology
5) Capital Improvement Plan

Summaries of these core components follow.

Asset Inventory/Condition Assessment

The City's combined sewer system is comprised of three major components; sewers, structures, and a pump station. Grosse Pointe Woods currently has 59.4 miles of wastewater sewers and 17.1 miles of storm sewers (totaling 76.5 miles of combined sewer), 1,930 manholes, 1,875 catch basins, and one (1) wastewater pump station.

All wastewater related assets have been assigned a unique identification number, cataloged, and stored in the City's geodatabase. The geodatabase serves as the data repository for all GIS related information for Grosse Pointe Woods, providing efficient and accurate means of maintaining and updating asset inventories and information, as well as providing for improved data dissemination across the community.

A condition assessment was performed on the combined sewer by means of Closed Circuit Television (CCTV) inspection while investigation of the structures and pump station was performed by means of visual assessment. Based on the condition assessment, pipes were assigned both a structural and operations and maintenance (O&M) Pipeline Assessment Certification Program (PACP) rating, ranging from 0 to 5, whereby 1 indicates new or excellent condition and 5 indicated failure or imminent attention required. Similarly, structures were rated by Manhole Assessment Certification Program (MACP) certified raters on 1 to 5 scale, whereby 1 indicates new or excellent condition and 5 indicated failure or imminent attention required.

Overall, the investigated sewers were found to be in general good condition with only 21% rated a structural 4 or 5, and 4% rated an O&M 4 or 5. Similarly, only 15% of structure were rated a 4 or 5.

Criticality Analysis

Assets were then analyzed to determine their Probability of Failure (POF) and Consequence of Failure (COF). The POF of an asset takes into account the condition rating while the COF takes into account the pipe/structure size, road type (major or minor), and location (paved or un-paved). POF and COF scores were determined for each asset and then multiplied together resulting in the Business Risk Exposure (BRE) score, also known as the criticality score. The BRE score is used to prioritize what assets are most critically in need of repair. Any asset with a BRE score of 16 or greater is considered critical by (EGLE). Based on the current assessments, a total of 859 feet of sewer and 135 structures were found to have a BRE score of 16 or greater.

Level of Service

Grosse Pointe Woods desires a high Level of Service (LOS) of their combined sewer system. In terms of the City's sewer system, the LOS would be the satisfaction of the residents, business owners and property owners. Therefore, the primary goal is to minimize customer complaints. There are many factors that can affect the perceived LOS of the system including sewer backups, which can result in street, yard and basement flooding.

Customer complaints received by the City were determined to be a result of private sanitary service connections or internal plumbing, not a result of the City' sewer collection system. Therefore, Grosse Pointe Woods' wastewater system is currently operating at a satisfactory LOS and will continue to do so through continued maintenance, rehabilitation and replacement of its assets as presented in the Asset Management Plan and Capital Improvement Plan.

Rate Methodology

A rate analysis was conducted as part of the AMP and it was found that Grosse Pointe Woods' revenues sufficiently cover all expenditures and a funding gap does not exist. The rate methodology was approved by EGLE in a letter dated November 5, 2019, therefore no corrections to the rate methodology are required.

Capital Improvement Plan

Based on the condition assessment and criticality analysis, a 15-year Capital Improvement Plan (CIP) was created. Through the condition assessment and criticality analysis calculations, a prioritized list of capital projects has been established. The prioritization of rehabilitation and replacement locations was determined based on the criticality score as well as a concerted effort to eliminate 'unknowns' and address the greatest structural concerns to avoid further deterioration of the system. Any asset with a criticality score of 16 or greater is considered critical by EGLE and therefore placed on the capital improvement list for rehabilitation or replacement.

In addition to addressing the critical assets, it is recommended that the City remain proactive in managing their infrastructure by addressing the sewers and structures rated a 4 or 5, as outlined below.

Sewers

1.) Full Length Lining Program – Years 1-10
2.) Sectional Liner Program – Year 4
3.) Dig Up Program – Years 6-15
4.) CCTV Inspections – 10 Year recurring cycle to start year 11

Structures

1.) Locate/Uncover/Inspect Structures – Years 1-4
2.) Structure Replacement – Years 5-6
3.) Structure Rehabilitation – Year 7
4.) Structure Inspections – 10 Year recurring cycle to start year 10

This summary provides a brief overview of the investigation, and evaluation of the sewer system assets, condition, operation and needs. A more comprehensive analysis can be found in the Wastewater Asset Management Plan.

List of Major Assets

Combined Sewer = 403,716 feet

Combined Manholes = 1,930

Catch Basins = 1,875

Pump Stations = 1

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date **12/31/2019**
(no later than 3 years from executed grant date)

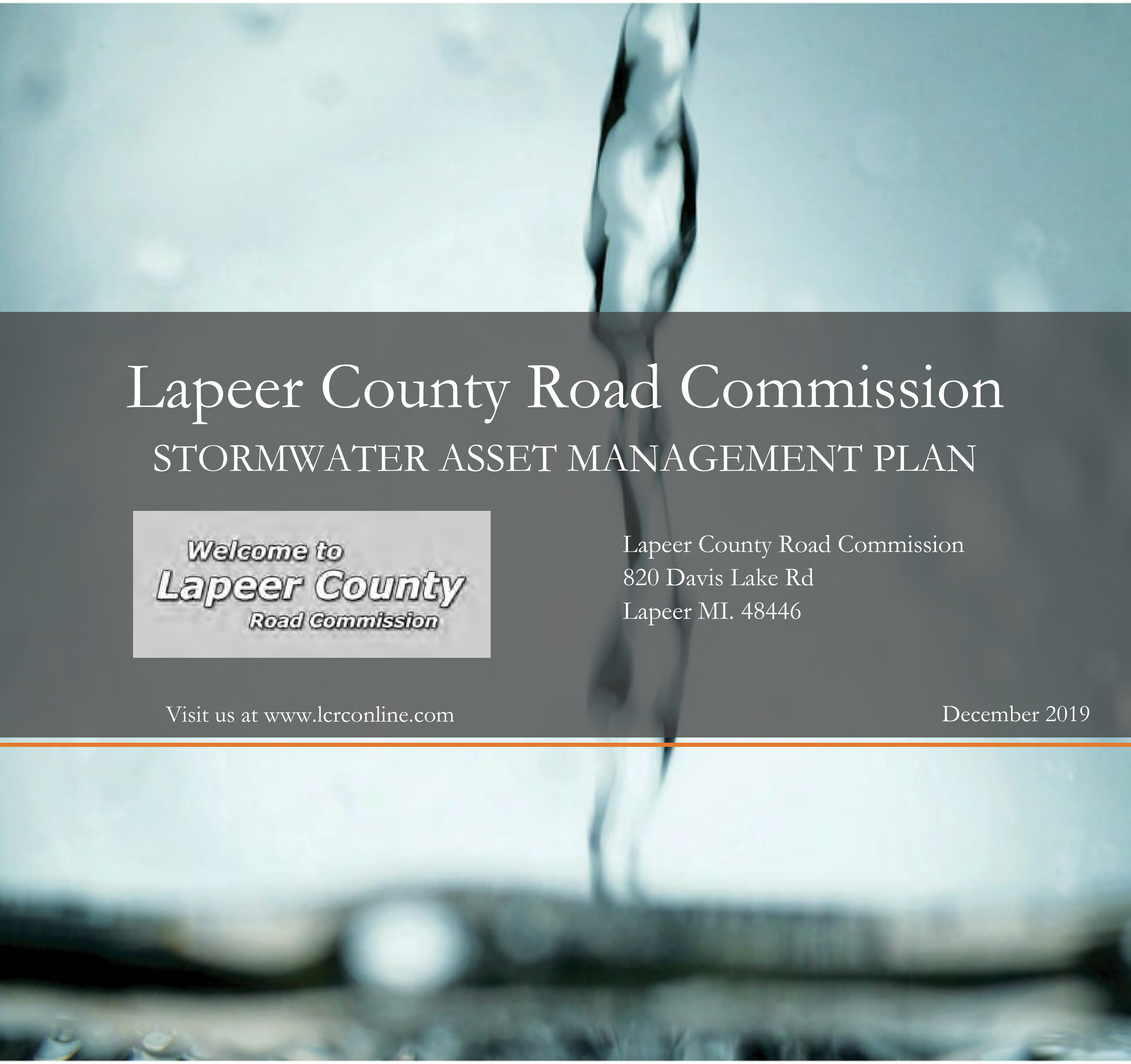
The Lapeer County Road Commission *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1552-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Destain Gingell	at	(810) 644-6272	dgingell@lcrconline.com
Name		Phone Number	Email

Destain D. Gingell. 12/30/19
Signature of Authorized Representative (Original Signature Required) Date

Destain D. Gingell, P.E., County Highway Engineer Lapeer County Road Commission
Print Name and Title of Authorized Representative



Lapeer County Road Commission

STORMWATER ASSET MANAGEMENT PLAN

Welcome to
Lapeer County
Road Commission

Lapeer County Road Commission
820 Davis Lake Rd
Lapeer MI. 48446

Visit us at www.lcrconline.com

December 2019

Prepared by:

OHM
Advancing Communities®
ARCHITECTS. ENGINEERS. PLANNERS.

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan Executive Summary Guidance

Lapeer County Road Commission
Destain D. Gingell, P.E.
County Highway Engineer
820 Davis Lake Road, Lapeer, MI. 48446
Phone: (810) 664-6272
Website: www.lcrconline.com
SAW Grant Project Number 1552-001

Executive Summary

The Lapeer County Lapeer CRC (Lapeer CRC) is located at 820 Davis Lake Road, Lapeer, Michigan 48446, and is responsible for the stormwater collection system in the following 18 townships: Almont, Arcadia, Attica, Burlington, Burnside, Deerfield, Dryden, Elba, Goodland, Hadley, Imlay, Lapeer, Marathon, Mayfield, Metamora, North Branch, Oregon and Rich. Within each township are networks of manholes, catch basins, sewers and culverts to manage stormwater drainage. The prominent infrastructure asset countywide are culverts for surface water conveyance. The Lapeer CRC and Townships are responsible for the upkeep and maintenance of storm sewer systems which includes but is not limited to culverts, catch basins, manholes and gravity sewer and recognizes the importance of preserving the integrity of their assets. This document was prepared using grant funding from the State of Michigan Stormwater Asset Management and Wastewater (SAW) Grant Program (SAW Grant **1552-01**), with a total budget of $812,000, which is inclusive of grant proceeds and local match of 10 percent.

The Asset Management Plan (AMP) was intended to accomplish the following key goals:

- Provide the Lapeer CRC with a framework for collecting, organizing, and storing data for their stormwater collection system using the latest available hardware and software.
- Survey key system components to augment the Lapeer CRC's newly created Geographic Information Systems (GIS) database and to make it easier for future generations to access infrastructure data with greater ease.
- Add information including asset size, age, and location to the GIS database.
- Physically evaluate the structural condition of a large percentage of publicly owned system components, including manholes, catch basins, and culverts that are older than 20 years in age, and to store the data in the Lapeer CRC's GIS database.
- Conduct Closed Circuit Television (CCTV) inspections on a representative portion of gravity main sewer throughout the county to verify the condition of these assets and include the inspection results in the GIS database.

Mission Statement

One important element to an AMP is a mission statement, which identifies the overarching purpose of the Lapeer CRC's AMP. The purpose of the Lapeer CRC's asset management program is summarized by the following mission Statement:

We are committed to providing and maintaining a high-quality storm sewer and culvert collection services to our existing and future system in a cost-effective manner while protecting human health, safety and the environment.

Lapeer County Road Commission

- Destain Gingell, P.E.
- County Highway Engineer
- dgingell@lcrconline.com
- 820 Davis Lake Rd
  Lapeer, MI. 48446
- Phone: (810) 664-6272
- Website: www.lcrconline.com

Figure 1: Asset Management Contact Information

Asset Management Contact Information

The Lapeer CRC is committed to the asset management mission statement; the contact person is listed in Figure 1. Along with a team of office quality control personal, GIS data managers and field staff, these individuals are instrumental in the progress made and findings outlined in this report. Further questions on the AMP can be directed to a team member.

Asset Inventory

An asset inventory is a compilation of data describing Lapeer CRC's assets and their attributes. The majority of the County's stormwater infrastructure is culverts with several areas containing storm manholes, catch basins and storm sewers. Storm manholes and catch basins will be referred to as storm structures throughout this report. The Lapeer CRC has provided several sources of information on the existing storm collection system including recorded as-built information. Information found in the recorded as-builts was incorporated into the GIS database, (i.e. asset material, diameter, install date, etc.). The resulting inventory of assets will reside in the Lapeer CRC's GIS database, which includes an aerial image of the Lapeer CRC's system and overlaying observed information.

Condition Assessment

The SAW grant allowed a large enough portion of the manholes, catch basins, sewers and culverts in the storm collection system to be assessed to provide a representative condition of the total system. It is the intent of Lapeer CRC to continue evaluating the remaining structures not assessed under the grant. The condition of the storm sewer manholes and catch basins were based on the National Association of Sewer Service Companies (NASSCO) condition grading scale, while culvert condition was based on several factors determining the physical condition of the culvert. The NASSCO scale grades from one to five with one indicating the structure is in very good condition. Five indicates the structure has failed or will imminently fail. The culvert scale used for analysis also grades from one to five with the same scaling as the NASSCO grading scale. Below is an approximate summary of assets that were assessed throughout the 18 townships:

- 344 assessed of 494 total catch basins (70%)
- 26 assessed of 29 total manholes (90%)
- 2.9 miles assessed of 13.6 total miles of storm sewer (21%)
- 4,352 assessed of 4,459 total road culverts assessed (98%)

It was also observed that:

- Catch basin and manhole infrastructure exhibits above average wear with an average rating of 2.03 but has experienced 64 percent of its expected life. In general, the storm structures are in moderate condition.
- The storm sewer infrastructure exhibits above average wear with and average rating of 2.85 but has experienced 80 percent of its expected life. Approximately 30 percent of observed sewer received a structural rating of 4 or 5. The storm sewer infrastructure is in poor condition.
- Of the total 13.6 miles of storm sewer throughout the county, approximately 2.85 miles or 21 percent of this consists of underdrain underneath the center of roads.
- The average Probability of Failure (PoF) is 2.81 across all inventoried culverts.

Criticality and Risk

Determining the failure risk of an asset, leads to the identification of critical infrastructure. Risk is identified as the PoF multiplied by the Consequence of Failure (CoF) as shown in Figure 2.

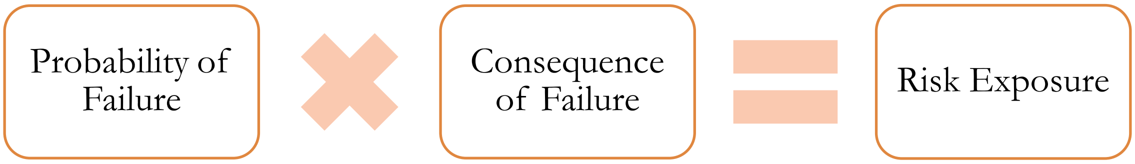


Figure 2: Risk Equation

PoF considers the physical condition of the asset while CoF considers economic, environmental and societal impacts to the community due to an asset's failure. CoF is driven by the asset's diameter, location and its' distance from an environmental feature. The following factors were combined to determine the CoF for storm structures and sewers:

- Diameter/Size – the relative size of the asset with respect to the rest of the storm system.
- Location – refers to the surface above or around the asset that will be affected if repairs or replacement is needed.
- Sensitive Environmental Features – proximity to sensitive environmental features such as State recognized bodies of water and railroad tracks.

Numerical values were assigned to the PoF and the CoF resulting in a RE of 1 through 25. A RE of 4 or less is considered low risk, a RE of 5 to 12 is considered a medium risk and a RE of 13 to 25 is considered a high risk asset. The RE was the basis for the resulting Capital Improvement Plan (CIP). The RE was calculated for the assessed assets as shown in Figure 3.

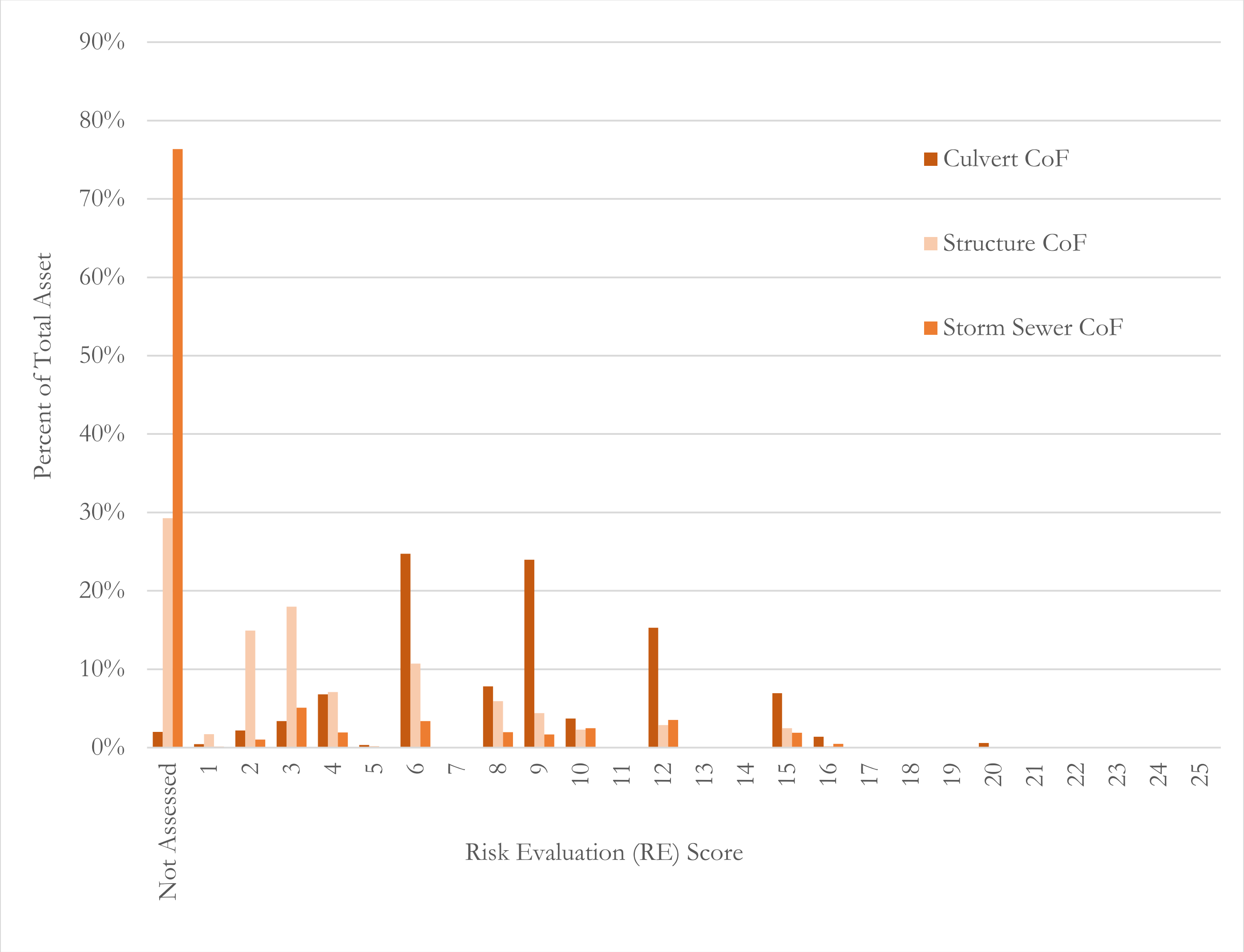


Figure 3: Risk Exposure Results for the County's Storm Assets

Level of Service

The Lapeer CRC adopted Level of Service (LOS) criteria, which it plans to use as a guideline to manage the storm system infrastructure. These level of service criteria are summarized in Table 1.

Table 1: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	PACP & MACP Assessments per Year*	• MACP assess a minimum of 10 percent of system per year • PACP assess a minimum of 20 percent of system every 5th years and remaining 80 percent every 10th year
Regulatory Compliance	Compliance with EGLE Policy and The Clean Water Act	Continue to comply with EGLE policy and The Clean Water Act
Service Delivery and Customer Communication	Utilize Software to aid in utility management and promote Township communication, increase effort to reduce number of culvert calls and response time	Respond to inquiries and service requests efficiently
O&M Optimization	O&M Recommended Strategies: Regular Cleaning and Maintenance	• Clean and maintain 10 percent of storm structures per year • Clean and maintain 20 percent of sewers every 5th years and remaining 80 percent every 10th year
Capital Improvements	Continue to upgrade storm infrastructure during road rehabilitation and replacement projects	Update CIP as projects are completed and evaluate Criticality every 5 years to ensure the CIP corresponds with County planning
Culvert Replacement Program	Continue to update and replace culverts as drainage changes or culverts begin to fail	Update GIS and CIP as culvert replacements are completed

* Pipe Assessment Certification Program (PACP), to assess storm sewer condition.

* Manhole Assessment Certification Program (MACP), to assess storm structure condition.

Capital Improvement Planning

The condition assessment helped identify capital improvements that will allow the County to operate at its maximum potential of its assets. Additional long-term operations and maintenance strategies will provide the means to maintain a sound structural condition in perpetuity, including:

- Regularly scheduled sewer, manhole, catch basin and culvert assessments.
- Repair and rehabilitation to address structural problems resulting from aging infrastructure. These projects should continue to be scheduled during road projects.

As counties like Lapeer have developed and aged, the buried infrastructure is deteriorating. Unless the County begins to systematically repair, rehabilitate and/or replace these aging components, County residents and businesses will experience a decreased level of service which could result in the following:

- Increased threat of property damage, public health and safety.
- Increased potential for environmental damage
- Increased potential for impassible roadways due to failed infrastructure.

Based on the assessments conducted during the SAW grant effort, a 20 year CIP was created to prioritize capital projects necessary to ensure the functionality of the stormwater system. A cost opinion was created for rehabilitation projects for storm structures, storm sewers and culverts. An O&M plan was also generated with an annual associated cost opinion. The cost opinion below represents the total, recommended rehabilitations plus projected, 20 year CIP cost:

MACP Rehabilitation Recommendations Total:	$160,000
PACP Rehabilitation Recommendations Total:	$3,845,000
Culvert Replacement Recommendations Total:	$6,145,000
Total Storm System Rehabilitation Recommendation Cost Opinion:	$10,500,000

The annual cost opinion of maintaining the O&M strategies laid out in the CIP is as follows:

Total Annual O&M Costs:	$43,500

List of Major Assets

The major assets are approximated in the text below. The full AMP report contains additional detail on the distribution of sizes, ages, and conditions.

- 29 manholes
- 494 catch basins
- 13.8 miles of gravity main
- 4,459 culverts

END EXECUTIVE SUMMARY

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12-15-2019
(no later than 3 years from executed grant date)

The Marion Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1306-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: 10-28-2019.
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ______.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Robert Hanvey at (517) 546-1588 supervisor@mariontownship.com
Name Phone Number Email

Robert W Hanvey FEBRUARY 14, 2020
Signature of Authorized Representative (Original Signature Required) Date

Robert Hanvey Supervisor
Print Name and Title of Authorized Representative

May 2019

Marion Township

SAW Grant Project No. 1306-01

EXECUTIVE SUMMARY

Prepared By:	**Spicer Group, Inc.** 125 Helle Blvd. Suite 2 Dundee, MI 48131 Ph: (734) 823-3308 Project No. 124240SG2016
Owner:	**Marion Township** 2877 West Coon Lake Road Howell, MI 48843 Ph: (517) 546-1588

Marion Township has entered into an agreement with the Michigan Department of Environmental Quality and the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. Marion Township received the following grant:

Wastewater Asset Management Plan (WWAMP) – 100% Grant	***$93,800***
LESS Local Match (10%)	$9,380
Total Grant Amount	$84,420

The Asset Management Plan (AMP) was required to be completed within three years of the date of the agreement; September 2016.

Each AMP has the following key components:

1. Asset Inventory and Condition Assessment
2. Level of Service Determination
3. Critical Assets / Risk Management
4. Capital Improvement Plan
5. Revenue Structure
6. Operation & Maintenance Strategies
7. GIS & Mapping System

WASTEWATER ASSET INVENTORY AND CONDITION ASSESSMENT

The Marion Township wastewater system infrastructure includes manholes, sewer pipes, pump stations and force mains. A list of system assets is as follows:

Sewer Manholes	467 each
Sewer Pipe	17.3 miles
Pump Stations	9 each

The system assets have a total replacement value of approximately $150 million.

All the manholes were inventoried and assessed by Spicer inspectors trained in the NASSCO Manhole/Pipeline Assessment Certification Programs (MACP/PACP).

Manholes by Quick Rating

Highest Rating	Structural Category		O&M Category		Combined	
	Number	Percent	Number	Percent	Number	Percent
5	3	1%	2	0%	5	1%
4	5	1%	13	3%	18	4%
3	83	18%	18	4%	84	18%
2	0	0%	414	89%	340	73%
1	358	77%	2	0%	2	0%
0	18	4%	18	4%	18	4%

Since the system is less than twenty years old, the vast majority of the manholes are in good condition. In fact, about three-quarters of the system manholes have scores only as high as 2 (1 being good condition, 5 being very poor condition), which is generally indicative of defects that have negligible impact on the overall function of the structure. The average Marion Township manhole has 58 years of life remaining, with the range being from 56 to 65 years. Minor maintenance is anticipated in the near future.

The Township system includes approximately 17.3 miles of sewer pipe of various sizes. Overall the system is still relatively new and in good condition. The average Marion Township PVC pipe has 83 years of life remaining, with the range being from 81 to 90 years. The Township does not currently have a program in place for televising and cleaning sewers on an annual basis. The recommendation is to begin televising and cleaning approximately 1 mile of the system every other year beginning in 2020. As the system continues to age and inflow/infiltration becomes more prevalent, the amount televised and cleaned should increase. Any necessary repairs that are identified during the televising should be completed the following year.

The final component of the Township's wastewater system is pump stations. Marion Township's system includes nine pump stations. The table below summarizes the relative ages of each component the pump stations and the remaining life expectancy for individual components:

Estimated Remaining Service Life for Pump Station Components

Station	Year Installed	Motor (yrs)		Pump Age (yrs)		Motor Control Center Age (yrs)		Valves & Piping Age (yrs)		Generator Age (yrs)	
		Age	Life	Age	Life	Age	Life	Age	Life	Age	Life
Norton	2000	18	-8	18	7	18	2	18	2	n/a	-
Peavy	2000	18	-8	18	7	18	2	18	2	2	18
Tracilee	2000	18	-8	18	7	18	2	18	2	n/a	-
MHOG	2000	18	-8	18	7	18	2	18	2	n/a	-
Francis	2000	18	-8	18	7	18	2	18	2	n/a	-
Burkhart	2000	18	-8	18	7	18	2	18	2	n/a	-
Allstot	2000	18	-8	18	7	18	2	18	2	n/a	-
Maple Farms	2000	18	-8	18	7	18	2	18	2	n/a	-
Parker	2005	13	-3	13	12	13	7	13	7	n/a	-

Of the nine pump stations in the Marion Township sanitary sewer system, eight are nearing 20 years in age and the Parker station is approaching 15 years in age. Overall the average pump station is in fair condition and has 8 years of life remaining. All of the stations have exceeded the life expectancy for the pump motors. The motor control center and internal valves and piping are nearing their life expectancy for all of the stations except Parker. The pump bodies still have significant life remaining for all of the stations. Very few, if any, major components have been replaced in any of these stations. Replacement of all the major components of each pump station is recommended in phases over the next 10 years.

LEVEL OF SERVICE

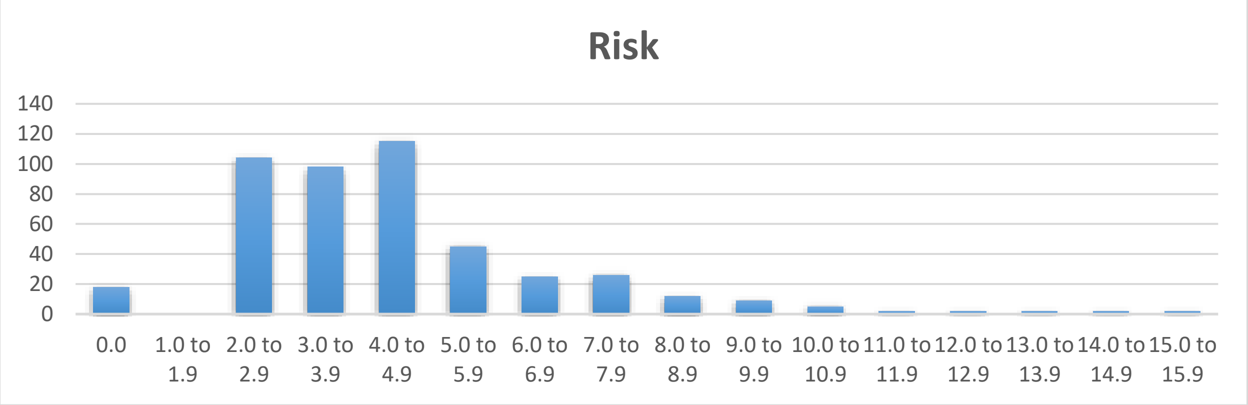
For the Level of Service (LOS), the Township prioritized projects in their Capital Improvement Plan (CIP) and rate structure based on the level of service they feel is affordable. The levels of service have been ranked as low, medium, and high. Medium LOS would be including work that is not critical to conform to regulations, but that makes sense for a long term sustainable result. For instance, instead of performing spot repairs on cracked sanitary sewer pipes (Low LOS), the repair is to line the entire length manhole to manhole (Med. LOS). For pump stations, an example of medium LOS is installing an onsite permanent generator instead of using a portable generator and personnel. Medium LOS would generally include replacing equipment before it is at the end of its useful service life and/or already failed.

Marion Township has selected a Medium Level of Service as their target. This level of service was the basis for determining the extent of repairs and replacements to be included in the Capital Improvement Plan.

CRITICAL ASSETS / RISK MANAGEMENT

For each asset in the Township's wastewater system, a criticality/risk assessment was performed to determine and prioritize the Township's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset including all manholes and pump station components. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on economic, social, and environmental consequences. Finally, the Risk assessment was calculated. Risk is represented on a scale from 0 to 25. 67% of the Township's manholes have a risk rating less than 5.0 on a scale from 0.0 to 36.0, inclusive. The highest risk rating in the system is 15.0 out of 36.0.

Figure 4.3: Risk



Risk for each pump station was also calculated on a scale of 0 to 20. Pump station risk in Marion Township ranged from 1 to 15, with one pump station, Peavy, having a risk of 15.

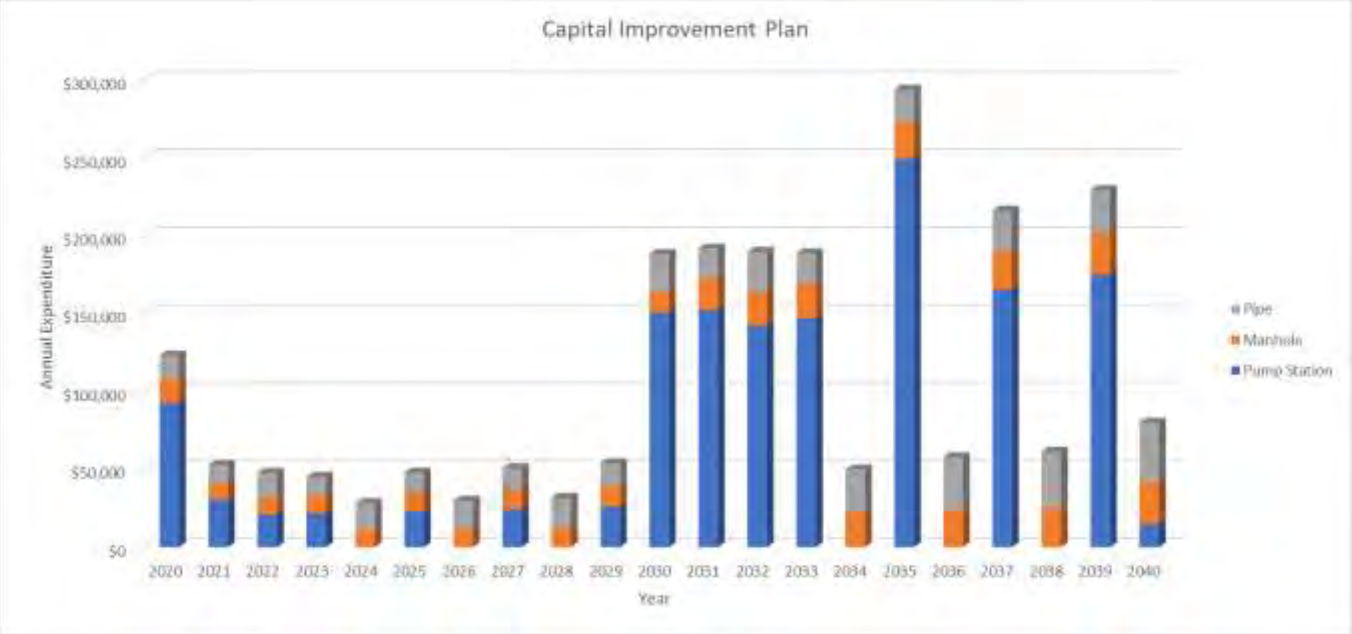
Table 4 - 1 Pump Station Risk Analysis

Station	Age	Pumps	LoF	Proximity to Open Water	Service Area Size	Number of Pumps	CoF	Risk
Norton	2	0	2	1	1	1	3	6
Peavy	2	1	3	1	2	2	5	15
Tracilee	2	0	2	0	0	1	1	2
MHOG	2	0	2	1	0	1	2	4
Francis	2	0	2	0	1	1	2	4
Burkhart	2	0	2	0	0	1	1	2
Allstot	2	0	2	0	0	1	1	2
Maple Farms	2	0	2	0	0	1	1	2
Parker	**1**	**0**	**1**	**0**	**0**	**1**	**1**	**1**

CAPITAL IMPROVEMENT PLAN

The Capital Improvement Plan (CIP) is a preliminary outline of recommended projects to be completed based on the desired Level of Service. The projects are prioritized and spread out over time in such a way that balances risk reduction against cost. A 20-year CIP was developed that includes various collection system improvements. 48 out of the 467 manholes in the system are planned for rehabilitation, spread out over ten years. By spreading the rehabilitations over several years, the costs per year can be kept down to an average of $10,000 per year. The Marion Township system includes approximately 17.3 miles of sewer pipe of various sizes. The Township does not currently have a program in place for televising and cleaning sewers on an annual basis. The recommendation is to begin televising and cleaning approximately 1 mile of the system every other year beginning in 2020. In addition to the manhole repairs, each of the pump stations have planned rehabilitations. Several pump station replacements and improvements are scheduled through the year 2040, which should update all pump station components to be within their expected service lives. At this point, the CIP includes a more routine improvement schedule that should reduce failures and spread out costs of future improvements over time.

Figure 5 – 2 Expenditures by Type and Year



Revenue Structure / Long Term Funding

The Township's sewer rate structure includes a usage charge per volume of flow and a ready to serve fee. These charges are billed quarterly to the system customers. To pay for the identified capital projects and ongoing O&M costs, the Township will need to implement a series of annual rate increases of roughly 5.5% over the life of the CIP. It should be noted at a significant development is planned at the Marion Oaks site that will increase the users by over 400, an approximate 40% increase in the total number of users. This increase has not been factored into the analysis at this time, due to the uncertainty of the project schedule. As significant numbers of these users are added to the system, the rate structure should be re-analyzed. An inflationary increase of 3% was added annually to the sewage treatment rate from the City of Howell. The same annual 3% increase was added to the other system operating costs.

GIS & Mapping System

While performing MACP inspections, field staff used GPS to locate assets in the Marion Township sanitary sewer system. These GPS locations were used to create features in a Geographic Information System (GIS) using ESRI ArcGIS. After a map of the Township's sewer was created in ArcGIS, inspection notes, condition assessments, and risk management data was imported, along with as-built records and pump station O&M manuals.

Conclusion

The condition of Marion Township's wastewater system is typical of a system of its age. The system is nearing 20 years of age at the time of this publication. The manholes are, for the most part, in good condition. The pump stations, on the other hand, have experienced more frequent failures in recent years and it is expected that more failures are soon to come. Because of the high cost of pump station replacements and rehabilitations, the Capital Improvement Plan developed under this Asset Management Plan calls for the Township to replace a pump station every five years and spread out the manhole repairs over ten years. This should adequately balance the need for improvements with the associated costs to the Township.

In accordance with the SAW Grant requirements, the Township's Wastewater Asset Management Plan (WWAMP) shall be kept available for citizen review for 15 years. The WWAMP should be reviewed annually and the components updated and included in the Township's annual budget process.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date: **December 27, 2019**
(no later than 3 years from executed grant date)

The **Charter Township of Oxford** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1291-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: ~~Yes~~ or **No**

   If No - Date of the rate methodology approval letter: **December 17, 2018**

2) Significant Progress Made: Yes or No

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: ____________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

William Dunn at **248.628.9787 ext. 109** **bdunn@oxfordtownship.org**
Name Phone Number Email

William 12-27-19
Signature of Authorized Representative (Original Signature Required) Date

William Dunn, Township Supervisor
Print Name and Title of Authorized Representative

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date: **December 27, 2019**
(no later than 3 years from executed grant date)

The **Charter Township of Oxford** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1291-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

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3) Date of rate methodology review letter identifying the gap: ________________________.

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ______________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

William Dunn at	**248.628.9787 ext. 109**	**bdunn@oxfordtownship.org**
Name	Phone Number	Email

William 12-27-19
Signature of Authorized Representative (Original Signature Required) Date

William Dunn, Township Supervisor
Print Name and Title of Authorized Representative

SHARPE ENGINEERING
101 N. WASHINGTON • OXFORD MI 48371
P.248.877.2102 • SHARPE-ENGINEERING.COM

MEMORANDUM

To: Michigan Department of Environment, Great Lakes, and Energy (EGLE)
Revolving Loan Section, Attn: Karen Nickols

From: Sharpe Engineering, Inc.

CC: Oxford Township SDS

Date: December 27, 2019 (revised 1/17/2020)

Re: Oxford Township Sanitary Disposal System
EGLE Stormwater, Asset Management and Wastewater (SAW) Grant #1291-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the EGLE SAW Grant work performed by the Charter Township of Oxford (OXT). It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows recent EGLE guidance.

GRANTEE INFORMATION:

Oxford Township, SAW Grant Project #1291-01

Project Grant Amount: $505,980

Applicant Match Amount $56,220

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WRC Project Manager
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248.858.4939
devischr@oakgov.com

EXECUTIVE SUMMARY:

The Oakland County Water Resources Commissioner's Office (WRC) on behalf of the Charter Township of Oxford applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary sewerage system through the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The Oxford Township sanitary sewerage system is owned by the Charter Township of Oxford and is operated and maintained by the Oakland County Water Resources Commissioner (WRC). The WRC has various tools used to manage the assets it owns or operates and maintains, including a GIS geodatabase, collaborative asset management system, hydraulic models, condition assessment methods, risk and prioritization models, capacity studies, asset deterioration models, and an operating and capital improvement project prioritization model. These tools are used to guide the short and long-term strategies for WRC to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective. The funding strategy for each fund is also evaluated annually through WRC's "Long-Term Plan" (LRP) process that includes a review of the current rate structure, fund balances and anticipated future funding needs.

The WRC "Common to All" approach was generally followed with in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

WASTEWATER INVENTORY:

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS). CAMS assists in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by the WRC to allow for efficient and consistent recording of asset condition. For sanitary, combined, and stormwater sewer assets, a NASSCO-compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS system. Inspection work orders in the CAMS system are used for evaluation of other types of assets, such as manholes and other collection system structures, and for most vertical asset types, such as pumps, valves, structures, etc.

As part of the grant for Oxford Township Sanitary Disposal System, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 981 segments totaling 205,315 lineal feet of sanitary sewer underwent condition assessment via cleaning and televising. Additionally, approximately 1046 manholes and other related structures were evaluated using the MACP Level 1 plus from through the CAMS inspection work order process. Vertical assets, including pump stations, were inventoried using a WRC hierarchy template and condition assessment data was collected and input into the CAMS system.

CRITICALITY OF ASSETS:

WRC implemented PowerPlan asset optimization software as part of the “Common to All” Program. Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors were configured into the software as part of that Program, and were used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations, storage, and treatment facilities, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25. Higher BRE scores identify the assets with the greatest overall risk.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, non-gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the CAMS system, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition.

For manholes, the POF is based primarily on MACP fields cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based solely on age.

For force mains, the POF was based on age, normal operating pressure, quantity of repairs tracked in the CMMS, and velocity. For manholes and other access structures, the POF is based primarily on the MACP fields cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based on just age.

The COF for mains and access points (sanitary sewers, force mains, and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

The POF and COF of vertical assets were calculated using a scoring matrix. The POF for vertical assets was calculated using a combination of age and physical condition collected from inspections performed using work orders through the CAMS system. O&M protocol and performance factors were also scored and used in the calculation. In the absence of any other data, age was used to estimate POF. The COF for vertical assets was scored using a matrix of factors including: safety of public and employees, financial impact, public confidence, regulatory compliance, and firm capacity. The asset optimization software then uses various strategies to determine if the overall risk for an asset is acceptable over the planning period, and if not, it will provide recommendations for future work to be performed such as additional inspections, rehabilitation, certain repair, and/or replacement.

The majority of the manhole and sewer pipe assets in the Oxford Township sanitary sewer system were found to be in good condition and therefore have an acceptable risk over the planning period. Only 44 pipe segments (3% of the overall system) and zero manholes are being recommended for a repair. However, many of the components and much of the equipment at and within the existing pump stations is reaching the end of its anticipated useful life, so upgrades are being recommended to reduce risk to the system and to ensure the facilities will continue to meet the required level of service.

The assets identified as exceeding the risk criteria over the planning period have been included in the capital improvement plan with recommended actions to reduce the risk of failure for the identified asset.

LEVEL OF SERVICE DETERMINATION:

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual LRP rate process form additional elements of the LOS. The WRC's current Mission Statement is:

> *The Oakland County Water Resources Commissioner's Office is dedicated to the preservation and protection of our water environments, public health, welfare, convenience and the citizen's right to quality water. We are committed to acting with integrity and professionalism and will always seek collaboration among our Oakland County communities and regional partners.*
>
> *We commit ourselves to providing our customers with high value services that are fairly priced, environmentally sound and sustainable in the long term. We are committed to an open dialogue with our communities and promise to keep lines of communication open.*
>
> *In our pursuit of excellence and continuous improvement, every member of our staff will respond to issues of the public promptly, safely, respectfully and with sensitivity to their individual needs. Our office will always endeavor to provide an appropriate resource when an issue is not within our authority.*
>
> *We will install a culture that perpetuates an environment promoting trust, respect and teamwork, both within our organization and among our communities and region.*

The WRC strategic Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.

- Regulatory Compliance. Goal: No state permit violations and comply with all EGLE policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data, and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

REVENUE STRUCTURE:

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspection, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real world” needs, including any improvements required due to capacity or regulation changes. The WRC uses this information as part of its existing LRP rate process to prioritize projects and ensure adequate funding is available.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Capital Improvement Plan (CIP) Reserve for replacement of equipment or facilities in kind or with alternate technology.

- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.

WRC worked with its internal fiscal staff to determine if the system’s current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system’s current rate structure was made, as required by the SAW Grant Program, and submitted to the EGLE six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN:

The asset optimization software forecasts and prioritizes assets that require replacement in the planning period. The individual replacements can be combined into projects and scheduled with budget amounts established. This information is then used in the LRP process to determine rate needs for funding the project established. A list of capital projects was developed for the Oxford Township sanitary sewer system by using recommendations from the asset optimization software and consideration of other system needs.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 5 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Improvement Projects, 0 to 5 years: Projected Cost - $1,892,721

• Sewer, Remove and Replace	$60,950
• Sewer, CIPP Liner	$14,250
• Sewer, Grout Joints	$5,000
• Pump Stations	$1,812,521

Capital Improvement Projects, 5 to 10 years: Projected Cost - $1,174,625

• Sewer, Remove and Replace	$12,000
• Sewer, CIPP Liner	$46,400
• Sewer, Grout Joints	$12,225
• Pump Stations	$1,104,000

Capital Improvement Projects, 10 to 20 years: Projected Cost - $1,243,500

• SCADA Upgrades	$300,000
• Pump Stations	$943,500

In accordance the Township’s Asset Management Program, ongoing inspections will be made and future projects will be identified as the need arises.

LIST OF MAJOR ASSETS:

The Oxford Township Sanitary Sewer System's major assets include:

- Total Sewer Segments: 1,675
- Gravity Sewer: 300,401 lineal feet consisting of 1,551 segments

Sewer Assets by Diameter	Total Length (ft)	Segments
8" or smaller	215,827	1,149
8" to 12"	56,423	283
12" to 16"	17,980	71
16" to 24"	10,171	48

Sewer Assets by Material	Total Length (ft)	Segments
ABS Truss	35,150	173
Clay or VCP	69,374	299
Concrete	913	6
Ductile Iron	1,245	11
HDPE	262	2
Non-reinforced Concrete	27	1
PVC	159,026	897
Reinforced Concrete	16,945	71
Truss	17,459	91

- Non-Gravity Sewer: 43,722 lineal feet consisting of 124 segments

Sewer Assets by Diameter	Total Length (ft)	Segments
8" or smaller	39,583	118
8" to 12"	4,139	6

Sewer Assets by Material	Total Length (ft)	Segments
Cast Iron	4,067	5
Ductile Iron	17,947	77
HDPE	15,430	25
PVC	6,238	15
Truss	39	2

- 1,541 manholes
- 23 sewage pump stations
  - 17 Precast Concrete Pump Stations
  - 6 Steel Can Pump Stations
- 13 grinder pumps

PROJECT HIGHLIGHTS:

The development of this Asset Management Program (AMP) for the Oxford Township sanitary sewerage system was led by Sharpe Engineering with significant field work performed by the WRC. The following list highlights some of the more tangible outcomes from the work provided under the SAW Grant:

- Updated OXT's GIS inventory with the age, material, size, and depth information
- Cleaned and televised 205,315 feet of sewers (60% of the overall system)
- Inspected 1,046 manholes (68% of the system manholes)
- Inspected all 23 sewage pump stations
- Performed ice pigging on 3 critical sewage pump stations
- Updated OXT's 0-5 year, 6-10 year, and 10-20 year LRP based on work provided

RECOMMENDATIONS:

In order to maintain the AMP sustainable into the future, the LRP process will be undertaken every 2 years to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will automatically update recommended events, treatment and replacement strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 2019
(no later than 3 years from executed grant date)

The Village of Pigeon *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1540-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**
   If No - Date of the rate methodology approval letter: 10-07-2019 .
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Steven Corrion	at	989-453-2733	pigeonclerk@gmail.com
Name		Phone Number	Email

12-24-19

Signature of Authorized Representative (Original Signature Required) Date

Steven Corrion Village Superintendent/Clerk

Print Name and Title of Authorized Representative

April 2017

WASTEWATER ASSET MANAGEMENT PLAN

VILLAGE OF PIGEON

HURON COUNTY, MICHIGAN

DECEMBER 2019

BASED ON:

ASSET MANAGEMENT GUIDANCE FOR WASTEWATER

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, JULY 2013

STORMWATER, ASSET MANAGEMENT, AND WASTEWATER (SAW) GRANT

PROJECT NUMBER: 1540-01

PREPARED BY:

Spicer group

230 S. Washington Avenue
Saginaw, MI 48607

PROJECT ID NUMBER: 124505SG2017

VILLAGE OF PIGEON
SAW GRANT NO. 1540-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
230 S. Washington Avenue
Saginaw, MI 48607

Owner: **VILLAGE OF PIGEON**
29 S. Main Street
Pigeon, MI 48755
Steven Corrion, Village Superintendent/Clerk
989-453-2733

In October 2016, the Village of Pigeon entered into an agreement with the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. The Village received the follow grants:

Wastewater Asset Management Plan (WWAMP) 90%	$327,075
LESS Local Match	($32,708)
Total Grant Amount	$294,368

The Asset Management Plans (AMPs) needed to be completed within three years of the date of the Michigan Finance Authority (MFA) agreement; December 2019.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Critical Assets (Risk)
- Level of Service Determination
- Revenue Structure
- Capital Improvement Plan

List of Major Assets

- 9.4 miles of sanitary sewer pipes ranging in size from 8”-14”
- 204 Sanitary Sewer Manholes
- 3 pumping stations
- 4-cell lagoon treatment facility

Wastewater Asset Inventory and Condition Assessment

The Village’s wastewater system consists of three main components: The collection system (pipes and manholes), pump stations/forcemains and lagoon wastewater treatment plant.

For the collection system, Spicer Group, Inc. completed a mobile mapping LiDAR survey of the entire Village and used the survey information to develop a comprehensive Geographic Information System (GIS). This GIS is located on a new computer in the Village office and is a detailed "smart" mapping system with databases, using the ArcGIS/Arc Online by ESRI platform. This system can be accessed and updated in the field by DPW staff from new iPads supplied as part of the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspections etc. can be accessed. This information can also be modified to provide specific lists and maps, and can be updated easily when future improvements are made.

The Village currently has 49,845 feet of sanitary sewer pipe in the entire sanitary sewer collection system; ranging in size from 8" to 14", 204 sanitary sewer manholes, and 610 sewer service connections.

Michigan Pipe Inspection, from Port Huron has completed a comprehensive cleaning and televising program of the sanitary sewer pipes using the NASSCO Pipeline Assessment Certification Program (PACP) to identify features and defects within the collection system. Spicer Group, Inc. completed a comprehensive inspection of the manholes using the NASSCO Manhole Assessment Certification Program (MACP) standards to identify features and defects within the manholes. The MACP/PACP system is used to standardize the scoring and to quantify the condition of the wastewater assets.

The next main component of the Village's wastewater system is three (3) pumping stations. Spicer Group completed an inspection and condition assessment of all the stations, and provided recommendations for future improvements. Many of the components of the pump station were past their useful life, but appeared to be working. It was recommended that the Village start budgeting for these future upgrades.

The last main component of the Village's wastewater system is the wastewater treatment plant lagoon (WWTL) located northwest of the Village limits. Spicer Group completed an inspection and assessment of the lagoon. Nu Systems, LLC performed a sludge judge and chemical analysis of the bio solids. Results from the lab found the material meets the MDEQ requirements for a Residuals Management Plan (RMP) and the material can be recycled in a beneficial reuse program such as land application.

Criticality (Risk)

For each asset in the Villages' wastewater system, a criticality/risk analysis was performed to determine and prioritize the Village's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including all pipes, manholes and pumping stations. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences if that asset failed. Finally, the Criticality (Risk) score was calculated using:

LoF x CoF = RISK

Overall the Village of Pigeon's collection system is in good condition. Most of the pipes had likelihood of failure scores under 4 indicating good to fair condition. This contributed to low consequence of failure scores and overall low risk scores. The manholes were also in overall good condition, however a total of 16 structures were unable to be inspected therefore they received high LoF values due to current condition being unknown. Also, 9 manholes are below grade and need to be raised to grade so they are accessible for maintenance and emergency situations. Overall CoF and Risk values for the manholes were also very low for the majority of the manholes due to being in good condition. The pump stations were critically assessed and found to have many components receiving high LoF scores indicating near failure. Since the pump stations handle wastewater flow for the entire system, most components received very high CoF scores. The high CoF and LoF scores for many of the pump station components led to an overall high-risk value for the pump stations.

Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of service does the Village want to provide to its wastewater customers? How are projects going to be prioritized and included in the Capital Improvement Plan (CIP)? What cost is the Village willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The Villages' Level of Service Goals are as follows:

Mission Statement

The Village of Pigeon strives to develop a financially stable, high performing wastewater collection, pumping and treatment service that addresses the customer's wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our customers.

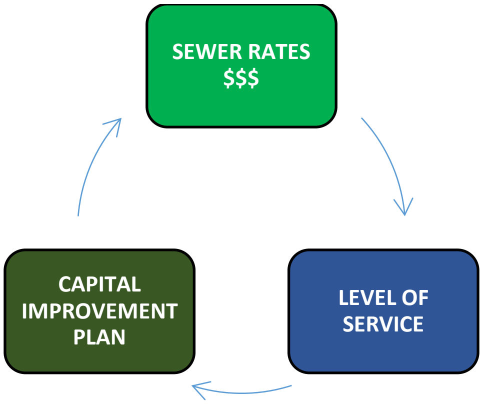
One of the basic goals is to review the capital improvement projects to determine the best value options for the Villages' customers based on life cycle costs and overall benefits to the community:

- "**MINIMUM**" Level of Service – Priority projects to meet the minimum local, State, and/or Federal regulations. Typically to be completed within the next 5 years.
- "**MEDIUM**" Level of Service – Projects that will need to be done eventually; typically when other infrastructure projects are happening.
- "HIGH" Level of Service – Projects that are on the long range radar that could spur future development and growth for the Village.

Generally, the "high" level of service projects will have a higher construction/initial cost but would provide a better long-term or life cycle cost for the Village. The "minimum" level of service projects would have a lower initial cost but would also have a shorter life span and higher overall life cycle costs.

As the AMP progressed, different scenarios were evaluated to show the relationship between the Villages' desired Level of Service and the costs of the capital improvement projects associated with that LOS, and the effect of that LOS on sewer rates.

Asset Management Plan Evaluation Process



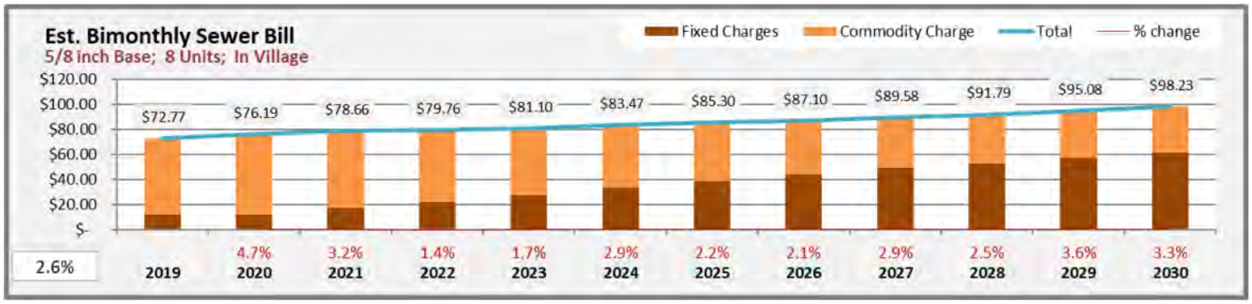
The resulting capital improvement plan and revenue structure was one that met the Villages' goals, addressed the improvements that need to be made, and is a sustainable rate structure for the Village's customers.

The Village chose to adopt a minimum Level of Service.

Revenue Structure

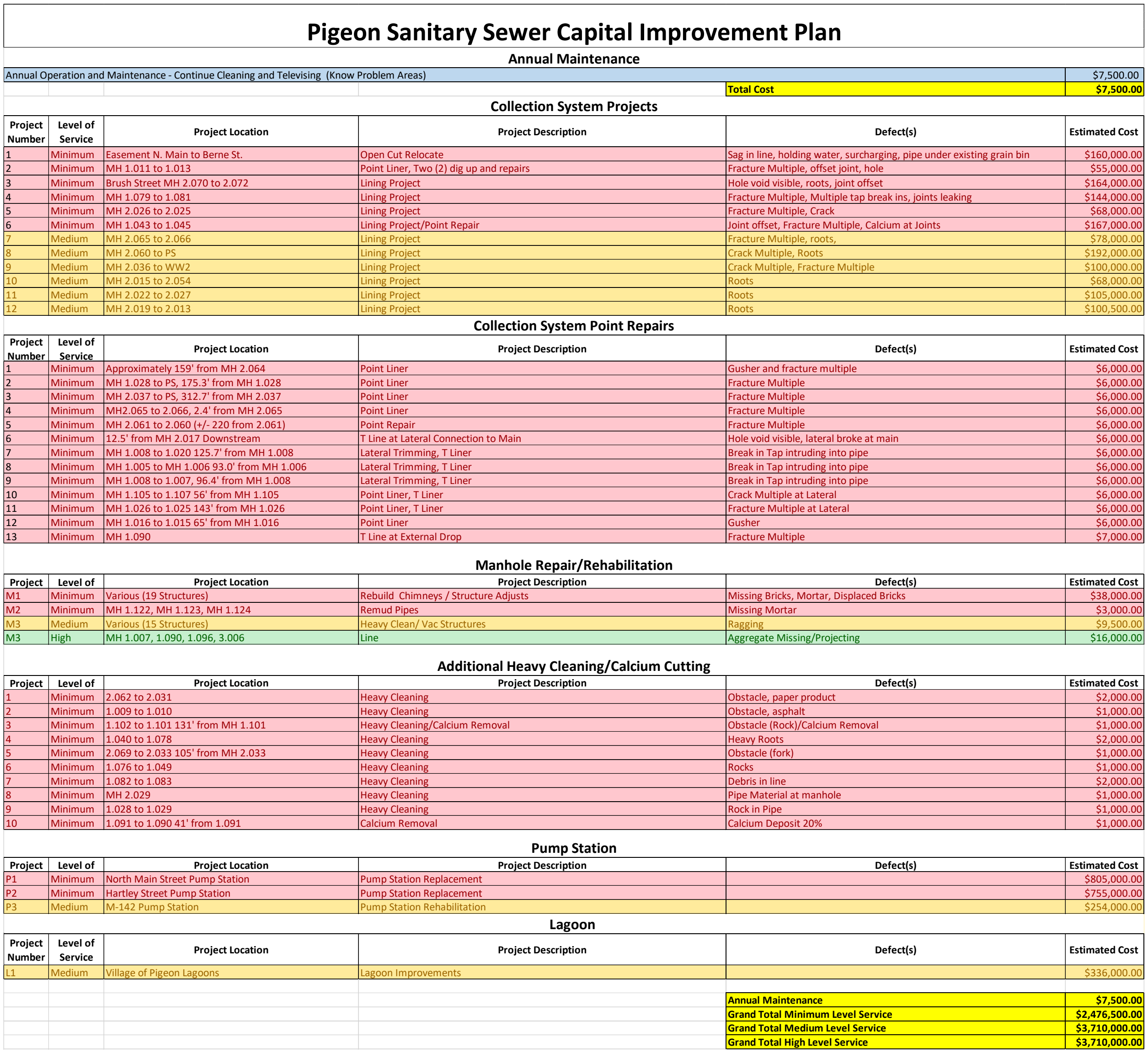
Spicer Group teamed with Municipal Analytics for the revenue structure analysis for the AMP. Wastewater account balances, expenditures, revenues, etc. were reviewed and inputted into financial software to perform a gap analysis to determine if there were any deficiencies in the rates. The Villages' current rate structure was found to have no deficiencies meaning the Village could fund current and future operations and maintenance of the system. However, the gap analysis did not consider any capital improvement project required to maintain the selected LOS.

The Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion, and the rate structure to support those improvements was determined. Many iterations/scenarios were performed to come up with a rate structure that met the Villages' Level of Service goals, completed the CIP projects that are needed, and had sustainable rates for the Village's customers. The result was a recommendation for a bimonthly readiness-to-serve charge based on meter size and a commodity rate based on 1,000 gallons of metered water. The impact on typical residential ratepayers is expected to be an annual increase of 2.6% per year through 2030. This should be reviewed annually as a part of the Villages' normal budgeting process.



Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the wastewater system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. Various degrees of Level of Service and the associated CIP projects were evaluated and plugged into the Revenue Structure model, and the resulting sewer rates for that set of scenarios were reviewed. If the projected rates were too high, a lower LOS was chosen, and those CIP projects were plugged into the Revenue Structure model and the resulting rates were then reviewed. The process then continued with different CIP projects at varying LOS's until an acceptable rate structure, level of service, and capital improvement plan was developed. A 5-year CIP was developed that includes various collection system improvements. The table below summarizes the minimum service level projects that were included in the 5-year capital improvement plan.



Pigeon Sanitary Sewer Capital Improvement Plan

Annual Maintenance

Annual Operation and Maintenance - Continue Cleaning and Televising (Know Problem Areas)	$7,500.00
Total Cost	**$7,500.00**

Collection System Projects

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	Easement N. Main to Berne St.	Open Cut Relocate	Sag in line, holding water, surcharging, pipe under existing grain bin	$160,000.00
2	Minimum	MH 1.011 to 1.013	Point Liner, Two (2) dig up and repairs	Fracture Multiple, offset joint, hole	$55,000.00
3	Minimum	Brush Street MH 2.070 to 2.072	Lining Project	Hole void visible, roots, joint offset	$164,000.00
4	Minimum	MH 1.079 to 1.081	Lining Project	Fracture Multiple, Multiple tap break ins, joints leaking	$144,000.00
5	Minimum	MH 2.026 to 2.025	Lining Project	Fracture Multiple, Crack	$68,000.00
6	Minimum	MH 1.043 to 1.045	Lining Project/Point Repair	Joint offset, Fracture Multiple, Calcium at Joints	$167,000.00
7	Medium	MH 2.065 to 2.066	Lining Project	Fracture Multiple, roots,	$78,000.00
8	Medium	MH 2.060 to PS	Lining Project	Crack Multiple, Roots	$192,000.00
9	Medium	MH 2.036 to WW2	Lining Project	Crack Multiple, Fracture Multiple	$100,000.00
10	Medium	MH 2.015 to 2.054	Lining Project	Roots	$68,000.00
11	Medium	MH 2.022 to 2.027	Lining Project	Roots	$105,000.00
12	Medium	MH 2.019 to 2.013	Lining Project	Roots	$100,500.00

Collection System Point Repairs

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	Approximately 159' from MH 2.064	Point Liner	Gusher and fracture multiple	$6,000.00
2	Minimum	MH 1.028 to PS, 175.3' from MH 1.028	Point Liner	Fracture Multiple	$6,000.00
3	Minimum	MH 2.037 to PS, 312.7' from MH 2.037	Point Liner	Fracture Multiple	$6,000.00
4	Minimum	MH2.065 to 2.066, 2.4' from MH 2.065	Point Liner	Fracture Multiple	$6,000.00
5	Minimum	MH 2.061 to 2.060 (+/- 220 from 2.061)	Point Repair	Fracture Multiple	$6,000.00
6	Minimum	12.5' from MH 2.017 Downstream	T Line at Lateral Connection to Main	Hole void visible, lateral broke at main	$6,000.00
7	Minimum	MH 1.008 to 1.020 125.7' from MH 1.008	Lateral Trimming, T Liner	Break in Tap intruding into pipe	$6,000.00
8	Minimum	MH 1.005 to MH 1.006 93.0' from MH 1.006	Lateral Trimming, T Liner	Break in Tap intruding into pipe	$6,000.00
9	Minimum	MH 1.008 to 1.007, 96.4' from MH 1.008	Lateral Trimming, T Liner	Break in Tap intruding into pipe	$6,000.00
10	Minimum	MH 1.105 to 1.107 56' from MH 1.105	Point Liner, T Liner	Crack Multiple at Lateral	$6,000.00
11	Minimum	MH 1.026 to 1.025 143' from MH 1.026	Point Liner, T Liner	Fracture Multiple at Lateral	$6,000.00
12	Minimum	MH 1.016 to 1.015 65' from MH 1.016	Point Liner	Gusher	$6,000.00
13	Minimum	MH 1.090	T Line at External Drop	Fracture Multiple	$7,000.00

Manhole Repair/Rehabilitation

Project	Level of	Project Location	Project Description	Defect(s)	Estimated Cost
M1	Minimum	Various (19 Structures)	Rebuild Chimneys / Structure Adjusts	Missing Bricks, Mortar, Displaced Bricks	$38,000.00
M2	Minimum	MH 1.122, MH 1.123, MH 1.124	Remud Pipes	Missing Mortar	$3,000.00
M3	Medium	Various (15 Structures)	Heavy Clean/ Vac Structures	Ragging	$9,500.00
M3	High	MH 1.007, 1.090, 1.096, 3.006	Line	Aggregate Missing/Projecting	$16,000.00

Additional Heavy Cleaning/Calcium Cutting

Project	Level of	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimum	2.062 to 2.031	Heavy Cleaning	Obstacle, paper product	$2,000.00
2	Minimum	1.009 to 1.010	Heavy Cleaning	Obstacle, asphalt	$1,000.00
3	Minimum	1.102 to 1.101 131' from MH 1.101	Heavy Cleaning/Calcium Removal	Obstacle (Rock)/Calcium Removal	$1,000.00
4	Minimum	1.040 to 1.078	Heavy Cleaning	Heavy Roots	$2,000.00
5	Minimum	2.069 to 2.033 105' from MH 2.033	Heavy Cleaning	Obstacle (fork)	$1,000.00
6	Minimum	1.076 to 1.049	Heavy Cleaning	Rocks	$1,000.00
7	Minimum	1.082 to 1.083	Heavy Cleaning	Debris in line	$2,000.00
8	Minimum	MH 2.029	Heavy Cleaning	Pipe Material at manhole	$1,000.00
9	Minimum	1.028 to 1.029	Heavy Cleaning	Rock in Pipe	$1,000.00
10	Minimum	1.091 to 1.090 41' from 1.091	Calcium Removal	Calcium Deposit 20%	$1,000.00

Pump Station

Project	Level of	Project Location	Project Description	Defect(s)	Estimated Cost
P1	Minimum	North Main Street Pump Station	Pump Station Replacement		$805,000.00
P2	Minimum	Hartley Street Pump Station	Pump Station Replacement		$755,000.00
P3	Medium	M-142 Pump Station	Pump Station Rehabilitation		$254,000.00

Lagoon

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
L1	Medium	Village of Pigeon Lagoons	Lagoon Improvements		$336,000.00

Annual Maintenance	**$7,500.00**
Grand Total Minimum Level Service	**$2,476,500.00**
Grand Total Medium Level Service	**$3,710,000.00**
Grand Total High Level Service	**$3,710,000.00**

Conclusion

The Village of Pigeon's wastewater system is a typical, aging municipal infrastructure system. The DPW staff have taken a proactive approach to routine operation and maintenance of the system. Structurally, the system is very sound. There is one area where grain bins have been built over the existing sanitary sewer. It is recommended the sewer be rerouted around the grain bins and abandoned under the grain bins. The Capital Improvement Plan has several lining projects to take care of some structural and O&M defects including fractures, cracks, infiltration and roots at various locations within the system. There are two areas noted in the Capital Improvement Plan that will need to be dug up and repaired with new PVC sewer and several locations where point liners or T liners will be installed to fix small issues within the system. Routine maintenance has allowed the pump stations to successfully function until now, but due to many of the components operating near failure it is recommended that the Village replace the pump station in the next 5 years on Hartley Street and the pump station on North Main Street. There are several manholes that need to be adjusted to grade and chimneys rebuilt. The Village needs to continue to monitor and maintain the annual operations and maintenance with specific areas noted in the Capital Improvement Plan noted to remove obstacles, debris, rocks, ad calcium. An increase to sewer rates by approximately 2.6% to be implemented at the beginning of the fiscal year is recommended along with recommended rate structure which includes a bi-monthly readiness-to-serve charge and a capital/debt charge based on meter size. The average 2.6% increase per year is expected to impact the typical residential rate payer through year 2030. After these improvements are made to the system, the asset management plan should be updated to show these improvements. Also, the rates should be reviewed annually during the Village's normal budgeting process.

In accordance with the SAW Grant requirements, the Villages' Wastewater Asset Management Plan (WWAMP) needs to be kept available for citizen review for 15 years. The WWAMP should be reviewed annually, and the components updated and included in the Villages' annual budget process.

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Saugatuck

SAW Project No. 1557-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2017, the City of Saugatuck received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the City's publicly owned stormwater utility. Working with City staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact information for the SAW Grant AMP is:

City of Saugatuck
102 Butler Street, Saugatuck, MI 49453 / www.saugatuckcity.com
Scott Herbert / (269) 857-2603
SAW Grant #1557-01

ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 34,384 feet (6.51 miles) of storm sewers and 509 stormwater structures connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size, and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping, and further evaluation purposes.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field-based assessments were completed on all 509 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 10% of the gravity pipe. Capacity analysis and hydraulic modeling was not commissioned. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance: 33% of the system was recommended for inspection and/or cleaning due to it not being done as part of the SAW Grant. Rehabilitation accounted for 23% of the system identifying the need for replacement, point repairs and lining. The remaining 44% of assets were placed in the 20+ year category.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City Asset Management Team to develop the following LOS statement and goals.

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

The overall objective of the City of Saugatuck is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the City of Saugatuck

- Provide adequate stormwater collection system and conveyance capacity for all service areas
- Actively maintain stormwater collection and conveyance system assets in reliable working condition.
- Provide rapid and effective emergency response services to customers.
- Ensure maintenance and operations staff are properly trained.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, and evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula.

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

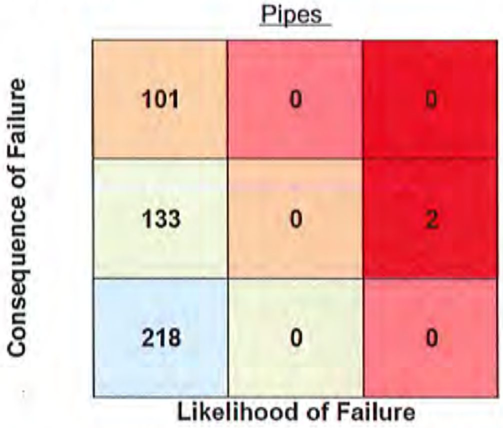
Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

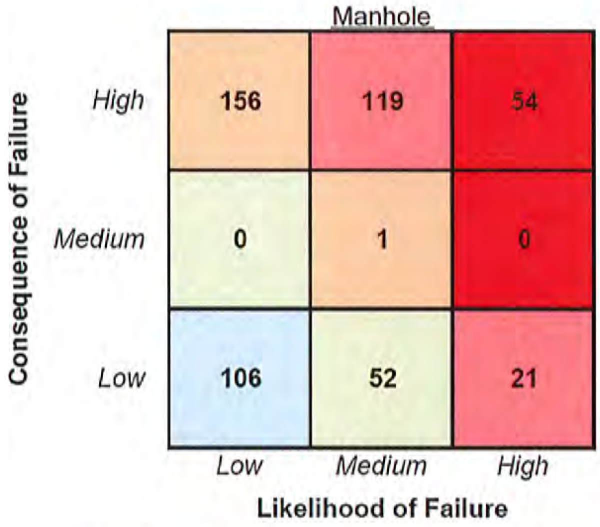
Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. Two pipe segments in the collection system have an extreme risk rating and are recommended to be further inspected with full lining recommended in the next 1-2 years.



101	0	0
133	0	2
218	0	0

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Fifty-four structures are identified as extreme risk and are recommended for replacement or rehabilitation.



	Low	Medium	High
High	156	119	54
Medium	0	1	0
Low	106	52	21

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

A spreadsheet providing asset criticality for each utility asset is included in the AMP detailed report for the stormwater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City's stormwater utility assets based on the Business Risk evaluation. From the BRE, a short-term (1-5 year CIP) and long-term (6-20-year CIP) was developed for the utility. Table 1 shows detailed recommendations of the assets needing rehabilitation in the short term.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Pipe Replacement	$ 125,828	$ -	$ 129,603	$ -	$ -	$ -
Pipe Point Repair	$ 7,840	$ 7,840	$ -	$ -	$ -	$ -
Manhole Replacement	$ 416,970	$ -	$ 188,552	$ -	$ -	$ 263,268
Total	$ 550,638	$ 7,840	$ 318,155	$ -	$ -	$ 263,268

OPERATIONS & MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table 2 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 2. 5-Year Capital Improvement Plan: Maintenance

Maintenance Action	Total Cost (Current Year Dollars)	2020	2021	2022	2023	2024
Manhole Inspection	$ 18,757	$ -	$ -	$ -	$ 20,496	$ -
Manhole Cleaning	$ 110,058	$ 45,513	$ -	$ -	$ -	$ 72,646
CCTV and Cleaning	$ 122,289	$ -	$ -	$ 129,736	$ -	$ -
Total	$ 251,103	$ 45,513	$ -	$ 129,736	$ 20,496	$ 72,646

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The City of Saugatuck *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1557-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

City of Saugatuck	at	(269) 857-2603	kirk@saugatuckcity.com
Name		Phone Number	Email

12-23-19

Signature of Authorized Representative (Original Signature Required) Date

Kirk Harrier – City Manager

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

ST. JOSEPH COUNTY
MICHIGAN

Prepared for:

St. Joseph County Drain Commissioner

SAW Project No. 1572-01

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

1.0 EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2017, The St. Joseph County Drain Commissioner (SJCDC) received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP). This report provides the Asset Management Plan (AMP) for the stormwater collection system(s). Working with drain staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system(s).

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The St. Joseph County Drain Commissioner has executed the "Certification of Project Completeness" for the storm water asset management plan and a copy has been provided at the end of this Executive Summary.

The contact person for the SJCDC AMP is:

Jeffery J. Wenzel – Drain Commissioner
612 E. Main St.
Centreville, MI 49032
Phone number: 269.467.5600
Email: wenzelj@stjosephcountymi.org

ASSET INVENTORY AND CONDITION ASSESSMENT

The St. Joseph County Drain Commissioner initially identified one (1) county drain with enclosed pipe networks needing to be cleaned, televised, and inspected. However, after further investigation, the Corey Lake Outlet was determined not to be an official County Drain. It was constructed by the County Commissioners in 1951, and never turned over to the Drain Commissioner.

Several dams were inspected under Part 307 and Part 315 of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. These include:

Lake Templene Dam, ID 470
Omena Lake Level Control Structure, ID 814
Clear Lake Level Control Structure, ID 939
Long Lake Level Control Structure, ID 940
Sand Lake Level Control Structure, ID 950
Corey Lake Level Control Structure, ID 2015
Klinger Lake Level Control Structure, ID 2016
Pleasant Lake Level Control Structure, ID 2017
Beaver Lake Level Control Structure, ID 2557
Fish Lake Level Control Structure, ID 2644
Kaiser Lake Level Control Structure, ID 4012
Eberhard Lake Level Control Structure, ID 4014

ASSET IDENTIFICATION AND LOCATION

A comprehensive stormwater system asset inventory was not developed due to the Corey Lake Outlet not being an official County Drain.

CONDITION ASSESSMENT AND EXPECTED USEFUL LIFE

For the Drain Commissioner, a comprehensive evaluation of the collection system was not performed. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were not conducted. Capacity analysis was not completed. This was all due to the determination of the Corey Lake Outlet not being an official County Drain.

LEVEL OF SERVICE

DEFINING THE EXPECTED LEVEL OF SERVICE (LOS)

Level of Service (LOS) defines the way in which the St. Joseph County stakeholders want the storm water system(s) to perform over the long term and is an MDEQ required component of an AMP. The LOS can include any technical, managerial, or financial components the County wishes, if all regulatory requirements are met. Throughout the development of this AMP, F&V worked with the County drain staff to develop the following LOS statement and goals.

STORMWATER – LEVEL OF SERVICE STATEMENT

To provide appropriate stormwater collection, diversion, and conveyance at a minimal cost, consistent with applicable Drain Code requirements. To achieve this the following Level of Service (LOS) goals are proposed for the St. Joseph County Drain Commissioner:

- *Provide adequate stormwater collection system(s) and conveyance capacity for all drainage districts.*
- *Maintain stormwater collection and conveyance system(s) assets in reliable working condition.*
- *Provide rapid and effective emergency response services to customers.*

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of the County change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the County Drain Commissioner from time to time to make sure they accurately reflect the desired operation of the storm water system(s).

MEASURING PERFORMANCE

Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. Evaluations of goals should be completed at least annually to determine if the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

DETERMINING CRITICALITY

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors: 1) Likelihood (Probability) of Failure and 2) Consequence of Failure. Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and on the utility's ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

ASSESSING CRITICALITY

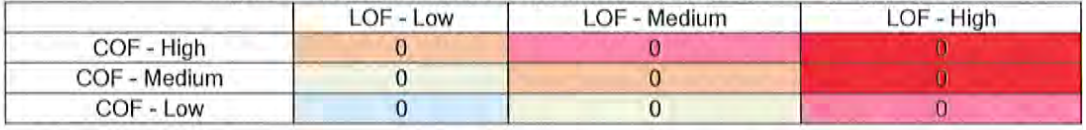
A Business Risk Evaluation (BRE) was not performed since there were no assets to evaluate.

The Business Risk score, also known as Criticality, is calculated for each asset using the following equation:

Business Risk = Consequence of Failure Score x Likelihood of Failure Score

Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. Since no pipe segments were evaluated, so there is no Business Risk data.

Figure 1 - Business Risk Matrix (Risk Rating) by Number of Gravity Pipes



	LOF - Low	LOF - Medium	LOF - High
COF - High	0	0	0
COF - Medium	0	0	0
COF - Low	0	0	0

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

CAPITAL IMPROVEMENT PLAN

Due to the reactionary nature of how the Drain Commissioner operates, being held to follow the Drain Code, a Capital Improvement Plan was not created. Most projects are either done by petition, or under maintenance.

OPERATIONS AND MAINTENANCE

Drain Commissions are created and governed by state statutes. The Drain Code of 1956 is the primary statute governing level of service for each drain. Per statute, the Drain Commissioner is authorized to expend up to $5,000 per linear mile for maintenance per each drainage district. Expending more than the authorized rate needs additional review and a petition by a municipality and/or landowners.

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date December 31, 2019
(no later than 3 years from executed grant date)

The St. Joseph County Drain Commissioner *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1572-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

St. Joseph County Drain Commissioner at	(269) 467-5600	drains@stjosephcountymi.org
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required)

12/18/19
Date

Jeffery J. Wenzel – St. Joseph County Drain Commissioner
Print Name and Title of Authorized Representative

DEQ

Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/31/2019
(no later than 3 years from executed grant date)

The City of Standish *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1034-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Peggy Burtch at 989-846-9588 pburtch@cityofstandish.com
Name Phone Number Email

12-6-19
Signature of Authorized Representative (Original Signature Required) Date

Gerald H. Nelson, City Manager
Print Name and Title of Authorized Representative

CITY OF STANDISH

STORMWATER ASSET MANAGEMENT PLAN

SAW GRANT PROJECT NO. 1034-01

Gateway To The Sunrise Side

December 2019

Executive Summary

Introduction

OHM
Advancing Communities®

In December 2013, the City of Standish applied for a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) in order to develop an Asset Management Plan (AMP) for the City's stormwater system. The purpose of this Asset Management Plan report is to provide a basis for determining needed annual capital reserves for asset replacement.

The contact person for the City of Standish Wastewater AMP is:

Gerald H. Nelson, City Manager
399 E. Beaver St.
Standish, MI 48658
Phone: (989)846-9588
Fax: (989)846-6287
jnelson@cityofstandish.com

Asset Inventory

An asset inventory is a list of the City's assets and their attributes. The City, in partnership with Surveying Solutions Inc., Dependable Sewer Service, and OHM Advisors, has inventoried and digitized the majority of its storm sewer infrastructure. The GIS framework was developed as part of this effort, making it easier to store critical data for the location, size, material, age, and condition of each stormwater asset. The major assets of the City's stormwater system are shown in Figure A. Privately owned assets and assets owned by MDOT are not included in Figure A.

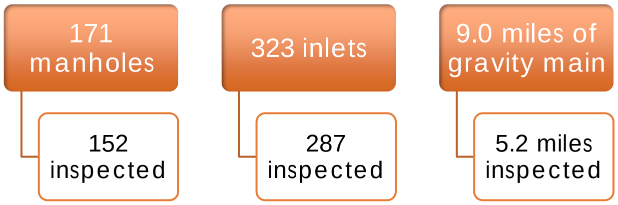


Figure A. List of Major Assets

Assessments were conducted to determine the overall, structural, and operational condition of each asset. The collection system was evaluated using the well-established NASSCO Manhole Assessment Certification Program (MACP) and Pipeline Assessment Certification Program (PACP).

Overall, the City's stormwater infrastructure is showing signs of moderate deterioration. Manholes and catch basins exhibit moderate wear with an average structural rating of approximately 2.23 and average O&M rating of 1.59. The inspected portion of the stormwater gravity mains had an Overall (Structural and O&M) rating of 3.05, indicating that the majority of the system is in moderate condition. The average Structural rating is 2.27, and the average O&M rating is 2.48.

Level of Service

The City has identified Level of Service (LOS) goals that will be used to guide the AMP and establish critical performance parameters. The LOS is bounded by the minimum regulatory requirements and the maximum capabilities of the assets.

Table A. City of Standish Stormwater Level of Service Goals

Key Service Criteria	Performance Indicator	Target Level of Service
Collection System Asset Condition Assessment	PACP and MACP inspections per year	Continue cleaning and inspections at an average rate of 8% per year, with 4% from the frequent maintenance list, and 4% from the remaining inventory
Regulatory Compliance	Compliance with EGLE Policy and the Clean Water Act	Comply with EGLE Policy and the Clean Water Act
Service Delivery and Customer Communication	Customer complaints per year, request response time	Acknowledge customer complaints and requests within 24 hours of receipt Respond to customer complaints and requests within three business days
GIS Database Management	Tracking asset conditions in the GIS geodatabase	Maintain a continuously updated GIS geodatabase
Capital Improvement Planning	Customer complaints per year, unexpected repair costs per year	Update the CIP annually using gathered information from customer complaints, history of emergency repairs, and inspection data.

Critical Assets

The investigation leading to the identification of critical sewer infrastructure involved the determination of business risk, which is identified as the combination of the probability of the infrastructure failing as well as the consequence of its failure.

The probability of failure is related to the physical condition of an asset. The consequence of failure focuses on the economic losses and other impacts to society due to an asset's failure. Stormwater catch basins and manholes were found to have an average probability of failure of 2.9 out of 5, while the stormwater gravity mains were found to have more significant deterioration with an average probability of failure of 3.4 out of 5. The following factors were combined to determine the consequence of failure for stormwater manholes, inlets, and gravity mains:

- Location – the cost to restore the surface above the asset and if traffic control is needed. Uses average daily traffic (ADT) data.
- Diameter – the relative size of the asset with respect to the rest of the system.
- Environment – proximity to sensitive environmental features. For the City these include: Middle Branch Pine River, Lake State Railway, and the Dobson Drain.

The Business Risk Exposure was calculated for each inspected asset as shown in Figure B.

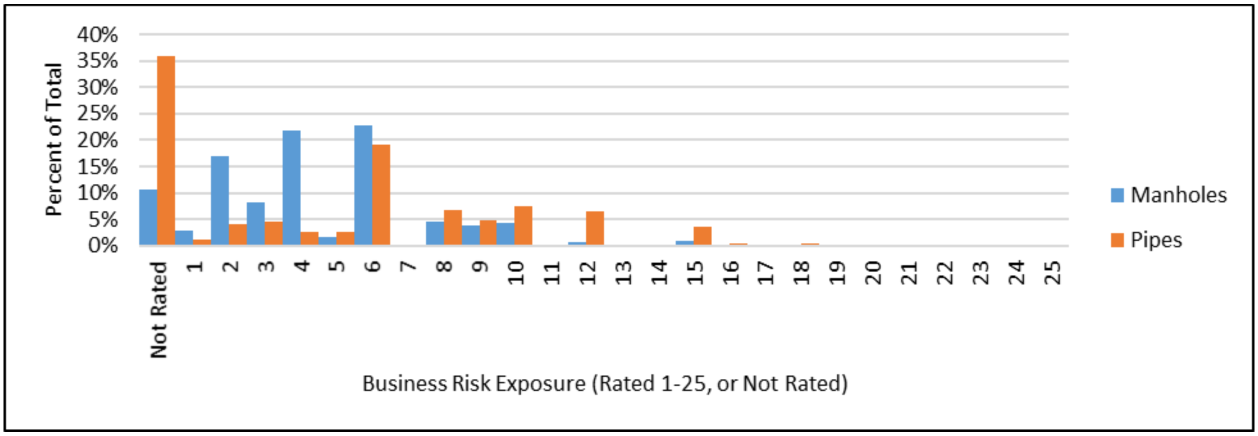


Figure B. Business Risk Exposure for City of Standish Stormwater Manholes & Catch Basins and Gravity Mains

Capital Improvement Plan

The Capital Improvement Plan (CIP) outlines the immediate/critical needs of the system as well as anticipated future needs over five-year, ten-year, and twenty-year horizons. Associated rehabilitation and replacement cost estimates are provided along with potential funding sources. The total estimated cost of the CIP is $3.13 million. The City's stormwater CIP outlines rehabilitation plans for stormwater manholes, catch basins, and gravity mains. The largest rehabilitation expense is in the Gravity Main Rehabilitation Plan, with an estimated total expense of $2.5 million over the next twenty years. Additional recommendations were developed for implementing a mainline inspection and cleaning program.

The City of Standish does not have a dedicated funding source for their stormwater system, unlike water and wastewater systems. The City funds stormwater improvements in conjunction with road and other utility projects wherever possible. The City relies on the General Fund if no other funding is available. This is a viable strategy for less expensive replacements and improvements going forward, as upgraded drainage will help increase the useful life of newly installed roadways. However, as the City's system continues to age, relying on federal loans and General Fund transfers may prove to be inadequate as more investment will be necessary to rehabilitate and replace aging system components. As an alternative to federal loans, the city could implement a stormwater utility fee. A more detailed look at the City's finances and the proposed fee structure's burden on residents will be necessary before implementing a stormwater utility fee for stormwater infrastructure funding.

Conclusion

A fully utilized AMP will improve the City's stormwater system for future generations. A healthy data management process is an ongoing cycle. The City's new asset management plan has essentially completed one cycle of the data management process. Even though that initial cycle is complete, it is essential that the City continue to collect and maintain its data. This data management process will aid in the tracking and use of data to cost-effectively manage the stormwater system.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date 12/31/2019
(no later than 3 years from executed grant date)

The City of Standish *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1034-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 17, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: N/A.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on N/A.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Name		Phone Number	Email
Peggy Burtch	at	989-846-9588	pburtch@cityofstandish.com

Signature of Authorized Representative (Original Signature Required)	Date
	12-6-19

Gerald H. Nelson, City Manager
Print Name and Title of Authorized Representative

April 2017

CITY OF STANDISH

WASTEWATER ASSET MANAGEMENT PLAN

SAW GRANT PROJECT NO. 1034-01

Gateway To The Sunrise Side

December 2019

Executive Summary

Introduction

OHM
Advancing Communities®

In December 2013, the City of Standish applied for a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) in order to develop an Asset Management Plan (AMP) for the City's sanitary sewer system. The purpose of this Asset Management Plan report is to provide a basis for determining needed annual capital reserves for asset replacement.

The contact person for the City of Standish Wastewater AMP is:

Gerald H. Nelson, City Manager
399 E. Beaver St.
Standish, MI 48658
Phone: (989)846-9588
Fax: (989)846-6287
jnelson@cityofstandish.com

Asset Inventory and Condition Assessment

An asset inventory is a list of the City's assets and their attributes. The City, in partnership with Surveying Solutions Inc., Dependable Sewer Service, and OHM Advisors, has inventoried and digitized much of its sanitary sewer infrastructure. The GIS framework was developed as part of this effort, making it easier to store critical data for the location, size, material, age, and condition of each wastewater asset. The major assets of the City's wastewater system are shown in Figure A.

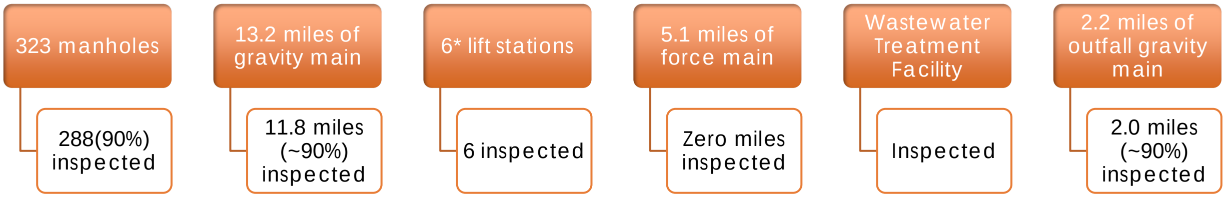


Figure A. List of Major Assets
**The City operates, but does not own, the Deep River Road Pump Station.*

Assessments were conducted to determine the overall, structural, and operational condition of each asset. The pumping stations and WWTP and all corresponding treatment appurtenances were inspected on site by engineers experienced in lift station and treatment facility design. The collection system was evaluated using the well-established NASSCO Manhole Assessment Certification Program (MACP) and Pipeline Assessment Certification Program (PACP).

It was found that the City of Standish's pumping stations and wastewater treatment plant are well maintained. Frequent check-ins by operators increase the City's ability to anticipate and resolve issues. However, most assets are either approaching the end of their useful lives or are beyond it. This will likely result in high operational and maintenance costs for the system in coming years.

Overall, the City's horizontal wastewater infrastructure is showing signs of aging. Manhole infrastructure exhibits age-appropriate/typical wear given age of system wear with an average structural rating of approximately 1.73, an average O&M rating of 2.14, and an overall average rating of 2.45. The City's gravity main infrastructure exhibits similar age-appropriate/typical wear given age of system wear with an average structural rating of approximately 1.78, an average O&M rating of 2.43, and an overall average rating of 2.58. There are eight air release valves and three gate valves that will reach the 35-year minimum expected service life within the planning horizon. The City should coordinate inspection of the adjacent force mains in conjunction with valve replacements to minimize service disruptions.

Level of Service

The City has identified Level of Service (LOS) goals that will be used to guide the AMP and establish critical performance parameters. The LOS is bounded by the minimum regulatory requirements and the maximum capabilities of the assets.

Table A. City of Standish Wastewater Level of Service Goals

Key Service Criteria	Performance Indicator	Target Level of Service
Collection System Asset Condition Assessment	PACP and MACP inspections per year	Continue cleaning and inspections at an average rate of 8% per year, with 4% from the frequent maintenance list, and 4% from the remaining inventory
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Capital Improvement Planning	Customer complaints per year, unexpected repair costs per year	Update the CIP annually using gathered information from customer complaints, history of emergency repairs, and inspection data.

Critical Assets

The investigation leading to the identification of critical sewer infrastructure involved the determination of business risk, which is identified as the combination of the probability of the infrastructure failing as well as the consequence of its failure. The probability of failure is related to the physical condition of an asset. Both sanitary manholes and sanitary gravity mains were found to have an average probability of failure of 2.5 out of 5. The consequence of failure focuses on the economic losses and other impacts to society due to an asset's failure. The following factors were combined to determine the consequence of failure for manholes and sanitary gravity mains: location, relative network position, top users, diameter, and proximity to environmentally sensitive features. The Business Risk Exposure was calculated for each inspected asset as shown in Figure B.

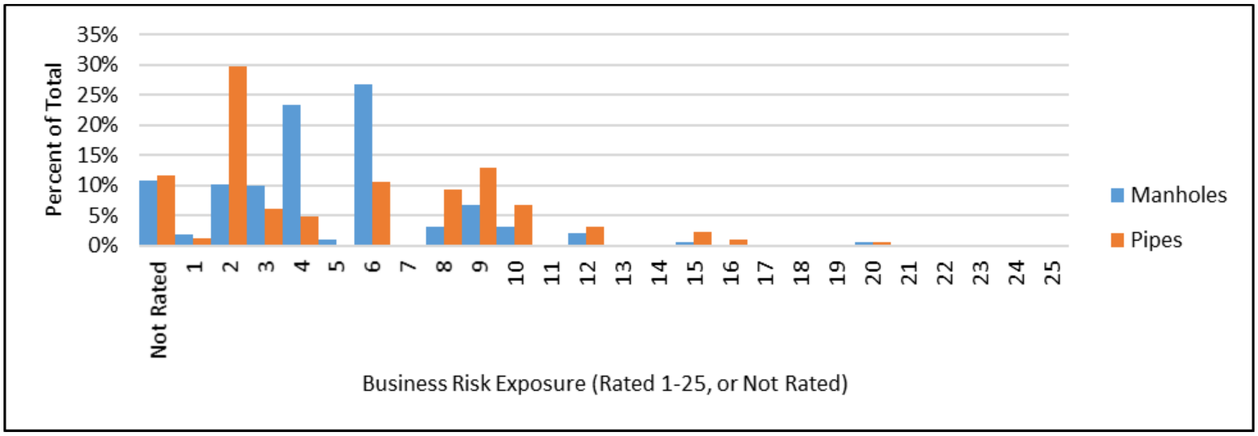


Figure B. Business Risk Exposure for Standish Wastewater Manholes and Gravity Mains

Revenue Structure

The City's sewer rates were analyzed and compared to the anticipated long-term operating expenses and capital improvements. An Asset Management Financial Plan (AMFP) was developed by Baker Tilly Municipal Advisors in collaboration with Surveying Solutions Inc., OHM Advisors, and the City of Standish. The AMFP includes annual rate increases of 2.25% and an anticipated bond issue of approximately $1.8 million in year 2024/2025. The AMFP also sets a cash balance target of eighteen months compared to cash operating expenses. Capital Improvements will require a mix a cash and debt funding as outlined in the plan. As with the AMP, the AMFP should be revised annually.

Capital Improvement Plan

The Capital Improvement Plan (CIP) outlines the immediate/critical needs of the system as well as anticipated future needs over five-year, ten-year, and twenty-year horizons. Associated rehabilitation and replacement cost estimates are provided along with potential funding sources in the Asset Management Plan. The total estimated cost of the CIP is $3.15 million. The City's CIP outlines rehabilitation plans for sanitary manholes, gravity mains, pump stations, force main, and WWTP. Additional recommendations were developed for deploying smart sewer technology, implementing a regular cleaning and inspection program, developing a lateral maintenance program, and performing sludge monitoring and as-needed removal planning at the WWTP.

Conclusion

A fully utilized AMP will improve the City's wastewater system for future generations. A healthy data management process is an ongoing cycle. The City's new asset management plan has essentially completed one cycle of the data management process. Even though that initial cycle is complete, it is essential that the City continue to collect and maintain its data. This data management process will aid in the tracking and use of data to cost-effectively manage the wastewater system.

EGLE

Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 10/23/2019
(no later than 3 years from executed grant date)

The Sylvan Township Water and Sewer Authority *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1665-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Bob Scull, DPW Supervisor at (734) 475-8890 x112 dpw@sylvan-township.org
Name Phone Number Email

10-23-19
Signature of Authorized Representative (Original Signature Required) Date

David Reinhardt Treasurer
Print Name and Title of Authorized Representative

Approval for the treasurer to sign-off the completion of the SAW grant was made by motion of the STWSA board at the October 23, 2019 regular meeting.

Stantec

Wastewater Asset Management and Capital Improvement Plan

2075142700

March 14, 2019

Prepared for:

Sylvan Township Water & Sewer Authority
18027 US Highway 12
Chelsea, Michigan 48118
Phone: (734) 475-8890 X112
e-mail dwp@sylvan-township.org

Prepared by:

Stantec Consulting Michigan Inc.
3754 Ranchero Drive

Project Performed under the EGLE Stormwater/Asset Management/Wastewater Grant Program

Project 1665-01

January 15, 2020 Update

STWSA Comment on SAW Grant – What was learned

In 2012-13, STWSA initiated a very basic 5-year budget plan. Prior to this, the budget was based on previous years expenses. The original 5-year plan helped guide budget development and setting rates; however, the plan was not nearly as comprehensive as the Asset Management Study performed by Stantec under the SAW Grant. With the SAW Grant study STWSA was able to develop the initial Asset Management Plan (AMP) and a framework for updating the AMP and determining budgets and rates in the future.

Several key items were found during the SAW grant study:

- *STWSA was lacking accurate information needed to develop the AMSAT. Poor record keeping, particularly bills of materials and manuals, made it difficult to create the Asset List. As-Built Drawings were not always accurate with field knowledge of the system.*
- *Hydrogen Sulfide damage was worse than expected. It is not likely that STWSA will experience any significant increase in flow or reduction of retention time that will make this problem less severe.*
- *Manhole inspections show deterioration of manholes along the main Grass Lake Interceptor. Previously only pump stations were being addressed.*
- *GIS data has been very helpful with locating and tracking field maintenance and service calls as well as providing additional documentation of work performed.*
- *Engineering estimates for useful life were not included in the original 5-year plan. This information was not within the expertise of the Board, Stantec was able to fill in this unknown, and along with Level of Service, implement these factors into the AMSAT. STWSA found that our system was experiencing much shorter useful life of equipment due to hydrogen sulfide, resulting in a higher projection of maintenance costs in the AMSAT.*
- *STWSA must prepare for the fact that many assets will reach the "end of useful life" at the same projected time. Implementation of annual inspections to evaluate asset conditions are needed. Particularly with regard to backup generator systems.*

In summary, STWSA has learned that system deterioration due to hydrogen sulfide has significantly accelerated costs to maintain the system and affects level of service. In 2019, STWSA commissioned Webster Environmental to evaluate hydrogen sulfide levels throughout the collection system and make recommendations for potential actions. The Authority plans on reviewing the cost/benefit of each proposal and implement a trial during the summer of 2020. The hydrogen sulfide project is in addition to implementation of projects that were identified in the SAW grant study.

Background

The Sylvan Township Water & Sewer Authority (STWSA) was awarded a Stormwater, Asset Management and Wastewater (SAW) Grant administered by the Michigan Department of Environmental Quality (MDEQ). The purpose of this grant is to assist communities in the development and/or upgrade of their Asset Management Program (AMP). STWSA retained Stantec Consulting Michigan Inc. (Stantec) to compile major elements of its AMP within an Asset Management Plan (Plan) as listed below:

1. Asset Inventory
2. Criticality/Risk Assessment
3. Level of Service (LOS)
4. Capital Improvement Plan (CIP)
5. Revenue Structure (included in **Appendix F**)

Included in this report is a description of the process undertaken by Stantec, using a combination of field investigations and data analysis, to evaluate the condition and criticality of the STWSA's assets, and develop a comprehensive AMP.

This Plan was developed in cooperation with the STWSA's Asset Management Team (AMT) which included:

- Mike Jurosek; STWSA Secretary and Treasurer 2012-2018
- Lloyd Lewis; Director Multi Lake Water and Sewer Authority
- Sylvan Township Water and Sewer Authority Board
    - Marc Keezer, Chairperson (Lyndon Township)
    - Rod Branham, Vice Chair (Sylvan Township)
    - John Budinger, Secretary and Treasurer (Sylvan Township)
- Stantec; Asset Management Consultant and Rate Study Consultant

Asset Inventory

STWSA utilizes Mobile311 by Dude Solutions for their asset inventory and work order system. Mobile311 includes a record for 100% of the STWSA-owned pump stations, force mains, grinder pumps, gravity sewer mains and manholes, as well as other appurtenances such as system valves. The pump station inventory was developed further, including a vertical asset data structure, with several subsystems and components being related to each station (e.g. structural elements, valves, piping, etc.). The STWSA also maintains an inventory and tracks the condition of their assets in the Asset Management Supplemental Analysis Tool (AMSAT); a spreadsheet tool developed to facilitate the AMP.

List of Major Assets Being Tracked

- Eleven (11) sanitary pump stations;
- Approximately 202,850 feet of force main piping from 1¼- to 24-inches in diameter with the following material types:
    - 99% High Density Polyethylene (HDPE);
    - < 1% Polyvinyl Chloride (PVC);
    - < 1% Ductile Iron;
- Approximately 8,200 feet of PVC gravity sewer pipes from 8- to 12-inches in diameter;

- 104 Manhole structures including:
  - 58 air/vacuum relief valve (ARV) structures;
  - 46 gravity sewer manholes;
- 303 residential grinder pumps with their associated electrical panels and shutoff valves.

Asset Inventory Sustainability

The STWSA will review and update the inventory and the AMSAT on a yearly basis for completed wastewater system projects, system improvements, and extensions.

Risk Assessment

Risk can be described as a function of the probability of failure and the consequences of failure, and is typically represented using the following formula:

Risk = [Probability of Failure] x [Consequence of Failure]

The condition assessment that was completed as part of this effort helps to define the probability of failure for the wastewater collection system assets. The examination of several factors, such as: impact on facility operations, impact on operator health and safety, difficulty of repair, and cost of repair, helped in determining the potential consequence of failure, or criticality, for each pump station facility and their respective components. For the linear infrastructure (i.e. pipes, manholes, ARVs), factors such as pipe size, environmental/public risk, and location led to an assessment of the consequence of failure (criticality).

Condition Ratings

As part of the AMP development, a condition rating was assigned to each of the tracked assets in the STWSA wastewater collection system. Condition assessment ratings were used to determine the likelihood of failure for each asset and were assigned to the assets based on a scale from 1-5:

- 1 = Excellent: New or Excellent Condition - Only normal maintenance required;
- 2 = Good: Minor Deterioration - Minor maintenance required;
- 3 = Average: Moderate Deterioration - Moderate maintenance required;
- 4 = Fair: Significant Deterioration - Significant renewal/upgrade required;
- 5 = Poor: Asset Unserviceable - Replacement required OR asset poses safety risk.

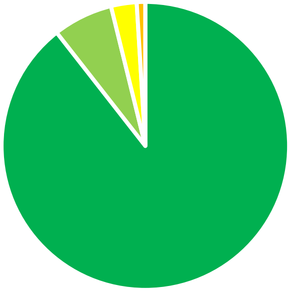
<u>Inspections</u>

During a series of site visits conducted in October 2017, Stantec and STWSA staff performed inspections of each pump station to determine the apparent condition for each component and document any observed conditions that may adversely impact the pump station's performance. This condition rating was determined based on visual inspection and STWSA operations staff feedback regarding the component's historical operating condition and performance. Overall the pump stations were in average condition. A summary of the condition ratings is presented in the following table for reference.

			Component Condition Ratings				
			1	2	3	4	5
Facility	**Average Condition Rating**	**Total # of Inspected Components**	**%**	**%**	**%**	**%**	**%**
Bristol Drive PS	2.1	33	6%	76%	18%	--	--
Cavanaugh East PS	2.7	39	3%	36%	62%	--	3%
Cavanaugh West PS	2.9	41	12%	5%	68%	7%	7%
Evergreen PS	2.8	38	--	34%	61%	--	5%
Guinan PS	2.8	41	--	34%	59%	2%	5%
Kilmer PS	3.0	36	--	19%	56%	22%	3%
Knight Road PS	2.8	32	6%	16%	72%	6%	--
Michigan Avenue PS	2.7	33	3%	21%	76%	--	--
Sugarloaf Lake CG PS	2.7	30	--	30%	70%	--	--
Township Hall PS	2.6	39	3%	41%	51%	3%	3%
Waterloo PS	2.7	40	--	35%	63%	3%	--

For the grinder pumps a representative sample of approximately 10% was selected for condition assessment. Stantec and STWSA staff performed an inspection of 30 individual grinder pumps, looking at each basin, pump, and electrical panel. The condition assessment of this sample was used to get a feel for the condition of the STWSA grinder pumps overall and determine if there were any noticeable patterns of deterioration that occur based on location, property use type, or age. Since no patterns emerged from the inspection results, future funding requirements were based on the useful service life for each grinder pump (estimated 15 years).

STWSA operations staff performed inspections on nearly all of the ARV manholes and a selection of standard gravity sewer manholes (13%). The inspections included a general observation of structural condition, inflow and infiltration (I/I) defects, and an overall condition rating for each manhole. The overall condition rating of the manhole structure was assigned based on the worst score of the two observations (structural vs I/I). A summary of the condition ratings for the gravity sewer manholes and ARV manholes is provided below.

Manhole/ARV Condition Rating	**#**	**%**	**Summary**
1	93	89%	
2	7	7%	
3	3	3%	
4	1	1%	
5	0	0%	
TOTAL	**104**	**100%**	

There are several areas in the STWSA system where evidence of Hydrogen Sulfide (H2S) damage has been identified (H2S exposure is known to deteriorate concrete and metal components). Because of the H2S damage that is taking place, it is advisable for the STWSA to perform an investigation and implement an appropriate H2S abatement program. A sucessful H2S abatement program has the potential to extend the life of those system assets that are most vulnerable to H2S attack (e.g. concrete and metal components). For this reason, H2S investigation and abatement has been added to the CIP expenditures listed in this report.

Desktop Analysis

There were several wastewater system assets that could not be inspected. Inspection of force mains is by nature invasive and expensive, and the gravity sewers and manholes were deemed ineligible for inspection funding through the SAW grant because they are less than 20 years old. The STWSA elects to track the uninspected assets via desktop analysis methods. To assign a condition assessment rating to an uninspected asset, a condition score of 1-5 was assigned based on the age of the asset. Because the STWSA system was largely constructed less than 20 years ago, and the uninspected assets (gravity sewers, force mains, etc.) have an estimated service life of 50-years, the condition of the uninspected linear infrastructure is estimated to be very good.

In addition to the age-based condition assessment, there was also a hydraulic capacity evaluation performed by Stantec for the wastewater system (Sylvan Township Water & Sewer Authority: Residual Capacity Assessment Analysis; dated August 10, 2018). Although the hydraulic study indicated that there may be some capacity deficiencies under future growth scenarios, this was not reflected in the force main conditions. 20-year growth projections are inherently uncertain, and since the possible capacity issues are based future growth, they were not considered as an indicator of present condition.

Criticality Ratings

A criticality rating system was developed to analyze the consequence of failure for the wastewater system assets and to determine the relative importance of the assets for the prioritization of future capital expenses. The criticality analysis was performed separately for the pump stations and the linear assets (gravity sewers and force mains), and uses a scale of 1-5, with 1 being the least critical, and 5 the most critical. Several key risk criteria were identified:

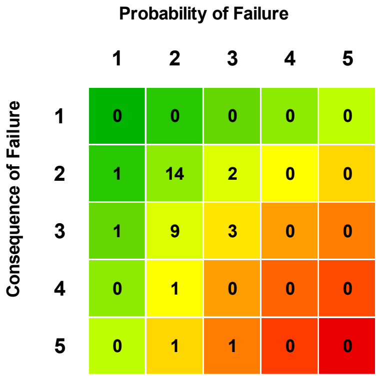
- Impact on Facility Operation
- Impact on Operator Health and Safety
- Cost of Repair
- Difficulty of Repair
- Customer Type
- Wastewater Asset Location and Size
- Redundancy

Each of the criticality criteria were assigned a weighting factor according to their relative importance as determined by the AMT. The consequence of failure for each asset was evaluated within this framework based on the qualities they possess, and an overall criticality rating was assigned to each by summing the weighted criticality scores for each of the risk criteria. For example, a large diameter force main crossing a freeway would be considered more critical than a small diameter grinder pump service line in an unimproved right-of-way. It should be noted that the criticality of the gravity sewer manholes and ARV manholes was assigned based on the criticality of the adjacent pipe since those assets are essentially inseparable from the pipe and located in the same general vicinity of the critical features (i.e. major roads, railroads, wetlands, etc.).

Risk Summary

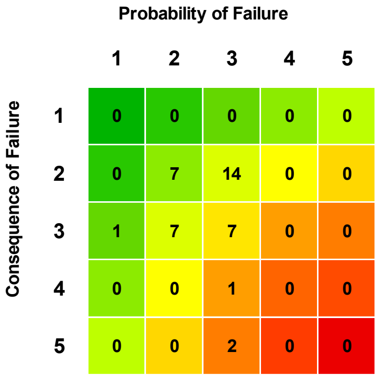
The risk to the STWSA associated with the failure of an asset was estimated based on the product of the condition rating and the criticality rating, with higher scores indicating greater risk. A map of the STWSA wastewater collection system with the overall criticality of the force mains and gravity sewers is included in **Appendix C**. Heat maps summarizing the risk are also provided below. For each pump station and linear asset type, the number of components is indicated for each combination of Probability of Failure (condition) and Consequence of Failure (criticality) score.

Bristol Drive PS



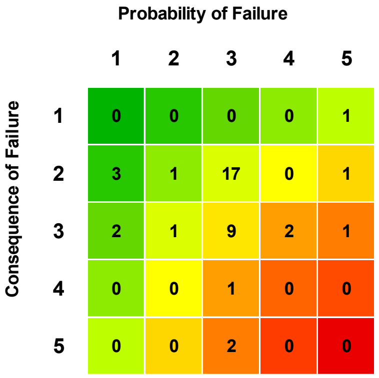
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	0	0	0	0
2	1	14	2	0	0
3	1	9	3	0	0
4	0	1	0	0	0
5	0	1	1	0	0

Cavanaugh East PS



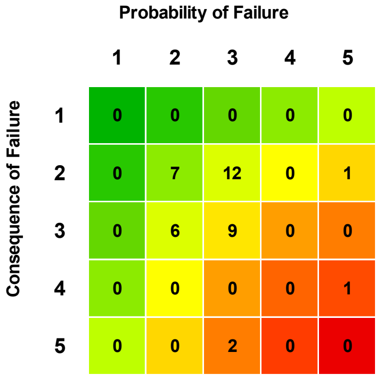
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	0	0	0	0
2	0	7	14	0	0
3	1	7	7	0	0
4	0	0	1	0	0
5	0	0	2	0	0

Cavanaugh West PS



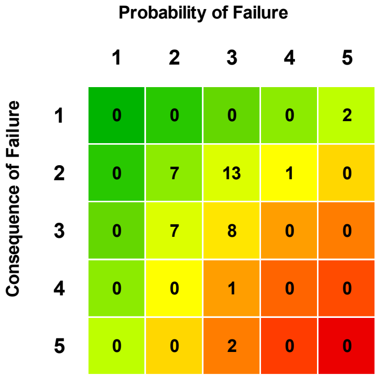
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	0	0	0	1
2	3	1	17	0	1
3	2	1	9	2	1
4	0	0	1	0	0
5	0	0	2	0	0

Evergreen PS



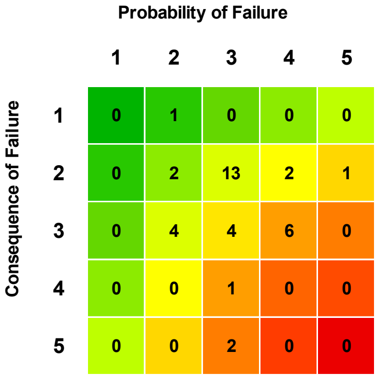
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	0	0	0	0
2	0	7	12	0	1
3	0	6	9	0	0
4	0	0	0	0	1
5	0	0	2	0	0

Guinan PS



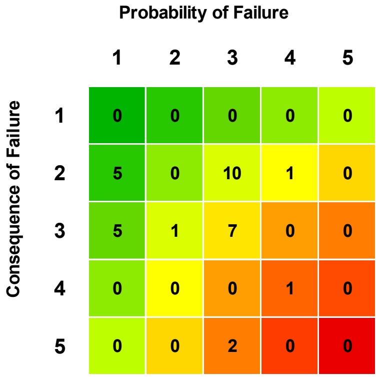
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	0	0	0	2
2	0	7	13	1	0
3	0	7	8	0	0
4	0	0	1	0	0
5	0	0	2	0	0

Kilmer PS



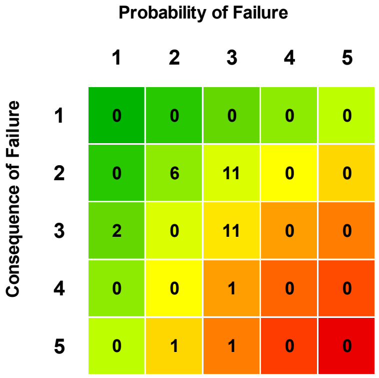
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	1	0	0	0
2	0	2	13	2	1
3	0	4	4	6	0
4	0	0	1	0	0
5	0	0	2	0	0

Knight Road PS



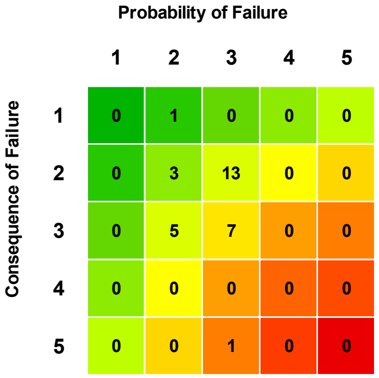
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	0	0	0	0
2	5	0	10	1	0
3	5	1	7	0	0
4	0	0	0	1	0
5	0	0	2	0	0

Michigan Avenue PS

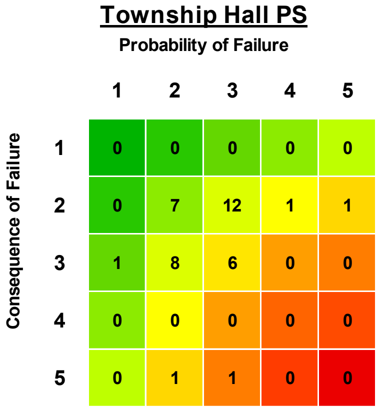


Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	0	0	0	0
2	0	6	11	0	0
3	2	0	11	0	0
4	0	0	1	0	0
5	0	1	1	0	0

Sugarloaf Lake CG PS



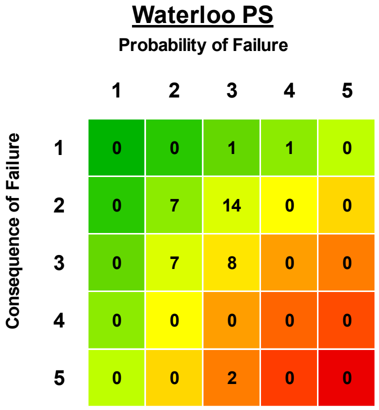
Consequence of Failure \ Probability of Failure	1	2	3	4	5
1	0	1	0	0	0
2	0	3	13	0	0
3	0	5	7	0	0
4	0	0	0	0	0
5	0	0	1	0	0



Township Hall PS

Probability of Failure

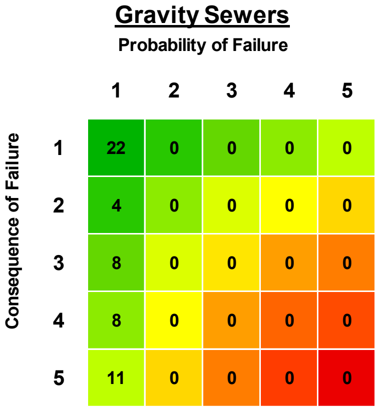
Consequence of Failure	1	2	3	4	5
1	0	0	0	0	0
2	0	7	12	1	1
3	1	8	6	0	0
4	0	0	0	0	0
5	0	1	1	0	0



Waterloo PS

Probability of Failure

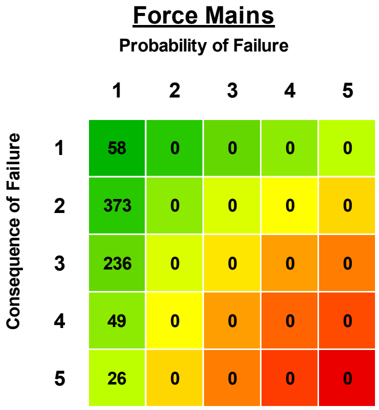
Consequence of Failure	1	2	3	4	5
1	0	0	1	1	0
2	0	7	14	0	0
3	0	7	8	0	0
4	0	0	0	0	0
5	0	0	2	0	0



Gravity Sewers

Probability of Failure

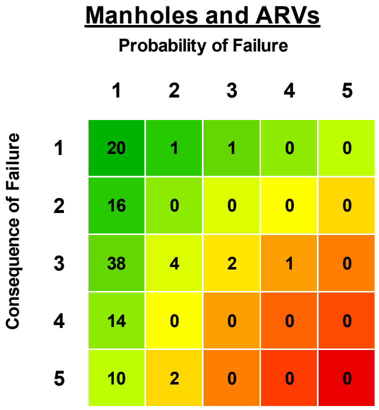
Consequence of Failure	1	2	3	4	5
1	22	0	0	0	0
2	4	0	0	0	0
3	8	0	0	0	0
4	8	0	0	0	0
5	11	0	0	0	0



Force Mains

Probability of Failure

Consequence of Failure	1	2	3	4	5
1	58	0	0	0	0
2	373	0	0	0	0
3	236	0	0	0	0
4	49	0	0	0	0
5	26	0	0	0	0



Manholes and ARVs

Probability of Failure

Consequence of Failure	1	2	3	4	5
1	20	1	1	0	0
2	16	0	0	0	0
3	38	4	2	1	0
4	14	0	0	0	0
5	10	2	0	0	0

Risk Assessment Sustainability

To ensure the sustainability of the AMP, the STWSA plans to track the condition of their assets and update their condition ratings as necessary in the AMSAT. The AMSAT will continue to be refined moving forward by the STWSA AMT.

For the linear infrastructure, the condition rating is driven mostly by age, which will update automatically within the AMSAT, but the asset inventory and AMSAT will need to be updated if pipes or manholes are replaced, repaired, or added to the system. The AMSAT also has a provision for including inspection condition ratings, should the uninspected sewers or manholes be inspected in the future.

The STWSA plans to inspect the pump station facilities annually or as needed. Condition ratings will be tracked and updated as necessary.

Level of Service (LOS)

The STWSA's LOS goal is to maintain all critical assets as well as some less critical assets to provide enhanced reliability, with an emphasis on meeting the regulatory requirements set by the MDEQ. The AMT identified this goal as the starting point for guiding CIP and maintenance expenditures. Qualitatively, LOS can be described in three tiers: Low, Medium, and High. With a Low LOS, only the most critical components in the system, or those with the highest risk, would be proactively maintained, and with a High LOS, every asset would be maintained proactively. The STWSA consistently endeavors to offer a High LOS. Therefore, based on AMT feedback and for the purposes of projecting CIP expenditures, a High LOS has been assumed. Quantitatively, this correlation between LOS and criticality, is defined within the AMSAT and the STWSA's LOS goals have an impact on the projected CIP expenditures. The STWSA will continue to review and refine their LOS goals moving forward.

Level of Service Sustainability

The STWSA plans to review and update their stated LOS goals regularly and assess the performance of their system against those goals to identify any areas that may need improvement. The STWSA will also examine the impact of LOS on CIP projections and may alter the LOS goals as deemed necessary.

Capital Improvement Plan

A CIP has been developed using the results of the AMP analysis and is divided into Pump Station Improvements in the Short-term (0-5 year) and Long-term (20 year), Linear Infrastructure Improvements, and ongoing initiatives. A summary is provided in the table below, with initial conceptual cost opinions in 2018 dollars. Based on STWSA preference, the CIP is expected to be funded from operating reserves.

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source
Short Term PS Improvements (based on CIP Development 0-5yrs)	Kilmer PS	Station Rehabilitation and Improvements: structural, electrical, I&C, and process improvements (see AMSAT for details)	Maintenance/ End of Service Life	2019	$347,500	Fund Balance
	Guinan PS	Station Rehabilitation and Improvements: electrical, I&C, and process improvements (see AMSAT for details)	Maintenance/ End of Service Life	2020	$152,200	Fund Balance
	Evergreen PS	Station Rehabilitation and Improvements: electrical, I&C, and process improvements (see AMSAT for details)	Maintenance/ End of Service Life	2020	$189,000	Fund Balance
	Cavanaugh West PS	Station Rehabilitation and Improvements: structural, electrical, I&C, process, and site improvements (see AMSAT for details)	Maintenance/ End of Service Life	2021	$165,750	Fund Balance
	Michigan Avenue PS	Station Rehabilitation and Improvements: electrical, I&C, and process improvements (see AMSAT for details)	Maintenance/ End of Service Life	2021	$165,000	Fund Balance
	Waterloo PS	Station Rehabilitation and Improvements: electrical, I&C, process, and site improvements (see AMSAT for details)	Maintenance/ End of Service Life	2022	$163,000	Fund Balance
	Township Hall PS	Station Rehabilitation and Improvements: electrical, I&C, process, and site improvements (see AMSAT for details)	Maintenance/ End of Service Life	2022	$184,000	Fund Balance
	Knight Road PS	Station Rehabilitation and Improvements: electrical, I&C, and process improvements (see AMSAT for details)	Maintenance/ End of Service Life	2023	$94,500	Fund Balance

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source
Long Term PS Improvements (5-20yrs)	Sugarloaf Lake CG PS	Station Rehabilitation and Improvements: electrical, I&C, and process improvements (see AMSAT for details)	Maintenance/ End of Service Life	2024	$83,200	Fund Balance
	Cavanaugh East PS	Station Rehabilitation and Improvements: electrical, I&C, and process improvements (see PS Facilities tab for details)	Maintenance/ End of Service Life	2025	$168,200	Fund Balance
	Bristol Drive PS	Station Rehabilitation and Improvements: electrical, I&C, and site improvements (see PS Facilities tab for details)	Maintenance/ End of Service Life	2026	$65,500	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2024	$83,000	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2025	$49,750	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2026	$645,750	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2028	$432,000	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2029	$35,250	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2030	$142,000	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2032	$62,000	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2033	$61,500	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2035	$192,750	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2037	$219,000	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2038	$397,500	Fund Balance
	Various Pump Stations	Rehabilitation and replacement at various pump stations (see AMSAT for details)	Maintenance/ End of Service Life	2039	$59,000	Fund Balance
Linear Infrastructure Improvements	Manholes/ARV Structures	Rehabilitation Estimates from (see AMSAT for details)	Maintenance/ End of Service Life	2023	$5,000	Fund Balance
	Manholes/ARV Structures	Rehabilitation Estimates from (see AMSAT for details)	Maintenance/ End of Service Life	2029	$10,000	Fund Balance

Timeframe	Project Name	Details	Justification	Year	Conceptual Opinion of Cost	Funding Source
	Manholes/ARV Structures	Rehabilitation Estimates from (see AMSAT for details)	Maintenance/ End of Service Life	2033	$15,000	Fund Balance
	Manholes/ARV Structures	Rehabilitation Estimates from (see AMSAT for details)	Maintenance/ End of Service Life	2039	$20,000	Fund Balance
Ongoing	ARV Replacement	Estimated 4 to 5 Air/Vacuum Valve replacements per year	Preventative Maintenance	ongoing	$5,500 annually	Fund Balance
	Hydrogen Sulfide Investigation and Abatement	Hydrogen Sulfide Investigation and Abatement	Preventative Maintenance	ongoing	$50,000 annually	Fund Balance
	Grinder Pumps	Estimated 20 replacements per year	Preventative Maintenance	ongoing	$30,000 annually	Fund Balance

CIP Sustainability

To maintain the sustainability of the AMP, the STWSA plans to update the CIP project list annually as part of the yearly budget process and as work is completed or new pertinent information is available (e.g. condition assessment and LOS updates).

Funding Structure and Rate Methodology

The rate study and evaluation of the STWSA's funding structure will be performed separately by Stantec and appended to this document. The document will address the following:

- Annual operating budget
- Current approved rate structure
- Documentation of legal authority for setting rates
- Discussion of anticipated costs (operations and capital) against revenue
- Documentation showing no funding gap

Funding Structure and Rate Methodology Sustainability

To maintain the sustainability of the AMP, the STWSA plans to revisit the funding structure and rate methodology to ensure that the funding is available to meet the requirements of the STWSA wastewater collection system.

This Plan was approved as completed and adopted by the STWSA board at the October 23,2019 regular meeting. Future revisions this summary will be posted on the Sylvan Township web site document center and at the Township Hall Lobby when the document is updated.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 20, 2019
(no later than 3 years from executed grant date)

The City of Trenton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1156-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: October 7, 2019.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: __________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on __________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Steven Rzeppa at 734-675-6500 rzeppasteven@gmail.com
Name Phone Number Email

12/22/19
Signature of Authorized Representative (Original Signature Required) Date

Steven Rzeppa, Mayor
Print Name and Title of Authorized Representative

April 2017

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City of Trenton - Executive Summary

Stormwater, Asset Management, and Wastewater Asset Management Plan

City of Trenton
2800 3rd Street, Trenton, MI 48183
Steven Rzeppa, Mayor
734.675.6500
SAW Grant Project Number 1156-01

Executive Summary

The City of Trenton (City) was awarded a grant by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) under the Stormwater, Asset Management, and Wastewater (SAW) Grant program to develop a wastewater Asset Management Plan (AMP). The total eligible cost was $1,497,661, less a local match of $207,749, for a total grant amount of $1,289,912.

The AMP was developed by Fishbeck working closely with City staff in accordance with the five EGLE AMP components:

1. Asset Inventory and Condition Assessment
2. Level of Service (LOS)
3. Asset Criticality
4. Capital Improvement Plan (CIP)
5. Revenue Structure

The objective of an AMP is to meet the required LOS in the most cost-effective manner through proper maintenance of the assets. For the City, this includes providing a summary of the condition of the assets owned by the City, a basis for prioritizing the rehabilitation/replacement of the assets, an updated operation and maintenance (O&M) program to routinely maintain the assets, and an assessment of the effect of implementing these tasks on the rates. The work completed as part of the SAW Grant included the components described below.

Asset Inventory

The City's wastewater system consists of approximately 417,000 feet of pipe ranging in size from 6 inches to 84 inches and 1,783 manholes. The system also includes four pump stations, one wastewater treatment plant (WWTP), one emergency bypass pump station, and one retention basin. The City's interceptors collect flow from each of the five districts and transport it to the WWTP. The flow is treated and discharged into the Detroit River.

The following steps were taken in an effort to locate and identify the system's horizontal and vertical assets:

1. Created a Geographic Information System (GIS) database for the City using the Wayne County GIS database as a background.
2. Collected 270 record drawings, scanned them, and incorporated them into the GIS database.
3. Developed a total of 53 different asset classes to represent the City's asset types, including manholes, pipes, pump station equipment, and WWTP equipment.

4. Reviewed existing records and conducted site visits to develop an inventory of the City assets, including:
   a. 1,783 manholes.
   b. 1,833 pipe segments.
   c. 574 vertical assets.
5. Developed a unique naming convention for the assets that incorporated the City's district system and the type of asset.
6. Developed an inventory of the City's asset information, including equipment and process descriptions, critical attribute information, age, expended useful life, and replacement costs, and incorporated this information into the GIS database.

Condition Assessment

1. Manhole inspections were performed in 2017, 2018, and 2019 on the majority of the manholes in the system in accordance with the Manhole Assessment and Certification Program (MACP). The inspection forms, as well as the results of the inspection, were incorporated into the City's GIS database.
2. Closed-circuit televising (CCTV) of 61,181 feet of sewer was performed in 2018 and 2019. The work was completed in accordance with the Pipeline Assessment and Certification Program (PACP). The inspection forms and the results of the inspections were incorporated into the City's GIS database.
3. Site visits were conducted to visually inspect and assess the condition of each vertical asset, based on criteria established for each asset class. The condition assessment forms and resulting 1 through 5 condition ratings were incorporated into the City's GIS database.
4. The results of the assessment indicated:
   a. The sewers are generally in good condition; however, 36 pipe segments have a structural condition rating above 4.00, and 14 pipe segments have an O&M rating above 4.00.
   b. There are 9 manholes with a composite (structural and O&M) rating above 4.00.
   c. There were no vertical assets with a condition rating above 4.00

Level of Service Determination

The City developed a LOS based on commitments to their customers and EGLE, which included:

1. Safeguarding public health and the environment.
2. Meeting EGLE requirements for effluent discharge loading limits.
3. Operating the system to minimize the probability of sanitary sewer overflows.
4. Maintaining equipment and assets at a level that meets customer and regulatory needs and requirements.

Criticality of Assets

1. Assigned a Probability of Failure (POF) rating for each asset based on the condition of the asset, and its age or useful life expended. The rating criteria was different for pipes, manholes, and vertical assets. The POF for pipes starts with determining the Overall Pipe Rating, which is calculated separately for structural and O&M defects. The Overall Pipe Rating is a summation of the individual segment grade scores. A sample calculation is provided in Table 1. Tables 2, 3, and 4 show the POF calculation for pipes, manholes, and vertical assets, respectively.

Table 1 – Sample Pipe Rating Index Calculation

Condition Grade	No. of Defects		Segment Grade	
	Structural	O&M	Structural	O&M
5	2	0	10	0
4	0	0	0	0
3	1	3	3	9
2	3	2	6	4
1	0	0	0	0
Total Defects	6	5		
Overall Pipe Rating			19	13
Pipe Rating Index			3.2	2.6

Table 2 – Pipe Probability of Failure

		Weighting Factor	5	4	3	2	1
			Imminent	Probable	Occasional	Remote	Improbable
POF	O&M Quick Rating (PACP)	50%	If there are no defects noted and the quick score is 0, Score = 1. If the quick score is denoted by a letter, letter = 9 Multiply the 4-digit quick score by 0.00085 = Score If resulting score ≥ 5, Score = 5 If resulting score ≤ 1, Score = 1				
	Structural Quick Rating (PACP)	50%	If there are no defects noted and the quick score is 0, Score = 1 If the quick score is denoted by a letter, letter = 9 Multiply the 4-digit quick score by 0.00085 = Score If resulting score ≥ 5, Score = 5 If resulting score ≤ 1, Score = 1				
	Useful Life Expended (used only when pipe not PACP inspected	100%	% Useful Life Expended: 81-100%	% Useful Life Expended: 61-80%	% Useful Life Expended: 41-60%	% Useful Life Expended: 21-40%	% Useful Life Expended: 0-20%

Table 3 – Manhole Probability of Failure

		Weighting Factor	5	4	3	2	1
			Imminent	Probable	Occasional	Remote	Improbable
POF	Structural and O&M Quick Rating (MACP)	100%	If there are no defects noted and the quick score is 0, Score = 1 If the quick score is denoted by a letter, letter = 9 Multiply the 4-digit quick score by 0.00085 = Score If resulting score ≥ 5, Score = 5 If resulting score ≤ 1, Score = 1				
	Useful Life Expended (used only when manhole not MACP inspected)	100%	% Useful Life Expended: 81-100%	% Useful Life Expended: 61-80%	% Useful Life Expended: 41-60%	% Useful Life Expended: 21-40%	% Useful Life Expended: 0-20%

Table 4 – Vertical Asset Probability of Failure

		Weighting Factor	5	4	3	2	1
			Imminent	Probable	Occasional	Remote	Improbable
POF	Condition Assessment	50%	Very Poor (ACI = 5)	Poor (ACI = 4)	Fair (ACI = 3)	Good (ACI = 2)	Very Good (ACI = 1)
	Useful Life Expended	50% (100% when asset not inspected)	% Useful Life Expended: 81-100%	% Useful Life Expended: 61-80%	% Useful Life Expended: 41-60%	% Useful Life Expended: 21-40%	% Useful Life Expended: 0-20%

2. Assigned a Consequence of Failure (COF) rating for each asset to reflect its importance to the system and the resulting disruption or difficulty of repair/replacement if failure occurs, based on the criteria in Tables 5 and 6.

Table 5 – Manhole and Pipe Consequence of Failure

		Weighting Factor	5	4	3	2	1
			Catastrophic Disruption	Major Disruption	Moderate Disruption	Minor Disruption	Insignificant Disruption
COF	Diameter Score	33%	≥ 36-inch	24-inch to 30-inch	15-inch to 21-inch	12-inch	≤ 6-inch to 10-inch
	Physical Location Score	33%	State Trunk Lines, Railroad Crossings, Water Crossing	-	Primary County Roads and Major City Roads	-	Minor City Roads
	Service Area Score	33%	Schools, Water Crossings	-	Churches, City Facilities, Industrial, Commercial	-	Single-Family Residential and Multi-Family Residential

Table 6 – Vertical Asset Consequence of Failure

			Weighting Factor	5	4	3	2	1
				Catastrophic Disruption	Major Disruption	Moderate Disruption	Minor Disruption	Insignificant Disruption
COF	Reliability	Disruption to the Community (Pump Stations)	20%	Long-term impact; area-wide disruption	Short-term impact but substantial disruption	Sporadic service disruptions	Minor disruption	No disruption
		Process Impact (WWTP)		Mission Critical - Unable to accomplish mission	Process shutdown	Potential process upset	Loss of redundancy	No impact on process
	Financial Input		20%	Major Cost (>$1Million)	Significant Cost ($500,000-$1,000,000)	Moderate Cost ($10,000-$500,000)	Minor Cost ($1,000-$10,000)	Insignificant ($1-$1,000)
	Safety		20%	Loss of life	Severe Injury to employees or public	Minor injury requiring treatment off-site or lost time	Minor injury requiring no medical treatment with no lost time	No injury
	Environmental/ Regulatory Impact		20%	Enforcement action with fines or ACO	Localized and minimal impact on the environment and ecosystem	Violation with minor enforcement action	Technical violation, but no enforcement action	100% compliance with permits
	Required Response Time		20%	1/2 hour or less	8 hours	1 day	1 Week	>1 Week

3. Multiplied the POF and the COF to compute the Business Risk Exposure (BRE) score for each asset, representing the asset's criticality on a scale of 1 through 25. The BRE score serves as a tool for prioritizing repair/replacement.

There was one inspected manhole, five CCTV-inspected sewers, and three WWTP assets that had a BRE greater than 16.00. There were 29 assets with a BRE score greater than 16.00 that were not inspected.

Operation and Maintenance Strategies

1. Reviewed current preventative maintenance history and system operations.
2. Identified gaps in the preventative maintenance program and in system operations.
3. Developed a revised preventative maintenance program outlining tasks by asset.

Capital Improvement Plan

A 20-year CIP was developed for the City using the useful life expended, repair/replacement costs, condition assessments, and BRE analysis results. The CIP included:

1. Grouping projects based on the type of work and asset class.
2. Scheduling repair/replacement projects through the year 2040.
3. Anticipating project costs and annual system costs through the year 2040.

Major projects anticipated to begin in the next few years are:

- Raising buried manholes to grade to provide maintenance access.
- Rehabilitating manholes and sewers that have high POF/BRE ratings.
- Rehabilitating components of the pump stations, WWTP, and emergency bypass station.
- Continuing inspection of the manholes over a 5-year period, repeating the inspection cycle every 5 years.
- Continuing inspection of the sewers over a 5-year period, repeating the inspection cycle every 5 years.

Revenue Considerations

- The City's fiscal year is from July through June. For each fiscal year, the Water and Sewer Budget is developed and includes the typical costs needed to operate the wastewater system as well as perform normal maintenance activities. The associated water and sewer rates for fiscal year 2018/2019 were developed to cover the budget.
- A 20-year financial projection was completed for the City to determine how they would implement the proposed tasks and projects included in the AMP. Plante Moran was contracted to provide the financial projection for the City. The purpose of the projection was to help the City determine the revenue requirements for fiscal years 2021–2040 and project rate adjustments required to work toward targeted revenue requirements. The complete financial report prepared by Plante Moran includes a long-term rate track for the City, which incorporates the AMP to help ensure the financial stability of the City's utility in future years.

List of Major Assets

Wastewater Assets:

- 417,210 feet of 6-inch to 84-inch diameter pipe
- 1,783 manholes
- Four pump stations:
    - Retention Basin Pump Station (1801 Van Horn Road, at the WWTP)
    - Van Horn Pump Station (4539 Fort Street (M-85), at Van Horn Road)

  - Brookview Pump Station (3200 Brookview Avenue)
  - Elizabeth Park Pump Station (3501 West Jefferson Avenue, at Slocum Street)
- 6.5 million gallon per day average activated sludge WWTP
- 20.1 million gallon retention basin
- An emergency bypass station:
  - Jefferson Avenue Pump Station (4735 West Jefferson Avenue, south of Van Horn Road)

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Williams Township

SAW Project No. 1045-01

Williams Charter Township
Preparing today for tomorrow.

FINAL
December 2019

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September of 2016, Williams Township received a Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1045-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Township's publicly owned wastewater utility. This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

The contact person for the Williams Township AMP is:

Paul Wasek, Supervisor
1080 W Midland Rd. Auburn, MI
Phone number: (989) 662-4241
Email: supervisor@williamstwp.com.

ASSET INVENTORY & CONDITION ASSESSMENT

A list of the major assets in the Township's wastewater system, described further below, include:

- Collection system piping and manholes
- Sanitary sewer lift stations

The wastewater collection system assets include approximately 102,439 feet (19.4 miles) of sanitary sewers (gravity pipe and force mains) and 307 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

The collection system is owned by Williams Township, but is maintained by the Bay County Department of Water and Sewer (BCDWS). Williams Township utilizes the West Bay County WWTP for wastewater treatment.

There are 93,015 feet (17.62 miles) of gravity pipe, 9,424 feet (1.78 miles) of forcemain, 301 wastewater manholes connecting the gravity pipelines, 6 manholes at air release valves on the forcemain, and 6 lift stations in the collection system. The lift stations are submersible style stations.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new, or updated (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 103 Lift Station Assets and 613 Collection System Assets.

Information was obtained from record drawings, field notes, staff knowledge, and a kmz.file provided by the Bay County Department of Water and Sewer.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on 219 manhole structures. 9 structures are buried, 4 are air release valves, 22 could not be located due to either being buried or in heavy brush areas, 7 could not be opened, 1 is under a driveway, and 42 were installed within the last 20 years and did not require assessment. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 75% of the gravity pipe. 19% of gravity pipes were not televised due to being installed within the last 20 years. Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 100% of the system tagged for inspection and/or cleaning. Rehabilitation accounted for 19% of the system identifying the need for point repairs and lining. The remaining 81% of assets were placed in the 20+ year category.

The condition of the assets at the lift stations range from excellent to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers, measure its performance, and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the Township and the Bay County Department of Water and Sewer to develop the following LOS statement and goals.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of Williams Township is to provide reliable wastewater collection and treatment services at a minimum cost, consistent with applicable environmental and health regulations. To achieve this the following Level of Service (LOS) goals are proposed:

- Provide adequate collection system capacity for all service areas.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to mitigate potential for sanitary overflows, water in basements, and overloading of the regional treatment facility.
- Provide rapid and effective emergency response services to its customers.
- Ensure staff that maintains the system are properly certified.
- Regularly review with the Bay County Department of Water and Sewer its health and safety procedures in order to provide proper worker safety.
- Regularly review projected O&M and capital expenditures. Adjust user rates, as necessary, to ensure sound financial management of wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Township from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, an evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the wastewater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula:

Business Risk = Consequence of Failure Score + Likelihood of Failure Score

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)
- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic, financial or environmental impact of failure of an asset and the utilities ability to respond, convey and treat wastewater. CoF categories of the collection system include:

- Proximity to critical environmental features
- Location (Zoning District) of asset
- Facilities served by asset
- Size of asset
- Type of asset.

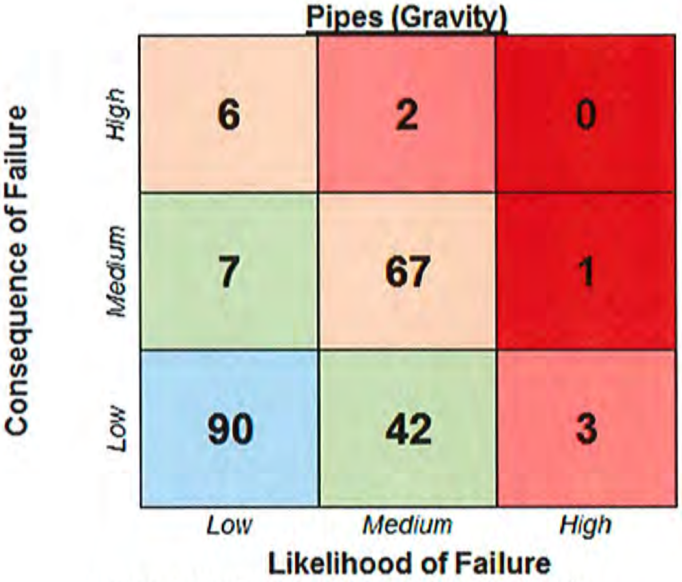
The lift station categories for CoF are:

- Process
- Financial Impact
- Safety
- Environmental Impact
- Disruption to the Community
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using an excel database that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for gravity pipe by number of pipe segments. 1 pipe segment in the collection system has an extreme risk rating. This pipe segment has deposits and a sag in the pipe. It is part of the original system that was installed in 1981 and is located on 11 Mile Road, near a commercial building, and shows signs of infiltration. Due to the sag, the Township will perform regular maintenance on this section of pipe.

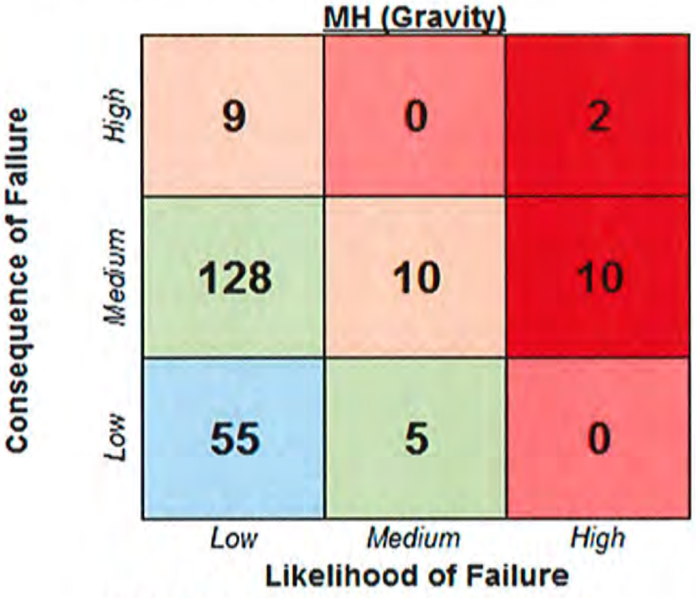


Pipes (Gravity)

Consequence of Failure	Low	Medium	High
High	6	2	0
Medium	7	67	1
Low	90	42	3

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity

Figure 2 provides the risk rating for the collection system manholes. There are 12 manholes that have been identified as an extreme risk and need some rehabilitation. These structures need mortared chimneys, the cover and frame replaced, or the cover replaced. This work will be scheduled over the next 5 years as funding becomes available. 95 percent of the collection system's manholes, as shown in Figure 9, have a low to negligible risk rating and are indicative of manholes in good condition.

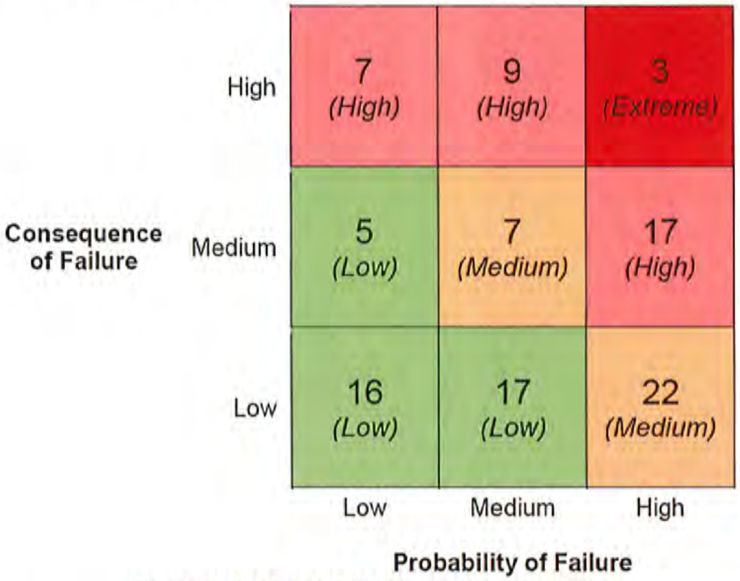


MH (Gravity)

Consequence of Failure	Low	Medium	High
High	9	0	2
Medium	128	10	10
Low	55	5	0

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. 3 assets are identified as extreme risk. The 33 assets with high risk ratings should be inspected at regular intervals.



Consequence of Failure	Low	Medium	High
High	7 *(High)*	9 *(High)*	3 *(Extreme)*
Medium	5 *(Low)*	7 *(Medium)*	17 *(High)*
Low	16 *(Low)*	17 *(Low)*	22 *(Medium)*

Figure 3. Business Risk Matrix (Risk Rating) by Number of Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and treatment systems.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Township's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, lift stations. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility. Table 1 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP (1-5 year).

Table 1: Capital Improvement Plan: Rehabilitation

Project Description	Fiscal Year					Total
	2020	2021	2022	2023	2024	
Collection System Improvements						
Gravity Sewer Point Repair (5 Areas)	$ -	$ -	$ 21,005.82	$ 16,347.20	$ 17,828.06	$ 55,181.08
Manhole Cover Replacement	$ -	$ 1,030.00	$ -	$ -	$ -	$ 1,030.00
Manhole Cover and Frame Replacement	$ -	$ 6,180.00	$ 6,365.40	$ -	$ -	$ 12,545.40
Manhole Replace Frame and Cover - Mortar Chimney	$ -	$ 3,296.00	$ 3,394.88	$ -	$ 1,800.81	$ 8,491.69
Total Collection System Improvements	*$ -*	*$ 10,506.00*	*$ 30,766.10*	*$ 16,347.20*	*$ 19,628.87*	*$ 77,248.17*

Assumes 3% Inflation per Year

Table 2 shows detailed recommendations for the lift station assets needing rehabilitation in the short-term CIP.

Recommended Capital Improvements for Lift Stations			
Asset Description	**Anticipated Year of Replacement**	**Budget (2019 Dollars)**	**Budget (Replacement Year)**
1-5 YEAR CIP PROJECTS			
Lift Station #25 Rehabilitation	2021	$206,800	$219,400
Lift Station #24 Rehabilitation	2024	$172,000	$199,400
6-20 YEAR CIP PROJECTS			
Lift Station #26 Rehabilitation	2027	$175,000	$221,700
Lift Station #34 Rehabilitation	2030	$175,000	$242,200
Lift Station #30 Rehabilitation	2031	$195,300	$278,500
Lift Station #28 Rehabilitation	2035	$104,800	$168,200
Standby Generator and Automatic Transfer Switch	2039	$417,000	$753,100

OPERATIONS, MAINTENANCE & REPLACEMENT

Regular operation, maintenance and replacement (OM&R) is essential in the management of a wastewater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system. By optimizing the performance infiltration/inflow are reduced and sanitary sewer overflows (SSO) are minimized or eliminated preserving the substantial investment the community has in its collection system. It is recommended that the Township budget funds to clean and televise one-seventh of the collection system each year.

Table 3 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 3: Capital Improvement Plan: Maintenance

Project Description	**Fiscal Year**					**Total**
	2020	**2021**	**2022**	**2023**	**2024**	
Collection System Improvements						
Structure Inspection (44/yr)	$ -	$ 440.00	$ 440.00	$ 440.00	$ 440.00	$ 1,760.00
Pipe Cleaning (13,300'/yr)	$ -	$ 23,940.00	$ 23,940.00	$ 23,940.00	$ 23,940.00	$ 95,760.00
CCTV (100% of Pipe Cleaning)	$ -	$ 15,960.00	$ 15,960.00	$ 15,960.00	$ 15,960.00	$ 63,840.00
Total Collection System Improvements	***$ -***	***$ 40,340.00***	***$ 40,340.00***	***$ 40,340.00***	***$ 40,340.00***	***$ 161,360.00***

An annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTF staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, laboratory instruments, etc. The existing OM&R fund is sufficient for the current operations.

REVENUE STRUCTURE

The revenue and rate methodology is an instrument to determine user rates and charges that will provide sufficient revenues to pay for utility operating costs.

The rate methodology required by the MDEQ for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed shows no revenue gap.

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date December 31, 2019
(no later than 3 years from executed grant date)

The Williams Charter Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1045-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or [✓ No]
   If No - Date of the rate methodology approval letter: November 5, 2019.
2) Significant Progress Made: Yes or No N/A
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: ________________________.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____________________________.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Paul Wasek, Supervisor, at (989) 662-4091 and supervisor@williamstwp.com
Name Phone Number Email

Paul Wasek 12-23-19
Signature of Authorized Representative (Original Signature Required) Date

PAUL WASEK Township Supervisor
Print Name and Title of Authorized Representative