SAW Section 603 Report

September 30, 2018

Display bookmarks to see an alphabetical listing of Round 2 SAW Grantee Names.

Alternatively, click “edit” and “find” in Adobe Reader to search by Grantee Name.

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section, Attn: Izabel Hartman

From: Sally Duffy, PE
Hubbell, Roth & Clark, Inc.

CC: Mr. Gary Nigro, PE
Oakland County Water Resources Commissioner

Date: October 31, 2017

Re: Acacia Park CSO Drainage District
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1221-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the Oakland County Water Resources Commissioner's office on behalf of the Acacia Park 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 MDEQ guidance.

GRANTEE INFORMATION

Acacia Park CSO Drainage District, SAW Grant Project #1221-01

Project Grant Amount: $656,118

Applicant Match Amount $65,612

Authorized Representative
Jim Nash, Birmingham 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. Proj. Engineer
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
(248) 858-5243
nigrog@oakgov.com

EXECUTIVE SUMMARY

The Acacia Park CSO Drainage District applied for and received a grant to further develop an Asset Management Plan (AMP) for its combined sewerage collection and treatment 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 Acacia Park 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 Acacia Park CSO Drainage District and the is operated and maintained by the Oakland County Water Resources Commissioner (WRC) in accordance with applicable provisions of 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 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 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 Acacia Park CSO Drainage District, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 19,661 lineal feet of combined sewer underwent condition assessment via cleaning and televising. Approximately 59 manhole and other related structures were evaluated using the CAMS inspection work orders. Vertical assets, which includes the CSO storage and treatment 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, 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 (storm, combined and sanitary sewers, force mains, siphons 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.

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 a lower probability of failure based on their current condition, so 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.
- 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, 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 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:

- $30,000 for collection system spot repairs in pipe and manholes in system. To be performed from budgeted funds over 5-year period.
- $30,000 for relining of sodium hypochlorite tanks. To be performed from budgeted funds over 5-year period.
- $750,000 for replacement and rehabilitation of mechanical (pumps, valves, H&V systems, etc.), electrical and instrumentation equipment at the RTB facility. To be performed from budgeted funds over 5-year period.
- $100,000 structural repairs in basin. Minor cracks, control joints, water intrusion, etc. To be performed from budgeted funds over 5-year period.

Total Cost for 5-year CIP: Approximately $900,000.

Capital Projects 6 to 20 year:

- $165,000 for work spot repairs in pipe and manholes and to line one pipe in system over next 20 years.
- $7,000,000 for continued replacement and rehabilitation of mechanical, electrical and instrumentation equipment at the RTB facility over 20 years.
- Estimate of approximately $500,000 structural repairs in basin over 20 years

Total Cost for 6 to 20-year CIP: Approximately $7,665,000.

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 preventive 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 Acacia Park CSO Drainage District's major assets include:

- Approximately 19,661 lineal feet of combined sewer, ranging in size from 15" to 120" diameter and 84" x 168" rectangular sewer.
- Approximately 59 combined sewer manholes, inlets and access structures
- One 4.0 Million Gallon Retention Treatment Basin and Regulator Structure. This facility includes approximately 97 major assets.

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

Completion Date: October 31, 2017
(no later than 3 years from executed grant date)

The **Acacia Park CSO Drain Drainage District** (legal name of grantee) certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1221-01** 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 18, 2017**

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: **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:

Jim Nash at **248-858-0958** **wrc@oakgov.com**

Name Phone Number Email

11/2/17

Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Chairman of the Drainage Board and Oakland County Water Resource Commissioner

Print Name and Title of Authorized Representative

ADRIAN WASTEWATER ASSET MANAGEMENT PLAN MDEQ SAW GRANT NO. 1205-01

EXECUTIVE SUMMARY

SEPTEMBER 2017

Contact Information:

Mr. Will Sadler

Utilities Director

135 E. Maumee Street

Adrian, MI 49221

(517) 264-4821

In 2014, the City of Adrian was awarded a State of Michigan Stormwater, Asset Management, and Wastewater (SAW) Grant to complete design and management services for the sanitary sewer system.

This AMP has been designed to provide the City with a proactive and sustainable long-term plan to help ensure the well-being of the community and environment.

The AMP approach centers on the following five core elements:

1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality
4. Revenue Structure
5. Capital Improvement Plan

Asset Inventory and Condition Assessment

The existing City GIS information was used as a basis for the inventory, and was augmented with survey data, detailed equipment and collection system asset inventories, and cost opinions. To aid in this analysis, as well as simplify annual reporting needs, the system information has been integrated with LucityTM Asset Management Software (AMS), which was purchased and implemented as part of this project. 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 value of the City's entire wastewater infrastructure approaches $133 million, with the current value of the City's sanitary sewer collection system estimated at approximately $79.5 million. Approximately 74% of the system cost is associated with gravity mains and manholes with the remaining cost attributed to pump stations, siphons, force mains, and a retention basin. Table 1 summarizes the quantity and baseline system replacement value (in 2017 dollars).

The City's collection system was inventoried and the condition assessed through detailed manhole inspections and sewer cleaning/televising. Additionally, flow monitoring was performed and a computer model prepared that provided additional data regarding sewer capacity.

Table 1 – Collection System Asset Summary and Cost

System Component	Quantity (unit)	Baseline System Value (Current Replacement Cost)
Gravity Mains	488,448 feet	$44,500,000
Inverted Siphons	11 each	$4,090,000
Manholes	2,077 each	$14,100,000
Pressurized Mains	20,677 feet	$3,500,000
Pump Stations	7 each	$6,770,000
Retention Basin	1 each	$6,500,000
	Total	**$79,460,000**

The City's Wastewater Treatment Plant includes a collection of over 800 assets that represent the total facility processes and are currently estimated at a value of approximately $53.7 million. Table 2 summarizes the major assets tracked for this AMP and the associated replacement value of those assets (in 2017 dollars).

The City's wastewater treatment assets were inventoried and the condition assessed through a walkthrough of all assets and discussion with WWTP staff regarding their condition and maintenance history.

Table 2 - WWTP Asset Summary and Cost

Process Location	Assets	Baseline System Replacement Cost
Administration Building	35	$4,328,000
Grit & Screening Building	16	$2,350,000
Primary Settling Tanks	72	$2,136,000
Blower Building	20	$2,792,000
Aeration Tanks	45	$15,174,000
Final Settling Tanks	11	$5,143,000
Filtration	26	$3,392,000
UV Building	6	$1,351,000
Digester	31	$7,965,000
Sludge Storage	6	$2,466,000
Thickener	4	$1,126,000
Retention & Equalization	17	$3,902,000
Electrical & Generators	22	$1,426,000
Total	**311**	**$53,708,000**

A list of the assets evaluated in this plan is attached to this summary.

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 to hold as goals for the Level of Service for their sanitary sewer facilities, which can be seen below in Table 3. The City currently is meeting the listed performance goals and will focus on maintaining this high Level of Service.

Table 3 – Level of Service KPIs

Level of Service Key Performance Indicators
Reduce Basement Backups
Reduce Infiltration/Inflow rates and volumes
Capacity to Convey MDEQ design storm
Reduce Odor Complaints
Clean all sewers at least once in 5-year period
Replace underperforming pump stations
Meet requirement of NPDES permit
Implement Equipment Inventory and Maintenance Tracking System

Criticality

Criticality of assets is a step used to prioritize future improvements so that money is invested in the most needed projects. Criticality is quantified by use of a numerical score called Business Risk Evaluation (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.

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 collection system, nearly all of the manholes and 62,210 feet of sewer were inspected to assign a condition rating to the assets.

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.

A BRE was subsequently determined for each asset in the City's system. These BRE ratings, combined with City Staff experience, were used to define a Capital Improvement Plan for the City of Adrian.

Operation and Maintenance/Revenue Structure/Long-Term Funding

The Adrian sewer and wastewater treatment systems are extraordinarily well maintained. The asset management software implemented for this project will assist in assessing assets that need more frequent maintenance.

The City has a goal of televising each sewer once every five years. An annual budget was presented in the plan that will allow the City to achieve that goal.

The City completed a revenue structure evaluation that demonstrated the City's wastewater utility generates sufficient revenue to fund the operation and maintenance at the wastewater utility. The SAW grant does not require the City to fund capital improvements through wastewater rates although Adrian, like most municipalities, typically does. A separate report has been prepared to analyze the ability of the City's rates to implement the CIP in this report.

Capital Improvement Plan

A 20-year capital improvement plan was developed for both the collection system and the WWTP using the results of the business risk evaluation conducted in this AMP. The capital improvement plan identifies areas in the collection system and specific parts of the WWTP processes where funding should be provided over the next 20 years. This capital improvement plan should be routinely updated to ensure that it includes short- and long-term needs. Events will occur and new knowledge will be gathered that will justify changes to this plan.

Table 4 - City of Adrian 20-Year Capital Improvement Plan (2017-2037)

Project Number	Description	Project Year	Project Cost
WWTP – 1	**Administration Building Ferric Pit Sump Pumps**	**2017**	**$12,000**
CS – 1	**Replace sewer along Maple Avenue and River Street**	**2018**	**$1,360,000***
WWTP – 2	**West Blower Sump Pump**	**2018**	**$11,000**
CS – 2.1	**Annual Miscellaneous Sewer Repairs ($500,000/year)**	**2019 - 2023**	**$2,500,000**
WWTP – 3	**Grit & Screening Building Appurtenances**	**2019**	**$60,000**
WWTP – 4	**Administration Building Roof**	**2020**	**$148,000**
WWTP – 5	**Administration Building Appurtenances & West Blower #1**	**2022**	**$360,000**
CS – 3	Broad Street Force Main	2023	$2,157,000
CS – 4	Broad Street Pump #1 through #3	2023	$150,000
WWTP – 6	South Digester Covers & WWTP Appurtenances	2023	$2,295,000
CS – 2.2	Annual Miscellaneous Sewer Repairs ($500,000/year)	2024 - 2028	$2,500,000
CS – 5	Pump Station Control Panels	2024	$80,000
WWTP – 7	Grit & Screening MCC and West Blower #3	2024	$233,000
WWTP – 8	East Aeration Tank Valves & Digesters	2025	$2,009,000
WWTP – 9	South Digester Sump Pumps & West Blower Scum Pump	2026	$67,000
WWTP – 10	East Primary Tanks & Filtration Appurtenances	2027	$3,003,000
CS – 6	Top 25 BRE Ranked Collection System Assets	2028	$628,000
WWTP – 11	Parshall Flume	2028	$21,000
CS – 2.3	Annual Miscellaneous Sewer Repairs ($500,000/year)	2029 - 2033	$2,500,000
CS – 7	Broad Street Flex Rakes & Other Miscellaneous Pump Station Assets	2029	$1,326,000
WWTP – 12	East and West Primary Tank Meters	2029	$48,000
CS – 8	Broad Street Pump #6 VFD	2030	$18,000

Project Number	Description	Project Year	Project Cost
CS – 9	Broad Street Generator	2031	$128,000
WWTP – 13	Filter Backwash Pumps and Digester Heat Exchangers	2031	$703,000
WWTP – 14	Plant SCADA, Digester #4, Pumps, Blowers & MCC throughout WWTP	2032	$2,619,000
CS – 10	Scott St Pumps and Rolling Meadows & Southfield Generators	2033	$193,000
WWTP – 15	East Blower, RAS Pumps & Generators	2033	$1,136,000
CS – 2.4	Annual Miscellaneous Sewer Repairs ($500,000/year)	2034 - 2037	$2,000,000
CS – 11	Riverside & Rolling Meadows Pumps	2034	$166,000
CS – 12	Sewer Replacement between Oakwood Road & WWTP	2034	$1,290,000
WWTP – 16	RAS Pumps, VFDs, and Primary Tank Appurtenances	2034	$1,142,000
CS – 13	Southfield Pumps	2035	$86,000
WWTP – 17	East Primary Tank Valves & #1 Thickener	2035	$290,000
WWTP – 18	MCC, Flight Drives, UV and Digester Appurtenances	2036	$3,013,000
CS – 14	Broad Street Boiler & Miscellaneous Pump Station Assets	2037	$916,000
WWTP – 19	East Aeration Tanks and Miscellaneous Appurtenances	2037	$14,035,000
*Represents portion of project not covered under pending grant.		**Total**	**$49,203,000**

Green Shading = Collection System project

Blue Shading = Wastewater Treatment project

Future Steps

Beginning in 2013, any major municipal wastewater system in the state of Michigan whose permit expires on October 1, 2012 or after will be including an asset management program requirement. This requirement will accompany an updated set of reporting requirements associated with operating the City's WWTP and collection system. The LucityTM AMS is designed to provide detailed reports regarding specific performance measures which will be essential to completing annual MDEQ reporting requirements. The City will be required through their permit to submit reports including specific information regarding what capital improvement projects were completed, how much was spent on sewer cleaning, preventative maintenance, and other measures.

This AMP, inclusive of the GIS model of the sewer system and LucityTM AMS, are intended to be worked 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 making revisions to the capital improvement plan to help Adrian best manage the needs of the City's wastewater infrastructure.

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

Completion Date 10-31-2017
(no later than 3 years from executed grant date)

The City of Adrian *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1205-01 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: **April 27, 2017**

2) Significant Progress Made: **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: **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	at	Phone Number	Email
Shane Horn	at	517-264-4831	shorn@adrianmi.gov

Signature of Authorized Representative (Original Signature Required) Date: 10-2-2017

Shane Horn, City Administrator
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

City of Albion

SAW Project No. 1630-01

FINAL
October 2017

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 May 2014, The City of Albion received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), Project No. 1630-01, 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 Albion AMP is:

Sheryl Mitchell, Manager
112 West Cass Street
Albion, MI 49224
Phone number: 517-629-5535
Email: smitchell@cityofalbionmi.gov

ASSET INVENTORY AND CONDITION ASSESSMENT

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

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

The wastewater collection system assets consist of approximately 267,109 feet (50.59 miles) of sanitary sewers (gravity pipe and force mains) and 1,119 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 WWTP currently includes the following treatment processes and major equipment:

- Influent Pump Station
- Grit Removal
- Primary Clarifiers
- Aeration Tanks and Blowers
- Activated Sludge Pumping
- Secondary Clarifiers
- Disinfection and Outfall
- Sludge Thickener
- Digesters
- Thickener and Digester Pumping
- Sludge Storage Tanks
- Chemical Building and Ferric Storage Tanks
- Plant Effluent Water System

Treated effluent is discharged the Kalamazoo River in accordance with NPDES permit No. MI0022161. The design capacity of the WWTP is up to 4.0 million gallons per day (mgd). The current annual average flow received by the facility is approximately 2.0 mgd.

There are three sanitary sewer lift stations located throughout the wastewater collection system. The stations are either wet well/dry well style or submersible style stations.

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, 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 476 WWTP assets, 49 lift station assets, and 2,262 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 983 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 46.3% of the gravity pipe. Smoke Testing performed on 100% of system to disclose location of inflow or infiltration and 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 36.6% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 17.2% of the system identifying the need for point repairs and lining. The remaining 46.2% of assets were placed in the 20+ year category.

Ongoing repairs have helped to maintain the condition of many assets as well as the work completed during the ongoing 2017 WWTP Improvements project. Some assets installed during the 1978 project are now near the end of their useful life and are deteriorated due to use and the harsh conditions associated with wastewater treatment. The most immediate concerns associated with the WWTP are being addressed by the ongoing project. Additional short term needs are included in the near term CIP projects.

The condition of the assets at the lift stations range from excellent to poor (27% excellent, 55% good, 10% fair, 8% poor). Ongoing maintenance has maintained the condition of most assets. Some assets have deteriorated due to use and the harsh conditions associated with typical wastewater collection systems.

Level of Service

Defining the Expected Level of Service (LOS)

The overall objective of the City 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 City of Albion 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 WWTP.
- 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 City from time to time to make sure they accurately reflect the desired operation of the utility.

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 WWTP and lift station categories for CoF are:

- Process
- Financial Impact
- Ability to Respond

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset in the collection system 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. A similar, but spreadsheet based approach was use for the WWTP and lift station assets.

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Twelve pipe segments in the collection system are identified as having an extreme risk rating. One pipe has been identified for replacement, one pipe for full lining, five for point repairs, and five are storm sewer cross connections that need to be abandoned. Much of the collection system's gravity pipes, 79 percent, have a low to negligible risk rating and are indicative of pipes in relatively good condition.

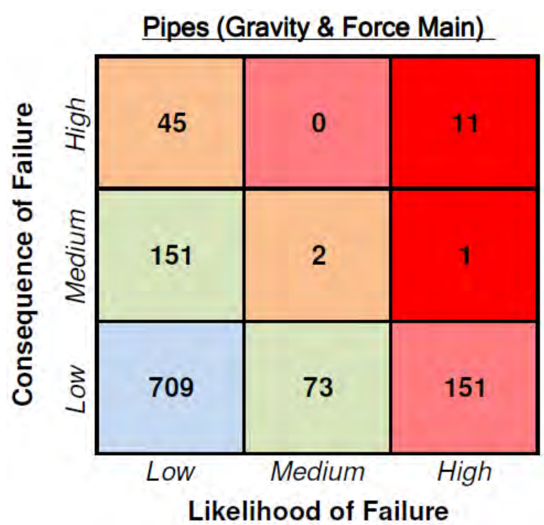


Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. 79 manholes have been identified as having an extreme risk rating. Rehabilitation methods vary from full replacement, chimney repairs, cover replacements, and plugging storm sewer cross connections. Many manholes are at low to medium risk and recommended to be included in a long-term rehabilitation strategy (90.3 percent).

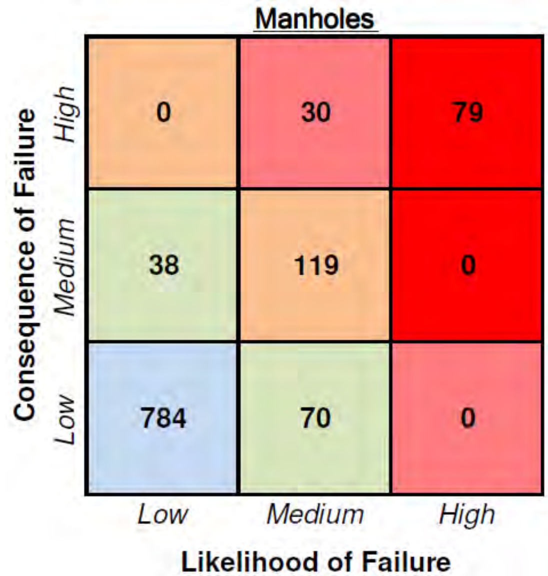


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTP and lift station assets. Six assets were identified as extreme risk. These assets are addressed in near term CIP projects.

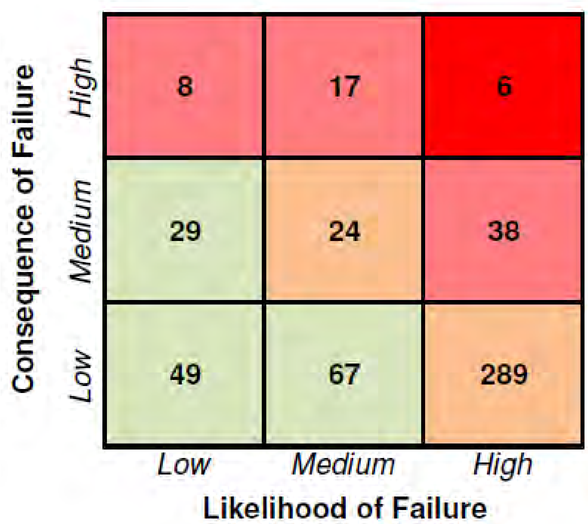


Figure 3. Business Risk Matrix (Risk Rating) for WWTP and lift station assets

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 City's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, WWTP 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 a detailed recommendation of the collection system assets needing rehabilitation in the short-term CIP.

Table 4. 5-Year Capital Improvement Plan: Rehabilitation Summary						
Maintenance Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Pipe Replacement	$ 186,782	$ 108,470	$ -	$ 83,081	$ -	$ -
Pipe Lining	$ 1,109,474	$ -	$ 11,748	$ -	$ 652,977	$ 563,319
Pipe Point Repair	$ 597,270	$ -	$ 65,333	$ 566,351	$ -	$ -
Abandon Storm Cross Connection	$ 36,664	$ 36,664	$ -	$ -	$ -	$ -
Manhole Replacement	$ 118,450	$ -	$ 63,654	$ -	$ -	$ 63,760
Manhole Repair	$ 27,038	$ -	$ 3,978	$ -	$ -	$ 26,084
Replace Manhole Cover	$ 9,800	$ 9,800	$ -	$ -	$ -	$ -
Manhole Chimney Repair	$ 97,500	$ 35,000	$ 64,375	$ -	$ -	$ -
Manhole Chimney Repair and Cover	$ 16,000	$ 16,000	$ -	$ -	$ -	$ -
Plug Storm Pipe Cross Connection	$ 2,500	$ 2,500	$ -	$ -	$ -	$ -
Plug Storm Pipe Cross Connection and Chimney Repair	$ 3,000	$ 3,000	$ -	$ -	$ -	$ -
Install new Manhole	$ 5,150	$ -	$ -	$ 5,464	$ -	$ -
Total	$ 2,209,627	$ 211,434	$ 209,088	$ 649,431	$ 652,977	$ 653,163

Table 5 shows detailed recommendations for the WWTP and lift station system assets needing rehabilitation in the short-term CIP

Table 5. WWTP & Lift Station Improvements						
Maintenance Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Wastewater Influent Screen	$ 797,000	$ 821,000	$ -	$ -	$ -	$ -
Digester Building & Equipment Rehab	$ 2,396,000	$ 2,468,000	$ -	$ -	$ -	$ -
Secondary Clarifier	$ 797,000	$ -	$ 846,000	$ -	$ -	$ -
Gravity Thickener	$ 337,000	$ -	$ 358,000	$ -	$ -	$ -
Filter Building & Equipment Repairs	$ 714,000	$ -	$ 757,000	$ -	$ -	$ -
WWTP Secondary Building Rehab	$ 1,618,000	$ -	$ 1,717,000	$ -	$ -	$ -
Sludge Holding Tanks	$ 162,000	$ -	$ -	$ 177,000	$ -	$ -
Ferric Feed System Replacement	$ 268,000	$ -	$ -	$ 293,000	$ -	$ -
WWTP Multiple Roof Replacements - Pump & Filter Buildings	$ 76,000	$ -	$ -	$ 83,000	$ -	$ -
Headworks Rehabilitation	$ 615,000	$ -	$ -	$ -	$ 692,000	$ -
Grit System Improvements	$ 1,092,000	$ -	$ -	$ -	$ -	$ 1,266,000
Total	$ 8,872,000	$ 3,289,000	$ 3,678,000	$ 553,000	$ 692,000	$ 1,266,000

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 WWTP 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.

Table 6 shows operation and maintenance costs for the collection system.

Table 6. Collection System Maintenance Summary Table: Year by Year

Maintenance Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Manhole Assessment	$ 111,240	$ 1,545	$ 4,774	$ -	$ 1,126	$ 117,087
Manhole Cleaning	$ 39,398	$ 3,863	$ 1,591	$ 2,459	$ 16,039	$ 19,128
CCTV	$ 80,367	$ 19,946	$ 12,411	$ 13,461	$ 16,930	$ 22,725
CCTV - Heavy Cleaning	$ 763,849	$ 183,786	$ 192,842	$ 196,364	$ 176,136	$ 52,400

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 an independent municipal financial advisor (Utility Financial Solutions, LLC) dated April 17, 2017.

The rate methodology required by the MDEQ for SAW Grant 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 UFS showed 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 ____October 31, 2107____
(no later than 3 years from executed grant date)

The ____City of Albion____ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. ____1630-01____ 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: ____May 2, 2017____.
2) Significant Progress Made: 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: ____NA____.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on ____NA____.

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:

____Jill Domingo – Clerk____ at ____(517) 629-7864____ jadomingo@cityofalbionmi.gov
Name | Phone Number | Email

Sheryl S Mitchell ____ 10/30/2017
Signature of Authorized Representative (Original Signature Required) | Date

____Sheryl Mitchell – Manager____
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Albion

SAW Project No. 1630-01

FINAL
October 2017

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 2014, The City of Albion 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 Cities stormwater collection system. 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 Albion AMP is:

Sheryl Mitchell, Manager
112 West Cass Street
Albion, MI 49224
Phone number: 517-629-5535
Email: smitchell@cityofalbionmi.gov

Asset Inventory and Condition Assessment

The stormwater collection system assets consist of approximately 215,196 feet (40.76 miles) of storm sewers and 2107 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 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 purposes.

Condition Assessment and Expected Useful Life

For the City of Albion, a comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field based assessments were completed on 1,916 of the total 2,107 structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 1% of the gravity pipe.

Recommendations for short-term (1-5 year) and long term (6-20 year) identifies the need for maintenance of the system, 0.6% was tagged for inspection and/or cleaning. Rehabilitation accounted for 6% of the system identifying the need for point repairs and lining. The remaining assets (93.4%) were placed in the beyond 20 year planning category.

Level of Service

Defining the Expected Level of Service (LOS)

The overall objective is to provide appropriate stormwater collection, diversion, and conveyance at a minimal cost, consistent with applicable environmental regulation.

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 Albion:

- *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.*
- *Maintenance and operations staff are to be properly trained.*

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 Village of Hopkins using Innovyze-InfoMaster software. InfoMaster is an ArcGIS-based sewer asset management and capital planning software that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. 66 pipe segments in the stormwater collection system have an extreme risk rating. Of these pipes one is called for replacement, one for full lining, and one for point repair, the remaining 63 pipes do not have a rehabilitation recommendation due to lack of CCTV data.

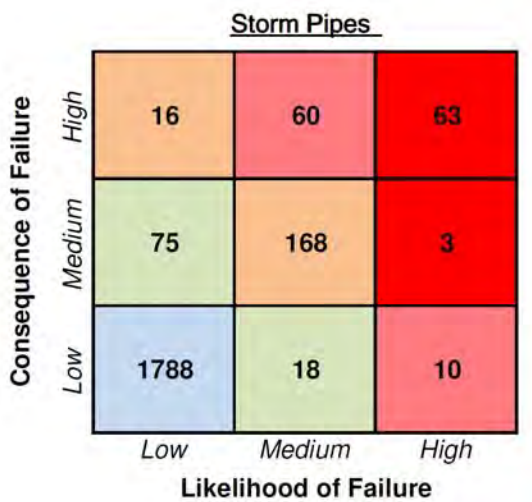


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Nineteen structures are identified as extreme risk, and are recommended for replacement or rehabilitation.

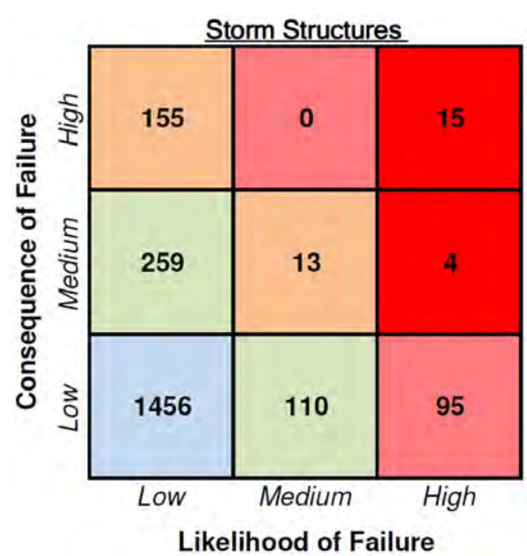


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

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 with recommendations was prepared for the Cities assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term 1-5 year and Long-Term 6-20 year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system. The 5-year CIP rehabilitation total is $523,062.

CIP Development

The City of Albion identifies assets of $5,000 or more to be capital expenditures. Collection System assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The recommended 5-Year Capital Improvement Plan for the City-owned storm water collection system is included in Table 4 below.

Table 4. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Pipe Replacement	$ 113,983	$ 113,983	$ -	$ -	$ -	$ -
Pipe Point Repair	$ 5,340	$ -	$ 5,500	$ -	$ -	$ -
Pipe Lining	$ 45,364	$ 9,073	$ 9,345	$ 9,617	$ 9,889	$ 10,162
Manhole Replacement	$ 206,000	$ -	$ 42,436	$ 60,100	$ 101,296	$ 17,389
Replace Manhole Cover	$ 4,500	$ 4,500	$ -	$ -	$ -	$ -
Chimney Repair	$ 135,000	$ -	$ 5,150	$ 31,827	$ -	$ 112,551
Manhole Repair	$ 12,875	$ -	$ -	$ -	$ 11,255	$ 2,898
Total	$ 523,062	$ 127,556	$ 62,431	$ 101,544	$ 122,440	$ 143,000

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound stormwater system. The process of cleaning and CCTV inspection of pipelines either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every ten years, or that 10% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects. The 5-year maintenance total is $45,476.

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Albion *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1630-01 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:

Jill Domingo - Clerk	at (517) 629-7864	jadomingo@cityofalbionmi.gov
Name	Phone Number	Email

Sheryl S Mitchell 10/30/2017
Signature of Authorized Representative (Original Signature Required) Date

Sheryl Mitchell - Manager
Print Name and Title of Authorized Representative

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Baroda, Michigan

Wastewater Sewer System

Date: October 2, 2017
To: Mr. David Worthington
Organization: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: Village of Baroda SAW Grant: Summary of Wastewater Asset Management Plan

Grantee Information:
Village of Baroda
P.O. Box 54
Baroda, MI 49101
www.barodavillage.org
Mr. Robert Getz; President
Ph: (269) 422-1779
SAW Project #: 1409-01

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:	$251,000	$125,000	$376,000
2) Less: Match	$ 25,100	$ 12,500	$ 37,600
3) Net Grant:	$225,900	$112,500	$338,400

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.*

A comprehensive inventory of the Sanitary Sewer system assets was performed using utility drawings and on site Global Positioning System (GPS) field locations. Using the data collected, a detailed map of the wastewater system was prepared using Geographical Information Systems (GIS). The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for accurately locating the manholes and other system assets in the field utilizing handheld GPS equipment. Collecting precise locations of utility assets will help aid the Village staff to locate assets more efficiently and respond more quickly to service calls, ensuring the highest level of customer service.

Condition assessments, as-recorded drawings, maintenance records and other data have been attached to the GIS maps allowing staff easy access to all records for the system at one location. Wastewater system maps are included in the Asset Management Plan. Electronic copies are available at the Village Hall on a dedicated computer and on several handheld tablets for ease of use in the field.

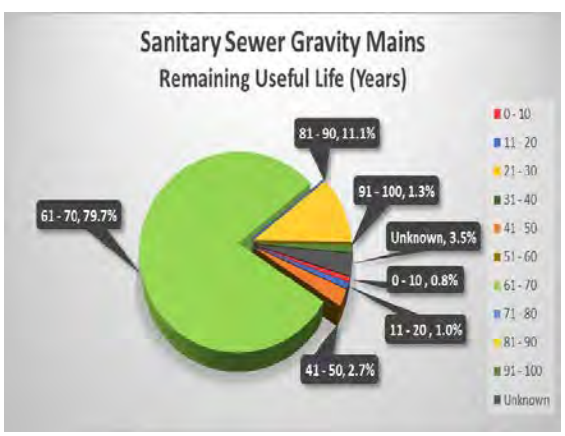
Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After the completion of the comprehensive inventory of the sanitary sewer and storm sewer system assets, a conditional assessment of all asset components was performed. Wightman and Associates, Inc. hired Terra Contracting Services, to perform the conditional assessment with a 360 degree panorama camera to provide GIS data for manholes greater than 20 years old. Wightman provided complete visual inspection of all of the manholes in the wastewater system that were less than 20 years old. All sections of pipe with an age greater than 20 years were inspected using closed circuit video televising equipment designed for internal pipe inspection and imaging provided by Terra.

The conditional assessment performed was based upon National Association of Sewer Service Companies (NASSCO) Standards. The numerical grading system defines the severity of pipe defects. Condition grades for structural defects and operation and maintenance (O&M) defects are assigned based on the likelihood of further deterioration or failure. The numerical system uses numbers ranging from 1 to 5 with 1 being the best and 5 being the worst. The severity ranking considers the immediate defect, risk of failure, and rate of deterioration. The following table provides a description of the five rating categories.

NASSCO Condition Assessment System	
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)

The following charts show the condition rating for the wastewater system based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database



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 (LOS) defines the way in which the Owner desires the wastewater system to perform over the long term. The LOS should include any technical, managerial, or financial components, as long as all regulatory requirements are met. The LOS is a fundamental part of how the Village wastewater system is operated and maintained.

Similar to the overall Asset Management Program, the LOS will need to be monitored and adjusted over time. As with all components of asset management, LOS is an ongoing process and determining and detailing the level of service that the system is going to provide is a key step in the asset management program.

The Asset Management Team has selected the following statements to define the desired LOS:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage, break, or lift station failure occur causing an untreated discharge, we will correct the problem as soon as possible to minimize any environmental damage.

3. We will develop and implement a preventive maintenance program to reduce the likelihood of the occurrence of a blockage, break, or lift station failure.

4. We will respond to customer complaints and system alarms within two hours for an emergency and within twenty-four hours for a non-emergency during normal business hours. Communication with the complainant or customers affected will be maintained until the issue is resolved.

5. We will maintain an asset management program for the system and provide reports on an as needed basis.

6. We will develop a work order system to identify, assign and track preventative and reactive work on the system and report on the status of work orders to the Village on an as needed basis.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to the Village on an as needed basis.

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?*

Criticality is a rating that considers the likelihood and consequence of an asset failing. Not all assets are equally important to a utility's operation. Some assets may have a high likelihood of failure but a very low consequence of failure. Correspondingly, some assets may have a low likelihood, but a high consequence. Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements.

A. Likelihood of Failure

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include: cost of repair; social cost associated with the loss of the asset; repair/replacement costs related to collateral damage caused by the failure; legal costs related to additional damage caused by the failure; environmental costs created by the failure; loss of business revenue to the community; and any other associated costs or losses.

Rating **Consequence**

1 **Insignificant:** <10% loss of service, limited potential human contact, minimal property damage.

2 **Minor:** 10% loss of service, potential human contact, minimal property damage.

3 **Moderate:** 25% loss of service, potential human contact, limited property damage, disruption to essential services or major industry.

4 **Major:** 90%>50% loss of service, likely human contact, moderate property damage.

5 **Catastrophic:** 90%+ loss of service, high potential of human contact with sewage, extensive property damage.

Loss of service for the wastewater system refers to number of service connections impacted due to a single isolated 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.*

Methodology – Asset Management Financial Review
A significant effort has been made by the Village 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 AMFR covers an extended forecast period to take this asset evaluation into account.

The AMFR 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, fund balance (i.e., actual cash and investment balance). The recommended analysis is “cash basis” approach as described in the AWWA Manual of Rate Making Practices.

Two financial models are provided to the Village Council to offer 2 scenarios for policy making decisions, to fund the increase in annual operating costs and the increase in capital spending.

Summary
- Rates: Recommend near term, gradual or consistent, annual increases to offset inflation and to level off, future operating and cash fund balance with potential larger increases to fund capital projects.
- Cash Balance: Work down cash balance financing of increased O/M and capital expenditures.
- Capital Cost: A cash financed approach, through rate increases, as provided in one of the models.

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.*

To ensure that the desired LOS can be maintained, a long-term Capital Improvement Plan (CIP) is required to meet the system needs for the future. The CIP is based upon improvements determined necessary due to the condition of the assets and their criticality. Projects include those where field assessment has determined the asset is nearing the end of its useful life and through engineering judgment should be replaced such as broken gravity mains, lift stations that have equipment nearing the end of its useful life and new advances in safety equipment. These projects include: gravity main repairs, lift stations upgrades, and lagoon sludge removal. The planning period is 20 years to allow the development of an adequate rate structure, to finance the projects. Capital improvement projects are projects that the community has an extended period of time to plan for and are projects that usually cover high cost, non-recurring items.

C. Recommended Wastewater System Projects

The following table lists the recommended capital improvement projects for the next five years and cyclical improvement projects for the wastewater system.

Year	***Project Name***	***Estimated Cost***
2018	Install Safety Grate at Lift Stations	$15,000
2018	Lagoon Site Improvements	$30,000
2019	Paint LS 1 Structure	$3,000
2019	Install Emergency Generator for LS 1	$39,000
2020	Install Emergency Generator for LS 2	$32,000
2021	Spot Repair on Lemon Creek at Cleveland	$8,000
2021	Spot Repair on Hills Road at Sonoma Court	$8,000
2022	Replace LS 1 Pumps	$28,000
2027	Replace LS 2 Pumps	$13,000
2032	Lagoon Sludge Removal	$360,000
2034	Telemetry and Controls Upgrades	$226,000
2034	Replace LS 3 and LS 4 Pumps	$25,000
Total Estimated Project Costs for Twenty Year CIP (current dollars) =		$787,000
Total Estimated Project Costs for Twenty Year CIP (future dollars) =		$1,034,000

List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the Village Assets identified and included in the Asset Management Program.

Table of Key Wastewater System Assets		
Item	Quantity	Unit
15” Sanitary Sewer	1,710	LF
12” Sanitary Sewer	252	LF
10” Sanitary Sewer	3,718	LF
8” Sanitary Sewer	19,222	LF
6” Sanitary Sewer	22	LF
4’ Sanitary Manhole	96	EA
6” Service Lead, Complete	231	EA
Lift Station > 500 gpm	1	EA
Lift Station < 500 gpm	3	EA
10” Force Main	12	LF
8” Force Main	2,296	LF
6” Force Main	1,327	LF
4” Force Main	1,408	LF
Air Release Valves/Cleanouts	7	EA
Treatment Lagoons	3	EA

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan Executive Summary Guidance Village of Baroda, Michigan

Storm Water System

Date: October 2, 2017
To: Mr. David Worthington
Organization: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: Village of Baroda SAW Grant: Summary of Storm Water Asset Management Plan

Grantee Information:
Village of Baroda
P.O. Box 54
Baroda, MI 49101
www.barodavillage.org
Mr. Robert Getz; President
SAW Project #: 1409-01

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:	$251,000	$125,000	$376,000
2)	Less: Match	$ 25,100	$ 12,500	$ 37,600
3)	Net Grant:	$225,900	$112,500	$338,400

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.*

A comprehensive inventory of the storm water sewer system assets was performed using utility drawings and on site Global Positioning System (GPS) field locations. Using the data collected, a detailed map of the storm water system was prepared using Geographical Information Systems (GIS). The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for accurately locating the manholes and other system assets in the field utilizing handheld GPS equipment. Collecting precise locations of utility assets will help aid the Village staff to locate assets more efficiently and respond more quickly to service calls, ensuring the highest level of customer service.

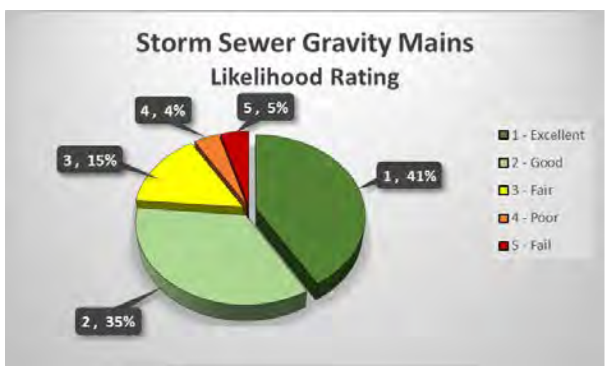
Condition assessments, as-recorded drawings, maintenance records and other data have been attached to the GIS maps allowing staff easy access to all records for the system at one location. Storm water system maps are included in the Asset Management Plan. Electronic copies are available at the Village Hall on a dedicated computer and on several handheld tablets for ease of use in the field. The following is a summary of the Village Assets identified and included in the Asset Management Program.

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 the completion of the comprehensive inventory of the storm sewer system assets, a conditional assessment of all asset components was performed. Wightman and Associates, Inc. hired Terra Contracting Services, to perform the conditional assessment. Wightman provided complete visual All sections of pipe with an age greater than 20 years were inspected using closed circuit video televising equipment designed for internal pipe inspection and imaging provided by Terra.

NASSCO Condition Assessment System	
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)

The following charts show the condition rating for the storm water system based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database.



<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 (LOS) defines the way in which the Village desires the storm water system to perform over the long term. The LOS should include any technical, managerial, or financial components, as long as all regulatory requirements are met. The LOS is a fundamental part of how the Village storm water system is operated and maintained.

Similar to the overall Asset Management Program, the LOS will need to be monitored and adjusted over time. As with all components of asset management, LOS is an ongoing process and determining and detailing the level of service that the system is going to provide is a key step in the asset management program.

The Asset Management Team has selected the following statements to define the desired LOS:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage or break occur, we will correct the problem as soon as possible to minimize any future flooding.

3. We will develop and implement a preventive maintenance program to reduce the likelihood of the occurrence of a blockage or breakage.

4. We will respond to customer complaints during normal business hours. Communication with the complainant or customers affected will occur.

5. We will maintain an asset management program for the system and provide reports on an as needed basis.

6. We will develop a work order system to identify, assign and track preventative and reactive work on the system and report on the status of work orders to the Village on an as needed basis.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to the Village on an as needed basis.

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?*

Criticality is a rating that considers the likelihood and consequence of an asset failing. Not all assets are equally important to a utility's operation. Some assets may have a high likelihood of failure but a very low consequence of failure. Correspondingly, some assets may have a low likelihood, but a high consequence. Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. The higher the criticality, the more resources should be allocated to maintain the asset. The next sections evaluate the likelihood and consequence of failure for the storm water system.

A. Likelihood of Failure

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include: cost of repair; social cost associated with the loss of the asset; repair/replacement costs related to collateral damage caused by the failure; legal costs related to additional damage caused by the failure; environmental costs created by the failure; loss of business revenue to the community; and any other associated costs or losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with a failure. Following is the ranking system that was used to determine the consequence of failure for the system.

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

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, improvements to the storm water 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. As such, an in-depth revenue structure cannot be developed for the storm water 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.*

To ensure that the desired LOS can be maintained, a long-term Capital Improvement Plan (CIP) is required to meet the system needs for the future. The CIP is based upon improvements determined necessary due to the condition of the assets and their criticality. Projects include those where field assessment has determined the asset is nearing the end of its useful life and through engineering judgment should be replaced such as broken gravity mains, lift stations that have equipment nearing the end of its useful life and new advances in safety equipment. These projects include: gravity main repairs, manhole and inlet rehabilitation. The planning period is 20 years to allow the development of an adequate rate structure, to finance the projects. Capital improvement projects are projects that the community has an extended period of time to plan for and are projects that usually cover high cost, non-recurring items.

A. Recommended Storm Water System Projects

The following table lists the recommended capital improvement projects for the next 20 years for the storm water system. Detailed descriptions and cost estimates for each project can be found in Appendix E in the Asset Management Plan.

Year	***Project Name***	***Estimated Cost***
2018	3rd Street Storm Rehabilitation	$16,000
2020	2nd Street Storm Rehabilitation	$19,000
2024	Center Street Storm Rehabilitation	$32,000
2026	South Street Storm Rehbailitation	$29,000
2028	Pheasant Run Road Storm Rehabilitation	$17,000
Total Estimated Project Costs for Twenty Year CIP (current dollars) =		$113,000

Once the above projects are completed, there are currently no other significant improvements required to maintain the LOS.

List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the Village Assets identified and included in the Asset Management Program.

Table of Key Storm Water System Assets		
Item	Quantity	Unit
30” Storm Sewer	1,092	LF
24” Storm Sewer	2,357	LF
18” Storm Sewer	2,040	LF
15” Storm Sewer	2,750	LF
12” Storm Sewer	7,645	LF
10” Storm Sewer	1,140	LF
8” Storm Sewer	821	LF
6” Storm Sewer	444	LF
Manholes	80	EA
Inlets	122	EA
Culverts	110	LF
Discharge Points	13	EA

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

Completion Due Date **10/31/17**
(no later than 3 years from executed grant date)

The Village of Baroda *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1409-01** 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. Robert Getz at *(269) 422-1779* *clerk@barodavillage.org*
Name | Phone Number | Email

Robert Getz
10-18-17
Signature of Authorized Representative (Original Signature Required) Date

Robert Getz, 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 **October 31, 2017**
(no later than 3 years from executed grant date)

The **Village of Baroda, Michigan** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1409-01** 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: 4/10/17

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
Mr. Robert Getz	at	**(269)** 422-1779	clerk@barodavillage.org

Robert Getz — 10-18-17

Signature of Authorized Representative (Original Signature Required) — Date

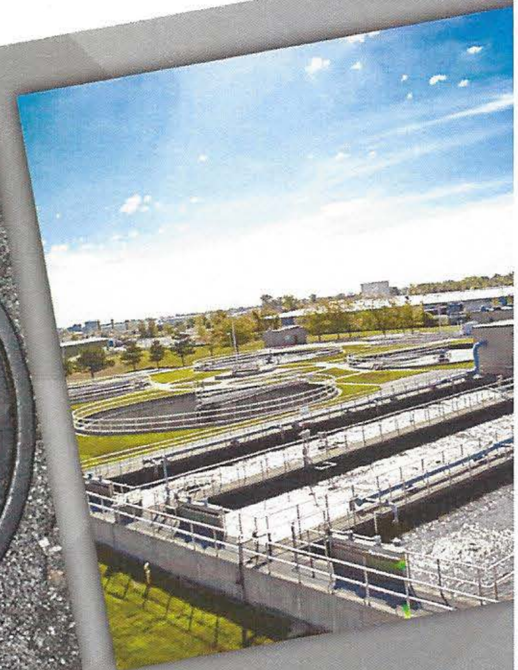
Mr. Robert Getz, Village President

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

Bay County Department of Water & Sewer

SAW Project No. 1036-01

FINAL
October 2017

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for the Storm water, Asset Management, and Wastewater (SAW) Grant Program. In October of 2014, the Bay County Department of Water and Sewer received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1036-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Bay County Department of Water and Sewer's publicly owned wastewater utility. The assets that comprise the utility include collection system piping and manholes, lift station/pump stations and force mains.

The SAW Grant amount awarded to the Bay County Department of Water and Sewer was $1,311,706
The Local Match provided by the Bay County Department of Water and Sewer was $215,013

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.

Questions regarding the Asset Management Plan should be directed to:
Ed Klopf
Wastewater Plant Superintendent
3933 Patterson Rd.
Bay City, MI 48706-1993
989-684-3883
Email: eklo@baycodws.org

ASSET INVENTORY AND CONDITION ASSESSMENT

The wastewater collection system assets consist of approximately:

- Gravity Sewer (14 inch thru 60 Inch): 99,636 feet (18.9 miles)
- Force Main (10 inch thru 24 inch): 13,394 feet (2.5 miles)
- Manhole Structures: 329
- Sewer Lift Stations: 4 Each
- Wastewater Treatment Plant

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

The treatment of wastewater for the Bay County Department of Water and Sewer is provided by itself. The wastewater collection system is operated and maintained by the Bay County Department of Water & Sewer staff.

The West Bay County Regional WWTP currently includes the following treatment processes:

- Influent Flow Equalization
- Coarse Screening
- Aerated Grit Removal
- Fine Screening
- Primary Clarification
- Activated Sludge
- Secondary Clarification
- Sludge Pumping
- Chlorination and Dechlorination
- Chemical Feed Systems
- Solids Handling (Dissolved Air Floatation & Belt Filter Press)
- High-Rate Anaerobic Digestion
- Sludge Storage

Treated effluent is discharged to the Saginaw River in accordance with NPDES permit. The design capacity of the WWTP is 10.28 million gallons per day (mgd). The current annual average flow received by the facility is approximately 6.0 mgd.

BCDWS owns four regional sanitary sewer lift stations located in the regional wastewater collection system. The stations consist of 2 wet well/dry well style, 1 can style and 1 submersible style.

In summary, the inventory includes over 1,050 WWTP assets, 100 lift station assets, and 634 collection system assets.

Asset Identification and Location
A comprehensive wastewater system asset inventory was developed from operation and maintenance manuals, which included a review of the existing record drawings, field notes, staff knowledge, site visits and 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 survey grade GPS equipment and a comprehensive evaluation of the gravity system.

This information was organized into a new database and piping network for archiving, mapping and future evaluation purposes.

Condition Assessment and Expected Useful Life
A comprehensive evaluation of the collection system was performed.

- NASSCO-MACP Level 1 manhole field based assessments were completed on manhole structures throughout the regional mains in Bangor, Monitor and Williams Township. The manhole structure assets reviewed ranged from Good to Fair. Most of the deficiencies observed were chimney deterioration due to the age of the structures.
- Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 99,636 LF of the gravity pipe.
- The condition of the collection system assets reviewed ranged from Good to Fair, with only a few minor deficiencies.
- Capacity Analysis was modeled for average day and peak hour conditions in areas of concern.
- Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. It is recommended to clean the collection system over a three-year period beginning in 2019 and televise those areas where excess debris is found. Adjustments in the level and reoccurrence of cleaning and televising will be reviewed and adjusted accordingly after the three-year period.

A comprehensive evaluation of the wastewater treatment plant was performed.

- Overall, the condition of the assets at the WWTP range from excellent to poor; most of the assets were in good to fair condition, about 33% and 50% respectively.
- Ongoing repairs have helped to maintain the condition of many assets. Some assets that were installed during original plant construction (1987 to 1980) have not been replaced and are now near the end of their useful life due to age or deterioration caused by harsh conditions associated with wastewater treatment.

A comprehensive evaluation of the regional lift stations was performed.

- The condition of the assets at the lift stations ranged from excellent to poor; most of the assets are in fair condition (about 65%).
- 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 minor. See the Lift Station Condition Assessment for details.

Level of Service

Defining the Expected Level of Service (LOS)

The overall objective of the Bay County Department of Water and Sewer as it relates to their wastewater collection system is to adopt the following Level of Service (LOS) goals:

LEVEL OF SERVICE STATEMENT

The overall objective of the Bay County Department of Water and Sewer 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:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with 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 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 the community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Bay County Department of Water and Sewer annually to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

To assure that LOS goals are met, performance measurements may need to be implemented. During the LOS review with the community the need for performance measurements was discussed.

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

Criticality Results
Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical sewer asset management and capital planning template 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.

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

Figure 1 provides the risk rating for gravity pipe by number of pipe segments. 2 pipe segments in the collection system have been identified with a high risk rating. One pipe is broken and one has a portion of the interior wall missing under a sewer lateral. Bay County Department of Water and Sewer will repair these 2 locations in the 1-5 year CIP. Other areas found to be in the high-risk category will be monitored. Much of the collection system's gravity pipes, 62 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes in relatively good condition.

Figure 2 provides the risk rating for the collection system manholes. There were 3 manholes that require frame replacement and manhole chimney reconstruction. Little of the collection system's manholes, 75 percent as shown in Figure 2, have a low to negligible risk rating and are indicative of manholes in relatively good condition.

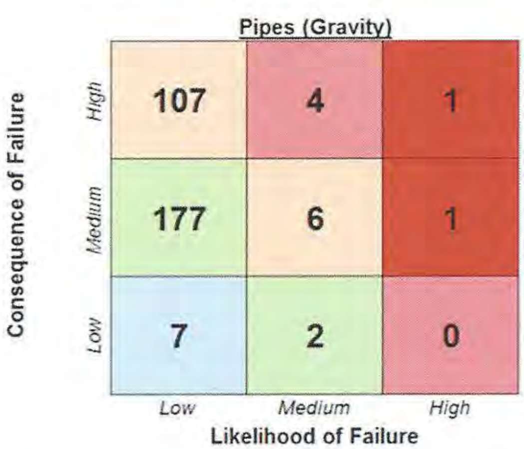


Figure 1. Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

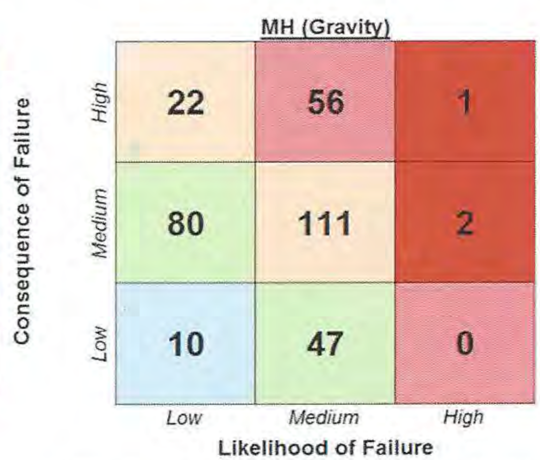


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. 0 assets are identified as an extreme risk, 32 assets are identified as a high risk, most of which are due to being installed over 30 years ago.

Consequence of Failure				
	High	4 *(High)*	4 *(High)*	0 *(Extreme)*
	Medium	20 *(Low)*	5 *(Med)*	24 *(High)*
	Low	7 *(Low)*	0 *(Low)*	40 *(Med)*
		Low	Medium	High
		Probability of Failure		

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

Figure 4 provides the risk ratings for the WWTP assets, 0 assets are identified as an extreme risk, 218 assets are identified as a high risk, most of which are due to being installed over 30 years ago.

Consequence of Failure				
	High	9 *(High)*	16 *(High)*	0 *(Extreme)*
	Medium	128 *(Low)*	135 *(Med)*	193 *(High)*
	Low	169 *(Low)*	76 *(Low)*	321 *(Med)*
		Low	Medium	High
		Probability of Failure		

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

Capital Improvement Plan

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the Bay County Department of Water and Sewer's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the wastewater treatment plant, pumping stations and collection system. From the BRE, a short-term (1-5 year) and long-term (6-20 year) CIP's were developed for the utility.

This AMP included a detailed condition assessment of the wastewater treatment plant, collection system and lift stations.

Based on the AMP condition assessment, the Bay County Department of Water and Sewer has identified assets which need improvement. These improvements can be completed with funding from the Bay County Department of Water and Sewer's sewer reserve account.

(1-5 Year) Capital Improvements include:

- Wastewater Treatment Plant Improvements
  - Replace Settled Sewage Pumps
  - Secondary Clarifier Rehabilitation (1 Unit)
  - Headworks Upgrade
  - Rehabilitate Primary Clarifiers
  - Replace Aeration Tank Air Drop Legs

- Lift Station Improvements
  - LS 14 Pump Replacement
  - LS 14 Hydraulic Valve System Replacement
  - LS 13 Pump Replacement

- Force Main Improvements
  - Replace Force Main from Lift Station 13 to E. Fisher Road

- Collection System Improvements
  - Repair extreme risk items (2)
  - Manhole Chimney Rehabilitation

(6-20 Year) Capital Improvements include:

- Wastewater Treatment Improvements
- Manhole Chimney Rehabilitation
- Lift Station Improvements

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 function 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.

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 existing rates were determined to create sufficient funds to fulfill the day-to-day maintenance and operations of the entire sanitary collection system.

The MDEQ approved the Bay County Department of Water and Sewer's rate methodology on May 16, 2017.

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

Completion Date: October 27,2017
(no later than 3 years from executed grant date)

The **Bay County Department of Water and Sewer** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No.**1036-01** 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: **May 16,2017**

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:

Ed Klopf, Wastewater Plant Superintendent	**989-684-3883**	**eklo@baycodws.org**
Name	Phone Number	Email

Edward W. Klopf ______________________________ 10-24-17

Signature of Authorized Representative (Original Signature Required) Date

Ed Klopf Wastewater Treatment Plant Superintendent

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Belding

SAW Project No. 1651-01

CITY of BELDING

FINAL
October 2017

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 2014, The City of Belding 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 City's stormwater collection system. 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 City of Belding 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 City of Belding AMP is:

Ernest Thomas, DPW Director
120 South Pleasant Street
Belding, Michigan 48809
Phone number: 616.794.1900
Email: e.thomas@ci.belding.mi.us

ASSET INVENTORY AND CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 135,962 feet (25.7 miles) of storm sewers and 1,554 stormwater structures connecting the gravity pipe. System outfalls are primarily located along Flat River, with some outlets to three unnamed tributaries of Flat River. There are also twelve culverts along the County drains located within City limits that are owned and maintained by the City. These assets are 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, or updated (GIS) database and piping network for archiving, mapping and further evaluation purposes.

The purchase of GIS/GPS equipment provided with the SAW grant program will greatly enhance the City's ability to physically locate defects in storm water system assets.

CONDITION ASSESSMENT AND EXPECTED USEFUL LIFE

For the City of Belding, a comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field based assessments were completed on 1,531 structures. Twenty-three structures were located but could not be accessed for assessment. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 14,250 feet of the gravity pipe.

In conversations with DWP staff, no problematic flooding areas of concern were identified within the storm sewer network. Therefore, a modified rational method was used to model hydraulic capacity and identify areas of hydraulic concern for large storm events. Storm structures and sewers were modeled using the 10-year, 6-hour storm to find capacity concerns. Sixty-six pipes flowed over 75% full in the model scenario. Pipes above 75% capacity, but otherwise no condition concerns, are recommended to be replaced and upsized.

Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance; 25.3% of the storm structures and 77.4% of the sewer system was tagged for CCTV, inspection, and/or cleaning. Rehabilitation is recommended for approximately 7% of the storm structures and 4.3% of the sewer system, mostly point repairs and lining. A few pipe segments if structural problems were identified for complete replacement. The remaining assets (67% and 18.3%, respectively) were placed in the beyond 20-year planning category.

Level of Service

Defining the Expected Level of Service (LOS)

Level of Service (LOS) defines the way in which the City stakeholders want the storm water system 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 City wishes, if all regulatory requirements are met.

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

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 Belding:

- *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.*
- *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 of Belding from time to time to make sure they accurately reflect the desired operation of the storm water system.

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

<u>ASSESSING CRITICALITY</u>

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset of the City of Belding using Innovyze-InfoMaster software. InfoMaster is an ArcGIS-based sewer asset management and capital planning software that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. Three pipe segments in the stormwater collection system have an extreme risk rating and are recommended to be for near-term rehabilitation or replacement.

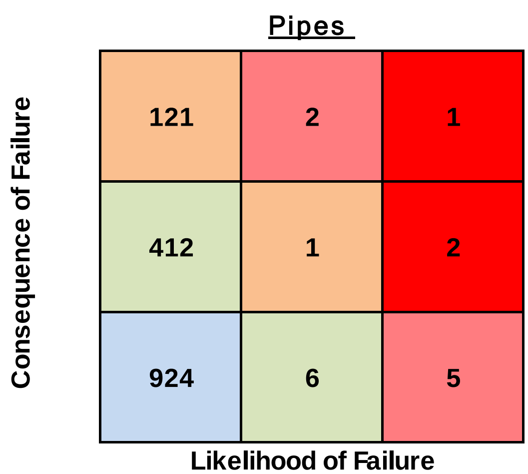


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Seven structures are identified as extreme risk, and are recommended for replacement or rehabilitation.

Manholes

Consequence of Failure	Low	Medium	High
High	**128**	**73**	**3**
Medium	**186**	**29**	**4**
Low	**902**	**222**	**7**

Likelihood of Failure

Figure 2: Business Risk Matrix (Risk Rating) by Number of 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 with recommendations was prepared for the City's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term 1-5 year and Long-Term 6-20-year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system. The 5-year CIP rehabilitation total is $1,043,240, with approximately $774,110 for assets located in Major Roads and $269,130 for assets located in Local roads.

CIP Development

Collection System assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The CIP was developed by assigning each project to a CIP year (1-5) based on several factors. In addition to Risk Rating, other factors used to assign CIP year include:

- Asset rehabilitation grouping (i.e. the type of repair/construction recommended)
- Coordination with other planned projects to achieve economies of scale or limiting disruption (an example is a street reconstruction project where identified utility recommendations can be included)

The recommended 5-Year Capital Improvement Plan for the City-owned storm water collection system is included in Table 3 below. The City of Belding will utilize two sources of funding to address the planned improvements. Funding sources are based on proximity to Major or Local Roads. Tables describing the CIP Summary by Year for each funding source are provided in the full report.

Table 3: Capital Improvement Plan Summary by Year - *OVERALL*						
Project Description	**Rehabilitation Fiscal Year**					**Total**
	2018	**2019**	**2020**	**2021**	**2022**	
Storm Sewer System Improvements						
Gravity Sewer Point Repair	$ 10,577		$ 79,027			$ 89,604
Gravity Sewer Replacement		$ 197,777			$ 306,906	$ 504,683
Manhole Lining		$ 23,446		$ 356,933		$ 380,378
Manhole Replacement		$ 10,609			$ 57,964	$ 68,573
Total Project Cost	***$ 10,577***	***$ 231,832***	***$ 79,027***	***$ 356,933***	***$ 364,870***	***$ 1,043,239***

Assumes 3% Inflation per Year

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound stormwater system. The process of cleaning and CCTV inspection of pipelines either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every five years, or that 20% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects. The 5-year CIP maintenance total is $687,340.

Table 4. Storm System Maintenance Summary Table: Year by Year - *OVERALL*						
Maintenance Action	**Total Cost (Current Year Dollars)**	**2018**	**2019**	**2020**	**2021**	**2022**
Manhole Assessment	$ 19,055	$ 3,811	$ 3,925	$ 4,040	$ 4,154	$ 4,268
Manhole Cleaning	$ 275,010	$ 55,002	$ 56,652	$ 58,302	$ 59,952	$ 61,602
CCTV	$ 393,275	$ 78,655	$ 81,015	$ 83,374	$ 85,734	$ 88,094
Total Project Cost	***$ 687,340***	***$ 137,468***	***$ 141,592***	***$ 145,716***	***$ 149,840***	***$ 153,964***

**Assumes 3% Inflation per Year*

DEQ

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

Completion Due Date 10/24/2017
(no later than 3 years from executed grant date)

The **City of Belding** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in **SAW Grant No. 1651-01** 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	at Phone Number	Email
Rebecca Schlienz, Finance Director	616.794.1900	becky@ci.belding.mi.us

Rebecca Schlienz ___ 10-24-17
Signature of Authorized Representative (Original Signature Required) — Date

Rebecca Schlienz Finance Director
Print Name and Title of Authorized Representative

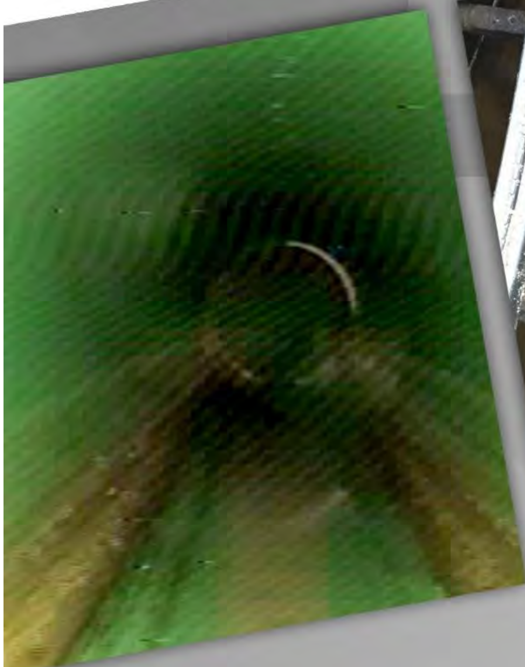
June 2014

F&V

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

City of Belding

SAW Project No. 1651-01

CITY of BELDING

FINAL
October 2017

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 May 2014, The City of Belding received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1651-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility. Working with City staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the wastewater collection system. The utilities assets include collection system piping and manholes, a wastewater treatment facility, lift station/pump stations and force mains.

This report 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 City of Belding has executed the "Certification of Project Completeness" for the wastewater asset management plan and a copy has been provided at the end of this Executive Summary.

The contact person for the City of Belding AMP is:

Ernest Thomas, DPW Director
120 South Pleasant Street
Belding, Michigan 48809
Phone number: 616.794.1900
Email: e.thomas@ci.belding.mi.us

Asset Inventory and Condition Assessment

A list of the major assets in the City'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 160,623 feet (30.4 miles) of sanitary sewers (gravity pipe and force mains) and 640 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:

- A single anaerobic lagoon
- Two facultative lagoons (one with Mechanical Aerators)
- Two Settling lagoons (ferric chloride is fed to these lagoons)

Treated effluent is discharged to the Flat River in accordance with NPDES permit No. MI0020851. The design capacity of the WWTF is 1.2 million gallons per day (mgd). Between July 2013 and March 2016, the average flow received by the facility was approximately 0.55 mgd.

The City of Belding operates and maintains seven sanitary sewer lift stations located throughout the wastewater collection system. The stations are either wet well/dry well style or submersible style stations.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed based on existing record drawings, operation and maintenance manuals, 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 Close Circuit Televising (CCTV) for pipelines greater than 20 years of age.

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 operations and maintenance uses by the City. The asset inventory includes 98 WWTF assets, 168 lift station assets, and 1,316 collection system assets (pipelines and manholes).

Condition Assessment and Expected Useful Life

A comprehensive condition assessment of the collection system was performed. NASSCO-MACP manhole field based assessments were completed for all 622 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 37% of the gravity pipe. Smoke Testing performed on approximately 16% of the system suspected of having high inflow or infiltration (I/I).

A collection system wide hydraulic model was created and average day and peak hour capacity analysis was performed to identify pipeline capacity problems. Results of the hydraulic model capacity analysis are included in the criticality results and CIP recommendations.

The assets of the wastewater collection system are in good condition. Recommended rehabilitation for 8% of the system includes the need for point repairs and sewer lining. The remaining 58% of assets were identified for rehabilitation in the future, beyond five years. Continued maintenance is recommended for 34% of the system and includes both additional inspection and/or cleaning.

Overall, the condition of the assets at the WWTF range from good to poor. Ongoing repairs have helped to maintain the condition of many assets while some assets that were installed during the 1965 construction and subsequent renovation projects and 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.

The condition of the assets at the lift stations range from fair to good. Ongoing maintenance and major lift station renovation projects have maintained the condition of many assets while other assets are worn due to age and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

A LOS service statement was developed with DPW and City Administrative Staff. The draft LOS was presented to the City Council at a publicly noticed meeting and was formally adopted for inclusion with the final wastewater asset management plan. The following is the LOS adopted for the City of Belding:

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the City of Belding 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 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 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. Ten pipe segments in the collection system had an extreme risk rating and are recommended to be replaced or point repaired. 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.

Figure 2 provides the risk rating for the collection system manholes. Eleven manholes are identified as extreme risk, and are recommended for replacement or to be cleaned, lined and repaired. The City plans to replace the manholes associated with the force main being replaced at the same time, and the others are to be determined. Many manholes are at low to negligible risk are indicative of manholes in relatively good condition (79 percent).

Pipes (Gravity & Force Main)

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	Medium 57	High 0	Extreme 8
Medium	Low 127	Medium 6	Extreme 2
Low	Negligible 449	Low 21	High 4

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

Manholes

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	Medium 46	High 8	Extreme 7
Medium	Low 60	Medium 10	Extreme 4
Low	Negligible 336	Low 108	High 61

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 seven assets with high risk ratings should be inspected at regular intervals. The City has identified replacement/repairs/improvements of WWTF assets in the proposed plans for system improvements.

Figure 4 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The nine assets with medium risk ratings should be inspected at regular intervals. The City has identified replacement/repairs/improvements of Lift Station assets in the long-term proposed plans for system improvements.

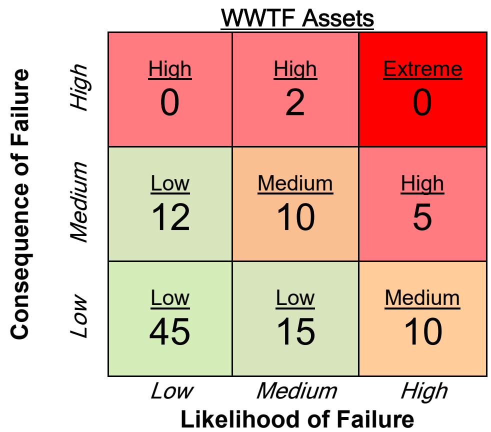


Figure 3. WWTF Assets by Risk Rating

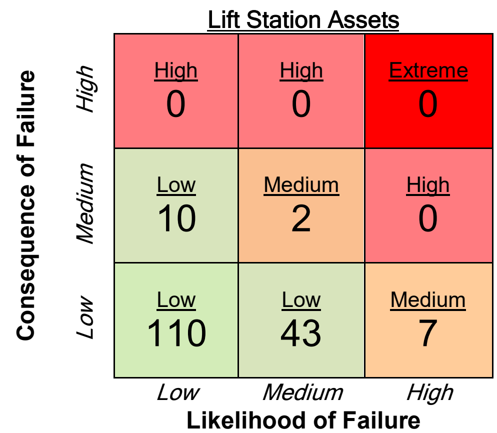


Figure 4. Lift Station Assets by Risk Rating

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 with recommendations was prepared for the City's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short Term 1-5 year and Long Term 6-20-year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

CIP Development

Collection System assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Opinions of probable project costs for the WWTF and Lift Station assets were prepared and are based on conceptual layouts of new facilities, or price quotes from material and equipment representatives. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The CIP was developed by assigning each project to a CIP year (1-5) based on several factors. In addition to Risk Rating, other factors used to assign CIP year include:

- Asset rehabilitation grouping (i.e. the type of repair/construction recommended)
- Coordination with other planned projects to achieve economies of scale or limiting disruption (an example is a street reconstruction project where identified utility recommendations can be included)

The 5-Year CIP must also consider project cost when assigned to a CIP year to balance capital requirements with generated utility revenues. The recommended 5-Year Capital Improvement Plan for the wastewater collection system and WWSL/lift stations is included in Table 3a. Recommendations for the long term 6-20 year CIP are included in Table 3b.

Table 3a: Capital Improvement Plan Summary by Year

Project Description	Rehabilitation Fiscal Year					Total
	2018	2019	2020	2021	2022	
Collection System Improvements						
Gravity Sewer Point Repair		$10,877	$11,203		$5,931	$28,011
Gravity Sewer Replacement					$70,397	$164,867
Manhole Lining	$18,580				$98,887	$227,207
Manhole Replacement	$10,000				$78,786	$147,135
Subtotal Collection System Improvements	**$28,580**	**$10,877**		**$0**	**$254,001**	**$567,220**
WWTF & Lift Station Improvements						
New Influent Pressure Sewer				$2,241,183		$2,241,183
Forcemain Replacements				$1,101,469		$1,101,469
Aeration Improvements	$78,000					$78,000
Lagoon 1 Cleaning				$676,398		$676,398
Subtotal WWTF & Lift Station Improvements	**$78,000**			**$4,019,050**		**$4,097,050**
Total Project Cost	***$106,580***	***$10,877***	***$273,762***	***$4,019,050***	***$254,001***	***$4,664,270***

Assumes 3% Inflation per Year

Table 3b: Capital Improvement Plan 6-20 Year

Description	6-20 Year
Collection System	
Known Collection System Rehabilitation	$ 100,130
Projected Collection System Rehabilitation	$ 1,418,504
Wastewater Treatment System	
WWTF and Lift Station Rehabilitation	$ 17,630,700
Total Rehabilitation Cost	***$ 19,149,334***

**Costs based on 2017 construction dollars*

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.

Table 4a identifies the recommended maintenance actions items for the wastewater collection system in a five-year summary. The total cost, as shown in the 'Total' column below, is taken and divided by five and then disbursed between 2018 to 2022, where each increasing year is multiplied by a 3% inflation factor starting at year 2 (2019).

Table 4a. Collection System Maintenance Summary Table: Year by Year

Project Description	Total (Current Year Dollars)	2018	2019	2020	2021	2022
Manhole Assessment	$7,000	$1,400	$1,442	$1,485	$1,530	$1,576
Manhole Cleaning	$18,000	$3,600	$3,708	$3,819	$3,934	$4,052
CCTV	$197,072	$39,414	$40,597	$41,815	$43,069	$44,361
CCTV & Heavy Cleaning	$225,186	$45,037	$46,388	$47,780	$49,213	$50,690
Total Project Cost	***$447,258***	***$32,949***	***$33,937***	***$34,956***	***$36,004***	***$37,084***

**Assumes 3% Inflation per Year*

A list of WWTF and lift (pump) station assets requiring replacement in the next 20 years was generated based on the expected useful life of assets included in the asset inventory. Assets addressed in the CIP were not included in the replacement cost table. Table 4b provides the results of the analysis.

Table 4b: WWTF & LS Summary Table: Assets With 0-20 Years Expected Useful Life

Asset Description	Location	Expected Useful Life (years)	Replacement Cost	Annual Replacement Cost
Surface Aerator 2	Pond No. 2	20	$13,000	$650
Surface Aerator 6	Pond No. 2	20	$13,000	$650
Surface Aerator 1	Pond No. 2	20	$13,000	$650
Surface Aerator 3	Pond No. 2	20	$13,000	$650
Surface Aerator 4	Pond No. 2	20	$13,000	$650
Surface Aerator 5	Pond No. 2	20	$13,000	$650
Dosing Pump 1	Chemical Building	10	$5,000	$500
Dosing Pump 2	Chemical Building	10	$5,000	$500
Level Transducer	Influent Chamber	10	$3,000	$300
Well Pump and Bladder Tank	Well House	20	$15,000	$750
Tractor	Garage	20	$25,000	$1,250
Transfer Pump 1	Chemical Building	20	$5,000	$250
Transfer Pump 2	Chemical Building	20	$5,000	$250
Refrigerated Sampler	Effluent Metering Structure	20	$7,000	$350
(3) 1" Chemical Feed Lines with Diffusers	Transfer / Chemical Feed Structure Between Pond No. 3 & Pond No. 4	20	$2,000	$100
V Notch Weir	Effluent Metering Structure	20	$2,000	$100
(1) 1-1/2" Chemical Feed Line with Diffuser	Outlet Control Structure	20	$1,000	$50
(1) 3/4" Chemical Feed Line with Diffuser	Transfer / Chemical Feed Structure Between Pond No. 4 & Pond No. 5	20	$1,000	$50

Boat	Lagoons	20	$1,000	$50
Pump #1	East Ellis Lift Station	20	$10,518	$526
Dry Well Hatch	Park Street Lift Station	20	$5,000	$250
Pump #1	North State Lift Station	20	$11,000	$550
Pump #2	North State Lift Station	20	$11,000	$550
Pump #1	M-44 Lift Station	20	$8,966	$448
Pump #2	M-44 Lift Station	20	$8,966	$448
Pump #1 VFD	Water Street Lift Station	15	$15,000	$1,000
Pump #2 VFD	Water Street Lift Station	15	$15,000	$1,000
Pump #1	Park Street Lift Station	20	$13,040	$652
Pump #2	Park Street Lift Station	20	$13,040	$652
Pump #1	West Ellis Lift Station	20	$10,518	$526
Pump #2	West Ellis Lift Station	20	$10,518	$526
Pump #2	Stocking Lift Station	20	$8,966	$448
Pump #1 VFD	North State Lift Station	15	$2,000	$133
Pump #2 VFD	North State Lift Station	15	$2,000	$133
Site Fencing	M-44 Lift Station	20	$12,000	$600
Pump #1 VFD	M-44 Lift Station	15	$2,000	$133
Pump #2 VFD	M-44 Lift Station	15	$2,000	$133
Pump #1	Stocking Lift Station	20	$8,966	$448
Pump #2	East Ellis Lift Station	20	$10,518	$526
Site Fencing	Water Street Lift Station	20	$12,000	$600
Dry Well Sump Pump	M-44 Lift Station	20	$1,000	$50
Valve Chamber Sump Pump	East Ellis Lift Station	20	$1,000	$50
Dry Well Sump Pump	Stocking Lift Station	20	$1,000	$50
		Total:	**$351,013**	**$18,834**

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. It is recommended that the City of Belding develop an equipment replacement fund to replace disposable equipment.

Revenue Structure

The MDEQ 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 City of Belding City, the rate study report was prepared by Utility Financial Services, LLC and approved by the MDEQ on May 18, 2017.

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

Completion Date 10/24/2017
(no later than 3 years from executed grant date)

The **City of Belding** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in **SAW Grant No. 1651.01** 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: 4/19/2017.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on 6/1/2017.

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
Rebecca Schlienz, Finance Director	at	**616.794.1900**	**becky@ci.belding.mi.us**

Rebecca Schlienz — 10-24-17
Signature of Authorized Representative (Original Signature Required) — Date

Rebecca L Schlienz — Finance Director
Print Name and Title of Authorized Representative

Ms. Denise Sovey-Meyer, Clerk
Berlin Charter Township
8000 Swan View Road
Newport, Michigan 48166
Phone – 734-586-2187
SAW Grant Project Number 1582-01

Executive Summary

1. Overview of SAW Grant Program

Berlin Charter Township, Monroe County, Michigan was successful in obtaining a Storm Water, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environmental Quality (MDEQ) in the amount of \$337,431.00 to continue a thorough, detailed, conditional analysis of the existing sanitary sewer system throughout Berlin Charter Township, develop capital improvement planning for the next 20 years and to develop a comprehensive asset management plan. In 2012, Berlin Charter Township began analyzing the sanitary sewer system through the S2 grant program in which the Township received \$752,836.00 in financial assistance. Both studies were managed by the Township's engineering consultant, Hennessey Engineers, Inc. (HEI) of Southgate, Michigan with assistance from Fleis and Vandenbrink (FV) of Grand Rapids, Michigan. The following items of work were completed as a part of the S2 and SAW grant studies:

- Cleaning and televising of all sanitary sewers that were not rehabilitated in the early 2000's and built prior to 1994 to identify any structural defects within the sewer system and identify locations of infiltration through pipe joints or structural defects.
- Inspection of all manholes within the system installed prior to 1994 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.
- A smoke testing program to identify illicit connections to the sanitary sewer system or locations of broken sanitary sewers or service leads. Illicit connections included catch basins tied into the sanitary sewer system in addition to roof conductors and sump pumps tied into the sanitary sewer system.
- Develop a Geographic Information System (GIS) database of the sanitary sewer system.
- As part of the S2 grant study, conduct flow monitoring of the entire sanitary sewer system to identify districts of the Township experiencing higher amounts of flow during wet weather

events and to identify areas of the system that may be exceeding capacity. As part of the SAW grant study, verify the reduction in flows from rehabilitation of the system in 2013-2014 to identify the amount of infiltration and inflow eliminated from the system.
- Evaluate all pump stations and document the condition of each asset within each pump station and provide recommendations for future improvements or replacement.
- Evaluate all assets of the wastewater treatment plant and document the condition of each asset and provide recommendations for future improvements or replacement.

Results of the S2 and SAW grant programs were as follows:

- During the cleaning and television investigation that took place in 2012, several pipe segments were identified with longitudinal, circumferential and/or multiple cracking, offset joints, holes within the pipe, deformed pipe or broken pipe. This resulted in a Township wide sewer rehabilitation program to address these issues utilizing Clean Water State Revolving Fund (SRF) loan in 2013-2014.
- Several locations during the cleaning and television investigation that took place in 2012 were identified as having moderate to heavy infiltration through pipe joints including excess inflow from sanitary service leads. This resulted in a Township wide sewer rehabilitation program to address these issues including the rehabilitation of sanitary service leads from the main line sewer to the right-of-way line with excessive inflow utilizing Clean Water State Revolving Fund (SRF) loan in 2013-2014.
- Manholes were identified as being in overall good to fair condition with minor infiltration entering the sanitary sewer system. Manholes identified with defects were rehabilitated through a Township wide program utilizing Clean Water State Revolving Fund (SRF) loan in 2013-2014.
- Flow monitoring of the system during the S2 grant program confirmed that the excessive infiltration and inflow exists in certain regions of the sewer system and that a significant increase in flows takes place during wet weather events resulting in capacity concerns at the wastewater treatment plant. Following the Township wide sanitary sewer rehabilitation program and improvements at the wastewater treatment plant, the MDEQ required the Township to reduce sanitary flows by 35 percent. Based upon post construction flow monitoring of the system as part of the SAW grant program, the Township reduced flows by nearly 50 percent.
- Based upon the results of the smoke testing program, several cleanout caps were identified as being broken or missing allowing inflow into the sanitary sewer system, in addition to low areas where manholes existed allowing significant inflow into the system.
- The pump station evaluations have allowed the Township to identify the current condition and operation of each station and prioritize future improvements.
- The evaluation of the wastewater treatment plant allowed the Township to identify the current condition and operation of each station and prioritize future improvements

This report provides a summary of the Asset Management Plan (AMP) for the Township's sanitary collection system, wastewater treatment plan and lift stations. HEI with assistance from Township staff prepared the asset management plan for the sanitary sewer collection system and FV with assistance from Township staff prepared the asset management plan for the wastewater treatment plant and lift stations and have been prepared as two (2) separate documents for the Township's reference. 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

The wastewater collection system was originally established in the early 1970's and has been expended since that time as new developments are established in the Township. The system has the capacity for additional expansion in the future. The collection system is primarily located along the southern boundary of the Township where residential developments have occurred and also serves the adjacent Village of Estral Beach. The wastewater collection system assets consist of 129,463.9 lineal feet (24.52 miles) of gravity sewers ranging in size from eight (8) inches to forty-eight (48) inches in diameter and 652 sanitary manholes. These assets are located in existing road right-of-ways owned and maintained by the Monroe County Road Commission 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	Truss	PVC	Total
8	2168.9	9271	13537	24976.9
10	16477.2	1608	2408	20493.2
12	22312.64	3089	4074	29475.64
15	12346.57	0	0	12346.57
18	13277.81	0	0	13277.81
21	2036.43	0	0	2036.43
24	1535.6	3171.2	0	4706.8
27	3275.92	0	0	3275.92
30	813.18	0	0	813.18
36	7355.71	0	0	7355.71
48	10705.74	0	0	10705.74
Total	92305.7	17139.2	20019	
			Total Pipe Length	***129463.9***

The wastewater treatment plant (WWTP) inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes over 180 assets. The Berlin Charter Township WWTP currently includes the following treatment processes: grit removal and screening, aeration, clarification, and disinfection. Treated effluent is discharged to the Swan Creek upstream of Lake Erie in accordance with the NPDES permit. The WWTP is designed to treat an average daily flow of 0.55 million gallons per day (mgd). The current average daily flow received by the plant is approximately 0.39 mgd.

The WWTP was originally constructed in the early 1970's, and placed into service in 1972 consisting of influent pumping, screening, grit removal, aeration, secondary clarification, disinfection, effluent pumping, aerobic digestion of solids followed by sludge drying beds. In 2001, the plant was upgraded with a mechanically-cleaned screen, vortex grit removal, and an additional secondary clarifier. Solids processing upgrades included a sludge storage tank and a belt filter press. A major rehabilitation project entitled "2012 Wastewater System Improvements" was completed utilizing State Revolving Fund (SRF) loan funds and included major upgrades to the WWTP. In general, the project improved and upgraded existing WWTP equipment. Specific improvements to the WWTP included:

- Replacement of influent pumps
- Rehabilitation of existing aeration tanks
- Construction of a flow splitting box, allowing all three clarifiers to be used simultaneously
- Replacement of two of the RAS pumps
- Addition of an aeration system to one of the sludge storage chambers
- SCADA system upgrade

The lift stations inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes over 200 assets. Berlin Charter Township operates and maintains 13 sanitary sewer lift stations located throughout the wastewater collection system. Nine (9) of the stations were installed as part of the original installation of the system in the early 1970's. One (1) station was installed I the 1990's and three (3) stations were installed in the 2000's. The stations are either wet well/dry well style or submersible style stations.

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 smoke testing and flow monitoring. Information such as age, size and material were identified as best as possible from 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 nearly 1,700 total assets.

Condition Assessment

As part of the S2 and SAW grant studies, a comprehensive, detailed evaluation of the sanitary collection system was completed consisting of cleaning and televising of sewers installed prior to 1994 and had not been rehabilitated in the past, inspections of manholes installed prior to 1994, and conducting a smoke testing investigation. 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 53,855.6 lineal feet of sewer (41.6% of overall system) and 314 manholes (48.5% of all manholes). The results of the smoke testing program performed was modeled for average day and peak hour conditions to identify any potential capacity concerns due to excessive infiltration and inflow into the system. Overall, the structural condition of the collection system was found to be in good to fair condition; however, there were several locations where infiltration and inflow was entering the system through pipe joints, manholes and service leads. Based upon the results of these studies, Berlin Charter Township has since completed a Township wide sanitary sewer rehabilitation program. This program consisted of the following:

- Full length and sectional length cured-in-place liner installations throughout the pipe network addressing all structural defects and locations of infiltration through pipe joints
- Installation of cured-in-place liners in service leads identified as having a significant amount of groundwater inflow from the main line sewer to the road right-of-way line.
- Rehabilitation of manholes including work such as reconstruction of chimneys, replacement of broken or incorrect frames and covers, grouting of joints and installation of internal and external seals around frames and covers

All structural defects and locations of infiltration and inflow were addressed as a part of the SRF rehabilitation program. Therefore, there is currently no plan to complete any further rehabilitation of the collection system at this time. However, it is recommended that the Township complete a sanitary sewer cleaning and television investigation on a five (5) year cycle to provide for reliable operation and maintenance of the system and identify structural defects to be immediately addressed before they become severe defects potentially risking broken or collapsed sewer. The Township should plan for additional rehabilitation in the future based upon future investigation of the system.

The WWTP inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes over 180 assets. Overall, the condition of the assets at the WWTP is good to fair. The recent renovation project utilizing SRF funding improved the condition of many assets. Some assets which were not included in the SRF project are now near the end of their useful life due to age or deterioration caused by harsh conditions associated with wastewater treatment. Immediate concerns include damage to the mixers and a knife gate valve in aeration tank number 1, deteriorating valves in the east sludge tank and an issue with the upstream water surface overtopping the screen basket due to lower influent flow rates. The recommendations for short and long term improvements are relatively extensive.

The lift station inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes over 200 assets. Overall, the condition of the assets at the lift stations are good to fair, and they appear to be well maintained. Six of the lift stations have 45-46 year old pumps. The pumps have been replaced in three of the stations, and one of the original can stations has been reconfigured to a submersible style station. Immediate concerns to be addressed include two (2) stations having elevated walkways around the dry well that are failing and pose a potential safety hazard, five (5) of the station have original pumps installed in the 1970's, eight (8) of the stations have original valves that were installed in the 1970's and five (5) of the stations have power and control panels located in the dry well that have corroded are in poor condition. The recommendations for short and long term improvements are relatively extensive.

3. Level of Service

Berlin Charter 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 and treatment 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 in the collection system and WWTP
- Provide continued maintenance of the collection system and WWTP 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 or overflows at the WWTP
- 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 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

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.

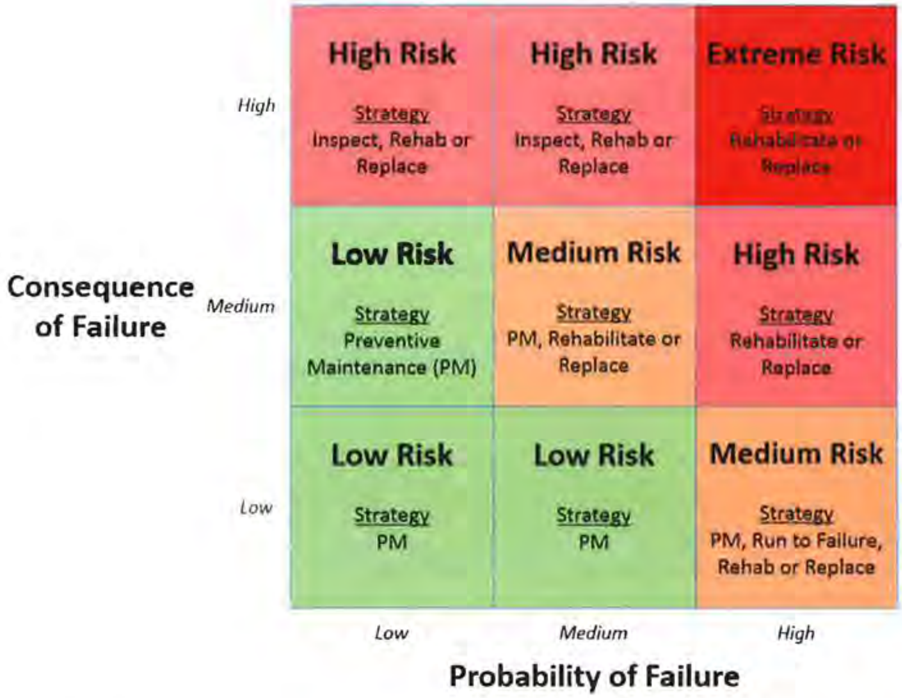
The Consequence of Failure is a measure of the impact of failure for an asset on the sanitary system's ability to convey and treat wastewater. Consequence of Failure is based on weighted factors such as location of asset, facilities or population served by the asset, size of the asset and ability to respond to emergencies for the collection system. Weighted factors such as process, financial impact, safety, environmental impact, disruption to the community and ability to respond are considered for the WWTP and lift stations.

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 using Innovyze-Infomaster Software, an Arc-GIS based sewer asset management and capital planning software that compiles, analyzes and assesses business risk for each asset and assists with developing a capital improvement plan.



For the collection system, the pipe network and manholes currently have a low risk as the entire system was recently installed or recently rehabilitated. However, business risks range from low risk to high risk with the WWTP and lift stations. The risk rating of an asset can be used to develop a risk-based strategy for asset rehabilitation or replacement.

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 prioritize all future capital improvement projects and develop a rate structure to fund these projects.

For the collection system, there are no immediate needs recommended at this time as the system was recently rehabilitated. However, it is recommended to inspect the collection system; both sewers and manholes, on a five (5) year cycle to identify any potential problems and identify ways to address these problems. Therefore, every five (5) years the maintenance and capital costs are estimated to be as follows:

• Sewer Cleaning and Televising Investigation Program		$450,000
• Manhole Investigation Program		$ 30,000
	TOTAL	$480,000

For the WWTP and lift stations, capital improvement projects were developed through two (2) approaches. The first approach developed a list of assets requiring replacement in the next 20 years based on the expected useful life of assets included in the asset inventory. These capital improvement costs are bare equipment costs, inflated to the proposed year of replacement. It should be noted that the Township may be able to repair or rehabilitate various pieces of equipment, as opposed to replacing them to save money. The decision to repair or replace will depend on the condition of the equipment and cannot be accurately determined at this time. The replacement option is the most conservative approach.

The below tables provide a summary of the capital improvement programs developed for the WWTP and the lift stations. Projects are separated by those to be completed within the first five years after asset management plan implementation and those beyond the five year period.

Recommended WWTP Capital Improvements for 5-Year and 20-Year Horizon

Project No.	Project Description	Replacement Fiscal Year	Project Cost (in 2016 Dollars)	Project Cost (Inflated 3%/yr)
1	Control Building Renovation and Misc. Rehabilitation	2018	$367,000	$401,000
2	Chemical Systems Rehabilitation	2020	$338,000	$392,000
3	Mechanical & SCADA Replacement	2020	$1,140,000	$1,322,000
4	Mechanical Rehabilitation-1	2025	$3,116,000	$4,188,000
5	Mechanical Rehabilitation-2	2035	$168,000	$303,000

Recommended Lift Station Capital Improvements for 5-Year and 20-Year Horizon

Project No.	Project Description	Replacement Fiscal Year	Project Cost (in 2016 Dollars)	Project Cost (Inflated 3%/yr)
1	Lift Station Rehabilitation – Misc.	2017	$1,913,000	$2,030,000
2	Lift Station #7 Rehabilitation	2022	$82,000	$101,000
3	Lift Station Rehabilitation – Select Stations	2028	$396,000	$582,000

6. Revenue Structure

A rate methodology report was submitted to the MDEQ on May 31, 2017 and approved by MDEQ staff on July 20, 2017. Costs for future construction projects; in addition to future investigative work and frequency such as cleaning and television investigation, manhole inspections, evaluations of lift stations and evaluations of the WWTP are figured into future rate adjustments. Township staff; along with the Engineering consultants, 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 S2 and SAW grant studies, there are no immediate needs for any repairs or rehabilitation to the collection system. For the WWTP and lift stations, there are immediate needs for repair and replacement of certain assets and there is a need for repair and replacement of assets over the course of the 20 year capital improvement plan. These costs can be spread out over multiple years to help reduce the financial impact on customers as shown on the tables in the previous section.

The current rate structure is sufficient to sustain the system in its current state and ensure the desired level of service; however, changes will need to be made in the near future for planned capital improvement projects. The costs for proposed projects were estimated based upon similar projects recently completed for other communities and used to determine the required funds needed for future projects. These projects would be funded through future rate increases. Therefore, the total increase in rates to support the asset management plan and 20 year capital improvement plan for the collection system would be $8.70 per REU per month. The total increase in rates to support the asset management plan and 20 year capital improvement plan for the WWTP and lift stations would be $33.60 per REU per month.

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

Completion Date **October 19, 2017**
(no later than 3 years from executed grant date)

Berlin Charter Township certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1582-01** 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: **July 20, 2017**

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:

R. Ryan Kern, P.E.	at **734-759-1600**	**rrkern@hengineers.com**
Name	Phone Number	Email

10-26-2017

Signature of Authorized Representative (Original Signature Required) — Date

Denise Sovey-Meyer, Clerk
Print Name and Title of Authorized Representative

HRC 100 YEARS
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section, Attn: Karen Nickols

From: Sally Duffy, PE
Hubbell, Roth & Clark, Inc.

CC: Mr. Gary Nigro, PE
Oakland County Water Resources Commissioner

Date: October 31, 2017

Re: Birmingham CSO Drainage District
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1218-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the Oakland County Water Resources Commissioner's office on behalf of the Birmingham 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 MDEQ guidance.

GRANTEE INFORMATION

Birmingham CSO Drainage District, SAW Grant Project #1218-01

Project Grant Amount: $648,000

Applicant Match Amount $64,800

Authorized Representative
Jim Nash, Birmingham 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. Proj. Engineer
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
(248) 858-5243
nigrog@oakgov.com

EXECUTIVE SUMMARY

The Birmingham CSO Drainage District applied for and received a grant to further develop an Asset Management Plan (AMP) for its combined sewerage collection and treatment 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 Birmingham 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 Birmingham CSO Drainage District and the is operated and maintained by the Oakland County Water Resources Commissioner (WRC) in accordance with applicable provisions of 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 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 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 Birmingham CSO Drainage District, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 22,187 lineal feet of combined sewer underwent condition assessment via cleaning and televising. Approximately 83 manhole and other related structures were evaluated using the CAMS inspection work orders. Vertical assets, including pump stations and storage and treatment facilities, 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, 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 (storm, combined and sanitary sewers, force mains, siphons 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.

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 a lower probability of failure based on their current condition, so 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.
- 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, 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 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:

- $200,000 for collection system spot repairs in pipe and manholes in system. To be performed from budgeted funds over 5-year period.
- $30,000 for relining of sodium hypochlorite tanks. To be performed from budgeted funds over 5-year period.
- $1,000,000 for replacement and rehabilitation of mechanical (pumps, valves, H&V systems, etc.), electrical and instrumentation equipment at the RTB facility. To be performed from budgeted funds over 5-year period.
- $200,000 structural repairs in basin. Hypo room beam (immediate), fix groundwater relief valves in basin, control joints, roof tiles, etc. To be performed from budgeted funds over 5-year period.

Total Cost for 5-year CIP: Approximately $1,500,000.

Birmingham 6 to 20 year:

- $15,000 for work spot repairs in pipe and manholes in system over 20 years.
- $6,500,000 for continued replacement and rehabilitation of mechanical, electrical and instrumentation equipment at the RTB facility over 20 years.
- Estimate of approximately $500,000 structural repairs in basin over 20 years

Total Cost for 6 to 20-year CIP: Approximately $7,000,000.

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 preventive 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 Birmingham CSO Drainage District's major assets include:

- Approximately 22,187 lineal feet of combined sewer, ranging in size from 18" to 132" diameter
- Approximately 83 combined sewer manholes, inlets and access structures
- One 5.5 Million Gallon Retention Treatment Basin with dry weather pumping station. This facility includes approximately 101 major assets.

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

Completion Date: October 31, 2017
(no later than 3 years from executed grant date)

The **Birmingham CSO Drain Drainage District** (legal name of grantee) certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1218-01** 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 $\boxed{\text{No}}$

   If No - Date of the rate methodology approval letter: **May 18, 2017**

2) Significant Progress Made: Yes or No, $\boxed{\text{N/A}}$

   (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: $\boxed{\text{N/A}}$

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on $\boxed{\text{N/A}}$.

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
Jim Nash	at **248-858-0958**	**wrc@oakgov.com**

Jim Nash — 11/2/17

Signature of Authorized Representative (Original Signature Required) — Date

Jim Nash, Chairman of the Drainage Board and Oakland County Water Resource Commissioner
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Executive Summary

Prepared for:

Village of Breedsville

SAW Project No. 1638-01

FINAL
September 2017

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 2014, The Village of Breedsville 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 Village's stormwater collection system. 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 Breedsville AMP is:

Dave Sumner, Village Drain Commissioner
82 East Main Street
PO Box 152
Breedsville, MI 49027
269.427.9029
dsumner.breedsville@gmail.com

Asset Inventory and Condition Assessment

The stormwater collection system assets consist of approximately 4,985 feet (0.94 miles) of storm sewers and 20 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 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 CAD drawing for archiving, mapping and further evaluation purposes.

Condition Assessment and Expected Useful Life

For the Village of Breedsville, an evaluation of the collection system was performed. NASSCO-MACP structure field based assessments were conducted on 19 structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 67% of the gravity pipe. Based on discussions with the stormwater system operations staff, there have not been any known capacity issues with the stormwater system. Any flooding or drainage problems occur when there is a blockage in the pipe, removing the blockage relieves the problem. For this reason, a capacity analysis was not completed. The Capital Improvement Plan identifies these short-term (1-5 years) and long-term (6-20 year) recommendations are needed. One manhole that was paved over (3% of system) is called to be inspected. Rehabilitation, such as point repairs and lining, accounted for 64% of the system. Replacement accounted for 22% of the system identifying assets in very poor condition. The remaining assets (11% of system) were placed in the beyond 20 year planning category.

Level of Service

Defining the Expected Level of Service (LOS)

To determine the Village's Level of Service statement the Village's drain commissioner collaborated with F&V on the expectations of the stormwater collection system. After a draft LOS statement was created it went before the Village Board and through an iterative process. The LOS for the Village's 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 Village of Breedsville:*
>
> - *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 maintenance emergency response services to residents.*
> - *Hire properly trained maintenance and operation contractors.*

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 stormwater system. Criticality is based on two factors: 1) Likelihood 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 Village of Breedsville.

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. 4 pipe segments in the stormwater collection system have an extreme risk rating and are recommended for near-term rehabilitation or replacement.

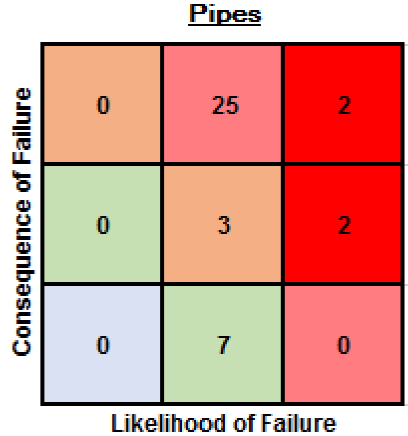


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. 15 structures are identified as extreme risk, and are recommended for replacement or rehabilitation.

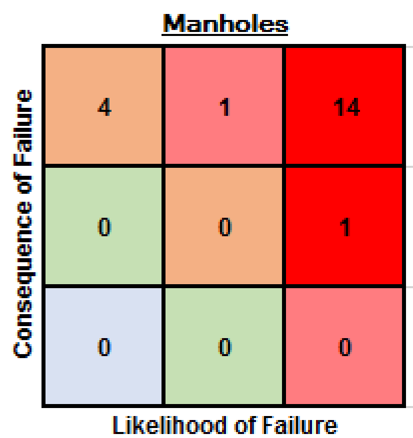


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

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 with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. Short-Term 1-5 year and Long-Term 6-20 year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system. The 5-year CIP rehabilitation total is $965,215.

CIP Development

Stormwater collection system assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent

projects in Michigan and includes engineering and administrative rates where applicable. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.
The recommended 5-Year Capital Improvement Plan for the Village's stormwater collection system is included in Table 1 below.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation	
Rehab Action	**Total Cost (2017 Dollars)**
Point Repair	$7,500
Replacement	$468,475
Full Lining	$19,910
80/20 Lining + Replacement	$442,509
MH Replace	$7,210
MH Repair + Line	$10,341
MH Repair	$9,270
Total	**$965,215**

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound stormwater system. The process of cleaning and CCTV inspection of pipelines either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every five years, or that 20% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects. The 5-year CIP maintenance total is $515 to inspect a manhole that was paved over. Anything that was not televised as a part of the project was in too poor of condition. These pipes are being recommended for replacement.

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

Completion Due Date 9-12-17
(no later than 3 years from executed grant date)

The Village of Breedsville *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1638-01 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:

DAVID SUMNER at 269-427-9029 dsumner.breedsville@gmail.com
Name Phone Number Email

[signature] 09/12/17
Signature of Authorized Representative (Original Signature Required) Date

DAVID SUMNER - VILLAGE OF BREEDSVILLE TRUSTEE
Print Name and Title of Authorized Representative

Memo

To:	Mr. Jonathan Berman Michigan Department of Environmental Quality	From:	Spencer Cain, PE Dima El-Gamal, Ph.D., PE, LEED® AP Stantec Ann Arbor, Michigan Office
File:	2075127901	Date:	October 26, 2017

Reference: City of Burton SAW – Executive Summary

This document is intended to provide an executive summary of the Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan (AMP) that was completed for the City of Burton (City).

Grant Recipient
SAW Grant Project# - 1420-01

City of Burton
4093 Manor Drive
Burton, Michigan 48519
http://www.burtonmi.gov/

Contact Person
Robert Slattery – Department of Public Works Director
(810) 742-9230
r.slattery@burtonmi.gov

EXECUTIVE SUMMARY

The City was a second round SAW Grant recipient of $2,332,818, including a local match of $ 416,538. The overall scope of work for this Grant was to: improve upon the baseline inventory, conduct condition assessments of the pump station facilities and eligible components of the gravity sewer system, develop a capital improvement plan, and coordinate the information collected with the City's asset/work order management software. The City's AMP addresses (will address) five core components:

1. Asset Inventory
2. Criticality/Risk Assessment
3. Level of Service (LOS)
4. Capital Improvement Plan (CIP)
5. Revenue Structure (will be completed in the future)

CITY ASSET MANAGEMNT TEAM (AMT)

This plan was developed in cooperation with the City's Asset Management Team (AMT), which included:

- Robert Slattery; Department of Public Works Director
- Dave Marshke; Utilities Superintendent
- Bryant Lawrence (preceded by Terry Gabriel) – Utilities Foreman

- Julie Griffith – Utilities Coordinator
- Steve Philips, IT Director
- Ginger Burke-Miller, City Controller
- Karen Moffitt, Deputy Controller
- Stantec; Asset Management Consultant

ASSET INVENTORY

The City, as part of the SAW grant, started utilizing the Cartegraph software for their work order management. The Cartegraph database was populated using the City's existing sanitary sewer GIS data. The asset inventory is maintained simultaneously in Cartegraph and ESRI's ArcGIS software, and includes a record for 100% of the City-owned sewer lines, manholes, forcemains, and pump stations, as well as other appurtenances which are partially populated, such as laterals, fittings, etc. The pump stations inventory was developed further, including a vertical asset data structure for each pump station with several subsystems and components being related to each station.

A review and update of the inventory database was included in this AMP 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. location information, invert and rim elevations, installation date, slope, material, diameter, etc.), as well as updates to reflect the observed system configurations in the field.

LIST OF MAJOR ASSETS

- Approximately 230 miles of gravity sewer pipes from 6 to 27-inches in diameter;
- Approximately 3,365 manholes;
- Approximately 4,785 feet of force main pipes from 4 to 10-inches in diameter; and,
- Ten pump stations.

CRITICALITY/RISK ASSESSMENT

CONDITION ASSESSMENT

As part of the AMP development, a series of field visits were made by Stantec, with the accompaniment of City operations staff. The inspections of the ten (10) pump station facilities were conducted, between July and November 2016. 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.

The City utilized third-party contractors and certified City Staff to carry out the condition assessment of the gravity sewer system using Closed Circuit Television (CCTV) inspection. Inspections were completed for the approximately 70% of the collection system (over 600,000 linear feet of pipe and 2,275 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

Reference: City of Burton SAW – Executive Summary

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 City's system, and used it as the basis of the condition assessment for the collection system.

The assessment of force mains and air relief valve structures was limited to an age based desktop assessment.

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:

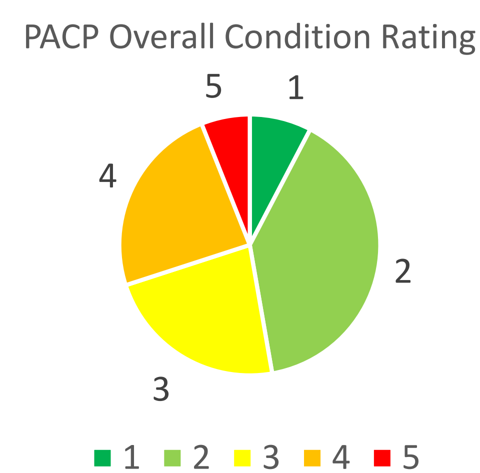
- 1 = Excellent: New or Excellent Condition- Only normal maintenance required;
- 2 = Good: Minor Deterioration- Minor maintenance required (5%);
- 3 = Average: Moderate Deterioration- Significant maintenance required (10-20%);
- 4 = Fair: Significant Deterioration- Significant renewal/upgrade required (20-40%);
- 5 = Poor: Asset Unserviceable- Replacement required OR asset poses safety risk (>50%).

Pump Stations

During the field investigations of the City's pump stations it was found that the facilities are generally well kept and most of the system components range in condition from average to excellent. Each pump station currently contains between 20-32 tracked components, and when considering each pump station as a whole, the average component condition rating ranged between 1.00 and 1.85.

Gravity Sewers

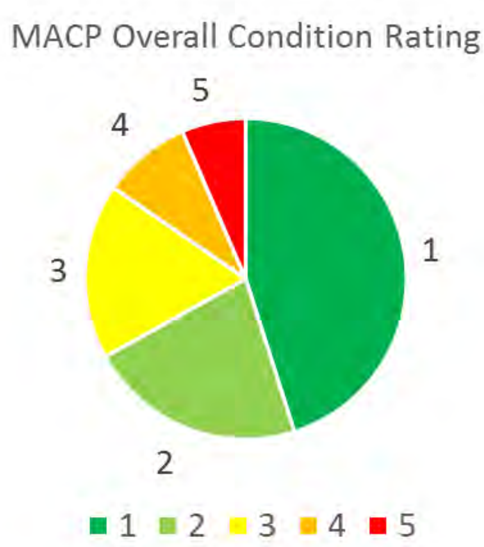
Based on the inspection data collected by the City staff and the CCTV contractors, the inspected sewers, were found to be generally in fair to good condition. Approximately 70% of the sewer pipes had an overall condition rating of less than 4 (PACP Structural and/or Operation and Maintenance categories). The chart below provides a depiction of the findings:



Reference: City of Burton SAW – Executive Summary

Manholes

Based on the inspection data collected by the CCTV contractors, the inspected manholes, were found to be generally in good condition. Approximately 85% of the manholes had an overall condition rating of less than 4 (MACP Structural and/or Operation and Maintenance categories). The chart below provides a depiction of the findings:



Infiltration and Inflow (I/I) Study

As a follow-up to a previous study (2013 S2 Grant Study), and as an additional method for condition assessment, an I/I study was performed within the City's system. The objective was to further evaluate the areas that were identified in the 2013 study as "inconclusive" with regard to I/I impacts. The study identified several moderate and high I/I responses in the previously inconclusive areas. It also indicated that there are widespread I/I impacts throughout the system, and that a system-wide approach to I/I reduction is necessary to help mitigate the risk of flooding and basement back-ups.

CRITICALITY ASSESSMENT

A criticality assessment 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 at three levels: overall pump station, pump station components, and gravity sewer components (pipes and manholes). Several key risk criteria were identified for each of the three levels such as (among others):

- Disruption to Customers;
- Risk to Public Health;
- Risk to the Environment;
- Major Traffic Disruption;
- Cost of Repair; and,
- Redundancy.

Reference: City of Burton SAW – Executive Summary

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 on a scale of 1-10 (10 being the most critical). For example, a large diameter interceptor pipe adjacent to a watercourse would be considered more critical than a small diameter collector pipe. The risk to the City 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.

LEVEL OF SERVICE (LOS)

To assist the City in developing a desired LOS, public engagement via an online survey was performed. A survey was posted on the City's website with a series of questions designed to assess the public's expectations with regard to wastewater system operations, maintenance, reliability, growth, and rates. After reviewing the survey responses, the City's AMT concluded that a Medium LOS should be the target. In other words, the City's goal is to maintain all critical assets as well as some less critical assets to provide enhanced reliability and meet the following goals identified through the survey:

- Strive to meet regulatory requirements set by the State;
- Attempt to reduce flooding and basement backups;
- Attempt to reduce service interruption durations and complaint response times;
- Maintain availability of wastewater system's capacity to accommodate future growth; and,
- Maintain modest rates.

CAPITAL IMPROVEMENT PLAN (CIP)

A CIP was developed as a result of the AMP analysis and divided into Short-term (0-5 year), Medium-term (5-10 year), and Long-term (10-20 year) initiatives. A summary is provided below with initial conceptual cost opinions:

Short Term CIP Summary (0-5 years)

- Sewer Rehabilitation - **$7.4 M**
  - Pipe and manhole replacement, lining, point repairs, etc.
- Pump Station Rehabilitation (for Lippincott, Dortch, Genesys, and Concordia) - **$0.7 M**
  - Process upgrades - pumps, motors, valves, piping
  - Controls upgrades – control panel, programmable logic controller, remote telemetry unit, level sensors
  - Electrical upgrades – motor starters, transfer switches, uninterruptible power supply
  - Structural rehabilitation as needed
  - Onsite backup generators
- Routine O&M - **$0.2 M annually**
  - Sewer and manhole inspections, cleaning, etc.

Medium Term CIP Summary (5-10 years)

- Sewer Rehabilitation - **$8.5 M**
  - Pipe and manhole replacement, lining, point repairs, etc.
- Pump Station Rehabilitation – **$0 M**
  - None projected at this time

Reference: City of Burton SAW – Executive Summary

- Routine O&M - **$2.85 M annually**
  - Sewer and manhole inspections, cleaning, right-of-way clearing, repairs, etc.

Long Term CIP Summary (10-20 years)

- Sewer Rehabilitation –
  - Long-term sewer rehabilitation cost estimates are wrapped into the routine O&M projection below
- Pump Station Rehabilitation - (for Casto, Rinn, Farner, Woodrow, Leith, and Cherylann Pump Stations): - **$0.55 M**
  - Process upgrades - Pumps, motors, motor starters, valves, piping
  - Controls upgrades – control panel, programmable logic controller, remote telemetry unit, level sensors
- Routine O&M - **$2.85 M annually**
  - Sewer and manhole inspections, cleaning, right-of-way clearing, repairs, etc.

REVENUE STRUCTURE

To satisfy the requirements of the SAW Grant, the City has completed and submitted a financial gap analysis. This gap analysis was accepted by the Michigan Department of Environmental Quality (MDEQ), and meets the standard set by the MDEQ, by showing that the City's revenue sources currently meet the required expenditures. Further analysis, to incorporate the CIP projections and ensure the sustainability of the AMP, will be completed outside the SAW Grant activities by a qualified rate consultant.

STANTEC CONSULTING MICHIGAN INC.

Spencer Cain, PE
Project Engineer
Phone: 734-214-1858
Cell: 734-546-6694
Spencer.cain@Stantec.com

Dima El-Gamal, Ph.D., PE, LEED ® AP
Senior Associate
Phone: 734-214-2516
Cell: 734-262-4857
Spencer.Cain@Stantec.com

c. Bob Slattery, City of Burton

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

Completion Date October 31, 1017
(no later than 3 years from executed grant date)

The City of Burton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. # 1420-01 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: June 17, 2017.

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. Robert Slattery	at 810-333-1893	r.slattery@burtonmi.gov
Name	Phone Number	Email

Robert Slattery Jr.   10-31-17

Signature of Authorized Representative (Original Signature Required)   Date

Mr. Robert Slattery, DPW Director

Print Name and Title of Authorized Representative

City of Cadillac
Waste Water Asset Management Plan Summary

City of Cadillac SAW Grant

200 North Lake Street, Cadillac, MI 49601

cadillac-mi.net

Contact Information for the grantee:

Ms. Carla Filkins

Address: 200 North Lake Street, Cadillac, MI 49601

Phone: 231-775-0181

SAW Grant Project Number: 1471-01

Executive Summary

The City of Cadillac received a SAW Grant in 2013 to prepare a Waste Water Asset Management Plan.

The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$1,367,126	$2,000,000	$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

City of Cadillac
Waste Water Asset Management Plan Summary

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 waste water system have been inventoried.

- Collection system manholes were located using survey quality GPS.
- Lift stations and buildings were located on maps.
- Fixed assets within the waste water 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 GIS. Data regarding 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 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.

City of Cadillac
Waste Water Asset Management Plan Summary

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 in-line closed circuit television (CCTV) from manhole to manhole. Pipes inspected with CCTV were rated using the PACP system (Pipeline Assessment Certification Program). 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
58%	6%	7%	8%	21%

Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, and structures.

Percentage of manholes within each rating category

1	2	3	4	5
26%	46%	17%	6%	<1%

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.

Percentage of lift station assets in each rating category

1	2	3	4	5
53%	25%	19%	4%	0%

City of Cadillac
Waste Water Asset Management Plan Summary

WWTP: Equipment within the WWTP were rated on a scale of 1-5 based on factors relating to physical condition and operating condition and major asset classes including structural, electrical, mechanical systems. A summary of the ratings for the treatment plant assets is as follows:

Percentage of WWTP assets in each rating category

1	2	3	4	5
30%	47%	19%	3%	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 acts as stewards of the system. We have held a series of meetings and workshops to present the results of our condition assessments, review the costs for meeting various Levels of Service, and reviewed 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. Maintain our in-house testing abilities
    c. Continue our Industrial Pretreatment Program
2. Minimize Service Interruptions
    a. Staff/equip crews sufficiently to perform specific routine maintenance items
    b. Repair/replace assets as required to limit emergency responses to 15 per year
3. Minimize Public Hazards
    a. Staff/equip emergency response services for 24 hour per day service and 90 minute response times

   b. Limit service interruptions to less than 6 hours

4. Manage Storm Water Inflow and Ground Water Infiltration
   a. Monitor I/I and implement CIP projects to meet MDEQ/EPA guidelines
5. Provide Capacity for Community Growth
6. Minimize Life Cycle Costs
7. Maintain Active Relationships with our Partner Communities

City of Cadillac
Waste Water Asset Management Plan Summary

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 the 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 versus actual pumping rates.

Assets were given a Consequence of Failure (CoF) 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 lakes, waterways or significant wetlands
- Impacted the major treatment processes and restricted the WWTP from meeting permit limits

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). We then ran a Jenks Optimization 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 was generated.

City of Cadillac
Waste Water Asset Management Plan Summary

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 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/or 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 lifecycle of all assets. The annual investment cost was evaluated and scenarios 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 increases were needed to fully implement the desired CIP. Meetings were held to convey the results of the asset evaluation (RoF and Criticality).

City of Cadillac

Waste Water Asset Management Plan Summary

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 asset RoF ratings were assigned and actions prioritized using the Criticality ratings, action timelines were predicted for maintenance/repair/replacement. Because the waste water 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 other asset systems were incorporated based on:

- Storm Water – based on Asset Management Plan work as part of SAW
- Roadway - based on roadway PASER (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 waste water 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 which will be available to the public once the final rate structure has been adopted.

City of Cadillac
Waste Water Asset Management Plan Summary

Major Identified Assets

List of the plan's major identified assets

- 3.2 MGD Average Daily Flow Waste Water Treatment Plant
- 11 lift stations
- 6.1 Miles (32,000 feet) of sanitary force main
- 60.3 Miles (318,600 feet) of gravity sanitary sewer
- 1,420 Manholes

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

Completion Date October 2017
(no later than 3 years from executed grant date)

The City of Cadillac *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1471-01 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 18, 2017.

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
Carla Filkins	at	231-775-0181	cfilkins@cadillac-mi.net

Carla J Filkins — 10/30/17

Signature of Authorized Representative (Original Signature Required) — Date

Carla Filkins, Mayor

Print Name and Title of Authorized Representative

City of Cadillac
Storm Water Asset Management Plan Summary

City of Cadillac SAW Grant

200 North Lake Street, Cadillac, MI 49601

cadillac-mi.net

Contact Information for the grantee:

Mayor Carla Filkins

Address: 200 North Lake Street, Cadillac, MI 49601

Phone: 231-775-0181

E-mail: cfilkins@cadillac-mi.net

SAW Grant Project Number: 1471-01

Executive Summary

The City of Cadillac received a SAW Grant in 2013 to prepare a Storm Water Asset Management Plan.

The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$632,874	$2,000,000	$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

City of Cadillac
Storm Water Asset Management Plan Summary

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, open drains, culverts, and buildings were located using hand held GPS equipment.
- Storm Water Lift Stations

Locations for all assets are recorded in GIS. Data regarding 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.

City of Cadillac
Storm Water Asset Management Plan Summary

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 a pole mounted zoom camera (looking down each pipe from the manholes). The zoom camera method provided a very economical condition assessment of the pipes.

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.

Percentage of mainline pipes within each rating category of the pipes rated

1	2	3	4	5
39%	49%	7%	3%	2%

Manholes, catch basins, outlets, culverts, and detention basins were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, and structures.

Percentage of manholes within each rating category of the manholes rated

1	2	3	4	5
25%	55%	14%	6%	<1%

Percentage of catch basins within each rating category of the catch basins rated

1	2	3	4	5
9%	73%	12%	6%	<1%

City of Cadillac
Storm Water Asset Management Plan Summary

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 acts as stewards of the system. We have held a series of meetings and workshops to present the results of our condition assessments, review the costs for meeting various Levels of Service, and reviewed 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 to seek out Illicit Discharges and eliminate them whenever possible
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 I/I and implement CIP projects to meet MDEQ/EPA guidelines
4. Provide Capacity for Community Growth
    a. Perform Site Plan Reviews
5. Minimize Life Cycle Costs
6. Maintain Active Water Quality
    a. Continue our street sweeping and catch basin cleaning program
    b. Continue fall leaf pick up program

c. Maintain our Illicit Discharge Program
d. Perform regular maintenance on open drains and outlets to ensure proper function
e. Maintain Active Relationships with our Partner Communities

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 the 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, 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/industrial park/major industry
- Are under major roads
- Are adjacent to waterways (Lake Cadillac, Lake Mitchell, and the Clam River) 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). We then ran a Jenks Optimization 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 was generated.

City of Cadillac
Storm Water Asset Management Plan Summary

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 Streets Fund were reviewed.

Based on that analysis, the CIP was adjusted and funding allocations in the Streets Fund were adjusted so that both O&M activities and CIP actions could be funded. Meetings were held to convey the results of the asset evaluation (RoF and Criticality) along with the financial evaluation. We are moving forward with the budget adjustments required to provide our desired Level of Service.

City of Cadillac
Storm Water Asset Management Plan Summary

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 asset RoF ratings were assigned and actions prioritized using the Criticality ratings, action timelines were predicted for maintenance/repair/replacement. Because the storm water collection system assets share physical space with other asset systems such as waste 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 other asset systems were incorporated based on:

- Waste Water – based on Asset Management Plan work as part of SAW
- Roadway - based on roadway PASER (Pavement Surface Evaluation and Rating) evaluations
- Drinking Water – based on the Water Reliability Study and on-going Water Asset Management Plan (WAMP)

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, waste water 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 which will be available to the public.

City of Cadillac
Storm Water Asset Management Plan Summary

Major Identified Assets

List of the plan's major identified assets

- 173,740 feet of gravity storm sewer, including catch basin leads
- 740 manholes
- 1,255 catch basins
- 8 detention basins
- Open Drains - Clam River

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

Completion Due Date October 2017
(no later than 3 years from executed grant date)

The City of Cadillac *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1471-01 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:

Carla Filkins at 231-775-0181 cfilkins@cadillac-mi.net

Name | Phone Number | Email

Carla J Filkins 10/30/17

Signature of Authorized Representative (Original Signature Required) | Date

Carla Filkins, Mayor

Print Name and Title of Authorized Representative

Memorandum

Date:	October 31, 2017
To:	Mr. David Worthington
Company:	Michigan Department of Environmental Quality
From:	Prein&Newhof
Project #:	2130371
Re:	Cannon Township SAW Grant Summary of Wastewater Asset Management Plan

Mr. Worthington:

This memorandum provides the summary of Cannon Township's SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

SAW Grant Project Number: 1483-01

Grantee:

Cannon Township

6878 Belding Road

Rockford, MI 49341

http://www.cannontwp.org/

Contact: Mr. Steve Grimm, Supervisor

Phone: 616-874-6966

Executive Summary

Cannon Township received a SAW Grant in 2014 to prepare a Waste Water Asset Management Plan. The Grant agreement indicated the following amounts:

Project Cost	Grant Amount	Local Match
$529,990	$476,991	$52,999

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 adjusted with Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, 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.

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 closed circuit television (CCTV) cameras. For sewers with prior CCTV inspections (on file from historical operations records), file videos were reviewed and conditions were logged by PACP certified inspectors. New CCTV inspections were made for eligible sewers. Pipes were rated using the 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
63%	27%	5%	4%	1%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. Cannon's force main data was compared with that of several other municipalities to establish a comparative reference.

Percentage of force main pipes in each rating category

1	2	3	4	5
74%	16%	10%	0%	0%

Manholes: Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, structures, and infiltration.

Percentage of manholes in each rating category

1	2	3	4	5
40%	54%	5%	<1%	<1%

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
3	3	4	2	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."

Cannon Township recognizes that the people served by the system are more than customers, they are the system owners. Township staff and system operators act as stewards of the system. The Township has held many public meetings with the Sewer Committee, which is made up of Township Board members, appointed community representatives, and staff. Sewer Committee meetings are open to the public and regularly attended by Township employees, consultants and NKSA representatives. At these meetings, the results of the condition assessments were discussed, the costs for various OM&R strategies affecting the levels of service were reviewed along with potential rate impacts. Based on the input received during those 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

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 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 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 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 Bostwick Lake Lift Station, Wildermere No. 1 Lift Station, Pinehurst Lift Station, Kitson No. 2 Lift Station, Davies Lift Station, Ramsdell Lift Station, and Belding Road sewers and force mains as shown in the Waste Water System Evaluation Report.

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 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 to 15 years. The annual investment cost was evaluated and scenarios developed for cash funding and debt financing. Based on that analysis, the Township affirmed its intention to continue with 3% annual rate increases for the next several years, recognizing that capital improvements in the 10 to 15 year horizon may require additional rate increases in the future.

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 10 to 15 year planning period. The projects identified in the CIP are:

- Grass Lake Lift Station Improvements
- Miscellaneous Pipe Repairs
- Lake Bella Vista Sewer Crossing Rehabilitation
- Davies Lift Station Improvements
- Pinehurst Lift Station Improvements
- Sunfish Lake Lift Station Improvements
- Bostwick Lake Force Main Replacement
- Silver Lake Southeast Sewer Reconstruction
- Belding Road Sewer Reconstruction
- Grass Lake Force Main Replacement

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Cannon Township's major assets include:

- 12 lift stations
- 155,900 feet of 8" to 15" diameter gravity sewer
- 22,200 feet of 2" to 12" diameter force main
- 701 manholes

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

Completion Date 10/31/2017
(no later than 3 years from executed grant date)

The Cannon Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1483-01 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: 5/18/2017.
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:

Steve Grimm at 616 874 6966 Sgrimm@cannontwp.org
Name / Phone Number / Email

[signature] 10/20/17
Signature of Authorized Representative (Original Signature Required) / Date

Stephen L. Grimm Supervisor Cannon Twp
Print Name and Title of Authorized Representative

WASTEWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

CARROLLTON TOWNSHIP

SAGINAW COUNTY, MICHIGAN

OCTOBER 2017

BASED ON:

ASSET MANAGEMENT GUIDANCE FOR WASTEWATER

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, JULY 2013

STORMWATER, ASSET MANAGEMENT, AND WASTEWATER (SAW) GRANT

PROJECT NUMBER: 1119-01

PREPARED BY:

230 S. Washington Avenue
Saginaw, MI 48607

PROJECT ID NUMBER: **121861SG2014**

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
230 S. Washington Avenue
Saginaw, MI 48607

Owner: **CARROLLTON TOWNSHIP**
645 Mapleridge Rd,
Saginaw, MI 48604
Craig Oatten, Township Director

On October 29th, 2014, the Township of Carrollton 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 Township received the following grants:

Wastewater Asset Management Plan (WWAMP) – 90% Grant	$572,801
LESS Local Match	($63,645)
Total Grant Amount	$636,446

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; October 2017.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Critical Assets (Risk)
- Level of Service Determination
- Revenue Structure
- Capital Improvement Plan

Wastewater Asset Inventory and Condition Assessment

The Township's wastewater system consists of two main components: The collection system (pipes and manholes), and pump stations.

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 a new Toughbook Tablets 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 currently has 130,912 feet of sanitary sewer pipes in the entire sanitary sewer collection system ranging in size from 8"-18", 435 sanitary sewer manholes and 6 pumping stations. City Sewer Cleaners, from Saginaw 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 other main components of the Township's wastewater system are the six pumping stations located on Carrollton Road, Stoker Drive, Tulane Street, Michigan Avenue, Hanchett Street and Sherman Road. Once past the Sherman Road pump station, all waste is carried through a series of force main to be discharged into the Saginaw Wastewater Treatment Plant. Carrollton Township owns and maintains only the Hanchett Street and Stoker Drive Pump stations. The remaining four pump stations are owned by Carrollton but maintained by the Northwest Utility Authority, which Carrollton Township is a member of. Spicer Group Inc. completed an inspection and condition assessment of each station, and provided recommendations for future improvements. It was recommended that the Township start budgeting for these future upgrades.

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

Carrollton Township's collection system has 50 pipe segments that received an LoF score of 5 or above and has 136 pipe segments that received an LoF score between 4 and 5. The collection system also has 17 manholes that received an LoF score of 5 or above as well as 17 manholes that received an LoF score between 4 and 5. Carrollton Township's collection system has 2 pipes with Consequence of Failure score of 4.0 or above and 51 pipe segments with a Consequence of Failure score between 3 and 4. The Township also has 15 manholes with a score between 3 and 4. Many of these assets are located along Carrollton Road, where the pipe diameters are larger, 15 to 18 inches, and the pipes and manholes are very deep. The highest risk score generated in Carrollton Townships collection system is Pipe Segment 417-413 with a risk score of 18.87. Of all 435 Manholes that were accounted for, there were zero that fell into the 'High Risk' range with manhole 311 being the highest with a score of 14.3. 12 manholes fell into the 'Medium Risk' range, 132 into the 'Low Risk' range, and the remaining 291 manholes fell into the 'Minimal to No Risk' range.

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 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

The Township of Carrollton 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.

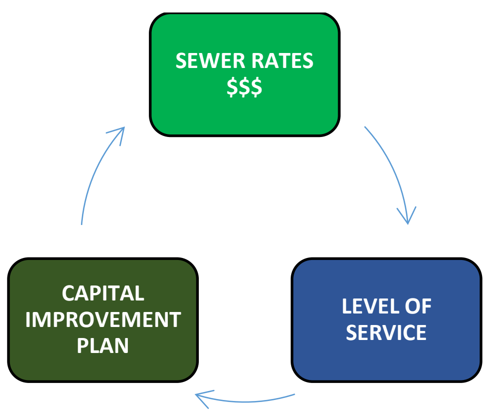
One of the basic goals is to review the capital improvement projects to determine the best value options for the Townships' customers based on life cycle costs and overall benefits to the community:

- "**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 Townships goals, addressed the improvements that need to be made, and is a sustainable rate structure for the Townships customers.

The Township chose to adopt a minimum Level of Service.

Revenue Structure

Spicer Group teamed with Burton & Associates/MWH-Hawksley Consulting/Stantec (Burton) for the revenue structure analysis for the AMP. Wastewater account balances, expenditures, revenues, etc. were reviewed and inputted into Burton's financial software to perform a gap analysis to determine if there were any deficiencies in the rates. The Townships 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 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 Townships Level of Service goals, completed the CIP projects that are needed, and had sustainable rates for the Townships customers. The result was a recommendation for an annual increase of about 8% for the next 5 years to match inflation to the Townships sanitary sewer rates. This should be reviewed annually as a part of the Townships normal budgeting process. Exact amounts of annual rate increase by year can be seen in the table below.

Recommended Annual Rate Increases	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Readiness To Serve Charges	0.00%	0.00%	0.00%	0.00%	0.00%
Usage Charges	10.00%	10.00%	10.00%	10.00%	10.00%
Combined Rate Charges	8.05%	8.16%	8.27%	8.39%	8.49%

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.

Carrollton Township Sanitary Sewer Capital Improvement Plan					
Project Number	**LOS**	**Project Location**	**Project Description**	**Estimated Cost**	**Project Year**
Operation and Maintenance & Manhole Rehabilitation					
3	Minimum	Manhole Rehabilitation Program	Critical Manholes based on SAW Grant MACP Inspections	$67,861.00	2019
			Total Operation and Maintenance & Manhole Rehabilitation	**$67,861.00**	
Stoker Drive District					
4	Minimum	Stoker District Pump Station Rehabilitation		$152,000.00	2019
5	Minimum	Carrollton Road from Stoker Drive to Reserve Road	Cured in Place Line VCP 15 inch Sanitary Sewer	$545,000.00	2028
6	Minimum	Michigan Avenue from Weiss Street to Stoker Drive	Cured in Place Line VCP 8 inch Sanitary Sewer	$260,000.00	2026
7	Minimum	Shattuck Road from MH275 to Michigan Avenue	Cured in Place Line VCP 8 inch Sanitary Sewer	$250,000.00	2026
8	Minimum	Eddy Street from Stoker Drive to MH 237	Cured in Place Line VCP 8 inch Sanitary Sewer	$115,000.00	2026
9	Minimum	Stoker Drive from MH232 to MH208	Cured in Place Line VCP 8 inch Sanitary Sewer	$140,000.00	2021
10	Minimum	Jackson Street from Stoker Drive to MH211	Cured in Place Line VCP 8 inch Sanitary Sewer	$180,000.00	2021
11	Minimum	Harrison Street from Stoker Drive to Shattuck Road	Cured in Place Line VCP 8 inch Sanitary Sewer	$235,000.00	2021
12	Minimum	Monroe Street from MH224 to Shattuck Road	Cured in Place Line VCP 8 inch Sanitary Sewer	$260,000.00	2021
Hanchett District					
47	Minimum	Hanchett Disconnect Program		$345,000.00	2023
48	Minimum	Hanchett District Pump Station Replacement		$525,000.00	2024
Grand Total Minimum Project Cost					**$3,074,861.00**

Conclusion

Carrollton 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 but it has issues when it comes to maintenance particularly with infiltration. There are many stretches of pipe that are structurally in good condition, but should be lined to prevent this excess amount of groundwater from entering the system. This extra water has cause the pump stations to run more than what should be necessary submitting the pump station components to additional wear and tear. Routine maintenance has allowed each station to successfully function until now, but it was recommended that the Township starts budgeting money for pump station upgrades in the future. An 8% annual rate increase is recommended to cover the planned operating expenses, capital improvement projects, and inflation for the next five years. This will need to be reviewed annually during the Townships normal budgeting process.

In accordance with the SAW Grant requirements, the Township's 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 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 10-31-2017
(no later than 3 years from executed grant date)

The Carrollton Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1119-01 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 X
   If No - Date of the rate methodology approval letter: April 19, 2017.
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:

Craig Oatten at 989-754-9244 chiefoatten@carrollton.twp.com
Name | Phone Number | Email

[signature] October 26, 2017
Signature of Authorized Representative (Original Signature Required) | Date

Craig Oatten, Township Director
Print Name and Title of Authorized Representative

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Cassopolis, Michigan

Wastewater Sewer System

Date: October 2, 2017
To: Ms. Izabel Hartman
Re: Organization: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: Village of Cassopolis SAW Grant: Summary of Wastewater Asset Management Plan

Grantee Information:
Village of Cassopolis
117 S. Broadway St. Suite 100
Cassopolis, MI 49031
manager@cassopolis-mi.us
Ms. Emilie Sarratore; Manager
PH: (269) 445-8648
SAW Project #: 1325-01

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:	$783,174	$298,000	$1,081,174
2) Less: Match	$ 00	$ 00	$ 00
3) Net Grant:	$783,174	$298,000	$1,081,174

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.*

Cassopolis owns and operates a wastewater collection system consisting of several miles of gravity sewer pipes and pressurized force mains that convey the wastewater from the Village, as well as wastewater from the Cassopolis Area Utility Authority (CAUA), to the City of Dowagiac (Dowagiac) Wastewater Treatment Facility (WWTF) for treatment. In addition to the pipes in the collection system, Cassopolis relies on a series of sewage lift (pump) stations to convey the wastewater through the system. There are two grinder pump lift stations serving individual locations or small areas, seven smaller lift stations serving various sewer sub-districts or neighborhoods, and three larger lift stations that operate in series to convey all the wastewater collected from both Cassopolis and the CAUA sanitary sewer systems, as well as some additional wastewater collected from areas served by the gravity sewer north of Cassopolis, to the Dowagiac WWTF.

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.

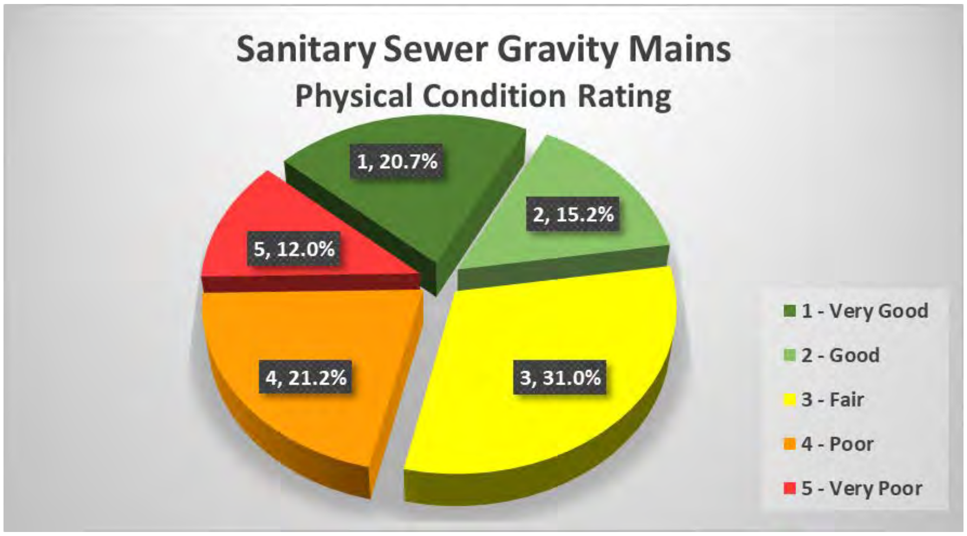
Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

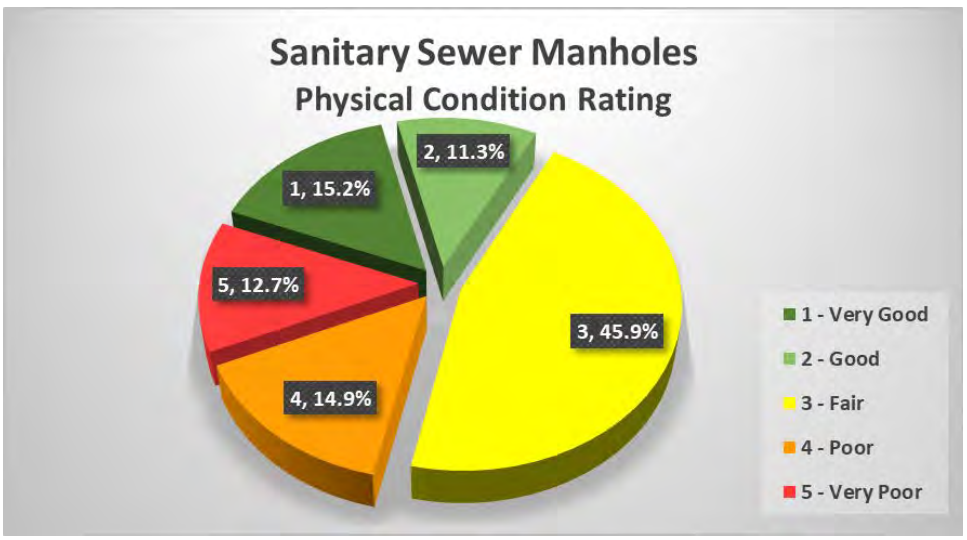
After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection system and estimate their remaining service life. Wightman and Associates, Inc. (WAI) performed the conditional assessments beginning with a complete visual and physical inspection of all the wastewater lift stations not scheduled for replacement in 2017. In addition, all the pipe in the wastewater system and all the wastewater manholes were videoed using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging. The CCTV service was provided by Terra Consulting Services, LLC.

The conditional assessments for 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 or the condition of the asset. Condition grades for both structural and operational and maintenance (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 the table below.

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)

The following figures show the condition rating for the wastewater collection system piping and manholes based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database.





The following table shows the condition ratings for each of the lift station components assessed based on NASSCO standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database.

Lift Station Name	Pump Design Capacity (gpm)	Design Head (ft)	Wet Well Condition	Pump Condition	Electrical & Controls Condition	Generator Condition
Lakeshore Drive	80	32.46	Good	Very Good	Good	N/A
Reed Street	180	30.89	Very Good	Very Good	Very Good	Very Good
Sherman Lane	180	23.67	Fair	Very Good	Very Good	N/A
Spencer Road	180	37.57	Fair	Very Good	Very Good	N/A
Depot Street	80	20.08	Fair	Very Good	Very Good	N/A
Second Street	180	12.36	Very Good	Very Good	Very Good	N/A
Rowland Street	25	19.65	Very Good	Very Good	Very Good	N/A
Lift Station # 1	1,200	91.81	Very Good	Very Good	Very Good	Very Good
Kemner Iott	30	45.84	Good	Good	Good	N/A

Lift Station # 2	1,200	125.77	Fair	Very Good	Very Good	Very Good
Pokagon Band	85	22.20	Very Good	Good	Good	Very Good
Lift Station # 3	1,300	78.04	Good	Very Good	Very Good	Very Good

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 (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how the Cassopolis wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team selected the following statements to define the desired LOS for the Cassopolis wastewater system:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage, break, or lift station failure occur causing an untreated discharge, we will respond within one hour and correct the problem as soon as possible to minimize any environmental damage.

3. We will develop and implement a preventative maintenance program to reduce the likelihood of the occurrence of a blockage or break, or lift station failure.

4. We will monitor the system electronically with in-house, advanced technologies and respond so as to prevent and/or mitigate any sanitary sewer overflows or back-ups.

5. We will respond to customer complaints and system alarms within one hour for an emergency and within twenty-four hours for a non-emergency during normal business hours. Communication with the complainant or customers affected will be maintained until the issue is resolved.

6. We will maintain an asset management program for the system and set rates and secure funding to maintain a sustainable funding structure.

7. We will develop a work order system to identify, assign, and track preventative and reactive work on the system and report on the status of work orders to the Village monthly.

8. We will inform the customers of our desired level of service and report on the compliance with the level of service to the Village on an annual basis.

9. We will consider all contact with persons, contractors, developers, municipalities, and paying customers as a “customer contact” and treat all with respect and dignity.

10. We will establish an on-going program for lowering the amount of infiltration & inflow into the system and continuously make improvements to the system to eliminate extraneous clean water from the sanitary sewer system.

11. We will establish an on-going program for monitoring and eliminating sources of fats, oils, and greases (known as FOG).

12. We will update the ordinances of the service district no less than every 5 years to keep abreast of the latest technologies and clarifications necessary to enhance the sanitary sewer system and its purposes.

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?*

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. 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

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

Rating	Condition Rating	Likelihood of Failure
1	New or Excellent (Very Good)	Remote/Rare
2	Minor Deterioration (Good)	Unlikely
3	Moderate Deterioration (Fair)	Possible
4	Significant Deterioration (Poor)	Probable
5	Unserviceable (Very Poor)	Highly Probable

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 cost associated with the loss of the asset.
- Repair/replacement costs related to collateral damage caused by the failure.
- Legal costs related to additional 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 event 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 for Cassopolis wastewater assets was assessed using the criteria presented in the table below:

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

C. <u>Criticality</u>

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 the table below. The resulting criticality of each asset is included as an attribute for that asset in the GIS mapping database.

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

[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. Methodology – Asset Management Financial Plan:

A significant effort has been made by the Village 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.

B. Management Summary

- Rates: 5% increases to both the meter equivalent charge and the commodity charge. Review in the next 3-5 years.
- Cash Balance: maintain cash balances above six months.
- Capital Cost: a cash, as opposed to debt, approach as modeled in the cash flow.

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.*

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. To ensure that the desired LOS 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. The planning period for a CIP is 20 years to allow for the development of a rate structure adequate to finance those projects that can reasonably be predicted to be needed during that period.

The table below lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next twenty years for the wastewater collection system.

1	2017	Lift Station Number 1 Force Main Replacement	$ 314,000
2	2017	Lift Station Rehabilitation	$ 1,380,000
3	2018	E. York Street Sewer Replacement	$ 46,000
4	2018	Lift Station 1 Discharge Manhole Replacement	$ 35,000
5	2019	N. Fulton Street Sewer Replacement	$ 79,000
6	2020	E. State Street Sanitary Sewer Reconstruction	$ 79,000
7	2021	N. Broadway Street Sanitary Sewer Reconstruction	$ 42,000
8	2021	Lift Station Discharge Manhole Lining - 2021	$ 35,000
9	2022	S. Rowland Street Sewer Reconstruction	$ 108,000
10	2023	E. Water Street Sewer Reconstruction	$ 67,000
11	2023	Lift Station Discharge Manhole Lining - 2023	$ 52,000
12	2024	N. O'Keefe Road Sewer Replacement - Phase A	$ 93,000
13	2024	Lift Station Discharge Manhole Lining - 2024	$ 9,000
14	2025	N. O'Keefe Road Sewer Replacement - Phase B	$ 80,000
15	2025	Lift Station Discharge Manhole Lining - 2025	$ 26,000
16	2026	Sanitary Sewer Spot Repairs - 2026	$ 63,000
17	2027	Sanitary Sewer Spot Repairs - 2027	$ 56,000
18	2027	Miscellaneous Manhole Repairs - 2027	$ 9,000
19	2028	Kemner Iott Lift Station Pump and Control Rehabilitation	$ 38,000
20	2029	Additional Sanitary Sewer and Manhole Repairs - 2029	$ 115,000
21	2030	Additional Sanitary Sewer and Manhole Repairs - 2030	$ 120,000
22	2031	Pokagon Band Lift Station Pump, Generator, and Control Rehabilitation	$ 88,000
23	2032	Lakeshore Drive Lift Station Pump and Control Rehabilitation	$ 55,000
24	2033	Lift Station Number 2 Pump, Generator, and Control Rehabilitation	$ 238,000
25	2034	Lift Station Number 1 Pump, Generator, and Control Rehabilitation	$ 295,000
26	2035	Lift Station Number 3 Pump, Generator, and Control Rehabilitation	$ 223,000
27	2036	Reed St., Depot St., and Rowland St. Pump and Control Rehabilitation	$ 189,000
28	2037	Spencer Rd., Sherman Ln., and 2nd St. Pump and Control Rehabilitation	$ 162,000
		Total Estimated Project Cost for Twenty-Year CIP (current dollars) =	$ 4,096,000
		Total Estimated Project Cost for Twenty-Year CIP (inflation adjusted costs) =	$ 4,801,000

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 Village Assets:

Asset Description	Quantity	Units
15" Sanitary Sewer	19,792	LF
12" Sanitary Sewer	15,577	LF
10" Sanitary Sewer	27,429	LF
8" Sanitary Sewer	33,650	LF
6" Sanitary Sewer	873	LF
Sanitary Sewer – Unknown Diameter	1,101	LF
4-foot Diameter Sanitary Manhole	362	EA
Service Lead, Complete	764	EA
Lift Station > or = 500 gpm	3	EA
Lift Station < 500 gpm	7	EA
Grinder Pump Lift Station	2	EA
12" Force Main	24,445	LF
10" Force Main	4,823	LF
8" Force Main	23	LF
6" Force Main	3,271	LF
4" Force Main	2,271	LF
3" Force Main	2,692	LF
2-1/2" Force Main	958	LF
2" Force Main	2,149	LF
Force Main – Unknown Diameter	1,101	LF
Cleanouts	24	EA
Air Release Valves	6	EA

Table 1 - Village of Cassopolis wastewater collection system assets

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Cassopolis, *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1325-01 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: 6/27/17
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. Emilie Sarratore at	(269) 445-8648	manager@cassopolis-mi.us
Name	Phone Number	Email

Emilie Sarratore (signature) — 10-17-17

Signature of Authorized Representative (Original Signature Required) — Date

Ms. Emilie Sarratore, Village Manager
Print Name and Title of Authorized Representative

April 2017

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Cassopolis, Michigan

Stormwater System

Date: October 2, 2017
To: Ms. Izabel Hartman
Re: Organization: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: Village of Cassopolis SAW Grant: Summary of Stormwater Asset Management Plan

Grantee Information:
Village of Cassopolis
117 S. Broadway St. Suite 100
Cassopolis, MI 49031
manager@cassopolis-mi.us
Ms. Emilie Sarratore; Manager
Ph: (269) 445-8648
SAW Project #: 1325-01

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:	$783,174	$298,000	$1,081,174
2) Less: Match	$ 00	$ 00	$ 00
3) Net Grant:	$783,174	$298,000	$1,081,174

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.*

Cassopolis owns and operates a stormwater system consisting of more than 33,000 feet of gravity sewer, 335 storm structures, and about 400 feet of storm culverts. The stormwater collection system serves the majority of the Village and conveys flow with primary outfalls being in Stone Lake or open ditches. The estimated replacement value for the stormwater collection system is $4,672,000.

Using the data collected, detailed maps of the stormwater collection 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.

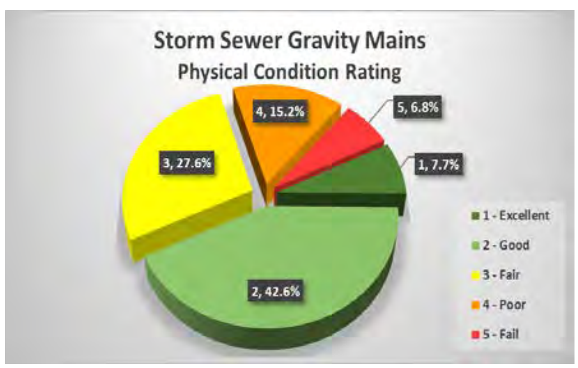
Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

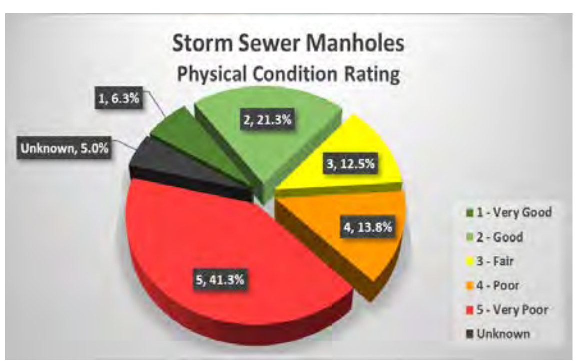
After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the stormwater system and estimate their remaining service life. Wightman and Associates, Inc. (WAI) performed the conditional assessments beginning with a complete visual and physical inspection of the manholes and inlet structures in the stormwater collection system (as depicted in Figure 1 below). In addition, a large portion of the storm sewer piping system was videoed using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging. The CCTV service was provided by Terra Contracting Services, LLC. For pipes that were not inspected using CCTV, limited conditional assessments of those portions of the pipe that could be visually inspected were performed.

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

The following charts show the condition rating for the stormwater system piping and manholes based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database





<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 (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how the Village of Cassopolis stormwater system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team selected the following statements to define the desired LOS for the Village of Cassopolis stormwater system:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage or break occur, we will correct the problem as soon as possible to minimize any future flooding.

3. We will develop and implement a preventative maintenance program to reduce the likelihood of the occurrence of a blockage or breakage.

4. We will respond to customer complaints during normal business hours. Communication with the complainant or customers affected will occur.

5. We will maintain an asset management program for the system and provide reports on an as needed basis.

6. We will develop a work order system to identify, assign, and track preventative and reactive work on the system and report on the status of work orders to the Village on an as needed basis.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to the Village on an as needed basis.

<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?*

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. 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

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

Rating	Condition Rating	Likelihood of Failure
1	New or Excellent (Very Good)	Remote/Rare
2	Minor Deterioration (Good)	Unlikely
3	Moderate Deterioration (Fair)	Possible
4	Significant Deterioration (Poor)	Probable
5	Unserviceable (Very Poor)	Highly Probable

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.
- 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 stormwater 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 for Cassopolis stormwater assets was assessed using the criteria presented in the table on the next page:

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

C. Criticality

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 the table below. The resulting criticality of each asset is included as an attribute for that asset in the GIS mapping database.

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

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 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 DPW. As such, an in-depth asset management financial review (AMFR) cannot be conducted and a revenue structure cannot be developed for the storm water 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.*

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. To ensure that the desired LOS 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. The planning period for a CIP is 20 years to allow for the development of a rate structure adequate to finance those projects that can reasonably be predicted to be needed during that period.

The table below lists the recommended capital improvement projects for the stormwater system. Where appropriate, the estimated project costs shown in the following table include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project.

Priority	CIP Year	Project Name	Estimated Cost
1	2018	Pipe 447 Replace Pipe and Resolve Conflict with Sanitary	$ 50,000
2	2018	Pipe 270 Replacement	$ 20,000
3	2019	Pipe 443 Resolve Conflict with Sanitary	$ 20,000
4	2020	Pipe 417 Resolve Conflict with Sanitary	$ 20,000
5	2021	Pipe 316 Resolve Conflict with Sanitary	$ 20,000
6	2022	Pipe 702 Resolve Conflict with Utility	$ 13,000
7	2023	Pipe 413 Resolve Conflict with Gas Line	$ 13,000
8	2023	Pipe 403 Partial Replacement	$ 14,000
9	2024	Pipe 701 Partial Replacement	$ 8,000
10	2024	Pipe 396 Resolve Conflict with Sanitary	$ 18,000
11	2025	Pipe 455 Multiple Spot Repairs or Replace	$ 22,000
12	2025	Pipe 356 Partial Replacement	$ 11,000
13	2026	Manhole Project 1	$ 18,000
14	2027	Manhole Project 2	$ 18,000
15	2028	Pipe 307 Resolve Conflict with Sanitary	$ 18,000
16	2030	Pipe 354 Resolve Conflict with Utility	$ 12,000
17	2031	Pipe 479 Resolve Conflict with Utility	$ 12,000
18	2032	Pipe 306 Replacement	$ 7,000
19	2035	Pipe 440/449/557 Replacement	$ 113,000
		Total Estimated Project Cost for Twenty Year Stormwater CIP (current dollars) =	$ 427,000
		Total Estimated Project Cost for Twenty Year Stormwater CIP (future dollars) =	$ 523,000

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 stormwater system assets owned by the Village:

Asset Description	Quantity	Units
36" Storm Sewer	2,191	LF
30" Storm Sewer	2,104	LF
27" Storm Sewer	563	LF
24" Storm Sewer	5,810	LF
18" Storm Sewer	1,565	LF
15" Storm Sewer	2,424	LF
12" Storm Sewer	15,809	LF
10" Storm Sewer	2,118	LF
8" Storm Sewer	872	LF
6" Storm Sewer	323	LF
Storm Culverts	407	LF
Storm Manhole	80	EA
Inlet Structure	255	EA
Storm Water Discharge Point	18	EA

Table 2 - Village of Cassopolis stormwater collection system assets

DEQ

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

Completion Due Date **10/31/17**
(no later than 3 years from executed grant date)

The Village of Cassopolis *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1325-01** 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. Emilie Sarratore	at	*(269) 445-8648*	*manager@cassopolis-mi.us*
Name		Phone Number	Email

Emilie Sarratore — 10-17-17

Signature of Authorized Representative (Original Signature Required) — Date

Emilie Sarratore; Village Manager

Print Name and Title of Authorized Representative

Charter Township of Chesterfield
47275 Sugar Bush Road
Chesterfield, MI 48047
(586)949-0400
Daniel J. Acciavatti, dacciavatti@chesterfieldtwp.org
http://www.chesterfieldtwp.org

As it relates to their sanitary sewer system 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 Chesterfield. By taking a proactive position in protecting the valued resources of the benefiting community, residents and property owners the Township initiated an application and was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program. Chesterfield Township's SAW grant award of $1,881,167 required a local match of $404,833 for a total of $2,286,000.

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 several 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) ordinance, designating criticality of assets, analyzing long-term operation and maintenance (O&M) strategies, consider 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, and visual observation. The inventory verified that Chesterfield's existing sanitary sewer system is composed of approximately 182 miles of gravity sewer, 2.5 miles of forcemain, 7 pump stations, and 4,500 sanitary manholes. The assets have been cataloged and stored in the Chesterfield 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.

Observed assets were analyzed to determine their Probability of Failure (POF) and Consequence of Failure (COF). The POF is based on the structural scores indicated by 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 an assets distance to critical facilities and environmental features, adjacent road size, and the asset's diameter or depth. The POF and COF scores are then 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. The MDEQ 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	1.50	16.25	4.85
Manholes	1.63	13.78	4.16

In reviewing the inspection reports and the BRE analysis it was determined that; generally the system was in good condition with only one asset in a failed condition (repair complete), and that none of the remaining assets were in danger of imminent failure. Therefore, the prioritized capital improvement projects consisted of cleaning and inspection of manholes and pipe, capacity relief, structural repairs, pump station replacement, and a sump pump disconnection program.

The complete CIP includes the following:

- CCTV inspection of pipes every ten (10) years ($435,000 annually).
- Capacity Relief Sewers ($2,800,000).
- Structural Repairs ($193,000).
- Pump Station Replacement ($400,000).
- Sump Pump Disconnection ($250,000).

A rate analysis was conducted as part of the AMP and it was found that the Chesterfield Sewer revenues sufficiently cover expenditures and a funding gap does not exist. Therefore no corrections to the rate methodology were required.

This summary provides a brief overview of the evaluation and investigation and offers initial insight into the Chesterfield Sanitary Sewer System, its assets, condition, operation and needs. A more comprehensive discussion can be found in the Wastewater 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 October 31, 2017
(no later than 3 years from executed grant date)

Chesterfield Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1594-01 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 15, 2017_______________.

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 Acciavatti	at	(586) 949-0400	dacciavatti@chesterfieldtwp.org
Name		Phone Number	Email

10 · 26 · 2017

Signature of Authorized Representative (Original Signature Required) Date

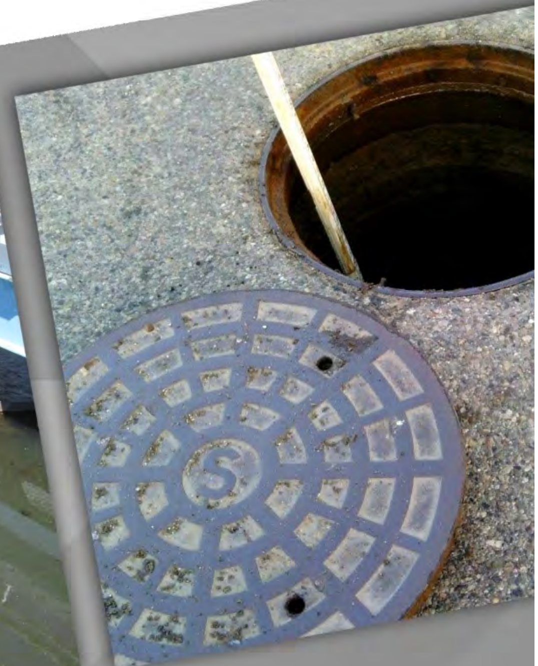
Daniel J. Acciavatti, Township Supervisor

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

City of Coleman

SAW Project No. 1044-01

FINAL
October 2017

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for the Storm water, Asset Management, and Wastewater (SAW) Grant Program. In October 2014, the City of Coleman received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1044-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility. The assets that comprise the utility include collection system piping and manholes, lift station/pump stations, force mains and a wastewater stabilization lagoon.

The SAW Grant amount awarded to City of Coleman was $558,631.00
The Local Match provided by City of Coleman was $64,557.00

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.

Questions regarding the Asset Management Plan should be directed to:
Mr. Bill Cozat
Public Works Director
City of Coleman
211 East Railway Street
Coleman. Michigan 48618
989-465-9182
Email: bcozat@hotmail.com

ASSET INVENTORY AND CONDITION ASSESSMENT

The wastewater collection system assets consist of approximately:

- Gravity Sewer (6 inch thru 12 Inch): 57,350 feet (10.9 miles)
- Force Main (4-8 inch): 1,600 feet
- Manhole Structures: 197
- Sewer Lift Stations: 2 Each

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

The treatment of wastewater for the City of Coleman is provided by the City with a waste stabilization lagoon system located at the northern edge of the City and south of US-10. The wastewater collection system is operated and maintained by the City with DPW staff.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance manuals, which included a review of the existing record drawings, field notes, staff knowledge, site visits and 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 survey grade GPS equipment and a comprehensive evaluation of the gravity system.

This information was organized into a new GIS database and piping network for archiving, mapping and future evaluation purposes.

Condition Assessment and Expected Useful Life
A comprehensive evaluation of the collection system was performed.

- NASSCO-MACP Level 1 manhole field based assessments were completed on 180 manhole structures that were assessible.
- Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 57,350 LF of the gravity pipe.
- The condition of the collection system assets reviewed ranged from Good to Fair, with only a few minor deficiencies.
- Capacity Analysis was modeled for average day and peak hour conditions in areas of concern.
- Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified.
- It is recommended to clean and televise the collection system on a 7 to 10-year rotating basis.

A comprehensive evaluation of the waste stabilization lagoons was performed.

- Based upon the WWSL evaluation and meetings with MDEQ, it was determined to reconstruct the lagoon interior slopes, dredge the lagoons, replace valves, piping and reconstruct the access roads around the facility.
- The condition of the assets ranged from Fair to Poor.
- The reconstruction project is included in the 5 year CIP

A comprehensive evaluation of the lift stations was performed.

- The condition of the assets at the lift stations range from Good to Poor.
- The main pump station has been recommended for a total replacement and is included in the 5 year CIP.
- 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

Defining the Expected Level of Service (LOS)

The overall objective of City of Coleman as it relates to their wastewater collection system is to adopt the following Level of Service (LOS) goals:

LEVEL OF SERVICE STATEMENT

The overall objective of City of Coleman 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:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with 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 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 the community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City annually to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

To assure that LOS goals are met, performance measurements may need to be implemented. During the LOS review with the community the need for performance measurements was discussed.

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

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 template 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.

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

Figure 1 provides the risk rating for gravity pipe by number of pipe segments. 4 pipe segments in the collection system have been identified with an extreme risk rating. These segments of pipe will be repaired as part of the short-term 1-5-year CIP. The City of Coleman will need to monitor these specific locations and may require occasional cleaning of the pipe until the repairs are made. 89 of the collection system's gravity pipes, (approximately 58 percent as shown in Figure 1), have a low risk rating and are indicative of pipes in relatively good condition.

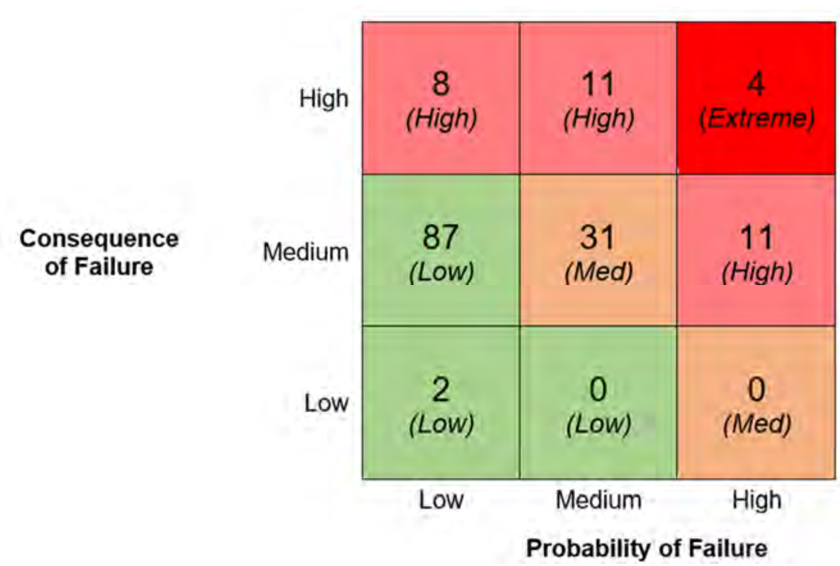


Figure 1. Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the collection system manholes. There are 48 manhole frame and castings that need point repairs, which will be completed as part of the short term 1-5 year CIP. 29 percent of the collection system's manholes as shown in Figure 2, have a low risk rating and are indicative of manholes in relatively good condition.

Consequence of Failure				
	High	1 *(High)*	0 *(High)*	0 *(Extreme)*
	Medium	40 *(Low)*	75 *(Med)*	48 *(High)*
	Low	6 *(Low)*	7 *(Low)*	3 *(Med)*
		Low	Medium	High
		Probability of Failure		

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

Figure 3 provides the risk ratings for the Dickenson Road lift station assets. Five assets are identified as a high risk, most of which are due to being installed over 30 years ago. These five assets with the high-risk ratings will be replaced within the 6-20 year CIP.

Consequence of Failure				
	High	0 *(High)*	3 *(High)*	0 *(Extreme)*
	Medium	2 *(Low)*	8 *(Med)*	2 *(High)*
	Low	0 *(Low)*	2 *(Low)*	1 *(Med)*
		Low	Medium	High
		Probability of Failure		

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

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, pumping stations and force mains. From the BRE, a short-term (1-5 year) and long-term (6-20 year) CIP's were developed for the utility.

This AMP included a detailed condition assessment of the collection system including televising of pipe, and field condition assessments of all accessible sanitary manholes, lift stations and the waste stabilization lagoon.

Based on the AMP condition assessment of the sanitary sewer system, the City has identified assets of the collection system, waste stabilization lagoon and lift stations for improvement. These improvements can be completed with funding from the City's sewer reserve account and funding thru MEDC ICE

(1-5 Year) Capital Improvements include:

- Replace the main lift station with a new lift station and SCADA system
- Reconstruct the waste stabilization lagoons
- Dredge the waste stabilization lagoons
- Reconstruct the access roads
- Install a new emergency generator
- Replace the existing 8-inch force main from the new pump station to each lagoon cell
- Replace the access walkways to the outfall structures
- Replace control valves
- Repair collection system structural deficiencies
- Manhole Frame and Chimney Rehabilitation

(6-20 Year) Capital Improvements include:

- Dickenson Road Pump Station Improvements
- Manhole Chimney Rehabilitation
- Collection system pipe lining

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 function 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 lift station 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) fund.

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 existing rates were determined to create sufficient funds to fulfill the day-to-day maintenance and operations of the entire sanitary collection system.

The MDEQ approved the City's rate methodology on May 2,2017

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

Completion Date: October 27,2017
(no later than 3 years from executed grant date)

The **City of Coleman** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No.**1044-01** 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: **May 2,2017**

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:

Steve Miller, Mayor	**989-465-6961**	**colemancity@hotmail.com**
Name	Phone Number	Email

S. Miller 10/25/17

Signature of Authorized Representative (Original Signature Required) Date

Steve Miller, Mayor

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Coleman

SAW Project No. 1044-01

FINAL
October 2017

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 October 2014, The City of Coleman received a (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), Project no.1044-01 to provide financial assistance for the development of this asset management plan (AMP). This report provides the Asset Management Plan (AMP) for the City's Stormwater collection system. 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.

The SAW Grant amount awarded for Stormwater to the City of Coleman was $461,807.00
The Local Match provided by City of Coleman was $53,367.00

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.

Questions regarding the Asset Management Plan should be directed to:
Mr. Bill Cozat
Public Works Director
City of Coleman
211 East Railway Street
Coleman. Michigan 48618
989-465-9182
Email: bcozat@hotmail.com

ASSET INVENTORY AND CONDITION ASSESSMENT

The Stormwater collection system assets consist of approximately:

- Storm piping (6 thru 42 inch): 44,360 (8.4 miles)
- Manhole and Catchbasins: 476

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 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 future evaluation.

Condition Assessment and Expected Useful Life

A comprehensive evaluation of the collection system was performed.

NASSCO-MACP Level 1 manhole field based assessments were completed on 476 structures.

Based on discussions with the City DPW staff, there have not been any known capacity issues with the City owned stormwater system.

Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 44,360 feet of the Storm piping.

The condition of the storm water system assets ranged from Good to Fair

Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. It is recommended to clean and televise the system on a 7 to 10-year rotating basis.

Level of Service

Defining the Expected Level of Service (LOS)

The City of Coleman Level of Service (LOS) goals as it relates to the stormwater collection system is summarized as follows:

LEVEL OF SERVICE STATEMENT

The overall objective of the City of Coleman is to provide reliable stormwater 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:

- Provide adequate collection system capacity for all service areas.
- Comply with local, state and federal regulations.
- Actively maintain collection system assets in reliable working condition
- 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, to ensure sound financial management of the stormwater 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 annually to make sure they accurately reflect the desired operation of the utility.

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 Stormwater 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 the utilities ability to convey and treat 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 City of Coleman using an ArcGIS-based sewer asset management and capital planning template that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. 27 pipe segments in the Stormwater collection system have a high to extreme risk rating. These pipe segments will need repairs during the short term 1-5 year CIP. 79% of the storm sewer collection system is in the low risk category and are in relatively good condition.

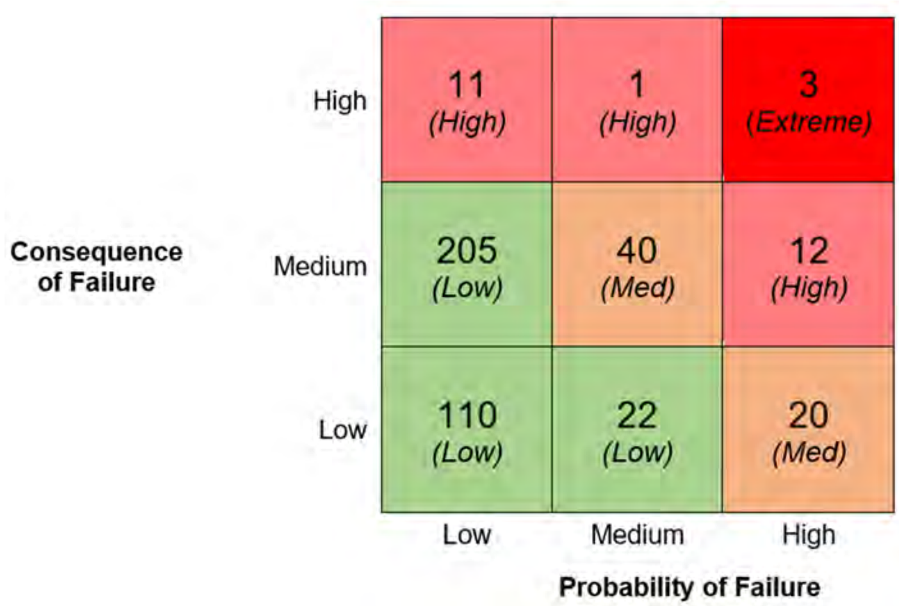


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. 3 structures are identified an extreme risk rating, and are recommended for short term replacement, the 19 other high-risk assets consist of cracked covers and frames throughout the city. These covers and frames are recommended for short term and long term replacement. Approximately 80% of the structures within the system are in the negligible to low risk category and are in relatively good condition.

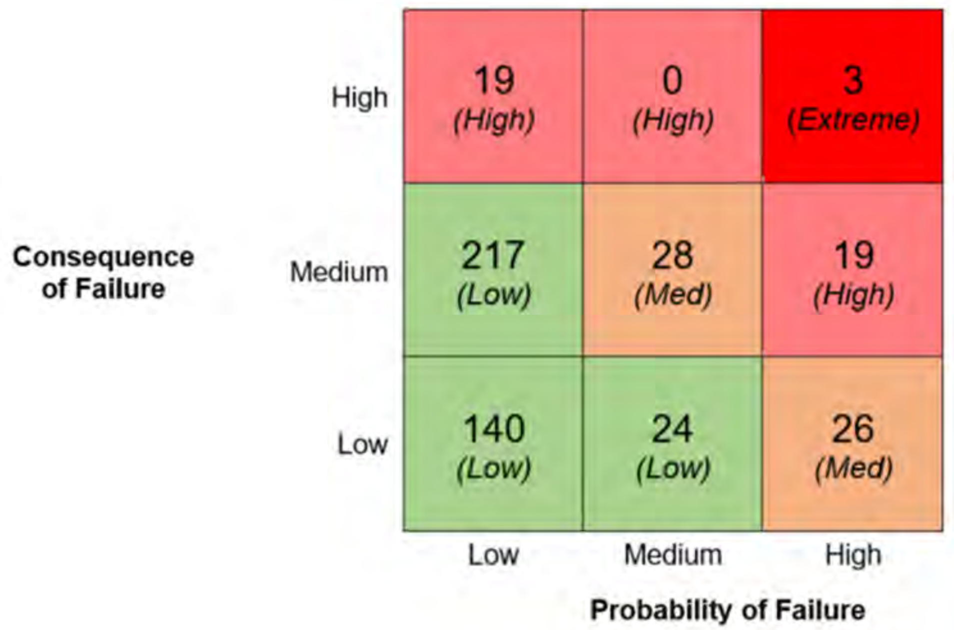


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

Capital Improvement Plan

A Capital Improvement Plan with recommendations was prepared for the City's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term (1-5 year) and Long-Term (6-20-year) Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

The City is considering funding options to make the needed improvements that have been identified as a high or extreme risk within the Short Term (1-5 year) CIP.

(1-5 Year) Capital Improvements include:

- Various sections of Storm Sewer to be replaced or repaired as identified in the AMP.
- Manhole Rehabilitation as identified within the AMP
- Catch Basin Rehabilitation as identified within the AMP

(6-20 Year) Capital Improvements include:

- Manhole Rehabilitation as identified within the AMP
- Catch Basin Rehabilitation as identified within the AMP
- Various sections of Storm Sewer to be replaced or repaired as identified in the AMP.

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound Stormwater system. The process of cleaning and CCTV inspection of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every 7 to 10 years. Available budget will dictate the frequency or size of yearly projects.

REVENUE STRUCTURE

The revenue for storm sewer improvements will come from the City local and major street funds or the City General Fund.

DEQ

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The **City of Coleman** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1044-01 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:

Steve Miller, Mayor at **989-465-6961** **colemancity@hotmail.com**

Name | Phone Number | Email

S Miller 10/25/17

Signature of Authorized Representative (Original Signature Required) | Date

Steve Miller, Mayor

Print Name and Title of Authorized Representative

June 2014

F&V

ASSET MANAGEMENT PLAN SUMMARY

for:

The Charter Township of Commerce

Wastewater Collection System

(as req'd under Section 603 of Public Act 84 of 2015)

MDEQ SAW Grant # 1021-01

GW Project # 18548.00

October 2017

Prepared by:

Giffels Webster

1025 East Maple

Suite 100

Birmingham, MI 48009

Asset Management Plan Summary

Commerce Township Wastewater System - MDEQ SAW Grant #1021-01
October 2017

The Charter Township of Commerce applied for and received a grant to further develop an Asset Management Plan 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.

The Commerce Township Sewage Disposal System is owned by Commerce Township and is operated and maintained by the Oakland County Water Resources Commissioner (WRC). The WRC has various tools used to manage the assets it maintains, including a GIS geodatabase, Computer Maintenance Management System (Cityworks), hydraulic models, condition assessment methods, risk/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 the 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 five major Asset Management Plan (AMP) components are as follows:

1) Asset Inventory and Condition Assessment
2) Level of Service
3) Criticality of Assets
4) O&M Strategies and Revenue Structure
5) Long Term Funding / Capital Improvement Plan

A. Asset Inventory and Condition Assessment

A Geographic Information System (GIS) geodatabase is maintained by the WRC and accessible to Commerce Township as the primary means to inventory and map the assets in the system. The geodatabase provides a means to record the attributes associated with each asset, such as installation date (age), size, material, along with other information need for a given asset type. The geodatabase is integral to WRC's Collaborative Asset Management System (CAMS,) which allows for maintenance history and cost tracking on an asset and/or fund level.

Condition assessment tools and protocols were developed by the WRC & Giffels Webster 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, and assets within the Commerce Township Wastewater Treatment Plan (CWWTP).

Asset Management Plan Summary

Commerce Township Wastewater System - MDEQ SAW Grant #1021-01
October 2017

As part of the grant for the Commerce Township Sewage Disposal System, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Commerce Township has approximately 72 miles (383,000 lineal feet) of gravity sewer, 56 miles (295,000 lineal feet) of force main, and 1826 manholes. Most of the sanitary pipe and manholes within the Commerce Township System are less than 20 years old and therefore not eligible for funding of field condition assessments. The portion of the sanitary sewer system older than 20 years, which is approximately 10.25 miles (54,161 lineal feet) of gravity sanitary sewer underwent a condition assessment via televising. In addition, approximately 231 manholes were evaluated using the NASSCO / CAMS inspection work orders. The project's scope included additional analysis of individual defects and review of the consequence of failure to identify recommendations for the first five-year projects.

<u>Horizontal Assets:</u>
Key sewer pipe and manhole projects to be completed within the first five years are as follows:

- Welch Road main sanitary sewer pipe relining – completed in 2017.
- Sleeth Road Manhole Rehabilitation – planned for 2018
- Sleeth Road MH Vortex Unit Study – planned for 2018
- Additional sewer videotaping & MH inspections - $150,000/year each of the first five years
- Township Sewer Extension Study – scheduled for 2018
- Newton Road Force Main – scheduled for 2018
- Huron River Sewer Rehabilitation – scheduled for 2019
- Sewer Extension at Lake Sherwood / gravel pit area – scheduled for 2019
- Welch Road Force Main between Pontiac Trail & Easy Street – scheduled for 2020
- Section 36 Sewer Relining – scheduled for 2021

<u>Vertical assets:</u>
Pump Stations - Twenty-eight (28) pump stations were inventoried using the WRC asset hierarchy template, condition assessment data was collected and input into the CAMS system.
Key projects to be completed in the first five years are as follows:

- Campbell Creek PS Abandonment (currently under construction).
- Pump Station Capacity Study – scheduled for 2018
- Haggerty Road PS Abandonment – scheduled for 2019
- Pump Replacement at the Oakley Park PS – scheduled for 2022

CWWTP - Major assets within the Commerce Township Wastewater Treatment Plant (CWWTP) were inventoried using a WRC hierarchy template, condition assessment data was collected and input into the CAMS system.
Key CWWTP projects to be completed in the first five years are as follows:

- WWTP Ventilation Improvements – scheduled for 2018
- WWTP Power Supply Improvements – scheduled for 2018
- WWTP Channel 5 Rehabilitation – scheduled for 2018
- WWTP Rehabilitation of remaining channels and wet well – scheduled for 2019
- WWTP Sewer Line Rehabilitation – scheduled for 2022

Note that the projects listed above are in addition to the ongoing operations, maintenance and asset evaluations performed by the WRC as a part of a yearly O&M budget.

B. Level of Service

An overall level of service goal was determined that will be used as a starting point for each fund. Considerations into the level of service included compliance to regulations, operation, impact to the public and environment, safety and security, and are included in the overall business risk evaluation.

KEY:
Level of Service Goals: (Level of Service Category, Base Level of Service Goals, *Measurables*)

- **Level of Service Categories are shown in bold Font**
- Base Level of Service Goals are shown in normal Font
- Measurables are shown in italics

1) **Financial Viability & Impact**, Emergency repairs can be repaired within Utility Reserve Budgets of the system, *Exceedances of reserve budgets*
2) **Public Confidence / System Service Impact**, Minimal to some loss of service or impact on other services for less than four hours. No sanitary sewer overflows (SSO's) into homes, businesses or waterways. Minor disruption (e.g., traffic, dust, noise), *Number of service interruptions, complaints, and SSO's*
3) **Regulatory Compliance**, No significant state permit violations. Comply with All MDEQ policies, *Number of violations*
4) **Safety of Public and Employees**, Non-reportable injuries. No lost-time injuries or medical attention required. No impact to public health, *Number of injuries and any public health advisories*
5) **Redundancy,** Comply with 10 State Standards, *Number of violations*
6) **Business Risk Evaluation (BRE) Score,** Assess condition of system assets, *System risk score*
7) **Staffing,** Staffing levels and training maintained to meet level of service, *Number of open positions, annual training hours.*

The Probability of Failure (POF) and Consequence of Failure (COF) 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 annual Long-Range Planning (LRP) process with WRC, Commerce Township and its customers.

C. Criticality of Assets

WRC uses asset optimization software Power Plan AMP (previously known as RIVA) to assist with prioritization of cost-effective maintenance strategies and capital improvement planning. The software syncs with both the GIS geodatabase and the Cityworks software packages.

Base line Probability of Failure (POF) and Consequence of Failure (COF) factors that WRC configured into the Power Plan software as part of the "Common to All" approach was used to estimate the overall risk of the wastewater collection system assets. For pump stations, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

The assets that have the greatest probability of failure and the greatest consequences associated with the failure will be the assets that are the most critical. Assets with the highest risk scores are likely candidates for immediate rehabilitation or replacement. Assets with lower scores should to be analyzed to develop the best life cycle strategy. The Business Risk Evaluation (BRE or Risk) score is the product of the POF and COF, as shown below:

BRE (Risk) = POF x COF

Using the WRC Common to All approach, the POF scoring factors for sanitary sewers (from highest to lowest weight) are the NASSCO Quick Structural Rating (QSR), NASSCO Quick Maintenance Rating (QMR), and the percent of useful life remaining, based on age and material. Pipes not inspected use only age and material as a preliminary score. Therefore, sewers with defects found during inspection and the oldest sewers will have the highest POF scores. Because only a portion of the sewerage system has been inspected, the final POF scores are still being developed.

Using the WRC Common to All approach similarly for the COF, the scoring factors for sanitary sewers (from highest to lowest weight) are the depth, diameter, water table (based on NASSCO infiltration defects found during televising) and proximity to a flood zone and major roadway. Therefore, sewers with the highest COF scores would be the larger, deeper sewers, particularly those located in floodplains, high water, or under roads.

By multiplying the POF and COF, the product becomes the Business Risk Evaluation score, or BRE. Therefore, the most “critical” sewers, or those with highest risk, would be the larger diameter pipes that have been televised with defects found, and that are deep.

The vertical assets, pump stations & major assets within the CWWTP were scored for POF based on the asset’s physical condition (60%), O&M protocols (25%), and performance (15%). The COF scores were based on the safety of the public and employee (25%), financial impact (15%), public confidence (10%), regulatory compliance (30%), and firm capacity (20%). Therefore, the most “critical” pump stations are those that have a lower physical condition and have higher firm capacities or more regulatory issues.

D. O&M Strategies and Revenue Structure

O&M strategies for the system were reviewed against the "Common to All" approach developed by WRC. These include determining future sewer cleaning and televising frequency, inspection & maintenance procedures for pump stations and the wastewater treatment plant. Costs required to implement the selected strategies were estimated and incorporated into the rate review process for the system. Commerce Township, Utility Financial Solutions, the OCWRC, and Oakland County's Fiscal Services staff all worked together to determine if the 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. The Power Plan software provides estimated annual maintenance and capital needs for each fund, which is then reviewed by WRC staff and Commerce Township.

The WRC prepares a budget for Commerce Township for operations of the overall sanitary sewer collection system. This includes system assets such as pipe, manholes, lift stations and numerous assets within the wastewater treatment plant. Commerce Township also has a budget for debt and other items. The two budgets noted above were pieced together as Commerce Township contracted with Utility Financial Systems, LLC (UFS) to prepare a SAW Grant Rate Methodology report. The UFS report balance sheet shows there is no revenue gap for budget. The rate methodology calculated by UFS under MDEQ requirements compared to the current approved rates confirm that there should not be a revenue gap compared to budgeted revenues. Also, per MDEQ SAW Grant requirements, this rate methodology demonstration of rate sufficiency was submitted to the MDEQ in April 2017 and was approved in May 2017.

E. Long Term Funding / Capital Improvement Plan

The Capital Improvement Plan (CIP) identifies system upgrades, 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. On behalf of Commerce Township, Giffels Webster prepared a CIP that covers capital improvements to a) improve the condition of the existing collection system, b) major maintenance to the existing collection system, and c) capital improvements to increase capacity or improve condition of the future collection system. The WRC as the system operator also utilizes Power Plan to model asset deterioration and assist with identifying capital improvement needs for the near and long term. Costs for anticipated capital projects in the near term are also incorporated into the rate process. A summary of the Capital Improvement Projects is listed below:

Capital Projects, 0 to 5 years

2018 – Approx. total $5,095,000

- Sleeth Road MH Rehabilitation
- Sleeth Road Vortex Unit Study
- Continue with update of AMP
- Township Sewer Extension Study
- Pump Station Capacity Study
- WWTP Ventilation Improvements
- WWTP Power Supply Improvements
- WWTP Channel #5 Improvements
- Newton Road Force Main
- General Engineering & System Assessment

2019 – Approx. total $2,995,000

- Sewer extension @ Lake Sherwood / gravel pit area
- Haggerty Road Pump Station Abandonment
- Huron River Sewer Rehabilitation
- WWTP – Rehabilitation of remaining channels and wet well
- General Engineering & System Assessment

2020 – Approx. total $700,000

- Odor control and H2S study at various locations
- Add redundant Welch Road Force Main between Pontiac Trail and Easy Street
- General Engineering & System Assessment

2021 – Approx. total $825,000

- Reline portions of the deteriorated pipes in Section 36
- General Engineering & System Assessment

2022 – Approx. total $525,000

- WWTP Sewer Line Rehabilitation
- Replace Pumps at Oakley Park Pump Station

- General Engineering & System Assessment

Capital Projects, 6 to 10 years

- Oakley Park Road Force Main
- Diversion Sewer at Wise Road & Huron River
- Install Carey / Commerce Booster Station
- Upgrade Huron River Pump Station

Capital Projects, 10 to 20 years

- Additional Capacity to Welch Road Sanitary Gravity Trunk Line

F. Certification of Project Completeness & Project Contact Information

A signed Certification of Project Completeness form is attached.
Contact information for the grantee including name, address, and phone number is included below:

Primary Contact Name:

Mr. David Scott, Township Supervisor

2009 Township Drive, Commerce Township, MI 48390

Phone: 248-970-7070

System Manager:

Mr. Tim Prince, PE, Chief Manager

WRC Office, One Public Works Drive, Building 95 West, Waterford, MI. 48328

Phone: 248-858-1069

WRC Project Manager:

Mr. Navid Mehram, PE, Manager

WRC Office, One Public Works Drive, Building 95 West, Waterford, MI. 48328

Phone: 248-452-9245

Consultant Name:

Mr. Jason Mayer, PE, Partner

Giffels Webster, 1025 E. Maple Road, Birmingham, MI. 48009

Phone: 248-852-3100

G. Grant Amounts

On November 12th, 2014, a SAW Grant was awarded to Commerce Township in the amount of $989,496. This amount was determined by using the total eligible amount of $1,099,440 and subtracting the amount of required 10% match of $109,944. The SAW Grant Agreement Period ran January 2013 through October 2017.

An overall breakdown of the total approved SAW amount is as follows:

Projects #1 & #2 - Wastewater System Asset Management Plan

(1) AMP for Sanitary Sewer System - $694,000

(2) AMP for CT Waste Water Treatment Plant - $265,000

Projects #3, #4 & #5 - Wastewater Planning & Design Activities

(3) CTC PS Abandonment - $45,440

(4) Welch PS Abandonment - $32,000

(5) Haggerty PS Abandonment - $63,000 (this project amount was transferred to Project #1).

H. Summary of Assets in the Commerce Township Sewage Disposal System

Horizontal Assets:

Gravity Sewer Main________________________383,510 Lineal Feet (LF)
Sewer Manhole____________________________1,826 each
Non-gravity Sewer Main (Force Main)_________294,765 LF
Sewer Access Point_________________________513 each
Sewer Fitting______________________________5,269 each

Vertical Assets:

Lift Stations_______________________________28 each
Sewage Treatment Facility (CWWTP)__________1 each
Grinder Pumps_____________________________1211 each

Note the following:

'Sewer Manholes' are located on gravity mains.
'Access Manholes' are located on force mains.
'Sewer fittings' include: barrel tap, bulkheads & plugs, increaser/reducer, cross fittings, tapping sleeves, tees and wyes.

DEQ

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

Completion Date OCTOBER 29, 2017
(no later than 3 years from executed grant date)

The CHARTER TOWNSHIP OF COMMERCE *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1021-01 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 15, 2017.
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: 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:

DAVID SCOTT at (248) 960-7070 dscott@commercetwp.com

Name | Phone Number | Email

[signature] 10-25-17

Signature of Authorized Representative (Original Signature Required) | Date

DAVID SCOTT, TOWNSHIP SUPERVISOR

Print Name and Title of Authorized Representative

Ms. Nickols:

This memorandum provides the summary of the Comstock 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 MDEQ guidance.

Grantee Information

Grantee:
Charter Township of Comstock
6138 King Highway
Kalamazoo MI 49048
http://www.comstockmi.gov

Contact: Mr. Scott Hess, Township Superintendent
Phone: 269-381-2360

SAW Grant Project Number: 1461-01

Executive Summary

The Charter Township of Comstock received a SAW Grant in October 2014 to prepare a Wastewater and Stormwater Asset Management Plans. The Grant agreement indicated the following amounts:

	Project Total	Grant Amount	Local Match
Wastewater AMP	$811,001	$729,901	$81,100

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 inventories. 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 adjusted with survey grade Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, 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.

Location of non-pipe assets, such as, lift station components, building components, and other equipment is 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 condition, 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
75%	17%	6%	1%	1%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. Comstock'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
54%	18%	14%	14%	0%

Manholes: Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, structures, and infiltration.

Percentage of manholes in each rating category

1	2	3	4	5
0%	83%	12%	4%	1%

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	5	3	2	0

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 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 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 the Kalamazoo River, northwest of the intersection of Gull Road and Sprinkle Road, and "H" Avenue.

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 acts as stewards of the system. The Township has held a series of public meetings and workshops with the Township staff. At these meetings, the results of the condition assessments were discussed, the costs for various OM&R 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. 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 our 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 showing project descriptions, cost estimates, and project timelines, was developed for the capital improvements needed within a ten year planning period. The wastewater system projects identified in the CIP are:

- Two (2) Point repairs to fix infiltration
- Three (3) Point repairs to fix utility penetrations
- Nine (9) Point repairs to repair broken or deformed pipes
- Three (3) Sewer lining projects to address corrosion of concrete pipes
- Various lift station projects

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Comstock's major assets include:

- 10 lift stations
- 278,656 feet of 8" to 54" diameter gravity sewer; 236,865 feet (8-inch to 24-inch) is owned by Comstock Township's and the remaining 41,791 feet (10-inch to 54-inch) are interceptor sewers that serve multiple jurisdictions, including Comstock Township
- 13,251 feet of 2" to 10" diameter force main
- 1,019 manholes

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Charter Township of Comstock (legal name of grantee) certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1461-01 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: April 27, 2017.
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:

Randy L. Thompson at 269-381-2360

Name | Phone Number | Email

Randy L Thompson 10-30-17

Signature of Authorized Representative (Original Signature Required) | Date

Randy L. Thompson Supervisor

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Village of Constantine

SAW Project No. 1565-01

VILLAGE OF CONSTANTINE
1828 MEEKS MILL

FINAL
October 2017

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Executive Summary

Overview

Public Act 562 of 2012 authorized money for the Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In October 2014, the Village of Constantine received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1565-01, 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 Constantine AMP is:

Mark Honeysett, Village Manager
115 White Pigeon Street
Constantine, MI 49042
Phone number: 269.435.2085
Email: mhoneysett@comcast.net

Asset Inventory and Condition Assessment

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

- Collection system piping system and manholes
- Sanitary sewer lift stations in the collection system

The wastewater collection system assets consist of approximately 106,171 feet (20 miles) of sanitary sewers (69,263 feet of gravity pipe and 36,908 feet of forcemain) and 292 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 Village's wastewater treatment plant is no longer in operation. In 1998 the Village built 7 miles of forcemain and has a contractual agreement with the City of Three Rivers to treat their wastewater. This agreement is currently up for consideration as well as an option for the Village to construct their own wastewater treatment plant in the future.

There are 3 sanitary sewer lift stations located throughout the wastewater collection system.

Asset Identification and Location

A comprehensive wastewater 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, manhole assessments, 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 CAD drawing and an asset inventory for archiving, mapping, and further evaluation purposes. The inventory includes over 154 lift station assets, and 590 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 all 292 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 20% of the gravity pipe. Smoke Testing and Capacity Analysis were not performed on the system. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance, with 80% of the system tagged for inspection and/or cleaning. Replacement accounted for 5% of the system, rehabilitation accounted for 15% of the system, identifying the need for point repairs and lining.

Overall, the condition of the force main to Three Rivers is in good condition and should undergo regular maintenance. Air release valves have required more frequent maintenance and will continue to do so.

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.

Level of Service

Defining the Expected Level of Service (LOS)

Throughout the development of this AMP, F&V worked with the Village Asset Management Team to develop the following LOS statement and goals. The following statement was reviewed with the Village administration.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Constantine 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.
- Actively maintain collection and lift station 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 lift stations and 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 the wastewater system.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of the 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

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; 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 asset inventory spreadsheet. 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. Seventeen pipe segments in the collection system have an extreme risk rating and are recommended to be replaced. The Village will coordinate the replacement of these pipes during street reconstruction projects in the short-term 1-5 year rehabilitation strategy. Two pipe segments have a high risk rating and will be considered for repair. Much of the collection system's gravity pipes, 70 percent as shown in Figure 1, have a low to negligible risk rating.

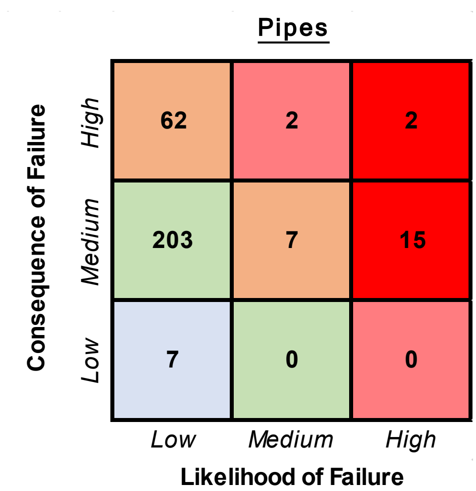


Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. Thirteen manholes are identified as extreme risk and are recommended for lining or replacement. The Village will coordinate the replacement of these manholes during street reconstruction projects in the short-term 1-5 year rehabilitation strategy. Fifty-two manholes are identified as high risk and will be considered for repair or lining in the short-term 1-5 year rehabilitation strategy. Many manholes are at low to medium risk and recommended to be included in a long-term 6-20-year rehabilitation strategy.

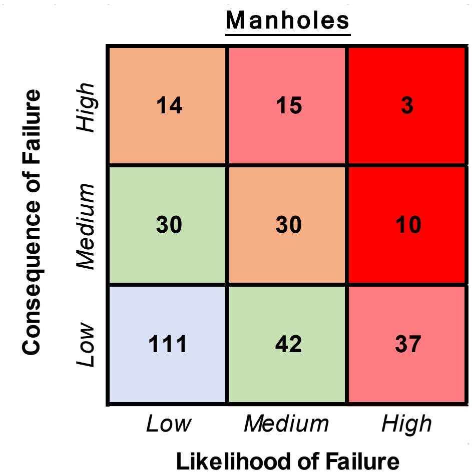


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. No assets scored in the extreme category. Thirty-four assets were identified as high risk and will be considered in the short-term 1-5 year rehabilitation strategy. Assets in the medium and low risk categories will be considered in the long-term 6-20 year rehabilitation strategy.

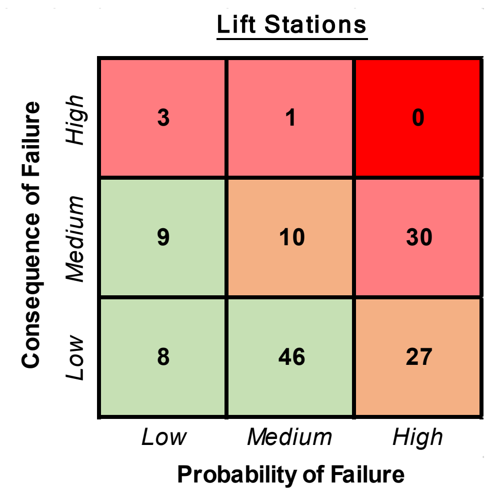


Figure 3. Business Risk Matrix (Risk Rating) for Lift Station assets

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

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. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. A short-term 1-5 year and long-term 6-20 year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system. The 5-year CIP rehabilitation total is $1,112,327 for the collection system and $613,550 for the lift stations. The 5-year CIP for the collection system and the lift stations can be found in Table 1, below.

Table 1. Capital Improvement Plan Summary by Year						
Project Description	**Rehabilitation Fiscal Year**					**Total**
	2017	**2018**	**2019**	**2020**	**2021**	
Collection System Improvements						
Point Repair/Line	$ 40,100	$ 41,000	$ 41,000	$ 36,000	$ 36,013	$ 194,113
Replacement	$ 140,000	$ 140,000	$ 132,000	$ 140,000	$ 140,984	$ 692,984
MH Replace	$ 13,000	$ 13,000	$ 13,000	$ 14,000	$ 13,950	$ 66,950
MH Repair/ Line	$ 32,000	$ 32,000	$ 32,000	$ 31,000	$ 31,280	$ 158,280
SubTotal Collection System Improvements	**$ 225,100**	**$ 226,000**	**$ 218,000**	**$ 221,000**	**$ 222,227**	**$ 1,112,327**
Lift Station Improvements						
Low Lift Station VFDs	$ -	$ -	$ -	$ 10,380	$ -	$ 10,380
Intermediate Booster Station Rehabilitation	$ -	$ -	$ -	$ 380,000	$ -	$ 380,000
High Lift Station Rehabilitation	$ -	$ -	$ -	$ 486,000	$ -	$ 486,000
Generator, High Lift	$ -	$ -	$ -	$ 164,450	$ -	$ 164,450
Automatic transfer switch, High Lift	$ -	$ -	$ -	$ 5,720	$ -	$ 5,720
SubTotal WWTP & Lift Station Improvements	**$ -**	**$ -**	**$ -**	**$ 1,046,550**	**$ -**	**$ 1,046,550**
Alternative Improvement (Not Included in total Project Cost)						
New WWTF						$12-18 Million
Total Project Cost	***$ 225,100***	***$ 226,000***	***$ 218,000***	***$ 1,267,550***	***$ 222,227***	***$ 2,158,877***

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.

A preventative maintenance program to systematically clean, inspect and CCTV inspect pipes and manholes to NASSCO-certified standards is critical for a sound collection system. The process of cleaning and inspecting pipelines and manholes either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines and manholes be cleaned and televised every five years, or that 20% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects.

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, 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.

A study was conducted by the Village to develop a financial projection to meet the Michigan Department of Environmental Quality SAW Grant requirements. They received MDEQ approval of their rate methodology on August 11, 2017.

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 Village has consistently increased their rates over the years to cover any revenue gaps identified in their rate studies. The last rate increase took place in 2015.

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The **Village of Constantine** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1565-01** 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**

   If No - Date of the rate methodology approval letter: **N/A.**

2) Significant Progress Made: **Yes**

   (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: **August 11, 2017.**

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on JULY 6, 2015.

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:

Mark Honeysett	at 269-435-2085	mhoneysett@comcast.net
Name	Phone Number	Email

	10/31/17
Signature of Authorized Representative (Original Signature Required)	Date

Mark Honeysett, Village Manager

Print Name and Title of Authorized Representative

COTTRELLVILLE TOWNSHIP
STORMWATER, ASSET MANAGEMENT, AND WASTEWATER (SAW) GRANT 1536-01
EXECUTIVE SUMMARY
10/30/2017

Cottrellville Township
Supervisor Mary Agnes Simons
supervisor@cott-township.org
7008 Marsh Road
Cottrellville, MI 48039
Phone: (810) 765-4730
Fax: (810) 765-2203

Huron Consultants
Eric J. Ostling, P.E., C.F.M.
eostling@huronconsultants.com
858 Lake Nepessing Road
Lapeer, MI 48446
Phone: (810) 966-0680
Fax: (810) 966-0681

EXECUTIVE SUMMARY

Cottrellville Township (Cottrellville), with the aid of Huron Consultants (Huron), has completed the requirements of the Stormwater, Asset Management, and Wastewater (SAW) Grant for Wastewater, awarded by the State of Michigan Department of Environmental Quality (MDEQ). The Grant was awarded in October of 2014, in the amount of $310,000.00, with a local match of 10%, equating to $31,000.00, a total reimbursement of costs totaling $279,000.00, and with a timeline of 3 years to complete the requirements by October 31, 2017.

Beginning in 2014 with the SAW Grant award, Cottrellville and Huron began to work on the plan set forth in the SAW Grant application. This Executive Summary will highlight methodology for the development of the following five (5) major components of the Wastewater Asset Management Plan (AMP):

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 major components were comprised of multiple Tasks to methodically build the AMP, which is submitted with this package. Each of these components is expanded upon later in this report.

ASSET INVENTORY AND CONDITION ASSESSMENT

Cottrellville operates and maintains a waste water collection system initially constructed in 1971 under the authority of the St. Clair County Board of Public Works. The inventory of the system began in 2014 upon award of the Grant, with the aid of record documents and a comprehensive history of the initial system and all subsequent improvements. Huron surveyed the entire system, and created maps using AutoCAD Civil 3D software. The information derived from that survey was compared with the records, and a comprehensive inventory of the system was created:

Asset Inventory:
173 Each Sanitary Structures
5 Each Pump Stations and Appurtenances
739’, 4” Forcemain and Appurtenances
2,449’, 6” Forcemain and Appurtenances
1,275’, 8” Forcemain and Appurtenances
16,064’, 8” Vitrified Clay Pipe (VCP) Sewer
2,174’, 10” VCP Sewer
1,766’, 10” Reinforced Concrete Pipe (RCP) Sewer
8,351’, 12” RCP Sewer
5,943’, 15” RCP Sewer
1,338’, 18” RCP Sewer

From that inventory, Huron had prepared plans and specifications to publicly bid the cleaning and televising of the system. The bid package was released March 26, 2015. Unfortunately, due to the high demand for these services by all other SAW Grant recipients, the bids came in over budget. The bid package was revised and released May 19, 2015, after which the Contract was awarded to United Resource, LLC. The cleaning and televising of the manholes and gravity sewer pipe was completed in the Fall of 2016. Huron used the data delivered by United Resource, LLC to assess the overall rating of the system, and focus on areas requiring improvements.

All pertinent Cottrellville and Huron personnel received required National Association of Sewer Service Companies (NASSCO) training and certifications. The NASSCO standards used in the development of the deliverables by United Resource made for a simple transition and assessment of data, for the pipe and manhole reports, pictures and videos. Huron used the data to categorize the Criticality of Assets, and Capital Improvement Plan (CIP), each covered later in this report.

The reports for the manholes and pipe sections used the NASSCO standards for rating the condition of the assets. Most of the gravity system was found to be structurally sound and with a low rating for structural, operation and maintenance concerns. There were several sections of gravity sewer found to have evidence of infiltration during dry weather conditions, and some structural deficiencies.

Roughly half of the gravity collection system, 18,238’ of the 35,636’, is Vitrified Clay Pipe (VCP). Being constructed over 40 years, there are expectedly issues regarding joint infiltration, and some structural issues.

Cottrellville purchased as part of the Grant, a Dell laptop with ESRI ARC-GIS software. The wastewater system map was exported from AutoCAD to be imported into ARC-GIS as a shape file. The pertinent reports from United Resource, in PDF format, can be linked to the respective shapes in ARC-GIS, such as manholes and pipe sections, for ease in reference to said reports. There are many sources of reference which can be assigned to the shapes in ARC-GIS.

Cottrellville will link ARC-GIS with the St. Clair County Geographic Information Systems (SCCGIS) Department, so that there will be layers on the County GIS website which will illustrate the wastewater system. The general public would not be able to access the background wastewater system information, only authorized County and Cottrellville personnel.

This AMP was developed from the Asset Management Plan Workbook form in Microsoft Excel format provided from the MDEQ website. Huron has used the AMP Workbook for water systems for years, and it was simply altered to be specific to the Cottrellville wastewater system. The AMP Workbook Table 1 - Asset Inventory complimented the Condition Assessment by providing the methodology to rate the criticality of each major system component at a glance, being pump stations and forcemains and appurtenances, gravity sewer collection system, and manholes.

Cottrellville knows well which portions of the system should require critical attention, each of the five (5) pump stations being the most critical to system performance. The Pump Station dry wells, pumps, and most of the appurtenances are over 40 years old, and are over-due for significant improvements. The forcemains were not televised, due the prohibitive cost of by-pass pumping in order to clean and televise, so those costs have been taken into consideration for the Conceptual Construction Cost of each Pump Station.

The AMP and CIP illustrate the scope of the proposed improvements, with a 10-year plan and beyond, to rate and address all aspects of the system which may require maintenance.

LEVEL OF SERVICE

Directly from the SAW Grant Application, 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 will become a fundamental part of how the utility is operated.

The Level of Service Statement was taken directly from the Sewer Use and Rates Ordinance:

> The Township shall be responsible for the supervision and control of the maintenance of the existing sewer line and all new connections. The Township shall be responsible for the supervision and control of all other matters related to the operation, maintenance, alteration, repair, and management of the wastewater treatment works. The Township may employ such person or persons in such capacity or capacities as advisable to carry out the efficient management and operations of the system and may make such necessary or recommended rules, orders and regulations to assure the efficient management and operation of the system, including the setting of rates, surcharges, fees, penalties, or other charges, for the use of said system.

A public hearing was held at the Cottrellville Township Hall on July 26, 2017, at which time the Cottrellville Board, pertinent Cottrellville staff, Huron and the public in attendance discussed what was involved with the SAW Grant, development of the AMP, CIP, Budget and Rate Structure.

Cottrellville Township already had in place a Resolution of Sewer Rates & Connection-Right Charges, Debt Service Charge, Penalty Connection-Right Charge and Use Factors, and also a Sewer Use and Rates Ordinance. These documents were updated, and adopted by the Board on August 9, 2017. This finalized AMP was adopted by the Board on October 19, 2017. All adopted documents are provided with the enclosed Certification of Project Completeness.

CRITICALITY OF ASSETS

As said above, the Criticality of Assets developed in the AMP Workbook complimented our Asset Inventory and Condition Assessment, as the AMP Workbook Table 1 – Asset Inventory provides an overall view of the system at a glance. Huron had developed an expanded Asset Inventory in Microsoft Excel, in which the ratings from the United Resource reports were entered in order to categorize which larger sections of the system might require improvements for the CIP.

Table 1 – Asset Inventory, and Table 2 – Asset Description, were used to assign the values of Condition, Probability of Failure, and Criticality of Asset, to arrive at the Business Risk of the failure of each component. Each Pump Station and Appurtenances shall be considered most critical, as any of the pump stations that becomes inoperable would cause a threat to Public Safety and Welfare, and cause a hardship to Cottrellville to provide emergency maintenance, by-pass pumping, or both, at a significant cost.

The Forcemains associated with each Pump Station would be the next critical elements, for the same reasons stated above—emergency maintenance and/or by-pass pumping would be required, and costly.

Each manhole and section of gravity sewer pipe would be less critical, though a total collapse or blockage of any of those elements may lead to the same emergency maintenance and/or by-pass pumping. This may seem redundant, but it is the reality.

The criticality of each component in the system has determined where in the CIP 10-year plan to place the most emphasis on preventive maintenance, and will be covered under the CIP.

Cottrellville received a Second Violation Notice No. SVN-00613 from the MDEQ on April 11, 2017, and a follow-up letter April 25, 2017. There had been a back-up in the sewer system, when wet-weather-induced infiltration caused the flow in the gravity collection system to exceed the capacity of one or more of the Pump Stations. Huron replied to the MDEQ May 12, 2017 in a letter on behalf of Cottrellville. The 2016 televising and rating of the gravity sewer system by United Resources during dry weather conditions identified only a couple of dozen pipes exhibiting infiltration, of the 372 lengths of pipe televised. As previously stated, roughly 50% of the gravity sewer is antiquated VCP, with the potential for joint failures, infiltration, or even more significant structural deficiencies. This moves all VCP sections higher on the list of preventative maintenance measures such as slip-lining, to be covered under the CIP, later in this report.

Cottrellville purchased four (4) each MACE FloProXCi metering systems, which were installed in the wet wells of Pump Stations 2, 3, 4 and 5. Pump Station 1 has a meter downstream, prior to the discharge of Cottrellville wastewater to Marine City for treatment. The meters have been operated, maintained and monitored regularly. Pump Stations 3 and 4 have been providing reliable data since installation. At Pump Stations 2 and 5, the meters have been less reliable, and control cards were replaced in the attempt by the vendor to provide more reliable data. It has been evident that the flows at all of the Pump Stations have increased during wet weather versus dry weather. This validates the theory that there is infiltration in the system. October 16, 2017 all pump stations provided good data, corroborating the model of the wastewater system, which was developed in EPA SWMM 5.1 software.

OPERATION AND MAINTENANCE STRATEGIES/REVENUE STRUCTURE

Operation and Maintenance (O&M) Strategies have been discussed at length, culminating in the projects identified in the CIP. The Pump Stations, being the most critical elements identified in the system, require immediate improvements. Elimination of known or potential Inflow and Infiltration (I&I) into the system will be the next priorities. The CIP will address the two (2) major options in the courses of action to take: slip-lining of the sections of VCP at priority locations only, versus slip-lining of large blocks of VCP in the system each year. This may mean the difference between internally funding annual improvement projects, versus seeking supplemental external funding, specifically the State Revolving Fund Program.

In 2017 Cottrellville hired a new Department of Public Works (DPW) Superintendent and Operations Technician. Cottrellville has already benefitted by this change in the DPW personnel, who are experienced, knowledgeable, and motivated to improve the Level of Service, and proactive in the areas of O&M, where past DPW personnel may not have been.

Improving the reliability of the Pump Stations, and significant reduction in the potential for I&I, will be the right combination to improve the economy and efficiency of the system O&M moving forward. One proactive measure taken by the DPW has been the lowering of the float switches in the Pump Station wet wells, so that now the pumps turn on earlier in the event of a rise in the flow or water level, and the inlet pipes do not surcharge. This immediately created capacity in the larger diameter wet well structures. Cottrellville has reported no problems with surcharging in the system since those proactive measures were taken.

Much deliberation has been put into how to fund the proposed CIP and future O&M of the system. Evaluation of the Sewer Fund Budget and Rates began in 2014, though Asset Inventory and Condition Assessment were the focus for 2015 and 2016. In March 2017, after the Fiscal Year (FY) 2016-17 figures were finalized, it became clear the Sewer Fund operated in a deficit. This is contrary to the requirements of the Enterprise Fund, so Rate Structure became the focus. One requirement of the SAW Grant was to identify and take measures to begin to rectify budget deficit prior to finalizing the AMP. In FY2016-17, Total Estimated Revenues were $148,712.00, and Total Appropriations were $188,078.00, for a deficit of $39,366.00. As is the case in many municipalities, that deficit was covered out of the General Fund.

To balance the Budget, AMP Workbook Table 4 – Rate Methodology was a useful tool in beginning the analysis of raising either the variable Usage Rates, and/or the Sewer Fixed Fee. Table 8 – Sewer Rate Structure Methodology, was developed as a basis to aid in the completion of Table 7 – Ten Year Budget. On June 24, 2017, Huron sent a letter to the Cottrellville Board, and copied the MDEQ, outlining this basis of Rate Structure. As this final submitted AMP Table 8 will illustrate, to close at least 10% of the Budget Deficit by the third year of the SAW Grant, October 31, 2017, Cottrellville opted to raise the Sewer Rate by 25%, from $5.00 to $6.25, which was adopted by the Board August 9, 2017. Based upon the same Sewer Usage as FY2016-17, the budget gap should be closed well over 10%, possibly entirely, for FY 2017-18. With the next raise in the Sewer Rate to take effect in FY2018-2019, based upon the same Total Appropriations and Sewer Usage, Cottrellville should begin to build a Budget Surplus.

LONG-TERM FUNDING/CAPITAL IMPROVEMENT PLAN

In the short-term, Cottrellville anticipates needing to pursue external funding for the CIP project for improvements to the Pump Stations, estimated to be $100,000.00 each. It would be prudent to improve each Pump Station in succession, possibly beginning with Pump Station 5, and working in order down the line to Pump Station 1. A total Construction Cost of $500,000.00 is not feasible to fund internally at this time. Cottrellville's preference would be to continue to partner with the State of Michigan Revolving Fund Program, and if necessary also pursue the United States Department of Agriculture (USDA) Rural Utilities Service (RUS) funding.

Long-term funding of the CIP projects may be feasible internally, if the Sewer Fund exhibits the projected Budget Surplus by the raising of the Usage Rates and Fixed Fees. However, Cottrellville may opt to levy against their assets to continue to pursue external funding through the SRF, and/or USDA.

The AMP Workbook, Table 6 – Capital Improvement Project Plan illustrates an overview of the information expanded upon in Table 6A. Huron has done their best to make sure all information is consistent across all Tables in the AMP. However, if there are any discrepancies between those Tables, they may be rectified in the future as the AMP evolves annually. Generally, Table 6A should be used to categorize the scope of work anticipated for any year. Tables 6 and 7 would require revisions.

The Pump Stations and Appurtenances improvements, with a Construction Cost Estimate of $500,000.00, have been considered the most critical. Cottrellville has time to further evaluate how to structure the annual improvements to the gravity sewer collection system.

Huron created the basis for the CIP cost estimates anticipating annual large-scale projects, slip-lining blocks of VCP and/or RCP per year. Once Cottrellville has a better idea of the Sewer Fund Budget Surplus, this can be re-evaluated for internal funding, or the pursuit of external funding.

If Cottrellville opts to pursue funding for the Pump Stations and the "Priorities" portion of Table 6A, the Construction Cost Estimate totals $654,785.00. The Amortization schedules used to complete Table 7 would require revisions.

CONCLUSION

Cottrellville is pleased to have this AMP in place to aid in the annual appropriations toward Capital Improvement Projects necessary to continue the O&M of the Wastewater System, with the mechanisms set in place to assure a balanced budget, if not a budget surplus. This AMP is a living document, to be evaluated every Fiscal Year when setting the budget.

Cottrellville looks forward to continuing to work with the MDEQ toward possible funding through the State Revolving Fund Program.

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

Completion Date October 25th, 2017
(no later than 3 years from executed grant date)

The Township of Cottrellville *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. ________ 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: May 17, 2017.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on August 9, 2017.

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:

Eric Ostling	at (810) 966-0680	ejostling@gmail.com
Name	Phone Number	Email

MaryAgnes Simons

Signature of Authorized Representative (Original Signature Required)

October 25th, 2017

Date

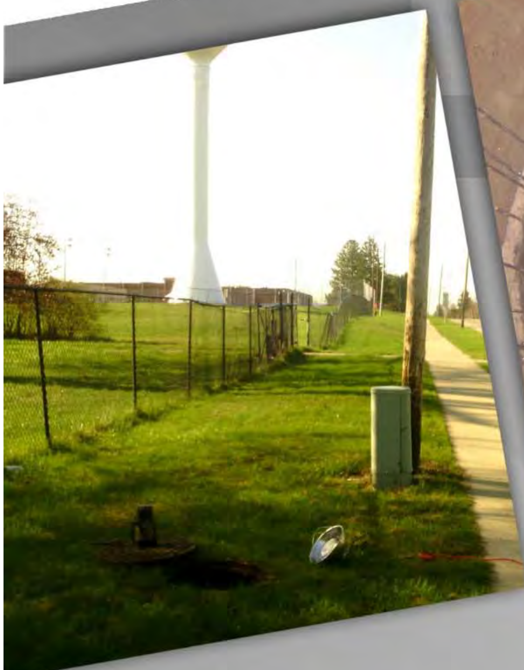
Mary Agnes Simons, Cottrellville Township Supervisor

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Executive Summary Report



Prepared for:

Covert Township

SAW Project No. 1632-01

FINAL
October 2017

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 May 2014, the Township received a Sewer and Wastewater (SAW) from the Michigan Department of Environmental Quality (MDEQ), project no. 1632-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Townships' 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 Covert Township AMP is:

Mr. Dennis Palgen, Township Supervisor
73943 Lake Street - P.O Box 35
Covert, MI, 49043
Phone number: 269.764.8986
Email: supervisor@coverttwp.org

ASSET INVENTORY AND CONDITION ASSESSMENT

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

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

The wastewater collection system assets consist of approximately 33,089 feet (6.27 miles) of sanitary sewers (gravity pipe and force mains) and 83 wastewater manholes connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the asset's use and maintenance.

The WWTS utilizes septic tank and drainfield technology as a means of treating the wastewater before it is discharged to groundwater. Monitoring wells are utilized to verify compliance with the groundwater discharge permit. The WWTS is permitted to discharge up to 62,000 gallons per day and 22.63 million gallons per year. The current annual average flow received by the facility is approximately 10.9 million gallons per year.

There are three sanitary sewer lift stations located throughout the wastewater collection system. The stations are submersible style stations.

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, 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 and Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on all 83 manhole structures and all three lift stations. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 100% of the gravity pipe. Smoke Testing performed on 100% of system to disclose location of inflow or infiltration. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 5.4% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 7.8% of the system identifying the need for point repairs and lining. The remaining 86.8% % of assets were placed in the 20+ year category.

Overall, the condition of the assets at the WWTS and lift stations ranges from new/excellent to poor (7% new/excellent, 68% good, 24% fair, and 1% poor). Ongoing repairs have helped to maintain the condition of many assets. Some assets are now near the end of their useful life and are deteriorated due to use and the harsh conditions associated with wastewater treatment. No immediate concerns were noted.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

The overall objective of the Township 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 Covert Township 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 capacity for all service areas.
- Comply with all local, state and federal regulations at all times.
- 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 lift stations.
- 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.

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
- Ability to Respond

<u>Criticality Results</u>
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. Two pipe segments in the collection system have a High risk rating and are recommended to be point repaired in the next 1-2 years. Much of the collection system's gravity pipes, 81.3 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition.

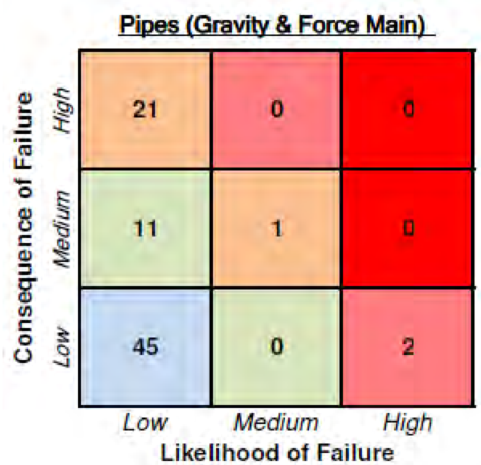


Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. Five manholes are identified as extreme risk and are recommended for repair and lining in the next 1-2 years**.** Many manholes are at low to medium risk and recommended to be included in a long-term rehabilitation strategy (91.8 percent).

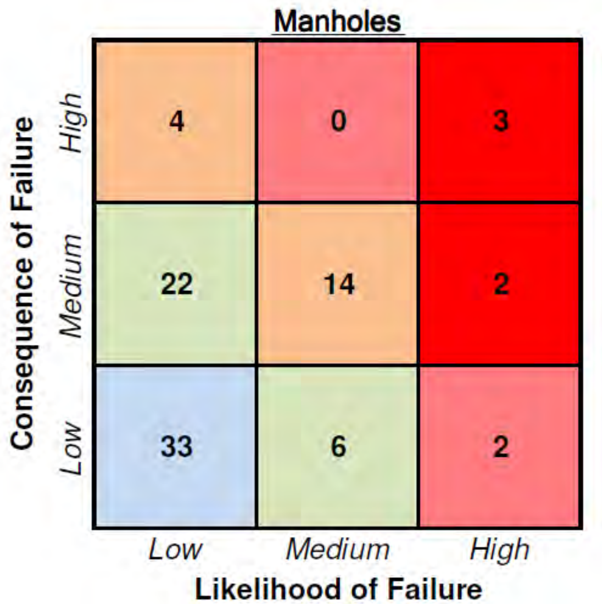


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTS and lift station assets. No assets are identified as extreme risk. The eight assets with high risk ratings should be inspected at regular intervals.

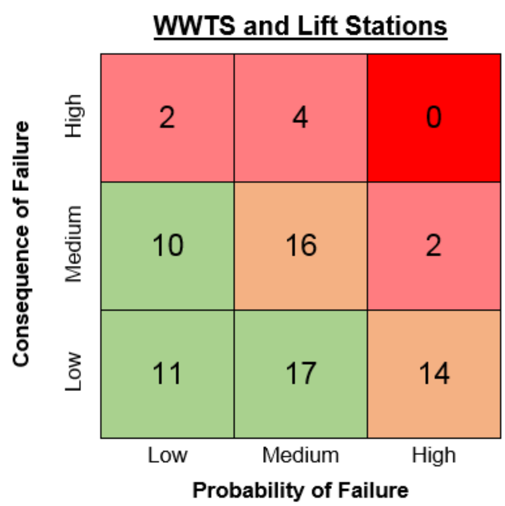


Figure 3. Business Risk Matrix (Risk Rating) for WWTS and Lift Station assets

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 Township's wastewater utility assets based on the Business Risk Evaluation (BRE). The CIP recommendations are provided for the collection system, wastewater treatment facility and pumping stations/force mains. A short-term (1-5-year CIP) and long-term (6-20-year CIP) was developed for the utility from the BRE. Table 4 and 5 show the rehabilitation costs for the 1-5 year Capital Improvement Plan for the collection system as well as the WWTS and Lift Stations.

Table 4. 5-Year Capital Improvement Plan: Rehabilitation										
Year	Asset	ID	Address	Rehab Actions	Cost	2018	2019	2020	2021	2022
1	Manhole	48	73650-73998 E Cemetery St	Replace Cover	$ 750	$ 750	$ -	$ -	$ -	$ -
2	Manhole	44	32596-33154 Orchard Dr	MH Repair	$ 500	$ -	$ 515	$ -	$ -	$ -
2	Manhole	63	32001-32575 M-140	MH Repair	$ 500	$ -	$ 515	$ -	$ -	$ -
2	Manhole	73	Van Buren Trail State Park	Repair MH	$ 500	$ -	$ 515	$ -	$ -	$ -
2	Manhole	4	74100-74736 34th Ave	MH Repair	$ 500	$ -	$ 515	$ -	$ -	$ -
3	Gravity Main	Pipe - (66)	Van Buren Trail State Park	Point Repair	$ 5,278	$ -	$ -	$ 5,595	$ -	$ -
3	Gravity Main	Pipe - (3)	74100-74736 Lake St	Point Repair	$ 5,278	$ -	$ -	$ 5,595	$ -	$ -
4	Manhole	58	Van Buren Trail State Park	Repair MH	$ 500	$ -	$ -	$ -	$ 545	$ -
4	Manhole	29	33615-33883 North St	MH Repair	$ 500	$ -	$ -	$ -	$ 545	$ -
TOTAL:						$ 750	$ 2,060	$11,190	$ 1,090	$ -

Table 5: Recommended WWTS and Lift Station Improvements			
Item No.	Improvement Description	Year	Estimated Cost (2017 Dollars)
1	WWTS Rehabilitation	2018	$226,000
2	Lift Station Rehabilitation	2018	$108,000
3	Lift Station Electrical and Controls Replacement Project	2024	$183,000
4	WWTS Mechanical Influent Screen	2027	$313,000

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 O&M 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.

A study was conducted by an independent municipal financial advisor (Utility Financial Solutions, LLC) dated April 3, 2017.

The rate methodology required by the MDEQ for SAW Grant 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 UFS showed 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 October 31, 2017
(no later than 3 years from executed grant date)

The Covert Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1632-01 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: May 16, 2017.
2) Significant Progress Made: 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: NA.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on NA.

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	at	Phone Number	Email
Daywi Cook – Township Clerk	at	(269) 764-8986 ext. 2	clerk@coverttwp.com

Dennis C Palgen 10/30/17
Signature of Authorized Representative (Original Signature Required) Date

Dennis Palgen – Township Supervisor
Print Name and Title of Authorized Representative

CRYSTAL FALLS TOWNSHIP
SAW GRANT ASSET MANAGEMENT PROJECT
ASSET MANAGEMENT PLAN SUMMARY

Crystal Falls Township
SAW Grant Asset Management Plan
Grant No. 1361-01
Tom Lesandrini, Township Supervisor
1384 West U. S. 2, P.O. Box 329
Crystal Falls, MI 49920
906.875.3062

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, the Township 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	20,385	LFT
Sanitary Force-Main	2,590	LFT
Manholes	89	EACH
Lift Stations	3	EACH

The breakdown of pipe sizing for the system is shown in Table 1.2:

Table 1.2: Sanitary Sewer Sizing Breakdown		
Pipe Diameter	**Length**	
6" Forcemain	2,590	LFT
6" Sewer Main	650	LFT
8" Sewer Main	11,730	LFT
10" Sewer Main	8,005	LFT

The Township has a minor amount of undersized sewer main remaining, with approximately 3% of their system being 6" gravity sewer main. Typically, new mains are not any smaller than 8" pipe due to the propensity for plugging issues and regulatory rules that require sewer mains to be at least 8" in diameter. The makeup of the sanitary sewer sizing is reflected in Figure 1.1 below:

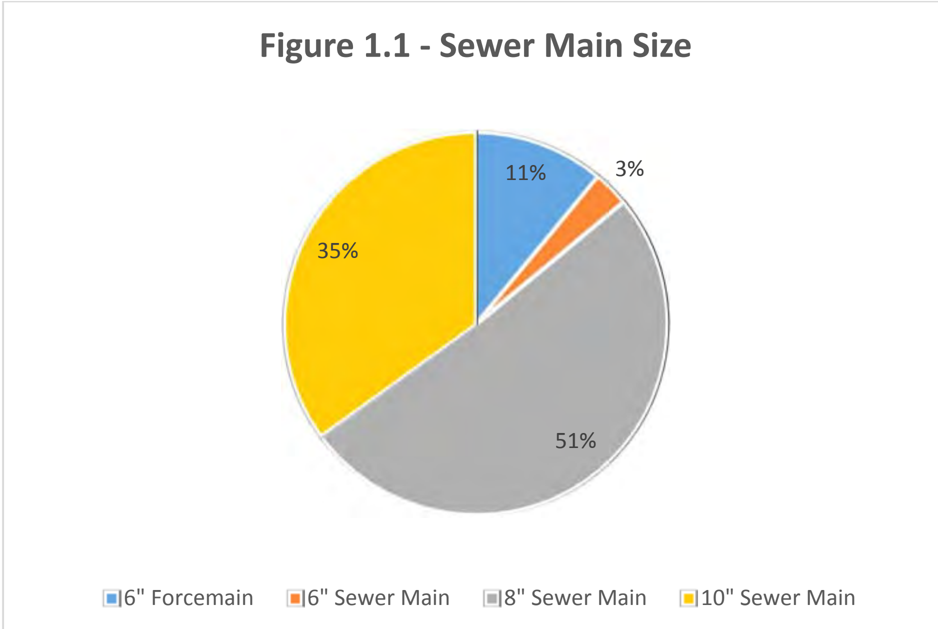
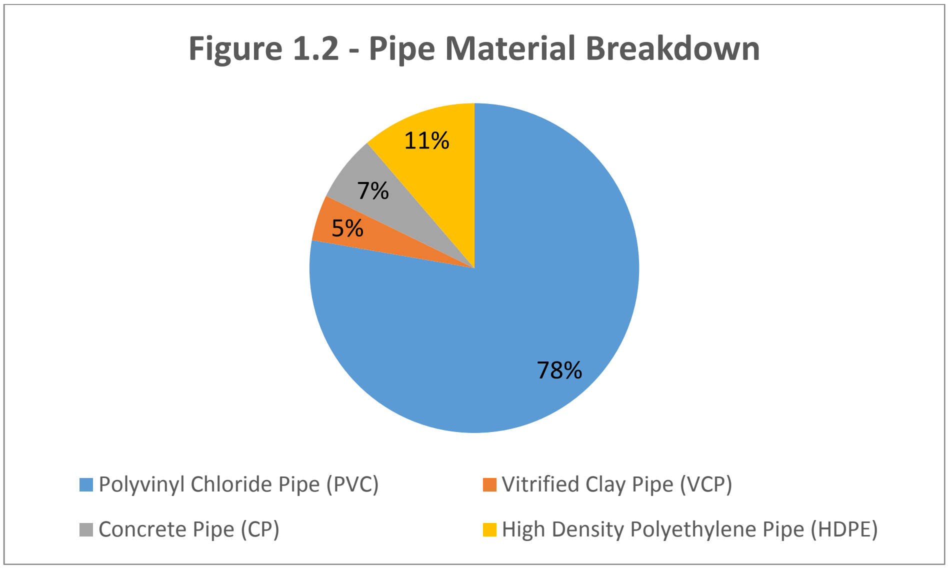


Table 1.3 indicates the quantity of each material making up the Township's sanitary sewer system:

Table 1.3: Sanitary Sewer Material Breakdown		
Pipe Material	**Length**	
Polyvinyl Chloride Pipe (PVC)	17,855	LFT
Vitrified Clay Pipe (VCP)	1,035	LFT
Concrete Pipe (CP)	1,490	LFT
High Density Polyethylene Pipe (HDPE)	2,590	LFT

A large portion of the Township's system (~89%) has been upgraded to a plastic product over the past 20 years. The newer plastic piping has a lower possibility of catastrophic failure from collapse or breakage, and newer pipes generally have a longer remaining service life. Approximately 12% of the Township's system consists of vitrified clay and concrete pipe. This type of pipe is significantly older than the plastic piping and more prone to failure due to age. Figure 1.2 provides a visual breakdown of the materials within the system.



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, as well as the asset's criticality, or consequence of failure. 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 the Township to prioritize those items where both condition and consequence of failure are used to determine areas of concern and prioritize maintenance schedules. The table below summarizes the condition rating assigned to the asset types listed:

Table 1.4: Condition Ratings - System Assets

Asset Type	Rated Condition				
	1	2	3	4	5
Sanitary Sewer Main (LFT)	18,630	1,625	1,405	1,315	-
Manholes	43	24	10	12	-
Lift Stations (overall)	-	3	-	-	-

The table above shows the majority of the Township's sewer system assets are in average to above average condition, none of the sewer main, manholes or lift station components that were evaluated are rated in as a 5. Additionally, only a small amount of sewer main and manholes were ranked as a 4.

Wastewater Asset Inventory

A complete inventory and condition assessment of all components of the Township's Sanitary Sewer System was conducted to gather information on the assets of the system. These assets are broken down into three categories: manholes, pipes, and lift stations. 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 Township's 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 were used to determine the condition of each section of pipe.

Lift stations were evaluated through various methods. Records research was performed to collect and determine existing information for each of the lift stations and a visual inspection of each lift station 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 performed initially 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 DPW staff to find and diagnose potential problems and to avoid future failures.

Table 6.1.1.1 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 C-1: Sanitary Sewer Manhole Inventory, Table C-2: Sanitary Sewer Pipe Inventory, and Table C-3: Sanitary Sewer Lift Station Inventory are enclosed with this summary include 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

In addition to the above Condition Rating, a Business Risk Factor rating was also assigned to each asset. This rating combines the condition and criticality ratings described above to give a business risk factor, 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. The Township has identified any items with a Business Risk Factor 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, and C-3 at the end of this summary.

Criticality of Assets

The Township'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 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

Typically, the most critical sections of the Township's system are located on the downstream sections of the system and on the line serving the Iron County Medical Care Facility and the main business district along Highway US-2. As you progress from the farther outstretches of the system, downstream, to the Township's tie-in locations with the City of Crystal Falls, 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. The Iron County Medical Care Facility is the Township's largest individual sewer contributor and contributes significant flows to the system. The Township's three sewer lift stations were also given higher criticality ratings as disruptions to these components typically are more expensive and difficult to repair. Areas of this system that were rated with lower criticality ratings are typically located on the outer edges, serve fewer customers, and have lower flows. Disruptions to these areas would affect less people and are generally easier to correct.

Level of Service Determination

The minimum level of service for the Township's 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 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, the Township 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.

Revenue Structure

The Township's current sanitary sewer rate is $52.00 per customer per month for up to 5,800 gallons (Basic Monthly Charge) of use and $8.97 per 1,000 gallons (Supplemental Monthly Charge) of use after 5,800 gallons. These amounts include the rates specified in the Township's Sewer Treatment Agreement with the City of Crystal Falls. The rate is made up of the following charges:

Table 7.1.1 Township Sewer Rate		
	Sewer Rate per Month	**Rate Description**
Debt Service Charge	$12.00	Rate per customer for Sewer System Debt, goes to City
Debt Reserve	$1.50	Reserve amount required by Bond, goes to City
Base Twp. OM & R	$24.85	Township Operation and Maintenance Costs
Base City OM & R	$13.65	130% of the City's Operation and Maintenance Costs, goes to City
Total Monthly Charge	**$52.00**	**Effective April 1, 2017 to March 31, 2018**

The Township's Resolution Establishing Rates, Charges, and Terms for the Sewer System Ordinance went into effect on May 31, 2010. Included in this resolution, is an Inflation Multiplier in which each year on April 1st, the Basic Monthly Charge and Supplemental Monthly Charge is increased the greater of 2.5% or the rate of inflation up to a max of 6%. This annual rate increase has allowed the Township to operate their Sewer Fund with a budget surplus.

Projected annual revenues for the Township's Sewer System are based on a projection of income from the Township's sewer rates and charges as described previous sections. Table 7.5.1 below is a summary of the revenues collected by the Township from the system's Residential and Other or Commercial users. A total of 234 Equivalent Dwelling Units (EDU's) were used in the revenue projections. An EDU is based on the average single family residential consumption rate of 5,800 gallons per month. Residential users are assumed to be one EDU while the EDU count for Other users is based on average water use during the past year.

Table 7.5.1 Annual Revenue Calculations

Established EDU Rate ==> ________ **Gal. per month**

Customer Info - Users:

Customer Type	***Users***	***EDU's***
Residential Users	74	74
Other Users	25	160
	99	**234**

Proposed 2017-18 Rate Structure

	Monthly Rate	***EDU's***	***Monthly Gallons***	***Monthly Revenue***	***Annual Revenue***
Residential	$ 52.00	74	429,200	$ 3,848.00	$ 46,176.00
Other Users	$ 52.00	160	928,000	$ 8,320.00	$ 99,840.00
Totals ==>				**$ 12,168.00**	**$ 146,016.00**

Capital Improvement Plan

Table 7.4.3 below is a summary of the capital improvements that the Township 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	
10-Year Capital Improvements Summary	
Location	**Estimated Construction Cost**
Lift Station Controls	$33,800.00
US-2 Sewer Repair	$84,500.00
Manhole Rehab	$24,700.00
0-10 Year Total ==>	**$143,000.00**
20-Year Capital Improvements Summary	
Location	**Estimated Construction Cost**
Sewer Main Replacement	$189,800.00
Lift Station Upgrades	$120,900.00
Lift Station SCADA Upgrades	$27,300.00
Tobin Alpha Sewer	$2,300,000.00
11-20 Year Total ==>	**$2,638,000.00**
Total ==>	**$2,781,000.00**

Recommendations

In general, the Township's Sanitary Sewer System is in good condition with approximately 78% of the gravity sewer and all of the lift stations and forcemain piping having been replaced in the last 20 years. The system components that are older than 20 years generally appear to be in good condition, with some minor exceptions noted.

Additionally, the Township's rate structure provides sufficient funds for proper operation and maintenance of the system and the annual rate increase the Township employs should keep sufficient funds in the sewer fund. It is recommended the Township review past and future expenses 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 Township'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 Township's major assets:

- Table C-1: Sanitary Sewer Manhole Inventory
- Table C-2: Sanitary Sewer Pipe Inventory
- Table C-3: Sanitary Sewer Lift Station Inventory

CRYSTAL FALLS TOWNSHIP
SANITARY SEWER ASSET MANAGEMENT PLAN
TABLE C-1: SANITARY SEWER MANHOLE INVENTORY

Inflation Rate 2.5%

Manhole Name	Installation Year	Street/Location	Manhole Diameter (Inches)	Depth	Remaining Useful Life	Condition Rating	Criticality Rating	Risk Factor	Replacement Cost	Replacement Year Cost
BL-1	1999	HARRISON AVENUE	48	6.22	75	2	2	4	$ 2,488	$ 15,854
BL-2	1999	HARRISON AVENUE	48	8.34	100	1	2	2	$ 3,336	$ 39,411
BL-3	1999	HARRISON AVENUE	48	7.93	20	4	2	8	$ 3,172	$ 5,198
BL-4	1999	HARRISON AVENUE	48	10.14	20	4	2	8	$ 4,056	$ 6,646
BS-2	1999	BATES STREET	48	9.51	100	1	4	4	$ 3,804	$ 44,939
CN-2	2003	CREDIT UNION WAY	48	10.15	100	1	1	1	$ 4,060	$ 47,964
DR-1	1999	Easement North of CFT Hall	48	8.83	100	1	5	5	$ 3,532	$ 41,726
DR-10	1999	Easement North of CFT Hall	48	6.71	20	4	5	20	$ 2,684	$ 4,398
DR-2	1999	Easement North of CFT Hall	48	6.85	100	1	5	5	$ 2,740	$ 32,370
DR-3	1999	Easement North of CFT Hall	48	6.75	100	1	5	5	$ 2,700	$ 31,897
DR-4	1999	Easement North of CFT Hall	48	6.77	20	4	5	20	$ 2,708	$ 4,437
DR-5	1999	Easement North of CFT Hall	48	10.66	75	2	5	10	$ 4,264	$ 27,171
DR-6	1999	Easement North of CFT Hall	48	5.31	20	4	5	20	$ 2,124	$ 3,480
DR-7	1999	Easement North of CFT Hall	48	6.78	20	4	5	20	$ 2,712	$ 4,444
DR-8	1999	Easement North of CFT Hall	48	6.97	20	4	5	20	$ 2,788	$ 4,568
DR-9	1999	Easement North of CFT Hall	48	5.52	20	4	5	20	$ 2,208	$ 3,618
FP-1	1999	FOREST PARKWAY	48	6.30	75	2	1	2	$ 2,520	$ 16,058
FP-2	1999	FOREST PARKWAY	48	7.41	100	1	1	1	$ 2,964	$ 35,016
FP-3	2003	FOREST PARKWAY	48	9.87	100	1	1	1	$ 3,948	$ 46,641
FP-4	1999	FOREST PARKWAY	48	10.70	50	3	1	3	$ 4,280	$ 14,711
FP-5	1999	FOREST PARKWAY	48	6.23	75	2	1	2	$ 2,492	$ 15,880
FT-10	1999	FOREST AVENUE	48	9.59	20	4	5	20	$ 3,836	$ 6,286
FT-11	1999	FOREST AVENUE	48	6.26	100	1	5	5	$ 2,504	$ 29,582
FT-12	1999	FOREST AVENUE	48	9.96	50	3	5	15	$ 3,984	$ 13,693
FT-13	1999	FOREST AVENUE	48	7.03	100	1	5	5	$ 2,812	$ 33,220
FT-14	1999	FOREST AVENUE	48	6.90	100	1	5	5	$ 2,760	$ 32,606
FT-4	1999	FOREST AVENUE	48	8.62	50	3	5	15	$ 3,448	$ 11,851
FT-5	1999	FOREST AVENUE	48	10.65	75	2	5	10	$ 4,260	$ 27,146
FT-6	1999	FOREST AVENUE	48	12.76	50	3	5	15	$ 5,104	$ 17,543
FT-8	1999	FOREST AVENUE	48	11.14	75	2	5	10	$ 4,456	$ 28,395
FT-9	1999	FOREST AVENUE	48	8.51	20	4	5	20	$ 3,404	$ 5,578
IP-1		NORTH OF US-2 - INDUSTRIAL PARK	48	8.23	100	1	2	2	$ 3,292	$ 38,891
IP-2		NORTH OF US-2 - INDUSTRIAL PARK	48	8.32	75	2	2	4	$ 3,328	$ 21,207
IP-3		NORTH OF US-2 - INDUSTRIAL PARK	48	8.71	75	2	2	4	$ 3,484	$ 22,201
IP-4		NORTH OF US-2 - INDUSTRIAL PARK	48	6.87	75	2	2	4	$ 2,748	$ 17,511
ME-10	1999	Marquette Avenue (Easement)	48	8.13	100	1	4	4	$ 3,252	$ 38,418
MM-1	1999	WILLIAMS MINI MALL DEVELOPMENT	48	8.66	100	1	3	3	$ 3,464	$ 40,923
MM-2	1999	WILLIAMS MINI MALL DEVELOPMENT	48	6.45	100	1	3	3	$ 2,580	$ 30,479
MM-3	1999	WILLIAMS MINI MALL DEVELOPMENT	48	5.81	50	3	3	9	$ 2,324	$ 7,988
MM-4	1999	WILLIAMS MINI MALL DEVELOPMENT	48	6.08	75	2	3	6	$ 2,432	$ 15,497
MM-4A		WILLIAMS MINI MALL DEVELOPMENT	48	4.01	75	2	1	2	$ 1,604	$ 10,221
MM-4B		WILLIAMS MINI MALL DEVELOPMENT	48	7.35	50	3	1	3	$ 2,940	$ 10,105
MM-5	1999	WILLIAMS MINI MALL DEVELOPMENT	48	7.81	100	1	2	2	$ 3,124	$ 36,906
MM-7		WILLIAMS MINI MALL DEVELOPMENT	48	5.00	100	1	2	2	$ 2,000	$ 23,627
OD-4	1999	North of Harrison Avenue	48	6.80	75	2	2	4	$ 2,720	$ 17,332
OR-1	1999	EASEMENT WEST OF ELM GROVE LANE	48	10.33	100	1	5	5	$ 4,132	$ 48,814
OR-2	1999	EASEMENT WEST OF ELM GROVE LANE	48	14.60	100	1	5	5	$ 5,840	$ 68,992
OR-3	1999	EASEMENT WEST OF ELM GROVE LANE	48	9.31	100	1	5	5	$ 3,724	$ 43,994
SN-1	1999	SHELDON AVENUE	48	8.46	100	1	3	3	$ 3,384	$ 39,978

CRYSTAL FALLS TOWNSHIP
SANITARY SEWER ASSET MANAGEMENT PLAN
TABLE C-1: SANITARY SEWER MANHOLE INVENTORY

Inflation Rate 2.5%

Manhole Name	Installation Year	Street/Location	Manhole Diameter (Inches)	Depth	Remaining Useful Life	Condition Rating	Criticality Rating	Risk Factor	Replacement Cost	Replacement Year Cost
SN-2	1999	SHELDON AVENUE	48	11.49	100	1	4	4	$ 4,596	$ 54,296
SN-3		SHELDON AVENUE	48	9.12	50	3	1	3	$ 3,648	$ 12,539
SN-3A		NORTH OF SHELDON AVE	48	9.00	75	2	1	2	$ 3,600	$ 22,940
SN-3B		NORTH OF SHELDON AVE	48	8.43	75	2	1	2	$ 3,372	$ 21,487
SN-4		SHELDON AVENUE	48	7.15	100	1	1	1	$ 2,860	$ 33,787
TA-1	1999	TOBIN ALPHA ROAD	48	7.68	100	1	2	2	$ 3,072	$ 36,292
TA-2	1999	TOBIN ALPHA ROAD	48	8.06	100	1	2	2	$ 3,224	$ 38,087
TA-3	1999	TOBIN ALPHA ROAD	48	7.58	100	1	2	2	$ 3,032	$ 35,819
TN-1	1999	TOBIN STREET	48	3.95	20	4	1	4	$ 1,580	$ 2,589
US-1	1999	HWY US-2	48	8.72	75	2	5	10	$ 3,488	$ 22,226
US-10	1999	HWY US-2	48	10.09	100	1	3	3	$ 4,036	$ 47,680
US-11	1999	HWY US-2	48	10.40	75	2	3	6	$ 4,160	$ 26,508
US-12	1999	HWY US-2	48	11.06	100	1	3	3	$ 4,424	$ 52,264
US-12A	1999	HWY US-2	48	9.97	75	2	2	4	$ 3,988	$ 25,412
US-13	1999	HWY US-2	48	8.92	50	3	3	9	$ 3,568	$ 12,264
US-14	1999	HWY US-2	48	7.25	75	2	1	2	$ 2,900	$ 18,479
US-15	1999	HWY US-2	48	11.25	75	2	5	10	$ 4,500	$ 28,675
US-2	1999	HWY US-2	48	6.06	50	3	5	15	$ 2,424	$ 8,332
US-3	1999	HWY US-2	48	10.35	75	2	5	10	$ 4,140	$ 26,381
US-4	1999	HWY US-2	48	7.56	75	2	5	10	$ 3,024	$ 19,270
US-5	1999	HWY US-2	48	6.23	20	4	5	20	$ 2,492	$ 4,083
US-6	1999	HWY US-2	48	6.67	100	1	2	2	$ 2,668	$ 31,519
US-7	1999	HWY US-2	48	7.25	75	2	2	4	$ 2,900	$ 18,479
US-8	1999	HWY US-2	48	8.90	100	1	2	2	$ 3,560	$ 42,057
US-9	1999	HWY US-2	48	10.30	75	2	2	4	$ 4,120	$ 26,253
WR-1	1999	Walker Avenue	48	7.98	100	1	4	4	$ 3,192	$ 37,709
WR-1A	1999	Walker Avenue	48	7.93	100	1	4	4	$ 3,172	$ 37,473
WR-2	1999	Walker Avenue	48	6.29	100	1	4	4	$ 2,516	$ 29,723
WR-2A	1999	Walker Avenue	48	6.81	100	1	4	4	$ 2,724	$ 32,181
WW-1	1999	WINKS WOODS ALLEY	48	5.16	75	2	2	4	$ 2,064	$ 13,152
WW-2	1999	WINKS WOODS ALLEY	48	7.65	100	1	2	2	$ 3,060	$ 36,150
WW-3	1999	WINKS WOODS ALLEY	48	9.64	100	1	2	2	$ 3,856	$ 45,554
WW-4	1999	WINKS WOODS ALLEY	48	12.25	100	1	5	5	$ 4,900	$ 57,887
ZD-1	1999	Zavada Drive	48	9.86	100	1	5	5	$ 3,944	$ 46,593
ZD-2	1999	Zavada Drive	48	12.05	100	1	5	5	$ 4,820	$ 56,942
ZD-3	1999	Zavada Drive	48	12.41	100	1	5	5	$ 4,964	$ 58,643
ZD-4	1999	Zavada Drive	48	12.16	100	1	5	5	$ 4,864	$ 57,462
ZD-5	1999	Zavada Drive	48	9.47	100	1	5	5	$ 3,788	$ 44,750
ZD-6	1999	Zavada Drive	48	0.80	100	1	5	5	$ 320	$ 3,780
ZD-7	1999	Zavada Drive	48	11.70	50	3	5	15	$ 4,680	$ 16,086

CRYSTAL FALLS TOWNSHIP
SANITARY SEWER ASSET MANAGEMENT PLAN
TABLE C-2: SANITARY SEWER PIPE INVENTORY

Inflation Rate 2.5%

Pipe Name	Street/Location	Pipe Material	Pipe Size	Downstream Manhole	Upstream Manhole	Installation Year	Remaining Useful Life	Remaining Useful Life	Condition Rating	Criticality Rating	Risk Factor	Replacement Cost	Replacement Year Cost
FMBL-1	Bristol Lift Station Force Main	HDPE	6	OD-4	LS-2	1999	82	100	1	5	5	$ 77,835	$ 919,524
FMODG-1	Odgers Lift Station Force Main	HDPE	6	FT-4	LS-3	1999	82	100	1	5	5	$ 20,994	$ 248,022
FMUS-1	US-2 Lift Station Force Main	HDPE	6	DR-11	LS-1	1999	82	100	1	5	5	$ 147,440	$ 1,741,814
PBL-1	HARRISON AVENUE	PVC	8	ZD-7	BL-1	1999	82	100	1	2	2	$ 35,981	$ 425,075
PBL-2	HARRISON AVENUE	PVC	8	BL-1	BL-2	1999	82	100	1	2	2	$ 27,147	$ 320,702
PBL-3	HARRISON AVENUE	PVC	8	BL-2	BL-3	1999	82	100	1	2	2	$ 5,471	$ 64,627
PBL-4	HARRISON AVENUE	PVC	8	BL-3	BL-4	1999	82	100	1	2	2	$ 37,881	$ 447,520
PBS-2	BATES STREET	PVC	10	BS-2	SN-2	1999	82	100	1	4	4	$ 30,380	$ 358,903
PBS-3	BATES STREET	PVC	10	ME-10	BS-2	1999	82	100	1	4	4	$ 23,007	$ 271,795
PBS-4	BATES STREET	PVC	10	WR-2A	ME-10	1999	50	75	2	4	8	$ 27,424	$ 174,752
PCN-1	CREDIT UNION WAY	PVC	8	FP-3	CN-2	2003	50	100	1	1	1	$ 18,658	$ 220,420
PCN-2	CREDIT UNION WAY	PVC	8	CN-2		2003	50	100	1	1	1	$ 3,000	$ 35,441
PDR-1	Easement North of CFT Hall	PVC	8	ZD-1	DR-1	1999	82	100	1	5	5	$ 5,491	$ 64,865
PDR-10	Easement North of CFT Hall	PVC	10	DR-9	DR-10	1999	82	100	1	5	5	$ 26,234	$ 309,922
PDR-2	Easement North of CFT Hall	PVC	8	DR-1	DR-2	1999	82	100	1	5	5	$ 30,626	$ 361,808
PDR-3	Easement North of CFT Hall	PVC	8	DR-2	DR-3	1999	82	100	1	5	5	$ 11,833	$ 139,790
PDR-4	Easement North of CFT Hall	PVC	8	DR-3	DR-4	1999	82	100	1	5	5	$ 14,459	$ 170,815
PDR-5	Easement North of CFT Hall	PVC	8	DR-4	DR-5	1999	82	100	1	5	5	$ 30,394	$ 359,065
PDR-6	Easement North of CFT Hall	PVC	10	DR-5	DR-6	1999	82	100	1	5	5	$ 22,243	$ 262,772
PDR-7	Easement North of CFT Hall	PVC	10	DR-6	DR-7	1999	82	100	1	5	5	$ 27,137	$ 320,584
PDR-8	Easement North of CFT Hall	PVC	10	DR-7	DR-8	1999	82	100	1	5	5	$ 35,422	$ 418,462
PDR-9	Easement North of CFT Hall	PVC	10	DR-8	DR-9	1999	82	100	1	5	5	$ 36,983	$ 436,902
PFP-1	FOREST PARKWAY	PVC	8	OR-3	FP-1	1999	82	100	1	1	1	$ 41,309	$ 488,008
PFP-2	FOREST PARKWAY	PVC	8	FP-1	FP-2	1999	82	100	1	1	1	$ 5,443	$ 64,296
PFP-3	FOREST PARKWAY	PVC	8	FP-2	FP-3		82	100	1	1	1	$ 35,084	$ 414,477
PFP-4	FOREST PARKWAY	PVC	8	FP-3	FP-4		82	100	1	1	1	$ 2,580	$ 30,475
PFP-5	FOREST PARKWAY	PVC	8	FP-4	FP-5		82	100	1	1	1	$ 46,687	$ 551,544
PFT-1	FOREST AVENUE	PVC	10	FT-13	FT-14	1999	82	100	1	5	5	$ 25,394	$ 300,000
PFT-1A	FOREST AVENUE (TO ELM GROVE LANE)	PVC	8	FT-13		1999	82	100	1	5	5	$ 8,491	$ 100,309
PFT-2	FOREST AVENUE	PVC	10	FT-12	FT-13	1999	82	100	1	5	5	$ 13,301	$ 157,134
PFT-3	FOREST AVENUE	PVC	8	FT-12	FT-11	1999	82	100	1	5	5	$ 3,526	$ 41,653
PFT-4	FOREST AVENUE	PVC	8	FT-11	FT-10	1999	50	100	1	5	5	$ 36,991	$ 437,003
PFT-5	FOREST AVENUE	PVC	8	FT-10	FT-9	1999	50	100	1	5	5	$ 31,885	$ 376,681
PFT-6	FOREST AVENUE	PVC	8	FT-9	FT-8	1999	50	100	1	5	5	$ 23,900	$ 282,349
PFT-7	FOREST AVENUE	PVC	8	FT-8	FT-6	1999	82	100	1	5	5	$ 163,426	$ 1,930,673
PFT-8	FOREST AVENUE	PVC	8	FT-6	FT-5	1999	50	100	1	5	5	$ 31,518	$ 372,350
PFT-9	FOREST AVENUE	PVC	8	CITY	FT-4	1999	82	100	1	5	5	$ 835	$ 9,859
PIP-1	INDUSTRIAL PARK	PVC	8	IP-2	IP-1	1999	82	75	2	2	4	$ 21,496	$ 136,980
PIP-1A	INDUSTRIAL PARK	PVC	8	IP-1		1999	82	100	1	2	2	$ 1,560	$ 18,431
PIP-2	INDUSTRIAL PARK	PVC	8	IP-3	IP-2	1999	82	75	2	2	4	$ 17,786	$ 113,337
PIP-2A	INDUSTRIAL PARK	PVC	8	CITY	IP-3	1999	82	100	1	2	2	$ 2,141	$ 25,291
PIP-2B	INDUSTRIAL PARK	PVC	8	IP-3		1999	50	100	1	2	2	$ 3,520	$ 41,586
PIP-3	INDUSTRIAL PARK	PVC	8	IP-3	IP-4	1999	50	75	2	2	4	$ 17,487	$ 111,430
PMM-1	WILLIAMS MINI MALL DEVELOPMENT	PVC	8	US-10	MM-1	1999	50	100	1	3	3	$ 19,053	$ 225,081
PMM-2	WILLIAMS MINI MALL DEVELOPMENT	PVC	8	MM-1	MM-2	1999	50	75	2	3	6	$ 10,162	$ 64,757
PMM-3	WILLIAMS MINI MALL DEVELOPMENT	PVC	8	MM-2	MM-3	1999	82	75	2	3	6	$ 7,250	$ 46,196
PMM-4	WILLIAMS MINI MALL DEVELOPMENT	Concrete	6	MM-3	MM-4		82	50	3	3	9	$ 16,625	$ 57,142
PMM-4A	WILLIAMS MINI MALL DEVELOPMENT	Clay	4	MM-4	MM-4A		82	50	3	1	3	$ 9,605	$ 33,013
PMM-4B	WILLIAMS MINI MALL DEVELOPMENT	Clay	6	MM-4	MM-4B		82	50	3	1	3	$ 17,955	$ 61,713
PMM-5	WILLIAMS MINI MALL DEVELOPMENT	PVC	8	MM-4	MM-5	1999	82	75	2	2	4	$ 34,657	$ 220,839
PMM-7	WILLIAMS MINI MALL DEVELOPMENT	PVC	8	MM-5	MM-7		50	100	1	2	2	$ 12,742	$ 150,528
POR-1	EASEMENT WEST OF ELM GROVE LANE	PVC	10	FT-14	OR-1	1999	82	100	1	5	5	$ 21,510	$ 254,111

CRYSTAL FALLS TOWNSHIP
SANITARY SEWER ASSET MANAGEMENT PLAN
TABLE C-2: SANITARY SEWER PIPE INVENTORY

Inflation Rate 2.5%

Pipe Name	Street/Location	Pipe Material	Pipe Size	Downstream Manhole	Upstream Manhole	Installation Year	Remaining Useful Life	Remaining Useful Life	Condition Rating	Criticality Rating	Risk Factor	Replacement Cost	Replacement Year Cost
POR-2	EASEMENT WEST OF ELM GROVE LANE	PVC	10	OR-1	OR-2	1999	82	100	1	5	5	$ 30,102	$ 355,622
POR-3	EASEMENT WEST OF ELM GROVE LANE	PVC	8	OR-2	OR-3	1999	82	100	1	5	5	$ 29,644	$ 350,207
POR-4	EASEMENT WEST OF ELM GROVE LANE	PVC	8	OR-3	WW-4	1999	82	100	1	5	5	$ 15,927	$ 188,154
PSN-1	SHELDON AVENUE	PVC	10	SN-2	SN-1	1999	82	100	1	4	4	$ 24,650	$ 291,207
PSN-1A	SHELDON AVENUE (NORTH)	Clay	8	SN-3	SN-3A		82	50	3	1	3	$ 10,381	$ 35,681
PSN-2	SHELDON AVENUE	Clay	8	SN-2	SN-3		82	50	3	1	3	$ 3,332	$ 11,452
PSN-2A	SHELDON AVENUE (NORTH)	Clay	8	SN-3A	SN-3B		50	50	3	1	3	$ 19,251	$ 66,169
PSN-3	SHELDON AVENUE	Clay	8	SN-3	SN-4		50	50	3	1	3	$ 19,002	$ 65,311
PTA-1	Tobin Alpha Road	PVC	8	US-6	TA-1	1999	50	100	1	2	2	$ 12,582	$ 148,639
PTA-2	Tobin Alpha Road	PVC	8	TA-1	TA-2	1999	50	100	1	2	2	$ 32,430	$ 383,118
PTA-3	Tobin Alpha Road	PVC	8	TA-2	TA-3	1999	82	50	3	2	6	$ 18,966	$ 65,189
PTN-1	TOBIN STREET	PVC	8	BL-4	TN-1	1999	82	75	2	1	2	$ 20,039	$ 127,691
PTN-2	TOBIN STREET	PVC	8	BL-4		1999	82	100	1	1	1	$ 4,200	$ 49,618
PTN-2A	TOBIN STREET	Clay	6				82	50	3	1	3	$ 4,222	$ 14,512
PUS-1	HWY US-2	PVC	8	LS-1	US-1	1999	82	100	1	5	5	$ 1,919	$ 22,675
PUS-10	HWY US-2	PVC	10	US-12	US-11	1999	82	100	1	4	4	$ 34,326	$ 405,515
PUS-11	HWY US-2	PVC	10	US-12	US-12A	1999	82	100	1	4	4	$ 5,537	$ 65,412
PUS-12	HWY US-2	PVC	8	US-13	US-12	1999	82	100	1	4	4	$ 24,268	$ 286,694
PUS-13	HWY US-2	PVC	10	SN-1	US-13	1999	82	100	1	4	4	$ 18,396	$ 217,331
PUS-14	HWY US-2	PVC	10	US-15	US-14	1999	82	100	1	1	1	$ 37,095	$ 438,224
PUS-15	HWY US-2	PVC	8	US-15	CITY	1999	82	100	1	5	5	$ 800	$ 9,451
PUS-1A	HWY US-2	Concrete	8	US-1	US-2		82	20	4	5	20	$ 9,777	$ 16,021
PUS-2	HWY US-2	Concrete	8	US-2	US-3		50	20	4	5	20	$ 31,124	$ 51,000
PUS-3	HWY US-2	Concrete	8	US-3	US-4		50	20	4	5	20	$ 39,930	$ 65,431
PUS-4	HWY US-2	Concrete	8	US-4	US-5		82	20	4	5	20	$ 34,378	$ 56,332
PUS-5	HWY US-2	PVC	10	US-7	US-6	1999	82	100	1	2	2	$ 40,402	$ 477,302
PUS-6	HWY US-2	PVC	10	US-8	US-7	1999	82	100	1	4	4	$ 28,837	$ 340,675
PUS-7	HWY US-2	PVC	10	US-9	US-8	1999	82	100	1	4	4	$ 36,887	$ 435,775
PUS-8	HWY US-2	PVC	10	US-10	US-9	1999	82	100	1	4	4	$ 16,992	$ 200,744
PUS-9	HWY US-2	PVC	10	US-11	US-10	1999	82	100	1	4	4	$ 15,015	$ 177,386
PWR-1	Walker Avenue	PVC	10	OR-1	WR-1	1999	50	100	1	4	4	$ 14,644	$ 172,996
PWR-2	Walker Avenue	PVC	10	WR-1	WR-1A	1999	50	100	1	4	4	$ 15,503	$ 183,149
PWR-3	Walker Avenue	PVC	10	WR-1A	WR-2	1999	50	100	1	4	4	$ 41,796	$ 493,766
PWR-4	Walker Avenue	PVC	10	WR-2	WR-2A	1999	50	100	1	4	4	$ 13,499	$ 159,469
PWW-1	WINKS WOODS ALLEY	PVC	8	WW-1	WW-1	1999	50	100	1	2	2	$ 17,497	$ 206,702
PWW-2	WINKS WOODS ALLEY	PVC	8	WW-3	WW-2	1999	50	100	1	2	2	$ 19,581	$ 231,320
PWW-3	WINKS WOODS ALLEY	PVC	8	WW-4	WW-3	1999	50	100	1	2	2	$ 20,218	$ 238,852
PWW-4	WINKS WOODS ALLEY	Clay	10	WW-4	US-15		50	50	3	2	6	$ 17,846	$ 61,340
PZD-1	ZAVADA DRIVE	Concrete	10	ZD-2	ZD-1		50	20	4	5	20	$ 17,238	$ 28,246
PZD-1A	ZAVADA DRIVE	PVC	10	ZD-2	ZD-1	1999	50	75	2	5	10	$ 8,002	$ 50,992
PZD-2	ZAVADA DRIVE	PVC	10	ZD-3		1999	50	100	1	5	5	$ 21,495	$ 253,930
PZD-3	ZAVADA DRIVE	PVC	10	ZD-4	ZD-3	1999	50	100	1	5	5	$ 29,529	$ 348,847
PZD-4	ZAVADA DRIVE	PVC	10	ZD-5	ZD-4	1999	50	100	1	5	5	$ 33,749	$ 398,706
PZD-5	ZAVADA DRIVE	PVC	10	ZD-6	ZD-5	1999	50	100	1	5	5	$ 28,707	$ 339,139
PZD-6	ZAVADA DRIVE	PVC	10	ZD-7	ZD-6	1999	50	100	1	5	5	$ 21,195	$ 250,392

CRYSTAL FALLS TOWNSHIP
SANITARY SEWER ASSET MANAGEMENT PLAN
TABLE C-3: SANITARY SEWER LIFT STATION INVENTORY

Inflation Rate 2.5%

Name	Type	X_Coordinate	Y_Coordinate	Elevation	Model	Year Installed	Rated Flow	Rated Head	Motor HP	Voltage	Useful Life	Remaining Useful Life	Condition Rating	Criticality Rating	Risk Factor	Replacement Costs	Replacement Year Cost
US-2 Lift Station	Submersible	481003.554	25899655.3	1554.498									2	3	6		
Pump 1	Barnes Pump				4XSE10034A	2004	145	27.5	10	240	30	17	2	3	6	$ 7,000	$ 10,651
Pump 2	Barnes Pump				4XSE10034A	2004	145	27.5	10	240	30	17	2	3	6	$ 7,000	$ 10,651
Wet Well	Concrete					2004					100	87	2	5	10	$ 5,000	$ 42,850
Valve Vault	Concrete					2004					100	87	2	5	10	$ 5,000	$ 42,850
Piping	Ductile					2004					50	37	2	5	10	$ 10,000	$ 24,933
Valves						2004					50	37	2	3	6	$ 5,000	$ 12,467
Electrical						2004					20	7	2	5	10	$ 20,000	$ 23,774
Back-up Power	Killark				VR1041-S39, 100 Amp, 4W, 4P	2004					30	17	2	2	4	$ 4,000	$ 6,086
Controls	SCADAPack					2004					20	7	2	5	10	$ 15,000	$ 17,830
SCADA						2004					20	7	2	2	4	$ 12,000	$ 14,264
Bristol Lift Station	Submersible	483280.308	25904049	1475.113									2	3	6		
Pump 1	Barnes Pump				4XSE10034A	1997	285	57	10	240	30	10	2	3	6	$ 7,000	$ 8,961
Pump 2	Barnes Pump				4XSE10034A	1997	285	57	10	240	30	10	2	3	6	$ 7,000	$ 8,961
Wet Well	Concrete					1997					100	80	2	5	10	$ 5,000	$ 36,048
Valve Vault	Concrete					1997					100	80	2	5	10	$ 5,000	$ 36,048
Piping	Ductile					1997					50	30	2	5	10	$ 10,000	$ 20,976
Valves						1997					50	30	2	3	6	$ 5,000	$ 10,488
Electrical						1997					30	10	2	5	10	$ 20,000	$ 25,602
Back-up Power	Killark				VR1041-S39, 100 Amp, 4W, 4P	1997					30	10	2	2	4	$ 4,000	$ 5,120
Controls	US Filters					1997					20	0	3	5	15	$ 15,000	$ 15,000
SCADA	NA																
Odgers Lift Station	Submersible	480891.262	25905522.97	1444.506									2	3	6		
Pump 1	Barnes Pump				4XSE10034A	1997	180	65	10	240	30	10	2	3	6	$ 7,000	$ 8,961
Pump 2	Barnes Pump				4XSE10034A	2017	180	65	10	240	30	30	2	3	6	$ 7,000	$ 14,683
Wet Well	Concrete					1997					100	80	2	5	10	$ 5,000	$ 36,048
Valve Vault	Concrete					1997					100	80	2	5	10	$ 5,000	$ 36,048
Piping	Ductile					1997					50	30	2	5	10	$ 10,000	$ 20,976
Valves						1997					50	30	2	3	6	$ 5,000	$ 10,488
Electrical						1997					30	10	2	5	10	$ 20,000	$ 25,602
Back-up Power	Killark				VR1041-S39, 100 Amp, 4W, 4P	1997					30	10	2	2	4	$ 4,000	$ 5,120
Controls	US Filters					1997					20	0	4	5	20	$ 15,000	$ 15,000
SCADA	NA																

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Crystal Falls Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1361-01 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 18, 2017 .
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:

Tom Lesandrini	at 906.875.3062	tomles@up.net
Name	Phone Number	Email

______________ 10/10/2017

Signature of Authorized Representative (Original Signature Required) Date

Tom Lesandrini – Supervisor

Print Name and Title of Authorized Representative

Asset Management Plan Executive Summary

City of Crystal Falls

Prepared by GEI Consultants, Inc.
On behalf of :

Patrick Reagan, City Manager
301 Superior Avenue
Crystal Falls, MI 49920
(906) 875-3212

Revised
October 30, 2017

Project No. 1412110
SAW Grant No. 1365-01

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 wastewater assets is listed in the tables below.

Table 1.1: System Asset Summary		
Total Sanitary Sewer	85089	LFT
Total Manholes	323	
Lift Stations	3	
Primary Lagoon Cell Volume	99	Acre-Feet
Rapid Infiltration Basin Area	14.6	Acre

The breakdown of sizing for the piping for the system is shown in Table 2.

Table 1.2: Sanitary Sewer Sizing Breakdown		
Pipe Diameter	**Length**	
<6"	3298	LFT
6"	7204	LFT
8"	52816	LFT
10"	10314	LFT
12"	9645	LFT
15"	1522	LFT
24"	290	LFT

The City has a minor amount of undersized sewer main remaining, with approximately 4% of their system measuring less than 6”, and 12% 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 below:

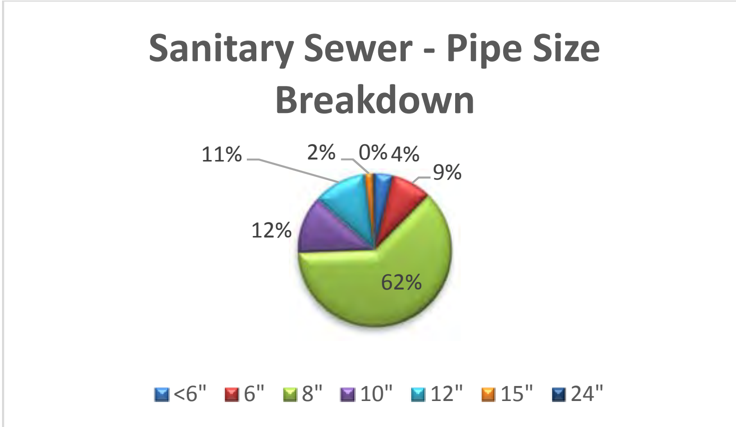


Figure 1: Sanitary Sewer Pipe Size

Table 3 indicates the quantity of each material making up the City's sanitary sewer system.

Table 1.3: Sanitary Sewer Material Breakdown		
Pipe Material	**Length**	
Polyvinyl Chloride Pipe (PVC)	54458	LFT
Vitrified Clay Pipe (VCP)	11010	LFT
Concrete Pipe (CP)	14866	LFT
Cured in Place Pipe (CIPP)	1752	LFT
High Density Polyethylene Pipe (HDPE)	3003	LFT

The good news is that a large portion of the City's system (70%) has been upgraded to a plastic product over the past 30 years. 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 2 provides a visual breakdown of the materials within the system.

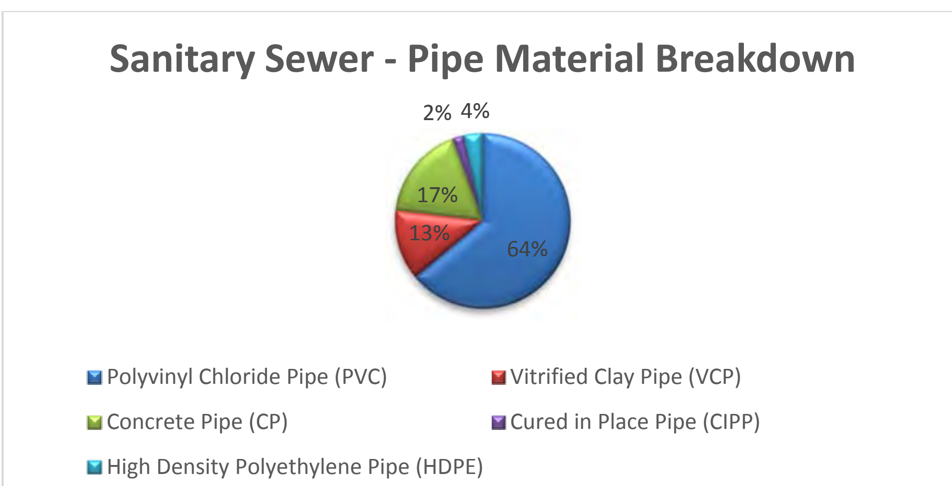


Figure 2: Sanitary Sewer Material

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 4 summarizes the condition range of system assets, with a 1 being very good, and a 5 being in a state of repair needed.

Table 1.4: Condition Ratings - System Assets					
	Rated Condition				
Asset Type	**1**	**2**	**3**	**4**	**5**
Sanitary Sewer (LFT)	62731	5358	12472	897	3631
Manholes	173	51	60	29	10
Lift Stations	1		1	1	
Wastewater Treatment Ponds			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 5 below, the City will need approximately $75,500/year 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 of Service Life**
Sanitary Sewer	$ 173,346.96	$ 58,725.71
Manholes	$ 42,722.02	$ 16,809.52
Lift Stations and Treatment	$ 53,500.00	$ -
Total	**$ 269,600.00**	**$ 75,500.00**

As will be discussed multiple times in the body of the report, specifically in Section 5 regarding budgeting, the City will typically not perform the same amount of annualized repairs on a year to year basis. Usually, larger projects will be performed that encompass many years' worth of work. In most cases, the City will attempt to leverage grant and or low interest loan programs to maximize the efficiency of their dollar.

Based on the system assessment, we have put together a proposed capital improvements schedule to cover the City for the next 20 years. The table below outlines the recommended improvements.

Table 1.6: Summary of Capital Improvements			
Year	**Project**	**Cost**	
2017-2022	Lagoon and Main Force Main Replacement	$	4,500,000.00
	Total 2017-2022	**$**	**4,500,000.00**
2023-2027	Alley behind M-69, Logan Street to Wagner Street	$	112,000.00
	City Hall Alley, Superior Avenue to Michigan Avenue	$	153,000.00
	Michigan Avenue, near First Street	$	52,000.00
	Maple Street	$	65,000.00
	Total 2023-2027	**$**	**382,000.00**
2028-2037	Bristol Location	$	246,000.00
	Court Street	$	59,000.00
	Spruce Street	$	78,000.00
	Grant Avenue	$	44,000.00
	US-2 near Park Street	$	58,000.00
	Iron Street alley to Maple Street	$	58,000.00
	Manhole Rehabilitation, City Wide	$	108,500.00
	Total 2028-2037	**$**	**651,500.00**

Table 7 shows estimates based on the City's proposed 2016/2017 budget.

Table 1.7: Projected Sewer Budget		
Gross Income	$	352,000.00
Expenses - O&M/Employee	$	66,665.00
Loan Payments (Principal and Interest)	$	214,605.00
Net Income	**$**	**70,730.00**
Net Income + Loans	**$**	**285,335.00**

As highlighted, there are two important numbers to note here. The net income is the money available to perform improvements on an annual basis. Ideally, this number should meet or exceed the annualized costs for those items with less than 20 years of service life remaining. Currently, the City will be able to cover their operation and maintenance costs, however as time goes on, this will not be the case, both due to inflation, as well as possible large scale projects.

The second number for comparison includes the City's loan payments. The small payment ($15,000) expires in 2030, and the large payment ($200,000) expires in 2038. Because of the way municipalities typically operate large projects, payments are usually being made on past projects, and the next large project will consist of another loan. Therefore, this number compares well to the full annualized cost of maintaining the system. Currently, the net income plus loan payments outpace the annualized costs, however again, if the City does not make future adjustments to account for inflation in costs, there will eventually be a gap.

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 determined 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 of course, the treatment lagoons, the main lift station that transports all of the City's wastewater to the lagoons, and the force main that connects them.

4. Level of Service Determination

The City of Crystal Falls maintains the following level of service goals

The wastewater treatment facility maintains the following level of service goals:

1. Perform within all requirements of their NPDES permit.
2. No reportable events to the MDEQ as required by the permit.
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 revenue structure for the City of Crystal Falls includes both the charges for their interior residents, as well as for those customers served as part of an agreement with Crystal Falls Township, as part of an agreement that was made during the 1999 sewer improvements project.

The current rates for the City are $24.00/5,800 gallons, which is both the minimum charge for a connected customer, as well as the rate for usage over that amount. Township customers pay a slightly higher amount, as they committed to a larger portion of the debt incurred during the aforementioned project. As such, their rates are $27.15/5,800 gallons.

Currently, as part of their loan obligations, the City does maintain a repair, replacement, and improvements account, which will allow for some of the maintenance items identified as higher priority by the AMP to addressed, and the City projects approximately $70,000 worth of income each year that can be devoted to maintenance and repair. A large scale capital improvements project, if determined to be necessary, would require an adjustment of the rates in the future in order to fund the loan required.

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, typically these projects would not be done each year for a community this size; rather, the smaller projects would be grouped together to form one maintenance project every 3-5 years.

In addition, if the City chose to undertake the large scale project of replacing their lagoons and force main, this would be accomplished via a larger funding agency, with the goal of having significant grant contribution.

The current capital improvement plan is as follows:

Summary of Capital Improvements		
Year	**Project**	**Cost**
2017-2022	Lagoon and Main Force Main Replacement	$ 4,500,000.00
	Total 2017-2022	**$ 4,500,000.00**
2023-2027	Alley behind M-69, Logan Street to Wagner Street	$ 112,000.00
	City Hall Alley, Superior Avenue to Michigan Avenue	$ 153,000.00
	Michigan Avenue, near First Street	$ 52,000.00
	Maple Street	$ 65,000.00
	Total 2023-2027	**$ 382,000.00**
2028-2037	Bristol Location	$ 246,000.00
	Court Street	$ 59,000.00
	Spruce Street	$ 78,000.00
	Grant Avenue	$ 44,000.00
	US-2 near Park Street	$ 58,000.00
	Iron Street alley to Maple Street	$ 58,000.00
	Manhole Rehabilitation, City Wide	$ 108,500.00
	Total 2028-2037	**$ 651,500.00**

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.

The City's treatment system, however, will be costly to replace, and will require both a large funding agency type project, as well as some adjustment to the rates to perform this work.

The good news is that a large portion of the collection system has been improved, and once the improvements are made to both the collection and treatment systems, maintenance and repair costs over the following years should be lessened significantly, allowing the City to begin building funding with their rate structure to prepare for large scale projects down the road.

8. List of Major Assets

Table 8.1: System Asset Summary		
Total Sanitary Sewer	85089	LFT
Total Manholes	323	
Lift Stations	3	
Primary Lagoon Cell Volume	99	Acre-Feet
Rapid Infiltration Basin Area	14.6	Acre

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

Completion Date 10-30-17
(no later than 3 years from executed grant date)

The City of Crystal Falls *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1365-01 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 10, 2017.
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:

Patrick Reagan	at (906) 875-3212	citymanager@crystalfalls.org
Name	Phone Number	Email

[signature] 10/26/17
Signature of Authorized Representative (Original Signature Required) Date

Patrick Reagan, City Manager
Print Name and Title of Authorized Representative

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Decatur, Michigan

Stormwater System

Date: October 12, 2017
To: Ms. Jaclyn Merchant
RE: Organization: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: Village of Decatur Grant: Summary of Stormwater Asset Management Plan

Grantee Information:
Village of Decatur
114 N. Phelps St.
Decatur, MI 49045
amitchell@decaturmi.org
Mr. Aaron Mitchell; Village Manager
Ph: (269) 423-6114
SAW Project #: 1324-01

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:	$545,826	$ 68,000	$ 613,826
2) Less: Match	$ 54,583	$ 6,800	$ 61,383
3) Net Grant:	$491,243	$ 61,200	$ 552,443

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 first step in developing an AMP is to identify the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

Description:
Decatur owns and operates a storm water collection and retention system. The collection system consists of over 3.5 miles of gravity sewer pipes and more than 220 buried structures (storm sewer manholes and stormwater inlet structures). In addition to the pipes and structures in the collection system, there are two retention basins and 10 discharge points to ditches, surface water bodies, wetlands, and the retention basins.

With a thorough knowledge of the basic layout of the stormwater system, a comprehensive inventory of all stormwater collection and retention system assets owned by Decatur 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 and retention 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.*

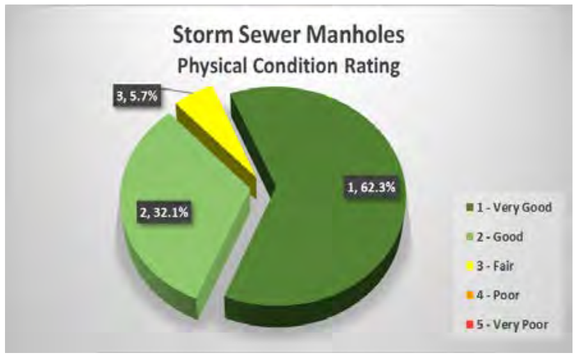
The focus of the Decatur stormwater AMP was to locate and document the stormwater assets present in the system. However, after completing the comprehensive inventory of the utility system assets, limited conditional assessments of all assets that could be visually inspected were performed. These conditional assessments provided the information needed to assess the physical condition and functionality of these assets. Wightman and Associates, Inc. (WAI) performed limited conditional assessments on the retention ponds, manholes, and inlet structures within the storm water collection system. However, no closed-circuit televising (CCTV) was conducted within the storm sewer system.

After the field inspection was complete, overall asset conditions were assessed using a systematic method to produce consistent, useful information. This information was used to make decisions about asset rehabilitation, replacement, and/or the need for further inspections. The asset conditions for 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 or the condition of the asset. The numerical system uses numbers ranging from 1 to 5 as shown in the Table below. This ranking considers both the immediate defect and the likelihood of further deterioration of the defect.

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

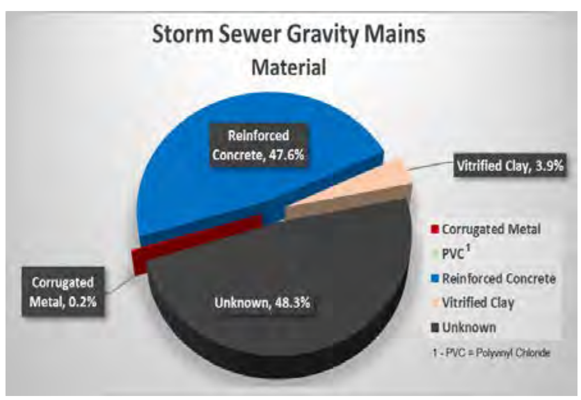
Table 1 - NASSCO conditional assessment system

The storm sewer manholes were assessed in accordance with the NASSCO Manhole Assessment Certification Program (MACP) and any defects noted in the visible portions of the storm sewer piping were graded according to the guidelines of the NASSCO Pipeline Assessment Certification Program (PACP). Once the individual defects were graded, an overall condition rating was applied to each storm sewer manhole based on the worst defect rating noted within the manhole. However, due to the limited amount of pipeline that was physically assessed, the overall condition rating for the storm sewer pipe was based on remaining life as described below. The Figure below shows the condition ratings for the storm sewer manholes.



Remaining 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 life is defined as the duration of time remaining until an unacceptable condition exists or an asset no longer meets its primary function.

Remaining useful life for storm sewers is dependent on the materials used in construction. Storm sewer pipe materials have evolved over the years, beginning with brick and non-reinforced concrete, transitioning to corrugated metal, clay and reinforced concrete and, more recently, to reinforced concrete, plastic (HPDE), and PVC piping.



<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 (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how the Decatur stormwater system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team selected the following statements to define the desired LOS for the Decatur stormwater system:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage or break occur, we will correct the problem as soon as possible to minimize any future flooding.

3. We will develop and implement a preventive maintenance program to reduce the likelihood of the occurrence of a blockage or breakage.

4. We will respond to customer complaints during normal business hours. Communication with the complainant or customers affected will occur.

5. We will maintain an asset management program for the system and provide reports on an as needed basis.

6. We will develop a work order system to identify, assign and track preventative and reactive work on the system and report on the status of work orders to the Village on an as needed basis.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to the Village on an as needed basis.

<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?*

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

A. Likelihood of Failure

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include: cost of repair; social cost associated with the loss of the asset; repair/replacement costs related to collateral damage caused by the failure; legal costs related to additional damage caused by the failure; environmental costs created by the failure; loss of business revenue to the community; and any other associated costs or losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with a failure. Below is the ranking system that was used to determine the consequence of failure for the Decatur system.

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 2 - Consequence of failure rating scheme for stormwater 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.*

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 DPW. 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.*

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. To ensure that the desired LOS 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. The planning period for a CIP is 20 years to allow for the development of a rate structure adequate to finance those projects that can reasonably be predicted to be needed during that period.

A. Recommended Stormwater System Projects

The Table below lists the recommended capital improvement projects for the next twenty years for the stormwater system. Where appropriate, the estimated project costs shown in the Table include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. Detailed descriptions and cost estimates for each project listed can be found in Appendix E in the Asset Management Plan.

Priority	CIP Year	Project Name	Estimated Cost[1]
1	2018	Develop Stormwater System Master Plan	$ 19,000
2	2019	Closed Circuit Televising of Storm Sewer – 2019	$ 18,000
3	2020	Closed Circuit Televising of Storm Sewer – 2020	$ 18,000
4	2021	Closed Circuit Televising of Storm Sewer – 2021	$ 18,000

[1] Estimated CIP project costs shown include both engineering fees and a contingency budget, where appropriate.

5	2022	Closed Circuit Televising of Storm Sewer – 2022	$ 18,000
6	2023	Closed Circuit Televising of Storm Sewer – 2023	$ 18,000
		Total Estimated Project Cost for Twenty Year Stormwater CIP (current dollars) =	$ 109,000
		Total Estimated Project Cost for Twenty Year Stormwater CIP (future dollars) =	$ 120,000

Table 3 - Recommended stormwater system capital improvement projects

In addition to the capital improvement projects listed above, sufficient funds must also be budgeted to continue to provide the routine operation and maintenance (O&M) services required to maintain the desired LOS within the Decatur stormwater system.

A. List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the Village Assets:

The following Table contains a summary of the stormwater system assets owned by Decatur that were identified and included in the stormwater AMP.

Asset Description	Quantity	Units
30" Storm Sewer	40	LF
24" Storm Sewer	1,226	LF
18" Storm Sewer	2,705	LF
15" Storm Sewer	1,659	LF
12" Storm Sewer	11,313	LF
10" Storm Sewer	1,210	LF
8" Storm Sewer	674	LF
6" Storm Sewer	592	LF
4-foot Diameter Manhole	54	EA
Inlet Structure	167	EA
Storm Water Discharge Point	10	EA
Storm Water Retention Pond	2	EA

Table 4 - Village of Decatur stormwater collection and retention system assets

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

Completion Due Date **10/31/17**
(no later than 3 years from executed grant date)

The Village of Decatur *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1324-**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. Aaron Mitchell at	*(269) 423-7014*	amitchell@decaturmi.org
Name	Phone Number	Email

10/17/17

Signature of Authorized Representative (Original Signature Required) — Date

Aaron Mitchell; Village Manager
Aaron Mitchell, Village Manager
Print Name and Title of Authorized Representative

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Village of Decatur, Michigan

Wastewater Sewer System

Date: October 12, 2017
To: Ms. Jaclyn Merchant
RE: Organization: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: Village of Decatur Grant: Summary of Wastewater Asset Management Plan

Grantee Information:
Village of Decatur
114 N. Phelps St.
Decatur, MI 49045
amitchell@decaturmi.org
Mr. Aaron Mitchell; Village Manager
Ph: (269) 423-6114
SAW Project #: 1324-01

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:	$545,826	$ 68,000	$ 613,826
2) Less: Match	$ 54,583	$ 6,800	$ 61,383
3) Net Grant:	$491,243	$ 61,200	$ 552,443

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 the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

Description:

Decatur owns and operates both a wastewater treatment facility (WWTF) and a wastewater collection system. The collection system consists of several miles of both gravity sewer pipes and pressurized force mains and over 300 manholes of varying age. In addition to the pipes and manholes in the collection system, Decatur relies on two sewage lift (pump) stations to convey the wastewater through the system and to the WWTF.

With a thorough knowledge of the basic layout of the collection system and the WWTF, 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 and the treatment facility 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.*

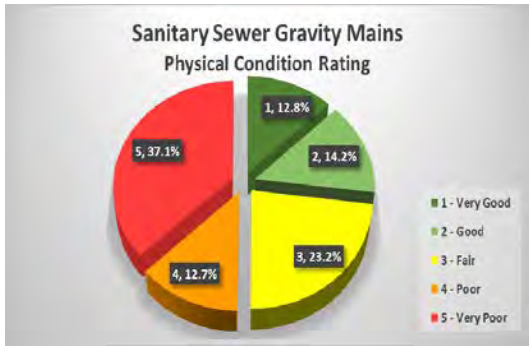
After completing the comprehensive inventory of the utility system assets, conditional assessments of all asset components were performed. The condition assessment provides the critical information needed to assess the physical condition and functionality of the assets in the collection and treatment systems and estimate their remaining service life. Wightman and Associates, Inc. (WAI) performed the conditional assessments beginning with a complete visual and physical inspection of both wastewater lift stations, the WWTF, and some manholes in the wastewater collection system. In addition, all the pipe in the wastewater system and all the wastewater manholes were videoed using closed-circuit televising (CCTV) equipment designed for internal pipe inspection and imaging. The CCTV service was provided by Terra Contracting Services, LLC.

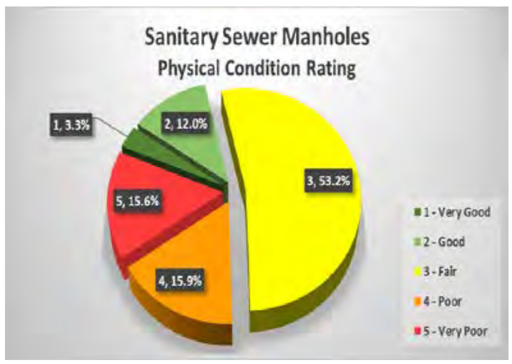
The conditional assessments for assets that were physically inspected were based on the National Association of Sewer Service Companies (NASSCO) numerical grading system, which defines the severity of observed defects or the condition of the asset. Condition grades for both structural and operational and maintenance (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 the Table below.

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

The following figures show the condition rating for the wastewater system based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database





<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.*

<u>Level of Service:</u> The Level of Service (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how the Village of Decatur's wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team has selected the following statements to define the desired LOS:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage, break, or lift station failure occur causing an untreated discharge, we will correct the problem as soon as possible to minimize any environmental damage.

3. We will develop and implement a preventative maintenance program to reduce the likelihood of the occurrence of a blockage, break, or lift station failure.

4. We will respond to customer complaints and system alarms within two hours for an emergency and within twenty-four hours for a non-emergency during normal business hours. Communication with the complainant or customers affected will be maintained until the issue is resolved.

5. We will maintain an asset management program for the system and provide reports on an as needed basis.

6. We will develop a work order system to identify, assign, and track preventative and reactive work on the system and report on the status of work orders to the Village on an as needed basis.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to the Village on an as needed basis.

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?*

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. 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

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include: cost of repair; social cost associated with the loss of the asset; repair/replacement costs related to collateral damage caused by the failure; legal costs related to additional damage caused by the failure; environmental costs created by the failure; loss of business revenue to the community; and any other associated costs or losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with a failure. Below is the ranking system that was used to determine the consequence of failure for the Decatur system.

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

Loss of service for the wastewater system refers to number of service connections impacted due to a single isolated failure.

[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. Methodology – Asset Management Financial Review

A significant effort has been made by Village of Decatur 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 AMFR 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 "cash basis" approach as described in the AWWA Manual of Rate Making Practices. From year to year, this AMFR may be used to implement policy regarding rate management and budgeting.

Management Summary

Rates: Consider a rate increase, possibly combined with financing of some of the capital improvements to level-off the future operating and cash fund balance. Options include:

- Cash approach to capital costs – Recommend immediate rate increase(s) in the short term with annual increases (tied to the Consumer Price Index for Utilities) thereafter. As the larger capital projects are completed, re-evaluate with consideration for rate reduction(s) beyond 2030.
- Debt approach to capital costs – Recommend combining the largest capital projects into a single project financed by a loan along with an immediate rate increase and another increase after the loan is secured (when debt service payments would begin) with annual increases (tied to the Consumer Price Index for Utilities) in other years.

Cash Balance: Reduce cash and investment balances to six months of capital and operating expenses.
Capital Cost: Either a cash approach or a combination of cash and debt approach, as modeled in the cash flow forecasts.

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.*

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. To ensure that the desired LOS 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. The planning period for a CIP is 20 years to allow for the development of a rate structure adequate to finance those projects that can reasonably be predicted to be needed during that period.

The Table below and continued on the following page lists the recommended capital improvement projects as well as cyclical improvement projects (i.e. equipment replacement) over the next twenty years for the wastewater collection system and the WWTF. Detailed descriptions and cost estimates for each project listed can be found in The AMP. Where appropriate, the estimated project costs shown in the Table include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. All costs shown in the Table are in current costs (no inflation) unless otherwise noted.

Priority	CIP Year	Project Name	Estimated Cost
1	2018	Repair Sanitary Sewer Cross-Bored by Utility	$ 5,000
2	2018	Manhole Lining - 2018	$ 47,000
3	2018	Lift Station 1 Comminutor Rebuild/Replacement	$ 22,000
4	2019	Lift Station 1 Lighting Upgrade	$ 5,000
5	2019	Recoat Exposed Piping and Valves at Lift Station 1	$ 11,000
6	2019	Lift Station 2 Lighting Installation	$ 5,000
7	2019	Sewer Spot Repairs - 2019	$ 32,000
8	2019	Replace Lagoon 2 Effluent Shear Gate Valve	$ 3,000
9	2019	Miscellaneous Manhole Repairs - 2019	$ 7,000
10	2020	Coat Lift Station 1 Wet Well Number 1	$ 75,000
11	2021	Coat Lift Station 2 Wet Well Number 1	$ 75,000
12	2022	Lagoon 3 Bank Regrading and Repair	$ 442,000
13	2023	Sewer Lining - 2023	$ 327,000
14	2024	Lagoon Sludge Removal	$ 236,000
15	2025	Replace Lift Station 1 Generator, Flow Meter, and Controls	$ 108,000
16	2025	Replace Lift Station 1 Pump Number 1	$ 18,000
17	2026	Replace Lift Station 1 Pump Number 2	$ 18,000
18	2026	Rosewood Sewer Reconstruction	$ 24,000
19	2026	Sewer Spot Lining - 2026	$ 28,000
20	2026	Manhole Lining - 2026	$ 32,000

Priority	CIP Year	Project Name	Estimated Cost
21	2026	Miscellaneous Manhole Repairs - 2026	$ 11,000
22	2026	Install Lagoon Effluent Flow Monitoring and Logging	$ 12,000
23	2027	Lagoon 2 Bank Repair	$ 285,000
24	2028	Sewer Lining - 2028	$ 190,000
25	2029	Manhole Lining - 2029	$ 35,000
26	2029	Miscellaneous Manhole Repairs - 2029	$ 27,000
27	2030	Replace Lift Station 2 Generator and Controls	$ 87,000
28	2030	Replace Lift Station 2 Pump Number 1	$ 9,000
29	2031	Replace Lift Station 2 Pump Number 2	$ 9,000
30	2031	Additional Sanitary Sewer and Manhole Repairs - 2031	$ 115,000
31	2033	Additional Sanitary Sewer and Manhole Repairs - 2033	$ 115,000
32	2035	Additional Sanitary Sewer and Manhole Repairs - 2035	$ 115,000
33	2037	Additional Sanitary Sewer and Manhole Repairs - 2037	$ 115,000
		Total Estimated Project Cost for Twenty-Year CIP (current costs) =	$ 2,645,000
		Total Estimated Project Cost for Twenty-Year CIP (inflation adjusted[2] costs) =	$ 3,179,000

A. List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the Village Assets:

Table 1 contains a summary of the Decatur wastewater collection system assets identified and included in the wastewater AMP.

Asset Description	Quantity	Units
18" Sanitary Sewer	805	LF
15" Sanitary Sewer	9,779	LF
12" Sanitary Sewer	6,602	LF
10" Sanitary Sewer	6,572	LF
8" Sanitary Sewer	63,965	LF
4-foot Diameter Sanitary Manhole	302	EA
Service Lead, Complete	1,129	EA
Lift Station > or = 500 gpm	1	EA
Lift Station < 500 gpm	1	EA
8" Force Main	2,289	LF
6" Force Main	2,142	LF

Table 2 - Village of Decatur wastewater collection system assets

[2] Twenty-year inflation adjusted calculations assumed a compounded annual inflation rate of 2% per year.

Table 2 contains a summary of the Decatur WWTF assets identified and included in the wastewater AMP.

Asset Description	Quantity	Units
Treatment Lagoon	3	EA
Diversion Chamber	1	EA
Lagoon Water Level Control Chamber	3	EA
Lagoon Outlet Structure	2	EA
Weir Manhole	2	EA
Lagoon Outlet Piping and Lined Ditch	2	EA
Security Fencing	5,800	LF
Access Road	9,560	SF
Warning Sign	10	EA
Site Sign	1	EA
10” Lagoon Influent Piping and Fittings	1,080	LF

Table 3 - Village of Decatur wastewater treatment facility assets

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

Completion Date **October 31, 2017**
(no later than 3 years from executed grant date)

The Village of Decatur, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1324-01 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: March 27, 2017

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. Aaron Mitchell at	**(269)** 423-7014	amitchell@decaturmi.org
Name	Phone Number	Email

____ 10/17/17
Signature of Authorized Representative (Original Signature Required) Date

Mr. Aaron Mitchell, Village Manager
Print Name and Title of Authorized Representative

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Village of Deckerville

SAW Project No. 1042-01

FINAL
October 2017

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Executive Summary

Overview

Public Act 562 of 2012 authorized money for the Storm water, Asset Management, and Wastewater (SAW) Grant Program. In October 2014, the Village of Deckerville received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1042-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Village's publicly owned wastewater utility. The assets that comprise the utility include collection system piping and manholes, lift station/pump station, force main and waste stabilization lagoons.

The SAW Grant amount awarded to the Village of Deckerville was $432,540
The Local Match provided by the Village of Deckerville was $48,060.00

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.

Questions regarding the Asset Management Plan should be directed to:
Mr. Tracy Hoff
Village Supervisor
Village of Deckerville
2521 Black River Road
Deckerville, Michigan 48427
810-376-8591
Email: deckervilledpw@frontier.com

Asset Inventory and Condition Assessment

The wastewater collection system assets consist of approximately:

- Gravity Sewer (6 inch thru 12 Inch): 39,759 feet (7.5 miles)
- Force Main (8 inch): 2,669 feet (0.5 miles)
- Manhole Structures: 150
- Sewer Lift Stations: 1 Each

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

The Village of Deckerville (Village) owns and operates a sanitary sewer collection system and wastewater stabilization lagoon facility (WWSL). Discharges from the Village's WWSL are regulated by the Michigan Department of Environmental Quality (MDEQ). The Village operates under General Permit No. MIG580000 and Certificate of Coverage (COC) No. MIG580306.

The Village's collection system includes one pump station. The WWSL is a facultative lagoon system with three lagoons.

In summary, the inventory includes the pump station and WWSL with a combined 23 assets and 263 collection system assets.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance manuals, which included a review of the existing record drawings, field notes, staff knowledge, site visits and 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 survey grade GPS equipment and a comprehensive evaluation of the gravity system.

This information was organized into a new GIS database and piping network for archiving, mapping and future evaluation purposes.

Condition Assessment and Expected Useful Life
A comprehensive evaluation of the collection system was performed.

- NASSCO-MACP Level 1 manhole field based assessments were completed on 139 manhole structures that were assessible.
- Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 32,557 LF of the gravity pipe.
- The condition of the collection system assets reviewed ranged from Good to Fair Condition, with only a few minor deficiencies.
- Capacity Analysis was modeled for average day and peak hour conditions in areas of concern.
- Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. It is recommended to clean and televise the collection system on a 7 to 10-year rotating basis.

A comprehensive evaluation of the WWSL and pump station was performed.

- Overall, the assets in the WWSL and pump station were found to be in good to fair condition.
- Some assets were in excellent condition due to relatively recent installation and others were near the end of their useful life due to age or deterioration caused by harsh conditions associated with treating wastewater.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)
The overall objective of the Village of Deckerville as it relates to their wastewater collection system is to adopt the following Level of Service (LOS) goals:

LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Deckerville 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:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with 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 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 the community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Village annually to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

To assure that LOS goals are met, performance measurements may need to be implemented. During the LOS review with the community the need for performance measurements was discussed.

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

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 template 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.

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

Figure 1 provides the risk rating for gravity pipe by number of pipe segments. 3 pipe segments in the collection system have been identified with a high-risk rating. Two of the segments are broken, and one is collapsed. The Village of Deckerville will need to monitor these specific locations and may require occasional cleaning of the pipe until the repairs can be completed within the 1-5-year CIP. Much of the collection system's gravity pipes, 93 percent as shown in Figure 1, have a low risk rating and are indicative of pipes in relatively good condition.

Consequence of Failure		Low	Medium	High
	High	6 *(High)*	0 *(High)*	0 *(Extreme)*
	Medium	115 *(Low)*	0 *(Med)*	3 *(High)*
	Low	0 *(Low)*	0 *(Low)*	0 *(Med)*
		Probability of Failure		

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

Figure 2 provides the risk rating for the collection system manholes. There were 21 structures that were found to have adjustment rings in poor condition and manhole frames that need to have point repairs where the frame sits on the manhole ring. Much of the collection system's manholes, 61 percent as shown in Figure 2, have a low risk rating and are indicative of manholes in relatively good condition

Consequence of Failure		Low	Medium	High
	High	2 *(High)*	0 *(High)*	8 *(Extreme)*
	Medium	31 *(Low)*	0 *(Med)*	13 *(High)*
	Low	54 *(Low)*	0 *(Low)*	31 *(Med)*
		Probability of Failure		

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

A summary of the risk ratings for WWSL and pump station assets is provided in Figure 3. The three lagoons are in the Extreme category due to the condition of the berms and the volume of sludge in each.

Consequence of Failure		Probability of Failure: Low	Probability of Failure: Medium	Probability of Failure: High
	High	0 *(High)*	1 *(High)*	3 *(Extreme)*
	Medium	2 *(Low)*	9 *(Med)*	2 *(High)*
	Low	0 *(Low)*	5 *(Low)*	1 *(Med)*

Figure 3. WWSL and Pump Station Assets by Risk Rating

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, pumping stations and force mains. From the BRE, a short-term (1-5 year) and long-term (6-20 year) CIP's were developed for the utility.

This AMP included a detailed condition assessment of the collection system including televising of pipe, and field condition assessments of all accessible sanitary manholes and lift stations.

Based on the AMP condition assessment of the sanitary sewer system, the Village has identified assets of the collection system, waste stabilization lagoon and lift stations for improvement. These improvements will be completed with funding from an outside funding agency such as USDA Rural Development.

(1-5 Year) Capital Improvements include:

- Lagoon 1 Biosolids Removal.
- Manhole Structure Rehabilitation.
- Repair collection system pipes where deficiencies were found.

(6-20 Year) Capital Improvements include:

- Lagoon Berm Repair.
- Lagoon Site Improvements.
- Lagoons 2 & 3 Biosolids Removal.
- Structure Rehabilitation.

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 function 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 Capital Improvement Budget should be considered to assist with funding the needed improvements to the system.

A replacement fund should also be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) fund.

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 existing rates were determined to create sufficient funds to fulfill the day-to-day maintenance and operations of the entire sanitary collection system.

The MDEQ approved the Village's rate methodology on June 2, 2017.

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

Completion Date: October 27,2017
(no later than 3 years from executed grant date)

The **Village of Deckerville** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1042-01** 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: **June 2,2017**

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:

Donald Murdock	810-376-8447	deckervilledpw@frontier.com
Name	Phone Number	Email

Donald Murdock 10/25/2017
Signature of Authorized Representative (Original Signature Required) Date

Donald Murdock Village President
DONALD MURDOCK VILLAGE PRESIDENT
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

Village of Deckerville

SAW Project No. 1042-01

FINAL
October 2017

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 October 2014, The Village of Deckerville received a (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), Project no.1042-01 to provide financial assistance for the development of this asset management plan (AMP). This report provides the Asset Management Plan (AMP) for the Village's Stormwater collection system. 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.

The SAW Grant amount awarded to Village of Deckerville was $401,035.00
The Local Match provided by Village of Deckerville was $44,560.00

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.

Questions regarding the Asset Management Plan should be directed to:
Mr. Tracy Hoff
Village Supervisor
Village of Deckerville
2521 Black River Road
Deckerville, Michigan 48427
810-376-8591
Email: deckervilledpw@frontier.com

ASSET INVENTORY AND CONDITION ASSESSMENT

The Stormwater collection system assets consist of approximately:

- Storm piping (6 thru 42 inch): 25,599 feet (4.85 miles)
- Manhole and Catchbasins: 282

<u>Asset Identification and Location</u>

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 future evaluation.

<u>Condition Assessment and Expected Useful Life</u>

A comprehensive evaluation of the collection system was performed.

NASSCO-MACP Level 1 manhole field based assessments were completed on 279 structures. These are the mainline and catch basin structures that were visible.

Based on discussions with the Village DPW staff, there have not been any known capacity issues with the Village owned stormwater system.

Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 19,761 feet of the Storm piping.

The condition of the storm water system assets ranged from Good to Fair.

Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. It is recommended to clean and televise the system on a 7 to 10-year rotating basis.

Level of Service

Defining the Expected Level of Service (LOS)

The Village of Deckerville Level of Service (LOS) goals as it relates to the stormwater collection system is summarized as follows:

LEVEL OF SERVICE STATEMENT

The overall objective of Village of Deckerville is to provide reliable stormwater 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:

- Provide adequate collection system capacity for all service areas.
- Comply with local, state and federal regulations.
- Actively maintain collection system assets in reliable working condition
- 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, to ensure sound financial management of the stormwater 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 annually to make sure they accurately reflect the desired operation of the utility.

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 Stormwater 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 the utilities ability to convey and treat 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 Village of Deckerville using an ArcGIS-based sewer asset management and capital planning template that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. 5 pipe segments in the Stormwater collection system have a extreme risk rating and are recommended for repair and replacement. Approximately 77% of the storm system is within a high risk rating, which will need to have further investigation to determine the corrective repair plan. Approximately 11% of the collection system is in the low risk category and are in relatively good condition.

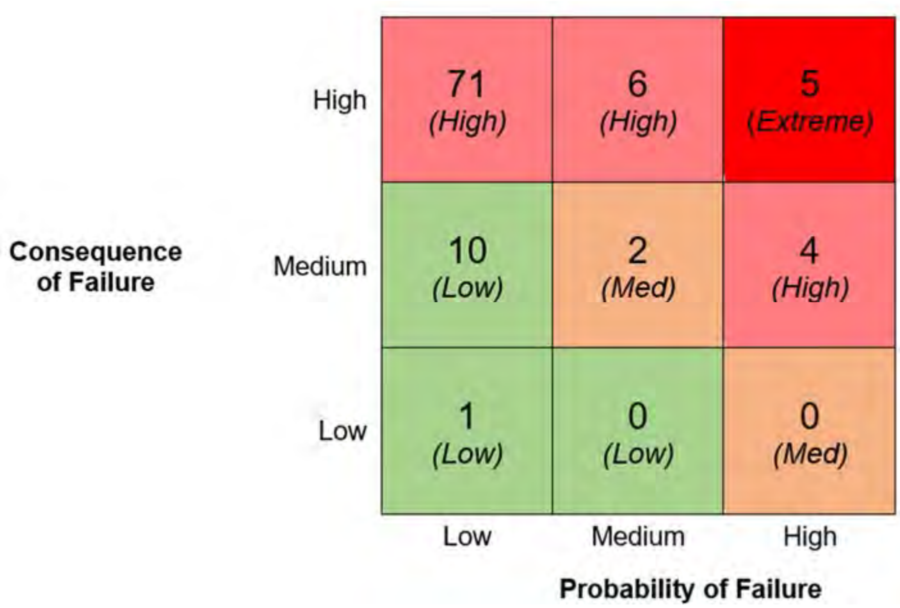


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Four structures are identified an extreme risk rating. One is recommended for short term replacement. Three are in need chimney rehabilitation.

Consequence of Failure	Probability of Failure: Low	Probability of Failure: Medium	Probability of Failure: High
High	218 *(High)*	14 *(High)*	4 *(Extreme)*
Medium	13 *(Low)*	1 *(Med)*	0 *(High)*
Low	28 *(Low)*	0 *(Low)*	1 *(Med)*

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

Capital Improvement Plan

A Capital Improvement Plan with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term (1-5 year) and Long-Term (6-20-year) Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

The Village is considering funding options to make the needed improvements that have been identified as an extreme risk within the Short Term (1-5 year) CIP.

(1-5 Year) Capital Improvements include:

- Various sections of Storm Sewer to be repaired or replaced as identified in the AMP.
- Structure rehabilitation on the extreme risk assets.

(6-20 Year) Capital Improvements include:

- Manhole Reconstruction or Replacement
- Catch basin reconstruction and frame and casting replacement
- Various sections of Storm Sewer to be replaced or repaired as identified in the AMP.

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound Stormwater system. The process of cleaning and CCTV inspection of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every 7 to 10 years. Available budget will dictate the frequency or size of yearly projects.

Revenue Structure

The revenue for storm sewer improvements will come from the Village local and major street funds or the Village General Fund.

DEQ

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

Completion Date October 27, 2017
(no later than 3 years from executed grant date)

The **Village of Deckerville** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1042-01** 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:

Donald Murdock at 810-376-8447 deckervilledpw@frontier.com
Name Phone Number Email

Donald Murdock 10/25/2017
Signature of Authorized Representative (Original Signature Required) Date

Mr. Donald Murdock Village President

Print Name and Title of Authorized Representative

June 2014

Deckerville Strm AMP Report - Executive Summary

Delhi Township Michigan
Asset Management Plan – SAW Grant No. 1096-01
Wastewater Collection System

Grantee: Charter Township of Delhi Michigan

2074 Aurelius Rd
Holt, MI 48842
Phone: 517-694-2135

Township Office Hours:
Monday - Friday: 8:00am-5:00pm
Closed on Holidays.

John Elsinga, Township Manager
Phone: (517) 694-2137
E-mail: John.Elsinga@delhitownship.com

Sandra Diorka, Director Public Services
Phone: (517) 699-3873
E-mail: Sandra.diorka@delhitownship.com

Karyn Stickel, Consulting Engineer
Hubbell, Roth & Clark, Inc.
Phone: 248-454-6566
E-mail: kstickel@hrc-engr.com

The total award amount of $1,949,716 was provided to the Charter Township of Delhi to complete a Wastewater Asset Management Plan, with the Township responsible for $354,494 in match funding. The final amount spent will not be available until the last disbursement request, after the October 31, 2017 deadline.

A. Asset Inventory:

The Township's Geographic Information Systems (GIS) was updated to inventory all of the Township-owned sanitary sewer collection system asset. In addition, the pump stations and POTW assets were entered into the CMMS software. The Township also purchased the necessary hardware and software, and received training to locate and track assets with fixed locations.

Location of nonspatial assets such as lift station components, POTW WWTP components, building components, and other equipment was compiled in inventory spreadsheets.

The GIS, asset spreadsheets, and CMMS will all be used to maintain asset data in the future. Below is a general list of major assets identified:

- 2545 Sanitary Manholes
- 118 Miles of Sanitary Gravity Mains
- 12 Sanitary Sewer Pump Stations
- 1 Wastewater Treatment Plant

B. Condition Assessment:

The GIS includes fields to record the required criticality factors and hyperlinks to scanned utility plans. Representatives from HRC and the Township were physically able to assess 90-95 percent of the Township's sanitary manhole structure inventory using the Manhole Assessment Certification Program (MACP) rating system. The Township also used its equipment and manpower to clean and televise most of the Township's eligible sanitary sewer lines that were installed before 1993 using the Pipeline Assessment Certification Program (PACP) rating system. This information was used to determine a Probability of Failure (POF) score, discussed further below.

The POTW and all twelve (12) sanitary sewer pump station were inspected and their condition, equipment, infrastructure, and structures were properly recorded. This included a detailed condition evaluation of the nitrification tower and the lagoon clay liner. Remote field tests were performed on forcemains to determine the pipe condition and available service life. A capacity analysis of the sanitary sewer system was performed to identify system deficiencies and potential sanitary sewer overflow (SSO) locations.

C. Level of Service:

The Township developed a level of service statement as part of the AMP as follows:

The Charter Township of Delhi is committed to maintaining the performance of our sanitary collection and treatment 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 Charter Township of Delhi choose to implement this statement as the defined Level of Service. The Township's statement considers the impacts to public health and the system's ability to comply with regulations. The current procedures and ongoing operations of the Township 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 Township will review the statement and ongoing system activities annualyl to determine if the mission is not being successfully fulfilled and further measurement of the stated goals is necessary

D. Criticality of Assets:

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 Township 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. Probably of Failure (POF) and Consequence of Failure (COF) were assigned on a scale of 1-5, with 5 being the worst condition/highest consequent. A Business Risk Evaluation Score (BRE) was calculated by multiplying POF and COF.

67 percent of the Township's sanitary sewer lines and 95 percent of sanitary manholes had a BRE score of 5 or less on a scale of 1 to 25, with 1 being lowest risk. The sanitary pump stations were also inspected and found to be in good condition, which is further documented in the AMP report. Below is a summary of the BRE scores:

- Sanitary Pipes:
  - 67% BRE 1-5
  - 30% BRE 6-10
  - 2% BRE 11-15
  - 0% BRE 16-20

    - 1% BRE 21-25
- Sanitary Manholes:
    - 95% BRE 1-5
    - 4% BRE 6-10
    - 1% BRE 11-15
    - 0% BRE 16-20
    - 0% BRE 21-25

A criticality analysis was also done on the vertical assets based on the COF and POF as well. These factors were developed through an interview process with the Township staff, age information, redundancy, and condition data. This analysis was entered into the Township database in order to develop the CIP.

E. Operation and Maintenance Strategies/Revenue Structure:

H.J. Umbaugh & Associates submitted a rate methodology study for the Township on March 19, 2017, which MDEQ approved on March 23, 2017. The Township demonstrated that current revenues are sufficient to meet anticipated operation and maintenance expenses.

F. Long-term Funding/Capital improvement Plan

The sanitary sewer collection system, pump station, and POTW WWTP improvement projects have been recommended over the next 20 years with a total estimated cost of $16,962,368. The estimated cost for each project has been included in the proposed budget for the estimated year of completion.

The Township anticipates two bond sales to pay for improvements. The first bond sale, in 2018, will include the following items:

POTW Projects

- Security and Fire System Improvements
- Grit Improvements
- Evoqua Cover Replacement
- Secondary Rehabilitation Improvements
- Influent Pump Replacements
- Valve Actuators
- Lab Cabinets
- Prefeed Mixings
- Sludge Storage Tank Valves
- Samplers
- Transformers/Switch Replacements
- Lagoon Generator
- Trickling Filter Rehabilitation

Collection System Projects

- Michael Street Sewer Improvement
- Inter Urban Sewer Improvement
- Delhi Commerce Lift Station Removal
- 30" Interceptor Lining

Total Bond Sale 1: $6,009,134

The second bond sale, in 2021 will cover the following items:

POTW Projects

- Grease Handling Upgrade
- Struvite Recovery
- Mixers and Airflow
- POTW Consolidation Work
- POTW Generator #1 and #2

Collection System Projects

- Pinetree Lift Station Improvements
- Heatherton Forcemain
- Keller Sewer

Total Amount of 2018 Bond Sale - $7,454,728

The proposed sanitary sewer budget includes the cost to clean and televise the Township sanitary sewer system on an on-going basis. The older clay pipes are televised on a three year rotation and the newer pipes are done on a six year basis. This will assist the Township to identify areas for necessary capital improvements.

A signed Certification of Project Completeness form is enclosed.

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Charter Township of Delhi *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1096-01 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: March 23, 2017.

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:

Sandra Diorka, Director of Public Service at 517-699-3873 sandra.diorka@delhitownhip.com
Name | Phone Number | Email

John B Elsinga 10/31/2017
Signature of Authorized Representative (Original Signature Required) | Date

John B. Elsinga, Township Manager
Print Name and Title of Authorized Representative

April 2017

DUNDEE WASTEWATER ASSET MANAGEMENT PLAN MDEQ SAW GRANT NO. 1204-01 SUMMARY OCTOBER 2017

Contact Information:

Dave Uhl

Village Manager

350 W. Monroe Street

Dundee, MI 48131

(734) 529-2500

In 2014, the Village of Dundee was awarded a State of Michigan Stormwater, Asset Management, and Wastewater (SAW) Grant to complete design and management services for the sanitary sewer system.

This AMP has been designed to provide the Village with a proactive and sustainable long-term plan to help ensure the well-being of the community and environment.

The AMP approach centers on the following five core elements:

1. Asset Inventory and Condition Assessment
2. Level of Service
3. Criticality
4. Revenue Structure
5. Capital Improvement Plan

Asset Inventory and Condition Assessment

The existing Village GIS information was used as a basis for the inventory, and was augmented with survey data, detailed equipment and collection system asset inventories, and cost opinions. 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 project. 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 Village streamline administrative processes and simplify mandatory reporting.

The value of the Village's entire wastewater infrastructure approaches $38.3 million, with the current value of the Village's sanitary sewer collection system estimated at approximately $20.2 million. Approximately 80% of the system cost is associated with gravity mains and manholes with the remaining cost attributed to pump stations and force mains. Table 1 summarizes the quantity and baseline system replacement value (in 2017 dollars).

The Village's collection system was inventoried and the condition assessed through detailed manhole inspections and sewer cleaning/televising. Additionally, flow monitoring was performed and a computer model prepared that provided additional data regarding sewer capacity.

Table 1 – Collection System Asset Summary and Cost

System Component	Quantity (unit)	Baseline System Value (Current Replacement Cost)
Gravity Mains	142,282 feet	$11,728,000
Manholes	672 each	$4,431,000
Pressurized Mains	16,600 feet	$1,219,000
Pump Stations	9 each	$2,817,000
	Total	**$20,195,000**

The Village's Wastewater Treatment Plant includes a collection of over 245 assets that represent the total facility processes and are currently estimated at a value of approximately $18.1 million. Table 2 summarizes the major assets tracked for this AMP and the associated replacement value of those assets (in 2017 dollars).

The Village's wastewater treatment assets were inventoried and the condition assessed through a walkthrough of all assets and discussion with WWTP staff regarding their condition and maintenance history.

Table 2 - WWTP Asset Summary and Cost

Process Location	Assets	Baseline System Replacement Cost
Maintenance Building	5	$817,500
Control Building	35	$1,384,700
Degritting & Blower Building	22	$1,991,300
Pre-aeration Tanks	7	$2,011,500
MBR Tanks	19	$2,859,800
MBR Building	71	$1,656,000
Chlorine Contact Tank	9	$1,032,600
Chemical Feed Building	9	$458,100
Membrane Thickener/Blower	33	$2,906,400
Sludge Transfer	4	$177,000
Wet Weather System	11	$2,126,600
Other Misc. Assets	20	$672,000
Total	**245**	**$18,093,500**

A list of the assets evaluated in this plan is attached to this summary.

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 Village developed a list of key performance indicators to hold as goals for the Level of Service for their sanitary sewer facilities, which can be seen below in Table 3. The Village currently is meeting the listed performance goals and will focus on maintaining this high Level of Service.

Table 3 – Level of Service KPIs

Level of Service Key Performance Indicators
Reduce Basement Backups
Reduce Infiltration/Inflow rates and volumes
Capacity to Convey MDEQ design storm
Reduce Odor Complaints
Clean all sewers at least once in 5-year period
Replace underperforming pump stations
Meet requirement of NPDES permit
Implement Equipment Inventory and Maintenance Tracking System

Criticality

Criticality of assets is a step used to prioritize future improvements so that money is invested in the most needed projects. Criticality is quantified by use of a numerical score called Business Risk Evaluation (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.

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 collection system, nearly all of the manholes and 38,036 feet of sewer were inspected to assign a condition rating to the assets.

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.

A BRE was subsequently determined for each asset in the Village's system. These BRE ratings, combined with Village Staff experience, were used to define a Capital Improvement Plan for the Village of Dundee.

Operation and Maintenance/Revenue Structure/Long-Term Funding

The Dundee sewer and wastewater treatment systems are maintained using a maintenance plan and several crews that perform weekly and monthly schedule tasks while also responding to emergency calls. The asset management software implemented for this project will assist in assessing assets that need more frequent maintenance.

The Village has a goal of televising parts of the system greater than 20 years old in the next five years. An annual budget was presented in the plan that will allow the Village to achieve that goal.

The Village completed a revenue structure evaluation that demonstrated the Village's wastewater utility generates sufficient revenue to fund the operation and maintenance at the wastewater utility. The SAW grant does not require the Village to fund capital improvements through wastewater rates although Dundee, like most municipalities, typically does. A separate report has been prepared to analyze the ability of the Village's rates to implement the CIP in this report.

Capital Improvement Plan

A 20-year capital improvement plan was developed for both the collection system and the WWTP using the results of the business risk evaluation conducted in this AMP. The capital improvement plan identifies areas in the collection system and specific parts of the WWTP processes where funding should be provided over the next 20 years. This capital improvement plan should be routinely updated to ensure that it includes short- and long-term needs. Events will occur and new knowledge will be gathered that will justify changes to this plan.

Table 4 – Village of Dundee 20-Year Capital Improvement Plan (2017-2037)

Project Number	Description	Project Year	Project Cost
CS - 1	**Relief Interceptor Extension**	**2017**	**$609,000**
CS - 2	**Outer Drive Sanitary Sewer Improvements**	**2017**	**$706,000**
WWTP - 1	**Screening and MBR Improvements**	**2017**	**$6,665,000**
CS - 3	**McBride Street Sanitary Sewer Improvements**	**2018**	**$162,000**
WWTP - 2	**CCT Baffles & Appurtenances**	**2018**	**$945,000**
CS - 4	**Grade 5 Defect Lining**	**2019**	**$528,000**
WWTP - 3	**Asphalt Pavement**	**2019**	**$112,000**
WWTP - 4	**VFDs throughout WWTP**	**2020**	**$650,000**
WWTP - 5	**WWTP Roofs & Appurtenances**	**2021**	**$110,000**
CS - 5	Grade 4 & 5 Defect Repairs	2022	$383,000
WWTP - 6	Maintenance Building Generator No. 1	2023	$373,000
WWTP - 7	Raw WW Pump No. 1 & No. 3	2024	$46,000
WWTP - 8	MBR Building Roof	2025	$45,000
CS - 6	Grade 4 Defect Lining	2026	$1,044,000
WWTP - 9	Aeration Tank Diffusers & Appurtenances	2026	$420,000
WWTP - 10	MBR Submerged Membrane Units	2027	$3,180,000
CS - 7	Pump Station Spare Pumps	2028	$347,000
WWTP – 11	MTB Membranes & MBR Building Appurtenances	2030	$1,200,000
WWTP - 12	DO Panel and Probe, Lab Equipment & Appurtenances	2031	$73,000
CS - 8	M-50 Trunk Sewer Rehab	2033	$436,000
WWTP – 13	MLSS Probes and Plant Drain Pumping Stations Pump No. 1 & 2	2034	$93,000
WWTP – 14	Pumps & Blowers throughout WWTP	2035	$1,910,000
WWTP – 15	MTB Permeate Pump No. 2 & FG Motors	2036	$84,000
WWTP – 16	MBR Submerged Membrane Units	2037	$3,084,000
		Total	**$49,203,000**

* Costs estimated at anticipated construction year.

Green Shading = Collection System project

Blue Shading = Wastewater Treatment project

Future Steps

Beginning in 2013, any major municipal wastewater system in the state of Michigan whose permit expires on October 1, 2012 or after will be including an asset management program requirement. This requirement will accompany an updated set of reporting requirements associated with operating the Village's WWTP and collection system. The Lucity^{TM} AMS is designed to provide detailed reports regarding specific performance measures which will be essential to completing annual MDEQ reporting requirements. The Village will be required through their permit to submit reports including specific information regarding what capital improvement projects were completed, how much was spent on sewer cleaning, preventative maintenance, and other measures.

This AMP, inclusive of the GIS model of the sewer system and LucityTM AMS, are intended to work as a unit to assist Village staff in operating, maintaining and upgrading the Village'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 making revisions to the capital improvement plan to help Dundee best manage the needs of the Village's wastewater infrastructure.

ATTACHMENTS

VILLAGE OF DUNDEE WWTP
ASSET MANAGEMENT PLAN EQUIPMENT INVENTORY LIST

Asset Class - Effective Lives (Years)

Class	Asset Type	Exp Life
1	**Civil**	75
2	**Pressure Pipework**	60
3	**Sewers**	100
4	**Pumps/Equipment**	30
5	**Valves**	30
6	**Motors**	35
7	**Electrical**	35
8	**Controls**	25
9	**Building Assets**	60
10	**Land**	300
11	**HVAC**	15
12	**Process Tanks (FRP, etc)**	50
13	**Building Roof**	20
14	**VFD**	15
15	**Membranes**	15

Consequence of Failure

CoF Rating	Description	% Affected	Level
1	Minor Component Failure	0-25%	Asset
2	Major Component Failure	25-50%	Asset
3	Major Asset	0-25%	Asset
4	Multiple Asset Failure	25-50%	Facility / Sub-System
5	Major Facilty Failure	50-100%	Facility
6	Minor Sanitary System Failure	20-40%	Total System
7	Medium	40-60%	Total System
8	Intermediate	60-80%	Total System
9	Significant	80-90%	Total System
10	Total	90-100%	Total System

Probability of Failure

% of Effective Life Consumed	PoF Rating
0%	**1**
10%	**2**
20%	**3**
30%	**4**
40%	**5**
50%	**6**
60%	**7**
70%	**8**
80%	**9**
90%	**10**

Redundancy

Level of Redundancy	Reduce PoF by:
No Backup	0%
50% Backup	50%
100% Backup	90%
200% Secondary Backup	98%

CURRENT YEAR: 2016

ENR Average Annual Change 2005-2015 (ENR AAC) = 3.17%

Asset No.	Asset Description	Asset ID	Location	Year Installed	Condition Rating (1 - 10)	Current Performance (1 - 5)	Current Reliability (1 - 5)	Availability of Parts (1 - 5)	Judgement on Residual Life (Years)	Comments	Asset Class (1 - 10)	Estimated Life New (Years)	Calculated Remaining Life (Years)	Projected Remaining Life (Years)	Asset Consumed (%)	Backup Redundancy % 0% - 98%	Probability of Failure (1 - 10)	Consequence of Failure (1 - 10)	Business Risk Exposure (1 - 100)	Year to Replace	Replacement Cost ENR 8050	Contractor & ELAC (50%)	ENR Inflation FV = PV $(1+i)^n$ i = ENR AAC
	WWTP																						
	Equipment																						
1	Influent Manholes	MH-3-10, 3-	Yard	1988	5	1	1	1	40		3	100	72	40	60%	0%	6	1	6	2056	$ 10,000	$ 15,000	$ 52,267
2	Effluent Storm Manhole	MH-4	Yard	1988	5	1	1	1	40		1	75	47	40	47%	0%	5	1	5	2056	$ 10,000	$ 15,000	$ 52,267
3	Sewers	MH-SEW	Yard		5	1	1	1	40		3	100	40	40	60%	0%	6	2	12	2056		$ -	$ -
	Maintenance Building (MB)																						
4	Maintenance Building	MB	Yard	1988	4	2	2	1	40	**Rubber Roofing - 27 years old watermarks in ceiling tile**	9	60	32	32	47%	0%	5	2	10	2048	$ 250,000	$ 375,000	$ 1,017,984
5	Maintenance Building Roof	MB-Roof	Yard	1988	4	2	2	1	5		13	20	-8	5	75%	0%	8	2	16	2021	$ 18,000	$ 27,000	$ 31,560
6	Generator No. 1	MB-Gen-1	Maintenance Building	1988	2	1	1	1	25	**250kW**	7	35	7	7	80%	0%	8	1	8	2023	$ 200,000	$ 300,000	$ 373,246
7	Boiler System	MB-BS-1	Maintenance Building	2014	1	1	1	1	40	**Honeywell**	4	30	28	28	7%	0%	1	1	1	2044	$ 75,000	$ 112,500	$ 269,556
8	Water Heater	MB-WH-1	Maintenance Building	2001	7	1	1	1	1		4	30	15	1	97%	0%	10	1	10	2017	$ 2,000	$ 3,000	$ 3,095
	Control Building (CB)																						
9	Control Building (north end/office)	CB-N-O	Yard	1957	5	3	2	1	40		9	60	1	1	98%	0%	10	2	20	2017	$ 250,000	$ 375,000	$ 386,888
10	Control Building Roof (north end/office)	CB-N-Roof	Yard	1957	5	3	2	1	5		13	20	-39	5	75%	0%	8	2	16	2021	$ 4,200	$ 6,300	$ 7,364
11	Control Building (south end/lab)	CB-S-O	Yard	1988	6	3	3	1	40		9	60	32	32	47%	0%	5	2	10	2048	$ 250,000	$ 375,000	$ 1,017,984
12	Control Building Roof (south end/lab)	CB-S-Roof	Control Building	1988	6	3	2	1	5		13	20	-8	5	75%	0%	8	2	16	2021	$ 4,200	$ 6,300	$ 7,364
	Stop Gate and Frame	CB-RWW-SG-1	Control Building	2016						**to be installed in 2016**											$ 1,500	$ 2,250	$ 0
	Stop Gate and Frame	CB-RWW-SG-2	Control Building	2016						**to be installed in 2016**											$ 1,500	$ 2,250	$ 0
13	Sluice Gate		Control Building	1957	-	-	-	-	-	**Locked out - not in use**													
14	Grinder No. 1	CB-RWW-GR-1	Control Building	2014	2	1	2	3	4	**JWC Channel Grinder, 5hp Re-built in July, 2014**	4	30	28	4	87%	50%	4	4	16	2020	$ 56,000	$ 84,000	$ 95,168
15	Grinder No. 2	CB-RWW-GR-2	Control Building	2015	1	1	1	1	1	**To be installed 2015**	4	30	29	1	97%	50%	5	4	20	2017	$ 56,000	$ 84,000	$ 86,663
16	Raw Wastewater Pump No. 1	CB-RWW-P-1	Control Building	2005	3	2	2	1	8	**P-2, Cornell, 1.5 MGD (1042gpm), 25HP**	4	30	19	8	73%	90%	1	4	4	2024	$ 23,000	$ 34,500	$ 44,284
17	Raw Wastewater Pump No. 1 - Motor	CB-RWW-P-1-M	Control Building	2005	1	1	1	1	25	**Cornell, 25HP**	6	35	24	24	31%	0%	3	4	12	2040	$ 9,800	$ 14,700	$ 31,088
18	Raw Wastewater Pump No. 1 - VFD	CB-RWW-P-1-VFD	Control Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 12,000	$ 18,000	$ 20,393
19	Raw Wastewater Pump No. 2	CB-RWW-P-2	Control Building	2005	3	2	2	1	10	**P-2, Cornell, 1.5 MGD (1042gpm), 25HP**	4	30	19	10	67%	90%	1	4	4	2026	$ 23,000	$ 34,500	$ 47,136
20	Raw Wastewater Pump No. 2 - Motor	CB-RWW-P-2-M	Control Building	2005	1	1	1	1	25	**Cornell, 25HP**	6	35	24	24	31%	0%	3	4	12	2040	$ 9,800	$ 14,700	$ 31,088
21	Raw Wastewater Pump No. 2 - VFD	CB-RWW-P-2-VFD	Control Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 12,000	$ 18,000	$ 20,393
22	Raw Wastewater Pump No. 3	CB-RWW-P-3	Control Building	2005	3	2	2	1	8	**P-3, Cornell, 1.5 MGD (1042gpm), 25HP**	4	30	19	8	73%	90%	1	4	4	2024	$ 23,000	$ 34,500	$ 44,284
23	Raw Wastewater Pump No. 3 - Motor	CB-RWW-P-3-M	Control Building	2005	1	1	1	1	25	**Cornell, 25HP**	6	35	24	24	31%	0%	3	4	12	2040	$ 9,800	$ 14,700	$ 31,088
24	Raw Wastewater Pump No. 3 - VFD	CB-RWW-P-3-VFD	Control Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 12,000	$ 18,000	$ 20,393
	Suction valves (8")	CB-V-1, CB-V-4, CB-V-7	Control Building	1988	2	1	1	1	20	**8"**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,200	$ 1,800	$ 1,916
	Pump P-1 discharge valve (8")	CB-V-2	Control Building	1988	2	1	1	1	20	**8" check**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,800	$ 2,700	$ 2,874
	Pump P-1 discharge valve (8")	CB-V-3	Control Building	1988	2	1	1	1	20	**8" plug**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,200	$ 1,800	$ 1,916
	Pump P-2 discharge valve (8")	CB-V-5	Control Building	1988	2	1	1	1	20	**8" check**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,800	$ 2,700	$ 2,874
	Pump P-2 discharge valve (8")	CB-V-6	Control Building	1988	2	1	1	1	20	**8" plug**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,200	$ 1,800	$ 1,916
	Pump P-3 discharge valve (8")	CB-V-8	Control Building	1988	2	1	1	1	20	**8" check**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,800	$ 2,700	$ 2,874
	Pump P-3 discharge valve (8")	CB-V-9	Control Building	1988	2	1	1	1	20	**8" plug**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,200	$ 1,800	$ 1,916
	Pump Discharge Header valve (8")	CB-V-10	Control Building	1988	2	1	1	1	20	**8" plug**	5	30	2	2	93%	0%	9	2	18	2018	$ 1,200	$ 1,800	$ 1,916
	Influent Flow Meter	CB-M-1	Control Building	1988							8	25	-3	0	100%	0%	10	1	10	2017	$ 4,000	$ 6,000	$ 6,190
	Raw Sample Pump	CB-RWW-SP-1	Control Building	2015	1	1	1	1	30	**Gormon-Rupp (Model 11 1/2A3-B)**	4	30	29	29	3%	0%	1	1	1	2045	$ 2,500	$ 3,750	$ 9,270
	Raw Sample Pump Motor	CB-RWW-SP-1-M	Control Building	2015	1	1	1	1	35	**2 HP**	6	35	34	34	3%	0%	1	2	2	2050	$ 400	$ 600	$ 1,734
	Raw Sampler	CB-RWW-SAM-1	Control Building	1988	3	2	3	2	3	**N-Con Sentinel 8**	4	30	2	2	93%	0%	9	1	9	2018	$ 7,500	$ 11,250	$ 11,975

CURRENT YEAR: 2016

ENR Average Annual Change 2005-2015 (ENR AAC) = 3.17%

Asset No.	Asset Description	Asset ID	Location	Year Installed	Condition Rating (1 - 10)	Current Performance (1 - 5)	Current Reliability (1 - 5)	Availability of Parts (1 - 5)	Judgement on Residual Life (Years)	Comments	Asset Class (1 - 10)	Estimated Life New (Years)	Calculated Remaining Life (Years)	Projected Remaining Life (Years)	Asset Consumed (%)	Backup Redundancy % 0% - 98%	Probability of Failure (1 - 10)	Consequence of Failure (1 - 10)	Business Risk Exposure (1 - 100)	Year to Replace	Replacement Cost ENR 8050	Contractor & ELAC (50%)	ENR Inflation FV = PV $(1+i)^n$ i = ENR AAC
25	Computer System	CB-COM-1	Control Building	2013	2	2	2	1	5	**computer replaced 2 years ago**	8	25	22	5	80%	0%	8	4	32	2021	$ 2,500	$ 3,750	$ 4,383
26	Laboratory Equipment - BOD cabinet/incubator/autoclave	CB-LAB-EQ-BOD	Control Building	1988	6	2	4	4	2		8	25	-3	2	92%	0%	9	1	9	2018	$ 5,000	$ 7,500	$ 7,983
27	Laboratory Equipment - analytical	CB-LAB-EQ-AN	Control Building	2015	1	1	1	1	15		8	25	24	15	40%	0%	4	1	4	2031	$ 10,000	$ 15,000	$ 23,955
28	MCC (for Raw WW Pumps)	CB-MCC-1									7	35	0	0	100%	0%	10	7	70	2017	$ 50,000	$ 75,000	$ 77,378
30	Influent Piping	CB-RWW-Pipe	Control Building	2005	2	1	1	1	40		5	30	19	19	37%	0%	4	1	4	2035	$ 70,000	$ 105,000	$ 189,979
31	Water Heater	CB-WH-1	Control Building	2014	1	1	1	1	14		4	30	28	14	53%	0%	5	1	5	2030	$ 2,000	$ 3,000	$ 4,644
	Degritting and Blower Building (GB)																						
32	Grit Tank paddle gearbox/motor	GB-M-1	Degrit and Blower Building	1988	6	1	1	1	10	**Jones & Atwood**	6	35	7	7	80%	0%	8	2	16	2023	$ 200,000	$ 300,000	$ 373,246
33	Grit Tank	GB-GT-1	Degrit and Blower Building	1988	2	1	1	1	40		1	75	47	40	47%	0%	5	3	15	2056	$ 1,000	$ 1,500	$ 5,227
34	Grit Tank Paddles	GB-PA-1	Degrit and Blower Building	2008	6	1	1	2	5		30	15	7	5	67%	0%	7	2	14	2021	$ 1,500	$ 2,250	$ 2,630
35	Overal Grit/Blower Building	GB-1	Yard	1988	2	1	1	1	40		9	60	32	32	47%	0%	5	2	10	2048	$ 250,000	$ 375,000	$ 1,017,984
36	Grit Blower Building Roof	GB-1-R	Degrit and Blower Building	1988	2	1	1	1	5		13	20	-8	5	75%	0%	8	2	16	2021	$ 17,500	$ 26,250	$ 30,683
37	Mechanical Bar Screen (1/4")	GB-S-2	Degrit and Blower Building	1988	6	3	3	5	3	**~6mm Jones & Atwood**	4	30	2	2	93%	0%	9	4	36	2018	$ 200,000	$ 300,000	$ 319,321
38	Mechanical Filter Screen (3mm)	GB-S-1	Degrit and Blower Building	2005	6	2	3	4	5	**Jones & Atwood**	4	30	19	5	83%	0%	8	4	32	2021	$ 200,000	$ 300,000	$ 350,662
39	Screen Conveyor	GB-S-1-C	Degrit and Blower Building	1988	6	2	3	4	5		4	30	2	2	93%	0%	9	1	9	2018	$ 40,000	$ 60,000	$ 63,864
40	Pre-Air Blower No. 1	GB-B-1	Degrit and Blower Building	1988	6	2	1	3	3	**Roots, 60HP**	4	30	2	2	93%	50%	5	3	15	2018	$ 18,500	$ 27,750	$ 29,537
41	Pre-Air Blower No. 1 Motor	GB-B-1-M	Degrit and Blower Building	2010	2	1	1	1	15		6	35	29	15	57%	0%	6	2	12	2031	$ 5,000	$ 7,500	$ 11,977
42	Pre-Air Blower No. 1 VFD	GB-B-1-VFD	Degrit and Blower Building	2005	1	1	1	1	10		14	15	4	4	73%	0%	7	2	14	2020	$ 27,500	$ 41,250	$ 46,735
43	Pre-Air Blower No. 2	GB-B-2	Degrit and Blower Building	1988	6	2	1	3	3	**Roots, 60HP**	4	30	2	2	93%	50%	5	3	15	2018	$ 18,500	$ 27,750	$ 29,537
44	Pre-Air Blower No. 2 Motor	GB-B-2-M	Degrit and Blower Building	2010	2	1	1	1	15		6	35	29	15	57%	0%	6	2	12	2031	$ 5,000	$ 7,500	$ 11,977
45	Pre-Air Blower No. 2 VFD	GB-B-2-VFD	Degrit and Blower Building	2005	1	1	1	1	10		14	15	4	4	73%	0%	7	2	14	2020	$ 27,500	$ 41,250	$ 46,735
46	Grit Piping	GB-PIPE-1	Degrit and Blower Building	1988	6	1	1	1	10		2	60	32	10	83%	0%	8	1	8	2026	$ 15,000	$ 22,500	$ 30,741
47	Grit Slurry Discharge Valve (V-21)	GB-V-21	Degrit and Blower Building	1988	6	1	1	1	5	**solenoid valves will stick, 4" plug, lever**	5	30	2	2	93%	0%	9	1	9	2018	$ 500	$ 750	$ 798
	Blower piping	GB-PIPE-2	Degrit and Blower Building	1988						**8" and 10" air**											$ 138,000	$ 207,000	$ 0
			Degrit and Blower Building																				
48	Control Panel for Filter Screen	GB-CP-FS	Degrit and Blower Building	2005	3	1	1	2	20		8	25	14	14	44%	0%	4	1	4	2030	$ 5,000	$ 7,500	$ 11,609
49	Boiler System	GB-BS		2014	1	1	1	1	30	**Honeywell**	4	30	28	28	7%	0%	1	1	1	2044	$ 75,000	$ 112,500	$ 269,556
50	Water Heater	GB-H20-HEAT		2014	1	1	1	1	15		4	30	28	15	50%	0%	5	1	5	2031	$ 2,000	$ 3,000	$ 4,791
51	Potable Water Supply	GB-POT-H20-01			5	3	1	1	10	**really rusty when first turned on, installed before 1988**	2	60	10	10	83%	0%	8	1	8	2026	$ 40,000	$ 60,000	$ 81,976
52	Potable Water Supply	GB-POT-H20-02		2005	1	1	1	1	40	**PVC**	2	60	49	40	33%	0%	3	1	3	2056	$ 40,000	$ 60,000	$ 209,068
	Aeration Tanks																						
53	Pre-Aeration Tank No. 1	AT-1	Aeration Tank	1988	4	1	1	1	50		1	75	47	47	37%	50%	2	3	6	2063	$ 600,000	$ 900,000	$ 3,901,699
54	Pre-Aeration Tank No. 2	AT-2	Aeration Tank	1988	4	1	1	1	50		1	75	47	47	37%	50%	2	3	6	2063	$ 600,000	$ 900,000	$ 3,901,699
55	Pre-Aeration Diffuser	AT-1-D	Aeration Tank	2005	5	1	1	1	10		2	60	49	10	83%	50%	4	3	12	2026	$ 60,000	$ 90,000	$ 122,964
56	Bypass Tank Aeration Diffuser	AT-2-BT-D	Aeration Tank	2005	5	1	1	1	10		2	60	49	10	83%	50%	4	3	12	2026	$ 60,000	$ 90,000	$ 122,964
57	DO Panel	AT-DO-1	Aeration Tank	2007	3	3	3	1	15		8	25	16	15	40%	0%	4	1	4	2031	$ 5,000	$ 7,500	$ 11,977
58	DO Probe and Panel	AT-DO-2	Aeration Tank	2007	8	5	5	1	15	**Cerlic**	8	25	16	15	40%	0%	4	1	4	2031	$ 3,500	$ 5,250	$ 8,384
59	Influent Channel Slide Plate	AT-SG-1	Aeration Tank	2005						**aluminum, operates with chain**	4	30	19	0	100%	0%	10	1	10	2017	$ 12,500	$ 18,750	$ 19,344
	MBR Tanks																						
60	Membrane Bioreactor Tank No. 1	MBR-T-1	MBR Tanks	2005	2	1	1	1	65		1	75	64	64	15%	50%	1	2	2	2080	$ 95,000	$ 142,500	$ 1,050,109

CURRENT YEAR: 2016

ENR Average Annual Change 2005-2015 (ENR AAC) = 3.17%

Asset No.	Asset Description	Asset ID	Location	Year Installed	Condition Rating (1 - 10)	Current Performance (1 - 5)	Current Reliability (1 - 5)	Availability of Parts (1 - 5)	Judgement on Residual Life (Years)	Comments	Asset Class (1 - 10)	Estimated Life New (Years)	Calculated Remaining Life (Years)	Projected Remaining Life (Years)	Asset Consumed (%)	Backup Redundancy % 0% - 98%	Probability of Failure (1 - 10)	Consequence of Failure (1 - 10)	Business Risk Exposure (1 - 100)	Year to Replace	Replacement Cost ENR 8050	Contractor & ELAC (50%)	ENR Inflation FV = PV $(1+i)^n$ i = ENR AAC
61	MBR Tank Cover No. 1	MBR-T-1-C																					
62	Membrane Bioreactor Tank No. 2	MBR-T-2	MBR Tanks	2005	2	1	1	1	65		1	75	64	64	15%	50%	1	2	2	2080	$ 95,000	$ 142,500	$ 1,050,109
63	MBR Tank Cover No. 2	MBR-T-2-C																					
64	Membrane Bioreactor Tank No. 3	MBR-T-3	MBR Tanks	2005	2	1	1	1	65		1	75	64	64	15%	50%	1	2	2	2080	$ 95,000	$ 142,500	$ 1,050,109
65	MBR Tank Cover No. 3	MBR-T-3-C																					
66	Membrane Bioreactor Tank No. 4	MBR-T-4	MBR Tanks	2005	2	1	1	1	65		1	75	64	64	15%	50%	1	2	2	2080	$ 95,000	$ 142,500	$ 1,050,109
67	MBR Tank Cover No. 4	MBR-T-4-C																					
68	MBR Submerged Membrane Units	MBR-SM-101 to MBR-SM-111	MBR Tank No. 1	2005	6	3	4	4	2	**Kubota, 400**	15	15	4	2	87%	50%	4	3	12	2018	$ 150,000	$ 225,000	$ 239,491
69	MBR Submerged Membrane Units	MBR-SM-201 to MBR-SM-211	MBR Tank No. 2	2005	6	3	4	4	2	**Kubota, 400**	15	15	4	2	87%	50%	4	3	12	2018	$ 150,000	$ 225,000	$ 239,491
70	MBR Submerged Membrane Units	MBR-SM-301 to MBR-SM-311	MBR Tank No. 3	2005	6	3	4	4	2	**Kubota, 400**	15	15	4	2	87%	50%	4	3	12	2018	$ 150,000	$ 225,000	$ 239,491
71	MBR Submerged Membrane Units	MBR-SM-401 to MBR-SM-411	MBR Tank No. 4	2005	6	3	4	4	2	**Kubota, 400**	15	15	4	2	87%	50%	4	3	12	2018	$ 150,000	$ 225,000	$ 239,491
72	Permeate Isolation Valves	MBR-ISOV-01 to MBR-ISOV-88	MBR Tanks	2005	5	2	3	1	10	**Asahi**	5	30	19	10	67%	0%	7	1	7	2026	$ 1,500	$ 2,250	$ 3,074
73-74	Fabricated Gates (FG 1 thru 2)	MBR-FG-1 through MBR-FG-2	MBR Tanks	2005	1	1	1	1	20	**manual**	4	30	19	19	37%	0%	4	2	8	2035	$ 40,000	$ 60,000	$ 108,559
75-78	MBR Influent Fabricated Gates (FG 3 thru 6)	MBR-IN-FG-3 through MBR-IN-FG-6	MBR Tanks	2005	3	2	2	1	20	**motor operated, guides are sticky**	4	30	19	19	37%	0%	4	2	8	2035	$ 40,000	$ 60,000	$ 108,559
79	FG 3 thru 6 motors	MBR-FG-3-M through MBR-FG-6-M	MBR Tanks	2005	2	1	1	1	20		6	35	24	20	43%	0%	4	1	4	2036	$ 4,000	$ 6,000	$ 11,200
80	FG 3 thru 6 actuators	MBR-FG-3-ACT through MBR-FG-6-ACT	MBR Tanks	2005	3	2	2	1	20		8	25	14	14	44%	0%	4	1	4	2030	$ 9,000	$ 13,500	$ 20,897
81	MBR Effluent Fabricated Gates (FG 7 thru 10)	MBR-EFF-FG-7 through MBR-EFF-FG-10	MBR Tanks	2005	2	1	1	1	20	**manual**	4	30	19	19	37%	0%	4	2	8	2035	$ 40,000	$ 60,000	$ 108,559
82	In-basin Piping	MBR-BASIN-PIPING	MBR Tanks	2005	1	1	1	1	50	**Enviroquip**	2	60	49	49	18%	0%	2	1	2	2065	$ 792,000	$ 1,188,000	$ 5,481,943
	MBR Building (MBB)																						
83	Overall MBR Building	MBB-1	Yard	2005	2	2	2	1	50		9	60	49	49	18%	0%	2	2	4	2065	$ 100,000	$ 150,000	$ 692,165
84	MBR Building Roof	MBB-1-R	MBR Building	2005	2	2	2	1	10	**rubber roof**	13	20	9	9	55%	0%	6	2	12	2025	$ 22,500	$ 33,750	$ 44,695
	Exhaust Fan No. 1	MBB-FAN-1																			$ 8,000	$ 12,000	$ 0
	Exhaust fan No. 2	MBB-FAN-2																			$ 8,000	$ 12,000	$ 0
85	RAS Pump No. 1	MBB-RASP-1	MBR Building	2005	1	1	1	1	20	**P-4, Gormon Rupp, 1050gpm, 10HP. Re-built Feb 2015**	4	30	19	19	37%	50%	2	4	8	2035	$ 16,000	$ 24,000	$ 43,424
86	RAS Pump No. 1 Motor	MBB-RASP-1-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,050	$ 1,575	$ 3,331
87	RAS Pump No. 1 VFD	MBB-RASP-1-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 7,500	$ 11,250	$ 12,746
88	RAS Pump No. 2	MBB-RASP-2	MBR Building	2005	1	1	1	1	20	**P-5, Gormon Rupp, 1050gpm, 10HP. Re-built Apr 2013**	4	30	19	19	37%	50%	2	4	8	2035	$ 16,000	$ 24,000	$ 43,424
89	RAS Pump No. 2 Motor	MBB-RASP-2-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,050	$ 1,575	$ 3,331
90	RAS Pump No. 2 VFD	MBB-RASP-2-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 7,500	$ 11,250	$ 12,746
91	RAS Pump No. 3	MBB-RASP-3	MBR Building	2005	1	1	1	1	20	**P-6, Gormon Rupp, 1050gpm, 10HP. Re-built May 2015**	4	30	19	19	37%	50%	2	4	8	2035	$ 16,000	$ 24,000	$ 43,424
92	RAS Pump No. 3 Motor	MBB-RASP-3-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,050	$ 1,575	$ 3,331
93	RAS Pump No. 3 VFD	MBB-RASP-3-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 7,500	$ 11,250	$ 12,746
94	RAS Magmeter (typ of 3)	MBB-FT-11007, 08, 09	MBR Building	2005	1	1	1	1	15	**Endress & Hauser**	8	25	14	14	44%	0%	4	1	4	2030	$ 25,000	$ 37,500	$ 58,047
95	WAS Pump No. 1	MBB-WAS-P-1	MBR Building	2005	2	1	1	1	20	**P-7, Gormon Rupp, 200gpm, 3HP**	4	30	19	19	37%	50%	2	4	8	2035	$ 7,700	$ 11,550	$ 20,898
96	WAS Pump No. 1 Motor	MBB-WAS-P-1-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 500	$ 750	$ 1,586
97	WAS Pump No. 2	MBB-WAS-P-2	MBR Building	2005	2	1	1	1	20	**P-8, Gormon Rupp, 200gpm, 3HP**	4	30	19	19	37%	50%	2	4	8	2035	$ 7,700	$ 11,550	$ 20,898
98	WAS Pump No. 2 Motor	MBB-WAS-P-2-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 500	$ 750	$ 1,586
99	Permeate Pump No. 1	MBB-PP-1	MBR Building	2005	2	1	1	1	20	**P-9, Gormon Rupp, 620gpm, 15HP**	4	30	19	19	37%	50%	2	4	8	2035	$ 10,000	$ 15,000	$ 27,140
100	Permeate Pump No. 1 Motor	MBB-PP-1-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,500	$ 2,250	$ 4,758
101	Permeate Pump No. 1 VFD	MBB-PP-1-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 10,000	$ 15,000	$ 16,994
102	Permeate Pump No. 2	MBB-PP-2	MBR Building	2005	2	1	1	1	20	**P-10, Gormon Rupp, 620gpm, 15HP**	4	30	19	19	37%	50%	2	4	8	2035	$ 10,000	$ 15,000	$ 27,140
103	Permeate Pump No. 2 Motor	MBB-PP-2-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,500	$ 2,250	$ 4,758

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104	Permeate Pump No. 2 VFD	MBB-PP-2-VFD	MBR Building	2015	1	1	1	1	20	VFD replaced Jan 2015	14	15	14	14	7%	0%	1	1	1	2030	$ 10,000	$ 15,000	$ 23,219
105	Permeate Pump No. 3	MBB-PP-3	MBR Building	2005	2	1	1	1	20	P-11, Gormon Rupp, 620gpm, 15HP	4	30	19	19	37%	50%	2	4	8	2035	$ 10,000	$ 15,000	$ 27,140
106	Permeate Pump No. 3 Motor	MBB-PP-3-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,500	$ 2,250	$ 4,758
107	Permeate Pump No. 3 VFD	MBB-PP-3-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 10,000	$ 15,000	$ 16,994
108	Permeate Pump No. 4	MBB-PP-4	MBR Building	2005	2	1	1	1	20	P-12, Gormon Rupp, 620gpm, 15HP	4	30	19	19	37%	50%	2	4	8	2035	$ 10,000	$ 15,000	$ 27,140
109	Permeate Pump No. 4 Motor	MBB-PP-4-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,500	$ 2,250	$ 4,758
110	Permeate Pump No. 4 VFD	MBB-PP-4-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 10,000	$ 15,000	$ 16,994
111	Permeate Pump No. 5	MBB-PP-5	MBR Building	2005	2	1	1	1	20	P-13, Gormon Rupp, 620gpm, 15HP	4	30	19	19	37%	50%	2	4	8	2035	$ 10,000	$ 15,000	$ 27,140
112	Permeate Pump No. 5 Motor	MBB-PP-5-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 1,500	$ 2,250	$ 4,758
113	Permeate Pump No. 5 VFD	MBB-PP-5-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 10,000	$ 15,000	$ 16,994
114	Permeate Magmeter (typ of 5)	MBB-MAG-11215 to 11219	MBR Building	2005	1	1	1	1	15	Endress & Hauser	8	25	14	14	44%	0%	4	1	4	2030	$ 25,000	$ 37,500	$ 58,047
115	TMP Pressure Transmitters (typ of 4)	MBB-PT-11201 to 11204	MBR Building	2005	1	1	1	1	15	Endress & Hauser	8	25	14	14	44%	0%	4	1	4	2030	$ 2,000	$ 3,000	$ 4,644
116	Permeate Turbimeter (typ of 4)	MBB-TURB-11220 to 11223	MBR Building	2005						Hach - DO NOT USE	8	25	14	0	100%	0%	10	1	10	2017	$ 20,000	$ 30,000	$ 30,951
117	MBR Process Blower No. 1	MBB-PB-1	MBR Building	2005	5	2	3	1	20	Roots, 1550scfm, 75HP. re-build planned in near future	4	30	19	19	37%	50%	2	4	8	2035	$ 15,000	$ 22,500	$ 40,710
118	MBR Process Blower No. 1 Motor	MBB-PB-1-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 8,500	$ 12,750	$ 26,965
119	MBR Process Blower No. 1 VFD	MBB-PB-1-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	2	14	2020	$ 29,000	$ 43,500	$ 49,284
120	MBR Process Blower No. 2	MBB-PB-2	MBR Building	2005	5	2	3	1	20	Roots, 1550scfm, 75HP. re-build planned in near future	4	30	19	19	37%	50%	2	4	8	2035	$ 15,000	$ 22,500	$ 40,710
121	MBR Process Blower No. 2 Motor	MBB-PB-2-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 8,500	$ 12,750	$ 26,965
122	MBR Process Blower No. 2 VFD	MBB-PB-2-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	2	14	2020	$ 29,000	$ 43,500	$ 49,284
123	MBR Process Blower No. 3	MBB-PB-3	MBR Building	2005	5	2	3	1	20	Roots, 1550scfm, 75HP. re-build planned in near future	4	30	19	19	37%	50%	2	4	8	2035	$ 15,000	$ 22,500	$ 40,710
124	MBR Process Blower No. 3 Motor	MBB-PB-3-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 8,500	$ 12,750	$ 26,965
125	MBR Process Blower No. 3 VFD	MBB-PB-3-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	2	14	2020	$ 29,000	$ 43,500	$ 49,284
126	MBR Process Blower No. 4	MBB-PB-4	MBR Building	2005	1	1	1	1	25	Roots, 1550scfm, 75HP. re-built in 2011	4	30	19	19	37%	50%	2	4	8	2035	$ 15,000	$ 22,500	$ 40,710
127	MBR Process Blower No. 4 Motor	MBB-PB-4-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 8,500	$ 12,750	$ 26,965
128	MBR Process Blower No. 4 VFD	MBB-PB-4-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	2	14	2020	$ 29,000	$ 43,500	$ 49,284
129	MBR Process Blower No. 5	MBB-PB-5	MBR Building	2005	5	2	3	1	20	Roots, 1550scfm, 75HP. re-build planned in near future	4	30	19	19	37%	50%	2	4	8	2035	$ 15,000	$ 22,500	$ 40,710
130	MBR Process Blower No. 5 Motor	MBB-PB-5-M	MBR Building	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	4	12	2040	$ 8,500	$ 12,750	$ 26,965
131	MBR Process Blower No. 5 VFD	MBB-PB-5-VFD	MBR Building	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	2	14	2020	$ 29,000	$ 43,500	$ 49,284
132	MBR Blower Piping	MBB-BL-Pipe	MBR Building	2005	1	1	1	1	50	cast	2	60	49	49	18%	0%	2	4	8	2065	$ 101,500	$ 152,250	$ 702,547
133	MBR Blower Valves	MBB-BL-Valve	MBR Building	2005	1	1	1	1	20		5	30	19	19	37%	0%	4	1	4	2035	$ 10,000	$ 15,000	$ 27,140
134	MBR Blower Temperature Switch (typ of 5)	MBB-TS-1914, -1917, -1920, -1923, -1926	MBR Building	2005	1	1	1	1	15	United Electric	8	25	14	14	44%	0%	4	1	4	2030	$ 5,000	$ 7,500	$ 11,609
135	MBR Air Supply Flowmeter (typ of 4)	MBB-FT-1501, -1601, -1701, -1801	MBR Building	2005	1	1	1	1	15	Sierra Instruments	8	25	14	14	44%	0%	4	1	4	2030	$ 25,000	$ 37,500	$ 58,047
136	MLSS Probe (typ of 4)	MBB-MLSS-Probe-1 thru 4	MBR Tanks 1 to 4	2009	1	1	1	1	20	Hach	8	25	18	18	28%	0%	3	1	3	2034	$ 5,000	$ 7,500	$ 13,153
137	Sodium Hypochlorite Tank	MBB-NACLO-Tank	MBR Building	2005	1	1	1	1	40	600gal, FRP	12	50	39	39	22%	0%	2	1	2	2055	$ 7,500	$ 11,250	$ 37,996
138	Sodium Hypochlorite Metering Pump No. 1	MBB-NACLO-P-1	MBR Building	2005	1	1	1	1	20		4	30	19	19	37%	98%	1	1	1	2035	$ 5,000	$ 7,500	$ 13,570
139	Sodium Hypochlorite Metering Pump No. 2	MBB-NACLO-P-2	MBR Building	2005	1	1	1	1	20		4	30	19	19	37%	98%	1	1	1	2035	$ 5,000	$ 7,500	$ 13,570
140	CIP Supply Pump No. 1	MBB-SUP-P-1	MBR Building	2005	1	1	1	1	20	Iwaki, 210gpm, 7.5HP	4	30	19	19	37%	98%	1	1	1	2035	$ 5,000	$ 7,500	$ 13,570
141	CIP Supply Pump No. 1 Motor	MBB-SUP-P-1-M			1	1	1	1	25		6	35	25	25	29%	0%	3	1	3	2041	$ 8,000	$ 12,000	$ 26,183
142	CIP Supply Pump No. 2	MBB-SUP-P-2	MBR Building	2005	1	1	1	1	20	Iwaki, 210gpm, 7.5HP	4	30	19	19	37%	98%	1	1	1	2035	$ 5,000	$ 7,500	$ 13,570
143	CIP Supply Pump No. 2 Motor	MBB-SUP-P-2-M			1	1	1	1	25		6	35	25	25	29%	0%	3	1	3	2041	$ 8,000	$ 12,000	$ 26,183
144	CIP Magmeter	MBB-FT-1906	MBR Building	2005	1	1	1	1	15	Endress & Hauser	8	25	14	14	44%	0%	4	1	4	2030	$ 25,000	$ 37,500	$ 58,047
145	MBR System Piping	MBB-Pipe	MBR Building	2005	1	1	1	1	50		2	60	49	49	18%	0%	2	1	2	2065	$ 40,700	$ 61,050	$ 281,711
146	MBR System Valves	MBB-Valve	MBR Building	2005	1	1	1	1	20		5	30	19	19	37%	0%	4	2	8	2035	$ 83,700	$ 125,550	$ 227,160

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147	CIP Feed Piping	MBB-FEED-Pipe	MBR Building	2005	1	1	1	1	40	**PVC**	2	60	49	40	33%	0%	3	1	3	2056	$ 5,580	$ 8,370	$ 29,165
148	CIP Feed Valves	MBB-FEED-Valve	MBR Building	2005	1	1	1	1	20		5	30	19	19	37%	0%	4	1	4	2035	$ 16,000	$ 24,000	$ 43,424
149	MBR Control Panel w/PLC and Panelview	MBB-CP-PLC	MBR Building	2005	1	1	1	1	15	**Allen Bradley**	8	25	14	14	44%	0%	4	2	8	2030	$ 40,000	$ 60,000	$ 92,875
150	MCC	MBB-MCC-1	MBR Building	2005	1	1	1	1	25		7	35	24	24	31%	0%	3	7	21	2040	$ 30,000	$ 45,000	$ 95,169
151	Water Heater	MBB-H20-Heat	MBR Building	2014	1	1	1	1	14		4	30	28	14	53%	0%	5	1	5	2030	$ 2,500	$ 3,750	$ 5,805
	Chlorine Contact Tank (CCT)																						
152	Chlorine Contact Tank No. 1	CCT-1	Yard	1988	1	1	1	1	50		1	75	47	47	37%	98%	1	2	2	2063	$ 97,000	$ 145,500	$ 630,775
153	Chlorine Contact Tank No. 1 Baffles	CCT-1-Baff	Chlorine Contact Tank No. 1	1988	7	2	2	1	10		4	30	2	2	93%	0%	9	1	9	2018	$ 232,000	$ 348,000	$ 370,413
154	Chlorine Contact Tank No. 2	CCT-2	Yard	1988	1	1	1	1	50		1	75	47	47	37%	98%	1	2	2	2063	$ 97,000	$ 145,500	$ 630,775
155	Chlorine Contact Tank No. 2 Baffles	CCT-2-Baff	Chlorine Contact Tank No. 2	1988	7	2	2	1	10		4	30	2	2	93%	0%	9	1	9	2018	$ 232,000	$ 348,000	$ 370,413
156	Effluent Flow Equipment	CCT-EFF-Equip	Chlorine Contact Tank Effluent Chamber	1988	1	1	1	1	24	**v-notch weir, ultrasonic and meter. New meter Jun 2014**	8	25	-3	24	4%	0%	1	1	1	2040	$ 15,000	$ 22,500	$ 47,584
157	Final Effluent Manhole	CCT-MH-5	Yard	1988	1	1	1	1	50		1	75	47	47	37%	0%	4	1	4	2063	$ 5,000	$ 7,500	$ 32,514
	Final Sample Pump	CCT-SAMP-P-1		2013	1	1	1	1	25	**Gormon Rupp**	4	30	27	25	17%	0%	2	2	4	2041	$ 2,500	$ 3,750	$ 8,182
	Final Sample Pump Motor	CCT-SAMP-P-1-M		2013	1	1	1	1	30	**2 HP**	6	35	32	30	14%	0%	1	3	3	2046	$ 400	$ 600	$ 1,530
	Final Sampler	CCT-SAMP-P-1-Samp		1988	3	2	3	2	3	**N-Con Sentinel 8**	4	30	2	2	93%	0%	9	4	36	2018	$ 7,500	$ 11,250	$ 11,975
	Chemical Feed Building (CFB)																						
158	Overall Chemical Feed Building	CFB-1	Yard	1988	2	1	1	1	40		9	60	32	32	47%	0%	5	5	25	2048	$ 250,000	$ 375,000	$ 1,017,984
159	Chemical Feed Building Roof	CFB-1-Roof	Chem Feed Building	1988	5	2	2	1	5		13	20	-8	5	75%	0%	8	5	40	2021	$ 15,000	$ 22,500	$ 26,300
160	Sodium Bisulfite Metering Pump No. 1	CFB-1-NaHSO3-P-1	Chem Feed Building	2005	1	1	1	1	20		4	30	19	19	37%	98%	1	1	1	2035	$ 5,000	$ 7,500	$ 13,570
161	Sodium Bisulfite Metering Pump No. 2	CFB-1-NaHSO3-P-2	Chem Feed Building	2005	1	1	1	1	20		4	30	19	19	37%	98%	1	1	1	2035	$ 5,000	$ 7,500	$ 13,570
162	Alum Storage Tank	CFB-ALUM-Tank	Chem Feed Building	1988	1	1	1	1	23	**6082gal, FRP**	12	50	22	22	56%	0%	6	1	6	2038	$ 15,000	$ 22,500	$ 44,705
163	Alum Feed Pump	CFB-ALUM-P-1	Chem Feed Building	2012	1	1	1	1	27	**fed to channel before grit,** *can* go tot aeration tanks	4	30	26	26	13%	0%	1	1	1	2042	$ 5,000	$ 7,500	$ 16,883
164	Alum Feed Piping	CFB-ALUM-Pipe	Chem Feed Building	1988	2	1	1	1	33		2	60	32	32	47%	0%	5	1	5	2048	$ 8,200	$ 12,300	$ 33,390
165	Alum Feed Valves	CFB-ALUM-Valve	Chem Feed Building	1988	2	1	1	1	3		5	30	2	2	93%	0%	9	1	9	2018	$ 200	$ 300	$ 319
166	Water Heater	CFB-ALUM-H2O-Heat	Chem Feed Building	1988	1	1	1	1	0		4	30	2	0	100%	0%	10	1	10	2017	$ 2,000	$ 3,000	$ 3,095
	Membrane Thickener/Blower Building (MTB)																						
167	MTB Tank	MTB-Tank	Yard	2005	1	1	1	1	65		1	75	64	64	15%	0%	1	2	2	2080	$ 22,000	$ 33,000	$ 243,183
168	MTB Tank Process Blower	MTB-Tank-B-1	Membrane Thickener/Blower Bldg	2005	3	1	1	1	20	**Roots, 350scfm, 20HP**	4	30	19	19	37%	0%	4	3	12	2035	$ 3,200	$ 4,800	$ 8,685
169	MTB Tank Process Blower Motor	MTB-Tank-B-1-M	Membrane Thickener/Blower Bldg	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	3	9	2040	$ 2,000	$ 3,000	$ 6,345
170	MTB Air Supply Flowmeter	MTB-FT-11105	Membrane Thickener/Blower Bldg	2005	1	1	1	1	15	**Sierra Instruments**	8	25	14	14	44%	0%	4	1	4	2030	$ 25,000	$ 37,500	$ 58,047
171	Digester Process ("Sludge") Blower No. 1	MTB-DIG-B-1	Membrane Thickener/Blower Bldg	2005	3	1	1	1	20	**Roots, 1850scfm, 100HP**	4	30	19	19	37%	50%	2	2	4	2035	$ 22,000	$ 33,000	$ 59,708
172	Digester Process ("Sludge") Blower No. 1 Motor	MTB-DIG-B-1-M	Membrane Thickener/Blower Bldg	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	2	6	2040	$ 10,500	$ 15,750	$ 33,309
173	Digester Process ("Sludge") Blower No. 1 VFD	MTB-DIG-B-1-VFD	Membrane Thickener/Blower Bldg	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 29,000	$ 43,500	$ 49,284
174	Digester Process ("Sludge") Blower No. 2	MTB-DIG-B-2	Membrane Thickener/Blower Bldg	2005	3	1	1	1	20	**Roots, 1850scfm, 100HP**	4	30	19	19	37%	50%	2	2	4	2035	$ 22,000	$ 33,000	$ 59,708
175	Digester Process ("Sludge") Blower No. 2 Motor	MTB-DIG-B-2-M	Membrane Thickener/Blower Bldg	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	2	6	2040	$ 10,500	$ 15,750	$ 33,309
176	Digester Process ("Sludge") Blower No. 2 VFD	MTB-DIG-B-2-VFD	Membrane Thickener/Blower Bldg	2005	2	1	1	1	10		14	15	4	4	73%	0%	7	1	7	2020	$ 29,000	$ 43,500	$ 49,284
177	Digester No. 1 Air Header and Diffuser Assembly	MTB-DIG-1-Diff	Digester Tank No. 1	2005	2	1	1	1	25	**Enviroquip**	2	60	49	25	58%	50%	3	3	9	2041	$ 50,000	$ 75,000	$ 163,643
178	Digester No. 2 Air Header and Diffuser Assembly	MTB-DIG-2-Diff	Digester Tank No. 2	2005	2	1	1	1	25	**Enviroquip**	2	60	49	25	58%	50%	3	3	9	2041	$ 50,000	$ 75,000	$ 163,643
179	Thickener Feed Pump No. 1	MTB-THK-P-1	Membrane Thickener/Blower Bldg	2005	2	2	2	1	20	**Gorman Rupp, 200gpm, 3HP**	4	30	19	19	37%	50%	2	2	4	2035	$ 7,700	$ 11,550	$ 20,898
180	Thickener Feed Pump No. 1 Motor	MTB-THK-P-1-M	Membrane Thickener/Blower Bldg	2005	2	2	2	1	25		6	35	24	24	31%	0%	3	2	6	2040	$ 500	$ 750	$ 1,586

CURRENT YEAR: 2016

ENR Average Annual Change 2005-2015 (ENR AAC) = 3.17%

Asset No.	Asset Description	Asset ID	Location	Year Installed	Condition Rating (1 - 10)	Current Performance (1 - 5)	Current Reliability (1 - 5)	Availability of Parts (1 - 5)	Judgement on Residual Life (Years)	Comments	Asset Class (1 - 10)	Estimated Life New (Years)	Calculated Remaining Life (Years)	Projected Remaining Life (Years)	Asset Consumed (%)	Backup Redundancy % 0% - 98%	Probability of Failure (1 - 10)	Consequence of Failure (1 - 10)	Business Risk Exposure (1 - 100)	Year to Replace	Replacement Cost ENR 8050	Contractor & ELAC (50%)	ENR Inflation FV = PV $(1+i)^n$ i = ENR AAC
181	Thickener Feed Pump No. 2	MTB-THK-P-2	Membrane Thickener/Blower Bldg	2005	2	2	2	1	20	**Gorman Rupp, 200gpm, 3HP**	4	30	19	19	37%	50%	2	2	4	2035	$ 7,700	$ 11,550	$ 20,898
182	Thickener Feed Pump No. 2 Motor	MTB-THK-P-2-M	Membrane Thickener/Blower Bldg	2005	2	2	2	1	25		6	35	24	24	31%	0%	3	2	6	2040	$ 500	$ 750	$ 1,586
179-182	MTB Submerged Membrane Units (typ of 4)	MTB-MEMB-501 TO MTB-MEMB-504	MBT Tank	2015	1	1	1	1	15	**Kubota**	15	15	14	14	7%	50%	1	3	3	2030	$ 285,000	$ 427,500	$ 661,735
183	Thickener Permeate Pump No. 1	MTB-THK-P-1	Membrane Thickener/Blower Bldg	2005	5	1	1	1	20	**Goulds, 25gpm, 3/4HP**	4	30	19	19	37%	50%	2	2	4	2035	$ 30,000	$ 45,000	$ 81,419
184	Thickener Permeate Pump No. 1 Motor	MTB-THK-P-1-M		2011	1	1	1	1	30		6	35	30	30	14%	0%	1	2	2	2046	$ 8,000	$ 12,000	$ 30,604
185	Thickener Permeate Pump No. 2	MTB-THK-P-2	Membrane Thickener/Blower Bldg	2010	1	1	1	1	20	**Goulds, 25gpm, 3/4HP**	4	30	24	20	33%	50%	2	2	4	2036	$ 30,000	$ 45,000	$ 84,000
186	Thickener Permeate Pump No. 2 Motor	MTB-THK-P-2-M		2010	1	1	1	1	30		6	35	29	29	17%	0%	2	2	4	2045	$ 8,000	$ 12,000	$ 29,664
187	MTB Permeate Flowmeter (typ of 2)	MTB-THK-Meter-11116, -11117	Membrane Thickener/Blower Bldg	2005	1	1	1	1	15		8	25	14	14	44%	0%	4	1	4	2030	$ 25,000	$ 37,500	$ 58,047
188	MTB TMP Pressure Transmitter	MTB-TMP-PT-11111	Membrane Thickener/Blower Bldg	2005	1	1	1	1	15	**Endress & Hauser**	8	25	14	14	44%	0%	4	1	4	2030	$ 2,000	$ 3,000	$ 4,644
189	Thickener System Piping	MTB-THK-Pipe	MBT System	2005	1	1	1	1	50		2	60	49	49	18%	0%	2	1	2	2065	$ 21,000	$ 31,500	$ 145,355
190	Thickener System Valves	MTB-THK-Valve	MBT System	2005	1	1	1	1	20		5	30	19	19	37%	0%	4	1	4	2035	$ 24,000	$ 36,000	$ 65,135
191	MTB Control Panel w/ PLC and Panelview	MTB-THK-PLC	Membrane Thickener/Blower Bldg	2005	1	1	1	1	15	**Allen Bradley**	8	25	14	14	44%	0%	4	2	8	2030	$ 40,000	$ 60,000	$ 92,875
192	MCC	MTB-THK-MCC	Membrane Thickener/Blower Bldg	2005	1	1	1	1	25		7	35	24	24	31%	0%	3	7	21	2040	$ 30,000	$ 45,000	$ 95,169
193	Exhaust Fan No. 1 (incl. motor)	MTB-EXH-Fan-1	Membrane Thickener/Blower Bldg	2005	2	1	1	1	25		6	35	24	24	31%	0%	3	1	3	2040	$ 8,000	$ 12,000	$ 25,378
194	Exhaust Fan No. 2 (incl. motor)	MTB-EXH-Fan-2	Membrane Thickener/Blower Bldg	2014	1	1	1	1	34	**replaced motor on No. 2**	6	35	33	33	6%	0%	1	1	1	2049	$ 8,000	$ 12,000	$ 33,608
195	Overall Thickener/Blower Building	MTB-BLDG-Overall	Membrane Thickener/Blower Bldg	2005	2	2	2	1	50		9	60	49	49	18%	0%	2	5	10	2065	$ 250,000	$ 375,000	$ 1,730,411
196	Thickener/Blower Building Roof	MTB-BLDG-Roof			2	2	2	1	10		13	20	10	10	50%	0%	5	5	25	2026	$ 7,000	$ 10,500	$ 14,346
197	Digester Tank No. 1	MTB-YARD-DIG-Tank-1	Yard	1988	4	1	1		50		1	75	47	47	37%	50%	2	2	4	2063	$ 435,000	$ 652,500	$ 2,828,732
198	Digester Tank No. 2	MTB-YARD-DIG-Tank-2	Yard	1988	4	1	1		50		1	75	47	47	37%	50%	2	2	4	2063	$ 435,000	$ 652,500	$ 2,828,732
	Sludge Transfer (SLDG)																						
199	Sludge Pumping Station	SLDG-Yard-P-1	Yard	2005	1	1	1	1	30	**Fiberglass doghouse, light green**	12	50	39	30	40%	0%	4	1	4	2046	$ 55,000	$ 82,500	$ 210,405
200	Sludge Loading Arm	SLDG-Yard-Arm-1	Yard	2005	1	1	1	1	50	**valve on arm was replaced ~2 years ago**	4	30	19	19	37%	0%	4	1	4	2035	$ 5,000	$ 7,500	$ 13,570
201	Sludge Loading Pump	SLDG-P-1	Sludge Loading Station	2005	1	1	1	1	20		4	30	19	19	37%	0%	4	1	4	2035	$ 50,000	$ 75,000	$ 135,699
202	Sludge Loading Pump Motor	SLDG-P-1-M	Sludge Loading Station	2005	1	1	1	1	25		6	35	24	24	31%	0%	3	1	3	2040	$ 8,000	$ 12,000	$ 25,378
	Plant Drain Pumping Station (PDPS)																						
203	Plant Drain Pumping Station	PDPS-Overall	Yard	1988	1	1	1	1	50		1	75	47	47	37%	0%	4	1	4	2063	$ 50,000	$ 75,000	$ 325,142
204	Pump No. 1	PDPS-P-1	Plant Drain Pumping Station	2004	2	1	1	1	19		4	30	18	18	40%	50%	2	1	2	2034	$ 15,000	$ 22,500	$ 39,459
205	Pump No. 1 Motor	PDPS-1-M	Plant Drain Pumping Station	2004	2	1	1	1	24		6	35	23	23	34%	0%	3	1	3	2039	$ 6,000	$ 9,000	$ 18,449
206	Pump No. 2	PDPS-P-2	Plant Drain Pumping Station	2004	2	1	1	1	19		4	30	18	18	40%	50%	2	1	2	2034	$ 15,000	$ 22,500	$ 39,459
207	Pump No. 2 Motor	PDPS-P-2-M	Plant Drain Pumping Station	2004	2	1	1	1	24		6	35	23	23	34%	0%	3	1	3	2039	$ 6,000	$ 9,000	$ 18,449
	Other (YARD)																						
208	Generator No. 2	YARD-Gen-2	Yard (near MBR Bldg)	2005	1	1	1	1	40		7	35	24	24	31%	0%	3	1	3	2040	$ 200,000	$ 300,000	$ 634,459
209	Asphalt Pavement	YARD-Pave-A-1	Yard	1988	7	2	2	1	3	**some cracks and potholes**	1	25	-3	3	88%	0%	9	2	18	2019	$ 68,000	$ 102,000	$ 112,011
210	Asphalt Pavement	YARD-Pave-A-2	Yard	2005	3	1	1	1	20		1	25	14	14	44%	0%	4	2	8	2030	$ 68,000	$ 102,000	$ 157,888
	Wet Weather System (WWS)																						
211	Sluice Gate	WWS-SLG-1		2016					30		4	30	30	30	0%	0%	1	2	2	2046	$ 42,000	$ 63,000	$ 160,673
	Sluice Gate Motor	WWS-SLG-1-M		2016							6												
212	Stop Logs	WWS-Stop-Overall		2016					30		4	30	30	30	0%	0%	1	2	2	2046	$ 14,000	$ 21,000	$ 53,558
213	Wet Weather Pump No. 1	WWS-P-1		2016					30		4	30	30	30	0%	98%	1	2	2	2046	$ 60,000	$ 90,000	$ 229,533

VILLAGE OF DUNDEE WWTP
ASSET MANAGEMENT PLAN EQUIPMENT INVENTORY LIST

CURRENT YEAR: 2016

ENR Average Annual Change 2005-2015 (ENR AAC) = 3.17%

Asset No.	Asset Description	Asset ID	Location	Year Installed	Condition Rating (1 - 10)	Current Performance (1 - 5)	Current Reliability (1 - 5)	Availability of Parts (1 - 5)	Judgement on Residual Life (Years)	Comments	Asset Class (1 - 10)	Estimated Life New (Years)	Calculated Remaining Life (Years)	Projected Remaining Life (Years)	Asset Consumed (%)	Backup Redundancy % 0% - 98%	Probability of Failure (1 - 10)	Consequence of Failure (1 - 10)	Business Risk Exposure (1 - 100)	Year to Replace	Replacement Cost ENR 8050	Contractor & ELAC (50%)	ENR Inflation FV = PV $(1+i)^n$ i = ENR AAC
214	Wet Weather Pump No. 1 Motor	WWS-P-1-M		2016					35		6	35	35	35	0%	0%	1	2	2	2051	$ 25,000	$ 37,500	$ 111,790
215	Wet Weather Pump No. 2	WWS-P-2		2016					30		4	30	30	30	0%	98%	1	2	2	2046	$ 60,000	$ 90,000	$ 229,533
216	Wet Weather Pump No. 2 Motor	WWS-P-2-M		2016					35		6	35	35	35	0%	0%	1	2	2	2051	$ 25,000	$ 37,500	$ 111,790
217	Wet Weather Pump No. 3	WWS-P-3		2016					30		4	30	30	30	0%	98%	1	2	2	2046	$ 60,000	$ 90,000	$ 229,533
218	Wet Weather Pump No. 3 Motor	WWS-P-3-M		2016					35		6	35	35	35	0%	0%	1	2	2	2051	$ 25,000	$ 37,500	$ 111,790
219	Wet Weather Storage Tank	WWS-Tank-1		2016					75		1	75	75	75	0%	0%	1	2	2	2091	$ 900,000	$ 1,350,000	$ 14,023,004
220	Wet Weather System Piping	WWS-Piping		2016							2	60	60	0	100%	0%	10	1	10	2017	$ 170,000	$ 255,000	$ 263,084
	Valve																						
221	WWP-1 Discharge Check Valve	VLV-Dis-Ck-1		2016					30	12"	5	30	30	30	0%	0%	1	1	1	2046	$ 4,200	$ 6,300	$ 16,067
222	WWP-2 Discharge Check Valve	VLV-Dis-Ck-2		2016					30	12"	5	30	30	30	0%	0%	1	1	1	2046	$ 4,200	$ 6,300	$ 16,067
223	WWP-3 Discharge Check Valve	VLV-Dis-Ck-3		2016					30	12"	5	30	30	30	0%	0%	1	1	1	2046	$ 4,200	$ 6,300	$ 16,067
224	WWP-1 Discharge isolation Valve	VLV-Dis-Iso-1		2016					30	12"	5	30	30	30	0%	0%	1	1	1	2046	$ 2,100	$ 3,150	$ 8,034
225	WWP-2 Discharge isolation Valve	VLV-Dis-Iso-2		2016					30	12"	5	30	30	30	0%	0%	1	1	1	2046	$ 2,100	$ 3,150	$ 8,034
226	WWP-3 Discharge isolation Valve	VLV-Dis-Iso-3		2016					30	12"	5	30	30	30	0%	0%	1	1	1	2046	$ 2,100	$ 3,150	$ 8,034
227	Wet Weather Drain Valve	VLV-Drain-Valve-1		2016					30	4"	5	30	30	30	0%	0%	1	1	1	2046	$ 6,300	$ 9,450	$ 24,101
228	Wet Weather Return Valve	VLV-Return-1		2016					30	8"	5	30	30	30	0%	0%	1	1	1	2046	$ 1,540	$ 2,310	$ 5,891
229	Wet Weather Return Valve	VLV-Return-2		2016					30	8"	5	30	30	30	0%	0%	1	1	1	2046	$ 10,000	$ 15,000	$ 38,256

Gravity Mains

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
52	SP-0068	1-55	1-54	1992	298	15	Concrete	668.13	670.92	8.07	7.62	656.18	656.66		102	3122	2900	312A	4	4	10	40	$ 105.00	$ 31,274.06	$ 75.00	$ 22,338.62
199	SP-0215	3-66A	3-65	1956	265	12	Concrete	653.24	651.88	21.90	9.50	640.87	641.36	No	110	3D01	512D	513D	5	7	4	28	$ 105.00	$ 27,815.39	$ 75.00	$ 19,868.14
150	SP-0166	3-171	3-15A	1950	198	21	Vitrified	652.19	0.00	18.70	8.30	645.50	646.03	No	91					4	6	24	$ 150.00	$ 29,688.62	$ 110.00	$ 21,771.66
44	SP-0060	2-66	2-65	1950	317	15	Vitrified	667.06	667.52	8.03	8.90	658.62	659.03	No	70	0	4132	4132	4	6	4	24	$ 105.00	$ 33,277.81	$ 75.00	$ 23,769.86
42	SP-0058	2-64	2-63	1950	238	12	Vitrified	666.88	665.75	9.45	7.55	646.20	650.39	No	39	4A3A	4121	4A3A	5	7	3	21	$ 85.00	$ 20,226.16	$ 60.00	$ 14,277.29
98	SP-0114	2-49	2-27	1950	333	15	Vitrified	664.13	663.28	11.55	11.60	651.68	652.58		100				5	7	3	21	$ 105.00	$ 34,914.94	$ 75.00	$ 24,939.24
99	SP-0115	2-48	2-27	1950	334	18	Vitrified	662.22	663.28	9.95	11.60	642.51	642.02	No	107	413D	5100	5141	5	7	3	21	$ 135.00	$ 45,087.89	$ 85.00	$ 28,388.67
339	SP-0355	2-70	2-68	1950	212	8	Vitrified	0.00	666.30	10.76	8.20	650.02	650.58		CMB15	4239	4125	4239	5	7	3	21	$ 65.00	$ 13,760.32	$ 45.00	$ 9,526.38
716	SP-0737	3-178	2-117	2015	181	10	PVC	649.10	647.00	0.00	0.00	635.00	636.90						1	2	10	20	$ 75.00	$ 13,555.88	$ 50.00	$ 9,037.25
722	SP-0742	3-178	2-117	2015	184	6	PVC	649.10	647.00	0.00	0.00	635.00	636.90						1	2	10	20	$ 55.00	$ 10,129.38	$ 40.00	$ 7,366.82
349	SP-0365	3-47	3-35	1950	335	6	Vitrified	650.52	650.03	5.17	7.10	642.93	645.35	No						4	5	20	$ 55.00	$ 18,450.02	$ 40.00	$ 13,418.19
41	SP-0057	2-63	2-62	1950	243	15	Vitrified	665.75	666.24	7.55	12.60	653.64	658.20	Yes	69	1100	0	1100	3	5	4	20	$ 105.00	$ 25,535.54	$ 75.00	$ 18,239.67
239	SP-0255	3-66	3-66A	1956	384	12	Vitrified	660.58	653.24	21.73	10.20	641.36	641.85		109	3N28	1100	3N28	3	5	4	20	$ 105.00	$ 40,270.84	$ 75.00	$ 28,764.89
247	SP-0263	3-69	3-68	1956	246	10	Concrete	663.27	662.08	15.95	12.40	649.68	651.51	No	113	3F1A	0	3F1A	3	5	4	20	$ 65.00	$ 15,979.00	$ 45.00	$ 11,062.38
248	SP-0264	3-70	3-69	1956	248	10	Concrete	664.23	663.27	12.79	12.86	650.41	651.44	No	112	3H22	2H00	3H2H	3	5	4	20	$ 85.00	$ 21,100.11	$ 60.00	$ 14,894.19
54	SP-0070	1-53	1-52	1992	306	15	Concrete	666.05	666.10	10.20	8.70	642.38	643.04		104	4232	4C2E	4D31	5	6	3	18	$ 105.00	$ 32,114.50	$ 75.00	$ 22,938.93
157	SP-0173	2-43	2-42	1950	343	15	Concrete	664.73	664.39	8.07	8.21	656.18	656.66	Yes	75	0	0	0	4	6	3	18	$ 105.00	$ 36,009.89	$ 75.00	$ 25,721.35
158	SP-0174	2-42	2-41	1950	348	15	Concrete	664.39	664.06	7.32	8.92	657.25	657.85	No	76	0	0	0	4	6	3	18	$ 105.00	$ 36,516.39	$ 75.00	$ 26,083.13
286	SP-0302	3-54	3-170	1950	105	12	Vitrified	651.97	651.86	20.76	9.35	641.85	642.15		52	4131	2B00	4131	4	6	3	18	$ 85.00	$ 8,903.67	$ 60.00	$ 6,284.94
9	SP-0025	2-86	2-67	1950	364	6	Vitrified	664.33	0.00	2.72	2.60	0.00	661.61	No						4	4	16	$ 55.00	$ 20,015.10	$ 40.00	$ 14,556.44
78	SP-0094	2-65	2-64	1950	279	15	Vitrified	667.52	666.88	10.71	8.95	653.95	655.10	No	72					4	4	16	$ 105.00	$ 29,248.54	$ 75.00	$ 20,891.82
238	SP-0254	3-67	3-66	1956	39	36	Concrete	660.68	660.58	12.20	0.00	643.04	648.48	No	98	0	0	0	2	4	4	16	$ 450.00	$ 17,588.67	$ 200.00	$ 7,817.19
249	SP-0265	3-71	3-70	1956	52	36	Steel	664.39	664.23	12.77	12.68	651.55	651.62							4	4	16	$ 150.00	$ 7,734.98	$ 110.00	$ 5,672.32
281	SP-0297	3-68	3-67	1956	252	10	Concrete	662.08	660.68	12.75	11.52	651.51	653.36	Yes	119	221H	0	221H	2	4	4	16	$ 65.00	$ 16,409.36	$ 45.00	$ 11,360.33
282	SP-0298	3-72	3-71	1956	233	12	Liner Material	664.40	664.39	0.00	12.70	651.69	0.00						1	4	4	16	$ 85.00	$ 19,811.22	$ 60.00	$ 13,984.39
285	SP-0301	3-171	3-54	1950	146	24	Vitrified	652.19	651.97	8.18	10.00	658.93	659.12		97	2100	0	2100	1	4	4	16	$ 150.00	$ 21,962.08	$ 110.00	$ 16,105.53
701	SP-0722	1-75	1-74	1950	58	15	Vitrified	666.96	666.65	8.30	8.25	658.40	658.66							4	4	16	$ 105.00	$ 6,087.08	$ 75.00	$ 4,347.92
186	SP-0202	3-10	3-9	1989	52	18	Concrete	642.45	653.41	0.00	22.70	630.71	0.00	No						3	5	15	$ 135.00	$ 6,976.98	$ 85.00	$ 4,392.91
4	SP-0020	1-81	1-80	1950	288	8	Vitrified	666.65	0.00	5.44	0.00	0.00	661.21	No	117	0	2E00	2E00	3	5	3	15	$ 65.00	$ 18,707.11	$ 45.00	$ 12,951.08
11	SP-0027	2-66	1-75	1950	55	8	Vitrified	667.06	666.96	15.80	8.03	647.05	647.44	No	CMB11	3122	0	3122	3	5	3	15	$ 65.00	$ 3,566.63	$ 45.00	$ 2,469.20
91	SP-0107	2-45	2-44	1950	129	15	Concrete	664.40	664.67	9.70	7.70	655.10	656.06	No	73	0	0	0	3	5	3	15	$ 105.00	$ 13,568.66	$ 75.00	$ 9,691.90
93	SP-0109	2-44	2-43	1950	186	15	Concrete	664.67	664.73	7.70	8.07	656.66	656.97	No	74	0	0	0	3	5	3	15	$ 105.00	$ 19,514.44	$ 75.00	$ 13,938.88
122	SP-0138	3-37	3-36	1950	433	10	Vitrified	655.50	649.05	10.23	7.00	642.05	645.27	No	107				3	5	3	15	$ 75.00	$ 32,495.73	$ 50.00	$ 21,663.82
301	SP-0317	2-68	2-62	1950	57	10	Vitrified	666.30	666.24	6.40	12.60	647.18	658.61	No	CMB33	0	2100	2100	3	5	3	15	$ 75.00	$ 4,274.18	$ 50.00	$ 2,849.46
665	SP-0683	1-100	1-85	1950	62	6	Vitrified	665.88	665.52	4.45	5.30	660.22	661.43	No	106	2113	0	2113	3	5	3	15	$ 55.00	$ 3,408.54	$ 40.00	$ 2,478.94
700	SP-0721	1-75A	1-75	1950	138	12	Vitrified	667.30	666.96	8.18	8.03	658.10	659.12	No	CMB37	3422	4600	4634	3	5	3	15	$ 85.00	$ 11,760.35	$ 60.00	$ 8,301.43
67	SP-0083	2-36	2-37	1950	259	12	Concrete	662.31	663.71	5.48	8.10	655.61	658.16	No	42	5242	3124	5242	5	7	2	13	$ 85.00	$ 21,986.96	$ 60.00	$ 15,520.21
337	SP-0353	1-36	1-35	1950	401	10	Vitrified	663.64	663.32	7.19	11.40	658.43	660.04		31	5133	3123	5134	5	7	2	13	$ 75.00	$ 30,051.47	$ 50.00	$ 20,034.31
698	SP-0718	1-26	1-36	1950	270	10	Vitrified	665.79	663.64	7.19	5.48	658.43	660.04		CMB32	5132	322B	5132	5	7	2	13	$ 75.00	$ 20,221.36	$ 50.00	$ 13,480.90
187	SP-0203	3-9	3-8	1989	129	24	PVC	653.41	655.96	0.00	23.60	632.36	0.00						2	2	6	12	$ 150.00	$ 19,286.18	$ 110.00	$ 14,143.20
179	SP-0195	2-14	2-13	1989	100	12	PVC	654.50	659.70	0.00	20.40	639.30	0.00	No	183					3	4	12	$ 85.00	$ 8,494.87	$ 60.00	$ 5,996.38
180	SP-0196	2-13	2-12	1989	92	36	Precast Concrete	659.70	659.74	0.00	18.20	641.54	0.00		182					3	4	12	$ 450.00	$ 41,267.61	$ 200.00	$ 18,341.16
720	SP-0740		3-179	1950	59	24	Precast Concrete	0.00	655.50	0.00	8.79	646.71	0.00						2	3	4	12	$ 150.00	$ 8,830.65	$ 110.00	$ 6,475.81
6	SP-0022	1-79	1-78	1950	187	12	Vitrified	667.45	668.05	7.20	8.00	660.05	660.25							4	3	12	$ 85.00	$ 15,887.78	$ 60.00	$ 11,214.91
7	SP-0023	1-80	1-79	1950	47	10	Vitrified	0.00	667.45	0.00	7.20	660.25	0.00	No						4	3	12	$ 75.00	$ 3,526.09	$ 50.00	$ 2,350.73
8	SP-0024	1-78	1-75A	1950	292	12	Vitrified	668.05	667.30	8.00	8.18	658.10	660.05							4	3	12	$ 85.00	$ 24,785.95	$ 60.00	$ 17,495.96
46	SP-0062	1-51A	1-82	1950	236	15	Concrete	0.00	0.00	7.50	0.00	0.00	0.00	No						4	3	12	$ 105.00	$ 24,816.83	$ 75.00	$ 17,726.31
74	SP-0090	2-66A	2-66	1950	336	15	Vitrified	662.56	667.06	0.00	7.90	659.16	0.00							4	3	12	$ 105.00	$ 35,316.38	$ 75.00	$ 25,225.99
75	SP-0091	2-69	2-68	1950	25	10	Vitrified	0.00	666.30	0.00	8.10	658.18	0.00	No						4	3	12	$ 75.00	$ 1,844.37	$ 50.00	$ 1,229.58
85	SP-0101	2-77	2-76	1950	220	8	Vitrified	667.09	667.93	0.00	10.50	657.43	0.00	No						4	3	12	$ 65.00	$ 14,319.81	$ 45.00	$ 9,913.71
86	SP-0102	2-76	2-75	1950	112	8	Vitrified	667.93	666.40	10.50	10.00	656.40	657.43	No						4	3	12	$ 65.00	$ 7,300.14	$ 45.00	$ 5,053.95
88	SP-0104	2-58	2-57	1996	316	21	PVC	665.03	664.62	21.90	12.10	652.52	646.16		87	0	4200	4200	4	4	3	12	$ 150.00	$ 47,390.07	$ 110.00	$ 34,752.71
97	SP-0113	2-27	2-18	1950	387	18	Concrete	663.28	662.13	0.00	15.00	647.13	0.00	Yes						4	3	12	$ 135.00	$ 52,197.68	$ 85.00	$ 32,865.21
108	SP-0124	2-29	2-28	1950	190	15	Concrete	663.16	662.33	8.90	9.72	652.61	654.26	No						4	3	12	$ 105.00	$ 19,941.85	$ 75.00	$ 14,244.18
110	SP-0126	2-34	2-38	1950	454	15	Liner Material	0.00	662.56	0.00	10.50	652.06	0.00	No					1	4	3	12	$ 105.00	$ 47,708.07	$ 75.00	$ 34,077.19
112	SP-0128	2-39	2-38	1950	294	15	Vitrified	663.89	662.56	8.80	10.50	652.06	655.09	No	103				2	4	3	12	$ 105.00	$ 30,917.31	$ 75.00	$ 22,083.79
113	SP-0129	2-38	2-49	1950	449	15	Vitrified	662.56	664.13	0.00	11.55	652.58	0.00	No						4	3	12	$ 105.00	$ 47,115.53	$ 75.00	$ 33,653.95
121	SP-0137	3-52	3-49	1950	265	6	Vitrified	657.26	653.32	7.00	6.35	646.97	650.26	No						4	3	12	$ 55.00	$ 14,563.25	$ 40.00	$ 10,591.46
152	SP-0168	3-49	3-48	1950	200	15	Vitrified	653.32	651.73	7.42	7.60	644.13	645.90							4	3	12	$ 105.00	$ 20,984.58	$ 75.00	$ 14,988.99
171	SP-0187	2-5	2-4	1989	370	15	PVC	644.79	646.12	0.00	10.30	635.82	0.00	No	104				4	4	3	12	$ 105.00	$ 38,896.31	$ 75.00	$ 27,783.08
172	SP-0188	2-6	2-5	1989	301	15	PVC	644.20	644.79	0.00	0.00	0.00	0.00	No	105				4	4	3	12	$ 105.00	$ 31,618.80	$ 75.00	$ 22,584.86
233	SP-0249	3-75	3-74	1970	307	10	Liner Material	664.89	664.69	7.50	9.20	655.49	657.39	No					1	4	3	12	$ 75.00	$ 23,010.62	$ 50.00	$ 15,340.41
234	SP-0250	3-74	3-73	1970	52	12	Liner Material	664.69	664.43	11.40	12.00	652.43	653.29	No					1	4	3	12	$ 85.00	$ 4,417.85	$ 60.00	$ 3,118.48

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
250	SP-0266	3-73	3-72	1956	229	12	Liner Material	664.43	664.40	0.00	0.00	0.00	0.00	No	151				2	4	3	12	$ 85.00	$ 19,472.65	$ 60.00	$ 13,745.40
251	SP-0267	3-79	3-78	1970	354	12	Liner Material	0.00	664.34	0.00	0.00	0.00	0.00						1	4	3	12	$ 85.00	$ 30,100.59	$ 60.00	$ 21,247.48
252	SP-0268	3-78	3-78A	1970	138	12	Liner Material	664.34	0.00	0.00	9.20	0.00	0.00	No					1	4	3	12	$ 85.00	$ 11,722.02	$ 60.00	$ 8,274.37
258	SP-0274	3-76	3-74	1970	264	12	Liner Material	664.14	664.69	10.38	9.20	655.49	653.76	No					1	4	3	12	$ 85.00	$ 22,477.63	$ 60.00	$ 15,866.56
283	SP-0299	3-48	3-47	1950	413	12	Vitrified	651.73	650.52	7.35	5.17	645.35	644.38	No						4	3	12	$ 85.00	$ 35,134.62	$ 60.00	$ 24,800.91
284	SP-0300	3-167	3-48	1950	264	12	Vitrified	651.87	651.73	0.00	7.65	644.08	0.00	No						4	3	12	$ 85.00	$ 22,408.86	$ 60.00	$ 15,818.02
287	SP-0303	3-169	3-168	1950	192	8	Vitrified	0.00	651.82	0.00	8.60	643.22	0.00							4	3	12	$ 65.00	$ 12,467.73	$ 45.00	$ 8,631.51
288	SP-0304	3-168	3-167	1950	52	8	Vitrified	651.82	651.87	0.00	0.00	0.00	0.00	No						4	3	12	$ 65.00	$ 3,361.50	$ 45.00	$ 2,327.19
291	SP-0307	<Null>	3-27	1950	351	8	Vitrified	0.00	653.82	0.00	8.75	645.07	0.00	No						4	3	12	$ 65.00	$ 22,804.05	$ 45.00	$ 15,787.42
294	SP-0310	3-65	3-14	1956	163	18	Vitrified	651.88	651.19	9.45	13.40	637.79	642.43							4	3	12	$ 135.00	$ 21,963.74	$ 85.00	$ 13,829.02
477	SP-0493	6-16	6-5	2005	321	10	PVC	666.55	667.34	21.90	23.67	643.67	644.65		115				4	4	3	12	$ 75.00	$ 24,094.72	$ 50.00	$ 16,063.14
664	SP-0682	152	1-51A	2008	20	15	Concrete	0.00	666.10	0.00	8.70	657.40	0.00	No	121	3115	0	3115	3	4	3	12	$ 105.00	$ 2,096.59	$ 75.00	$ 1,497.56
677	SP-0696	2-27A	2-27	1950	304	15	Concrete	662.69	663.28	9.93	11.60	651.68	652.76	No						4	3	12	$ 105.00	$ 31,939.24	$ 75.00	$ 22,813.74
687	SP-0707	<Null>	1-81	1950	91	8	Vitrified	0.00	666.65	5.44	5.50	661.15	661.21	No	114	0	0	0	1	4	3	12	$ 65.00	$ 5,945.33	$ 45.00	$ 4,116.00
688	SP-0708	1-78A	1-78	1950	51	8	Vitrified	667.33	668.05	8.00	8.10	659.95	660.05	No						4	3	12	$ 65.00	$ 3,306.14	$ 45.00	$ 2,288.86
696	SP-0716	3-170	3-169	1950	40	12	Vitrified	651.86	0.00	20.76	8.40	641.85	642.15	No						4	3	12	$ 85.00	$ 3,367.92	$ 60.00	$ 2,377.35
47	SP-0063	1-27	1-26	1950	315	8	Concrete	664.50	665.79	6.45	6.90	656.81	659.10		CMB2	3F21	4234	423G	4	6	2	12	$ 65.00	$ 20,458.65	$ 45.00	$ 14,163.68
58	SP-0074	<Null>	2-34	1950	153	10	Concrete	0.00	0.00	0.00	8.20	0.00	0.00	No	100	3C28	0	3C28	4	6	2	12	$ 75.00	$ 11,475.61	$ 50.00	$ 7,650.41
84	SP-0100	2-78	2-59	1950	138	12	Vitrified	665.65	665.28	0.00	9.10	659.20	0.00	No	CMB49	3329	2200	332A	4	6	2	12	$ 85.00	$ 11,707.53	$ 60.00	$ 8,264.14
92	SP-0108	2-46	2-45	1950	265	12	Concrete	665.17	664.40	6.13	7.15	656.71	656.96	No	50	423I	3100	423I	4	6	2	12	$ 85.00	$ 22,536.98	$ 60.00	$ 15,908.46
111	SP-0127	2-38	2-28	1950	346	12	Vitrified	662.56	662.33	0.00	9.70	652.63	0.00	No	117				4	6	2	12	$ 85.00	$ 29,417.71	$ 60.00	$ 20,765.44
114	SP-0130	2-49A	2-50	1950	127	8	Vitrified	664.41	664.55	6.44	6.95	657.60	657.97	No	118				4	6	2	12	$ 65.00	$ 8,265.77	$ 45.00	$ 5,722.46
148	SP-0164	1-84	1-83A	1950	190	8	Vitrified	0.00	665.89	3.80	6.68	658.89	660.70		CMB3	3200	3100	3300	4	6	2	12	$ 65.00	$ 12,320.65	$ 45.00	$ 8,529.68
149	SP-0165	1-83	1-51	1950	132	8	Vitrified	0.00	665.85	6.20	7.20	654.83	656.23		CMB4	0	0	0	4	6	2	12	$ 65.00	$ 8,557.92	$ 45.00	$ 5,924.71
154	SP-0170	3-44	3-43	1950	474	8	Concrete	664.43	663.77	5.80	7.85	655.92	658.63	No					4	6	2	12	$ 65.00	$ 30,840.94	$ 45.00	$ 21,351.42
609	SP-0626	3-55	3-54	1950	373	8	Vitrified	659.84	651.97	19.51	5.77	642.15	642.31		CMB20	543C	2I00	543C	4	6	2	12	$ 65.00	$ 24,271.14	$ 45.00	$ 16,803.10
697	SP-0717	1-83A	1-83	1950	152	8	Vitrified	665.89	0.00	3.80	0.00	658.89	660.70		10				4	6	2	12	$ 65.00	$ 9,893.38	$ 45.00	$ 6,849.26
191	SP-0207	6-44	6-104	1992	36	15	Plastic	666.92	0.00	27.30	0.00	0.00	639.62	No						2	5	10	$ 105.00	$ 3,752.86	$ 75.00	$ 2,680.62
329	SP-0345	3-23	3-22	1993	55	15	PVC	650.46	649.83	9.40	8.65	641.18	641.06	No	163				1	2	5	10	$ 105.00	$ 5,723.42	$ 75.00	$ 4,088.15
33	SP-0049	2-79	2-78	1950	360	12	Vitrified	665.03	665.65	0.00	7.80	650.39	0.00	No	CMB38	3100	4324	4331	3	5	2	10	$ 85.00	$ 30,574.62	$ 60.00	$ 21,582.08
43	SP-0059	2-81	2-80	1950	390	12	Vitrified	666.08	664.96	6.68	6.70	658.26	659.21	No	CMB40	3324	2A00	332B	3	5	2	10	$ 85.00	$ 33,137.39	$ 60.00	$ 23,391.10
120	SP-0136	3-51	3-50	1950	274	8	Vitrified	0.00	654.42	0.00	6.90	647.52	0.00	No	109				3	5	2	10	$ 65.00	$ 17,835.49	$ 45.00	$ 12,347.65
289	SP-0305	3-42	3-41	1950	335	8	Concrete	663.80	660.44	8.00	5.70	654.74	655.80	No	124				3	5	2	10	$ 65.00	$ 21,764.97	$ 45.00	$ 15,068.06
316	SP-0332	6-31	6-27	2005	297	8	PVC	665.87	666.14	18.22	19.50	646.64	647.65	No	101				5	5	2	10	$ 65.00	$ 19,308.54	$ 45.00	$ 13,367.45
338	SP-0354	1-85	1-84	1950	105	8	Vitrified	665.52	0.00	5.70	0.00	656.23	659.82	No	CMB5	0	3122	3122	3	5	2	10	$ 65.00	$ 6,845.90	$ 45.00	$ 4,739.47
341	SP-0357	3-39	3-37	2013	292	8	PVC	654.85	655.50	6.87	10.30	645.20	647.98	No					5	5	2	10	$ 65.00	$ 18,985.63	$ 45.00	$ 13,143.90
343	SP-0359	2-80	2-79	1950	60	12	Vitrified	664.96	665.03	5.60	7.00	655.61	656.71	No	51	4233	2200	4233	3	5	2	10	$ 85.00	$ 5,089.39	$ 60.00	$ 3,592.51
346	SP-0362	3-32	3-31	1950	219	12	Vitrified	667.20	666.71	15.70	15.80	650.91	651.50		122				3	5	2	10	$ 85.00	$ 18,648.53	$ 60.00	$ 13,163.67
492	SP-0508	6-25	6-24	2005	170	8	PVC	665.15	666.14	9.30	12.00	654.14	655.85	No					5	5	2	10	$ 65.00	$ 11,022.74	$ 45.00	$ 7,631.13
608	SP-0625	3-55A	3-55	1950	304	8	Vitrified	0.00	659.84	19.85	9.45	645.71	647.19	No	19	3622	2100	3623	3	5	2	10	$ 65.00	$ 19,761.59	$ 45.00	$ 13,681.10
151	SP-0167	1-51	1-51A	2008	54	15	Concrete	665.85	0.00	19.50	7.00	647.80	648.36	No	120	0	0	0	1	3	3	9	$ 105.00	$ 5,641.09	$ 75.00	$ 4,029.35
175	SP-0191	2-10	2-9	1989	135	15	PVC	655.41	655.80	0.00	17.20	638.60	0.00	No						3	3	9	$ 105.00	$ 14,200.94	$ 75.00	$ 10,143.53
178	SP-0194	2-11	2-10	1989	231	15	PVC	657.00	655.41	0.00	16.80	638.61	0.00							3	3	9	$ 105.00	$ 24,219.01	$ 75.00	$ 17,299.29
222	SP-0238	6-15	6-14	2005	336	8	PVC	666.56	665.25	10.80	12.85	652.40	655.76	No	125				3	3	3	9	$ 65.00	$ 21,853.87	$ 45.00	$ 15,129.60
229	SP-0245	3-25	3-24	1996	214	10	PVC	662.56	651.03	6.52	8.80	642.23	656.04	No	106				3	3	3	9	$ 75.00	$ 16,029.91	$ 50.00	$ 10,686.61
254	SP-0270	3-80	3-77A	1970	375	8	Vitrified	663.94	664.11	9.50	9.40	654.71	654.44	No						3	3	9	$ 65.00	$ 24,354.08	$ 45.00	$ 16,860.52
257	SP-0273	3-151	3-76A	1970	239	12	Vitrified	662.82	663.65	8.00	9.20	654.45	654.82	No						3	3	9	$ 85.00	$ 20,356.23	$ 60.00	$ 14,369.10
479	SP-0495	6-6	6-5	2005	142	10	PVC	667.06	667.34	22.92	23.59	643.75	644.14		114				3	3	3	9	$ 75.00	$ 10,680.56	$ 50.00	$ 7,120.37
580	SP-0596	3-76A	3-76	1970	270	12	Vitrified	663.65	664.14	9.20	10.38	653.76	654.45	No	111	0	0	0	1	3	3	9	$ 85.00	$ 22,926.46	$ 60.00	$ 16,183.38
614	SP-0631	2-15	2-14	1989	63	12	PVC	654.30	654.50	0.00	14.80	639.70	0.00							3	3	9	$ 85.00	$ 5,385.86	$ 60.00	$ 3,801.78
615	SP-0632	1-1	2-15	1989	158	12	PVC	654.23	654.30	14.90	0.00	0.00	639.33	No						3	3	9	$ 85.00	$ 13,414.97	$ 60.00	$ 9,469.39
685	SP-0705	3-78A	3-73	1970	28	8	PVC	0.00	664.43	0.00	12.00	652.43	0.00	No						3	3	9	$ 65.00	$ 1,792.85	$ 45.00	$ 1,241.21
721	SP-0741	3-179		1956	330	24	Precast Concrete	655.50	644.50	10.67	4.50	640.00	644.83						2	3	3	9	$ 150.00	$ 49,499.99	$ 110.00	$ 36,300.00
1	SP-0017	1-2	1-1	2010	120	24	PVC	656.63	654.23	0.00	15.00	658.18	0.00		92	0	0	0	2	2	4	8	$ 150.00	$ 18,065.02	$ 110.00	$ 13,247.68
130	SP-0146	3-21	3-20	1993	159	15	PVC	650.29	646.78	10.05	6.30	640.48	640.24		161				1	2	4	8	$ 105.00	$ 16,717.40	$ 75.00	$ 11,941.00
176	SP-0192	2-9	2-8	1989	49	15	PVC	655.80	657.68	0.00	19.20	638.48	0.00	No						2	4	8	$ 105.00	$ 5,159.71	$ 75.00	$ 3,685.51
209	SP-0225	5-1	<Null>	2003	40	15	PVC	662.22	0.00	21.46	0.00	0.00	640.76	No						2	4	8	$ 105.00	$ 4,247.77	$ 75.00	$ 3,034.12
296	SP-0312	3-1	<Null>	1989	41	15	PVC	656.65	0.00	0.00	0.00	0.00	0.00						2	2	4	8	$ 105.00	$ 4,314.31	$ 75.00	$ 3,081.65
325	SP-0341	6-2	6-1	2005	98	12	PVC	664.89	666.32	26.10	0.00	0.00	638.79	No						2	4	8	$ 85.00	$ 8,303.93	$ 60.00	$ 5,861.60
328	SP-0344	3-35	3-23	1993	13	10	PVC	650.03	650.46	8.95	9.22	641.24	641.08	No						2	4	8	$ 75.00	$ 961.59	$ 50.00	$ 641.06
330	SP-0346	3-22	3-21	1993	167	15	PVC	649.83	650.29	8.65	10.05	640.24	641.18	No	162				1	2	4	8	$ 105.00	$ 17,500.04	$ 75.00	$ 12,500.03
604	SP-0620	6-81	6-70	1992	401	15	PVC	665.66	666.54	22.88	24.72	641.82	642.78	Yes						2	4	8	$ 105.00	$ 42,127.97	$ 75.00	$ 30,091.41
605	SP-0621	6-70	6-49	1992	403	15	PVC	666.54	665.07	24.72	24.32	640.75	641.82	No						2	4	8	$ 105.00	$ 42,326.86	$ 75.00	$ 30,233.47
612	SP-0629	3-8	<Null>	1989	85	18	PVC	655.96	0.00	0.00	0.00	0.00	0.00	No					2	2	4	8	$ 135.00	$ 11,420.76	$ 85.00	$ 7,190.85

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
714	SP-0735	3-175	3-10	2015	11	24	PVC	0.00	654.90	654.50	0.00	633.77	633.70						1	2	4	8	$ 150.00	$ 1,724.81	$ 110.00	$ 1,264.86
10	SP-0026	2-67	2-66A	1950	142	8	Vitrified	0.00	662.56	0.00	5.80	656.76	0.00	No						4	2	8	$ 65.00	$ 9,230.85	$ 45.00	$ 6,390.59
20	SP-0036	1-24	1-23	1950	357	8	Vitrified	665.55	664.70	8.03	7.89	658.93	659.03		CMB1	0	2B00	2B00	1	4	2	8	$ 65.00	$ 23,216.43	$ 45.00	$ 16,072.91
21	SP-0037	1-22	1-14	1950	264	8	Vitrified	665.95	662.90	9.35	7.60	655.30	656.60	No						4	2	8	$ 65.00	$ 17,138.03	$ 45.00	$ 11,864.79
22	SP-0038	1-23	1-22	1950	260	8	Vitrified	664.70	665.95	7.89	9.35	656.60	656.81	No						4	2	8	$ 65.00	$ 16,902.24	$ 45.00	$ 11,701.55
53	SP-0069	1-54	1-53	1992	277	15	Concrete	670.92	666.05	8.21	0.00	655.14	656.18		103	211J	2A00	2A1J	3	4	2	8	$ 105.00	$ 29,125.08	$ 75.00	$ 20,803.63
55	SP-0071	1-82	1-64	1950	271	12	Concrete	0.00	665.75	5.88	6.55	646.50	648.53	No	35					4	2	8	$ 85.00	$ 23,075.28	$ 60.00	$ 16,288.43
60	SP-0076	2-33	2-34	1950	160	8	Vitrified	0.00	0.00	0.00	8.20	0.00	0.00	No	101	2211	0	2211	2	4	2	8	$ 65.00	$ 10,367.78	$ 45.00	$ 7,177.70
66	SP-0082	2-35	2-36	1950	101	12	Concrete	663.09	662.31	8.20	5.60	656.71	658.10	No	41	2100	2600	2700	2	4	2	8	$ 85.00	$ 8,553.27	$ 60.00	$ 6,037.60
68	SP-0084	2-37	2-28	1950	388	12	Vitrified	663.71	662.33	8.10	9.30	653.03	655.61	No						4	2	8	$ 85.00	$ 32,994.63	$ 60.00	$ 23,290.33
100	SP-0116	2-47	2-48	1950	213	8	Vitrified	663.01	662.22	10.16	9.02	649.58	650.02	No	14	2100	2300	2400	2	4	2	8	$ 65.00	$ 13,853.47	$ 45.00	$ 9,590.86
109	SP-0125	2-30	2-29	1950	301	12	Concrete	662.35	663.16	8.00	8.90	654.26	654.35	No						4	2	8	$ 85.00	$ 25,593.31	$ 60.00	$ 18,065.86
115	SP-0131	2-49	2-49A	1950	209	8	Vitrified	664.13	664.41	0.00	6.44	657.97	0.00	No						4	2	8	$ 65.00	$ 13,557.01	$ 45.00	$ 9,385.62
116	SP-0132	3-41	3-37	1950	200	8	Vitrified	660.44	655.50	5.70	9.90	645.60	654.74	No	0				2	4	2	8	$ 65.00	$ 12,997.41	$ 45.00	$ 8,998.21
119	SP-0135	3-50	3-49	2013	348	8	PVC	654.42	653.32	0.00	7.28	646.04	0.00	No					4	4	2	8	$ 65.00	$ 22,626.08	$ 45.00	$ 15,664.21
153	SP-0169	3-45	3-44	1950	486	8	Concrete	664.99	664.43	5.65	5.30	659.13	659.34							4	2	8	$ 65.00	$ 31,609.82	$ 45.00	$ 21,883.72
155	SP-0171	3-43	3-42	1950	5	8	Concrete	663.77	663.80	7.85	7.97	655.83	655.92	No	108					4	2	8	$ 65.00	$ 345.38	$ 45.00	$ 239.11
192	SP-0208	3-31	3-28	1950	269	12	Vitrified	666.71	665.25	0.00	16.00	649.25	0.00	No	147				2	4	2	8	$ 85.00	$ 22,876.19	$ 60.00	$ 16,147.90
244	SP-0260	3-60	3-57	1950	214	8	Vitrified	663.48	662.79	9.75	10.00	652.79	653.73	No						4	2	8	$ 65.00	$ 13,894.49	$ 45.00	$ 9,619.27
245	SP-0261	3-58	3-57	1950	274	8	Vitrified	662.97	662.79	9.37	10.07	652.72	653.60	No						4	2	8	$ 65.00	$ 17,815.25	$ 45.00	$ 12,333.64
246	SP-0262	3-59	3-58	1950	301	8	Vitrified	662.56	662.97	5.43	9.37	653.60	657.13	No						4	2	8	$ 65.00	$ 19,569.83	$ 45.00	$ 13,548.34
290	SP-0306	3-46	3-44	1950	256	8	Concrete	662.76	664.43	2.10	5.60	658.83	660.66	No						4	2	8	$ 65.00	$ 16,647.35	$ 45.00	$ 11,525.09
318	SP-0334	6-33	6-32	2005	155	8	PVC	662.56	666.04	12.95	15.15	650.89	649.61		112				4	4	2	8	$ 65.00	$ 10,059.71	$ 45.00	$ 6,964.42
333	SP-0349	3-40	3-37	1950	198	8	Liner Material	660.16	655.50	6.60	6.10	649.40	653.56	No					1	4	2	8	$ 65.00	$ 12,867.56	$ 45.00	$ 8,908.31
348	SP-0364	<Null>	3-42	1950	318	8	Concrete	0.00	663.80	0.00	7.95	655.85	0.00	No						4	2	8	$ 65.00	$ 20,655.31	$ 45.00	$ 14,299.83
481	SP-0497	6-38	6-37	2005	318	8	PVC	665.12	665.81	14.33	16.26	649.55	650.79	No	113				4	4	2	8	$ 65.00	$ 20,653.99	$ 45.00	$ 14,298.91
486	SP-0502	6-21	6-20	2005	185	10	PVC	667.61	0.00	20.13	19.20	0.00	647.48	No	111				4	4	2	8	$ 75.00	$ 13,860.70	$ 50.00	$ 9,240.47
603	SP-0619	6-50	6-49	1992	111	12	PVC	664.74	665.07	18.70	19.57	648.60	646.03		67	0	4133	4133	4	4	2	8	$ 85.00	$ 9,459.16	$ 60.00	$ 6,677.05
676	SP-0695	2-28	2-27A	1950	111	12	Concrete	662.33	662.69	9.73	9.93	652.76	652.60	No						4	2	8	$ 85.00	$ 9,407.23	$ 60.00	$ 6,640.40
2	SP-0018	1-35	1-10	2010	23	15	PVC	663.32	663.64	8.75	12.20	655.96	657.31							2	3	6	$ 105.00	$ 2,464.27	$ 75.00	$ 1,760.19
3	SP-0019	1-44	1-43	2008	205	24	Liner Material	666.03	665.61	0.00	8.70	656.91	0.00	No					1	2	3	6	$ 150.00	$ 30,754.74	$ 110.00	$ 22,553.47
28	SP-0044	1-43	1-42	2008	259	24	Liner Material	665.61	665.42	0.00	8.80	656.62	0.00						1	2	3	6	$ 150.00	$ 38,850.07	$ 110.00	$ 28,490.05
29	SP-0045	1-42	1-41	2008	254	24	Liner Material	665.42	664.99	0.00	8.90	656.09	0.00						1	2	3	6	$ 150.00	$ 38,125.83	$ 110.00	$ 27,958.94
30	SP-0046	1-41	1-40	2008	224	24	Liner Material	664.99	666.05	0.00	10.30	655.75	0.00						1	2	3	6	$ 150.00	$ 33,571.29	$ 110.00	$ 24,618.95
31	SP-0047	1-38	1-31	2008	54	24	Liner Material	666.97	666.42	0.00	11.10	655.32	0.00	No					1	2	3	6	$ 150.00	$ 8,166.77	$ 110.00	$ 5,988.96
32	SP-0048	1-40	1-38	2008	273	24	Liner Material	666.05	666.97	0.00	11.50	655.47	0.00						1	2	3	6	$ 150.00	$ 40,977.21	$ 110.00	$ 30,049.96
36	SP-0052	1-51	1-49	2008	316	18	Liner Material	665.85	665.55	7.15	7.30	658.25	658.70						1	2	3	6	$ 135.00	$ 42,634.30	$ 85.00	$ 26,843.82
45	SP-0061	1-73	1-43	2009	249	15	PVC	666.82	665.61	0.00	8.70	656.91	0.00	No						2	3	6	$ 105.00	$ 26,184.65	$ 75.00	$ 18,703.32
56	SP-0072	2-61	2-60	1996	217	18	PVC	666.35	666.10	21.52	12.70	647.19	647.80	No		0	0	0	2	2	3	6	$ 135.00	$ 29,327.50	$ 85.00	$ 18,465.46
57	SP-0073	2-51	2-20	1996	278	21	PVC	664.21	663.06	0.00	12.40	650.66	0.00							2	3	6	$ 150.00	$ 41,748.96	$ 110.00	$ 30,615.90
59	SP-0075	2-53	2-40	1996	376	15	PVC	664.09	664.50	11.05	12.65	651.85	653.04	No						2	3	6	$ 105.00	$ 39,441.35	$ 75.00	$ 28,172.39
73	SP-0089	1-31	1-32	2010	15	24	PVC	666.42	666.45	0.00	17.85	648.60	0.00	No						2	3	6	$ 150.00	$ 2,221.30	$ 110.00	$ 1,628.95
76	SP-0092	2-62	2-61	1996	43	15	PVC	666.24	666.35	8.75	12.45	655.96	657.31		71	0	0	0	1	2	3	6	$ 105.00	$ 4,484.54	$ 75.00	$ 3,203.24
77	SP-0093	2-60	2-59A	1996	220	18	PVC	666.10	0.00	19.50	11.70	647.80	648.36		84	0	0	0	1	2	3	6	$ 135.00	$ 29,687.03	$ 85.00	$ 18,691.83
83	SP-0099	2-59A	2-58	1996	250	18	PVC	0.00	665.03	23.30	12.40	646.16	645.71	Yes	85	0	0	0	1	2	3	6	$ 135.00	$ 33,750.07	$ 85.00	$ 21,250.05
89	SP-0105	2-55	2-51	1996	377	21	PVC	664.23	664.21	0.00	0.00	659.80	0.00	No	88	0	0	0	1	2	3	6	$ 150.00	$ 56,492.21	$ 110.00	$ 41,427.62
90	SP-0106	2-50	2-51	1996	60	15	PVC	664.55	664.21	13.42	0.00	0.00	651.13	No						2	3	6	$ 105.00	$ 6,287.96	$ 75.00	$ 4,491.40
101	SP-0117	3-11	3-10	1989	299	18	PVC	643.59	642.45	0.00	18.20	624.25	0.00	No					2	2	3	6	$ 135.00	$ 40,425.85	$ 85.00	$ 25,453.31
102	SP-0118	2-1	3-11	1989	251	15	PVC	643.17	643.59	0.00	9.40	634.19	0.00						2	2	3	6	$ 105.00	$ 26,304.12	$ 75.00	$ 18,788.66
103	SP-0119	2-3	2-2	1989	113	15	PVC	642.27	645.15	0.00	9.80	635.35	0.00	No					2	2	3	6	$ 105.00	$ 11,833.79	$ 75.00	$ 8,452.71
104	SP-0120	2-2	2-1	1989	94	15	PVC	645.15	643.17	0.00	0.00	0.00	0.00	No					2	2	3	6	$ 105.00	$ 9,823.99	$ 75.00	$ 7,017.14
105	SP-0121	2-4	2-3	1989	273	15	PVC	646.12	642.27	0.00	0.00	0.00	0.00		160				1	2	3	6	$ 105.00	$ 28,690.59	$ 75.00	$ 20,493.28
123	SP-0139	3-19	3-18	2015	359	15	PVC	645.22	646.89	0.00	7.80	639.09	0.00	Yes					1	2	3	6	$ 105.00	$ 37,738.55	$ 75.00	$ 26,956.11
125	SP-0141	3-17	3-16	2015	181	18	PVC	651.49	650.14	0.00	11.90	637.77	637.99						1	2	3	6	$ 135.00	$ 24,385.43	$ 85.00	$ 15,353.79
126	SP-0142	3-18	3-17	2015	198	18	PVC	646.89	651.49	0.00	0.00	638.09	638.33	No					1	2	3	6	$ 135.00	$ 26,723.81	$ 85.00	$ 16,826.10
127	SP-0143	3-16	3-15	2015	280	18	PVC	650.14	650.24	0.00	11.30	638.94	637.32						1	2	3	6	$ 135.00	$ 37,738.85	$ 85.00	$ 23,761.50
129	SP-0145	3-20	3-19	2015	344	15	PVC	646.78	645.22	0.00	5.50	639.72	0.00	No	139				2	2	3	6	$ 105.00	$ 36,149.97	$ 75.00	$ 25,821.41
133	SP-0149	4-60	4-59	2000	354	6	PVC	665.31	663.93	5.98	6.40	657.53	659.33	No						2	3	6	$ 55.00	$ 19,454.12	$ 40.00	$ 14,148.45
141	SP-0157	4-62	4-61	1999	268	12	PVC	669.01	668.06	23.30	21.90	663.30	645.71	No	CMB56	0	0	0	1	2	3	6	$ 85.00	$ 22,750.95	$ 60.00	$ 16,059.50
144	SP-0160	1-49	1-45	2008	378	18	Liner Material	665.55	666.71	7.40	9.70	657.01	658.15	No					1	2	3	6	$ 135.00	$ 50,978.38	$ 85.00	$ 32,097.50
145	SP-0161	1-45	1-44	2008	217	24	Liner Material	666.71	666.03	0.00	9.30	656.73	0.00	No					1	2	3	6	$ 150.00	$ 32,577.60	$ 110.00	$ 23,890.24
159	SP-0175	2-41	2-40	1996	40	15	PVC	664.06	664.50	8.92	12.65	651.85	655.14	No						2	3	6	$ 105.00	$ 4,250.56	$ 75.00	$ 3,036.12
160	SP-0176	2-52	2-50	1996	229	15	PVC	0.00	664.55	0.00	13.42	651.13	0.00	Yes						2	3	6	$ 105.00	$ 24,083.91	$ 75.00	$ 17,202.79
161	SP-0177	2-40	2-52	1996	208	15	PVC	664.50	0.00	12.73	12.20	0.00	651.77	No						2	3	6	$ 105.00	$ 21,866.85	$ 75.00	$ 15,619.18

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
162	SP-0178	2-57	2-56	1996	300	21	PVC	664.62	664.24	0.00	12.20	652.04	0.00		89	0	4100	4100	1	2	3	6	$ 150.00	$ 44,998.48	$ 110.00	$ 32,998.88
163	SP-0179	2-56	2-55	1996	367	21	PVC	664.24	664.23	19.70	12.70	648.36	648.92	No	90	0	0	0	1	2	3	6	$ 150.00	$ 55,037.30	$ 110.00	$ 40,360.69
165	SP-0181	2-20	2-19	1996	333	15	PVC	663.06	663.36	0.00	13.60	649.76	0.00	Yes						2	3	6	$ 105.00	$ 35,004.08	$ 75.00	$ 25,002.92
166	SP-0182	2-19	2-18	1996	334	15	PVC	663.36	662.13	0.00	15.00	647.13	0.00	No						2	3	6	$ 105.00	$ 35,114.23	$ 75.00	$ 25,081.59
167	SP-0183	2-16	2-2	1996	139	15	PVC	658.40	645.15	0.00	9.80	635.35	0.00	No						2	3	6	$ 105.00	$ 14,566.31	$ 75.00	$ 10,404.51
168	SP-0184	2-17	2-16	1996	406	15	PVC	662.36	658.40	0.00	11.70	646.70	0.00	Yes						2	3	6	$ 105.00	$ 42,628.68	$ 75.00	$ 30,449.06
169	SP-0185	2-18	2-17	1996	46	15	PVC	662.13	662.36	0.00	15.20	647.16	0.00	No						2	3	6	$ 105.00	$ 4,828.76	$ 75.00	$ 3,449.11
173	SP-0189	2-7	2-6	1989	358	15	PVC	645.04	644.20	7.80	0.00	0.00	637.24		134				2	2	3	6	$ 105.00	$ 37,537.95	$ 75.00	$ 26,812.82
174	SP-0190	2-103	2-7	1989	135	15	PVC	657.68	645.04	0.00	7.80	637.24	0.00		135				2	2	3	6	$ 105.00	$ 14,207.68	$ 75.00	$ 10,148.34
177	SP-0193	2-12	2-11	1989	82	27	PVC	659.74	657.00	0.00	0.00	0.00	0.00	No						2	3	6	$ 150.00	$ 12,333.50	$ 110.00	$ 9,044.57
220	SP-0236	6-40	6-39	2005	136	8	PVC	664.76	665.46	12.28	13.74	651.72	652.48	No	154				2	2	3	6	$ 65.00	$ 8,862.25	$ 45.00	$ 6,135.41
221	SP-0237	6-41	6-40	2005	121	8	PVC	663.70	664.76	10.08	12.28	652.48	653.62	No	174				1	2	3	6	$ 65.00	$ 7,868.88	$ 45.00	$ 5,447.69
227	SP-0243	6-9	6-7	2005	88	8	PVC	668.36	668.38	23.28	23.60	644.78	645.08		158				2	2	3	6	$ 65.00	$ 5,712.50	$ 45.00	$ 3,954.81
228	SP-0244	3-26	3-25	1996	409	10	PVC	652.41	662.56	7.80	6.52	656.04	644.61		142				2	2	3	6	$ 75.00	$ 30,677.79	$ 50.00	$ 20,451.86
230	SP-0246	3-24	3-23A	1996	75	10	PVC	651.03	651.48	8.80	9.75	641.73	642.23	No	141				2	2	3	6	$ 75.00	$ 5,588.59	$ 50.00	$ 3,725.73
231	SP-0247	3-23A	3-23	1996	238	10	PVC	651.48	650.46	9.75	9.32	641.14	641.73	No	140				2	2	3	6	$ 75.00	$ 17,865.73	$ 50.00	$ 11,910.49
232	SP-0248	3-36	3-35	1996	49	10	PVC	649.05	650.03	7.90	8.85	641.18	641.15	No						2	3	6	$ 75.00	$ 3,693.02	$ 50.00	$ 2,462.01
235	SP-0251	6-83	6-82	1992	311	15	PVC	666.09	666.02	21.62	22.33	643.69	644.47	No						2	3	6	$ 105.00	$ 32,632.58	$ 75.00	$ 23,308.98
237	SP-0253	6-84	6-83	1992	119	8	PVC	665.87	666.09	20.02	21.62	644.47	645.85	No						2	3	6	$ 65.00	$ 7,765.93	$ 45.00	$ 5,376.41
293	SP-0309	3-173	3-172	1989	353	8	PVC	654.41	652.80	6.95	6.30	653.36	658.05	No	18				2	2	3	6	$ 65.00	$ 22,970.44	$ 45.00	$ 15,902.62
319	SP-0335	6-5	6-4	2005	278	10	PVC	667.34	664.29	23.64	21.46	642.83	643.70		175				1	2	3	6	$ 75.00	$ 20,873.49	$ 50.00	$ 13,915.66
324	SP-0340	5-6	5-5	2003	123	8	PVC	660.03	660.72	12.25	8.12	651.91	648.47	No						2	3	6	$ 65.00	$ 7,976.11	$ 45.00	$ 5,521.92
327	SP-0343	1-37	1-33	2010	22	6	PVC	666.50	666.73	0.00	17.85	648.88	0.00							2	3	6	$ 55.00	$ 1,227.00	$ 40.00	$ 892.36
334	SP-0350	3-15A	3-14	2015	74	18	PVC	650.24	651.19	0.00	13.40	637.13	637.32	No					1	2	3	6	$ 135.00	$ 10,043.57	$ 85.00	$ 6,323.73
344	SP-0360	3-3	3-2	1989	204	12	PVC	657.08	656.42	0.00	0.00	0.00	0.00	No						2	3	6	$ 85.00	$ 17,367.19	$ 60.00	$ 12,259.19
345	SP-0361	3-2	3-1	1989	39	12	PVC	656.42	656.65	0.00	0.00	0.00	0.00							2	3	6	$ 85.00	$ 3,342.44	$ 60.00	$ 2,359.37
356	SP-0372	3-172	3-171	1989	15	8	Plastic	652.80	652.19	6.35	6.70	645.49	646.45	No						2	3	6	$ 65.00	$ 969.60	$ 45.00	$ 671.26
360	SP-0376	6-82	6-81	1992	400	15	PVC	666.02	665.66	22.33	22.88	642.78	643.69	No						2	3	6	$ 105.00	$ 41,975.98	$ 75.00	$ 29,982.84
373	SP-0389	6-89	6-88	1993	403	8	PVC	664.36	664.96	13.40	15.06	649.90	650.96	No						2	3	6	$ 65.00	$ 26,198.85	$ 45.00	$ 18,137.67
425	SP-0441	5-61	5-51	2005	309	12	PVC	661.53	661.99	14.83	16.20	645.79	646.70	No						2	3	6	$ 85.00	$ 26,247.75	$ 60.00	$ 18,527.82
467	SP-0483	5-43	5-42	2003	100	12	PVC	662.91	663.58	20.76	21.73	641.85	642.15	No	64	0	0	0	1	2	3	6	$ 85.00	$ 8,485.58	$ 60.00	$ 5,989.82
468	SP-0484	5-42	5-41	2003	117	12	PVC	663.58	663.26	21.73	21.90	641.36	641.85	No	65	0	0	0	1	2	3	6	$ 85.00	$ 9,972.84	$ 60.00	$ 7,039.65
469	SP-0485	5-41	5-1	2003	156	12	PVC	663.26	662.22	21.90	21.35	640.87	641.36	Yes	66	0	0	0	1	2	3	6	$ 85.00	$ 13,241.78	$ 60.00	$ 9,347.14
470	SP-0486	5-2	5-1	2003	85	8	PVC	662.13	662.22	24.32	20.80	639.62	640.75	No	21	0	0	0	1	2	3	6	$ 65.00	$ 5,499.36	$ 45.00	$ 3,807.25
474	SP-0490	6-8	6-7	2005	222	8	PVC	669.55	668.38	20.40	22.50	645.88	649.15	No						2	3	6	$ 65.00	$ 14,433.98	$ 45.00	$ 9,992.76
475	SP-0491	6-27	6-26	2005	89	8	PVC	666.14	666.27	0.00	20.58	645.69	0.00							2	3	6	$ 65.00	$ 5,795.77	$ 45.00	$ 4,012.46
480	SP-0496	6-7	6-6	2005	152	10	PVC	668.38	667.06	23.60	22.92	644.14	644.78		156				2	2	3	6	$ 75.00	$ 11,389.95	$ 50.00	$ 7,593.30
483	SP-0499	6-18	6-17	2005	126	10	PVC	666.24	666.72	20.60	21.58	645.14	645.64	No	165				1	2	3	6	$ 75.00	$ 9,438.22	$ 50.00	$ 6,292.14
484	SP-0500	6-19	6-18	2005	139	10	PVC	666.93	666.24	20.70	20.60	645.64	646.23		152				2	2	3	6	$ 75.00	$ 10,453.35	$ 50.00	$ 6,968.90
493	SP-0509	6-10	6-9	2005	208	8	PVC	666.86	668.36	20.94	23.28	645.08	645.92	No	159				2	2	3	6	$ 65.00	$ 13,541.72	$ 45.00	$ 9,375.03
589	SP-0605	6-49	6-44	1992	395	15	PVC	665.07	666.92	12.20	27.30	639.62	648.48	Yes	82	0	0	0	2	2	3	6	$ 105.00	$ 41,456.96	$ 75.00	$ 29,612.12
616	SP-0633	1-34	1-2	2010	161	24	PVC	666.70	656.63	4.95	19.10	657.33	658.03		93					2	3	6	$ 150.00	$ 24,153.51	$ 110.00	$ 17,712.58
617	SP-0634	1-33	1-34	2010	306	24	PVC	666.73	666.70	15.50	18.90	647.80	646.63	No	95		3100	3100	1	2	3	6	$ 150.00	$ 45,915.12	$ 110.00	$ 33,671.09
618	SP-0635	1-32	1-33	2010	93	24	PVC	666.73	666.45	15.60	18.00	646.63	647.05	No	96	0	0	0	1	2	3	6	$ 150.00	$ 13,907.38	$ 110.00	$ 10,198.74
620	SP-0637	<Null>	2-94	1989	100	6	PVC	0.00	668.75	0.00	7.25	661.50	0.00							2	3	6	$ 55.00	$ 5,526.15	$ 40.00	$ 4,019.02
629	SP-0646	3-160	3-151	1989	46	12	PVC	662.44	662.82	7.85	7.16	655.28	654.97	No						2	3	6	$ 85.00	$ 3,947.72	$ 60.00	$ 2,786.62
636	SP-0653	2-90	2-89	1989	40	6	PVC	666.61	666.94	13.15	13.80	653.14	653.46	No						2	3	6	$ 55.00	$ 2,200.81	$ 40.00	$ 1,600.59
637	SP-0654	2-85	2-89	1989	211	6	PVC	666.18	666.94	8.22	10.75	656.19	657.96	No						2	3	6	$ 55.00	$ 11,611.34	$ 40.00	$ 8,444.61
638	SP-0655	2-89	2-88	1989	99	6	PVC	666.94	667.15	13.75	14.60	652.55	653.19	No						2	3	6	$ 55.00	$ 5,448.43	$ 40.00	$ 3,962.49
639	SP-0656	2-84	<Null>	1999	61	12	PVC	667.39	0.00	12.51	0.00	0.00	654.88	No						2	3	6	$ 85.00	$ 5,185.45	$ 60.00	$ 3,660.32
643	SP-0660	<Null>	6-97	1992	87	8	PVC	0.00	665.92	0.00	20.40	645.52	0.00	No						2	3	6	$ 65.00	$ 5,646.78	$ 45.00	$ 3,909.31
702	SP-0723	1-74	1-73	2009	245	15	PVC	666.65	666.82	8.25	9.20	657.62	658.40	No						2	3	6	$ 105.00	$ 25,745.94	$ 75.00	$ 18,389.96
703	SP-0724	2-103	2-104	2015	10	15	PVC	650.90	650.00	0.00	0.00	638.08	638.18	No					1	2	3	6	$ 105.00	$ 1,064.16	$ 75.00	$ 760.11
704	SP-0725	2-104	2-105	2015	130	15	PVC	650.00	647.80	0.00	0.00	637.35	637.54						1	2	3	6	$ 105.00	$ 13,644.76	$ 75.00	$ 9,746.26
705	SP-0726	2-105	2-106	2015	315	15	PVC	647.80	646.70	0.00	0.00	636.78	637.25						1	2	3	6	$ 105.00	$ 33,048.40	$ 75.00	$ 23,606.00
706	SP-0727	2-106	2-107	2015	315	15	PVC	646.70	647.40	0.00	0.00	636.21	636.68						1	2	3	6	$ 105.00	$ 33,067.16	$ 75.00	$ 23,619.40
707	SP-0728	2-107	2-108	2015	51	15	PVC	647.40	647.50	0.00	0.00	636.04	636.11						1	2	3	6	$ 105.00	$ 5,385.69	$ 75.00	$ 3,846.92
708	SP-0729	2-108	2-110	2015	346	15	PVC	647.50	647.10	0.00	0.00	635.41	635.94						1	2	3	6	$ 105.00	$ 36,283.13	$ 75.00	$ 25,916.52
709	SP-0730	2-110	2-111	2015	283	15	PVC	0.00	647.10	643.80	0.00	634.88	635.31						1	2	3	6	$ 105.00	$ 29,705.14	$ 75.00	$ 21,217.96
710	SP-0731	2-111	2-112	2015	200	24	PVC	0.00	643.80	644.70	0.00	634.32	634.48						1	2	3	6	$ 150.00	$ 29,989.96	$ 110.00	$ 21,992.64
711	SP-0732	2-112	3-177	2015	220	24	PVC	0.00	644.70	646.50	0.00	634.14	634.32						1	2	3	6	$ 150.00	$ 32,975.71	$ 110.00	$ 24,182.19
712	SP-0733	3-177	3-176	2015	191	24	PVC	0.00	646.50	643.90	0.00	633.99	634.14						1	2	3	6	$ 150.00	$ 28,661.97	$ 110.00	$ 21,018.78
713	SP-0734	3-176	3-175	2015	226	24	PVC	0.00	643.90	654.20	0.00	633.81	633.99						1	2	3	6	$ 150.00	$ 33,974.36	$ 110.00	$ 24,914.53
715	SP-0736	2-117	3-177	2015	98	18	PVC	647.00	646.50	0.00	0.00	634.34	634.46						1	2	3	6	$ 135.00	$ 13,231.57	$ 85.00	$ 8,330.99

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
717	SP-0738	3-14	3-178	2015	36	18	PVC	649.50	649.10	0.00	0.00	637.00	637.03						1	2	3	6	$ 135.00	$ 4,854.04	$ 85.00	$ 3,056.25
718	SP-0190	2-8	2-7	1989	57	15	PVC	657.68	645.04	0.00	7.80	637.24	0.00		135				2	2	3	6	$ 105.00	$ 6,019.47	$ 75.00	$ 4,299.62
719	SP-0739	2-5	2-108	2015	13	15	PVC	644.79	647.50	0.00	0.00	636.90	0.00	No					1	2	3	6	$ 105.00	$ 1,342.66	$ 75.00	$ 959.05
12	SP-0028	1-70	1-69	1989	31	8	Vitrified	665.82	665.80	4.00	6.40	659.40	661.82	No						3	2	6	$ 65.00	$ 1,986.45	$ 45.00	$ 1,375.24
23	SP-0039	1-21	1-14	1973	403	8	PVC	667.44	662.90	11.00	7.70	655.20	656.44							3	2	6	$ 65.00	$ 26,202.73	$ 45.00	$ 18,140.35
63	SP-0079	2-31	2-30	1989	303	8	PVC	662.43	662.35	12.29	7.52	647.44	648.43	No	12	3200	4423	4432	3	3	2	6	$ 65.00	$ 19,689.35	$ 45.00	$ 13,631.09
65	SP-0081	2-32	2-31	1989	324	8	PVC	0.00	662.43	10.77	6.20	648.50	649.58	No	13	2100	2100	2200	3	3	2	6	$ 65.00	$ 21,036.63	$ 45.00	$ 14,563.82
69	SP-0085	2-98	2-97	1989	336	8	Vitrified	663.61	664.18	7.05	8.72	655.46	656.56	No						3	2	6	$ 65.00	$ 21,812.77	$ 45.00	$ 15,101.15
70	SP-0086	2-97	2-96	1989	363	8	Vitrified	664.18	664.19	8.72	10.30	653.89	655.46	No						3	2	6	$ 65.00	$ 23,611.69	$ 45.00	$ 16,346.56
106	SP-0122	2-96	2-95	1989	51	8	Vitrified	664.19	664.84	10.70	11.20	653.64	653.49							3	2	6	$ 65.00	$ 3,341.13	$ 45.00	$ 2,313.09
107	SP-0123	2-101	2-95	1989	360	12	Vitrified	661.72	664.84	0.00	11.20	653.64	0.00	No						3	2	6	$ 85.00	$ 30,614.05	$ 60.00	$ 21,609.92
170	SP-0186	2-95	3-3	1989	481	12	Vitrified	664.84	657.08	0.00	5.80	651.28	0.00	No						3	2	6	$ 85.00	$ 40,917.20	$ 60.00	$ 28,882.73
181	SP-0197	2-102	2-101	1989	28	12	Vitrified	661.78	661.72	0.00	6.80	654.92	0.00	No						3	2	6	$ 85.00	$ 2,356.28	$ 60.00	$ 1,663.26
204	SP-0220	1-87	1-69	1989	264	12	PVC	664.30	665.80	5.70	4.50	659.80	659.82	No	CMB36	0	4200	4200	3	3	2	6	$ 85.00	$ 22,482.20	$ 60.00	$ 15,869.79
253	SP-0269	3-81	3-80	1970	439	8	Vitrified	663.48	663.94	0.00	6.50	657.44	0.00	No						3	2	6	$ 65.00	$ 28,547.67	$ 45.00	$ 19,763.77
259	SP-0275	3-78A	3-77A	1970	6	8	Vitrified	0.00	664.11	0.00	9.40	654.71	0.00	No						3	2	6	$ 65.00	$ 381.27	$ 45.00	$ 263.95
313	SP-0329	6-39	6-38	2005	189	8	PVC	665.46	665.12	13.73	14.33	650.79	651.73		127				3	3	2	6	$ 65.00	$ 12,253.27	$ 45.00	$ 8,483.03
340	SP-0356	3-38	3-37	2013	388	8	Vitrified	652.33	655.50	0.00	9.17	646.33	0.00	No	123				1	3	2	6	$ 65.00	$ 25,220.95	$ 45.00	$ 17,460.66
408	SP-0424	1-99	1-98	1973	352	8	PVC	0.00	658.31	8.64	5.80	653.20	654.37	No	6	0	0	0	1	3	2	6	$ 65.00	$ 22,869.94	$ 45.00	$ 15,833.03
409	SP-0425	1-98	1-96	1973	345	8	PVC	658.31	662.98	0.00	4.80	659.21	0.00	No	7	0	3100	3100	2	3	2	6	$ 65.00	$ 22,406.71	$ 45.00	$ 15,512.33
410	SP-0426	1-96	1-95	1973	205	8	PVC	662.98	663.53	4.95	6.20	658.65	658.03	No	8	0	0	0	1	3	2	6	$ 65.00	$ 13,297.29	$ 45.00	$ 9,205.82
411	SP-0427	1-95	1-21	1973	213	8	PVC	663.53	667.44	12.93	10.70	656.74	650.34		9	0	3100	3100	2	3	2	6	$ 65.00	$ 13,836.89	$ 45.00	$ 9,579.38
412	SP-0428	1-97	1-96	1973	220	8	PVC	0.00	662.98	0.00	4.90	658.08	0.00							3	2	6	$ 65.00	$ 14,316.65	$ 45.00	$ 9,911.53
421	SP-0437	3-148	3-147	1970	38	8	PVC	663.95	664.62	10.40	11.39	653.23	653.55	No						3	2	6	$ 65.00	$ 2,444.75	$ 45.00	$ 1,692.52
541	SP-0557	3-82	3-81	1970	331	8	Vitrified	664.67	663.48	4.38	4.30	659.18	660.29	No						3	2	6	$ 65.00	$ 21,544.95	$ 45.00	$ 14,915.73
601	SP-0617	6-60	6-59	1993	349	8	PVC	665.99	666.36	11.80	12.80	653.56	654.19	No	116				3	3	2	6	$ 65.00	$ 22,708.12	$ 45.00	$ 15,721.01
671	SP-0690	<Null>	2-81	1989	21	8	Vitrified	0.00	666.08	0.00	7.00	659.08	0.00	No						3	2	6	$ 65.00	$ 1,368.60	$ 45.00	$ 947.49
5	SP-0021	1-77	1-76	2009	221	8	PVC	0.00	666.21	6.88	7.10	659.11	659.33							2	2	4	$ 65.00	$ 14,372.94	$ 45.00	$ 9,950.50
13	SP-0029	1-10	1-28	2010	280	12	PVC	663.64	666.26	15.40	15.60	650.66	650.86	No						2	2	4	$ 85.00	$ 23,806.48	$ 60.00	$ 16,804.58
15	SP-0031	1-11	1-10	1989	302	10	PVC	667.02	663.64	13.05	12.20	651.44	653.97	No						2	2	4	$ 75.00	$ 22,624.78	$ 50.00	$ 15,083.18
16	SP-0032	1-13	1-35	1989	405	8	PVC	667.50	663.32	13.60	8.80	654.52	653.90	No						2	2	4	$ 65.00	$ 26,320.02	$ 45.00	$ 18,221.55
17	SP-0033	1-12	1-11	1989	284	10	PVC	666.82	667.02	12.35	13.05	653.97	654.47	No						2	2	4	$ 75.00	$ 21,335.27	$ 50.00	$ 14,223.51
18	SP-0034	1-14	1-13	1989	409	8	PVC	662.90	667.50	0.00	13.60	653.90	0.00	No						2	2	4	$ 65.00	$ 26,559.71	$ 45.00	$ 18,387.49
19	SP-0035	1-15	1-14	1989	13	8	PVC	662.90	662.90	7.60	7.95	654.95	655.30	No						2	2	4	$ 65.00	$ 860.91	$ 45.00	$ 596.01
24	SP-0040	1-16	1-20	1993	189	8	PVC	665.17	662.15	8.75	6.25	655.90	656.42	No						2	2	4	$ 65.00	$ 12,298.07	$ 45.00	$ 8,514.05
25	SP-0041	1-19	1-18	1993	99	8	PVC	667.78	668.02	5.60	6.65	661.37	662.18	No						2	2	4	$ 65.00	$ 6,421.29	$ 45.00	$ 4,445.51
26	SP-0042	1-18	1-17	1993	170	8	PVC	668.02	668.29	6.65	8.00	660.29	661.37	No						2	2	4	$ 65.00	$ 11,043.09	$ 45.00	$ 7,645.22
27	SP-0043	1-17	1-16	1993	296	8	PVC	668.29	665.17	5.00	8.60	656.57	663.29	No						2	2	4	$ 65.00	$ 19,243.04	$ 45.00	$ 13,322.11
35	SP-0051	1-50	1-49	2009	161	8	PVC	666.33	665.55	3.55	7.40	658.15	662.78							2	2	4	$ 65.00	$ 10,487.45	$ 45.00	$ 7,260.54
37	SP-0053	1-56	1-55	1992	301	12	Plastic	666.87	668.13	7.55	8.30	659.83	658.20	No	53					2	2	4	$ 85.00	$ 25,617.24	$ 60.00	$ 18,082.75
38	SP-0054	1-57	1-56	1992	329	8	Plastic	666.28	666.87	4.37	0.00	0.00	661.91	No						2	2	4	$ 65.00	$ 21,359.51	$ 45.00	$ 14,787.36
39	SP-0055	2-22	2-21	1996	392	8	PVC	664.07	665.06	7.80	9.52	655.54	656.27	No						2	2	4	$ 65.00	$ 25,452.57	$ 45.00	$ 17,621.01
40	SP-0056	2-23	2-22	1996	370	8	PVC	665.81	664.07	8.02	7.80	656.27	657.79	No						2	2	4	$ 65.00	$ 24,048.99	$ 45.00	$ 16,649.30
48	SP-0064	1-72	1-71	2010	258	8	PVC	0.00	0.00	0.00	0.00	0.00	0.00							2	2	4	$ 65.00	$ 16,788.42	$ 45.00	$ 11,622.75
49	SP-0065	1-71	1-60	2010	262	8	PVC	0.00	667.88	0.00	14.10	653.78	0.00	Yes						2	2	4	$ 65.00	$ 17,025.25	$ 45.00	$ 11,786.71
50	SP-0066	1-59	1-28	2010	411	10	PVC	0.00	666.26	0.00	15.30	650.96	0.00	No						2	2	4	$ 75.00	$ 30,794.29	$ 50.00	$ 20,529.52
61	SP-0077	3-63A	3-63	1993	286	8	PVC	662.90	663.99	0.00	8.00	655.99	0.00							2	2	4	$ 65.00	$ 18,564.81	$ 45.00	$ 12,852.56
64	SP-0080	2-54	2-53	1996	369	12	PVC	663.73	664.09	9.78	11.05	653.04	653.95	No						2	2	4	$ 85.00	$ 31,372.19	$ 60.00	$ 22,145.08
71	SP-0087	2-82	2-81	1989	261	12	PVC	665.87	666.08	18.95	7.00	646.03	647.18	No	43	0	2100	2100	2	2	2	4	$ 85.00	$ 22,160.22	$ 60.00	$ 15,642.51
72	SP-0088	2-83	2-82	1989	225	12	PVC	665.40	665.87	6.70	7.00	658.16	659.09		42	0	4100	4100	1	2	2	4	$ 85.00	$ 19,150.94	$ 60.00	$ 13,518.31
79	SP-0095	2-73	2-72	1996	334	12	PVC	666.06	665.76	8.75	9.80	655.96	657.31	No	45	0	0	0	1	2	2	4	$ 85.00	$ 28,374.69	$ 60.00	$ 20,029.19
80	SP-0096	2-71	2-60	1996	335	12	PVC	665.81	666.10	10.71	12.15	659.83	655.10	No	46	0	0	0	1	2	2	4	$ 85.00	$ 28,448.15	$ 60.00	$ 20,081.05
81	SP-0097	2-72	2-71	1996	325	12	PVC	665.76	665.81	8.95	10.71	658.20	657.93	No	47	0	0	0	1	2	2	4	$ 85.00	$ 27,666.01	$ 60.00	$ 19,528.95
82	SP-0098	2-59	2-58	1996	30	12	PVC	665.28	665.03	0.00	12.40	652.63	0.00	No	48	0	0	0	1	2	2	4	$ 85.00	$ 2,532.34	$ 60.00	$ 1,787.53
87	SP-0103	2-75	2-74	1996	14	8	PVC	666.40	666.36	11.80	0.00	0.00	654.60	No						2	2	4	$ 65.00	$ 925.09	$ 45.00	$ 640.45
94	SP-0110	2-26	2-25	1996	260	8	PVC	663.90	662.45	0.00	6.40	656.05	0.00	No						2	2	4	$ 65.00	$ 16,878.42	$ 45.00	$ 11,685.06
95	SP-0111	2-25	2-24	1996	305	8	PVC	662.45	663.09	6.40	8.30	654.79	656.05	No						2	2	4	$ 65.00	$ 19,803.67	$ 45.00	$ 13,710.24
96	SP-0112	2-24	2-17	1996	294	8	PVC	663.09	662.36	8.30	15.20	647.16	654.79	No						2	2	4	$ 65.00	$ 19,132.68	$ 45.00	$ 13,245.70
117	SP-0133	3-53	3-52	1989	181	8	PVC	0.00	657.26	0.00	6.95	650.31	0.00	No	150				2	2	2	4	$ 65.00	$ 11,734.72	$ 45.00	$ 8,124.04
118	SP-0134	3-62	3-61	1993	100	8	PVC	663.37	662.62	7.80	7.43	655.19	655.57	No						2	2	4	$ 65.00	$ 6,522.87	$ 45.00	$ 4,515.83
131	SP-0147	4-64	4-63	1999	384	12	PVC	669.32	667.04	8.03	19.85	658.62	659.03	No	CMB54	0	0	0	1	2	2	4	$ 85.00	$ 32,600.80	$ 60.00	$ 23,012.33
132	SP-0148	4-65	4-64	1999	260	12	PVC	667.86	669.32	7.50	21.52	647.80	648.36	No	55	0	0	0	1	2	2	4	$ 85.00	$ 22,125.62	$ 60.00	$ 15,618.08
134	SP-0150	4-59	4-58	2000	123	8	PVC	663.93	665.76	6.40	8.95	656.81	657.53	No						2	2	4	$ 65.00	$ 7,977.02	$ 45.00	$ 5,522.55
135	SP-0151	4-58	4-57	2000	361	12	PVC	665.76	666.61	9.05	11.40	655.21	656.71	No						2	2	4	$ 85.00	$ 30,642.97	$ 60.00	$ 21,630.33

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
136	SP-0152	4-57	4-56	2000	150	12	PVC	666.61	667.77	11.40	13.22	654.55	655.21	No						2	2	4	$ 85.00	$ 12,788.74	$ 60.00	$ 9,027.35
137	SP-0153	4-54	4-53	2000	225	12	PVC	667.28	667.04	16.20	16.55	650.49	651.08	No						2	2	4	$ 85.00	$ 19,126.90	$ 60.00	$ 13,501.34
138	SP-0154	4-53	4-52	2000	217	12	PVC	667.04	665.86	16.55	16.03	649.83	650.49	No						2	2	4	$ 85.00	$ 18,441.33	$ 60.00	$ 13,017.41
139	SP-0155	4-52	4-51	2000	341	12	PVC	665.86	667.29	16.03	18.60	648.69	649.83	No						2	2	4	$ 85.00	$ 28,993.17	$ 60.00	$ 20,465.77
142	SP-0158	4-72	4-69	2000	275	8	PVC	665.92	665.00	10.48	11.05	653.95	655.44	No						2	2	4	$ 65.00	$ 17,867.07	$ 45.00	$ 12,369.51
146	SP-0162	1-76	1-45	2009	305	8	PVC	666.21	666.71	6.88	9.70	657.01	659.33	No						2	2	4	$ 65.00	$ 19,843.21	$ 45.00	$ 13,737.60
147	SP-0163	1-66	1-65	2009	213	8	PVC	665.67	666.05	6.42	5.40	660.27	659.63	No						2	2	4	$ 65.00	$ 13,823.64	$ 45.00	$ 9,570.21
156	SP-0172	<Null>	4-66	1999	285	10	PVC	0.00	668.62	0.00	15.40	653.22	0.00	No						2	2	4	$ 75.00	$ 21,375.00	$ 50.00	$ 14,250.00
164	SP-0180	2-21	2-20	1996	387	8	PVC	665.06	663.06	9.52	12.40	650.66	655.54	No						2	2	4	$ 65.00	$ 25,185.95	$ 45.00	$ 17,436.43
182	SP-0198	4-40	4-36A	2005	304	8	PVC	666.67	0.00	16.17	0.00	0.00	650.50	No						2	2	4	$ 65.00	$ 19,767.85	$ 45.00	$ 13,685.44
183	SP-0199	4-30	4-28	2000	436	8	PVC	666.15	666.76	9.30	10.90	655.86	656.85	No						2	2	4	$ 65.00	$ 28,338.13	$ 45.00	$ 19,618.70
184	SP-0200	4-28	4-27	2000	399	8	PVC	666.76	668.31	10.90	13.82	654.49	655.86	No						2	2	4	$ 65.00	$ 25,929.38	$ 45.00	$ 17,951.11
185	SP-0201	4-27	4-26	2000	401	8	PVC	668.31	667.01	13.82	13.32	653.69	654.49	No						2	2	4	$ 65.00	$ 26,068.54	$ 45.00	$ 18,047.45
188	SP-0204	6-97	6-83	1992	91	12	PVC	665.92	666.09	21.03	21.62	644.47	644.89							2	2	4	$ 85.00	$ 7,766.95	$ 60.00	$ 5,482.55
190	SP-0206	6-76	6-75	1999	290	8	Plastic	665.61	665.09	4.84	5.36	659.73	660.77							2	2	4	$ 65.00	$ 18,844.13	$ 45.00	$ 13,045.94
193	SP-0209	3-29	3-30	1996	9	8	PVC	665.00	665.15	0.00	7.90	657.25	0.00	No						2	2	4	$ 65.00	$ 554.64	$ 45.00	$ 383.98
194	SP-0210	3-30	3-28	1996	18	10	PVC	665.15	665.25	8.00	15.30	649.95	657.15	Yes						2	2	4	$ 75.00	$ 1,320.84	$ 50.00	$ 880.56
195	SP-0211	3-28	3-28A	1996	325	10	PVC	665.25	658.70	16.25	10.16	648.54	649.00	No	146					2	2	4	$ 75.00	$ 24,401.14	$ 50.00	$ 16,267.42
196	SP-0212	3-28A	3-27	1996	274	10	PVC	658.70	653.82	10.16	8.88	644.94	648.54	No	144				2	2	2	4	$ 75.00	$ 20,513.11	$ 50.00	$ 13,675.41
197	SP-0213	3-27	3-26	1996	93	10	PVC	653.82	652.41	8.88	7.80	644.61	644.94	Yes	143				2	2	2	4	$ 75.00	$ 6,967.16	$ 50.00	$ 4,644.77
198	SP-0214	4-81	4-66	2000	391	12	PVC	670.20	668.62	20.39	19.38	649.24	649.81	No						2	2	4	$ 85.00	$ 33,246.66	$ 60.00	$ 23,468.23
201	SP-0217	4-56	4-54	2000	130	12	PVC	667.77	667.28	13.22	16.90	650.38	654.55							2	2	4	$ 85.00	$ 11,071.89	$ 60.00	$ 7,815.45
202	SP-0218	4-55	4-54	2005	60	12	PVC	0.00	667.28	0.00	16.12	651.16	0.00	No						2	2	4	$ 85.00	$ 5,102.77	$ 60.00	$ 3,601.96
203	SP-0219	4-61	<Null>	1999	294	12	PVC	668.06	0.00	7.62	0.00	0.00	663.30	No	57	0	0	0	2	2	2	4	$ 85.00	$ 24,971.68	$ 60.00	$ 17,627.07
205	SP-0221	1-88	1-87	1989	197	12	PVC	666.27	664.30	6.08	4.25	660.05	660.19							2	2	4	$ 85.00	$ 16,703.14	$ 60.00	$ 11,790.45
206	SP-0222	1-86	1-87	1989	309	8	PVC	0.00	664.30	4.25	4.50	659.80	0.00	No						2	2	4	$ 65.00	$ 20,074.55	$ 45.00	$ 13,897.77
208	SP-0224	5-20	5-13	2003	96	8	PVC	662.37	663.00	15.31	16.60	646.40	647.06	No						2	2	4	$ 65.00	$ 6,268.87	$ 45.00	$ 4,339.99
210	SP-0226	5-30	5-29	2005	108	8	PVC	664.43	663.65	15.90	14.61	649.04	648.53							2	2	4	$ 65.00	$ 7,005.58	$ 45.00	$ 4,850.01
213	SP-0229	5-27	5-26	2005	77	8	PVC	664.07	664.75	16.79	17.86	646.89	647.28	No						2	2	4	$ 65.00	$ 4,978.00	$ 45.00	$ 3,446.30
214	SP-0230	5-62	5-61	2005	307	8	PVC	661.04	661.53	12.52	14.30	647.23	648.52	No						2	2	4	$ 65.00	$ 19,958.87	$ 45.00	$ 13,817.68
215	SP-0231	5-63	5-61	2005	146	12	PVC	662.89	661.53	15.69	14.83	646.70	647.20	Yes						2	2	4	$ 85.00	$ 12,406.15	$ 60.00	$ 8,757.29
216	SP-0232	5-64	5-63	2005	89	12	PVC	662.23	662.89	14.70	15.59	647.30	647.53	No						2	2	4	$ 85.00	$ 7,602.93	$ 60.00	$ 5,366.77
219	SP-0235	6-43	6-42	2005	216	8	PVC	0.00	664.87	0.00	11.98	652.89	0.00	No						2	2	4	$ 65.00	$ 14,047.29	$ 45.00	$ 9,725.05
226	SP-0242	6-11	6-7	2005	239	8	PVC	666.65	668.38	17.79	22.60	645.78	648.86	No						2	2	4	$ 65.00	$ 15,552.01	$ 45.00	$ 10,766.77
236	SP-0252	6-85	6-84	1993	343	8	PVC	666.24	665.87	19.09	20.02	645.85	647.15	No						2	2	4	$ 65.00	$ 22,296.33	$ 45.00	$ 15,435.92
243	SP-0259	3-61	3-60	1993	194	8	PVC	662.62	663.48	7.43	9.75	653.73	655.19	No						2	2	4	$ 65.00	$ 12,616.00	$ 45.00	$ 8,734.15
256	SP-0272	3-103	<Null>	2004	36	8	PVC	661.25	0.00	11.85	0.00	0.00	649.40	No						2	2	4	$ 65.00	$ 2,369.39	$ 45.00	$ 1,640.34
260	SP-0276	4-106	4-105	2005	254	8	PVC	666.85	666.73	7.40	8.58	658.15	659.45	No						2	2	4	$ 65.00	$ 16,507.32	$ 45.00	$ 11,428.15
262	SP-0278	4-109	4-108	2005	308	8	PVC	667.28	662.56	10.60	7.90	654.66	656.68	No						2	2	4	$ 65.00	$ 20,021.65	$ 45.00	$ 13,861.14
263	SP-0279	4-108	4-107	2005	229	8	PVC	662.56	667.22	7.90	9.27	657.95	654.66	No						2	2	4	$ 65.00	$ 14,907.42	$ 45.00	$ 10,320.52
264	SP-0280	4-107	4-104	2005	224	8	PVC	667.22	666.90	9.27	9.92	656.98	657.95	No						2	2	4	$ 65.00	$ 14,591.76	$ 45.00	$ 10,101.99
265	SP-0281	4-105	4-104	2005	249	8	PVC	666.73	666.90	8.58	9.82	657.08	658.15	No						2	2	4	$ 65.00	$ 16,209.98	$ 45.00	$ 11,222.29
266	SP-0282	4-104	4-103	2005	101	8	PVC	666.90	667.36	9.92	10.80	656.56	656.98	No						2	2	4	$ 65.00	$ 6,558.94	$ 45.00	$ 4,540.80
267	SP-0283	4-103	4-55	2005	98	12	PVC	667.36	0.00	15.40	0.00	0.00	651.96	No						2	2	4	$ 85.00	$ 8,287.99	$ 60.00	$ 5,850.34
268	SP-0284	4-2	4-1	2000	347	12	PVC	667.23	667.07	18.85	19.80	647.27	648.38	No						2	2	4	$ 85.00	$ 29,455.80	$ 60.00	$ 20,792.33
269	SP-0285	4-3	4-2	2000	560	12	PVC	667.90	667.23	18.00	18.85	648.38	649.90	No						2	2	4	$ 85.00	$ 47,570.87	$ 60.00	$ 33,579.43
272	SP-0288	4-6	4-5	2000	286	12	PVC	665.68	667.43	12.42	15.05	652.38	653.26	No						2	2	4	$ 85.00	$ 24,349.18	$ 60.00	$ 17,187.66
273	SP-0289	4-26	4-6	2000	114	12	PVC	667.01	665.68	13.32	12.30	653.38	653.69	No						2	2	4	$ 85.00	$ 9,706.99	$ 60.00	$ 6,851.99
274	SP-0290	6-48	6-47	1992	306	8	PVC	666.95	667.23	9.28	7.19	647.60	647.35	No	28	0	0	0	1	2	2	4	$ 65.00	$ 19,887.57	$ 45.00	$ 13,768.32
275	SP-0291	6-75	6-74	1999	149	8	Plastic	665.09	665.61	5.36	6.83	658.78	659.73	No						2	2	4	$ 65.00	$ 9,659.87	$ 45.00	$ 6,687.60
278	SP-0294	5-36	5-28	2005	328	8	PVC	662.48	664.06	13.00	16.03	648.03	649.48	Yes						2	2	4	$ 65.00	$ 21,333.67	$ 45.00	$ 14,769.47
279	SP-0295	<Null>	4-96	2000	104	8	PVC	0.00	666.85	0.00	9.20	657.65	0.00	No						2	2	4	$ 65.00	$ 6,789.32	$ 45.00	$ 4,700.30
280	SP-0296	<Null>	4-92	2000	114	8	PVC	0.00	666.10	0.00	7.22	658.88	0.00	No						2	2	4	$ 65.00	$ 7,431.35	$ 45.00	$ 5,144.78
295	SP-0311	<Null>	3-1	1989	111	8	PVC	0.00	656.65	0.00	0.00	0.00	0.00	Yes						2	2	4	$ 65.00	$ 7,234.48	$ 45.00	$ 5,008.48
302	SP-0318	1-30	1-31	2010	323	12	PVC	666.59	666.42	0.00	11.40	655.02	0.00	Yes						2	2	4	$ 85.00	$ 27,490.59	$ 60.00	$ 19,405.12
303	SP-0319	1-29	1-30	2010	285	12	PVC	666.40	666.59	0.00	17.20	649.39	0.00	No						2	2	4	$ 85.00	$ 24,220.96	$ 60.00	$ 17,097.15
304	SP-0320	1-60	1-59	2010	191	10	PVC	667.88	0.00	14.75	14.00	0.00	653.13	No						2	2	4	$ 75.00	$ 14,348.59	$ 50.00	$ 9,565.73
305	SP-0321	1-28	1-29	2010	156	12	PVC	666.26	666.40	0.00	15.40	650.86	0.00	No						2	2	4	$ 85.00	$ 13,299.99	$ 60.00	$ 9,388.23
306	SP-0322	4-41	4-40	2005	299	8	PVC	667.84	666.67	14.65	15.85	650.82	653.19	No						2	2	4	$ 65.00	$ 19,429.00	$ 45.00	$ 13,450.85
307	SP-0323	4-42	4-41	2005	252	8	PVC	665.66	667.84	11.43	14.65	653.19	654.23	No						2	2	4	$ 65.00	$ 16,383.16	$ 45.00	$ 11,342.19
308	SP-0324	4-45	4-44	2005	300	8	PVC	665.58	664.28	12.50	12.52	651.76	653.08	No						2	2	4	$ 65.00	$ 19,475.85	$ 45.00	$ 13,483.28
311	SP-0327	4-82	4-81	2000	223	12	PVC	669.46	670.20	19.35	20.39	649.81	650.11	No						2	2	4	$ 85.00	$ 18,996.35	$ 60.00	$ 13,409.19
312	SP-0328	<Null>	5-38	2005	203	8	PVC	0.00	662.84	0.00	10.10	652.74	0.00	No						2	2	4	$ 65.00	$ 13,195.07	$ 45.00	$ 9,135.05
320	SP-0336	6-4	6-3	2005	100	10	PVC	664.29	664.94	21.46	22.56	642.38	642.83	No	173				1	2	2	4	$ 75.00	$ 7,481.12	$ 50.00	$ 4,987.41

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
321	SP-0337	6-3	6-2	2005	173	10	PVC	664.94	664.89	22.56	25.00	639.89	642.38	No	166				1	2	2	4	$ 75.00	$ 12,970.75	$ 50.00	$ 8,647.17
326	SP-0342	3-166	<Null>	2005	17	8	PVC	662.78	0.00	0.00	0.00	0.00	0.00	No						2	2	4	$ 65.00	$ 1,124.72	$ 45.00	$ 778.65
332	SP-0348	3-63	3-62	1993	163	8	PVC	663.99	663.37	7.87	7.80	655.57	656.12							2	2	4	$ 65.00	$ 10,565.68	$ 45.00	$ 7,314.70
335	SP-0351	4-1	<Null>	1999	18	12	PVC	0.00	667.07	0.00	19.90	647.17	0.00	No						2	2	4	$ 85.00	$ 1,512.50	$ 60.00	$ 1,067.65
336	SP-0352	6-1	<Null>	2005	7	8	PVC	666.32	0.00	0.00	0.00	0.00	0.00							2	2	4	$ 65.00	$ 447.98	$ 45.00	$ 310.14
342	SP-0358	2-74	2-58	1996	217	8	PVC	666.36	665.03	0.00	12.40	652.63	0.00	No						2	2	4	$ 65.00	$ 14,112.66	$ 45.00	$ 9,770.30
350	SP-0366	3-64	3-62	1993	287	8	PVC	663.37	663.37	6.92	7.80	655.57	656.45	No						2	2	4	$ 65.00	$ 18,684.50	$ 45.00	$ 12,935.42
351	SP-0367	4-46	4-45	2005	300	8	PVC	664.42	665.58	10.09	12.50	653.08	654.33	No						2	2	4	$ 65.00	$ 19,509.46	$ 45.00	$ 13,506.55
352	SP-0368	4-47	4-46	2005	241	8	PVC	667.05	664.42	11.65	10.09	654.33	655.40	No						2	2	4	$ 65.00	$ 15,639.60	$ 45.00	$ 10,827.42
353	SP-0369	4-39	4-38	2005	172	8	PVC	667.07	666.64	10.66	10.90	655.74	656.41	No						2	2	4	$ 65.00	$ 11,159.63	$ 45.00	$ 7,725.90
354	SP-0370	4-38	4-37	2005	175	8	PVC	666.64	667.38	10.90	12.47	654.91	655.74	No						2	2	4	$ 65.00	$ 11,372.01	$ 45.00	$ 7,872.93
355	SP-0371	4-48	4-47	2005	221	8	PVC	667.19	667.05	9.46	11.60	655.45	657.73	No						2	2	4	$ 65.00	$ 14,345.33	$ 45.00	$ 9,931.38
358	SP-0374	6-99	6-98	1992	400	12	PVC	665.19	665.95	17.80	19.80	646.15	647.39	No						2	2	4	$ 85.00	$ 33,999.24	$ 60.00	$ 23,999.46
359	SP-0375	6-98	6-97	1992	399	12	PVC	665.95	665.92	19.80	21.03	644.89	646.15	No						2	2	4	$ 85.00	$ 33,906.51	$ 60.00	$ 23,934.01
368	SP-0384	6-94	6-93	1993	76	8	PVC	664.93	664.77	9.49	9.62	655.15	655.44	Yes						2	2	4	$ 65.00	$ 4,931.28	$ 45.00	$ 3,413.96
372	SP-0388	6-90	6-89	1993	343	8	PVC	664.27	664.36	12.10	13.40	650.96	652.17	No						2	2	4	$ 65.00	$ 22,269.27	$ 45.00	$ 15,417.19
374	SP-0390	6-88	6-87	1993	67	8	PVC	664.96	664.83	15.06	15.25	649.58	649.90	No						2	2	4	$ 65.00	$ 4,379.20	$ 45.00	$ 3,031.76
376	SP-0392	6-86	6-85	1993	375	8	PVC	666.39	666.24	17.97	19.09	647.15	648.42	No						2	2	4	$ 65.00	$ 24,363.24	$ 45.00	$ 16,866.86
377	SP-0393	4-101	4-100	2000	81	8	PVC	666.51	666.44	7.85	8.20	658.24	658.66	No						2	2	4	$ 65.00	$ 5,297.45	$ 45.00	$ 3,667.46
378	SP-0394	4-100	4-99	2000	243	12	PVC	666.44	666.08	8.30	8.60	657.48	658.14	No						2	2	4	$ 85.00	$ 20,676.28	$ 60.00	$ 14,595.02
379	SP-0395	4-99	4-98	2000	221	12	PVC	666.08	665.21	8.63	8.10	657.11	657.45	No						2	2	4	$ 85.00	$ 18,818.01	$ 60.00	$ 13,283.30
388	SP-0404	4-85	4-84	2000	302	12	PVC	670.44	669.31	17.80	18.52	650.79	652.64	No						2	2	4	$ 85.00	$ 25,681.41	$ 60.00	$ 18,128.05
390	SP-0406	4-83	4-82	2000	345	12	PVC	668.82	669.46	17.80	19.35	650.11	651.02	No						2	2	4	$ 85.00	$ 29,307.16	$ 60.00	$ 20,687.41
391	SP-0407	4-66	4-65	1999	137	12	PVC	668.62	667.86	19.70	19.50	648.36	648.92	No	58	0	2600	2600	1	2	2	4	$ 85.00	$ 11,646.06	$ 60.00	$ 8,220.75
395	SP-0411	5-66	5-65	2005	180	8	PVC	661.17	661.09	12.20	12.68	648.41	648.97							2	2	4	$ 65.00	$ 11,691.01	$ 45.00	$ 8,093.77
397	SP-0413	3-98	3-97	2004	209	8	PVC	663.23	0.00	7.20	7.00	0.00	656.03							2	2	4	$ 65.00	$ 13,616.18	$ 45.00	$ 9,426.59
399	SP-0415	3-121	3-116	2004	84	8	PVC	661.17	660.88	10.85	10.98	649.90	650.32	No						2	2	4	$ 65.00	$ 5,470.92	$ 45.00	$ 3,787.56
400	SP-0416	3-116	3-103	2004	97	8	PVC	660.88	661.25	10.95	11.80	649.45	649.93	No						2	2	4	$ 65.00	$ 6,336.78	$ 45.00	$ 4,387.00
401	SP-0417	4-67	4-66A	2000	67	12	PVC	667.46	0.00	15.95	0.00	653.90	651.51	No	59	0	0	0	1	2	2	4	$ 85.00	$ 5,723.57	$ 60.00	$ 4,040.17
402	SP-0418	4-68	4-67	2000	259	12	PVC	666.11	667.46	8.90	15.95	657.93	658.62	No	60	0	0	0	1	2	2	4	$ 85.00	$ 22,041.86	$ 60.00	$ 15,558.96
403	SP-0419	4-69	4-68	2000	253	12	PVC	665.00	666.11	7.15	12.75	656.97	657.25	No	61	0	2600	2600	1	2	2	4	$ 85.00	$ 21,539.33	$ 60.00	$ 15,204.23
404	SP-0420	4-73	4-72	2000	87	8	PVC	665.89	665.92	10.10	10.48	655.44	655.79	No						2	2	4	$ 65.00	$ 5,673.33	$ 45.00	$ 3,927.69
405	SP-0421	4-74	4-73	2000	101	8	PVC	665.62	665.89	9.55	10.10	655.79	656.07	No						2	2	4	$ 65.00	$ 6,548.23	$ 45.00	$ 4,533.39
406	SP-0422	4-75	4-74	2000	199	8	PVC	664.94	665.62	7.07	9.10	656.52	657.87	No						2	2	4	$ 65.00	$ 12,945.11	$ 45.00	$ 8,962.00
407	SP-0423	4-63	4-62	1999	150	12	PVC	667.04	669.01	7.70	23.30	656.66	656.97		62					2	2	4	$ 85.00	$ 12,708.96	$ 60.00	$ 8,971.03
413	SP-0429	1-89	1-88	1989	20	8	PVC	666.43	666.27	6.20	6.08	660.19	660.23	No						2	2	4	$ 65.00	$ 1,300.64	$ 45.00	$ 900.44
414	SP-0430	1-91	1-89	1989	249	8	PVC	666.33	666.43	5.24	6.20	660.23	661.09							2	2	4	$ 65.00	$ 16,172.95	$ 45.00	$ 11,196.66
415	SP-0431	1-92	1-91	1989	145	8	PVC	0.00	666.33	0.00	5.24	661.09	0.00							2	2	4	$ 65.00	$ 9,395.43	$ 45.00	$ 6,504.53
416	SP-0432	1-93	1-92	1989	78	8	PVC	667.23	0.00	5.31	0.00	0.00	661.92							2	2	4	$ 65.00	$ 5,088.43	$ 45.00	$ 3,522.76
417	SP-0433	1-94	1-93	1989	136	8	PVC	666.09	667.23	3.73	5.31	661.92	662.36	No						2	2	4	$ 65.00	$ 8,837.84	$ 45.00	$ 6,118.51
418	SP-0434	1-90	1-89	1989	99	8	PVC	667.05	666.43	6.22	6.20	660.23	660.83	No						2	2	4	$ 65.00	$ 6,465.85	$ 45.00	$ 4,476.35
426	SP-0442	5-54	5-51	2005	169	8	PVC	662.13	661.99	15.54	16.20	645.79	646.59	No						2	2	4	$ 65.00	$ 10,986.00	$ 45.00	$ 7,605.69
427	SP-0443	5-55	5-54	2005	82	8	PVC	660.94	662.13	13.81	15.54	646.59	647.13	No						2	2	4	$ 65.00	$ 5,348.14	$ 45.00	$ 3,702.56
428	SP-0444	5-56	5-55	2005	120	8	PVC	661.05	660.94	13.36	13.81	647.13	647.69							2	2	4	$ 65.00	$ 7,817.52	$ 45.00	$ 5,412.13
429	SP-0445	5-57	5-56	2005	114	8	PVC	661.95	661.05	13.67	13.36	647.69	648.28	No						2	2	4	$ 65.00	$ 7,389.14	$ 45.00	$ 5,115.56
430	SP-0446	5-58	5-57	2005	108	8	PVC	661.97	661.95	13.18	13.67	648.28	648.79	No						2	2	4	$ 65.00	$ 7,043.39	$ 45.00	$ 4,876.19
432	SP-0448	4-18	4-17	2000	402	8	PVC	668.40	667.16	10.92	11.34	655.82	657.48	No						2	2	4	$ 65.00	$ 26,114.34	$ 45.00	$ 18,079.16
434	SP-0450	4-12	4-11	2000	201	8	PVC	669.16	667.11	11.15	10.05	657.06	658.01	No						2	2	4	$ 65.00	$ 13,075.61	$ 45.00	$ 9,052.34
435	SP-0451	4-10	4-7	2000	201	8	PVC	665.15	665.97	9.73	11.40	654.57	655.42	No						2	2	4	$ 65.00	$ 13,060.05	$ 45.00	$ 9,041.57
437	SP-0453	4-20	4-19	2000	216	8	PVC	668.67	669.35	9.25	10.90	658.45	659.42	No						2	2	4	$ 65.00	$ 14,037.03	$ 45.00	$ 9,717.94
438	SP-0454	4-11	4-10	2000	402	8	PVC	667.11	665.15	10.05	9.73	655.42	657.06	No						2	2	4	$ 65.00	$ 26,150.11	$ 45.00	$ 18,103.92
439	SP-0455	4-13	4-12	2000	121	8	PVC	669.92	669.16	11.33	11.15	658.01	658.59	No						2	2	4	$ 65.00	$ 7,883.85	$ 45.00	$ 5,458.05
440	SP-0456	4-14	4-13	2000	129	8	PVC	669.20	669.92	9.97	11.33	658.59	659.23	No						2	2	4	$ 65.00	$ 8,377.48	$ 45.00	$ 5,799.79
441	SP-0457	4-24	4-23	2000	328	8	PVC	671.76	670.84	9.75	10.38	660.46	662.01	No						2	2	4	$ 65.00	$ 21,338.66	$ 45.00	$ 14,772.92
444	SP-0460	5-51	5-50	2003	183	12	PVC	661.99	661.07	16.40	15.58	645.49	645.59	No						2	2	4	$ 85.00	$ 15,574.75	$ 60.00	$ 10,993.94
449	SP-0465	4-16	4-7	2000	131	8	PVC	666.23	665.97	11.12	11.52	654.45	655.11	No						2	2	4	$ 65.00	$ 8,489.61	$ 45.00	$ 5,877.42
450	SP-0466	5-59	5-58	2005	205	8	PVC	660.78	661.97	11.04	13.18	648.79	649.74	No						2	2	4	$ 65.00	$ 13,295.31	$ 45.00	$ 9,204.45
451	SP-0467	5-60	5-59	2005	286	8	PVC	663.12	660.78	12.18	11.04	649.74	650.94	No						2	2	4	$ 65.00	$ 18,606.67	$ 45.00	$ 12,881.54
452	SP-0468	5-25	5-24	2005	254	8	PVC	0.00	663.04	0.00	12.48	650.56	0.00	No						2	2	4	$ 65.00	$ 16,485.67	$ 45.00	$ 11,413.16
453	SP-0469	5-24	5-23	2005	401	8	PVC	663.04	662.56	12.48	13.90	648.66	650.56	No						2	2	4	$ 65.00	$ 26,057.57	$ 45.00	$ 18,039.85
454	SP-0470	5-23	5-22	2005	296	8	PVC	662.56	661.94	13.90	14.32	647.62	648.66	No						2	2	4	$ 65.00	$ 19,253.69	$ 45.00	$ 13,329.48
455	SP-0471	5-22	5-21	2005	65	8	PVC	661.94	661.94	14.32	14.72	647.22	647.62	No						2	2	4	$ 65.00	$ 4,221.59	$ 45.00	$ 2,922.64
456	SP-0472	5-21	5-20	2005	61	8	PVC	661.94	662.37	14.72	15.31	647.06	647.22	No						2	2	4	$ 65.00	$ 3,955.96	$ 45.00	$ 2,738.74
457	SP-0473	5-13	5-1	2003	393	8	PVC	663.00	662.22	17.00	17.67	644.55	646.00	No						2	2	4	$ 65.00	$ 25,522.51	$ 45.00	$ 17,669.43

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
458	SP-0474	5-52	5-51	2005	172	12	PVC	661.29	661.99	15.05	16.20	645.79	646.24	Yes						2	2	4	$ 85.00	$ 14,626.07	$ 60.00	$ 10,324.28
459	SP-0475	5-53	5-52	2005	104	12	PVC	660.65	661.29	13.81	15.05	646.24	646.85	No						2	2	4	$ 85.00	$ 8,846.01	$ 60.00	$ 6,244.24
460	SP-0476	5-50	5-49	2003	62	12	PVC	661.07	660.95	15.58	16.03	644.92	645.49	No						2	2	4	$ 85.00	$ 5,304.30	$ 60.00	$ 3,744.21
461	SP-0477	5-49	5-48	2003	73	12	PVC	660.95	661.43	16.03	16.85	644.58	644.92	No						2	2	4	$ 85.00	$ 6,226.72	$ 60.00	$ 4,395.33
462	SP-0478	5-45	5-44	2003	190	8	PVC	662.04	661.82	8.80	18.80	643.02	653.24	No						2	2	4	$ 65.00	$ 12,339.25	$ 45.00	$ 8,542.56
463	SP-0479	5-44	5-43	2003	69	12	PVC	661.82	662.91	19.51	20.76	642.15	642.31	Yes	63	0	0	0	1	2	2	4	$ 85.00	$ 5,853.66	$ 60.00	$ 4,132.00
464	SP-0480	5-46	5-44	2003	399	12	PVC	662.64	661.82	19.02	19.36	642.46	643.62	No						2	2	4	$ 85.00	$ 33,929.11	$ 60.00	$ 23,949.96
465	SP-0481	5-47	5-46	2003	151	12	PVC	662.43	662.64	18.19	19.02	643.62	644.24	No						2	2	4	$ 85.00	$ 12,801.06	$ 60.00	$ 9,036.05
466	SP-0482	5-48	5-47	2003	114	12	PVC	661.43	662.43	16.95	18.19	644.24	644.48	No						2	2	4	$ 85.00	$ 9,732.46	$ 60.00	$ 6,869.97
471	SP-0487	5-3	5-2	2003	76	8	PVC	662.65	662.13	12.55	15.50	653.40	653.80	Yes	22	0	0	0	1	2	2	4	$ 65.00	$ 4,929.06	$ 45.00	$ 3,412.43
472	SP-0488	5-4	5-3	2003	76	8	PVC	663.24	662.65	12.80	15.60	647.05	653.30	No	23					2	2	4	$ 65.00	$ 4,909.05	$ 45.00	$ 3,398.58
473	SP-0489	5-39	5-38	2005	80	8	PVC	662.85	662.84	10.00	10.10	652.74	652.85	No						2	2	4	$ 65.00	$ 5,170.44	$ 45.00	$ 3,579.53
476	SP-0492	6-26	6-16	2005	186	8	PVC	666.27	666.55	20.58	21.40	645.15	645.69		164				1	2	2	4	$ 65.00	$ 12,103.94	$ 45.00	$ 8,379.65
478	SP-0494	6-17	6-16	2005	84	10	PVC	666.72	666.55	21.58	21.86	644.69	645.14	No	110				2	2	2	4	$ 75.00	$ 6,280.38	$ 50.00	$ 4,186.92
482	SP-0498	6-37	6-36	2005	197	8	PVC	665.81	665.35	16.26	16.82	648.53	649.55	No						2	2	4	$ 65.00	$ 12,811.76	$ 45.00	$ 8,869.68
485	SP-0501	6-20	6-19	2005	123	10	PVC	0.00	666.93	0.00	20.70	646.23	0.00	No	167				1	2	2	4	$ 75.00	$ 9,215.05	$ 50.00	$ 6,143.37
491	SP-0507	6-24	6-23	2005	325	8	PVC	666.14	0.00	12.00	14.38	0.00	654.14	No						2	2	4	$ 65.00	$ 21,108.39	$ 45.00	$ 14,613.50
494	SP-0510	5-19	5-18	2003	112	8	PVC	663.23	662.30	7.83	7.63	654.67	655.40							2	2	4	$ 65.00	$ 7,300.46	$ 45.00	$ 5,054.17
495	SP-0511	5-18	5-17	2003	89	8	PVC	662.30	661.67	7.63	7.52	654.15	654.67	No						2	2	4	$ 65.00	$ 5,804.54	$ 45.00	$ 4,018.53
496	SP-0512	5-17	5-16	2003	360	8	PVC	661.67	662.62	7.52	9.85	652.77	654.15	No						2	2	4	$ 65.00	$ 23,424.39	$ 45.00	$ 16,216.88
497	SP-0513	5-16	5-15	2003	75	8	PVC	662.62	0.00	9.85	0.00	0.00	652.77	No						2	2	4	$ 65.00	$ 4,893.86	$ 45.00	$ 3,388.06
498	SP-0514	5-15	5-14	2003	74	8	PVC	0.00	0.00	0.00	0.00	0.00	0.00	No						2	2	4	$ 65.00	$ 4,838.26	$ 45.00	$ 3,349.56
499	SP-0515	5-5	5-4	2003	339	8	PVC	660.72	663.24	12.29	15.80	647.44	648.43		24					2	2	4	$ 65.00	$ 22,050.77	$ 45.00	$ 15,265.92
500	SP-0516	5-7	5-5	2003	198	8	PVC	660.35	660.72	9.50	12.22	648.50	652.72	No	25	0	0	0	1	2	2	4	$ 65.00	$ 12,886.74	$ 45.00	$ 8,921.59
501	SP-0517	5-8	5-7	2003	83	8	PVC	660.18	660.35	10.16	10.77	649.58	650.02	No	26	0	0	0	1	2	2	4	$ 65.00	$ 5,408.55	$ 45.00	$ 3,744.38
502	SP-0518	5-9	5-8	2003	93	8	PVC	661.34	660.18	10.76	10.16	650.02	650.58	No	27	0	0	0	1	2	2	4	$ 65.00	$ 6,055.72	$ 45.00	$ 4,192.42
503	SP-0519	5-10	5-9	2003	334	8	PVC	661.55	661.34	9.65	10.76	650.58	651.90	No						2	2	4	$ 65.00	$ 21,721.35	$ 45.00	$ 15,037.86
504	SP-0520	5-11	5-10	2003	59	8	PVC	661.01	661.55	8.79	9.65	651.90	652.22	No						2	2	4	$ 65.00	$ 3,864.26	$ 45.00	$ 2,675.26
505	SP-0521	5-12	5-11	2003	220	8	PVC	661.95	661.01	8.72	8.79	652.22	653.23	No						2	2	4	$ 65.00	$ 14,286.41	$ 45.00	$ 9,890.59
507	SP-0523	6-101	6-100	1992	434	12	PVC	663.93	666.48	14.48	18.32	648.16	649.45	No						2	2	4	$ 85.00	$ 36,898.13	$ 60.00	$ 26,045.74
508	SP-0524	5-32	5-31	2005	328	8	PVC	662.38	662.67	10.03	11.79	650.88	652.35	No						2	2	4	$ 65.00	$ 21,311.51	$ 45.00	$ 14,754.12
509	SP-0525	5-33	5-32	2005	90	8	PVC	661.98	662.38	9.15	10.03	652.35	652.83	No						2	2	4	$ 65.00	$ 5,873.19	$ 45.00	$ 4,066.06
514	SP-0530	5-37	5-36	2005	365	8	PVC	662.70	662.48	11.65	13.00	649.48	651.05	No						2	2	4	$ 65.00	$ 23,737.50	$ 45.00	$ 16,433.66
515	SP-0531	5-26	5-13	2003	195	8	PVC	664.75	663.00	17.86	17.80	645.20	646.89	No						2	2	4	$ 65.00	$ 12,666.74	$ 45.00	$ 8,769.28
516	SP-0532	5-14	5-13	2003	110	8	PVC	0.00	663.00	0.00	16.80	646.20	0.00	No						2	2	4	$ 65.00	$ 7,153.11	$ 45.00	$ 4,952.15
517	SP-0533	4-49	4-48	2005	200	8	PVC	667.35	667.19	8.94	9.46	657.73	658.41	No						2	2	4	$ 65.00	$ 12,983.60	$ 45.00	$ 8,988.64
518	SP-0534	4-44	4-40	2005	300	8	PVC	664.28	666.67	12.52	16.08	650.59	651.76	No						2	2	4	$ 65.00	$ 19,475.53	$ 45.00	$ 13,483.06
519	SP-0535	6-96	6-95	1993	405	8	PVC	665.71	665.95	8.08	9.31	656.64	657.63	No	181				1	2	2	4	$ 65.00	$ 26,341.87	$ 45.00	$ 18,236.68
520	SP-0536	3-165	3-166	2005	390	8	PVC	663.38	662.78	9.27	13.50	649.28	654.11	No						2	2	4	$ 65.00	$ 25,320.79	$ 45.00	$ 17,529.77
526	SP-0542	3-106	3-105	2004	68	8	PVC	0.00	660.20	0.00	8.80	651.40	0.00	No						2	2	4	$ 65.00	$ 4,410.42	$ 45.00	$ 3,053.37
527	SP-0543	3-129	3-128	2004	222	8	PVC	0.00	668.56	0.00	13.05	655.51	0.00	No						2	2	4	$ 65.00	$ 14,431.77	$ 45.00	$ 9,991.22
528	SP-0544	3-131	3-130	2004	123	8	PVC	674.85	673.76	17.58	17.24	656.52	657.27	No						2	2	4	$ 65.00	$ 8,019.42	$ 45.00	$ 5,551.91
530	SP-0546	3-134	3-133	2004	109	8	PVC	0.00	673.34	0.00	12.40	660.94	0.00	No						2	2	4	$ 65.00	$ 7,076.39	$ 45.00	$ 4,899.04
531	SP-0547	3-135	3-134	2004	163	8	PVC	672.21	0.00	0.00	9.67	0.00	0.00							2	2	4	$ 65.00	$ 10,610.44	$ 45.00	$ 7,345.69
532	SP-0548	3-136	3-135	2004	66	8	PVC	670.74	672.21	7.78	9.67	662.54	662.96	No						2	2	4	$ 65.00	$ 4,257.52	$ 45.00	$ 2,947.51
533	SP-0549	3-138	3-137	2004	115	8	PVC	0.00	0.00	0.00	0.00	0.00	0.00	No						2	2	4	$ 65.00	$ 7,475.00	$ 45.00	$ 5,175.00
534	SP-0550	3-140	3-139	2004	159	8	PVC	0.00	671.93	0.00	11.85	660.08	0.00							2	2	4	$ 65.00	$ 10,344.25	$ 45.00	$ 7,161.40
536	SP-0552	3-143	3-142	2004	74	8	PVC	672.92	672.17	11.51	11.20	660.97	661.41	No						2	2	4	$ 65.00	$ 4,835.76	$ 45.00	$ 3,347.83
539	SP-0555	3-86	3-85	1999	149	8	PVC	662.87	662.57	11.40	11.70	650.87	651.47	No						2	2	4	$ 65.00	$ 9,661.01	$ 45.00	$ 6,688.39
540	SP-0556	3-87	3-85	1999	199	8	PVC	662.17	662.57	10.30	11.60	650.97	651.87	No						2	2	4	$ 65.00	$ 12,938.80	$ 45.00	$ 8,957.63
548	SP-0564	3-88	3-87	1999	262	8	PVC	662.37	662.17	9.55	10.30	651.87	652.82	No						2	2	4	$ 65.00	$ 17,014.95	$ 45.00	$ 11,779.58
549	SP-0565	3-90	3-84	1999	209	8	PVC	0.00	662.64	0.00	12.31	650.33	0.00	No						2	2	4	$ 65.00	$ 13,577.15	$ 45.00	$ 9,399.57
550	SP-0566	3-130	3-129	2004	57	8	PVC	673.76	0.00	17.24	0.00	0.00	656.52	No						2	2	4	$ 65.00	$ 3,677.78	$ 45.00	$ 2,546.15
552	SP-0568	3-144	3-143	2004	102	8	PVC	673.07	672.92	11.09	11.51	661.41	661.98	No						2	2	4	$ 65.00	$ 6,662.48	$ 45.00	$ 4,612.49
553	SP-0569	3-142	3-139	2004	194	8	PVC	672.17	671.93	11.20	11.85	660.08	660.97	No						2	2	4	$ 65.00	$ 12,636.03	$ 45.00	$ 8,748.02
554	SP-0570	3-139	3-138	2004	118	8	PVC	671.93	0.00	11.85	0.00	0.00	660.08	No						2	2	4	$ 65.00	$ 7,682.85	$ 45.00	$ 5,318.90
555	SP-0571	3-137	3-133	2004	149	8	PVC	0.00	673.34	0.00	15.25	658.09	0.00							2	2	4	$ 65.00	$ 9,679.89	$ 45.00	$ 6,701.46
556	SP-0572	3-133	3-130	2004	339	8	PVC	673.34	673.76	17.24	15.25	658.51	656.10	No						2	2	4	$ 65.00	$ 22,062.16	$ 45.00	$ 15,273.80
562	SP-0578	3-109	3-108	2004	318	8	PVC	662.87	661.65	8.89	8.84	652.81	653.98	No						2	2	4	$ 65.00	$ 20,699.77	$ 45.00	$ 14,330.61
565	SP-0581	3-105	3-104	2004	90	8	PVC	660.20	660.97	8.80	10.13	650.84	651.40	No						2	2	4	$ 65.00	$ 5,854.37	$ 45.00	$ 4,053.02
568	SP-0584	3-101	3-100	2004	79	8	PVC	662.10	661.46	4.80	4.44	657.02	657.30	No						2	2	4	$ 65.00	$ 5,164.33	$ 45.00	$ 3,575.30
579	SP-0595	3-122	3-121	2004	197	8	PVC	664.90	661.17	13.75	10.85	650.32	651.15	No						2	2	4	$ 65.00	$ 12,793.43	$ 45.00	$ 8,856.99
582	SP-0598	4-17	4-16	2000	143	8	PVC	667.16	666.23	11.55	11.12	655.11	655.61	No						2	2	4	$ 65.00	$ 9,316.21	$ 45.00	$ 6,449.68
584	SP-0600	4-15	4-14	2000	267	8	PVC	669.49	669.20	9.08	9.97	659.23	660.40	No						2	2	4	$ 65.00	$ 17,361.21	$ 45.00	$ 12,019.30

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
586	SP-0602	4-50	4-47	2005	313	8	PVC	665.86	667.05	9.16	11.65	655.40	656.70	No						2	2	4	$ 65.00	$ 20,348.60	$ 45.00	$ 14,087.49
587	SP-0603	4-43	4-42	2005	174	8	PVC	664.19	665.66	9.42	11.43	654.23	654.77	No						2	2	4	$ 65.00	$ 11,331.49	$ 45.00	$ 7,844.88
588	SP-0604	4-37	4-36	2005	273	8	PVC	667.38	664.54	12.47	15.70	648.84	654.91	No						2	2	4	$ 65.00	$ 17,730.99	$ 45.00	$ 12,275.30
596	SP-0612	6-61	6-60	1993	349	8	PVC	666.46	665.99	11.28	11.71	654.28	655.18	No	83					2	2	4	$ 65.00	$ 22,663.48	$ 45.00	$ 15,690.10
606	SP-0622	6-103	6-102	1992	296	12	PVC	661.13	0.00	9.58	12.30	0.00	651.55	No						2	2	4	$ 85.00	$ 25,194.58	$ 60.00	$ 17,784.41
607	SP-0623	6-102	6-101	1992	436	12	PVC	0.00	663.93	0.00	14.48	649.45	0.00							2	2	4	$ 85.00	$ 37,025.97	$ 60.00	$ 26,135.98
610	SP-0627	3-57	3-56	2005	71	8	PVC	662.79	0.00	10.13	11.10	0.00	652.66							2	2	4	$ 65.00	$ 4,599.10	$ 45.00	$ 3,183.99
611	SP-0628	3-56	3-55A	2005	104	8	PVC	0.00	0.00	0.00	0.00	0.00	0.00	No						2	2	4	$ 65.00	$ 6,740.65	$ 45.00	$ 4,666.60
619	SP-0636	6-80A	6-80	1999	300	10	PVC	666.00	666.02	6.57	5.67	660.33	659.45	No						2	2	4	$ 75.00	$ 22,509.30	$ 50.00	$ 15,006.20
621	SP-0638	<Null>	2-94	1989	88	8	PVC	0.00	668.75	0.00	8.70	660.05	0.00	No						2	2	4	$ 65.00	$ 5,750.75	$ 45.00	$ 3,981.29
622	SP-0639	2-94	2-93A	1989	270	8	PVC	668.75	667.30	8.70	8.20	659.10	660.05	No						2	2	4	$ 65.00	$ 17,550.61	$ 45.00	$ 12,150.42
623	SP-0640	2-93A	2-93	1989	296	8	PVC	667.30	667.10	8.20	9.10	658.00	659.10	No						2	2	4	$ 65.00	$ 19,217.03	$ 45.00	$ 13,304.10
625	SP-0642	2-93	2-92	1989	394	8	PVC	667.10	666.27	9.12	10.05	656.23	657.98	No						2	2	4	$ 65.00	$ 25,598.20	$ 45.00	$ 17,721.83
627	SP-0644	2-92	2-91	1989	366	8	PVC	666.27	666.40	10.05	11.60	654.80	656.23	No						2	2	4	$ 65.00	$ 23,807.76	$ 45.00	$ 16,482.29
630	SP-0647	3-162	3-161	1989	247	12	PVC	661.31	661.73	5.47	6.29	655.44	655.84	No						2	2	4	$ 85.00	$ 21,025.48	$ 60.00	$ 14,841.51
631	SP-0648	3-161	3-160	1989	200	12	PVC	661.73	662.44	6.29	7.16	655.28	655.44	No						2	2	4	$ 85.00	$ 16,988.99	$ 60.00	$ 11,992.23
634	SP-0651	2-91A	2-91	1999	63	8	PVC	667.23	666.40	11.50	11.10	655.30	655.73	No						2	2	4	$ 65.00	$ 4,121.47	$ 45.00	$ 2,853.32
635	SP-0652	2-91	2-90	1989	347	6	PVC	666.40	666.61	11.62	13.15	653.46	654.78	No						2	2	4	$ 55.00	$ 19,073.21	$ 40.00	$ 13,871.43
640	SP-0657	2-88	<Null>	1989	195	12	PVC	667.15	0.00	14.75	0.00	0.00	652.40							2	2	4	$ 85.00	$ 16,549.72	$ 60.00	$ 11,682.16
642	SP-0659	<Null>	6-99	1992	119	8	PVC	0.00	665.19	0.00	17.80	647.39	0.00	No						2	2	4	$ 65.00	$ 7,754.30	$ 45.00	$ 5,368.36
645	SP-0662	6-100	6-100A	1992	64	12	PVC	666.48	666.74	18.32	18.72	648.02	648.16	Yes						2	2	4	$ 85.00	$ 5,428.80	$ 60.00	$ 3,832.10
646	SP-0663	<Null>	6-100	1992	63	8	PVC	0.00	666.48	0.00	18.20	648.28	0.00	No						2	2	4	$ 65.00	$ 4,088.94	$ 45.00	$ 2,830.80
648	SP-0665	<Null>	6-101	1992	85	8	PVC	0.00	663.93	0.00	14.00	649.93	0.00	No						2	2	4	$ 65.00	$ 5,548.18	$ 45.00	$ 3,841.05
652	SP-0669	3-15	3-15A	1989	25	10	PVC	0.00	650.24	0.00	11.30	638.94	0.00	No						2	2	4	$ 75.00	$ 1,838.09	$ 50.00	$ 1,225.40
656	SP-0674	<Null>	4-54	2005	85	12	PVC	0.00	667.28	16.20	16.20	651.08	0.00	No						2	2	4	$ 85.00	$ 7,192.53	$ 60.00	$ 5,077.08
657	SP-0675	<Null>	4-103	2005	80	8	PVC	0.00	667.36	0.00	10.85	656.51	0.00	No						2	2	4	$ 65.00	$ 5,226.87	$ 45.00	$ 3,618.61
659	SP-0677	1-64	1-63	1993	26	10	PVC	665.75	665.80	8.50	9.40	656.40	657.25	No						2	2	4	$ 75.00	$ 1,974.85	$ 50.00	$ 1,316.57
660	SP-0678	1-63	1-62	2010	351	12	PVC	665.80	0.00	0.00	9.60	656.20	0.00							2	2	4	$ 85.00	$ 29,796.42	$ 60.00	$ 21,032.77
661	SP-0679	1-69	1-63	1989	14	12	PVC	665.80	665.80	0.00	7.00	658.80	0.00							2	2	4	$ 85.00	$ 1,193.81	$ 60.00	$ 842.69
662	SP-0680	1-62	1-61	2010	332	12	PVC	0.00	665.51	11.00	10.40	655.11	654.51	No						2	2	4	$ 85.00	$ 28,239.25	$ 60.00	$ 19,933.59
663	SP-0681	1-61	1-60	2010	439	10	PVC	665.51	667.88	0.00	14.65	653.23	0.00							2	2	4	$ 75.00	$ 32,917.35	$ 50.00	$ 21,944.90
667	SP-0685	1-65	1-49	2009	217	8	PVC	666.05	665.55	0.00	6.42	659.63	0.00	No						2	2	4	$ 65.00	$ 14,108.21	$ 45.00	$ 9,767.22
668	SP-0686	1-48	1-47	2010	272	8	PVC	666.32	0.00	0.00	5.12	661.20	0.00	No						2	2	4	$ 65.00	$ 17,697.86	$ 45.00	$ 12,252.36
669	SP-0687	1-47	1-61	2010	236	8	PVC	0.00	665.51	0.00	10.40	655.11	0.00	No						2	2	4	$ 65.00	$ 15,371.22	$ 45.00	$ 10,641.61
684	SP-0704	<Null>	5-53	2005	26	12	PVC	0.00	660.65	0.00	13.81	646.85	0.00	No						2	2	4	$ 85.00	$ 2,180.75	$ 60.00	$ 1,539.35
690	SP-0710	5-75	5-63	2005	126	8	PVC	662.11	662.89	15.69	14.44	647.67	647.20	No						2	2	4	$ 65.00	$ 8,215.62	$ 45.00	$ 5,687.74
691	SP-0711	5-73	5-74	2005	305	8	PVC	662.48	662.13	13.23	14.19	647.93	649.25	No						2	2	4	$ 65.00	$ 19,840.62	$ 45.00	$ 13,735.82
694	SP-0714	1-101	1-100	1993	36	8	PVC	666.06	665.88	0.00	4.32	661.74	0.00	No	105	0	0	0	1	2	2	4	$ 65.00	$ 2,317.63	$ 45.00	$ 1,604.51
695	SP-0715	4-66A	4-66	2000	68	12	PVC	0.00	668.62	0.00	18.30	653.90	0.00	No						2	2	4	$ 85.00	$ 5,771.93	$ 60.00	$ 4,074.30
699	SP-0719	1-20	1-15	1993	127	8	PVC	662.15	662.90	6.25	8.00	654.90	655.90	No						2	2	4	$ 65.00	$ 8,270.03	$ 45.00	$ 5,725.41
347	SP-0363	3-34	3-32	1950	281	12	Concrete	664.63	667.20	0.00	15.70	651.50	0.00	No	148				2	4	1	4	$ 85.00	$ 23,927.06	$ 60.00	$ 16,889.69
419	SP-0435	3-150	3-149	1970	307	8	PVC	663.65	664.36	8.57	9.95	654.41	655.08							3	1	3	$ 65.00	$ 19,967.82	$ 45.00	$ 13,823.88
420	SP-0436	3-149	3-148	1970	311	8	PVC	664.36	663.95	9.95	10.38	653.57	654.41	No						3	1	3	$ 65.00	$ 20,191.47	$ 45.00	$ 13,978.71
422	SP-0438	3-147	3-146	1970	40	8	PVC	664.62	664.18	11.35	11.10	653.08	653.27	No						3	1	3	$ 65.00	$ 2,580.53	$ 45.00	$ 1,786.52
423	SP-0439	3-146	3-34	1970	220	8	PVC	664.18	664.63	0.00	12.72	651.91	0.00	No						3	1	3	$ 65.00	$ 14,273.38	$ 45.00	$ 9,881.57
487	SP-0503	6-22	6-21	2005	203	8	PVC	667.42	667.61	19.03	20.13	647.48	648.39	No	126				3	3	1	3	$ 65.00	$ 13,170.68	$ 45.00	$ 9,118.16
592	SP-0608	6-54	6-53	1993	310	8	PVC	0.00	665.01	0.00	6.40	658.61	0.00	No	128				3	3	1	3	$ 65.00	$ 20,138.87	$ 45.00	$ 13,942.29
593	SP-0609	6-58	6-57	1993	353	8	PVC	666.04	665.79	14.00	14.64	651.15	652.04	No	129				3	3	1	3	$ 65.00	$ 22,960.64	$ 45.00	$ 15,895.82
595	SP-0611	6-59	6-58	1993	348	8	PVC	666.36	666.04	12.80	14.00	652.04	653.56	No	130				3	3	1	3	$ 65.00	$ 22,618.46	$ 45.00	$ 15,658.94
597	SP-0613	6-62	6-61	1993	350	8	PVC	666.36	666.46	10.71	11.28	655.18	655.65	No	131				3	3	1	3	$ 65.00	$ 22,767.23	$ 45.00	$ 15,761.93
600	SP-0616	6-63	6-62	1993	354	8	PVC	666.01	666.36	9.14	10.71	655.65	656.87	No	132				3	3	1	3	$ 65.00	$ 23,021.07	$ 45.00	$ 15,937.67
51	SP-0067	1-58	1-57	1992	300	8	Plastic	669.28	666.28	6.39	4.37	661.91	662.89	No						2	1	2	$ 65.00	$ 19,477.50	$ 45.00	$ 13,484.43
140	SP-0156	4-51	4-1	2000	385	12	PVC	667.29	667.07	18.60	19.85	647.22	648.69	No						2	1	2	$ 85.00	$ 32,684.18	$ 60.00	$ 23,071.18
143	SP-0159	5-35	5-34	2005	91	8	PVC	662.69	662.43	8.88	9.13	653.30	653.81	No						2	1	2	$ 65.00	$ 5,928.70	$ 45.00	$ 4,104.48
189	SP-0205	6-79	6-78	1999	298	10	PVC	666.43	666.26	7.70	8.39	657.87	658.73	No						2	1	2	$ 75.00	$ 22,357.06	$ 50.00	$ 14,904.71
200	SP-0216	5-69	5-67	2005	323	8	PVC	657.23	660.09	6.08	9.99	650.10	651.15							2	1	2	$ 65.00	$ 20,975.19	$ 45.00	$ 14,521.28
207	SP-0223	6-67	6-66	1993	348	8	PVC	666.08	666.43	9.70	11.04	655.39	656.38	No						2	1	2	$ 65.00	$ 22,599.01	$ 45.00	$ 15,645.47
211	SP-0227	5-29	5-28	2005	231	8	PVC	663.65	664.06	14.61	16.13	647.93	649.04	No						2	1	2	$ 65.00	$ 15,035.05	$ 45.00	$ 10,408.88
212	SP-0228	5-28	5-27	2005	143	8	PVC	664.06	664.07	16.23	16.79	647.28	647.83	No						2	1	2	$ 65.00	$ 9,266.21	$ 45.00	$ 6,415.07
217	SP-0233	5-65	5-64	2005	373	8	PVC	661.09	662.23	12.68	14.70	647.53	648.41	No						2	1	2	$ 65.00	$ 24,227.98	$ 45.00	$ 16,773.22
218	SP-0234	6-42	6-39	2005	232	8	PVC	664.87	665.46	11.98	13.64	651.82	652.89	No	172				1	2	1	2	$ 65.00	$ 15,106.61	$ 45.00	$ 10,458.42
223	SP-0239	6-14	6-13	2005	270	8	PVC	665.25	665.79	12.85	14.90	650.89	652.40	No						2	1	2	$ 65.00	$ 17,571.08	$ 45.00	$ 12,164.59
224	SP-0240	6-13	6-12	2005	283	8	PVC	665.79	666.97	14.90	17.25	649.72	650.89	No						2	1	2	$ 65.00	$ 18,376.95	$ 45.00	$ 12,722.50
225	SP-0241	6-12	6-11	2005	185	8	PVC	666.97	666.65	17.25	17.79	648.86	649.72	No						2	1	2	$ 65.00	$ 12,054.65	$ 45.00	$ 8,345.53

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
241	SP-0257	4-102	4-101	2000	118	8	PVC	666.97	666.51	7.85	7.85	658.66	659.12							2	1	2	$ 65.00	$ 7,643.60	$ 45.00	$ 5,291.72
242	SP-0258	<Null>	4-100	2000	26	12	PVC	0.00	666.44	8.24	7.90	658.54	658.20	No						2	1	2	$ 85.00	$ 2,199.47	$ 60.00	$ 1,552.57
255	SP-0271	3-96	3-95	1999	113	8	PVC	661.43	662.04	6.50	7.60	654.44	654.93	No						2	1	2	$ 65.00	$ 7,357.78	$ 45.00	$ 5,093.85
261	SP-0277	4-110	4-109	2005	77	8	PVC	0.00	667.28	0.00	16.60	650.68	0.00							2	1	2	$ 65.00	$ 4,975.09	$ 45.00	$ 3,444.29
270	SP-0286	4-4	4-3	2000	408	12	PVC	666.91	667.90	15.58	18.00	649.90	651.33	No						2	1	2	$ 85.00	$ 34,712.13	$ 60.00	$ 24,502.68
271	SP-0287	4-5	4-4	2000	399	12	PVC	667.43	666.91	15.05	15.58	651.33	652.38	No						2	1	2	$ 85.00	$ 33,923.25	$ 60.00	$ 23,945.82
276	SP-0292	6-47	6-45	1992	385	8	PVC	667.23	666.72	18.90	8.29	658.43	647.80	No	29	0	2B00	2B00	1	2	1	2	$ 65.00	$ 25,045.67	$ 45.00	$ 17,339.31
277	SP-0293	6-45	6-44	1992	61	10	PVC	666.72	666.92	8.29	8.93	657.99	658.43	No						2	1	2	$ 75.00	$ 4,548.43	$ 50.00	$ 3,032.29
297	SP-0313	5-70	5-71	2005	123	8	PVC	662.66	0.00	0.00	11.30	651.36	0.00							2	1	2	$ 65.00	$ 7,986.21	$ 45.00	$ 5,528.92
298	SP-0314	5-69	5-70	2005	652	8	PVC	0.00	662.66	11.30	9.90	652.76	651.36							2	1	2	$ 65.00	$ 42,384.66	$ 45.00	$ 29,343.23
299	SP-0315	4-36	<Null>	2003	101	8	Plastic	664.54	0.00	15.58	9.20	656.95	648.96	No						2	1	2	$ 65.00	$ 6,593.08	$ 45.00	$ 4,564.44
300	SP-0316	4-36A	4-36	2005	85	8	PVC	0.00	664.54	0.00	15.60	648.94	0.00	No						2	1	2	$ 65.00	$ 5,514.11	$ 45.00	$ 3,817.46
309	SP-0325	4-96	4-95	2000	219	12	PVC	666.85	666.57	10.10	10.71	655.86	656.75	No						2	1	2	$ 85.00	$ 18,595.24	$ 60.00	$ 13,126.05
310	SP-0326	4-94	4-93	2000	218	12	PVC	665.81	665.33	10.75	10.35	654.98	655.06	No						2	1	2	$ 85.00	$ 18,534.30	$ 60.00	$ 13,083.04
314	SP-0330	6-28	6-27	2005	256	8	PVC	664.56	666.14	13.62	18.80	647.34	650.94	No	169				1	2	1	2	$ 65.00	$ 16,635.70	$ 45.00	$ 11,517.02
315	SP-0331	6-36	6-31	2005	179	8	PVC	665.35	665.87	16.82	18.30	647.57	648.53		171				1	2	1	2	$ 65.00	$ 11,634.60	$ 45.00	$ 8,054.73
317	SP-0333	6-32	6-31	2005	145	8	PVC	666.04	665.87	15.15	17.29	648.58	650.89							2	1	2	$ 65.00	$ 9,405.15	$ 45.00	$ 6,511.26
322	SP-0338	6-30	6-29	2005	370	8	PVC	664.68	666.80	8.95	14.80	652.00	655.73	No	153				2	2	1	2	$ 65.00	$ 24,019.46	$ 45.00	$ 16,628.86
323	SP-0339	6-29	6-28	2005	192	8	PVC	666.80	664.56	14.80	13.62	650.94	652.00		170				1	2	1	2	$ 65.00	$ 12,459.68	$ 45.00	$ 8,625.93
331	SP-0347	3-83	<Null>	1999	94	8	PVC	0.00	0.00	0.00	4.38	0.00	0.00	No						2	1	2	$ 65.00	$ 6,109.98	$ 45.00	$ 4,229.99
357	SP-0373	6-100A	6-99	1992	302	12	PVC	666.74	665.19	18.72	17.80	647.39	648.02	Yes						2	1	2	$ 85.00	$ 25,664.56	$ 60.00	$ 18,116.16
361	SP-0377	6-80	6-79	1999	297	10	PVC	666.02	666.43	6.57	7.70	658.73	659.45	No						2	1	2	$ 75.00	$ 22,300.36	$ 50.00	$ 14,866.91
362	SP-0378	6-78	6-77	1999	102	10	PVC	666.26	666.31	8.39	8.90	657.41	657.87	No						2	1	2	$ 75.00	$ 7,639.30	$ 50.00	$ 5,092.87
363	SP-0379	6-77	6-74	1999	107	10	PVC	666.31	665.61	8.90	8.56	657.05	657.41	No						2	1	2	$ 75.00	$ 8,035.10	$ 50.00	$ 5,356.73
364	SP-0380	6-74	6-73	1999	131	10	PVC	665.61	665.42	8.56	9.09	656.33	657.05	No						2	1	2	$ 75.00	$ 9,820.24	$ 50.00	$ 6,546.83
365	SP-0381	6-73	6-72	1999	227	10	PVC	665.42	664.31	9.09	8.70	655.61	656.33	No						2	1	2	$ 75.00	$ 17,018.49	$ 50.00	$ 11,345.66
366	SP-0382	6-72	6-71	1999	226	10	PVC	664.31	664.78	8.70	10.15	654.63	655.61	No						2	1	2	$ 75.00	$ 16,966.90	$ 50.00	$ 11,311.27
367	SP-0383	6-71	6-70	1999	63	10	PVC	664.78	666.54	10.15	12.25	654.29	654.63	No						2	1	2	$ 75.00	$ 4,700.00	$ 50.00	$ 3,133.33
369	SP-0385	6-93	6-91	1993	288	8	PVC	664.77	0.00	9.62	10.70	0.00	655.15	No	180				1	2	1	2	$ 65.00	$ 18,738.63	$ 45.00	$ 12,972.90
370	SP-0386	6-91B	6-91	1993	350	8	PVC	0.00	664.62	0.00	11.46	653.16	0.00	No						2	1	2	$ 65.00	$ 22,723.01	$ 45.00	$ 15,731.31
371	SP-0387	6-91	6-90	1993	352	8	PVC	664.62	664.27	11.46	12.05	652.22	653.16	No						2	1	2	$ 65.00	$ 22,900.48	$ 45.00	$ 15,854.18
375	SP-0391	6-87	6-86	1993	375	8	PVC	664.83	666.39	15.25	17.97	648.42	649.58	No						2	1	2	$ 65.00	$ 24,391.58	$ 45.00	$ 16,886.48
380	SP-0396	4-98	4-97	2000	220	12	PVC	665.21	665.85	0.00	9.20	656.65	0.00	No						2	1	2	$ 85.00	$ 18,665.57	$ 60.00	$ 13,175.69
381	SP-0397	4-97	4-96	2000	221	12	PVC	665.85	666.85	9.30	10.61	656.24	656.55	No						2	1	2	$ 85.00	$ 18,814.72	$ 60.00	$ 13,280.98
382	SP-0398	4-95	4-94	2000	221	12	PVC	666.57	665.81	10.71	10.75	655.06	655.86	No						2	1	2	$ 85.00	$ 18,752.62	$ 60.00	$ 13,237.15
383	SP-0399	4-93	4-92	2000	221	12	PVC	665.33	666.10	10.35	11.75	654.35	654.98	No						2	1	2	$ 85.00	$ 18,788.01	$ 60.00	$ 13,262.12
384	SP-0400	4-92	4-91	2000	298	12	PVC	666.10	667.27	11.75	13.52	653.75	654.35	No						2	1	2	$ 85.00	$ 25,296.58	$ 60.00	$ 17,856.41
385	SP-0401	4-91	4-90	2000	302	12	PVC	667.27	0.00	13.52	0.00	0.00	653.75	No						2	1	2	$ 85.00	$ 25,708.75	$ 60.00	$ 18,147.35
386	SP-0402	4-90	4-85	2000	138	12	PVC	0.00	670.44	0.00	17.70	652.74	0.00							2	1	2	$ 85.00	$ 11,771.72	$ 60.00	$ 8,309.45
387	SP-0403	4-86	4-85	2000	298	12	PVC	667.63	670.44	14.79	17.75	652.69	652.84	No						2	1	2	$ 85.00	$ 25,316.50	$ 60.00	$ 17,870.47
389	SP-0405	4-84	4-83	2000	301	12	PVC	669.31	668.82	18.52	17.80	651.02	650.79	No						2	1	2	$ 85.00	$ 25,612.70	$ 60.00	$ 18,079.55
392	SP-0408	4-87	4-86	2000	310	8	PVC	667.94	667.63	13.77	14.70	652.93	654.17							2	1	2	$ 65.00	$ 20,128.73	$ 45.00	$ 13,935.28
393	SP-0409	4-88	4-87	2000	300	8	PVC	669.34	667.94	14.31	13.77	654.17	655.03							2	1	2	$ 65.00	$ 19,508.66	$ 45.00	$ 13,506.00
394	SP-0410	4-89	4-88	2000	332	8	PVC	668.86	669.34	12.86	14.31	655.03	656.00							2	1	2	$ 65.00	$ 21,576.51	$ 45.00	$ 14,937.58
396	SP-0412	5-67	5-66	2005	375	8	PVC	660.09	661.17	9.99	12.20	648.97	650.10							2	1	2	$ 65.00	$ 24,370.02	$ 45.00	$ 16,871.55
398	SP-0414	3-97	3-96	2004	219	8	PVC	0.00	661.43	0.00	6.50	654.93	0.00	No						2	1	2	$ 65.00	$ 14,219.49	$ 45.00	$ 9,844.26
424	SP-0440	6-51	6-50	1993	290	8	PVC	665.05	664.74	0.00	11.78	652.96	0.00	No						2	1	2	$ 65.00	$ 18,832.86	$ 45.00	$ 13,038.13
431	SP-0447	6-56	6-55	1993	382	8	PVC	668.50	666.57	17.52	16.72	649.85	650.98	No	176				1	2	1	2	$ 65.00	$ 24,816.36	$ 45.00	$ 17,180.56
433	SP-0449	4-9	4-8	2000	92	8	PVC	665.45	666.06	10.48	11.60	654.46	654.97	No						2	1	2	$ 65.00	$ 6,006.77	$ 45.00	$ 4,158.53
436	SP-0452	4-19	4-18	2000	212	8	PVC	669.35	668.40	10.90	10.92	657.48	658.45	No						2	1	2	$ 65.00	$ 13,811.64	$ 45.00	$ 9,561.90
442	SP-0458	4-23	4-22	2000	402	8	PVC	670.84	669.80	10.38	10.85	658.95	660.46	No						2	1	2	$ 65.00	$ 26,138.33	$ 45.00	$ 18,095.77
443	SP-0459	4-22	4-21	2000	395	8	PVC	669.80	667.27	10.90	10.05	657.22	658.90	No						2	1	2	$ 65.00	$ 25,673.02	$ 45.00	$ 17,773.63
445	SP-0461	6-66	6-60	1993	353	8	PVC	666.43	665.99	11.04	11.71	654.28	655.39	No	178				1	2	1	2	$ 65.00	$ 22,962.64	$ 45.00	$ 15,897.21
446	SP-0462	6-68	6-67	1993	253	8	PVC	665.45	666.08	8.28	9.70	656.38	657.17	No	179				1	2	1	2	$ 65.00	$ 16,457.77	$ 45.00	$ 11,393.84
447	SP-0463	6-69	6-68	1993	224	8	PVC	665.13	665.45	7.16	8.28	657.17	657.98	No	157				2	2	1	2	$ 65.00	$ 14,531.98	$ 45.00	$ 10,060.60
448	SP-0464	4-8	4-7	2000	28	8	PVC	666.06	665.97	11.40	11.48	654.49	654.66	No						2	1	2	$ 65.00	$ 1,834.91	$ 45.00	$ 1,270.32
488	SP-0504	6-34	6-33	2005	335	8	PVC	666.31	662.56	11.85	19.95	642.61	654.46	No						2	1	2	$ 65.00	$ 21,807.01	$ 45.00	$ 15,097.16
489	SP-0505	6-35	6-34	2005	150	8	PVC	665.47	666.31	9.40	11.85	654.46	656.07	No						2	1	2	$ 65.00	$ 9,736.92	$ 45.00	$ 6,740.95
490	SP-0506	6-23	6-21	2005	342	8	PVC	0.00	667.61	14.38	19.15	648.46	0.00	No	168				1	2	1	2	$ 65.00	$ 22,241.09	$ 45.00	$ 15,397.67
506	SP-0522	6-95	6-94	1993	414	8	PVC	665.95	664.93	9.31	9.49	655.44	656.64	No						2	1	2	$ 65.00	$ 26,911.09	$ 45.00	$ 18,630.76
510	SP-0526	5-34	5-33	2005	90	8	PVC	662.43	661.98	9.13	9.15	652.83	653.30	No						2	1	2	$ 65.00	$ 5,855.15	$ 45.00	$ 4,053.57
511	SP-0527	5-31	5-30	2005	327	8	PVC	662.67	664.43	11.79	15.90	648.53	650.88	No						2	1	2	$ 65.00	$ 21,227.59	$ 45.00	$ 14,696.02
512	SP-0528	5-40	5-39	2005	108	8	PVC	662.28	662.85	8.84	10.00	652.85	653.44	No						2	1	2	$ 65.00	$ 6,996.52	$ 45.00	$ 4,843.75
513	SP-0529	5-38	5-37	2005	304	8	PVC	662.84	662.70	10.55	11.65	651.05	652.29	No						2	1	2	$ 65.00	$ 19,780.65	$ 45.00	$ 13,694.30

Asset ID Information				Asset Inventory Information										Inspection Data						Asset Criticality			Asset Renewal Cost			
Object ID	Asset Id	US MH	DS MH	Install Date	Length	Diameter	Material	US RIM	DS RIM	US Depth	DS Depth	US I.E.	DS I.E.	Pipe Drop	Setup Number	PACP Qstr	PACP Qom	PACP Qoverall	ECR	POF	COF	BRE	Replacement $/Ft	Replacement Cost	Rehab $/Ft	Rehabilitation Cost
521	SP-0537	3-118	3-117	2004	112	8	PVC	662.56	660.72	10.30	10.32	650.40	652.26							2	1	2	$ 65.00	$ 7,294.88	$ 45.00	$ 5,050.30
522	SP-0538	3-116A	3-114	2004	199	8	PVC	661.56	660.87	7.50	8.40	652.47	654.06	No						2	1	2	$ 65.00	$ 12,954.45	$ 45.00	$ 8,968.47
523	SP-0539	3-117A	3-116A	2004	245	8	PVC	662.56	661.56	7.20	7.50	654.06	655.36	No						2	1	2	$ 65.00	$ 15,937.93	$ 45.00	$ 11,033.95
524	SP-0540	3-113	3-112	2004	64	8	PVC	663.83	663.91	7.82	8.28	655.63	656.01	No						2	1	2	$ 65.00	$ 4,176.29	$ 45.00	$ 2,891.28
525	SP-0541	3-110	3-109	2004	87	8	PVC	662.18	662.87	7.72	8.89	653.98	654.46	No						2	1	2	$ 65.00	$ 5,664.47	$ 45.00	$ 3,921.56
529	SP-0545	3-132	3-131	2004	154	8	PVC	672.96	674.85	14.90	17.58	657.27	658.06	No						2	1	2	$ 65.00	$ 10,027.83	$ 45.00	$ 6,942.35
535	SP-0551	3-141	3-140	2004	85	8	PVC	0.00	0.00	0.00	7.50	0.00	0.00	No						2	1	2	$ 65.00	$ 5,525.03	$ 45.00	$ 3,825.02
537	SP-0553	3-84	3-83	1999	231	8	PVC	662.64	0.00	12.31	15.00	0.00	650.33	No						2	1	2	$ 65.00	$ 15,015.32	$ 45.00	$ 10,395.22
538	SP-0554	3-85	3-84	1999	99	8	PVC	662.57	662.64	11.75	12.31	650.33	650.82	No						2	1	2	$ 65.00	$ 6,438.59	$ 45.00	$ 4,457.49
542	SP-0558	3-95	3-94	1999	214	8	PVC	662.04	662.20	7.60	8.53	653.67	654.44	No						2	1	2	$ 65.00	$ 13,923.03	$ 45.00	$ 9,639.02
543	SP-0559	3-94	3-93	1999	109	8	PVC	662.20	661.86	8.53	8.55	653.31	653.67	No						2	1	2	$ 65.00	$ 7,091.48	$ 45.00	$ 4,909.48
544	SP-0560	3-93	3-92	1999	104	8	PVC	661.86	661.55	8.55	8.65	652.90	653.31	No						2	1	2	$ 65.00	$ 6,773.85	$ 45.00	$ 4,689.59
545	SP-0561	3-92	3-91	1999	186	8	PVC	661.55	662.78	8.65	10.55	652.23	652.90	No						2	1	2	$ 65.00	$ 12,106.21	$ 45.00	$ 8,381.22
546	SP-0562	3-91	3-90	1999	255	8	PVC	662.78	0.00	10.55	11.30	0.00	652.23	No						2	1	2	$ 65.00	$ 16,561.38	$ 45.00	$ 11,465.57
547	SP-0563	3-89	3-88	1999	353	8	PVC	662.23	662.37	8.26	9.55	652.82	653.97							2	1	2	$ 65.00	$ 22,971.73	$ 45.00	$ 15,903.50
551	SP-0567	3-145	3-144	2004	362	8	PVC	671.61	673.07	8.28	11.09	661.98	663.33	No						2	1	2	$ 65.00	$ 23,560.47	$ 45.00	$ 16,311.09
557	SP-0573	3-99	3-98	2004	64	8	PVC	663.48	663.23	7.20	7.20	656.03	656.28							2	1	2	$ 65.00	$ 4,190.53	$ 45.00	$ 2,901.14
558	SP-0574	3-112	3-111	2004	127	8	PVC	663.91	664.16	8.28	8.95	655.21	655.63	No						2	1	2	$ 65.00	$ 8,280.44	$ 45.00	$ 5,732.61
559	SP-0575	3-111	3-109	2004	276	8	PVC	664.16	662.87	8.95	8.89	653.98	655.21	No						2	1	2	$ 65.00	$ 17,925.11	$ 45.00	$ 12,409.69
560	SP-0576	3-115	3-114	2004	68	8	PVC	660.35	660.87	5.70	7.00	653.87	654.65	No						2	1	2	$ 65.00	$ 4,428.45	$ 45.00	$ 3,065.85
561	SP-0577	3-114	3-105	2004	247	8	PVC	660.87	660.20	8.40	8.80	651.40	652.47	No						2	1	2	$ 65.00	$ 16,043.21	$ 45.00	$ 11,106.84
563	SP-0579	3-108	3-107	2004	77	8	PVC	661.65	661.38	8.84	8.84	652.54	652.81	No						2	1	2	$ 65.00	$ 4,973.11	$ 45.00	$ 3,442.92
564	SP-0580	3-107	3-106	2004	185	8	PVC	661.38	0.00	8.84	9.10	0.00	652.54	No						2	1	2	$ 65.00	$ 12,041.20	$ 45.00	$ 8,336.22
566	SP-0582	3-104	3-103	2004	137	8	PVC	660.97	661.25	10.13	11.75	649.50	650.84	No						2	1	2	$ 65.00	$ 8,893.12	$ 45.00	$ 6,156.77
567	SP-0583	3-102	3-101	2004	100	8	PVC	661.28	662.10	3.65	4.80	657.30	657.63	No						2	1	2	$ 65.00	$ 6,521.46	$ 45.00	$ 4,514.85
569	SP-0585	3-100	3-99	2004	273	8	PVC	661.46	663.48	4.44	7.20	656.28	657.02	No						2	1	2	$ 65.00	$ 17,752.81	$ 45.00	$ 12,290.41
570	SP-0586	3-117	3-116	2004	67	8	PVC	660.72	660.88	10.32	10.78	650.10	650.40	No						2	1	2	$ 65.00	$ 4,343.74	$ 45.00	$ 3,007.20
571	SP-0587	3-119	3-118	2004	201	8	PVC	660.83	662.56	8.88	10.30	652.26	651.95	No						2	1	2	$ 65.00	$ 13,042.20	$ 45.00	$ 9,029.22
572	SP-0588	3-120	3-119	2004	199	8	PVC	660.77	660.83	8.00	8.88	651.95	652.77	No						2	1	2	$ 65.00	$ 12,965.03	$ 45.00	$ 8,975.79
573	SP-0589	3-128	3-127	2004	244	8	PVC	668.56	665.39	13.05	10.85	654.54	655.51	No						2	1	2	$ 65.00	$ 15,873.26	$ 45.00	$ 10,989.18
574	SP-0590	3-127	3-126	2004	64	8	PVC	665.39	664.19	10.85	10.20	653.99	654.54	No						2	1	2	$ 65.00	$ 4,164.34	$ 45.00	$ 2,883.01
575	SP-0591	3-126	3-125	2004	42	8	PVC	664.19	664.40	10.85	11.35	653.05	653.34	No						2	1	2	$ 65.00	$ 2,757.90	$ 45.00	$ 1,909.32
576	SP-0592	3-125	3-124	2004	125	8	PVC	664.40	664.74	11.35	12.18	652.56	653.05	No						2	1	2	$ 65.00	$ 8,148.55	$ 45.00	$ 5,641.31
577	SP-0593	3-124	3-123	2004	77	8	PVC	664.74	664.83	12.18	13.58	651.25	652.56	No						2	1	2	$ 65.00	$ 5,016.77	$ 45.00	$ 3,473.15
578	SP-0594	3-123	3-122	2004	64	8	PVC	664.83	664.90	13.58	13.75	651.15	651.25	No						2	1	2	$ 65.00	$ 4,189.71	$ 45.00	$ 2,900.57
581	SP-0597	4-21	4-17	2000	319	8	PVC	667.27	667.16	10.32	11.39	655.77	656.95	No						2	1	2	$ 65.00	$ 20,721.67	$ 45.00	$ 14,345.77
583	SP-0599	4-7	4-6	2000	255	8	PVC	665.97	665.68	11.56	12.05	653.63	654.41	No						2	1	2	$ 65.00	$ 16,600.42	$ 45.00	$ 11,492.60
585	SP-0601	4-25	4-24	2000	243	8	PVC	670.63	671.76	7.45	9.75	662.01	663.18	No						2	1	2	$ 65.00	$ 15,762.76	$ 45.00	$ 10,912.68
590	SP-0606	6-52	6-50	1993	333	8	PVC	666.13	664.74	10.50	18.70	641.97	641.69	No	34					2	1	2	$ 65.00	$ 21,674.11	$ 45.00	$ 15,005.15
591	SP-0607	6-53	6-52	1993	420	8	PVC	665.01	666.13	6.40	18.95	647.18	658.61	No	30					2	1	2	$ 65.00	$ 27,315.87	$ 45.00	$ 18,910.99
594	SP-0610	6-57	6-55	1993	375	8	PVC	665.79	666.57	14.64	16.72	649.85	651.15	No	177				1	2	1	2	$ 65.00	$ 24,394.87	$ 45.00	$ 16,888.76
598	SP-0614	6-65	6-64	1993	350	8	PVC	666.34	666.36	7.40	8.30	658.06	658.94	No						2	1	2	$ 65.00	$ 22,749.40	$ 45.00	$ 15,749.58
599	SP-0615	6-64	6-63	1993	351	8	PVC	666.36	666.01	8.30	9.14	656.87	658.06	No						2	1	2	$ 65.00	$ 22,806.59	$ 45.00	$ 15,789.18
602	SP-0618	6-55	6-54	1993	324	8	PVC	666.57	0.00	16.72	0.00	0.00	649.85	No	155				2	2	1	2	$ 65.00	$ 21,034.51	$ 45.00	$ 14,562.35
613	SP-0630	<Null>	5-69	2005	29	8	PVC	0.00	0.00	0.00	7.40	0.00	0.00							2	1	2	$ 65.00	$ 1,879.25	$ 45.00	$ 1,301.02
624	SP-0641	2-99	2-93	1989	237	8	PVC	666.28	667.10	7.35	9.12	657.98	658.93	No						2	1	2	$ 65.00	$ 15,379.08	$ 45.00	$ 10,647.05
626	SP-0643	<Null>	2-99	1989	20	8	PVC	0.00	666.28	0.00	7.30	658.98	0.00	No						2	1	2	$ 65.00	$ 1,300.01	$ 45.00	$ 900.00
632	SP-0649	3-163	3-162	1989	244	12	PVC	661.00	661.31	4.46	5.47	655.84	656.54	No						2	1	2	$ 85.00	$ 20,759.85	$ 60.00	$ 14,654.01
633	SP-0650	3-164	3-163	1989	144	12	PVC	660.77	661.00	4.33	4.46	656.54	656.44	No						2	1	2	$ 85.00	$ 12,218.95	$ 60.00	$ 8,625.14
641	SP-0658	<Null>	6-90	1993	32	8	PVC	0.00	664.27	12.10	12.10	652.17	652.17							2	1	2	$ 65.00	$ 2,105.62	$ 45.00	$ 1,457.74
644	SP-0661	6-105	6-100A	1999	279	8	PVC	664.87	666.74	9.78	18.20	648.54	655.09	No						2	1	2	$ 65.00	$ 18,119.69	$ 45.00	$ 12,544.40
647	SP-0664	6-106	6-105	1999	274	8	PVC	665.23	664.87	9.11	9.78	655.09	656.12	No						2	1	2	$ 65.00	$ 17,835.30	$ 45.00	$ 12,347.52
649	SP-0666	<Null>	6-103	1992	25	8	PVC	0.00	661.13	0.00	9.58	651.55	0.00	No						2	1	2	$ 65.00	$ 1,632.62	$ 45.00	$ 1,130.28
650	SP-0667	<Null>	6-103	1992	17	8	PVC	0.00	661.13	0.00	9.35	651.78	0.00	No						2	1	2	$ 65.00	$ 1,117.07	$ 45.00	$ 773.36
654	SP-0671	<Null>	3-132	2004	27	8	PVC	0.00	672.96	0.00	14.90	658.06	0.00	No						2	1	2	$ 65.00	$ 1,777.89	$ 45.00	$ 1,230.85
655	SP-0672	<Null>	3-145	2004	24	8	PVC	0.00	671.61	0.00	8.28	663.33	0.00							2	1	2	$ 65.00	$ 1,558.69	$ 45.00	$ 1,079.09
658	SP-0676	<Null>	1-55	1992	37	8	Plastic	0.00	668.13	0.00	8.30	659.83	0.00	No						2	1	2	$ 65.00	$ 2,378.90	$ 45.00	$ 1,646.93
681	SP-0701	5-76	5-48	2003	173	8	PVC	658.03	661.43	1.02	16.40	645.03	657.01	No						2	1	2	$ 65.00	$ 11,267.20	$ 45.00	$ 7,800.37
682	SP-0702	5-77	5-76	2003	259	8	PVC	659.35	658.03	10.18	1.02	657.01	649.17	Yes						2	1	2	$ 65.00	$ 16,853.44	$ 45.00	$ 11,667.77
683	SP-0703	<Null>	5-77	2003	66	8	PVC	0.00	659.35	0.00	10.18	649.17	0.00	No						2	1	2	$ 65.00	$ 4,264.59	$ 45.00	$ 2,952.41
689	SP-0709	5-74	5-75	2005	68	8	PVC	662.13	662.11	14.19	14.44	647.67	647.93	No						2	1	2	$ 65.00	$ 4,408.33	$ 45.00	$ 3,051.92
692	SP-0712	5-71	5-72	2005	150	8	PVC	0.00	0.00	0.00	11.10	0.00	0.00	No						2	1	2	$ 65.00	$ 9,734.96	$ 45.00	$ 6,739.59
693	SP-0713	5-72	5-73	2005	367	8	PVC	0.00	662.48	13.23	12.70	649.78	649.25	No						2	1	2	$ 65.00	$ 23,845.11	$ 45.00	$ 16,508.15
				Total	**148,281**	**Feet**																	**Total**	**$ 11,728,000.00**	**Total**	**$ 8,168,000.00**

Manholes

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
17	3-54	1/1/1950	651.97	10.30	641.67	Junction	Solid	24	Brick	4	Brick		Sheeting	Complete	None	None	Evidence	None	CA 5	8	4	32	$6,500	$3,500
107	2-76	1/1/1950	667.93	10.10	657.83	Junction	Solid	26	Brick	4	Brick		None	Complete	None	None	None	None	CA 1-2	5	5	25	$6,500	$3,500
223	3-48	1/1/1950	651.73	7.90	643.83	Junction	Solid	24	Brick	4	Brick		Sheeting	Complete	None	None	Evidence	None	CA 5	8	3	24	$6,500	$3,500
88	2-64	1/1/1950	666.88	9.00	657.88	Junction	Solid	26		4	Block	Cast Iron	Sheeting	Complete	None	None		None	CA 5	7	3	21	$6,500	$3,500
190	3-9	1/1/1950	653.41	22.70	630.71	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	3	7	21	$6,500	$3,500
593	1-13	1/1/1950	667.50	13.70	653.80	Junction	Vented	24	Brick	4	Brick	Steel	Sheeting	Complete	None	None	None	None	CA 4	7	3	21	$6,500	$3,500
675	3-179	4/1/1950	655.50	10.67	644.83	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	3	7	21	$6,500	$3,500
18	3-171	1/1/1950	652.19	10.40	641.79	Drop	Solid	24	Brick	4	Brick		Sheeting	Complete	None	None	< 0.25 GPM	Evidence	CA 1-2	5	4	20	$6,500	$3,500
86	2-68	1/1/1950	666.30	8.10	658.20	Junction	Solid	26	Brick	4	Brick		Sheeting	Complete					CA 1-2	5	4	20	$6,500	$3,500
161	2-12	1/1/1989	659.74	18.20	641.54	Junction	Solid	23	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 5	5	4	20	$6,500	$3,500
15	3-69	1/1/1956	663.27	12.00	651.27	Junction	Solid	26	Block	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	Evidence	None	Evidence	CA 1-2	3	6	18	$6,500	$3,500
16	3-68	1/1/1956	662.08	12.40	649.68	Junction	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	3	6	18	$6,500	$3,500
64	1-81	1/1/1950	666.65	5.50	661.15	Junction	Solid	26		4	Brick		Sheeting	Complete	None	None		None	CA 3	6	3	18	$6,500	$3,500
99	2-49	1/1/1950	664.13	11.40	652.73	Junction	Solid	22	Unknown	4	Brick	Cast Iron	None	Complete	None	None	None	None	CA 3	6	3	18	$6,500	$3,500
285	3-79	1/1/1970	0.00	6.30	0.00	Junction	Solid	24	Block	3.5	Block		None	Complete	None	None	Evidence	None	CA 4	6	3	18	$6,500	$3,500
305	3-1	1/1/1950	656.65	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	3	6	18	$6,500	$3,500
659	3-7	1/1/1950	656.97	0.00	0.00	Junction	Vented	26	Block	4	Precast Concrete	Cast Iron	Sheeting	Complete			Evidence		CA 1-2	3	6	18	$6,500	$3,500
90	2-70	1/1/1950	0.00	8.90	0.00	Junction	Bolt Down	24	Block	4	Block		Sheeting	Complete	Evidence				CA 1-2	4	4	16	$6,500	$3,500
630	2-100	1/1/1950	0.00	5.60	0.00	Junction	Solid	24	Brick	3	Block		Sheeting	Complete	None	None	None	None	CA 1-2	4	4	16	$6,500	$3,500
651	2-86	1/1/1950	664.33	2.40	661.93	Junction	Solid	22	Precast Concrete	2	Block		Sheeting	Complete	None	None	None	None	CA 1-2	4	4	16	$6,500	$3,500
9	1-32	1/1/2010	666.45	18.00	648.45	Junction	Solid	26	Concrete	5	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	Evidence	CA 3	3	5	15	$10,000	$5,500
67	1-79	1/1/1950	667.45	7.40	660.05	Junction	Solid	26		4	Block	Cast Iron	Sheeting	Complete	None	None		None	CA 3	5	3	15	$6,500	$3,500
164	1-1	1/1/2010	654.23	15.00	639.23	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 3	3	5	15	$6,500	$3,500
225	3-168	1/1/1950	651.82	8.60	643.22	Junction	Solid	26		4	Brick	Unknown	Sheeting	Complete	None	None		< 0.25 GPM	CA 1-2	5	3	15	$6,500	$3,500
248	2-96	1/1/1950	664.19	10.60	653.59	Junction	Vented	22		3	Brick		Sheeting	Complete	None	None		None	CA 1-2	5	3	15	$6,500	$3,500
304	3-8	1/1/1950	655.96	23.60	632.36	Junction	Vented	26		4	Precast Concrete	Cast Iron	None	Complete				< 0.25 GPM	CA 1-2	3	5	15	$6,500	$3,500
497	3-23	1/1/1950	650.46	9.40	641.06	Junction	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	3	5	15	$6,500	$3,500
498	3-22	1/1/1950	649.83	8.10	641.73	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	3	5	15	$6,500	$3,500
102	3-58	1/1/1950	662.97	9.30	653.67	Junction	Bolt Down	26	Brick	4	Brick	her/See Comme	Sheeting	Complete	None	None	Evidence	None	CA 4	7	2	14	$6,500	$3,500
106	2-77	1/1/1950	667.09	9.90	657.19	Junction	Solid	26	Brick	3.5	Brick		None	Complete	None	None	Evidence	Evidence	CA 4	7	2	14	$6,500	$3,500
118	3-44	1/1/1950	664.43	5.80	658.63	Junction	Solid	24		4	Brick		Sheeting	Complete	None	None	None	None	CA 4	7	2	14	$6,500	$3,500
120	3-42	1/1/1950	663.80	8.10	655.70	Junction	Solid	24	Brick	3	Brick		Sheeting	Complete	None	None	Evidence	None	CA 4	7	2	14	$6,500	$3,500
203	2-44	1/1/1950	664.67	7.20	657.47	Junction	Solid	22	Brick	4	Brick	Cast Iron	Sheeting	Complete	None	None	None	None	CA 4	7	2	14	$6,500	$3,500
8	1-31	1/1/2010	666.42	11.40	655.02	Junction	Vented	24	Block	4	Block	Cast Iron	Sheeting	Complete	None	None	None	None	CA 3	4	3	12	$6,500	$3,500
13	3-71	1/1/1956	664.39	12.50	651.89	Junction	Solid	26	Block	4	Precast Concrete	Cast Iron	None	Complete	None	None	None	None	CA 1-2	3	4	12	$6,500	$3,500
14	3-70	1/1/1956	664.23	12.80	651.43	Junction	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	3	4	12	$6,500	$3,500
22	3-55	1/1/1950	659.84	9.50	650.34	Junction	Solid	26	Brick	4	Brick	her/See Comme	Sheeting	Complete	None	None	None	None	CA 3	6	2	12	$6,500	$3,500
65	1-78	1/1/1950	668.05	8.10	659.95	Junction	Solid	26		4	Liner Material	Unknown	Sheeting	Complete	None	None		None	CA 1-2	4	3	12	$6,500	$3,500
72	1-70	1/1/1989	665.82	3.80	662.02	Junction	Solid	26	Brick	4	Brick		Sheeting	Complete	None	None	None	None	CA 4	6	2	12	$6,500	$3,500
87	2-65	1/1/1950	667.52	9.00	658.52	Junction	Solid	26		4	Block	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	4	3	12	$6,500	$3,500
89	2-63	1/1/1950	665.75	7.70	658.05	Junction	Solid	26		4	Block	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	4	3	12	$6,500	$3,500
96	2-34	1/1/1950	0.00	8.20	0.00	Junction	Solid	24	Brick	5	Liner Material	Steel	Ponding	Complete	None	None	None	None	CA 1-2	4	3	12	$10,000	$5,500
97	2-38	1/1/1950	662.56	10.50	652.06	Junction	Solid	22	Brick	4	Liner Material	Steel	Sheeting	Complete	None	None	Evidence	Evidence	CA 1-2	4	3	12	$6,500	$3,500
112	2-80	1/1/1950	664.96	6.70	658.26	Junction	Solid	22	Brick	3.5	Brick		None	Complete	None	None	None	None	CA 3	6	2	12	$6,500	$3,500
117	2-45	1/1/1950	664.40	7.00	657.40	Junction	Solid	22	Brick	4	Brick	her/See Comme	None	Complete	None	None	None	None	CA 3	6	2	12	$6,500	$3,500
152	3-10	1/1/1989	654.50	18.20	633.67	Junction	Solid	26		8	Precast Concrete	Plastic	None	Complete	Evidence			.25 - 1 GPM	CA 1-2	2	6	12	$17,500	$9,000
167	2-13	1/1/1989	659.70	20.40	639.30	Junction	Bolt Down	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	Evidence			1 - 10 GPM	CA 3	3	4	12	$6,500	$3,500
205	2-27	1/1/1950	663.28	11.60	651.68	Junction	Solid	22	Brick	4	Liner Material	Cast Iron	None	Complete	None	None	None	None	CA 1-2	4	3	12	$6,500	$3,500
222	3-47	1/1/1950	650.52	5.00	645.52	Junction	Solid	24		4	Block	Steel	Sheeting	Complete	None	None	None	None	CA 1-2	4	3	12	$6,500	$3,500
226	3-167	1/1/1950	651.87	0.00	0.00	Junction		0		4	Liner Material			Unable to Open					CA 1-2	4	3	12	$6,500	$3,500
230	3-67	1/1/1956	660.68	11.60	649.08	Junction	Solid	24		4	Precast Concrete	Cast Iron	Ponding	Complete	None	Evidence	None	None	CA 1-2	3	4	12	$6,500	$3,500
231	3-66	1/1/1956	660.58	0.00	0.00	Junction		0		4	Precast Concrete			Revisit/See Comment					CA 1-2	3	4	12	$6,500	$3,500
232	3-66A	1/1/1956	653.24	10.20	643.04	Junction		0		4	Precast Concrete			Unable to Open					CA 1-2	3	4	12	$6,500	$3,500
256	2-33	1/1/1950	0.00	6.60	0.00	Junction	Solid	22	Brick	4	Brick	Steel	Ponding	Complete	None	None	None	None	CA 3	6	2	12	$6,500	$3,500
257	3-2	1/1/1950	656.42	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 3	4	3	12	$6,500	$3,500
265	3-36	1/1/1996	649.05	7.00	642.05	Drop	Bolt Down	26	Precast Concrete	4	Precast Concrete	HDPE	None	Complete	Evidence	None	None	None	CA 1-2	2	6	12	$6,500	$3,500
276	3-75	1/1/1970	664.89	7.90	656.99	Junction	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 4	4	3	12	$6,500	$3,500
278	3-73	1/1/1956	664.43	12.00	652.43	Junction	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 3	4	3	12	$6,500	$3,500
302	2-66	1/1/1950	667.06	7.50	659.56	Junction	Solid	22	Brick	3.5	Liner Material	Block	None	Complete	None	None	Evidence	None	CA 1-2	4	3	12	$6,500	$3,500
359	3-146	1/1/1950	664.18	11.10	653.08	Junction	Vented	23	Block	4	Precast Concrete	Steel	Sheeting	Complete	None	None	Evidence	None	CA 3	4	3	12	$6,500	$3,500
496	3-35	1/1/1950	650.03	8.90	641.13	Junction	Vented	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	3	4	12	$6,500	$3,500
599	1-21	1/1/1950	667.44	10.70	656.74	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete					CA 3	4	3	12	$6,500	$3,500
656	3-170	1/1/1950	651.86	9.50	642.36	Junction	Solid	26	Brick	4	Block	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	4	3	12	$6,500	$3,500
657	3-151	1/1/1970	662.82	8.00	654.82	Junction	Solid	26	Block	4	Block	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	4	3	12	$6,500	$3,500
658	1-75A	1/1/1950	667.30	8.30	659.00	Junction	Solid	26	Block	4	Block	Cast Iron	Sheeting	Complete	None	None	None	< 0.25 GPM	CA 1-2	4	3	12	$6,500	$3,500
670	3-177	4/1/2015	646.50	0.00	634.14	Junction	Bolt Down	26	Precast Concrete	5	Precast Concrete			New-Uninspected					CA 1-2	2	6	12	$10,000	$5,500
55	1-85	1/1/1950	665.52	5.00	660.52	Junction	Solid	24		4	Block		Sheeting	Complete	None	None		None	CA 3	5	2	10	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
84	2-62	1/1/1996	666.24	12.60	653.64	Junction	Solid	26		5	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	5	10	$10,000	$5,500
105	2-78	1/1/1950	665.65	7.80	657.85	Junction	Solid	22	Block	4	Block	Cast Iron	None	Complete	None	None	None	None	CA 3	5	2	10	$6,500	$3,500
108	2-75	1/1/1996	666.40	11.10	655.30	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	5	10	$6,500	$3,500
109	2-74	1/1/1996	666.36	0.00	0.00	Junction	Bolt Down	26		4	Precast Concrete		Sheeting	Unable to Open					CA 1-2	2	5	10	$6,500	$3,500
113	2-81	1/1/1989	666.08	7.00	659.08	Junction	Bolt Down	26	Block	2	Block		Sheeting	Complete	Evidence	None	None	None	CA 4	5	2	10	$6,500	$3,500
121	3-43	1/1/1950	663.77	8.10	655.67	Junction	Solid	24	Block	4	Precast Concrete	Cast Iron	None	Complete	None	None	1 - 10 GPM	None	CA 4	5	2	10	$6,500	$3,500
158	2-8	1/1/1989	657.68	19.20	638.48	Junction	Solid	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	5	10	$6,500	$3,500
165	2-15	1/1/1989	654.30	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	5	10	$6,500	$3,500
166	2-14	1/1/1989	654.50	14.80	639.70	Junction	Solid	26	Brick	4	Liner Material	Plastic	None	Complete			Evidence		CA 1-2	2	5	10	$6,500	$3,500
279	3-77A	1/1/1956	664.11	9.40	654.71	Junction	Solid	26		4	Brick	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	5	2	10	$6,500	$3,500
286	3-80	1/1/1950	663.94	6.90	657.04	Junction	Solid	20	Block	2	Block	Plastic	Sheeting	Complete	None	None	None	None	CA 3	5	2	10	$6,500	$3,500
303	2-66A	1/1/1950	662.56	5.80	656.76	Junction	Solid	22	Brick	4	Brick		Sheeting	Complete	None	None	Evidence	< 0.25 GPM	CA 1-2	5	2	10	$6,500	$3,500
576	1-33	1/1/2010	666.73	17.85	648.88	Junction		26		5	Precast Concrete			Not Found					CA 1-2	2	5	10	$10,000	$5,500
577	3-50	1/1/2013	654.42	6.90	647.52	Junction	Solid	23	Block	3.5	Brick		Sheeting	Complete	None	None	< 0.25 GPM	None	CA 3	5	2	10	$6,500	$3,500
636	1-34	1/1/2010	666.70	19.40	647.30	Junction	Solid	26	Brick	5	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	5	10	$10,000	$5,500
673	3-178	4/1/2015	649.10	0.00	636.90	Junction	Solid	26		5.5	Precast Concrete	Plastic		New-Uninspected					CA 1-2	2	5	10	$13,000	$7,500
674	2-117	4/1/2015	647.00	0.00	634.46	Junction	Solid	26		5	Precast Concrete	Plastic		New-Uninspected					CA 1-2	2	5	10	$10,000	$5,500
676	2-118	4/1/2015	0.00	0.00	0.00	Junction	Solid	26		7	Precast Concrete	Plastic		New-Uninspected					CA 1-2	2	5	10	$13,000	$7,500
20	3-173	1/1/1950	654.41	6.00	648.41	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	3	3	9	$6,500	$3,500
23	3-56	1/1/1950	0.00	11.10	0.00	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	3	9	$6,500	$3,500
24	3-57	1/1/1950	662.79	10.30	652.49	Junction	Solid	26	Cast Iron	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	3	9	$6,500	$3,500
68	1-80	1/1/1950	0.00	0.00	0.00	Junction		0		4	Liner Material			Not Found					CA 1-2	3	3	9	$6,500	$3,500
69	1-75	1/1/1950	666.96	8.40	658.56	Junction	Solid	26		4	Liner Material	Steel	Sheeting	Complete	None	None		None	CA 1-2	3	3	9	$6,500	$3,500
75	1-12	1/1/1950	666.82	12.50	654.32	Junction	Solid	26	Cast Iron	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	3	9	$6,500	$3,500
132	2-51	1/1/1996	664.21	0.00	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence				CA 3	3	3	9	$6,500	$3,500
134	2-50	1/1/1996	664.55	13.00	651.55	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 3	3	3	9	$6,500	$3,500
140	2-18	1/1/1996	662.13	15.00	647.13	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete				1 - 10 GPM	CA 3	3	3	9	$6,500	$3,500
142	2-19	1/1/1996	663.36	13.60	649.76	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	< 0.25 GPM	CA 3	3	3	9	$6,500	$3,500
220	3-32	1/1/1950	667.20	14.90	652.30	Junction	Solid	23	Precast Concrete	4	Precast Concrete	Steel	Sheeting	Complete	None	None	Evidence	Evidence	CA 1-2	3	3	9	$6,500	$3,500
221	3-34	1/1/1950	664.63	13.00	651.63	Junction	Vented	22	Precast Concrete	4	Precast Concrete	Cast Iron	Sheeting	Complete	Evidence				CA 1-2	3	3	9	$6,500	$3,500
224	3-169	1/1/1950	0.00	8.40	0.00	Junction	Solid	26		4	Liner Material	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	3	3	9	$6,500	$3,500
237	3-65	1/1/1956	651.88	9.40	642.48	Junction	Vented	26	Brick	4	Precast Concrete	Cast Iron	Sheeting	Complete					CA 1-2	3	3	9	$6,500	$3,500
281	3-72	1/1/1956	664.40	0.00	0.00	Junction		0		4	Precast Concrete			Unable to Open					CA 1-2	3	3	9	$6,500	$3,500
284	3-78	1/1/1970	664.34	0.00	0.00	Junction		0		4	Liner Material			Unable to Open					CA 1-2	3	3	9	$6,500	$3,500
446	6-7	1/1/2005	668.38	22.60	645.78	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence			Evidence	CA 3	3	3	9	$6,500	$3,500
589	1-11	1/1/1950	667.02	13.20	653.82	Junction	Solid	24	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	3	9	$6,500	$3,500
595	1-95	1/1/1950	663.53	60.00	603.53	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	3	3	9	$6,500	$3,500
635	1-35	1/1/1950	663.32	11.40	651.92	Junction	Solid	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	3	9	$6,500	$3,500
10	1-38	1/1/2008	666.97	11.50	655.47	Junction	Solid	26		4	Block	Cast Iron	None	Complete					CA 3	4	2	8	$6,500	$3,500
46	4-82	1/1/1999	669.46	18.80	650.66	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	Evidence	None	CA 1-2	2	4	8	$6,500	$3,500
54	1-84	1/1/1950	0.00	0.00	0.00	Junction		0		4	Block			Not Found					CA 1-2	4	2	8	$6,500	$3,500
56	1-82	1/1/1950	0.00	0.00	0.00	Junction		0		4	Block			Not Found					CA 1-2	4	2	8	$6,500	$3,500
57	1-29	1/1/2010	666.40	15.40	651.00	Junction	Solid	26		4	Precast Concrete			Not Found	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
70	2-67	1/1/1950	0.00	2.60	0.00	Junction	Solid	22	Precast Concrete	2	Block		Sheeting	Complete	None	None	None	None	CA 3	4	2	8	$6,500	$3,500
77	1-22	1/1/1950	665.95	9.10	656.85	Junction	Bolt Down	26	Brick	4	Precast Concrete	Steel	Sheeting	Complete	Evidence	Evidence	None	None	CA 3	4	2	8	$6,500	$3,500
79	1-24	1/1/1950	665.55	6.00	659.55	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 3	4	2	8	$6,500	$3,500
81	1-30	1/1/2010	666.59	17.20	649.39	Junction	Solid	26	Concrete	4	Precast Concrete	Precast Concrete	Sheeting	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
85	2-69	1/1/1950	0.00	0.00	0.00	Junction		0		4	Block			Not Found					CA 1-2	4	2	8	$6,500	$3,500
119	3-46	1/1/1950	662.76	2.40	660.36	Junction	Solid	22	Precast Concrete	2	Block		Sheeting	Complete	None	None	None	None	CA 1-2	4	2	8	$6,500	$3,500
129	2-42	1/1/1950	664.39	8.40	655.99	Junction	Solid	22	Brick	4	Liner Material	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	4	2	8	$6,500	$3,500
141	2-17	1/1/1996	662.36	15.20	647.16	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
146	2-23	1/1/1996	665.81	7.70	658.11	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete					CA 1-2	2	4	8	$6,500	$3,500
153	2-4	1/1/1989	646.12	10.30	635.82	Junction	Solid	26	Block	4	Precast Concrete	Plastic	Inundated	Complete	Evidence	None	None	1 - 10 GPM	CA 1-2	2	4	8	$6,500	$3,500
155	2-5	1/1/1989	644.79	0.00	0.00	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete		Ponding	New-Uninspected					CA 1-2	2	4	8	$6,500	$3,500
156	2-6	1/1/1989	644.20	0.00	0.00	Junction	Solid	0		4	Precast Concrete			Unable to Open					CA 1-2	2	4	8	$6,500	$3,500
159	2-9	1/1/1989	655.80	17.20	638.60	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
160	2-10	1/1/1989	655.41	16.80	638.61	Junction	Solid	24	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
162	2-11	1/1/1989	657.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	4	8	$6,500	$3,500
168	2-102	1/1/1989	661.78	6.00	655.78	M Discharg	Solid	22		4	Brick	Cast Iron	None	Complete	None	None			CA 1-2	4	2	8	$6,500	$3,500
174	4-40	1/1/2005	666.67	15.80	650.87	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
191	3-28	1/1/1996	665.25	16.00	649.25	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	HDPE	None	Complete	None	None	None	Evidence	CA 1-2	2	4	8	$6,500	$3,500
192	3-29	1/1/1996	665.00	15.30	649.70	Drop	Bolt Down	26	Precast Concrete	4	Precast Concrete	HDPE	Sheeting	Complete	None	None	Evidence	None	CA 1-2	2	4	8	$6,500	$3,500
204	2-43	1/1/1950	664.73	8.00	656.73	Junction	Solid	22	Brick	4	Liner Material	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	4	2	8	$6,500	$3,500
236	3-14	4/1/2015	649.50	13.40	637.22	Drop		0	<Null>	4	Precast Concrete		None	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
253	2-37	1/1/1950	663.71	8.00	655.71	Junction	Solid	23	Precast Concrete	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None	< 0.25 GPM	None	CA 3	4	2	8	$6,500	$3,500
264	3-21	1/1/1989	650.29	9.30	640.99	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
267	3-24	1/1/1996	651.03	8.60	642.43	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Concrete	Sheeting	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
268	3-25	1/1/1996	662.56	6.40	656.16	Junction	Bolt Down	26	Brick	4	Precast Concrete	HDPE	Sheeting	Complete	None		Evidence		CA 1-2	2	4	8	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
275	3-16	4/1/2015	650.80	11.90	637.67	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete		Sheeting	New-Uninspected					CA 1-2	2	4	8	$6,500	$3,500
277	3-74	1/1/1970	664.69	11.40	653.29	Junction	Solid	26		4	Precast Concrete	Concrete	Sheeting	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
282	3-76	1/1/1970	664.14	10.50	653.64	Junction	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
300	4-61	1/1/1999	668.06	21.30	646.76	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
335	4-52	1/1/2000	665.86	16.10	649.76	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	None	None	CA 1-2	2	4	8	$6,500	$3,500
341	4-62	1/1/1999	669.01	21.70	647.31	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
361	5-55	1/1/2005	660.94	15.40	645.54	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	Evidence	Evidence		.25 - 1 GPM	CA 1-2	2	4	8	$6,500	$3,500
384	5-51	1/1/2003	661.99	16.30	645.69	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
409	5-13	1/1/2003	663.00	16.90	646.10	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	.25 - 1 GPM	None	CA 1-2	2	4	8	$6,500	$3,500
412	5-50	1/1/2003	661.07	15.50	645.57	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete		None			CA 1-2	2	4	8	$6,500	$3,500
413	5-49	1/1/2003	660.95	15.60	645.35	Junction	Solid	26		4	Precast Concrete	Precast Concrete	Sheeting	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
414	5-48	1/1/2003	661.43	16.40	645.03	Drop	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	Evidence		None	CA 1-2	2	4	8	$6,500	$3,500
415	5-44	1/1/2003	661.82	18.80	643.02	Drop	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	Evidence		None	CA 1-2	2	4	8	$6,500	$3,500
417	5-43	1/1/2003	662.91	20.30	642.61	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	Evidence		None	CA 1-2	2	4	8	$6,500	$3,500
418	5-46	1/1/2003	662.64	18.40	644.24	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
419	5-47	1/1/2003	662.43	17.50	644.93	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	Evidence		None	CA 1-2	2	4	8	$6,500	$3,500
420	5-26	1/1/2003	664.75	17.40	647.35	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	Evidence	None	None	CA 1-2	2	4	8	$6,500	$3,500
421	5-42	1/1/2003	663.58	21.20	642.38	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	Evidence		None	CA 1-2	2	4	8	$6,500	$3,500
422	5-41	1/1/2003	663.26	17.50	645.76	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
423	5-1	1/1/2003	662.22	20.80	641.42	Drop	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
426	5-4	1/1/2003	663.24	15.40	647.84	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	4	8	$6,500	$3,500
432	5-63	1/1/2005	662.89	15.20	647.69	Junction	Solid	26		4	Precast Concrete		None	Complete					CA 1-2	2	4	8	$6,500	$3,500
528	3-131	1/1/2004	674.85	17.60	657.25	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	4	8	$6,500	$3,500
582	6-1	1/1/2005	666.32	0.00	0.00	Junction	Other	0		4	Precast Concrete		Sheeting	Complete					CA 1-2	2	4	8	$6,500	$3,500
591	1-28	1/1/2010	666.26	15.60	650.66	Junction	Solid	26	Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
597	1-18	1/1/1950	668.02	7.00	661.02	Junction	Solid	26	Concrete	4	Precast Concrete	HDPE	None	Complete					CA 3	4	2	8	$6,500	$3,500
600	1-52	1/1/1950	666.10	8.70	657.40	Junction	Vented	24	Precast Concrete	4	Precast Concrete	Steel	Sheeting	Complete	None	None	None	None	CA 3	4	2	8	$6,500	$3,500
608	1-83	1/1/1950	0.00	0.00	0.00	Junction		0		4	Block			Not Found					CA 1-2	4	2	8	$6,500	$3,500
615	2-91A	1/1/1999	667.23	11.10	656.13	Junction	Bolt Down	24	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
620	6-100	1/1/1992	666.48	17.80	648.68	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	4	8	$6,500	$3,500
644	1-83A	1/1/1950	665.89	6.80	659.09	Junction	Solid	26	Brick	4	Block	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	4	2	8	$6,500	$3,500
661	2-103	4/1/2015	650.90	0.00	637.43	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	4	8	$6,500	$3,500
662	2-104	4/1/2015	650.00	0.00	637.54	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	4	8	$6,500	$3,500
666	2-108	4/1/2015	647.50	0.00	635.94	Junction	Bolt Down	26	Precast Concrete	5	Precast Concrete			New-Uninspected					CA 1-2	2	4	8	$10,000	$5,500
668	2-111	4/1/2015	643.80	0.00	634.48	Junction	Bolt Down	26	Precast Concrete	5	Precast Concrete			New-Uninspected					CA 1-2	2	4	8	$10,000	$5,500
671	3-176	4/1/2015	643.90	0.00	633.99	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	4	8	$6,500	$3,500
672	3-175	4/1/2015	633.67	0.00	0.00	Junction	Bolt Down	26	Precast Concrete	5	Precast Concrete			New-Uninspected					CA 1-2	2	4	8	$10,000	$5,500
124	3-37	1/1/2013	655.50	10.50	645.00	Junction	Solid	24	Precast Concrete	5	Precast Concrete		Sheeting	Complete	None	None	None	None	CA 1-2	2	4	8	$10,000	$5,500
103	3-45	1/1/1950	664.99	5.60	659.39	Junction	Solid	24	Precast Concrete	4	Brick	Steel	Sheeting	Complete	None	None	None	None	CA 4	7	1	7	$6,500	$3,500
123	3-40	1/1/1950	660.16	7.00	653.16	Junction	Vented	24	Precast Concrete	4	Brick		None	Complete	None	None	None	None	CA 4	7	1	7	$6,500	$3,500
1	3-87	1/1/1999	662.17	10.70	651.47	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	Evidence	CA 1-2	2	3	6	$6,500	$3,500
11	1-40	1/1/2008	666.05	10.30	655.75	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
19	3-172	1/1/1989	652.80	5.80	647.00	Junction	Solid	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	< 0.25 GPM	Evidence	None	CA 1-2	2	3	6	$6,500	$3,500
25	3-60	1/1/1950	663.48	10.00	653.48	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
26	3-61	1/1/1950	662.62	10.00	652.62	Junction	Bolt Down	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
27	6-70	1/1/1992	666.54	24.80	641.74	Junction	Solid	26	Block	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
33	6-82	1/1/1992	666.02	22.60	643.42	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
34	6-97	1/1/1992	665.92	20.40	645.52	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	Evidence	Evidence	1 - 10 GPM	CA 1-2	2	3	6	$6,500	$3,500
35	6-98	1/1/1992	665.95	19.00	646.95	Drop	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	3	6	$6,500	$3,500
36	6-99	1/1/1992	665.19	17.40	647.79	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	Evidence	None	CA 1-2	2	3	6	$6,500	$3,500
40	4-69	1/1/2000	665.00	10.40	654.60	Drop	Vented	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
42	4-67	1/1/2000	667.46	15.30	652.16	Junction	Vented	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete					CA 1-2	2	3	6	$6,500	$3,500
43	4-66	1/1/1999	668.62	19.30	649.32	Drop	Bolt Down	26	HDPE	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
44	4-65	1/1/1999	667.86	18.90	648.96	Junction	Bolt Down	26	Block	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
45	4-81	1/1/1999	670.20	19.80	650.40	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	Evidence	Evidence	CA 1-2	2	3	6	$6,500	$3,500
47	4-83	1/1/2000	668.82	17.80	651.02	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
58	1-59	1/1/2010	0.00	14.00	0.00	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
59	1-60	1/1/2010	667.88	14.10	653.78	Junction	Solid	26	HDPE	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
60	1-71	1/1/2010	0.00	0.00	0.00	Junction	Solid	26		4	Precast Concrete			Not Found					CA 1-2	2	3	6	$6,500	$3,500
62	4-36A	1/1/2005	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	3	6	$6,500	$3,500
71	1-69	1/1/1950	665.80	6.40	659.40	Junction	Bolt Down	24	Brick	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
73	1-26	1/1/1950	665.79	6.80	658.99	Junction	Vented	26	Precast Concrete	4	Precast Concrete	Steel	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
74	1-27	1/1/1950	664.50	3.80	660.70	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
76	1-15	1/1/1950	662.90	8.20	654.70	Junction	Solid	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
78	1-23	1/1/1950	664.70	7.20	657.50	Junction	Bolt Down	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	< 0.25 GPM	None	CA 1-2	3	2	6	$6,500	$3,500
80	1-16	1/1/1950	665.17	8.70	656.47	Junction	Solid	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
82	2-60	1/1/1996	666.10	12.30	653.80	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	PVC	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
83	2-61	1/1/1996	666.35	11.80	654.55	Junction	Bolt Down	26	Precast Concrete	4	Liner Material	Plastic	Sheeting	Complete	.25 - 1 GPM	None	None	None	CA 1-2	2	3	6	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
91	2-71	1/1/1996	665.81	10.30	655.51	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	None	None	CA 1-2	2	3	6	$6,500	$3,500
94	2-59A	1/1/1996	0.00	11.70	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
95	2-58	1/1/1996	665.03	12.40	652.63	Drop	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
98	2-39	1/1/1950	663.89	8.10	655.79	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
110	2-57	1/1/1996	664.62	12.10	652.52	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
111	2-79	1/1/1950	665.03	7.00	658.03	Junction	Solid	22	Block	3	Liner Material	Cast Iron	None	Complete	None	None	None	Evidence	CA 1-2	3	2	6	$6,500	$3,500
116	2-46	1/1/1950	665.17	7.20	657.97	Junction	Solid	22	Brick	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
122	3-41	1/1/1950	660.44	6.20	654.24	Junction	Solid	24		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
126	3-51	1/1/1950	0.00	8.10	0.00	Junction	Solid	21	Block	4	Precast Concrete	Cast Iron	None	Complete	None	None	Evidence	None	CA 1-2	3	2	6	$6,500	$3,500
127	3-49	1/1/2013	653.32	7.60	645.72	Junction	Vented	2	Brick	3	Brick		None	Complete	None	None	Evidence	Evidence	CA 4	6	1	6	$6,500	$3,500
131	2-40	1/1/1996	664.50	12.00	652.50	Drop	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
133	2-55	1/1/1996	664.23	12.70	651.53	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None		None	CA 1-2	2	3	6	$6,500	$3,500
135	2-56	1/1/1996	664.24	12.20	652.04	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
136	2-52	1/1/1996	0.00	12.20	0.00	Junction	Bolt Down	26		4	Precast Concrete	recast Concrete	Sheeting	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
137	2-53	1/1/1996	664.09	10.50	653.59	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
143	2-20	1/1/1996	663.06	12.40	650.66	Drop	Bolt Down	24	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	Evidence	None	None	CA 1-2	2	3	6	$6,500	$3,500
144	2-21	1/1/1996	665.06	9.10	655.96	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 3	3	2	6	$6,500	$3,500
148	2-2	1/1/1989	645.15	9.80	635.35	Drop	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	Evidence	None		None	CA 1-2	2	3	6	$6,500	$3,500
149	2-3	1/1/1989	642.27	0.00	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete		Inundated	New-Uninspected					CA 1-2	2	3	6	$6,500	$3,500
150	2-1	1/1/1989	643.17	0.00	0.00	Junction	Solid	0		4	Precast Concrete		Inundated	Unable to Open					CA 1-2	2	3	6	$6,500	$3,500
151	3-11	1/1/1989	643.59	9.40	634.19	Junction	Solid	26		4	Precast Concrete	Plastic	Inundated	Complete	Evidence	Evidence		None	CA 1-2	2	3	6	$6,500	$3,500
157	2-7	1/1/1989	645.04	7.00	638.04	Junction	Solid	26	Block	4	Precast Concrete	Plastic	Inundated	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
169	4-4	1/1/2000	666.91	15.20	651.71	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
175	4-3	1/1/2000	667.90	17.30	650.60	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
176	4-36	1/1/2005	664.54	15.70	648.84	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
178	4-38	1/1/2005	666.64	11.10	655.54	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
180	4-41	1/1/2005	667.84	14.30	653.54	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	Evidence	CA 1-2	2	3	6	$6,500	$3,500
181	4-42	1/1/2005	665.66	11.20	654.46	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	Evidence	CA 1-2	2	3	6	$6,500	$3,500
194	3-31	1/1/1950	666.71	9.50	657.21	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Steel	Sheeting	Complete	Evidence	None	None	< 0.25 GPM	CA 1-2	3	2	6	$6,500	$3,500
195	3-82	1/1/1950	664.67	4.50	660.17	M Discharg	Solid	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete					CA 1-2	3	2	6	$6,500	$3,500
202	3-160	1/1/1970	662.44	6.90	655.54	Junction	Solid	24	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
206	2-48	1/1/1950	662.22	8.20	654.02	Junction	Solid	27	Brick	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
207	2-47	1/1/1950	663.01	8.10	654.91	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Cast Iron	Sheeting	Complete	Evidence	None	< 0.25 GPM	None	CA 1-2	3	2	6	$6,500	$3,500
211	5-32	1/1/2005	662.38	9.60	652.78	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	< 0.25 GPM	< 0.25 GPM	< 0.25 GPM	CA 3	3	2	6	$6,500	$3,500
215	5-28	1/1/2005	664.06	15.80	648.26	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	.25 - 1 GPM	CA 1-2	2	3	6	$6,500	$3,500
216	5-27	1/1/2005	664.07	16.50	647.57	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	Evidence	.25 - 1 GPM	CA 1-2	2	3	6	$6,500	$3,500
249	2-95	1/1/1950	664.84	11.20	653.64	Junction	Vented	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None			CA 1-2	3	2	6	$6,500	$3,500
251	2-28	1/1/1950	662.33	9.50	652.83	Junction	Solid	22	Precast Concrete	4	Precast Concrete	Cast Iron	None	Complete		Evidence	None	None	CA 1-2	3	2	6	$6,500	$3,500
252	2-32	1/1/1950	0.00	5.00	0.00	Junction	Solid	22		4	Precast Concrete	Steel	None	Complete	None	Evidence	None	None	CA 1-2	3	2	6	$6,500	$3,500
254	2-36	1/1/1950	662.31	5.00	657.31	Junction	Solid	21	Precast Concrete	4	Precast Concrete		None	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
258	6-100A	1/1/1992	666.74	18.20	648.54	Junction	Bolt Down	26		4	Precast Concrete		Sheeting	Complete					CA 1-2	2	3	6	$6,500	$3,500
262	3-20	1/1/1989	646.78	6.30	640.48	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	New-Uninspected	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
263	3-19	1/1/1989	645.22	5.50	639.72	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	New-Uninspected	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
266	3-23A	1/1/1996	651.48	9.50	641.98	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	HDPE	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
272	3-28A	1/1/1996	658.70	10.00	648.70	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	HDPE	Sheeting	Complete	None	None	Evidence	Evidence	CA 1-2	2	3	6	$6,500	$3,500
273	3-18	4/1/2015	648.50	7.80	638.33	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete		None	New-Uninspected					CA 1-2	2	3	6	$6,500	$3,500
280	3-78A	1/1/1956	0.00	9.20	0.00	Junction	Solid	26	Block	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	3	2	6	$6,500	$3,500
283	3-76A	1/1/1970	663.65	9.40	654.25	Junction	Solid	26		4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None		None	CA 1-2	2	3	6	$6,500	$3,500
287	3-81	1/1/1950	663.48	4.30	659.18	Junction	Solid	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete					CA 1-2	3	2	6	$6,500	$3,500
288	6-83	1/1/1992	666.09	21.50	644.59	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	1 - 10 GPM	CA 1-2	2	3	6	$6,500	$3,500
289	6-84	1/1/1992	665.87	20.20	645.67	Drop	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
290	6-85	1/1/1993	666.24	19.30	646.94	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
291	6-86	1/1/1993	666.39	18.10	648.29	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
292	6-87	1/1/1993	664.83	15.50	649.33	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
293	6-88	1/1/1993	664.96	15.30	649.66	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
295	6-90	1/1/1993	664.27	12.10	652.17	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
297	4-84	1/1/2000	669.31	17.40	651.91	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	3	6	$6,500	$3,500
298	4-85	1/1/2000	670.44	17.20	653.24	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
299	4-2	1/1/2000	667.23	18.30	648.93	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	3	6	$6,500	$3,500
306	2-29	1/1/1950	663.16	8.90	654.26	Junction	Solid	23	Precast Concrete	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	Evidence	None	None	CA 1-2	3	2	6	$6,500	$3,500
307	2-30	1/1/1950	662.35	7.50	654.85	M Discharg	Solid	22	Precast Concrete	4	Precast Concrete		None	Complete					CA 1-2	3	2	6	$6,500	$3,500
308	2-31	1/1/1950	662.43	5.60	656.83	Junction	Solid	22	Precast Concrete	4	Precast Concrete	Steel	None	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
309	6-54	1/1/1993	0.00	0.00	0.00		Solid	0		4	Precast Concrete		Inundated	Complete	None	None	None	Evidence	CA 1-2	2	3	6	$6,500	$3,500
310	6-55	1/1/1993	666.57	16.30	650.27	Junction	Solid	26		4	Precast Concrete	Plastic	Inundated	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
311	6-56	1/1/1993	668.50	17.20	651.30	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	1 - 10 GPM	CA 1-2	2	3	6	$6,500	$3,500
312	4-90	1/1/2000	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	3	6	$6,500	$3,500
325	4-64	1/1/1999	669.32	21.00	648.32	Junction	Bolt Down	26	Block	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
326	4-63	1/1/1999	667.04	19.50	647.54	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None		CA 1-2	2	3	6	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
332	4-54	1/1/2005	667.28	16.20	651.08	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
333	4-55	1/1/2005	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	3	6	$6,500	$3,500
334	4-53	1/1/2000	667.04	15.80	651.24	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
336	4-51	1/1/2000	667.29	18.10	649.19	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
345	1-97	1/1/1950	0.00	0.00	0.00	Junction		0		4	Precast Concrete		None	Not Found					CA 1-2	3	2	6	$6,500	$3,500
358	3-147	1/1/1950	664.62	11.10	653.52	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
362	5-56	1/1/2005	661.05	12.80	648.25	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None		None	CA 1-2	2	3	6	$6,500	$3,500
363	5-57	1/1/2005	661.95	13.10	648.85	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	None		None	CA 1-2	2	3	6	$6,500	$3,500
364	5-58	1/1/2005	661.97	12.70	649.27	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	None		None	CA 1-2	2	3	6	$6,500	$3,500
365	6-50	1/1/1992	664.74	18.70	646.03	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	> 10 GPM	CA 1-2	2	3	6	$6,500	$3,500
366	6-51	1/1/1993	665.05	11.20	653.85	Junction	Solid	26	Precast Concrete	4	Precast Concrete		None	Complete	None	None	None	None	CA 3	3	2	6	$6,500	$3,500
367	6-53	1/1/1993	665.01	17.10	647.91	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	1 - 10 GPM	CA 1-2	2	3	6	$6,500	$3,500
369	4-21	1/1/2000	667.27	10.20	657.07	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	Evidence	None	None	CA 3	3	2	6	$6,500	$3,500
372	4-11	1/1/2000	667.11	11.20	655.91	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
376	4-12	1/1/2000	669.16	11.50	657.66	Junction	Solid	26	Precast Concrete	4	Liner Material	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
378	4-14	1/1/2000	669.20	10.10	659.10	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
401	5-59	1/1/2005	660.78	10.60	650.18	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None		None	CA 1-2	2	3	6	$6,500	$3,500
402	5-60	1/1/2005	663.12	11.70	651.42	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	Evidence		None	CA 1-2	2	3	6	$6,500	$3,500
403	5-24	1/1/2005	663.04	11.90	651.14	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	< 0.25 GPM	None	Evidence	CA 1-2	2	3	6	$6,500	$3,500
406	5-22	1/1/2005	661.94	14.50	647.44	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
408	5-20	1/1/2003	662.37	15.60	646.77	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	.25 - 1 GPM	CA 1-2	2	3	6	$6,500	$3,500
410	5-52	1/1/2005	661.29	14.60	646.69	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	3	6	$6,500	$3,500
425	5-3	1/1/2003	662.65	15.30	647.35	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	3	6	$6,500	$3,500
444	6-12	1/1/2005	666.97	16.80	650.17	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
445	6-11	1/1/2005	666.65	17.20	649.45	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence		None	None	CA 1-2	2	3	6	$6,500	$3,500
447	6-9	1/1/2005	668.36	22.90	645.46	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	3	6	$6,500	$3,500
448	6-8	1/1/2005	669.55	20.20	649.35	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence			Evidence	CA 1-2	2	3	6	$6,500	$3,500
449	6-27	1/1/2005	666.14	18.60	647.54	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
450	6-26	1/1/2005	666.27	20.10	646.17	Junction	Bolt Down	26		4	Liner Material	Plastic	None	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
452	6-16	1/1/2005	666.55	21.40	645.15	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
453	6-5	1/1/2005	667.34	23.00	644.34	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None			< 0.25 GPM	CA 1-2	2	3	6	$6,500	$3,500
454	6-17	1/1/2005	666.72	21.00	645.72	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
455	6-6	1/1/2005	667.06	22.50	644.56	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
456	6-37	1/1/2005	665.81	15.80	650.01	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None		None	CA 1-2	2	3	6	$6,500	$3,500
457	6-36	1/1/2005	665.35	16.50	648.85	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Ponding	Complete					CA 1-2	2	3	6	$6,500	$3,500
458	6-31	1/1/2005	665.87	17.20	648.67	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	None	None		None	CA 1-2	2	3	6	$6,500	$3,500
461	6-18	1/1/2005	666.24	20.90	645.34	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	None			Evidence	CA 1-2	2	3	6	$6,500	$3,500
462	6-19	1/1/2005	666.93	20.30	646.63	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
463	6-20	1/1/2005	0.00	19.20	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Inundated	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
464	6-21	1/1/2005	667.61	19.00	648.61	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
465	6-22	1/1/2005	667.42	18.50	648.92	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence			< 0.25 GPM	CA 1-2	2	3	6	$6,500	$3,500
471	6-4	1/1/2005	664.29	21.10	643.19	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete					CA 1-2	2	3	6	$6,500	$3,500
472	6-3	1/1/2005	664.94	22.00	642.94	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None			< 0.25 GPM	CA 1-2	2	3	6	$6,500	$3,500
473	6-2	1/1/2005	664.89	25.00	639.89		Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete				1 - 10 GPM	CA 1-2	2	3	6	$6,500	$3,500
474	6-10	1/1/2005	666.86	20.50	646.36	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	3	6	$6,500	$3,500
484	5-7	1/1/2003	660.35	10.30	650.05	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	3	6	$6,500	$3,500
486	5-9	1/1/2003	661.34	10.50	650.84	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None		None	CA 1-2	2	3	6	$6,500	$3,500
526	3-129	1/1/2004	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	3	6	$6,500	$3,500
527	3-130	1/1/2004	673.76	17.30	656.46	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	3	6	$6,500	$3,500
529	3-132	1/1/2004	672.96	15.10	657.86	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	3	6	$6,500	$3,500
530	3-133	1/1/2004	673.34	15.50	657.84	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None				CA 1-2	2	3	6	$6,500	$3,500
557	6-81	1/1/1992	665.66	23.10	642.56	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
558	6-49	1/1/1992	665.07	24.40	640.67	Drop	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
559	6-52	1/1/1993	666.13	19.20	646.93	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
562	4-103	1/1/2005	667.36	14.90	652.46	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
571	2-89	1/1/1989	666.94	13.80	653.14	Junction	Solid	24	Block	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	3	6	$6,500	$3,500
574	3-85	1/1/1999	662.57	12.10	650.47	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 3	3	2	6	$6,500	$3,500
575	1-37	1/1/2010	666.50	6.00	660.50	Junction	Bolt Down	26	Block	4	Block		Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
581	6-44	1/1/1992	666.92	27.00	639.92	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
586	4-1	1/1/2000	667.07	19.70	647.37	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	Evidence		None	CA 1-2	2	3	6	$6,500	$3,500
587	3-59	1/1/1950	662.56	5.70	656.86	M Discharg	Vented	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	Evidence	None	CA 1-2	3	2	6	$6,500	$3,500
592	1-10	1/1/2010	663.64	12.20	651.44	Junction	Solid	26	Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
594	1-14	1/1/1950	662.90	7.70	655.20	Junction	Solid	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
596	1-19	1/1/1950	667.78	6.00	661.78	Junction	Solid	22	HDPE	4	Precast Concrete	HDPE	None	Complete					CA 1-2	3	2	6	$6,500	$3,500
598	1-17	1/1/1950	668.29	8.20	660.09	Junction	Solid	26	HDPE	4	Precast Concrete	Plastic	None	Complete					CA 1-2	3	2	6	$6,500	$3,500
603	1-49	1/1/2008	665.55	7.40	658.15	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 3	3	2	6	$6,500	$3,500
613	1-78A	1/1/1950	667.33	6.90	660.43	Junction	Solid	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
629	1-101	1/1/1950	666.06	4.40	661.66	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
634	1-20	1/1/1950	662.15	6.50	655.65	Junction	Solid	26	Brick	4	Precast Concrete	Precast Concrete	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
638	1-36	1/1/1950	663.64	4.90	658.74	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
640	1-64	1/1/1950	665.75	8.10	657.65	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
642	1-61	1/1/2010	665.51	10.40	655.11	Junction	Solid	26	HDPE	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	3	6	$6,500	$3,500
643	1-51A	1/1/1950	0.00	7.00	0.00	Junction	Solid	24	Precast Concrete	4	Precast Concrete	Steel	Sheeting	Complete	None	None	None	None	CA 1-2	3	2	6	$6,500	$3,500
645	1-100	1/1/1950	665.88	4.20	661.68	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete					CA 1-2	3	2	6	$6,500	$3,500
650	4-66A	1/1/2000	0.00	0.00	0.00	Junction	Bolt Down	0		4	Precast Concrete		Ponding	Not Found					CA 1-2	2	3	6	$6,500	$3,500
660	1-72	1/1/2010	0.00	0.00	0.00	Junction	Solid	26		4	Precast Concrete			Not Found					CA 1-2	2	3	6	$6,500	$3,500
663	2-105	4/1/2015	647.80	0.00	637.25	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	3	6	$6,500	$3,500
664	2-106	4/1/2015	646.70	0.00	636.68	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	3	6	$6,500	$3,500
665	2-107	4/1/2015	647.40	0.00	636.11	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	3	6	$6,500	$3,500
667	2-110	4/1/2015	647.10	0.00	635.31	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	3	6	$6,500	$3,500
669	2-112	4/1/2015	644.70	0.00	634.32	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete			New-Uninspected					CA 1-2	2	3	6	$6,500	$3,500
21	3-55A	1/1/1950	0.00	0.00	0.00	Junction		0		4	Brick			Not Found					CA 1-2	5	1	5	$6,500	$3,500
578	3-53	1/1/1950	0.00	0.00	0.00	Junction		0		3	Brick			Not Found					CA 1-2	5	1	5	$6,500	$3,500
2	3-91	1/1/1999	662.78	10.60	652.18	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
12	1-41	1/1/2008	664.99	8.90	656.09	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete					CA 1-2	2	2	4	$6,500	$3,500
28	6-71	1/1/1999	664.78	10.40	654.38	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	.25 - 1 GPM	None	None	CA 1-2	2	2	4	$6,500	$3,500
39	5-71	1/1/2005	0.00	11.00	0.00	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
41	4-68	1/1/2000	666.11	12.00	654.11	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	Evidence	None	None	CA 1-2	2	2	4	$6,500	$3,500
53	1-51	1/1/2008	665.85	6.80	659.05	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
61	1-43	1/1/2008	665.61	8.70	656.91	Junction	Bolt Down	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
63	1-50	1/1/2009	666.33	3.50	662.83	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
66	1-77	1/1/2009	0.00	6.88	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
92	2-72	1/1/1996	665.76	9.30	656.46	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
93	2-73	1/1/1996	666.06	8.40	657.66	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
104	2-59	1/1/1996	665.28	9.10	656.18	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
114	2-82	1/1/1989	665.87	7.00	658.87	Junction	Solid	23	Brick	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
115	2-83	1/1/1989	665.40	5.00	660.40	M Discharg	Solid	26	Precast Concrete	4	Precast Concrete	Cast Iron	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
128	3-52	1/1/1950	657.26	6.00	651.26	Junction	Solid	23	Brick	3	Liner Material		Sheeting	Complete	None	Evidence	Evidence	None	CA 1-2	4	1	4	$6,500	$3,500
130	2-41	1/1/1996	664.06	8.10	655.96	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
138	2-54	1/1/1996	663.73	9.30	654.43	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
139	2-26	1/1/1996	663.90	0.00	0.00	Junction	Bolt Down	0		4	Precast Concrete		Sheeting	Unable to Open					CA 1-2	2	2	4	$6,500	$3,500
145	2-22	1/1/1996	664.07	7.30	656.77	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
147	2-16	1/1/1996	658.40	11.70	646.70	Junction	Bolt Down	26		4	Precast Concrete	Steel	Sheeting	Complete	Evidence	None		None	CA 1-2	2	2	4	$6,500	$3,500
163	1-42	1/1/2008	665.42	8.80	656.62	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete					CA 1-2	2	2	4	$6,500	$3,500
170	4-5	1/1/2000	667.43	14.50	652.93	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	Evidence	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
171	4-26	1/1/2000	667.01	13.00	654.01	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
172	4-27	1/1/2000	668.31	13.40	654.91	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	Evidence	< 0.25 GPM	None	CA 1-2	2	2	4	$6,500	$3,500
173	4-28	1/1/2000	666.76	10.40	656.36	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
177	4-37	1/1/2005	667.38	12.60	654.78	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
179	4-39	1/1/2005	667.07	10.70	656.37	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
183	4-44	1/1/2005	664.28	12.20	652.08	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
184	4-45	1/1/2005	665.58	12.20	653.38	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
185	4-46	1/1/2005	664.42	9.80	654.62	Junction	Solid	26	Other/See Comment	4	Liner Material	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
186	4-47	1/1/2005	667.05	11.30	655.75	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
193	3-30	1/1/1996	665.15	7.90	657.25	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	HDPE	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
196	3-86	1/1/1999	662.87	11.40	651.47	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	Evidence	None	None	CA 1-2	2	2	4	$6,500	$3,500
212	5-31	1/1/2005	662.67	11.30	651.37	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
213	5-30	1/1/2005	664.43	14.50	649.93	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	< 0.25 GPM	CA 1-2	2	2	4	$6,500	$3,500
214	5-29	1/1/2005	663.65	14.20	649.45	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	.25 - 1 GPM	CA 1-2	2	2	4	$6,500	$3,500
217	5-36	1/1/2005	662.48	12.60	649.88	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
218	5-37	1/1/2005	662.70	11.20	651.50	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Precast Concrete	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
219	5-62	1/1/2005	661.04	12.30	648.74	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
229	6-92	1/1/1993	0.00	10.70	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
233	3-15	4/1/2015	649.50	11.30	637.32	Drop	Bolt Down	0	Precast Concrete	4	Precast Concrete		Sheeting	New-Uninspected	Evidence	Evidence	None	1 - 10 GPM	CA 1-2	2	2	4	$6,500	$3,500
238	1-86	1/1/1989	0.00	4.25	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
239	4-86	1/1/2000	667.63	14.79	652.84	Junction	Bolt Down	0		4	Precast Concrete		Ponding	Unable to Open					CA 1-2	2	2	4	$6,500	$3,500
240	4-87	1/1/2000	667.94	13.77	654.17	Junction	Bolt Down	26		4	Precast Concrete		Ponding	Unable to Open					CA 1-2	2	2	4	$6,500	$3,500
241	4-88	1/1/2000	669.34	14.31	655.03	Junction	Bolt Down	26		4	Precast Concrete		Ponding	Unable to Open					CA 1-2	2	2	4	$6,500	$3,500
242	4-89	1/1/2000	668.86	12.30	656.56	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Ponding	Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
243	5-65	1/1/2005	661.09	12.20	648.89	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
244	5-66	1/1/2005	661.17	12.20	648.97	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
247	2-98	1/1/1950	663.61	7.00	656.61	Junction	Solid	22	Block	4	Block		Sheeting	Complete	None	None	None	None	CA 1-2	4	1	4	$6,500	$3,500
255	2-35	1/1/1950	663.09	5.40	657.69	Junction	Solid	22	Precast Concrete	4	Liner Material	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
260	6-102	1/1/1992	0.00	12.30	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
269	3-26	1/1/1996	652.41	7.60	644.81	Junction	Bolt Down	26	Block	4	Precast Concrete	HDPE	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
270	3-38	1/1/2013	652.33	6.60	645.73	Drop	Bolt Down	26	Precast Concrete	4	Precast Concrete	HDPE	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
271	3-27	1/1/1996	653.82	8.70	645.12	Drop	Bolt Down	26	Block	4	Precast Concrete	HDPE	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
274	3-17	4/1/2015	651.49	0.00	637.99	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete		None	New-Uninspected					CA 1-2	2	2	4	$6,500	$3,500
294	6-89	1/1/1993	664.36	13.60	650.76	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
296	6-91	1/1/1993	664.62	11.70	652.92	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
301	1-56	1/1/1992	666.87	0.00	0.00	M Discharg	Solid	23		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
313	4-91	1/1/2000	667.27	13.40	653.87	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
314	4-92	1/1/2000	666.10	12.40	653.70	Drop	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
316	4-94	1/1/2000	665.81	10.80	655.01	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
317	4-95	1/1/2000	666.57	10.70	655.87	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
318	4-96	1/1/2000	666.85	10.20	656.65	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
330	4-57	1/1/2000	666.61	10.90	655.71	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
331	4-56	1/1/2000	667.77	12.80	654.97	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
337	4-72	1/1/2000	665.92	10.00	655.92	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
339	4-74	1/1/2000	665.62	9.55	656.07	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
340	4-75	1/1/2000	664.94	6.40	658.54	Junction	Solid	26		4	Precast Concrete		Sheeting	Complete					CA 1-2	2	2	4	$6,500	$3,500
343	1-98	1/1/1950	658.31	5.80	652.51	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Ponding	Complete	Evidence	.25 - 1 GPM		Evidence	CA 3	4	1	4	$6,500	$3,500
346	1-94	1/1/1989	666.09	3.30	662.79	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
350	1-89	1/1/1989	666.43	5.90	660.53	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None		None	CA 1-2	2	2	4	$6,500	$3,500
351	1-90	1/1/1989	667.05	6.00	661.05	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
352	1-88	1/1/1989	666.27	6.00	660.27	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
353	1-87	1/1/1989	664.30	4.50	659.80	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
357	3-148	1/1/1970	663.95	10.20	653.75	Junction	Solid	0	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
360	5-54	1/1/2005	662.13	15.00	647.13	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	Evidence	None		None	CA 1-2	2	2	4	$6,500	$3,500
368	4-17	1/1/2000	667.16	11.40	655.76	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
370	4-9	1/1/2000	665.45	10.50	654.95	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
373	4-18	1/1/2000	668.40	10.90	657.50	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
374	4-19	1/1/2000	669.35	11.20	658.15	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
377	4-13	1/1/2000	669.92	11.40	658.52	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
382	4-23	1/1/2000	670.84	10.40	660.44	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
383	4-22	1/1/2000	669.80	10.80	659.00	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
385	6-58	1/1/1993	666.04	13.70	652.34	Junction	Solid	26		4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	1 - 10 GPM	CA 1-2	2	2	4	$6,500	$3,500
386	6-59	1/1/1993	666.36	13.10	653.26	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
387	6-60	1/1/1993	665.99	11.30	654.69	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	> 10 GPM	CA 1-2	2	2	4	$6,500	$3,500
388	6-61	1/1/1993	666.46	11.10	655.36	Junction	Solid	26		4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	Evidence	CA 1-2	2	2	4	$6,500	$3,500
389	6-66	1/1/1993	666.43	10.70	655.73	Junction	Solid	0		4	Precast Concrete		None	Complete					CA 1-2	2	2	4	$6,500	$3,500
390	6-62	1/1/1993	666.36	10.10	656.26	Junction	Solid	26		4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	> 10 gpm	CA 1-2	2	2	4	$6,500	$3,500
397	4-6	1/1/2000	665.68	11.80	653.88	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
398	4-7	1/1/2000	665.97	11.60	654.37	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Precast Concrete	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
399	4-8	1/1/2000	666.06	11.70	654.36	Junction	Solid	26	Precast Concrete	4	Liner Material	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
400	4-16	1/1/2000	666.23	10.90	655.33	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
404	5-25	1/1/2005	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
405	5-23	1/1/2005	662.56	14.00	648.56	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	Evidence	None	None	CA 1-2	2	2	4	$6,500	$3,500
407	5-21	1/1/2005	661.94	15.00	646.94	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
411	5-53	1/1/2005	660.65	13.30	647.35	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
416	5-45	1/1/2003	662.04	7.50	654.54	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	< 0.25 GPM	< 0.25 GPM	< 0.25 GPM	CA 1-2	2	2	4	$6,500	$3,500
424	5-2	1/1/2003	662.13	15.00	647.13	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
427	5-61	1/1/2005	661.53	14.30	647.23	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
428	5-38	1/1/2005	662.84	10.10	652.74	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
433	5-64	1/1/2005	662.23	14.20	648.03	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
434	6-39	1/1/2005	665.46	13.90	651.56	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	Evidence	None	None	CA 1-2	2	2	4	$6,500	$3,500
435	6-42	1/1/2005	664.87	11.50	653.37	Junction	Bolt Down	26		4	Precast Concrete		Sheeting	Complete					CA 1-2	2	2	4	$6,500	$3,500
436	6-43	1/1/2005	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
437	6-40	1/1/2005	664.76	11.90	652.86	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
438	6-41	1/1/2005	663.70	10.00	653.70	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	Evidence	None	None	CA 1-2	2	2	4	$6,500	$3,500
439	6-38	1/1/2005	665.12	14.00	651.12	Junction	Bolt Down	26		4	Precast Concrete		Ponding	Complete					CA 1-2	2	2	4	$6,500	$3,500
441	6-15	1/1/2005	666.56	10.20	656.36	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
442	6-14	1/1/2005	665.25	11.10	654.15	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
443	6-13	1/1/2005	665.79	14.40	651.39	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	None	None	CA 1-2	2	2	4	$6,500	$3,500
451	6-28	1/1/2005	664.56	13.20	651.36	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	2	4	$6,500	$3,500
459	6-32	1/1/2005	666.04	14.70	651.34	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete				.25 - 1 GPM	CA 1-2	2	2	4	$6,500	$3,500
460	6-33	1/1/2005	662.56	12.50	650.06	Junction	Bolt Down	26	Brick	4	Precast Concrete	Plastic	None	Complete	Evidence	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
466	6-34	1/1/2005	666.31	11.40	654.91	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None		None	CA 1-2	2	2	4	$6,500	$3,500
468	6-23	1/1/2005	0.00	14.00	0.00	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	2	4	$6,500	$3,500
469	6-24	1/1/2005	666.14	11.60	654.54		Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	2	4	$6,500	$3,500
475	6-29	1/1/2005	666.80	14.40	652.40	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	2	4	$6,500	$3,500
476	5-19	1/1/2003	663.23	8.00	655.23	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
480	5-15	1/1/2003	0.00	0.00	0.00	Junction	Solid	0	Cast Iron	4	Precast Concrete			Complete			Evidence		CA 1-2	2	2	4	$6,500	$3,500
481	5-14	1/1/2003	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
482	5-5	1/1/2003	660.72	11.90	648.82	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
485	5-8	1/1/2003	660.18	9.90	650.28	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
489	5-12	1/1/2003	661.95	8.40	653.55	Junction	Solid	26		4	Precast Concrete	Plastic		Complete	None	None		None	CA 1-2	2	2	4	$6,500	$3,500
492	3-166	1/1/2005	662.78	13.50	649.28	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	2	4	$6,500	$3,500
494	2-24	1/1/1996	663.09	7.90	655.19	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	< 0.25 GPM	CA 1-2	2	2	4	$6,500	$3,500
495	2-25	1/1/1996	662.45	6.00	656.45	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete		None			CA 1-2	2	2	4	$6,500	$3,500
506	3-121	1/1/2004	661.17	11.20	649.97	Junction	Bolt Down	0		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
507	3-116	1/1/2004	660.88	11.00	649.88	Junction	Bolt Down	0		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
508	3-104	1/1/2004	660.97	10.50	650.47	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	< 0.25 GPM	CA 1-2	2	2	4	$6,500	$3,500
509	3-117	1/1/2004	660.72	10.50	650.22	Junction	Bolt Down	0		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
510	3-118	1/1/2004	662.56	10.70	651.86	Junction	Solid	0	Brick	4	Precast Concrete	Plastic	None	Complete			Evidence		CA 1-2	2	2	4	$6,500	$3,500
531	3-134	1/1/2004	0.00	9.67	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
534	3-137	1/1/2004	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
535	3-138	1/1/2004	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	2	4	$6,500	$3,500
536	3-139	1/1/2004	671.93	12.10	659.83	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
539	3-142	1/1/2004	672.17	11.40	660.77	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
540	3-143	1/1/2004	672.92	11.00	661.92	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
541	3-144	1/1/2004	673.07	11.50	661.57	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
543	3-128	1/1/2004	668.56	13.50	655.06	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
544	3-127	1/1/2004	665.39	11.00	654.39	Drop	Bolt Down	0	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
545	3-126	1/1/2004	664.19	11.10	653.09	Junction	Bolt Down	0		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
546	3-125	1/1/2004	664.40	11.60	652.80	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
547	3-124	1/1/2004	664.74	12.50	652.24	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
548	3-123	1/1/2004	664.83	13.80	651.03	Junction	Bolt Down	0	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
549	3-122	1/1/2004	664.90	13.90	651.00	Junction	Solid	0		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
551	6-101	1/1/1992	663.93	14.00	649.93	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence				CA 1-2	2	2	4	$6,500	$3,500
563	4-104	1/1/2005	666.90	9.50	657.40	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
564	4-107	1/1/2005	667.22	8.80	658.42	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
565	4-105	1/1/2005	666.73	8.00	658.73	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
566	4-106	1/1/2005	666.85	7.00	659.85	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
567	4-108	1/1/2005	662.56	7.00	655.56	Junction	Bolt Down	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
570	2-90	1/1/1989	666.61	12.90	653.71	Junction	Solid	24	Block	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	2	4	$6,500	$3,500
572	3-84	1/1/1999	662.64	12.70	649.94	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
573	3-90	1/1/1999	0.00	11.30	0.00	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	2	4	$6,500	$3,500
583	3-83	1/1/1999	0.00	15.00	0.00	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete				.25 - 1 GPM	CA 1-2	2	2	4	$6,500	$3,500
585	3-103	1/1/2004	661.25	12.00	649.25	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
601	6-57	1/1/1993	665.79	14.40	651.39	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	1 - 10 GPM	CA 1-2	2	2	4	$6,500	$3,500
602	1-47	1/1/2010	0.00	6.20	0.00	Junction	Solid	26	Brick	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
604	1-45	1/1/2008	666.71	9.70	657.01	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	PVC	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
605	1-44	1/1/2008	666.03	9.30	656.73	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
606	1-76	1/1/2009	666.21	7.10	659.11	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	2	4	$6,500	$3,500
607	1-65	1/1/2009	666.05	6.50	659.55	Junction	Bolt Down	26	HDPE	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
614	2-91	1/1/1989	666.40	11.10	655.30	Junction	Solid	24	Block	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
618	2-88	1/1/1989	667.15	14.30	652.85	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
619	2-88A	1/1/1989	665.96	12.10	653.86	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	.25 - 1 GPM	CA 1-2	2	2	4	$6,500	$3,500
625	5-72	1/1/2005	0.00	11.10	0.00	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
626	5-73	1/1/2005	662.48	12.70	649.78	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
627	5-74	1/1/2005	662.13	12.70	649.42	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
628	5-75	1/1/2005	662.11	14.00	648.11	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
632	3-41A	1/1/2000	663.97	6.80	657.17		Solid	24	Precast Concrete	4	Precast Concrete	Cast Iron	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
633	1-16A	1/1/2000	665.69	8.80	656.89	Junction	Vented	22	Concrete	4	Precast Concrete	HDPE	Sheeting	Complete					CA 1-2	2	2	4	$6,500	$3,500
637	1-2	1/1/2010	656.63	9.50	647.13	Junction	Solid	26	Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
639	1-63	1/1/2010	665.80	9.10	656.70	Junction	Bolt Down	26	HDPE	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
641	1-62	1/1/2010	0.00	9.40	0.00	Junction	Solid	26	HDPE	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
646	1-66	1/1/2009	665.67	5.50	660.17	Junction	Bolt Down	26	HDPE	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
647	1-48	1/1/2010	666.32	5.20	661.12	Junction	Solid	24		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
648	1-73	1/1/2009	666.82	9.20	657.62	Junction	Bolt Down	26		4	Precast Concrete	Precast Concrete	Sheeting	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
649	1-74	1/1/2009	666.65	8.40	658.25	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
652	2-54A	1/1/1996	663.66	4.50	659.16	Junction	Vented	21	Brick	3	Brick	Cast Iron	Ponding	Complete	None	None	None	None	CA 1-2	4	1	4	$6,500	$3,500
653	2-27A	1/1/1993	662.69	9.50	653.19	Junction	Solid	22	Precast Concrete	4	Precast Concrete	Cast Iron	None	Complete	None	None	None	None	CA 1-2	2	2	4	$6,500	$3,500
49	1-54	1/1/1992	670.92	7.60	663.32	Junction	Vented	23		4	Precast Concrete	Cast Iron	Ponding	Complete	None	None	None	Evidence	CA 3	3	1	3	$6,500	$3,500
100	2-49A	1/1/1950	664.41	5.60	658.81	Junction	Solid	20	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	Evidence	CA 1-2	3	1	3	$6,500	$3,500
101	3-63	1/1/1950	663.99	8.00	655.99	Junction	Bolt Down	24	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	1	3	$6,500	$3,500
154	3-3	1/1/1950	657.08	5.80	651.28	Junction	Solid	22		4	Precast Concrete	Cast Iron	Ponding	Complete	None	None		Evidence	CA 1-2	3	1	3	$6,500	$3,500
200	2-99	1/1/1989	666.28	7.00	659.28	Junction	Vented	22	Block	4	Block	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	3	1	3	$6,500	$3,500
208	2-97	1/1/1950	664.18	8.80	655.38	Junction	Solid	22	Block	4	Liner Material		Sheeting	Complete	None	Evidence	Evidence	Evidence	CA 1-2	3	1	3	$6,500	$3,500
342	1-96	1/1/1950	662.98	4.50	658.48	Junction	Solid	26	Brick	4	Precast Concrete	Plastic	None	Complete	Evidence	None	Evidence	None	CA 1-2	3	1	3	$6,500	$3,500
344	1-99	1/1/1950	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	3	1	3	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
479	5-16	1/1/2003	662.62	9.90	652.72	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 3	3	1	3	$6,500	$3,500
579	3-62	1/1/1950	663.37	8.00	655.37	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	3	1	3	$6,500	$3,500
580	3-64	1/1/1950	663.37	7.00	656.37	Junction	Bolt Down	26	Block	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	1	3	$6,500	$3,500
590	1-25	1/1/1950	662.48	5.60	656.88	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	1	3	$6,500	$3,500
631	3-63A	1/1/1950	662.90	5.20	657.70	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	3	1	3	$6,500	$3,500
3	3-92	1/1/1999	661.55	9.00	652.55	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
4	3-93	1/1/1999	661.86	9.00	652.86	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
5	3-94	1/1/1999	662.20	8.80	653.40	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
6	3-88	1/1/1999	662.37	9.80	652.57	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
7	3-89	1/1/1999	662.23	8.40	653.83	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
29	6-72	1/1/1999	664.31	8.90	655.41	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
30	6-75	1/1/1999	665.09	5.50	659.59	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
31	6-77	1/1/1999	666.31	9.00	657.31	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
32	6-80	1/1/1999	666.02	6.60	659.42	Drop	Solid	2		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
37	5-69	1/1/2005	0.00	7.40	0.00	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
38	5-70	1/1/2005	662.66	9.90	652.76	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
48	1-55	1/1/1992	668.13	7.70	660.43	Junction	Solid	22	Precast Concrete	4	Liner Material	Plastic	None	Complete	None	None	None	.25 - 1 GPM	CA 1-2	2	1	2	$6,500	$3,500
50	1-57	1/1/1992	666.28	4.80	661.48	Junction	Solid	22	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
51	1-58	1/1/1992	669.28	5.90	663.38	Junction	Vented	22	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
52	1-53	1/1/1992	666.05	0.00	0.00	Junction	Solid	23		4	Precast Concrete			Not Found					CA 1-2	2	1	2	$6,500	$3,500
125	3-39	1/1/2013	654.85	6.50	648.35	Drop	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
182	4-43	1/1/2005	664.19	9.00	655.19	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
187	4-50	1/1/2005	665.86	8.70	657.16	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	Evidence		CA 1-2	2	1	2	$6,500	$3,500
188	4-49	1/1/2005	667.35	8.60	658.75	Junction	Solid	26	Precast Concrete	4	Precast Concrete		Ponding	Complete			Evidence		CA 1-2	2	1	2	$6,500	$3,500
189	4-48	1/1/2005	667.19	9.00	658.19	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
197	6-80A	1/1/1999	666.00	5.80	660.20	Junction	Solid	26	Brick	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
198	2-93A	1/1/1989	667.30	7.60	659.70	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
199	2-93	1/1/1989	667.10	9.00	658.10	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
201	2-92	1/1/1989	666.27	9.50	656.78	Junction	Vented	26		4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
209	5-34	1/1/2005	662.43	8.70	653.73	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	< 0.25 GPM	CA 1-2	2	1	2	$6,500	$3,500
210	5-33	1/1/2005	661.98	8.70	653.28	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
227	6-93	1/1/1993	664.77	9.00	655.77	Junction	Solid	26		4	Precast Concrete	Precast Concrete	Ponding	Complete	Evidence	< 0.25 GPM	None	None	CA 1-2	2	1	2	$6,500	$3,500
228	6-94	1/1/1993	664.93	8.90	656.03	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	< 0.25 GPM	< 0.25 GPM	None	CA 1-2	2	1	2	$6,500	$3,500
245	5-67	1/1/2005	660.09	9.50	650.59	Junction	Solid	26	Block	4	Precast Concrete	Plastic	None	Complete				.25 - 1 GPM	CA 1-2	2	1	2	$6,500	$3,500
246	5-68	1/1/2005	657.23	5.70	651.53	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
250	2-101	1/1/1989	661.72	6.80	654.92	Junction	Vented	26		4	Precast Concrete	Plastic	None	Complete	None	None		None	CA 1-2	2	1	2	$6,500	$3,500
259	2-94	1/1/1989	668.75	9.10	659.65	Drop	Bolt Down	26		4	Precast Concrete	Concrete	None	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
261	6-47	1/1/1992	667.23	6.70	660.53	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
315	4-93	1/1/2000	665.33	9.80	655.53	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
319	4-97	1/1/2000	665.85	8.70	657.15	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
320	4-98	1/1/2000	665.21	8.10	657.11	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
321	4-99	1/1/2000	666.08	8.00	658.08	Junction	Solid	26		4	Precast Concrete	Precast Concrete	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
322	4-100	1/1/2000	666.44	7.90	658.54	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
323	4-101	1/1/2000	666.51	7.60	658.91	Junction	Solid	26		4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
324	4-102	1/1/2000	666.97	7.20	659.77	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete		Evidence			CA 1-2	2	1	2	$6,500	$3,500
327	4-60	1/1/2000	665.31	5.98	659.33		Solid	26		4	Precast Concrete		Ponding	Complete					CA 1-2	2	1	2	$6,500	$3,500
328	4-59	1/1/2000	663.93	5.80	658.13	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
329	4-58	1/1/2000	665.76	8.60	657.16	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
338	4-73	1/1/2000	665.89	9.30	656.59	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
347	1-93	1/1/1989	667.23	4.90	662.33	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	PVC	None	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
348	1-92	1/1/1989	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	1	2	$6,500	$3,500
349	1-91	1/1/1989	666.33	5.10	661.23	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
354	4-30	1/1/2003	666.15	9.30	656.85	Junction	Solid	26	Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
355	3-150	1/1/1970	663.65	8.90	654.75	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence		Evidence		CA 1-2	2	1	2	$6,500	$3,500
356	3-149	1/1/1970	664.36	9.80	654.56	Junction	Bolt Down	26	Block	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
371	4-10	1/1/2000	665.15	9.90	655.25	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
375	4-20	1/1/2000	668.67	9.30	659.37	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
379	4-15	1/1/2000	669.49	9.20	660.28	Junction	Solid	26	Block	4	Precast Concrete	Precast Concrete	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
380	4-25	1/1/2000	670.63	7.60	663.03	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
381	4-24	1/1/2000	671.76	9.90	661.86	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
391	6-63	1/1/1993	666.01	8.90	657.11	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete				1 -10 GPM	CA 1-2	2	1	2	$6,500	$3,500
392	6-64	1/1/1993	666.36	7.80	658.56	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	.25 - 1 GPM	CA 1-2	2	1	2	$6,500	$3,500
393	6-65	1/1/1993	666.34	7.00	659.34	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
394	6-67	1/1/1993	666.08	9.20	656.88	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence	None	None	>10 GPM	CA 1-2	2	1	2	$6,500	$3,500
395	6-68	1/1/1993	665.45	8.00	657.45	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
396	6-69	1/1/1993	665.13	6.90	658.23	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
429	5-39	1/1/2005	662.85	9.50	653.35	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Ponding	Complete	Evidence				CA 1-2	2	1	2	$6,500	$3,500
430	5-40	1/1/2005	662.28	8.40	653.88	Junction	Bolt Down	26	Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500

Asset ID Information		Asset Inventory Information												Inspection Data									Asset Renewal Costs	
GIS OBJECT ID	Asset ID	Install Date	Rim Elevation	Depth	Invert Elevation	MH Type	Cover Type	Cover Dia (ft)	Chimney Material	MH Dia (ft)	MH Wall Material	Steps Material	Potential Runoff	Inspection Status	Cover IQ	Frame IQ	Chimney IQ	Wall IQ	Condition Rating	POF	COF	BRE	Replacement Costs	Rehabilitation Costs
431	5-35	1/1/2005	662.69	8.30	654.39	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	< 0.25 GPM	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
440	6-30	1/1/2005	664.68	8.50	656.18	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	1	2	$6,500	$3,500
467	6-35	1/1/2005	665.47	8.90	656.57	Junction	Bolt Down	26		4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None		None	CA 1-2	2	1	2	$6,500	$3,500
470	6-25	1/1/2005	665.15	8.90	656.25	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	1	2	$6,500	$3,500
477	5-18	1/1/2003	662.30	7.70	654.60	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	< 0.25 GPM	None	CA 1-2	2	1	2	$6,500	$3,500
478	5-17	1/1/2003	661.67	7.70	653.97	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
483	5-6	1/1/2003	660.03	7.90	652.13	Junction	Solid	26		4	Precast Concrete	Plastic	Ponding	Complete	None	None		None	CA 1-2	2	1	2	$6,500	$3,500
487	5-10	1/1/2003	661.55	9.40	652.15	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	1	2	$6,500	$3,500
488	5-11	1/1/2003	661.01	8.40	652.61	Junction	Solid	26		4	Precast Concrete	Plastic	Sheeting	Complete	None	None		None	CA 1-2	2	1	2	$6,500	$3,500
490	6-95	1/1/1993	665.95	8.90	657.05	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	< 0.25 GPM	None	None	CA 1-2	2	1	2	$6,500	$3,500
491	6-96	1/1/1993	665.71	7.50	658.21	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	< 0.25 GPM		Evidence	CA 1-2	2	1	2	$6,500	$3,500
493	3-165	1/1/2005	663.38	8.90	654.48	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	1	2	$6,500	$3,500
499	3-98	1/1/2004	663.23	7.50	655.73	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
500	3-97	1/1/2004	0.00	7.00	0.00	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
501	3-96	1/1/2004	661.43	6.60	654.83	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
502	3-95	1/1/1999	662.04	7.80	654.24	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete				Evidence	CA 1-2	2	1	2	$6,500	$3,500
503	3-99	1/1/2004	663.48	8.50	654.98	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
504	3-100	1/1/2004	661.46	5.00	656.46	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
505	3-101	1/1/2004	662.10	5.10	657.00	Junction	Bolt Down	26		4	Precast Concrete	Precast Concrete	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
511	3-119	1/1/2004	660.83	9.40	651.43	Junction	Bolt Down	0		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
512	3-120	1/1/2004	660.77	7.80	652.97	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	1	2	$6,500	$3,500
513	3-105	1/1/2004	660.20	9.50	650.70	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
514	3-114	1/1/2004	660.87	9.00	651.87	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
515	3-115	1/1/2004	660.35	6.20	654.15	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
516	3-116A	1/1/2004	661.56	7.80	653.76	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
517	3-117A	1/1/2004	662.56	7.50	655.06	Junction	Bolt Down	26	Brick	4	Precast Concrete	Plastic	None	Complete	None	None	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
518	3-111	1/1/2004	664.16	9.30	654.86	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
519	3-112	1/1/2004	663.91	8.70	655.21	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
520	3-113	1/1/2004	663.83	8.20	655.63	Junction	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
521	3-109	1/1/2004	662.87	9.20	653.67	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
522	3-110	1/1/2004	662.18	8.00	654.18	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
523	3-108	1/1/2004	661.65	9.10	652.55	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
524	3-107	1/1/2004	661.38	9.50	651.88	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
525	3-106	1/1/2004	0.00	9.10	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
532	3-135	1/1/2004	672.21	9.90	662.31	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
533	3-136	1/1/2004	670.74	8.30	662.44	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
537	3-140	1/1/2004	0.00	7.50	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
538	3-141	1/1/2004	0.00	0.00	0.00	Junction		0		4	Precast Concrete			Not Found					CA 1-2	2	1	2	$6,500	$3,500
542	3-145	1/1/2004	671.61	8.60	663.01	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
550	6-103	1/1/1992	661.13	9.00	652.13	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
552	6-79	1/1/1999	666.43	7.90	658.53	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	None	None	Evidence	CA 1-2	2	1	2	$6,500	$3,500
553	6-78	1/1/1999	666.26	8.50	657.76	Junction	Solid	26		4	Precast Concrete	Plastic	None	Complete	None	Evidence	None	None	CA 1-2	2	1	2	$6,500	$3,500
554	6-76	1/1/1999	665.61	5.10	660.51	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
555	6-73	1/1/1999	665.42	9.30	656.12	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
556	6-74	1/1/1999	665.61	8.70	656.91	Junction	Solid	26	Block	4	Precast Concrete	Plastic	None	Complete	None	Evidence	None	None	CA 1-2	2	1	2	$6,500	$3,500
560	6-45	1/1/1992	666.72	8.40	658.32	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
561	6-48	1/1/1992	666.95	5.00	661.95	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	Evidence	Evidence	None	CA 1-2	2	1	2	$6,500	$3,500
568	4-109	1/1/2005	667.28	6.80	660.48	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
569	4-110	1/1/2005	0.00	6.30	0.00	Drop	Bolt Down	26		4	Precast Concrete	Plastic	None	Complete	Evidence				CA 1-2	2	1	2	$6,500	$3,500
584	3-102	1/1/2004	661.28	3.90	657.38	M Discharg	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete					CA 1-2	2	1	2	$6,500	$3,500
609	3-161	1/1/1970	661.73	5.80	655.93	Junction	Vented	24		4	Precast Concrete	Plastic	Sheeting	Complete	< 0.25 GPM	Evidence	None	None	CA 1-2	2	1	2	$6,500	$3,500
610	3-162	1/1/1970	661.31	4.70	656.61	Junction	Vented	24		4	Precast Concrete	Plastic	Sheeting	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
611	3-163	1/1/1970	661.00	2.90	658.10	Junction	Solid	24	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	.25 - 1 GPM	CA 1-2	2	1	2	$6,500	$3,500
612	3-164	1/1/1970	660.77	3.30	657.47	Junction	Solid	24	Block	4	Precast Concrete		Ponding	Complete	None	Evidence	None	None	CA 1-2	2	1	2	$6,500	$3,500
616	2-85	1/1/1989	666.18	8.00	658.18	Junction	Solid	24	Block	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
617	2-84	1/1/1999	667.39	8.50	658.89	Junction	Solid	24	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
621	6-105	1/1/1999	664.87	9.40	655.47	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Sheeting	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
622	6-106	1/1/1999	665.23	8.60	656.63	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	Evidence	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
654	5-76	1/1/2003	658.03	9.60	648.43	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	None	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
655	5-77	1/1/2003	659.35	9.80	649.55	Junction	Solid	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	Complete	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
623	3-15A	4/1/2015	0.00	8.30	0.00	Junction	Bolt Down	26	Precast Concrete	4	Precast Concrete	Plastic	Ponding	New-Uninspected	None	None	None	None	CA 1-2	2	1	2	$6,500	$3,500
																						Total	$4,430,500	$2,387,500

Force Mains

Asset ID Information		Asset Inventory Information						Faciltiy Data	Asset Criticality			Asset Renewal Cost	
GIS OBJECT ID	Asset ID	Install Date	Length	Diameter	Material	US RIM	DS RIM	Lift Station Name	POF	COF	BRE	Replacement $/Ft	Replacement Costs
11	FM-0011	1/1/1992	5344	6	Plastic	0.00	0.00	PS-1 Ann Arbor Rd FM	4	4	16	$ 75.00	$ 400,779.18
12	FM-0012	1/1/2004	4741	6	Plastic	0.00	662.35	PS-2 Arbor Chase FM	4	2	8	$ 75.00	$ 355,547.98
5	FM-0005	1/1/2003	2521	6	Plastic	0.00	0.00	PS-3 Dundee Ridge FM	4	2	8	$ 75.00	$ 189,068.63
8	FM-0008	1/1/2004	18	4	Plastic	0.00	661.28	PS-4 Golf FM	4	1	4	$ 60.00	$ 1,080.10
4	FM-0004	1/1/2005	1467	4	Plastic	0.00	662.56	PS-5 Oak St FM	2	1	2	$ 60.00	$ 88,015.29
18	FM-0014	1/1/1989	1741	6	DIP	0.00	665.40	PS-6 Rawson Street FM	6	6	36	$ 75.00	$ 130,539.36
17	FM-0673	1/1/2002	20	4	Plastic	666.15	0.00	PS-7 River Ridge FM	4	1	4	$ 60.00	$ 1,220.96
7	FM-0007	1/1/1999	46	4	Plastic	0.00	664.67	PS-8 1st Street FM	4	1	4	$ 60.00	$ 2,740.81
6	FM-0006	1/1/1999	665	6	Plastic	0.00	666.87	PS-9 Waterstadt PS FM	5	4	20	$ 75.00	$ 49,872.15
		Total	**16,562**	**Feet**								**Total**	**1,219,000.00**

CURRENT YEAR 2016

Pump Stations	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Ann Arbor PS	**PS-1**		**West side Ann Arbor Road**	**1992**	**30591**	**5**	**2**	**3**	**4**	**10**		2026
Structures												
Wet Well	PS-1	Square	grass	1992		5	1	1	1	80	76	2092
Valve Vault / Enclosure		Valve Vault	grass	1992		5	1	1	1	80	76	2092
Site												
Access Drive		HMA	Yard	1992		5	1	1	1	20	20	2036
Site Fence		6' Chain Link	Perimeter	1992		5	1	1	1	20	16	2032
Pumps												
Pump 1		Submersible	Wet Well	2014	1870	1	1	1	1	30	28	2044
Pump 2		Submersible	Wet Well	2016	500	1	1	1	1	30	30	2046
Process												
Piping		Ductile iron	Valve Vault	1992		5	5	3	5	40	36	2052
Valves			Valve Vault	1992		5	5	3	5	10	6	2022
Controls												
Enclosure		Stainless steel.(Weather proof enclosure installed in 2015)	Rack	1992		2	1	1	1	15	1	2017
Panel			Enclosure	1992		2	1	1	1	20	1	2017
Electrical												
Disconnect			Enclosure	1992		4	1	1	1	10	1	2017
Backup Generator		Kohler 39 kW	NA	-	21	-	-	-	-	-	-	-

Information Fact Sheet for Lift Station PS-1 Ann Arbor Rd
PS Location: Ann Arbor Rd, north of Granite Drive


Description: Pump Station PS-1 is a duplex submersible pump station with a square precast concrete underground valve vault. The station serves a commercial and industrial area on the north part of the Village. The station was originally constructed in 1992 and currently discharges to the Rawson PS via a 6 inch plastic force main. Pump number 1 was recently replaced due to age and usage. This station is scheduled to have the second pump replaced and station valves inspected in the near future. Much of the upstream tributary area is currently undeveloped but experiences some infiltration. The controls and control cabinet are in good condition and are covered by a recently installed 6'x10' weather enclosure.

Deficiencies: Recently replaced pump #1.
Current Service Area: 665 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 6 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-1	ABS	200 gpm, 40 TDH	8/208/3
RSP2-PS-1	ABS	200 gpm, 40 TDH	8/208/3
MBP-PS-1	Main Breaker Panel		
MSCP-PS-1	Station Control Panel		
MFM1-PS-1	Magnetic Flow Meter		
CV1-PS-1	Check Valve Pump 1		
CV2-PS-1	Check Valve Pump 2		
PV1-PS-1	US Plug Valve Pump 1		
PV2-PS-1	US Plug Valve Pump 2		
PV3-PS-1	DS Plug Valve Pump 1		
PV4-PS-1	DS Plug Valve Pump 2		

Standby Power: Kohler 39 kW Natural Gas Generator
Remote Monitoring: No

CURRENT YEAR **2016**

Pump Stations	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Arbor Chase PS	**PS-2**		**End of Somersby St**	**2005**	**2102**	**2**	**2**	**1**	**1**	**30**		2046
Structures												
Wet Well	PS-2	Round	Concrete pad	2005		5	1	1	1	80	80	2096
Valve Vault / Enclosure		Enclosure	Concrete pad	2005		2	1	1	1	50	49	2065
Site												
Access Drive		Concrete	Yard	2005		3	3	1	1	35	35	2051
Site Fence		None		-	-	-	-	-	-	-		
Pumps												
Pump 1		Submersible	Wet Well	2005	2401	3	2	1	1	20	19	2035
Pump 2		Submersible	Wet Well	2005	1757	3	2	1	1	20	19	2035
Process												
Piping		Ductile iron	Enclosure	2005		2	1	1	1	50	49	2065
Valves			Enclosure	2005		2	1	1	1	20	19	2035
Controls												
Enclosure		Fiberglass	Enclosure	2005		2	1	1	1	50	49	2065
Panel			Enclosure	2005		2	1	1	1	20	14	2030
Electrical												
Disconnect			Enclosure	2005		2	1	1	1	20	14	2030
Backup Generator		Katolight - 80 Kw	NA	2005	152	2	1	1	1	20	14	2030

Information Fact Sheet for Lift Station PS-2 Arbor Chase
PS Location: End of Sommersby Street


Description: Pump Station PS- 2 is a small duplex submersible pump station with an above ground fiberglass valve and control enclosure. The station the first phase of a residential development located on the northeast side of the Village. The station was originally constructed in 2005 and currently discharges to the gravity sewers in Pennfield Street via a 6 inch plastic force main at manhole 2-30. There are no current defects at the station, although pump runtimes suggest there is infiltration in the area. The remainder of the site equipment is in good condition.

Deficiencies: Noticeable I/I.
Current Service Area: 183 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 12 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-2	Gorman-Rupp	325 gpm, 49 TDH	21/480/3
RSP2-PS-2	Gorman-Rupp	325 gpm, 49 TDH	21/480/3
MBP-PS-2	Main Breaker Panel		
MSCP-PS-2	Station Control Panel		
CV1-PS-2	Check Valve Pump 1		
CV2-PS-2	Check Valve Pump 2		
PV1-PS-2	US Plug Valve Pump 1		
PV2-PS-2	US Plug Valve Pump 2		
PV3-PS-2	DS Plug Valve Pump 1		
PV4-PS-2	DS Plug Valve Pump 2		
GEN-PS-2	Katolight Generator		

Standby Power: 80 kW Propane Generator w/ Propane Tank
Remote Monitoring: No

CURRENT YEAR **2016**

Pump Stations	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Dundee Ridge PS	**PS-3**		**Caribou Run and Elk Ridge Dr**	**2003**	**4186**	**2**	**2**	**1**	**1**	**30**		2046
Structures												
Wet Well	PS-3	Square	Concrete pad	2003		5	1	1	1	80	80	2096
Valve Vault / Enclosure		Enclosure	Concrete pad	2003		2	1	1	1	50	47	2063
Site												
Access Drive		Concrete	Yard	2003		4	2	4	1	40	37	2053
Site Fence		Wrought Iron	Perimeter	2003	-	6	7	7	4	5	5	2021
Pumps												
Pump 1		Submersible	Wet Well	2005	4564	3	2	1	1	20	19	2035
Pump 2		Submersible	Wet Well	2005	4464	3	2	1	1	20	19	2035
Process												
Piping		Ductile iron	Enclosure	2005		3	1	1	1	50	49	2065
Valves			Enclosure	2005		3	1	1	1	20	19	2035
Controls												
Enclosure		Fiberglass	Enclosure	2005		2	1	1	1	50	49	2065
Panel			Enclosure	2005		2	1	1	1	20	14	2030
Electrical												
Disconnect			Enclosure	2005		2	1	1	1	20	14	2030
Backup Generator		Cummins - 50 Kw	NA	2005	880	2	1	1	1	20	14	2030

Information Fact Sheet for Lift Station PS-3 Dundee Ridge
PS Location: East side of Caribou Run at Elk Ridge Drive


Description: Pump Station PS-3 is a duplex submersible pump station with an above ground fiberglass valve and control enclosure. The station serves a partially completed residential area on the northeast part of the Village. The station was originally constructed in 2003 and currently discharges to manhole 2-92 on Main Street, east of the RR tracks via a 6 inch plastic force main. The pumps and valves are in good condition, however recent motor issues have arisen leading to capacitor replacement. The controls and control cabinet are in good condition. Several of the sections in the site perimeter fencing are bent out of shape and may require replacement in the future.

Deficiencies: Damaged site fence and potential sinkhole under concrete slab over wet well.
Current Service Area: 180 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 9 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-3		396 gpm, 42 TDH	13/208/3
RSP2-PS-3		396 gpm, 42 TDH	13/208/3
MBP-PS-3	Main Breaker Panel		
MSCP-PS-3	Station Control Panel		
CV1-PS-3	Check Valve Pump 1		
CV2-PS-3	Check Valve Pump 2		
PV1-PS-3	US Plug Valve Pump 1		
PV2-PS-3	US Plug Valve Pump 2		
PV3-PS-3	DS Plug Valve Pump 1		
PV4-PS-3	DS Plug Valve Pump 2		
GEN-PS-3		50 kW	

Standby Power: 50 kW Diesel Generator
Remote Monitoring: No

CURRENT YEAR **2016**

Pump Stations	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Golf Ridge PS	**PS-4**		**Golf Ridge Dr and Henning St**	**2003**	**626**	**2**	**2**	**1**	**1**	**30**		2046
Structures												
Wet Well	PS-4	Square	Concrete pad	2003		5	1	1	1	80	80	2096
Valve Vault / Enclosure		Enclosure	Concrete pad	2003		2	1	1	1	50	47	2063
Site												
Access Drive		Concrete	Yard	2003		2	2	2	1	40	37	2053
Site Fence		None		-	-	-	-	-	-	-		
Pumps												
Pump 1		Submersible	Wet Well	2003	472	3	3	1	1	20	17	2023
Pump 2		Submersible	Wet Well	2016	-	1	2	1	1	20	20	2036
Process												
Piping		Ductile iron	Enclosure	2003		3	1	1	1	50	47	2063
Valves			Enclosure	2003		3	1	1	1	20	17	2033
Controls												
Enclosure		Fiberglass	Enclosure	2003		2	1	1	1	50	47	2063
Panel			Rack	2003		2	1	1	1	20	12	2028
Electrical												
Disconnect			Enclosure	2003		2	1	1	1	20	12	2028
Backup Generator		Cummins - 50 Kw	NA	2003	646.7	2	1	1	1	20	12	2028

Information Fact Sheet for Lift Station PS-4 Golf Ridge
PS Location: North side of Henning Street at Golf Ridge Drive


Description: Pump Station PS-4 is a duplex submersible pump station with an above ground fiberglass valve and control enclosure. The station serves a partially completed residential area on the southeast part of the Village. The station was originally constructed in 2003 and currently discharges to manhole 3-102 adjacent to the station via a 4 inch plastic force main. The station valves are in good condition. The controls and control cabinet are in good condition. There have been some issues with pump run times in this area. High usage has already led to the replacement of one of the pumps.

Deficiencies: None
Current Service Area: 48 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 8 feet Square
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-4		86 gpm, 22 TDH	2.7/240/3
RSP2-PS-4		86 gpm, 22 TDH	2.7/240/3
MBP-PS-4	Main Breaker Panel		
MSCP-PS-4	Station Control Panel		
CV1-PS-4	Check Valve Pump 1		
CV2-PS-4	Check Valve Pump 2		
PV1-PS-4	US Plug Valve Pump 1		
PV-2-PS-4	US Plug Valve Pump 2		
PV3-PS-4	DS Plug Valve Pump 1		
PV4-PS-4	DS Plug Valve Pump 2		
GEN-PS-4		50 kW	

Standby Power: 50 kW Natural Gas Generator
Remote Monitoring: No

CURRENT YEAR **2016**

Pump Stations	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Oak St PS	**PS-5**		**Oak St S. of Roosevelt St**	**1999**	**1513**	**2**	**2**	**1**	**1**	**30**		2046
Structures												
Wet Well	PS-5	Round	Concrete pad	1999		5	1	1	1	80	80	2096
Valve Vault / Enclosure		Enclosure	Concrete pad	1999		2	1	1	1	50	43	2059
Site												
Access Drive		Concrete	Yard	1999		4	2	4	1	40	33	2049
Site Fence		6' Wooden Fence	Perimeter	1999		6	3	5	1	5	5	2021
Pumps												
Pump 1		Submersible	Wet Well	1999	1598	3	2	1	1	20	13	2029
Pump 2		Submersible	Wet Well	1999	869	3	2	1	1	20	13	2029
Process												
Piping		Ductile iron	Enclosure	1999		3	1	1	1	50	43	2059
Valves			Enclosure	1999		3	1	1	1	20	13	2029
Controls												
Enclosure		Fiberglass	Enclosure	1999		4	1	1	1	50	43	2059
Panel			Rack	1999		2	1	1	1	20	8	2024
Electrical												
Disconnect			Enclosure	1999		2	1	1	1	20	8	2024
Backup Generator		None - receptacle.	NA	-	-	-	-	-	-	-	-	-

Information Fact Sheet for Lift Station PS-5 Oak St
PS Location: East side of Oak Street south of Roosevelt Street


Description: Pump Station PS-5 is a duplex submersible pump station with an above ground fiberglass valve and control enclosure. The station serves a handful of properties on Oak Street south of Roosevelt Street. The station was originally constructed in 1999 and currently discharges to manhole 3-59 in Oak Street north of Country Heritage via 4 inch plastic force main. The pumps and valves are in good condition. The controls and control cabinet are in good condition.

Deficiencies: None
Current Service Area: 2.6 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 10 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-5		100 gpm, 25 TDH	2.7/240/3
RSP2-PS-5		100 gpm, 25 TDH	2.7/240/3
MBP-PS-5	Main Breaker Panel		
MSCP-PS-5	Station Control Panel		
CV1-PS-5	Check Valve Pump 1		
CV2-PS-5	Check Valve Pump 2		
PV1-PS-5	US Plug Valve Pump 1		
PV2-PS-5	US Plug Valve Pump 2		
PV3-PS-5	DS Plug Valve Pump 1		
PV4-PS-5	DS Plug Valve Pump 2		

Standby Power: None - Receptacle
Remote Monitoring: No

CURRENT YEAR **2016**

Pump Stations	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Rawson PS	**PS-6**		**Rawson Place**	**2010**	**4025**	**2**	**2**	**1**	**1**	**30**		2046
Structures												
Wet Well	PS-6	Round	Concrete pad	1993		5	1	1	1	80	77	2093
Valve Vault / Enclosure		Brick Masonry Building	Concrete pad	2010		5	1	1	1	80	80	2096
Site												
Access Drive		Concrete	Yard	2010		2	2	2	1	40	40	2056
Site Fence		None		-	-	-	-	-	-	-		
Pumps												
Pump 1		Submersible	Wet Well	2010	4785	2	1	1	1	25	24	2040
Pump 2		Submersible	Wet Well	2010	4199	2	1	1	1	25	24	2040
Process												
Piping		Ductile iron	Enclosure	1993		3	1	1	1	50	37	2053
Valves			Enclosure	1993		2	1	1	1	20	7	2023
Controls												
Enclosure		Building	Building	2010		2	1	1	1	60	54	2070
Panel			Building	2010		2	1	1	1	20	19	2035
Electrical												
Disconnect			Building	2010		1	1	1	1	20	19	2035
Backup Generator		Generac - 8 Kw	NA	2010	52.5	1	1	1	1	20	19	2035

Information Fact Sheet for Lift Station PS-6 Rawson St
PS Location: Northwest corner of Rawson Street and Rawson Place


Description: Pump Station PS-6 is a duplex submersible pump station with a masonry building housing the valves and pumps. The station serves a gravity system for Research Park Dr and Dundee Meadows, in addition to also conveying the pumped flows from the Ann Arbor Road PS (PS-1). The station was reconstructed with new pumps and the masonry building in 2010 and currently discharges to manhole 2-83 in Ypsilanti Street via 4 inch plastic force main. The pumps and valves are in good condition. The controls and control cabinet are in good condition.

Deficiencies: None
Current Service Area: 48 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 10 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-6		310 gpm, 45 TDH	10/480/3
RSP2-PS-6		310 gpm, 45 TDH	10/480/3
MBP-PS-6	Main Breaker Panel		
MSCP-PS-6	Station Control Panel		
CV1-PS-6	Check Valve Pump 1		
CV2-PS-6	Check Valve Pump 2		
PV1-PS-6	US Plug Valve Pump 1		
PV2-PS-6	US Plug Valve Pump 2		
PV3-PS-6	DS Plug Valve Pump 1		
PV4-PS-6	DS Plug Valve Pump 2		
GEN-PS-6		8 kW	

Standby Power: 8 kW Natural Gas Generator
Remote Monitoring: No

CURRENT YEAR				2016								
Pump Stations	**Asset ID**	**Description**	**Location**	**Year Installed**	**Total Hours Operated**	**Condition Rating 1 - 10 Tab 1**	**Current Performance 1 - 5 Tab 1**	**Current Reliability 1 - 5 Tab 1**	**Availability of Parts 1 - 5 Tab 1**	**Judgement on Residual Life Years**	**Projected Remaining Life Years**	**Year to Replace**
River Ridge PS	**PS-7**		**River Ridge Dr and Brewer Rd**	**2003**	**1351**	**2**	**1**	**1**	**1**	**20**		2036
Structures												
Wet Well	PS-7	Round	Concrete pad	2003		5	1	1	1	80	80	2096
Valve Vault / Enclosure		Enclosure	Concrete pad	2003		2	1	1	1	50	47	2063
Site												
Access Drive		Concrete	Yard	2003		2	2	2	1	40	37	2053
Site Fence		None		-	-	-	-	-	-	-		
Pumps												
Pump 1		Submersible	Wet Well	2003	1473	3	2	1	1	20	17	2033
Pump 2		Submersible	Wet Well	2003	1256	3	2	1	1	20	17	2033
Process												
Piping		Ductile iron	Enclosure	2003		3	1	1	1	50	47	2063
Valves			Enclosure	2003		3	1	1	1	20	17	2033
Controls												
Enclosure		Fiberglass	Enclosure	2003		2	1	1	1	50	47	2063
Panel			Rack	2003		2	1	1	1	20	12	2028
Electrical												
Disconnect			Enclosure	2003		2	1	1	1	20	12	2028
Backup Generator		Cummins - 35 Kw	NA	2003	474.5	2	1	1	1	20	12	2028

Information Fact Sheet for Lift Station PS-7 River Ridge
PS Location: West side of River Ridge Drive south of Brewer Road

Description: Pump Station PS-7 is a duplex submersible pump station with an above ground fiberglass valve and control enclosure. The station serves a small residential development on the southwest corner of the Village. The station was originally constructed in 2003 and currently discharges to manhole 4-30, adjacent to the station via 4 inch plastic force main. The pumps and valves are in good condition. The controls and control cabinet are in good condition.

Deficiencies: None
Current Service Area: 53 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 6 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-7		165 gpm, 33 TDH	4/208/3
RSP2-PS-7		165 gpm, 33 TDH	4/208/3
MBP-PS-7	Main Breaker Panel		
MSCP-PS-7	Station Control Panel		
CV1-PS-7	Check Valve Pump 1		
CV2-PS-7	Check Valve Pump 2		
PV1-PS-7	US Plug Valve Pump 1		
PV2-PS-7	US Plug Valve Pump 2		
PV3-PS-7	DS Plug Valve Pump 1		
PV4-PS-7	DS Plug Valve Pump 2		
GEN-PS-7		35 kW	

Standby Power: 35 kW Diesel Generator
Remote Monitoring: No

CURRENT YEAR 2016

Pump Stations	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Village Park / 1st St PS	**PS-8**		**1st St and Roosevelt St**	**2004**	**689**	3	2	2	1	20		2036
Structures												
Wet Well	PS-8	Round	Concrete pad	2004		5	1	1	1	80	80	2096
Valve Vault / Enclosure	NA	Enclosure	Concrete pad	2004		3	1	1	1	45	45	2061
Site												
Access Drive	NA	Concrete	Yard	2004		3	2	2	1	40	38	2054
Site Fence		None		-	-	-	-	-	-	-		
Pumps												
Pump 1		Submersible	Wet Well	2004	789	5	3	2	1	10	10	2026
Pump 2		Submersible	Wet Well	2004	646	5	3	2	1	10	10	2026
Process												
Piping		Ductile iron	Enclosure	2004		3	1	1	1	50	48	2064
Valves			Enclosure	2004		3	1	1	1	20	18	2034
Controls												
Enclosure		Fiberglass	Enclosure	2004		3	1	1	1	50	48	2064
Panel			Rack	2004		2	1	1	1	20	13	2029
Electrical												
Disconnect			Enclosure	2004		2	1	1	1	20	13	2029
Backup Generator		Cummins - 35 Kw	NA	2004	72.3	2	1	1	1	20	13	2029

Information Fact Sheet for Lift Station PS-8 Village Park / 1st Street
PS Location: East Side of 1st, North of Roosevelt


Description: Pump Station PS-8 is a duplex submersible pump station with an above ground fiberglass valve and control enclosure. The station serves a small residential development in the southern portion of the Village, as well as the pumped flows from Golf Ridge PS (PS-4). The station was originally constructed in 2004 and currently discharges to manhole 3-82, adjacent to the station via 4 inch plastic force main. The pumps and valves are in good condition, although pump run times are higher than typical and may require closer monitoring. The controls and control cabinet are in good condition. There is a small sinkhole beginning along the station slab above the pipe connections to the wet well.

Deficiencies: Small sinkhole near enclosure slab.
Current Service Area: 22 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 8 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-8		275 gpm, 32 TDH	6.2/240/3
RSP2-PS-8		275 gpm, 32 TDH	6.2/240/3
MBP-PS-8	Main Breaker Panel		
MSCP-PS-8	Station Control Panel		
CV1-PS-8	Check Valve Pump 1		
CV2-PS-8	Check Valve Pump 2		
PV1-PS-8	US Plug Valve Pump 1		
PV2-PS-8	US Plug Valve Pump 2		
PV3-PS-8	DS Plug Valve Pump 1		
PV4-PS-8	DS Plug Valve Pump 2		
GEN-PS-8		35 kW	

Standby Power: 35 kW Natural Gas Generator
Remote Monitoring: No

CURRENT YEAR						2016								
Pump Stations	Type	Category	Asset ID	Description	Location	Year Installed	Total Hours Operated	Condition Rating 1 - 10 Tab 1	Current Performance 1 - 5 Tab 1	Current Reliability 1 - 5 Tab 1	Availability of Parts 1 - 5 Tab 1	Judgement on Residual Life Years	Projected Remaining Life Years	Year to Replace
Waterstradt PS			**PS-9**		**Waterstradt Dr and Powell Dr**	**1999**	**4873**	**2**	**1**	**1**	**1**	**20**		2036
Structures														
Wet Well			PS-9	Round	Concrete pad	1999		5	1	1	1	80	80	2096
Valve Vault / Enclosure				Enclosure	Concrete pad	1999		2	1	1	1	50	43	2059
Site														
Access Drive				Concrete	Yard	1999		2	2	2	1	40	33	2049
Site Fence				None		-	-	-	-	-	-	-		
Pumps														
Pump 1				Submersible	Wet Well	2015	5340	3	2	1	1	20	19	2035
Pump 2				Submersible	Wet Well	2014	4572	3	2	1	1	20	18	2034
Process														
Piping				Ductile iron	Enclosure	1999		3	1	1	1	50	43	2059
Valves					Enclosure	1999		3	1	1	1	20	13	2029
Controls														
Enclosure				Fiberglass	Enclosure	1999		3	1	1	1	50	43	2059
Panel					Rack	1999		2	1	1	1	20	8	2024
Electrical														
Disconnect					Enclosure	1999		2	1	1	1	20	8	2024
Backup Generator				Cummins - 85 Kw	NA	1999	320.3	2	1	1	1	20	8	2024

Information Fact Sheet for Lift Station PS-9 Waterstradt
PS Location: Northwest corner of Waterstradt Commerce Drive and Powell Drive


Description: Pump Station PS-9 is a duplex submersible pump station with an above ground fiberglass valve and control enclosure. The station serves nearly the entirety of the service area west of US-23, as well as the pumped flows from River Ridge PS (PS-7). The station was originally constructed in 1999 and upgraded in 2008 and currently discharges to manhole 1-56, adjacent to the station via 4 inch plastic force main. The pumps and valves are in good condition, as the pumps have both been replaced within the last several years. The station experiences some extended run times, and is frequently in need of cleaning from grease buildup, which may also impact the discharge force main. The controls and control cabinet are in good condition. There is a small sinkhole beginning along the station slab above the pipe connections to the wet well.

Deficiencies: None
Current Service Area: 400 acres
Avg Daily Flow gpm/cfs/acre: not available
Peak Flow gpm/cfs/acre : not available
Configuration: Duplex
Wet Well Diameter: 10 feet
Equipment:

Equipment	Manufacturer/Description	Rated Capacity	HP/Volts/Phase
RSP1-PS-9		750 gpm, 54 TDH	21/480/3
RSP2-PS-9		750 gpm, 54 TDH	21/480/3
MBP-PS-9	Main Breaker Panel		
MSCP-PS-9	Station Control Panel		
CV1-PS-9	Check Valve Pump 1		
CV2-PS-9	Check Valve Pump 2		
PV1-PS-9	US Plug Valve Pump 1		
PV2-PS-9	US Plug Valve Pump 2		
PV3-PS-9	DS Plug Valve Pump 1		
PV4-PS-9	DS Plug Valve Pump 2		
GEN-PS-9		85 kW	

Standby Power: 85 kW Natural Gas Generator
Remote Monitoring: No

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

Completion Date 10-31-2017
(no later than 3 years from executed grant date)

The Village of Dundee *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1204-01 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: Feb 16, 2017
2) Significant Progress Made: **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: **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:

Dave Uhl at 734-529-3430 duhl@villageofdundee.net
Name Phone Number Email

10/03/17
Signature of Authorized Representative (Original Signature Required) Date

Dave Uhl, Village Manager
Print Name and Title of Authorized Representative

City of East Grand Rapids
750 Lakeside Dr. SE, East Grand Rapids MI 49506 – www.eastgr.org
Mr. Doug La Fave, Assistant City Manager – (616)940-4817
SAW Grant # 1150-01

Summary of Sanitary Asset Management Plan

The City of East Grand Rapids SAW Grant included asset inventory, condition assessment, criticality rating, and business risk determination of the collection system. The total grant amount was $402,900, of which the City paid for 10% with a local match. The 10% match was accounted for through in kind activities. Overall, the system was in "fair 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 maintain the system and respond to emergencies. The rates that the City currently charges the users 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 ratings.

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 with the use of GIS as-built records, and coordination with the DPW Staff. The condition rating of the collection infrastructure was done by a person with PACP/MACP certification based on the 100 percent televising of the system. The lift stations were evaluated on the individual components that make up the lift station. This can include the below-grade structures, mechanical equipment, piping, HVAC, electrical, communications, etc. 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. The summary of the collection system ratings is shown below in Figure 1.

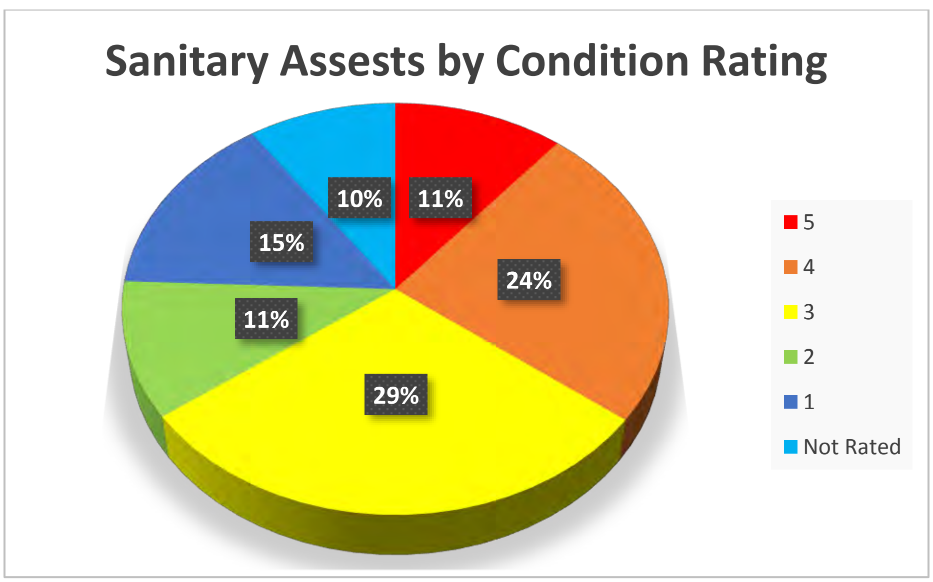


Figure 1-Sanitary Assets by Condition Rating

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. The summary of the business risk is shown below in Figure 2.

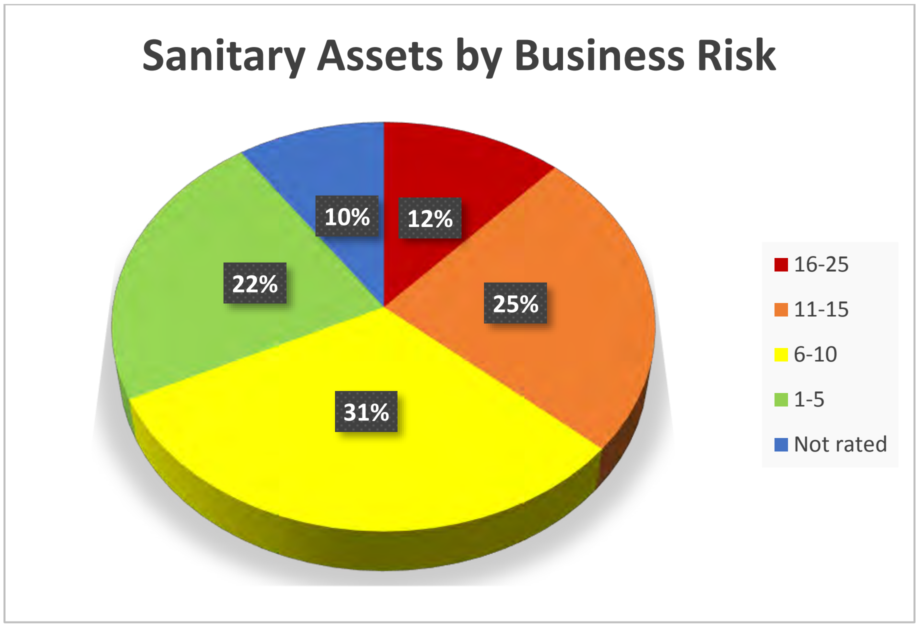


Figure 2- Sanitary Assets by Business Risk

Level of Service Determination

The East Grand Rapids Staff and Engineers had multiple discussions about the Level of Service Below is a summary of the Level of Service for the East Grand Rapids System:

1. THE PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT
2. MAINTAIN A SUSTAINABLE SYSTEM

Revenue Structure

It was determined that the revenue structure was adequate to support the operations and maintenance, as well as capital improvements planned through the SAW analysis. East Grand Rapids submitted the rate methodology to the DEQ and was approved on June 22, 2017. The City reviews rates annually and is aware that rate adjustments may be required in the future as additional projects are needed.

Capital Improvement Plan

Several assets that have been flagged for improvement based on that condition or business risk will be slated to be improved. While the sanitary 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 (based on business risk and if the priority has changed)
- CIPP Line Sewers based on hotspot map priority
- Replace gravity sewers in critical areas (if street project planned)
- Replace lift station assets (Based on condition of asset)

List of Major Assets:

Collection System

- 42 miles 8”-18” Gravity Piping
- Lift Stations (6)

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

Completion Date Noted as "End of October 2017"
(no later than 3 years from executed grant date)

The City of East Grand Rapids *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1150-01 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: June 22, 2017.
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:

Douglas William LaFave at 616-940-4817 dlafave@eastgr.org
Name Phone Number Email

[signature] 10/23/17
Signature of Authorized Representative (Original Signature Required) Date

Douglas William LaFave, Assistant City Manager
Print Name and Title of Authorized Representative

City of East Grand Rapids
750 Lakeside Dr. SE, East Grand Rapids MI 49506 – www.eastgr.org
Mr. Doug La Fave, Assistant City Manager – (616)940-4817
SAW Grant # 1150-01

Summary of Stormwater Asset Management Plan

The City of East Grand Rapids SAW Grant included asset inventory, condition assessment, criticality rating, and business risk determination of the stormwater collection system. The total grant amount was $402,900 of which the City paid for 10% with a local match. The 10% match was accounted for through in kind activities. Overall, the system was in "good health" and the City successfully collects and discharges stormwater 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.

Stormwater Collection System Inventory

The asset management spreadsheet for the stormwater collections system includes the gravity collection system and hydrodynamic separators. The spreadsheet was created with the use of GIS as-built records, and coordination with the DPW Staff. The condition rating 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 East Grand Rapids Staff and Engineers had multiple discussions about the Level of Service Below is a summary of the Level of Service for the East Grand Rapids System:

1. THE PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT
2. MAINTAIN A SUSTAINABLE SYSTEM

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 (10% per year)
- CIPP Line Sewers based on hotspot map priority
- Replace gravity sewers and catch basins in critical areas (if street project planned)

List of Major Assets:

Collection System

- 12”-66” Gravity Piping
- Approximately 1,500 Catch Basins
- 5-Hydrodynamic Separators

DEQ

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

Completion Due Date Noted as "End of October 2017"
(no later than 3 years from executed grant date)

The City of East Grand Rapids *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1150-01 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:

Douglas William LaFave at 616-940-4817 dlafave@eastgr.org
Name Phone Number Email

[signature] 10/23/17
Signature of Authorized Representative (Original Signature Required) Date

Douglas William LaFave, Assistant City Manager
Print Name and Title of Authorized Representative

WASTEWATER
ASSET MANAGEMENT PLAN

200-13045-15002

October 2017

410 Abbot Road
East Lansing, MI 48823

www.cityofeastlansing.com

Scott House, Director of Public Works
517-337-9459

SAW Grant Project Number 1398-01

Tetra Tech Project Number 200-13045-15002

EXECUTIVE SUMMARY

In 2014, the City of East Lansing (the City) was awarded a Stormwater, Asset Management, and Wastewater (SAW) grant by the Michigan Department of Environmental Quality (MDEQ) to prepare an Asset Management Plan (AMP) for the Water Resource Recovery Facility (WRRF) and sewage collection system. The City's SAW grant provided financial assistance to implement an Asset Management Plan (AMP), which is required by Part I.A.11 of NPDES Permit No. MI0022853.

As one of the aspects of the East Lansing SAW agreement, this AMP report provides the City with a proactive and sustainable long-term plan to help ensure the well-being of the community and the environment.

Five primary elements are highlighted by the AMP approach:

1. Asset Inventory
2. Level of Service
3. Asset Criticality
4. Capital Improvement Plan
5. Revenue Structure

Asset Inventory: Engineering survey data, in addition to contract drawings, other inventory-oriented information, collection system and WRRF condition assessments, and risk analysis and cost development were used as a basis for the plan. To aid in the AMP generation and analysis, as well as to simplify annual reporting needs, the inventory information gathered during the AMP generation 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 generated inventory system 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 replacement value of the assets evaluated at the WRRF is estimated at approximately $98.0 million. Table A summarizes the baseline system replacement value (in 2016 dollars) of these assets. Costs are based on the September 2016 Engineering News Record (ENR) Index of 10,403.

Table A-Baseline System Replacement Value of the WRRF

Location	Number of Assets	Baseline System Value (Current Replacement Cost)
Raw Sewage	33 assets, 452 ft. of process piping	$903,000
EQ Building	152 assets, 307 ft. of process piping	$4,571,000
South Blower/Flotation Building	98 assets, 1386 ft. of process piping	$3,240,000
Control Building	194 assets, 1663 ft. of process piping	$5,821,000
Grit Handling	30 assets, 948 ft. of process piping	$150,000
Primary Settling Tanks	164 assets, 5781 ft. of process piping	$14,531,000
Aeration Tanks	364 assets, 6282 ft. of process piping	$33,964,000
Secondary Settling Tanks	154 assets, 5179 ft. of process piping	$17,895,000
Tertiary Building	231 assets, 1215 ft. of process piping	$9,865,000
Truck Loading Facility	8 assets	$130,000
Old Chlorine Building	11 assets	$81,000
Ferric Chloride System	38 assets	$67,000
Sodium Hypochlorite Building	10 assets	$106,000
Polymer Feed	30 assets	$186,000
Pipe Galleries	115 assets, 2053 ft. of process piping	$1,914,000
UV Building	63 assets, 192 ft. of process piping	$1,994,000
Blower and Electrical Building (North)	45 assets	$1,396,000
Sludge Storage Tanks	19 assets	$304,000
Misc. Mechanical and Electrical	23 assets	$399,108
Heated Storage Garage	5 assets	$179,000
Tank Storage	5 assets	$179,000
Stair Enclosures	9 assets	$96,000
Total	**1814 assets, 25,458 ft. of process piping**	**$97,972,000**

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. Although the City has not stated specific sanitary sewer facility Level of Service goals that it would like to fulfill, common key performance indicators (KPIs) that may serve as said goals are depicted below in Table B.

Table B–Level of Service KPIs

Level of Service Key Performance Indicators
Reduce Basement Backups
Reduce Infiltration/Inflow rates and volumes
Capacity to Convey MDEQ design storm
Reduce Odor Complaints
Clean all sewers 24-inches in diameter or smaller at least once in 5-year period
Replace underperforming pump stations
Meet requirements of NPDES permit
Implement Equipment Inventory and Maintenance Tracking System

Asset Criticality: The evaluation of risk and consequence of failure is based on condition assessment information collected as part of this AMP. In many cases, inspections of assets were conducted to prepare condition assessment. However, in some cases, survey limitations (the inability to inspect submerged equipment, the inability to assess the operation of idle equipment, and a lack of access to some equipment) prevented the gathering of asset information. When an asset was not inspected, the condition was inferred based on the age of the asset and the condition of similar assets that were inspected. The intent is to transition all assets in the inventory model to the Lucity™ model.

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 is calculated using the following formula:

Consequence of Failure x (1 - Redundancy) x Probability of Failure = Business Risk Exposure

The Consequence of Failure (CoF) rating assigned to each asset represents the overall effect the failure of an asset will have on the rest of the wastewater operations.

The Probability of Failure (PoF) rating represents the overall likelihood that an asset will fail at any given moment. This rating accounts for an asset's condition, age, asset life and, if known, the nature of the utilization of the asset as well as any available maintenance history.

Redundancy (R) refers to the fact that additional capacity is often 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 a treatment process.

A BRE score was calculated for each asset. The asset inventory and BRE scores are included in Excel spreadsheets included in Appendices B and C. These BRE scores, combined with East Lansing staff experience, were used to develop a capital improvement plan.

Capital Improvement Plan: A 20-year capital improvement plan (Table C, below) was developed for both the collection system and the WRRF using the results of the inventory assessment methodology outlined in this AMP. The capital improvement plan identifies areas in the WRRF facility and collection system where Tetra Tech and HRC recommend funding be provided over the next 20 years. This capital improvement plan should be routinely updated to ensure that it includes short- and long-term needs. It will provide the City with defensible documentation for setting aside and safeguarding funds for projects. Costs are based on the September 2016 Engineering News Record (ENR) Index of 10,403.

Table C- City of East Lansing 20-Year Capital Improvement Plan (2017-2037)

Project No. (1)	Description	Project Year	Project Cost (2016 dollars, ENR index 10,403)		Funding Source
WRRF-1	Headworks Facility Improvements (Bid May, 2017; Under Construction). This project includes projects SCS 17-2 and WRRF-8, below)	2017	$	31,470,000	SRF Loan
SCS 17-2	Relief WWRF Influent Sewer (Included in project WRRF-1, above)	2017			Included in WRRF-1 SRF Loan, above
SCS 17-3	CSO Retention Treatment Basin, RTB Dewatering Pump Station Equipment Repair or Replacement	2017-2021	$	400,000	Capital Outlay
WRRF-10	Building Roof Repairs (Average $120,500 per year)	2017-2025	$	1,085,000	Capital Outlay
WRRF-11	Building Façade Repairs (Average $39,400 per year)	2017-2030	$	551,000	Capital Outlay
SCS 18-1	Replace Power Supply at Coleman Rd Pump Station	2018	$	10,000	Capital Outlay
SCS 19-1	Replace Woodingham Pump Station	2019	$	7,600,000	SRF Loan
SCS 19-2	Michigan Ave & Harrison Rd Improvements	2019	$	4,200,000	SRF Loan
SCS 19-3	Rehabilitate Critical Interceptors	2019	$	500,000	Capital Outlay
WRRF-2	Solids Handling Improvements	2019	$	7,431,000	SRF Loan
WRRF-3	Waste Activated Sludge Thickening Improvements	2019	$	3,216,000	SRF Loan
SCS 21-1	Rehabilitate Critical Interceptors	2021	$	450,000	SRF Loan
SCS 21-2	SSES studies in the Wilmarth and Taylor Drain areas (2)	2021	$	2,206,000	SRF Loan
WRRF-4	Gallery Piping and Ventilation Improvements	2021	$	2,615,000	TBD
SCS 21-3	Replace Pump Trains 1 & 2 at Coleman Rd Pump Sta.	2021	$	50,000	TBD
WRRF-5	Aeration Improvements	2022	$	13,530,000	TBD
SCS 22-1	Rehabilitate Burcham Park Interceptor Sewers	2022	$	350,000	TBD
SCS 22-2	Rehabilitate System Sewers-Phase I	2022	$	300,000	TBD
WRRF-6	Secondary Clarifier Improvements (Including improvements to the existing clarifiers plus two new clarifiers)	2025	$	19,450,000	TBD
SCS 25-1	Rehabilitate System Sewers-Phase II	2025	$	300,000	TBD
SCS 26-1	Replace Pumps at DPW Pump Station	2026	$	50,000	TBD

SCS 27-1	Replace Elm Street Sewer	2027	$	495,000	TBD
WRRF-7	Primary Clarifier Improvements	2028	$	9,445,000	TBD
SCS 28-1	Rehabilitate System Sewers-Phase III	2028	$	300,000	TBD
SCS 30-1	Rehabilitate Sewer Located in Grand River Alley	2028	$	800,000	TBD
WRRF-8	Chemical Feed Improvements (Included in project WRRF-1, above)	2017			Included in WRRF-1 SRF Loan, above
SCS 31-1	Rehabilitate System Sewers-Phase IV	2031	$	300,000	TBD
WRRF-9	EQ Basin Dewatering Pump Replacement	2034	$	2,955,000	TBD
SCS 34-1	Rehabilitate System Sewers-Phase V	2034	$	300,000	TBD
SCS 36-1	Replace Pumps 1 & 2 at Coleman Rd Pump Station	2036	$	30,000	TBD
SCS 37-1	Rehabilitate System Sewers-Phase IV	2037	$	300,000	TBD
SCS M1	Annual Cleaning and Televising (Average $250,000 per year)	2017-2037	$	5,000,000	TBD
		Total	**$**	**115,689,000**	

Notes: 1. The total amount in this CIP includes both the sewer collection system and WRRF projects.

2. Project SCS 21-2 includes SSES studies in the Wilmarth and Taylor Drain areas per the June 2008 Sanitary Sewer Master Plan Report which estimated these projects to costs $1,121,000 and $596,000, respectively, based on a 2008 ENR Index of 8,100. These costs are $1,440,000 and $766,000 escalated to September, 2016 ENR 10,403. Total SCS 21-2 project cost is therefore $2,206,000.

Revenue Structure: The Revenue Structure, included in Appendix D, includes the rate methodology used by the City of East Lansing to fund the asset management program. It documents that the revenue paid by each user class will recover all net East Lansing related operation, maintenance, replacement and capital expenses. The rates were reviewed and it was determined that there were sufficient funds to cover these expenses. It was determined that there is no funding gap.

Beginning in 2013, any major municipal wastewater system in the state of Michigan whose permit expired on October 1, 2012 or after is required to implement an asset management program. The Lucity™ AMS is designed to provide data which will be essential to completing annual MDEQ reporting requirements. The City will be required by its permit to submit reports including specific information regarding what capital improvement projects were completed, how much was spent on sewer cleaning, preventative maintenance, and other measures.

This AMP, inclusive of the Lucity™ AMS, is intended to assist City staff in operating, maintaining and upgrading the City's wastewater infrastructure efficiently and cost effectively. It will be a living document to help City staff manage the City's wastewater infrastructure.

CITY OF EAST LANSING

SAW ASSET MANAGEMENT PLAN

The City has purchased the Lucity Asset Management software program for implementing its formal asset management plan. The City has already begun inputting data on hundreds of sewer system components; WRRF processes and pieces of equipment; pumping stations; and other sewer collection and treatment components.

The SAW AMP included hundreds of individual components organized under the following general headings:

I. Water Resource Recovery Facility (WRRF)
- Raw Sewage Pump Station
- Equalization (EQ) Basin & Building
- Primary Settling Tanks
- Secondary Treatment Systems
- Tertiary Treatment System
- Disinfection System
- Solids Handling System
- Chemical Feed System
- General Building & Structures

II. Pumping Stations
- Woodingham Pump Station
- Coleman Road Pump Station
- DPW Pump Station

III. Retention Treatment Basin

IV. Sewer System (Separate Sanitary and Combined Sewer)

Pipe Size	**Feet**	**System Type**	**Pipe Size**	**Feet**	**System Type**
06	7,190.88	Sanitary	06	20,754.66	Combined
08	211,689.60	Sanitary	08	47,804.94	Combined
10	37,333.67	Sanitary	10	23,858.71	Combined
12	37,190.18	Sanitary	12	35,553.97	Combined
15	25,668.65	Sanitary	15	16,548.37	Combined
16	130.18	Sanitary	18	12,595.44	Combined

Pipe Size	Feet	System Type
18	25,100.53	Sanitary
20	1,367.80	Sanitary
21	6,680.30	Sanitary
24	32,824.11	Sanitary
27	3,870.10	Sanitary
30	664.15	Sanitary
32	512.19	Sanitary
33	5,015.22	Sanitary
36	9,806.03	Sanitary
42	1,250.68	Sanitary
48	6,236.97	Sanitary
54	5,884.57	Sanitary
60	2,814.23	Sanitary
	421,230.05	**Total**

Pipe Size	Feet	System Type
20	311.78	Combined
21	2,468.99	Combined
22	203.01	Combined
24	19,229.97	Combined
24x30	1,377.43	Combined
27	5,434.75	Combined
30	2,707.89	Combined
36	9,316.78	Combined
42	2,442.07	Combined
48	6,981.93	Combined
54	3,708.92	Combined
60	7,017.27	Combined
72	2,462.15	Combined
78	2,497.48	Combined
	223,276.49	**Total**

3,046 Manholes (1909 Sanitary/ 1137 Combined)
1068 Catch Basins (Combined)

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

Completion Date October 25, 2017
(no later than 3 years from executed grant date)

The City of East Lansing *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1398-01 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: February 16, 2017.
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:

Scott House at (517) 337-9459 shouse@cityofeastlansing.com
Name Phone Number Email

[signature] 10-25-2017
Signature of Authorized Representative (Original Signature Required) Date

Scott House, Director of Public Works
Print Name and Title of Authorized Representative

April 2017

Contact Person:
Joseph Merucci
Eastpointe City Hall
23200 Gratiot Avenue
Eastpointe, MI 48021
jmerucci@eastpointecity.org
586-204-3012

SAW Grant No. 1417-01

EXECUTIVE SUMMARY

The City of Eastpointe is home to over 34,000 residents in an area comprising 5.1 square miles. The majority of the City has a combined wastewater and stormwater system while the northeast corner of the city is served by a separated system. The separated system is located in the area from Nine Mile Road to Ten Mile Road and from Schroeder Street to Interstate-94. City Council applied for, and was awarded a grant through the Department of Environmental Quality's Stormwater, Asset Management, and Wastewater (SAW) Program. This grant has allowed the City enough funds to create a long term plan to manage their wastewater system's needs.

The City of Eastpointe was awarded a grant for $701,919 to investigate and evaluate the City's wastewater assets. Eastpointe qualified for disadvantaged community status for their wastewater system which means that no local match was required. Specifically the SAW grant awarded was for investigating and developing a Wastewater Asset Management Plan for the City. Through development and implementation of the plan, insight and understanding of the wastewater system's assets has significantly improved. A comprehensive investigation included inventory and inspection of wastewater assets, condition assessment of assets, capital improvement needs, and enhancement of the existing Geographic Information System (GIS) which includes mapping, database and system information that was previously not available.

Recognizing the complexity of developing and implementing a comprehensive and viable Wastewater Asset Management Plan, AEW proceeded with cataloging and evaluating the City's wastewater assets. A multi-phased approach was taken in which communication and interaction played a major role. This included a complex mixture of fact finding, criteria development, professional judgment, staff knowledge of the system, and common sense.

Eastpointe's wastewater assets located throughout the city include over 134 miles of enclosed sewer (72" diameter or less), 5,860 wastewater structures, and 1 pump station. A condition assessment was performed on selected wastewater sewers and structures. The condition assessment for the wastewater sewers was performed by means of closed circuit television (CCTV), while investigation of wastewater structures were performed by means of visual assessment.

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 and the useful life expended while the COF takes into account financial, safety and environmental 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. A wastewater sewer with a BRE score of 5 or greater is considered critical while a wastewater structure with a BRE score of 8 or greater is considered critical.

The City of Eastpointe's wastewater system has numerous assets with BRE scores that exceed the critical ratings. Based on the current assessments and projections, the following assets are considered critical:

- Over 86,000 feet of wastewater sewer (Over 119,000 feet projected)
- 1,175 wastewater structures (2,070 projected)

Based on the assets inspected a Capital Improvement Plan was created. From the findings and projections it was determined that it would cost the City approximately $13,400,000.00 to repair all of its critical assets. The City decided to allot just over $1,900,000.00 annually for 8 years to repair these critical assets. Contingency costs and costs to keep the asset management program updated over the 8 year period are included in the annual cost. The projected costs give an estimate as to how many assets are in need of repair or replacement, however it does not give insight as to where in the City these assets are located. In order to determine the location of these assets it is recommended that in addition to the rehabilitation of critical assets an annual maintenance and investigation program be implemented. An annual program will give insight as to the actual condition of all of the City's assets and provide real time information ensuring the Asset Management Plan is continually updated. The estimated cost to investigate the rest of the City's assets is included in the annual Capital Improvement Plan cost.

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. It was understood from the inception of this investigation that the research and findings presented, were to provide direction and insight into Eastpointe's wastewater system. This Executive Summary provides a brief overview of the investigation, and evaluation of the system assets, condition, operation and needs. A more comprehensive discussion follows in the body of this report

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

Completion Date October 27, 2017
(no later than 3 years from executed grant date)

The City of Eastpointe *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1417-01 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: June 7, 2017.
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:

Joseph Merucci at (586)204-3012 jmerucci@eastpointecity.org
Name | Phone Number | Email

[signature] October 27, 2017
Signature of Authorized Representative (Original Signature Required) | Date

Joseph Merucci, Acting City Manager
Print Name and Title of Authorized Representative

Contact Person:
Joseph Merucci
Eastpointe City Hall
23200 Gratiot Avenue
Eastpointe, MI 48021
jmerucci@eastpointecity.org
586-204-3012

SAW Grant No. 1417-01

EXECUTIVE SUMMARY

The City of Eastpointe is home to over 34,000 residents in an area comprising 5.1 square miles. The majority of the City has a combined wastewaster and stormwater system while the northeast corner of the city is served by a separated system. The separated system is located in the area from Nine Mile Road to Ten Mile Road and from Schroeder Street to Interstate-94. City Council applied for, and was awarded a grant through the Department of Environmental Quality's Stormwater, Asset Management, and Wastewater (SAW) Program. This grant has allowed the City enough funds to create a long term plan to manage their stormwater system.

The City of Eastpointe was awarded a grant for $591,532, with a local match of $137,672 to investigate and evaluate the City's separated stormwater system's assets. Specifically the SAW grant was awarded for investigating and developing a Stormwater Asset Management Plan and Stormwater Management Plan for the City. Through development and implementation of these plans, the insight and understanding of the stormwater system's assets has significantly improved. A comprehensive investigation included inventory and inspection of stormwater assets, condition assessment of assets, capital improvement needs, and enhancement of the existing Geographic Information System (GIS) which includes mapping, database and system information.

Recognizing the complexity of developing and implementing a comprehensive and viable Stormwater Asset Management, and Stormwater Management Plan AEW proceeded with cataloging and evaluating the City's stormwater assets. A multi-phased approach was taken in which communication and interaction played a major role. This included a complex mixture of fact finding, criteria development, professional judgment, staff knowledge of the system, and common sense.

Eastpointe's stormwater assets in the separated area of the City include over 12.5 miles of enclosed sewer and 849 stormwater structures. A condition assessment was performed on all of the stormwater sewers and structures. The condition assessment for the storm sewer was performed by means of closed circuit television (CCTV), while investigation of stormwater structures was performed by means of visual assessment.

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 and useful life expended while the COF takes into account financial, safety and environmental impacts. POF and COF scores were determined for each asset and then are 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. A stormwater sewer with a BRE score of 5 or greater is considered critical while a stormwater structure with a BRE score of 8 or greater is considered critical.

The City of Eastpointe's stormwater system has numerous storm sewers and structures with BRE scores that exceed the critical ratings. Based on the current assessments, the following assets are considered critical:

- 162 stormwater sewer segments (over 14,000 feet of sewer)
- 210 stormwater structures

Based on the condition assessment a cost estimate was created for all critical assets. It will cost the City just over $1,850,000.00 to repair all of the critical stormwater assets in the separated area of the City. The City has decided to allot just under $260,000.00 a year over 8 years to repair the critical assets. Contingency costs as well as costs to keep the asset management plan updated have been included in the annual cost.

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.

It was understood from the inception of this investigation that the research and findings presented, were to provide direction and insight into Eastpointe's stormwater system. This Executive Summary provides a brief overview of the investigation, and evaluation of the system assets, condition, operation and needs. A more comprehensive discussion follows in the body of this report.

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

Completion Due Date _October 27, 2017__
(no later than 3 years from executed grant date)

The City of Eastpointe *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1417-01 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:

Joseph Merucci at (586)204-3012 jmerucci@eastpointecity.org
Name | Phone Number | Email

Joseph Merucci
Signature of Authorized Representative (Original Signature Required) | October 27, 2017
Date

Joseph Merucci, Acting City Manager
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Emmett Charter Township

SAW Project No. 1559-01

Battle Creek, Michigan

FINAL
October 2017

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 May 2014, Emmett Charter Township received a Wastewater and Asset Management (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1559-01, 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 Emmett Charter Township AMP is:

Tim Hill, Supervisor
621 Cliff Street
Battle Creek, MI 49014-6421
Phone number: (269) 968-0241
Email: timhill@emmett.org

ASSET INVENTORY AND CONDITION ASSESSMENT

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

- Collection system piping system and manholes
- Sanitary sewer lift stations in the collection system

The wastewater collection system assets consist of approximately 239,490 feet (45.36 miles) of sanitary sewers (gravity pipe and force mains), 856 wastewater manholes, 34 lift stations, and 25 cleanouts / air release valves. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance. All wastewater collected by the Township flows into the City of Battle Creeks wastewater collection system for treatment at their WWTP.

There are 34 sanitary sewer lift stations located throughout the wastewater collection system. The stations are either can-style flooded suction, submersible style, or residential grinder style stations.

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, 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 498 lift station assets and 1,801 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 860 of 915 sanitary sewer structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 92.5% of the gravity pipe. Smoke Testing performed on 100% of system to disclose location of inflow or infiltration and Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Rehabilitation and maintenance recommendations were created for short-term (1-5 year) and long term (6-20 year.   9.1% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 8.7% of the system identifying the need for point repairs and lining. The remaining 82.2% of assets were placed in the 20+ year category.

Overall, the lift stations are in fair condition. The City of Battle Creek has performed minor repairs to the stations to keep them operating well. However, 25 of the 34 stations are more than 30 years old and starting to show their age. 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.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

The overall objective of the Township Wastewater Department is to provide reliable wastewater collection 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 Emmett Charter Township is to provide reliable wastewater collection 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.
- 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.

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 and convey 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.

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 (1366 feet) in the collection system have an extreme risk rating and are recommended to be rehabilitated in the next 1-2 years. One pipe segment (395 feet) has been identified as high risk and requires a point repair. Much of the collection system's gravity pipes, 82.2 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	91	1	3
Medium	285	0	4
Low	502	0	0

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. Sixty-two manholes are identified as extreme risk, 31 are recommended for repair, 27 are recommended for repair and lining, and 4 are in need of a replacement cover in the next 1-4 years. 12 Manholes are identified as high risk, eight are recommended for repairs in year 5 while the other four need no action at this time. Many manholes are at low to medium risk and recommended to be included in a long-term rehabilitation strategy (91.1 percent).

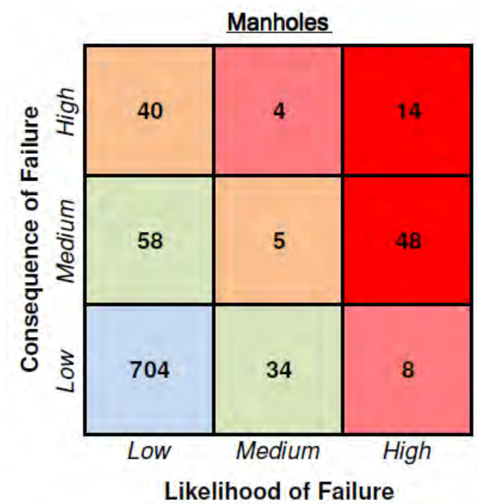


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. Assets in the "High Risk" category with medium or high probability of failure are addressed in the Capital Improvement Plan

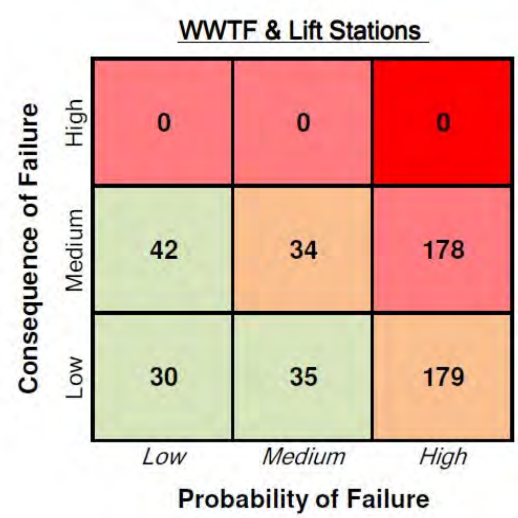


Figure 3. Business Risk Matrix (Risk Rating) for WWTF and Lift Station assets

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

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, wastewater treatment facility and pumping stations/force mains. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility.

Table 4 summarizes the recommended capital improvement plan rehabilitations in the short term (1-5 years) with recommended cost over the 5-year period.

Table 4. 5-Year Capital Improvement Plan: Rehabilitation Summary						
Maintenance Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Pipe Lining	$ 10,971	$ -	$ 11,300	$ -	$ -	$ -
Pipe Point Repair	$ 31,679	$ 26,401	$ -	$ -	$ -	$ 5,941
Manhole Replace Cover	$ 2,200	$ 2,200	$ -	$ -	$ -	$ -
Manhole Repair Chimney and Line	$ 11,371	$ 5,686	$ 5,856	$ -	$ -	$ -
Manhole Clean, Line and Repair	$ 117,194	$ 24,416	$ 45,266	$ 51,805	$ -	$ -
Manhole Replace Cover and Line	$ 5,383	$ 5,383	$ -	$ -	$ -	$ -
Manhole Repair	$ 5,000	$ -	$ -	$ 1,061	$ 3,278	$ 1,126
Manhole Chimney Repair	$ 87,550	$ -	$ 2,652	$ 13,659	$ 59,089	$ 20,287
Total	$ 271,349	$ 64,085	$ 65,075	$ 66,525	$ 62,367	$ 27,353

Table 5 summarizes the recommended capital improvement plan rehabilitations for the lift stations in the short term (1-5 years) with forecasted cost.

Table 5. Recommended Capital Improvements						
Project Description	Project Cost (2017 dollars)	2018	2019	2020	2021	2022
Mechanical and Coating Rehabilitatin, Phase 1	$ 1,124,000	$ 1,192,000	$ -	$ -	$ -	$ -
Electrical Rehabilitation Phase 1	$ 2,355,000		$ 2,573,000	$ -	$ -	$ -

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.

Table 6 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 6. Collection System Maintenance Summary Table: Year by Year						
Maintenance Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Manhole Assessment	$ 28,840	$ 1,545	$ -	$ 1,639	$ -	$ 28,982
Manhole Cleaning	$ 31,673	$ 773	$ -	$ 7,376	$ -	$ 26,953
CCTV	$ 51,887	$ -	$ 13,387	$ 21,755	$ 20,088	$ -
CCTV - Heavy Cleaning	$ -	$ -	$ -	$ -	$ -	$ -

For the lift stations, a list of assets requiring replacement in the next 20 years was generated based on the expected useful life of assets included in the asset inventory. Assets addressed in the CIP were not included in the replacement cost table. Due to the scope of the proposed rehabilitation projects, the pumps at the 34 lift stations were identified as the only assets for the replacement cost table.

An annual replacement cost was calculated for the pumps by dividing the replacement cost by the expected useful life. On average, the Township should plan to spend approximately $63,000 per year to replace or rehabilitate pumps at the 34 stations throughout the collection system.

Table 7. Replacement Costs for Lift Stations					
Asset Description	Year Installed	Expected Useful Life (Years)	Anticipated Year of Replacement	Total Cost (2017 Dollars)	Annual Replacement Cost
Pumps (68 Total)	Various	15	Various	$ 941,000	$ 63,000

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. The MDEQ 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 Emmett Charter Township, the rate study report was prepared by the Township and submitted on April 27, 2017. It was subsequently approved by the MDEQ on May 18, 2017 showing that no revenue gap exists for current utility operations.

DEQ

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Emmett Charter Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1559-01 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: May 18, 2017.
2) Significant Progress Made: 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: NA.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on NA.

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 Myers-Malone at (269) 968-0241 trmyers@emmett.org
Name Phone Number Email

[signature] 10/30/17
Signature of Authorized Representative (Original Signature Required) Date

Tim Hill – Supervisor
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater
Asset Management Plan
Wastewater Executive Summary

City of Flat Rock
25500 Gibraltar Road, Flat Rock, Michigan 48134
Meaghan K. Bachman, City Clerk
734.782.2455, Ext. 6
SAW Grant Project Number 1542-01

Executive Summary

The City of Flat Rock (City) was awarded a grant by the Michigan Department of Environmental Quality (MDEQ) under the Stormwater, Asset Management, and Wastewater (SAW) Grant Program to develop both a wastewater and a stormwater Asset Management Plan (AMP). The total eligible cost was $2,444,253, less a local match of $444,397, for a total grant amount of $1,999,856. The grant was divided into two components: wastewater AMP cost ($1,101,222) and stormwater AMP cost ($1,343,031). The wastewater AMP is discussed below. A separate summary is available for the stormwater AMP.

The AMP was developed by Fishbeck, Thompson, Carr & Huber, Inc. (FTCH) and the City Engineer, C. E. Raines Company (CERCO), working closely with City staff in accordance with the five MDEQ AMP components:

1. Asset Inventory and Condition Assessment
2. Level of Service (LOS)
3. Asset Criticality
4. Revenue Structure
5. Capital Improvement Plan (CIP)

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 under the SAW Grant included the components described below.

Asset Inventory

The City's wastewater system consists of approximately 208,011 feet of pipe ranging in size from 6 inches to 48 inches. The system also includes three wastewater pump stations: Gibraltar Pump Station, Huroc Pump Station, and Olmstead Pump Station. The wastewater system discharges its flow to the South Huron Valley Utility Authority (SHVUA) for treatment.

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) for the City using the Wayne County GIS database as a background.
2. Collected 69 wastewater system plans and record drawings, scanned them, and incorporated them into the GIS database.
3. Developed a total of 16 different asset classes to represent the City asset types, including sewer pipes; manholes; process equipment; pumps; structures; buildings; electrical systems; and heating, ventilation, and air conditioning equipment.

4. Reviewed existing records and conducted site visits to develop an inventory of the City assets, including:
   a. 992 sanitary manholes.
   b. 1,039 sanitary sewers.
   c. 36 vertical assets.
5. Developed a unique naming convention for the City assets that incorporated the section number and type of asset.
6. Developed an inventory of the City's asset information, including equipment and process descriptions, critical attribute information, age, remaining useful life, and replacement costs. Incorporated the information into the GIS database.

Condition Assessment

1. Manhole inspections were performed in 2015 and 2016 on the majority of the sanitary manholes in the system. The inspection forms, as well as the results of the inspection, were incorporated into the City's GIS database.
2. Closed circuit television (CCTV) inspection of the sanitary sewers was performed in 2016. The work was completed in accordance with the Pipeline Assessment and Certification Program (PACP). The inspection forms, and the results of the inspection, 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 sanitary sewers are generally in good condition; however, 32 pipe segments have a structural condition rating above a 4.0 and 39 pipe segments have an O&M rating above a 4.0.
   b. There are 26 sanitary manholes with a composite (structural and O&M) rating above 4.0.
   c. The outfall structure at the Gibraltar Pump Station has an overall condition rating greater than 4.0. The structure is severely corroded and needs to be replaced.

Level of Service Determination

The City developed a LOS based on commitments to their customers and the MDEQ, which included:

1. Safeguard public health and the environment.
2. Operate the system to ensure it has sufficient capacity to reduce the chances of any sanitary sewer overflows.
3. Maintain the 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 remaining life. The rating criteria was different for pipes, manholes, and vertical assets as follows:

Table 1 – Pipe Probability of Failure

		Weighting Factor	**5** Imminent	**4** Probable	**3** Occasional	**2** Remote	**1** 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				
Remaining Useful Life (used only when pipe not PACP inspected)		100%	Useful Life Remaining: 0%	Useful Life Remaining: 1-20%	Useful Life Remaining: 20-50%	Useful Life Remaining: 50-70%	Useful Life Remaining: 70-100%

Table 2 – Manhole Probability of Failure

		Weighting Factor	**5** Imminent	**4** Probable	**3** Occasional	**2** Remote	**1** 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				
Remaining Useful Life (used only when pipe not MACP inspected)		100%	Useful Life Remaining: 0%	Useful Life Remaining: 1-20%	Useful Life Remaining: 20-50%	Useful Life Remaining: 50-70%	Useful Life Remaining: 70-100%

Table 3 – Vertical Asset Probability of Failure

		Weighting Factor	5 Imminent	4 Probable	3 Occasional	2 Remote	1 Improbable
Physical Condition (based on visual inspection)		80%	Very Poor (Condition Grade 5)	Poor (Condition Grade 4)	Fair (Condition Grade 3)	Good (Condition Grade 2)	Very Good (Condition Grade 1)
Useful Life	Frequently Operated Major	5%	Greater than 80% of useful life	Age between 60% and 80% of useful life	Age between 40% and 60% of useful life	Age between 20% and 40% of useful life	Age less than 20% of useful life
	Frequently Operated Minor		At or beyond useful life	Age between 80% and 100% of useful life	Age between 50% and 80% of useful life	Age between 25% and 50% of useful life	Age less than 25% of useful life
	Frequently Operated Rebuilt/ Reconditioned		Rebuilt over 20 years	Rebuilt 15 to 20 years	Rebuilt 10 to 15 years	Rebuilt 5 to 10 years	Rebuilt less than 5 years
	Infrequently Operated		Run time average more than 7,500 hours per year	Run time average between 5,000 and 7,500 hours per year	Run time average between 3,000 and 5,000 hours per year	Run time average between 1,000 and 3,000 hours per year	Run time average less than 1,000 hours per year
Current O&M Status		15%	Not operational and not maintained (repairs cost prohibitive)	Operational, but hard to maintain/ obsolete or parts not available	Operational, but behind on maintenance	Operational with sporadic maintenance	No operational problems, regular maintenance

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 following criteria:

Table 4 – Consequence of Failure for Pipes and Manholes

		Weighting Factor	5 Catastrophic Disruption	4 Major Disruption	3 Moderate Disruption	2 Minor Disruption	1 Insignificant Disruption
COF	Diameter Score	33%	≥ 24-inch	18-inch to 21-inch	15-inch	10-inch to 12-inch	≤ 8-inch
	Physical Location Score	33%	State Trunklines, Railroad Crossings, Water Crossing		Primary County Roads and City Major Roads		City Minor Roads
	Service Area Score	33%	Schools, Water Crossings		Churches, City Facilities, Industrial, Commercial		Single Family Residential and Multi-Family Residential

Table 5 – Consequence of Failure for Vertical Assets

		Weighting Factor	5	4	3	2	1
			Catastrophic Disruption	Major Disruption	Moderate Disruption	Minor Disruption	Insignificant Disruption
COF	Process	25%	Mission critical: unable to accomplish mission	Process shut-down	Loss of redundancy or temporary process upset	Potential process upset	No impact on process
	Financial Impact	25%	May require new borrowing or impact rates (> $100,000)	May require transfer from reserves ($25,000 - $100,000)	Absorbed within current budget ($10,000 - $25,000)	Absorbed within applicable line item ($1,000 - $25,000)	Budgeted expense (< $1,000)
	Disruption to the Community	25%	Long term impact; area wide disruption	Short term impact but substantial disruption	Sporadic service disruptions	Minor disruption	No disruption
	Required Response Time	25%	< 1 hour	1 to 4 hours	4 to 8 hours	8 to 48 hours	> 48 hours

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 were 8 wastewater assets that had a BRE score greater than 16: one pipe segment, four manholes, and three vertical assets. The pipe segment was a 24-inch diameter concrete pipe exhibiting surface damage with variable stages of visible aggregate. This pipe will need to be rehabilitated with a cured-in-place pipe liner.

Two of the manholes showed signs of hydrogen sulfide (H_2S) attack and were severely corroded. The other two manholes had poor chimney conditions and had weeping and dripping infiltration through the manhole wall.

The vertical assets with a high BRE included the outfall structure and electrical system at the Gibraltar Pump Station and the electrical system at the Olmstead Pump Station. The outfall structure is severely corroded and needs to be replaced. The electrical systems are outdated and replacement parts are difficult to find.

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.
4. Reviewed current staffing plan and updated it based on the hours and staff needed to comply with the revised preventative maintenance program.

Revenue Considerations

The City's fiscal year is from July to June. For each fiscal year, the water and sewer budget is developed and includes the typical costs needed to operate the sanitary and storm sewer system as well as perform normal maintenance activities. The associated water and sewer rates for the fiscal year 2016/17 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. Utility Financial Solutions, LLC (UFS) 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 2017-2037 and project rate adjustments required to work toward targeted revenue requirements. The complete financial report prepared by UFS 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.

Capital Improvement Plan

A 20-year CIP was developed for the City using the results of the metering, condition assessments, BRE, remaining useful life, and repair/replacement costs. The CIP included:

1. Grouping projects based on the type of work and asset classes.
2. A schedule for repair/replacement projects through the year 2037.
3. Anticipated project costs and annual system costs through the year 2037.

Major projects anticipated to begin in the next few years are:

- Study – Installation of meters on three sanitary pump stations.
- Study – Inspect remaining manholes that were not inspected under the SAW Grant.
- Study – Inspect remaining sewers that were not inspected under the SAW Grant.
- Raise buried manholes to grade to provide access for maintenance.
- Rehabilitate manholes and sewers that have high POF/BRE ratings.
- Replace outfall structure at Gibraltar Pump Station.
- Install generators at Gibraltar and Olmstead Pump Stations.
- Ypsilanti Street/ Moses Street sanitary sewer upgrade.

List of Major Assets

Wastewater Assets:

- 208,011 feet of 6-inch to 48-inch diameter pipe.
- 992 sanitary manholes.
- 3 sanitary pump stations.

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

Completion Date October 23, 2017
(no later than 3 years from executed grant date)

The City of Flat Rock *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1542-01 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: No – March 2, 2017.

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:

Meaghan K. Bachman at	734-782-2455	clerk@flatrockmi.org
Name	Phone Number	Email

Meaghan K. Bachman 10-23-2017

Signature of Authorized Representative (Original Signature Required) Date

Meaghan K. Bachman - City Clerk

Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater
Asset Management Plan
Stormwater Executive Summary

City of Flat Rock
25500 Gibraltar Road, Flat Rock, Michigan 48134
Meaghan K. Bachman, City Clerk
734.782.2455, Ext. 6
SAW Grant Project Number 1542-01

Executive Summary

The City of Flat Rock (City) was awarded a grant by the Michigan Department of Environmental Quality (MDEQ) under the Stormwater, Asset Management, and Wastewater (SAW) Grant Program to develop both a wastewater and a stormwater Asset Management Plan (AMP). The total eligible cost was $2,444,253, less a local match of $444,397, for a total grant amount of $1,999,856. The grant was divided into two components: wastewater AMP cost ($1,101,222) and stormwater AMP cost ($1,343,031). The stormwater AMP is discussed below. A separate summary is available for the wastewater AMP.

The AMP was developed by Fishbeck, Thompson, Carr & Huber, Inc. (FTCH) and the City Engineer, C. E. Raines Company (CERCO), working closely with City staff in accordance with the following MDEQ AMP components:

1. Asset Inventory and Condition Assessment
2. Level of Service (LOS)
3. Asset Criticality
4. Capital Improvement Plan (CIP)

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, and an updated operation and maintenance (O&M) program to routinely maintain the assets. The work completed under the SAW Grant included the components described below.

Asset Inventory

The City's stormwater system consists of approximately 211,598 feet of pipe ranging in size from 4 inches to 66 inches. The system also includes four stormwater pump stations: Arsenal Road Pump Station, Baseball Field Pump Station, Community Center Pump Station, and Huron Woods Pump Station. The stormwater system discharges its flow to local drains as well as the Huron 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) for the City using the Wayne County GIS database as a background.
2. Collected 66 stormwater system plans and record drawings, scanned them, and incorporated them into the GIS database.
3. Developed a total of 16 different asset classes to represent the City asset types, including sewer pipes; manholes; process equipment; pumps; structures; buildings; electrical systems; and heating, ventilation, and air conditioning equipment.

4. Reviewed existing records and conducted site visits to develop an inventory of the City assets, including:
   a. 597 storm manholes.
   b. 1,463 catch basins.
   c. 2,264 storm sewers.
   d. 28 vertical assets.
   e. 122 storm outfalls.
5. Developed a unique naming convention for the City assets that incorporated the section number and type of asset.
6. Developed an inventory of the City's asset information, including equipment and process descriptions, critical attribute information, age, remaining useful life, and replacement costs. Incorporated the information into the GIS database.

Condition Assessment

1. Manhole inspections were performed in 2015 and 2016 on the majority of the storm manholes in the system. Only some catch basins located along main line sewer were inspected at that time. The inspection forms, as well as the results of the inspection, were incorporated into the City's GIS database.
2. Closed circuit television (CCTV) inspection of the storm sewers was performed in 2017. The work was completed in accordance with the Pipeline Assessment and Certification Program (PACP). The inspection forms, and the results of the inspection, 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. There are 10 storm manholes with a composite (structural and O&M) rating above 4.0.

Level of Service Determination

The City developed a LOS based on commitments to their customers and the MDEQ, which included:

1. Safeguard public health and the environment.
2. Operate the system to ensure it has sufficient capacity to reduce the chances of surface flooding.
3. Maintain the 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 remaining life. The rating criteria was different for pipes, manholes, and vertical assets as follows:

Table 1 – Pipe Probability of Failure

		Weighting Factor	**5** Imminent	**4** Probable	**3** Occasional	**2** Remote	**1** 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				
Remaining Useful Life (used only when pipe not PACP inspected)		100%	Useful Life Remaining: 0%	Useful Life Remaining: 1-20%	Useful Life Remaining: 20-50%	Useful Life Remaining: 50-70%	Useful Life Remaining: 70-100%

Table 2 – Manhole Probability of Failure

		Weighting Factor	**5** Imminent	**4** Probable	**3** Occasional	**2** Remote	**1** 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				
Remaining Useful Life (used only when pipe not MACP inspected)		100%	Useful Life Remaining: 0%	Useful Life Remaining: 1-20%	Useful Life Remaining: 20-50%	Useful Life Remaining: 50-70%	Useful Life Remaining: 70-100%

Table 3 – Vertical Asset Probability of Failure

		Weighting Factor	5 Imminent	4 Probable	3 Occasional	2 Remote	1 Improbable
Physical Condition (based on visual inspection)		80%	Very Poor (Condition Grade 5)	Poor (Condition Grade 4)	Fair (Condition Grade 3)	Good (Condition Grade 2)	Very Good (Condition Grade 1)
Useful Life	Frequently Operated Major	5%	Greater than 80% of useful life	Age between 60% and 80% of useful life	Age between 40% and 60% of useful life	Age between 20% and 40% of useful life	Age less than 20% of useful life
Useful Life	Frequently Operated Minor	5%	At or beyond useful life	Age between 80% and 100% of useful life	Age between 50% and 80% of useful life	Age between 25% and 50% of useful life	Age less than 25% of useful life
Useful Life	Frequently Operated Rebuilt/ Reconditioned	5%	Rebuilt over 20 years	Rebuilt 15 to 20 years	Rebuilt 10 to 15 years	Rebuilt 5 to 10 years	Rebuilt less than 5 years
Useful Life	Infrequently Operated	5%	Run time average more than 7,500 hours per year	Run time average between 5,000 and 7,500 hours per year	Run time average between 3,000 and 5,000 hours per year	Run time average between 1,000 and 3,000 hours per year	Run time average less than 1,000 hours per year
Current O&M Status		15%	Not operational and not maintained (repairs cost prohibitive)	Operational, but hard to maintain/ obsolete or parts not available	Operational, but behind on maintenance	Operational with sporadic maintenance	No operational problems, regular maintenance

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 following criteria:

Table 4 – Consequence of Failure for Pipes and Manholes

		Weighting Factor	5 Catastrophic Disruption	4 Major Disruption	3 Moderate Disruption	2 Minor Disruption	1 Insignificant Disruption
COF	Diameter Score	33%	≥ 24-inch	18-inch to 21-inch	15-inch	10-inch to 12-inch	≤ 8-inch
COF	Physical Location Score	33%	State Trunklines, Railroad Crossings, Water Crossing		Primary County Roads and City Major Roads		City Minor Roads
COF	Service Area Score	33%	Schools, Water Crossings		Churches, City Facilities, Industrial, Commercial		Single Family Residential and Multi-Family Residential

Table 5 – Consequence of Failure for Vertical Assets

		Weighting Factor	5 Catastrophic Disruption	4 Major Disruption	3 Moderate Disruption	2 Minor Disruption	1 Insignificant Disruption
COF	Process	25%	Mission critical: unable to accomplish mission	Process shut-down	Loss of redundancy or temporary process upset	Potential process upset	No impact on process
	Financial Impact	25%	May require new borrowing or impact rates (> $100,000)	May require transfer from reserves ($25,000 - $100,000)	Absorbed within current budget ($10,000 - $25,000)	Absorbed within applicable line item ($1,000 - $25,000)	Budgeted expense (< $1,000)
	Disruption to the Community	25%	Long term impact; area wide disruption	Short term impact but substantial disruption	Sporadic service disruptions	Minor disruption	No disruption
	Required Response Time	25%	< 1 hour	1 to 4 hours	4 to 8 hours	8 to 48 hours	> 48 hours

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 were 4 storm manholes that had a BRE score greater than 16. These manholes had cracked frame seals and high consequence of failure ratings due to the size of the 30-inch diameter pipes connected to the structures. The City will monitor the condition of the manholes during the next round of manhole inspections.

The vertical assets for the stormwater system all had BRE values below 10. There are no major repairs or upgrades necessary at this time. However, the City should continue to perform preventative maintenance to keep the pump stations in good working order.

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.
4. Reviewed current staffing plan and updated it based on the hours and staff needed to comply with the revised preventative maintenance program.

Capital Improvement Plan

A 20-year CIP was developed for the City using the results of the condition assessments, the BRE, remaining useful life, and repair/replacement costs. The CIP included:

1. Grouping projects based on the type of work and asset classes.
2. A schedule for repair/replacement projects through the year 2037.
3. Anticipated project costs and annual system costs through the year 2037.

Major projects anticipated to begin in the next few years are:

- Study – Inspect remaining manholes that were not inspected under the SAW Grant.
- Study – Inspect remaining sewers that were not inspected under the SAW Grant.
- Raise buried manholes to grade to provide access for maintenance.
- Rehabilitate manholes and sewers that have high POF/BRE ratings.
- Upgrade pump controllers and clean and calibrate level sensors at pump stations.

List of Major Assets

Stormwater Assets:

- 211,598 feet of 4-inch to 66-inch diameter pipe.
- 597 storm manholes.
- 1,463 catch basins.
- 122 storm outfalls.
- 4 storm pump stations.

DEQ

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

Completion Due Date October 23, 2017
(no later than 3 years from executed grant date)

The City of Flat Rock *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1542-01 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:

Meaghan K. Bachman at 734-782-2455 clerk@flatrockmi.org
Name Phone Number Email

Meaghan K. Bachman 10.23.2017
Signature of Authorized Representative (Original Signature Required) Date

Meaghan K. Bachman - City Clerk
Print Name and Title of Authorized Representative

STORMWATER ASSET MANAGEMENT PLAN (AMP)
EXECUTIVE SUMMARY

Municipality:	Village of Forestville
Address:	5605 Cedar Street Forestville, MI 48434
Web Address:	www.forestvillemichigan.com
Contact Name:	Tim Sielaff – Village President
Phone Number:	989-864-3447
SAW Grant Project Number:	1190-01

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 Forestville 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 AM inventory, rating and budgeting document.

Over 2,800 feet of storm pipe was inspected and added to the AMP, while all 12,672 feet were inventoried.

The Village's knowledge of their storm sewer systems greatly increased both in location of infrastructure that they were unaware of and knowledge related to the condition and importance of each component. Many manholes were covered with asphalt or buried with dirt that were not accessible for many years. New found pipes and catchbasins have now been added to the GIS system map. All drawings are now available electronically in pdf format and have also been hyperlinked to the system features on the GIS map.

The storm sewer system in the Village is unique. Due to the Villages proximity to Lake Huron and being between 20' and 50' above the water surface of the Lake Huron provides for a couple of intriguing concepts:

- Drainage should not be an issue in Forestville due to the elevation difference between the lake and the ground elevation in the Village.
- The Villages system addresses drainage along M-25, private driveways and along the street right of way in the flatter portions of the Village. Most sewer systems are relatively short and end at open ditches. The Village is bounded by two large gulleys on its north and south limits that drain to Lake Huron on the east.

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) Pipes, Culverts and Structures under M-25.
      ii) Driveway culverts.
      iii) Commercial developments infrastructure.
      iv) Storm sewers in the street right of way.
      v) 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 track the assets at the wastewater treatment plant.
   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 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) Since the sewer system in Forestville are groups of short section of sewers that daylight into open ditches the assessment process involved visual inspections of the pipes from the surface versus a more intensive cleaning and video program.
   c) All 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.
5) *The results of the assessment*
   a) Stormwater System Results
      i) Only a portion of the storm sewer system was inspected (2,883 or 22.3%) and the results for the sections inspected are:

Storm Mains	
Videoed	
Size	Length
8	191
12	2,607
15	85
18	-
24	-
36	-
60	-
Total	2,883

(1) Storm Pipe Results Table

Storm Mains	Ratings	Length of Pipe (Feet)	Percent
TOTALS (by Ratings)	1	6,030	47.6%
	2	5,970	47.1%
	3	301	2.4%
	4	371	2.9%
	<Null>	-	
	TOTAL	12,672	

(2) Rating Legend

Storm Mains	
Ratings	
Ratings	Condition
1	Good
2	Monitor
3	Review
4	Repair/Replace
<Null>	Not Inspected

(3) Storm Structure Results Table

Storm Asset Management				
Assets	District	Rating	# of Manholes	Percent
Storm Manholes	Forestville	1	36	55%
		2	24	37%
		3	5	8%
		4	0	0%
		TOTAL	65	

(4) Rating Legend

Ratings (Rating = Manhole Condition)	
Rating	Condition
1	Good
2	Fair
3	Poor
4	Repair needed/Replace

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 to evaluate 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.
      i) For example: Several residents kindly pointed out deficiencies in their yard that caused water to pond for longer than acceptable periods of time and/or ponded very close to their house or on their driveway. This public expectation is what drove the inventory and condition assessment.

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.

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

- 12,672 lineal feet of storm sewer pipe
- 65 storm manholes/catchbasins

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Forestville *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1190-1 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:

Tim Sielaff at 989-864-3447 tsielaff@coopelev.com

Name | Phone Number | Email

T. Sielaff 10-31-17

Signature of Authorized Representative (Original Signature Required) | Date

Tim Sielaff Village President

Print Name and Title of Authorized Representative

WASTEWATER ASSET MANAGEMENT PLAN (AMP)
EXECUTIVE SUMMARY

Municipality:	Village of Forestville
Address:	5605 Cedar Street Forestville, MI 48434
Web Address:	www.forestvillemichigan.com
Contact Name:	Tim Sielaff – Village President
Phone Number:	989-864-3447
SAW Grant Project Number:	1190-01

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 Forestville 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 AM inventory, rating and budgeting document.

The Village's knowledge of their storm sewer systems greatly increased both in location of infrastructure that they were unaware of and knowledge related to the condition and importance of each component. Many manholes were covered with asphalt or buried with dirt that were not accessible for many years. New found pipes and catchbasins have now been added to the GIS system map. All drawings are now available electronically in pdf format and have also been hyperlinked to the system features on the GIS map.

The storm sewer system in the Village is unique. Due to the Villages proximity to Lake Huron and being between 20' and 50' above the water surface of the Lake Huron provides for a couple of intriguing concepts:

- Drainage should not be an issue in Forestville due to the elevation difference between the lake and the ground elevation in the Village.
- The Villages system addresses drainage along M-25, private driveways and along the street right of way in the flatter portions of the Village. Most sewer systems are relatively short and end at open ditches. The Village is bounded by two large gulleys on its north and south limits that drain to Lake Huron on the east.

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.
   b) The lagoon system inventoried for all major components.
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 and stormwater collection systems.
   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 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 Stations were 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 the MDEQ 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 – Over 50% of asset requires replacement.

5) *The results of the assessment.*

a) Wastewater Collection Results

i) Due to the newness of the sanitary sewer system none of the pipes were evaluated. A bias sampling of sanitary manholes was inspected. Seventeen (17) manholes (22%) were inspected and found to be in good condition requiring no repairs. The bias was that the manholes at the ends of the force mains were included in this review as deterioration would likely begin at these structures prior to structures in the system.

(1) Sanitary Structure Results Table

Sanitary Asset Management			
Assets	Districts	Ratings	# of Manholes
Sanitary Manholes	Forestville	1	77
		2	0
		3	0
		4	0

(2) Sanitary Structure Rating Legend

Ratings (Rating = Manhole Condition)	
Rating	Condition
1	Good
2	Fair
3	Poor
4	Repair needed/Replace

6) Lagoon System and Pump Station Results Table
   a) 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 number the more important the attention that asset should receive. Based on our analysis this table shows the top rated assets.
   b) It should be noted that the two pump stations listed have redundant components. For example: Lake Street Pumps – 2 means that there are 2 pumps in this pump station with one being a redundant unit.

Assets	**Condition**	**Probability of Failure**	**Criticality of Asset**	**Business Risk**
Lake Street Pumps – 2	2	4	4	**16**
Lakeview Ave Pumps – 2	2	4	4	**16**
Lagoon Valves	2	3	3	**9**
Lagoon Meter	2	3	2	**6**

7) Lagoon System and Pump Station Rating Legends
   a) 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

   b) 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

c) 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

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 MDEQ 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

1) *The Village used the following process to involve stakeholders in developing the level of service:*
   a) The Village has made changes in the past 5 years to improve the level of service by contracting with the City of Harbor Beach for all water and sewer operations services. The cost of having their own department of public works and that DPW being able to have the tools and equipment to do the required tasks encouraged the Village to contract with Harbor Beach. At the time the switch was made it was an intentional decision that the Village believes provided for improved service from an entity that already has the staffing and equipment to perform the maintenance required. In the past the Village had contracted for a licensed operator only, then performed the work internally before hiring Harbor Beach.
   b) Being a small community without a manager the Level of Service goals originate from the public, through demands and requests and then are implemented in a team setting with the Village board.
2) The trade-offs for the service to be provided have improved significantly over the past few years. There are still limitations and restrictions that limit the Village's ability to meet its desired level of service, but things have greatly improved.
   a) In the past the Village would struggle with:
      i) Self-performing routine infrastructure repairs, thus spending money on 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 work loads.

ii) Equipment maintenance. Which is no longer an issue, as the City of Harbor Beach provides the equipment for repairs and maintains the Villages equipment on the same schedule as the City's.

b) Regulatory requirements were always the goal. With the newer sanitary system maintaining compliance has not been an issue.

3) How the level of service goals were determined.

a) The level of service was determined by the Village staff and leaders when they hired Harbor Beach to operate the sanitary sewer system.

Revenue Structure

1) *A summary of the funding structure and rate methodology that provides sufficient resources to implement the asset management program. Discussion may include:*
   a) *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 (gap) review the Village is not operating the sanitary sewer system in a deficit (with a gap). There is sufficient revenue to cover the cost of operating the sanitary sewer system.
      ii) 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) The Village, as revenue allows will fund replacement items that are considered short lived assets and will begin to budget for items that have medium lives.
      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.

Capital Improvement Plan

1) The Village does not have nor was a Capital Improvement Plan developed for the sanitary sewer system.
   a) No expansions of the system are planned as the system was completely built out when originally constructed.
   b) Due to the young age of the system no capital improvement projects are needed to replace any major components.
   c) Funds are being accrued to pay for large maintenance items, but not for capital improvements.

List of Major Assets

The following lists of assets summarize the major components identified as part of the asset management plan for Wastewater System.

Wastewater Collection System

- 77 sanitary manholes
- 2 pump stations
- Pipes are itemized by two sizes for all gravity pipes (8" and 10"), pressure pipes are those from individual residential pump stations and the force mains are the pipes leaving that larger pump stations that serve the Village and pump the sewage to the lagoon.

Sanitary Asset Management		
Assets	Pipe Size	Length of Pipe, ft
Sanitary Sewer	8"	17,724
Sanitary Sewer	10"	3,861
Pressure Pipe	2.5"	3,549
Force Main	6"	9,800

Lagoon System

- Lagoon
- Inlet, outlet and transfer structures
- Discharge and Transfer Valves
- Effluent Meter

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Forestville *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1190-1 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: June 7, 2017.

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:

Tim Sielaff at 989-864-3447 tsielaff@coopelev.com

Name | Phone Number | Email

T Sielaff 10-31-17

Signature of Authorized Representative (Original Signature Required) Date

Tim Sielaff Village President

Print Name and Title of Authorized Representative

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	October 30, 2017
To:	Ms. Karen Nickols
Company:	Michigan Department of Environmental Quality
From:	Prein&Newhof
Project #:	2130283
Re:	City of Galesburg SAW Grant: Summary of Wastewater Asset Management Plan

Ms. Nickols:

This memorandum provides the summary of the City of Galesburg wastewater asset management plan SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

Grantee:
City of Galesburg
200 E. Michigan Avenue
Galesburg, MI 49053
http://www.galesburgcity.org/

Contact: Ms. Karen Bresson, City Clerk
Phone: 269-665-7000

SAW Grant Project Number: 1496-01

Executive Summary

The City of Galesburg received a SAW Grant in October 2014 to prepare a Wastewater and Stormwater Asset Management Plans. The Grant agreement indicated the following amounts:

Project Total	Grant Amount	Local Match
$1,128,980	$1,128,980	$0
Project Total	Wastewater Costs	Stormwater Costs
$1,128,980	$581,998	$546,982

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 locations adjusted with survey grade Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, 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.

Location of non-pipe assets, such as, lift station components, building components, and other equipment is 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 in-line closed circuit television (CCTV) cameras. Pipes inspected with CCTV were rated using the Pipeline Assessment Certification Program (PACP) system condition grading system. The PACP ratings were then used to derive a composite Risk of Failure rating of 1-5 for each pipe.

Percentage of gravity sewer pipes in each rating category

1	2	3	4	5
26%	37%	25%	11%	1%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. Galesburg'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
0%	100%	0%	0%	0%

Manholes: Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, structures, and infiltration.

Percentage of manholes in each rating category

1	2	3	4	5
0%	26%	54%	20%	0%

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	1	0	0

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 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 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 the Beckwith Drive, Michigan Avenue, Battle Creek Street, and McCollum Avenue.

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 City recognizes that the people served by the system are more than customers, they are the system owners. City staff acts as stewards of the system. The City has held a numerous public meetings and workshops with the City Staff and Council members. At these meetings, the results of the condition assessments were discussed, the costs for various OM&R 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 has 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 our 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 showing project descriptions, cost estimates, and project timelines, was developed for the capital improvements needed within a ten year planning period. The wastewater system projects identified in the CIP are:

- Michigan and Thomas (Point Repair)
- Hamilton Street
- Battle Creek Street (M-96)
- Elmwood Boulevard
- Grove Street
- Burgess Drive (N. 36th Street)
- Beckwith Drive
- Morhouse Pump Station
- Portable Generator

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Galesburg's major assets include:

- 1 lift station
- 43,580 feet of 6" to 36" diameter gravity sewer; 33,758 feet (8-inch to 12-inch) is the City of Galesburg's and the remaining 8,822 feet (18-inch to 36-inch) is the interceptor sewer
- 63 feet of 4" diameter force main
- 165 manholes

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Galesburg *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1496-01 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: April 27, 2017.
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:

CARL NEWTON at 269 217 3909 CARL.A.NEWTON@SBCGLOBAL.NET
Name / Phone Number / Email

Carl Newton
Signature of Authorized Representative (Original Signature Required)

10.30.17
Date

CARL NEWTON - MAYOR
Print Name and Title of Authorized Representative

Prein&Newhof

Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	October 30, 2017
To:	Ms. Karen Nickols
Company:	Michigan Department of Environmental Quality
From:	Prein&Newhof
Project #:	2130283
Re:	City of Galesburg SAW Grant: Summary of Stormwater Asset Management Plan

Ms. Nickols:

This memorandum provides the summary of the City of Galesburg stormwater asset management plan SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

Grantee:
City of Galesburg
200 E. Michigan Avenue
Galesburg, MI 49053
http://www.galesburgcity.org/

Contact: Ms. Karen Bresson, City Clerk
Phone: 269-665-7000

SAW Grant Project Number: 1496-01

Executive Summary

The City of Galesburg received a SAW Grant in October 2014 to prepare a Wastewater and Stormwater Asset Management Plans. The Grant agreement indicated the following amounts:

Project Total	Grant Amount	Local Match
$1,128,980	$1,128,980	$0
Project Total	Wastewater Costs	Stormwater Costs
$1,128,980	$581,998	$546,982

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 stormwater system have been inventoried. Manhole, catch basin, leaching basins and sewer pipe locations were plotted in a Geographic Information System (GIS) using record drawings, aerial imagery, and land contours. Locations were field verified and locations adjusted with survey grade Global Positioning System (GPS) coordinates.

Asset inventory data for storm sewers, including year of installation, material, 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.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

Storm Sewer Pipes: 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 condition, 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
30%	25%	9%	13%	24%

Manholes and Catch Basins: Manholes and catch basins were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, structures, and sediment.

Percentage of structures in each rating category

1	2	3	4	5
4%	57%	22%	6%	11%

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 network, and the surrounding property/environment.

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 storm sewers along Beckwith Drive, Battle Creek Street, Church Street and Michigan Avenue.

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 City recognizes that the people served by the system are more than customers, they are the system owners. City staff acts as stewards of the system. The City has held a series of public meetings and workshops with the City Council. At these meetings, the results of the condition assessments were discussed, the costs for various OM&R strategies affecting the levels of service were reviewed along with potential costs. Based on the input received during these meetings, the following Level of Service Goals have been established:

1. Meet Regulatory Requirements
2. Minimize Flood Risk
3. Minimize Public Hazards
4. Manage Storm Water Discharges into the Wastewater System
5. Support Community Growth and Development
6. Maintain Water Quality
7. 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."

Stormwater system improvements are funded with street improvements through the City's general fund. Project costs were estimated for capital improvements within the first 10 years. Future costs beyond the 10 year capital improvement plan were projected using inventory and condition assessment data. Based on this analysis, the City is considering property tax millage rate increases to begin increasing general fund revenues.

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 showing project descriptions, cost estimates, and project timelines, was developed for the capital improvements needed within a ten year planning period. The stormwater system projects identified in the CIP are:

- Michigan & Climax (Point Repair)
- Battle Creek and Grove (Point Repair)
- Mill Street
- Church Street
- Blake Boulevard & Grove Street

- Beckwith Drive
- Battle Creek Street

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Galesburg's major assets include:

- 15,951 feet of 6" to 30" diameter storm sewer
- 54 manholes
- 107 catch basins / Inlets
- 21 leaching basins

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Galesburg *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1496-01 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:

CARL NEWTON at 269 217 7901 CARL.A.NEWTON@SBCGLOBAL.NET
Name Phone Number Email

Carl Newton 10.30.17
Signature of Authorized Representative (Original Signature Required) Date

CARL NEWTON MAYOR
Print Name and Title of Authorized Representative

Mr. Robert Muery, City Manager/Police Chief
City of Garden City
6000 Middlebelt Road
Garden City, Michigan 48135
Phone – 734-793-1660
SAW Grant Project Number 1248-01

Executive Summary

1. Overview of SAW Grant Program

The City of Garden City, Wayne County, Michigan was successful in obtaining a Storm Water, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environmental Quality (MDEQ) in the amount of $629,930.00 to fully complete a thorough, detailed, conditional analysis of the existing sanitary sewer collection system throughout the entire City, develop capital improvement planning for the next 20 years and to develop a comprehensive asset management plan. The 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 all sanitary sewers to identify any structural defects within the sewer system and identify locations of infiltration through pipe joints or structural defects.
- Update the existing Geographic Information System (GIS) database of the sanitary sewer system.
- Evaluate the system for potential illicit connections into the sanitary collection 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 pipe.

- Several locations during the cleaning and television investigation were identified as having moderate to heavy infiltration through pipe joints.

- A handful of locations were identified as being collapsed or partially collapsed requiring sectional replacement of sewers by open cut excavation. These locations were repaired immediately repaired by the City's Department of Public Services personnel once identified.
- A 385 foot sewer had to be replaced from manhole to manhole on Dawson Avenue at Brandt Avenue due to severe deterioration of the pipe. This work was competitively bid out and completed in 2013.

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 Garden City has municipal water and sanitary sewer services throughout the entire City and also provides water and sewer service to a subdivision on the east side of Merriman Road between Maplewood Avenue and Warren Road within the limits of the City of Westland. 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) and sewage is discharged into the Wayne County Rouge Valley Interceptor by means of two (2) interceptors along Merriman Road and Middlebelt Road north of Warren Road within Hines Park. Sewage is then transported to the GLWA interceptor system and treated at GLWA's wastewater treatment plant located in Southwest Detroit, Wayne County. The majority of the sewage collection system within the City of Garden City was installed between 1939 and 1961 as a combined sewer system and since that time has been fully separated. The wastewater collection system assets consist of 521,540.03 lineal feet (98.78 miles) of gravity sewers ranging in size from eight (8) inches to seventy-two (72) inches in diameter. These assets are located in existing road right-of-ways owned and maintained by the City of Garden City or within roads under the jurisdiction of Wayne County, including Inkster Road, Middlebelt Road, Merriman Road, Venoy Road, Warren Road and Cherry Hill Road, 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	Total
8	21031.44
10	180044.9
12	127794.8
15	58868.33
18	47709.23
21	19784.4
24	11334.17
27	12153.14
30	8117.93
36	9640.91
42	9085.2
48	4068.61
54	1114.12
60	5435.11
72	5357.74
TOTAL	***521540.03***

Asset Identification and Location

A comprehensive sanitary sewer collection 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 and cleaning and television investigation of sewers Information such as age, size and material were identified as best as possible from an existing Geographic Information System (GIS) geodatabase, as-built drawings, archived records and from the cleaning and televising program. As part of the SAW grant program, the existing GIS geodatabase was updated and allows for better organization and record keeping, allows City personnel to better track required maintenance and allows the City to better prepare capital improvement programs and identify projects for the future. The GIS geodatabase for the sanitary sewer pipe network consists of 1,943 total assets.

Condition Assessment

As part of the SAW grant study, a comprehensive, detailed evaluation of the sanitary collection pipe network was completed consisting of cleaning and televising of sewers. Evaluations were based on the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) 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). Overall, the structural condition of the collection system was found to be in overall fair condition with structural defects such as cracked and broken pipe found throughout the system ranging in severity; however, there were several locations where infiltration and inflow was entering the system through pipe joints, cracks and service leads.

Based upon the results of the SAW grant study, the City 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 or where infiltration through joints or cracks were identified. Garden City was approved for a loan in 2016 in the amount of $4,750,000.00 and commenced rehabilitation of the collection system in July 2016. Two (2) separate contracts, one for full length cured-in-place pipe lining and another for sectional length cured-in-place pipe lining. The full length lining program has since been completed and the sectional length lining program expected to be completed in December 2017. This loan will allow the City to complete all necessary rehabilitation and pay back the loan over a 20 year period at approximately 2.5 percent interest.

3. Level of Service

The City of Garden City 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 Wayne County Rouge Valley Interceptor system
- 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
- 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 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

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 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.

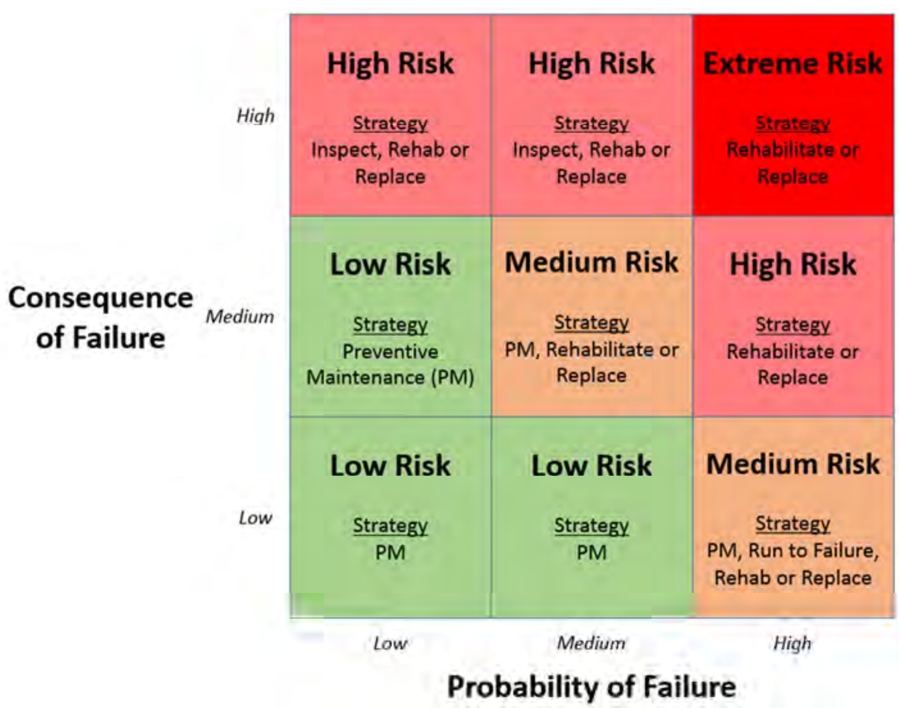
The Consequence of Failure is a measure of the impact of failure for an asset on the sanitary system's ability to convey and treat wastewater. Consequence of Failure is based on weighted factors such as location of asset, facilities or population served by the asset, size of the asset and ability to 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.



For the collection system, the pipe network currently has 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 1,785 pipe assets within the collection system is shown below:

Consequence of Failure	Probability of Failure: Low	Med	High
High	*High* 56	*High* 16	*Extreme* 0
Med	*Low* 93	*Medium* 37	*High* 0
Low	*Low* 1,104	*Low* 479	*Medium* 0

5. Capital Improvement Project Planning

Based upon the business risk evaluation, the City has developed a capital improvement plan providing recommendations for 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 currently being addressed with those structural defects that were rated in poor to severe condition and to eliminate infiltration through joints to alleviate sewer surcharging and work to meet the contractual capacity with the Rouge Valley Interceptor System through the SRF rehabilitation program to be completed in December 2017. In the future however, it is recommended to inspect the collection system; bothsewers and manholes, every five (5) years to identify any new or potential problems and identify ways to address these problems. Therefore, the annual maintenance and capital costs are estimated to be $297,760 annually to perform a City wide cleaning and televising and manhole investigation program.

6. Revenue Structure

A rate methodology report was submitted to the MDEQ on April 27, 2017 and approved by MDEQ staff on May 18, 2017. Costs for the proposed SRF improvements projects; in addition to future investigative work and frequency such as cleaning and television investigation and manhole inspections are 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 will allow the City to calculate estimated costs for future projects and assist with future rate adjustments. Based upon the SAW grant study, the immediate need to rehabilitate sewers with poor to severe structural defects and eliminate infiltration through joints is currently being completed utilizing SRF loan assistance. In addition to the current needs, there will be additional needs in the future for the system within the next 20 years based upon the results of the cleaning and television investigations and manhole investigations conducted on an annual basis. The rate structure will need to be revisited regularly to identify if additional funding will be necessary to correct any future deficiencies within the collection system.

The current rate structure is sufficient to sustain the system in its current state and ensure the desired level of service; however, changes may need to be made in the future for annual investigative work and capital improvement projects. The costs for the future investigative work was estimated based upon similar projects recently completed for other communities. It is anticipated that future investigative and improvement projects will be funded through future rate increases.

Therefore, the total increase in rates already approved in 2016 to support the SRF improvements project for the sanitary sewer system was $2.28 per 1,000 cubic feet consumed. The total increase in rates expected to support annual investigative work $2.64 per 1,000 cubic feet consumed.

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

Completion Date <u>October 27, 2017</u>
(no later than 3 years from executed grant date)

The <u>**City of Garden City**</u> certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. <u>**1248-01**</u> 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: <u>**May 18, 2017**</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:

<u>**R. Ryan Kern, P.E.**</u>	at	<u>**734-759-1600**</u>	<u>**rrkern@hengineers.com**</u>
Name		Phone Number	Email

[signature] 10 · 31 · 2017

Signature of Authorized Representative (Original Signature Required) Date

<u>**Robert Muery, City Manager**</u>
Print Name and Title of Authorized Representative

123 W. Main St. Suite 200
Gaylord, MI 49735
O: 989.732.8131
www.c2ae.com

GAYLORD STORMWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

City of Gaylord
305 East Main Street
Gaylord, MI 49735
Joe Duff – City Manager, (989) 732-4060
SAW GRANT PROJECT NUMBER 1524-01

Executive Summary

The SAW agreement with the State of Michigan was signed in October 24, 2014 which began the overall SAW program.

The Grant agreement included the following funding amounts:

- Total Cost = $428,241
  - Grant Value = $385,417
  - Local Match = $42,824

The City of Gaylord is located in the north central portion of Otsego County in the north central lower peninsula of Michigan, approximately 60 miles south of the Mackinac Bridge. It is located at the crossroads of I-75 and M-32. Gaylord's storm sewer collection system has approximately 93,600 feet of storm sewer and approximately 1,063 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:
  - 31.3% of assets are 1's
  - 61.7% of assets are 2's
  - 6.3% of assets are 3's
  - 0.2% of assets are 4's
  - 0.5% of assets are 5's

Condition Assessment

Overall, the system was in good condition. A significant portion of the storm sewer system had been constructed in the past 25 years. There are a few recommendations for improvements in the 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.

- 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 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 millage. The future will require extension of millage and 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 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 (MH Project #4)*
  - *Storm System Sewer Repairs with a Business Risk of 16+ or likely sewer collapse (Sewer Project # 2)*

- 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

- 93,590.86 feet of storm sewer
- 1,063 storm structures

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Gaylord *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1524-01 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:

Joseph Duff at 989-732-4060 duffj@cityofgaylord.org
Name Phone Number Email

10-31-17
Signature of Authorized Representative (Original Signature Required) Date

Joseph P. Duff, 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

GAYLORD WASTEWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

City of Gaylord
305 East Main Street
Gaylord, MI 49735
Joe Duff – City Manager, (989) 732-4060
SAW GRANT PROJECT NUMBER 1524-01

<u>**Executive Summary**</u>

The SAW agreement with the State of Michigan was signed on October 24, 2014 which began the overall SAW program.

The Grant agreement included the following funding amounts:

- Total Cost = $489,135
  - Grant Value = $440,222
  - Local Match = $48,913

The City of Gaylord is located in the north central portion of Otsego County in the north central lower peninsula of Michigan, approximately 60 miles south of the Mackinac Bridge. It is located at the crossroads of I-75 and M-32. The City owns and operates an oxidation ditch activated sludge Wastewater Treatment Plant with a rated capacity of 1.13 million gallon per day (MGD). The treatment plant discharges to the local groundwater aquifer under permit GW1810128. Gaylord's sanitary collection system has approximately 234,000 feet of sanitary sewer and force main, approximately 789 sanitary manholes and 9 lift stations that provides sewer services to the City and portions of Livingston Township.

<u>**Wastewater Asset Inventory**</u>

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:
  - 38% of assets are 1's
  - 36% of assets are 2's
  - 14% of assets are 3's
  - 5% of assets are 4's
  - 7% of assets are 5's

Condition Assessment

The City of Gaylord's sanitary collection system is in fair to good condition overall. The City has been continuously upgrading the collection system along with its yearly street reconstruction projects since 1993. There are areas of older sewers that were constructed of concrete pipe that are showing signs of deterioration due to hydrogen sulfide attack. Some of these sections of sewer are already planned for replacement in 2018. The wastewater treatment facility is in good condition, recently being upgraded in 2001 and 2010. 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 grade below "D" to be lined (MH Project #1)*
    - *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* (MH Project #3)
    - *Sanitary System Sewer Repairs with a Business Risk of 16+ or likely sewer collapse* (Sewer Project # 1)
    - *Sanitary Collection System Lift Station repairs for Lift Station 003, (Old 27 South PS), Lift Station 005, (Dickerson Road PS) and Lift Station 006, (Otsego Club PS).*
- 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

- 200,933 feet of sanitary sewer
- 33,035 feet of force main
- 789 sanitary manholes
- 9 lift stations
- 1.13 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 October 31, 2017
(no later than 3 years from executed grant date)

The City of Gaylord *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1524-01 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: June 2, 2017.

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:

Joseph Duff	at 989-732-4060	duffj@cityofgaylord.org
Name	Phone Number	Email

[signature] 10-31-17

Signature of Authorized Representative (Original Signature Required) — Date

Joseph P. Duff, City Manager

Print Name and Title of Authorized Representative

Stormwater
Asset Management Plan
for the Genesee County
Road Commission System

TETRA TECH

October 2017

Stormwater Asset Management Plan 1048-01

For the Genesee Road Commission System

Grantee:

Genesee County Drain Commissioner's Office- Surface Water Management

4608 Beecher Rd

Flint MI 48532

810-732-1590

www.gcdcswm.com

Contact: Susanne Hogan

On behalf of

Genesee County Road Commission

211 W. Oakley St

Flint MI 48503

810-767-4920

Grant partners	Grant Cots
SAW Grant	$415,800.00
Genesee County Drain Commissioner's Office	$46,200.00 *
Total	$462,000.00

*** the match by GCDC-SWM is a minimum, additional costs above the grant amount will be paid by grantee.**

EXECUTIVE SUMMARY

A 5-year Genesee County Road Commission (RC) stormwater Asset Management Plan (AMP) was created for the RCs stormwater infrastructure within the county's urbanized boundary. The plan demonstrates how the Road Commission's goal of establishing and delivering certain levels of service may be achieved through effective and sustainable management of the stormwater system. This AMP is contained to the urbanized boundary where a majority of the assets exist and the AMP will be used to meet the County's NPDES permit requirements. By developing a proactive long-term plan for stormwater asset management, the Road Commission will have a sustainable system that can be partnered with other County plans to ensure the well-being of the community, environment, and future generations.

The general scope of the asset management plan consists of four major items:

- Inventory of the existing stormwater assets
- 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 RC's stormwater drainage system is estimated at $125 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 ES-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 ES-1-1: Asset Summary and Cost

System Component	Quantity (unit)	Baseline System Value (Current Cost)	Baseline Future System Value (Replacement Cost at Failure)
Channels	780 miles	NA	$2,434,000
Pipes	256 miles	$70,890,000	$294,710,000
Inlets	9,110 each	$21,410,000	$48,760,000
Junctions	3,978 each	$11,740,000	$31,200,000
Culverts	1,155 each	$6,170,000	$8,650,000
Outfalls	2,708 each	$9,950,000	$15,320,000
		Total	$401,074,000

The evaluation of risk and consequence of failure is based on the condition assessment and POF, COF, and BRE scores. 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.

- 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.

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 ES-1-2 summarizes the annual funding requirements necessary to meet each level of service.

Table ES-1-2: Level of Service Funding Requirements

Level of Service	Annual Funding Requirement
A	$12,225,000
B	$7,914,000
C	$4,976,000
Existing	$2,534,000

Project areas identified in the 2017-2020 Transportation Improvement Program (TIP) were used to find assets near planned road projects over the next 5 years. Additionally, using an assumed LOS, asset quantities were summarized for rehabilitation and replacement over the next 10 years. Further recommendations included analyzing county-wide projects for opportunities for joint coordination between the RC and other county and municipal utilities.

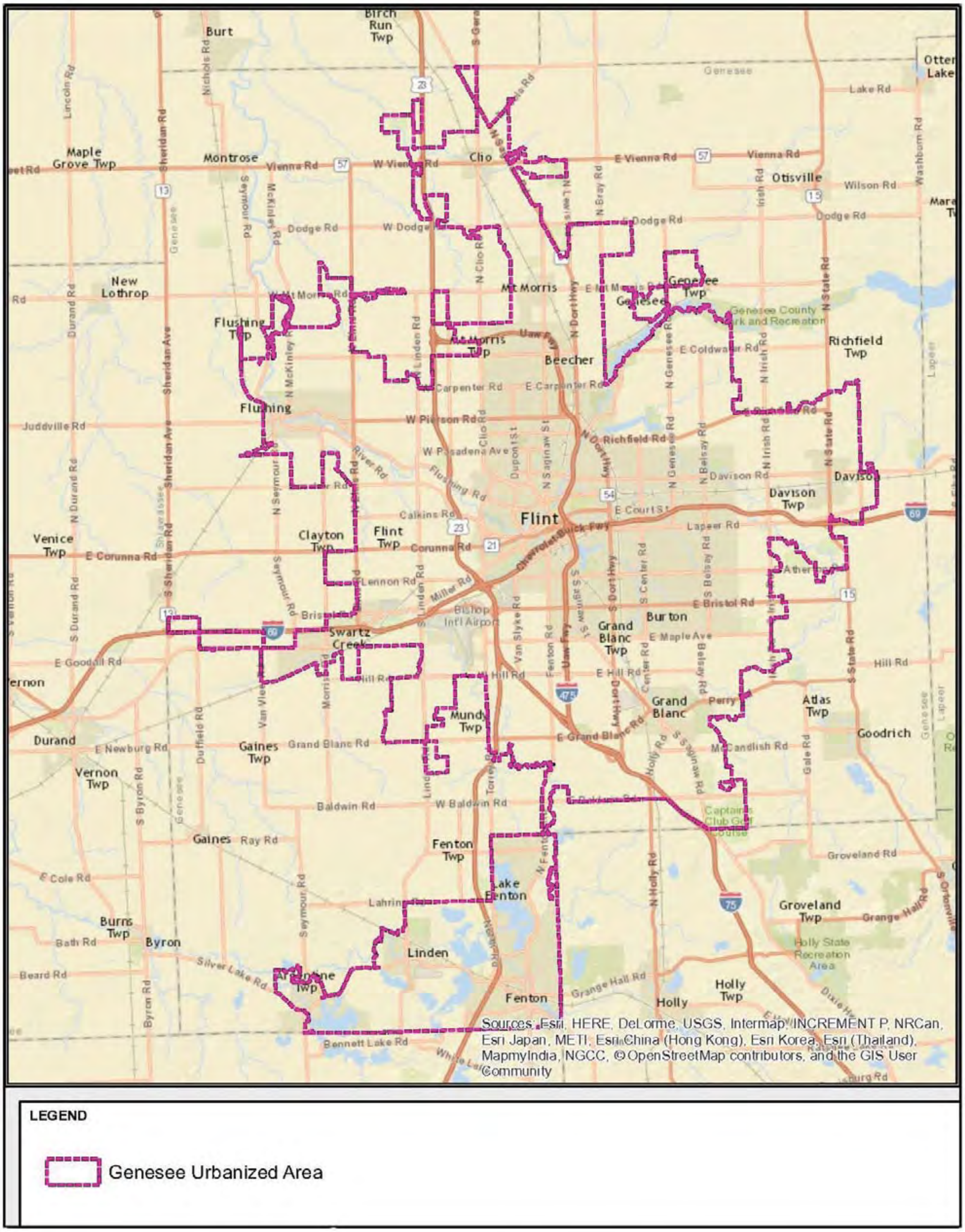


Figure 1-1: Urbanized Area Map

PROJECT APPROACH

The approach taken for this project included the following steps:

1. An asset inventory including the component locations.
2. An evaluation and rating of each asset.
3. Determination of unit price replacement and repair costs plus a complete valuation of the system.
4. Defining various levels of service and strategies for asset renewal.
5. Summary of efforts necessary to meet the desired level of service.

The Office of the Drain Commissioner maintains a Geographic Information System (GIS) of the stormwater drainage system. The current GIS includes components for the storm sewers, pump stations, manholes, catch basins, stream crossings, detention basins, floodwall penetrations, open ditches, green infrastructure, streams, and storm discharge points. A major gap in the inventory was the drainage system associated with the County roads. The GIS was used as the foundation for an inventory and location of the assets.

Limited information on the condition of the assets was available at the beginning of the project. The approach was to visit as many system components as feasible in order to geo-reference and assess their condition. On all assets the installation year was populated in GIS from as-built drawings. On assets not visited, the installation year of each asset was the basis for that asset's condition assessment. The asset age and generalized condition information were used to determine the probability of failure. A consequence of failure was determined for each asset employing factors such as proximity of the drainage asset to floodplains, roads, and areas of environmental concern.

A comprehensive unit price database was established for the repair and reconstruction of each asset. This database is the foundation for all of the valuation and costing information.

In order to evaluate options on how the system may be operated, four (4) different levels of service were defined. The various levels of service represent the frequency and strategy for renewal options along with operation and maintenance of the system. The financial impacts of the various levels of service were determined from the asset inventory, rating system, and unit price information. Annual costs were estimated for each level of service.

Following the completion of these items, the results were compared to the 2017-2020 Transportation Improvement Plan to determine if assets near planned road projects require rehabilitation or replacement.

METHODOLOGY

The asset management plan was developed for the stormwater collection system associated with the roads under the jurisdiction of the Genesee County Road Commission. Components of the system were inventoried and assessed in the field using either an iOS or Android collector app for ArcGIS Online hosted by a Tetra Tech feature service. Using the information from as-builts and from data collected in the field, the business risk exposure (BRE) will be calculated for assets using their probability of failure (POF) and consequence of failure (COF). The BRE will help the RC in determining its critical components, one of the primary goals of an asset management plan, in a consistent manner. A BRE also aids in predicting and prioritizing maintenance, rehabilitation, and replacement activities.

The redundancy factor (R) is based on the existing system conditions, and is assumed to be equal to 1 for the majority of stormwater assets. Unique POF and COF attributes are identified for each individual asset group utilizing attributes available in GIS. Each of these attributes is assigned a weight with the sum of the weights equaling ten. 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 environmental hazards.

The first step was to review the data collected for each asset in the database. Not all the data that was initially targeted for collection was able to be collected. For the data that was collected, consistency was the greatest focus.

MAJOR VARIABLES

Estimated Effective Life: Installation dates are used to calculate the remaining useful life (RUL) of an asset based on the standard 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 for an individual asset based on available information. For example, most junctions are assumed to have an EEL of 75 years; if a 70-year-old junction is inspected and found to be in excellent condition, the EEL could be adjusted to 100 years. Preventive maintenance can also impact the EEL. If a storm 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 installation date. Channels rely on maintenance activities to function and if well maintained channels have an infinite EEL.

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. Each of these attributes is assigned a weight and a value that is dependent upon the attribute specific characteristics. The weighted score for each attribute is calculated by multiplying the value and weight. The weighted attribute scores are summed for the total POF score for the asset.

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. The predominant attributes in determining COF are those that related to the size and/or amount of tributary area upstream of the specific asset. Examples of these attributes, for the RC stormwater system, are channel size, pipe size, and asset type.

Business Risk Equivalent: Using the POF and COF for each asset, we can now calculate the Business Risk Evaluation (BRE) BRE = POF x COF x 1/R Where R stands for redundancy which is typically not a factor provided for in linear collection system assets and therefore dropped from the equation.

CONDITION ASSESSMENTS

Rating	Condition	Definition
1	Excellent	Structure is brand new or just repaired
2	Good	Structure is in good condition and no maintenance needed
3	Fair	Structure shows wear and tear but can wait to be maintained with the next 5-years
4	Poor	Structure has some major issues and needs to be maintained in a year or two
5	Failure	Structure is not functioning as intended and needs to be maintained immediately

Linear Assets : Channels, pipes, and culverts are the linear asset classes found in the RC stormwater system. No CCTV recordings were available for pipes and culverts. Furthermore, channels that are of long lengths make condition assessment along the entire length of the asset impractical. Therefore, the condition assessments for linear assets were conducted at both the upstream and downstream ends of the asset. The result, for all three of these asset classes, was two condition ratings. Utilizing both ratings unnecessarily complicated the POF and COF scoring so a single condition rating representing each linear asset was derived. This single rating was determined by taking the maximum rating of the two assessments completed in the field.

Incomplete Condition Assessments: For assets missing a condition rating after the inventory period, a rating was assigned based on the age of the asset and EEL. The details of the condition assessments assigned based on age are detailed below as well as the one exception to this rule: channels.

Age-Based Condition Rating: A majority of the assets received field condition assessments and subsequent ratings. A large portion of the assets without field condition assessments were a result of assets being added to the GIS database manually via as-built drawings. Ratings based on age were developed. The condition rating is determined by the asset class and the corresponding EEL based on material of the asset. Using a combination of field assessments and age-based condition ratings 100% of assets within the RC database have a condition rating.

> **Channels :** The lack of an EEL for channels makes an age-based condition assessment impossible. Furthermore, channels have an infinite life expectancy, if maintained and/or reconstructed, so age is not a performance factor.

ASSET GROUPS

Assets are broken up into the following categories:

- Open Channel and Road side ditches
- Pipes
- Inlets
- Junctions
- Culverts
- Outfalls
- Best Management Practices: i.e. water quality measures.

Each group has:

- Been inventoried
- The condition assessed
- The probability of Failure calculated
- The consequence of failure calculated
- Scored and estimates of effective life summarized.

This has been detailed in Chapter 3 of the report.

LEVEL OF SERVICE

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 storm sewer system are crucial to implementing a comprehensive and sustainable O&M plan
- Preventative maintenance: work that intends to extend the estimated service life.
- Corrective Maintenance: includes all repairs to correct defects or failures identified in the system during inspections.
- System Renewal is the replacement of an asset at the end of its effective life.
- Other activities: street sweeping, green infrastructure, studies or planning, regulatory or developmental compliance are activities that are included in the level of service categories and cost estimates.

Table 4-2: Existing Level of Service Definition

Asset Type	Action	Quantity (unit)	Total Dollars Spent
Channel/ Ditch Maintenance	Clean Debris, Corrective Maintenance	30 miles	$750,000.00
Inlets/ Junctions/ Outfalls	Clean, Corrective Maintenance	120 each	$300,000.00
Culverts	Clean, Corrective Maintenance	unknown	$1,484,000.00
		Total Exisitng Level of Service Budget	$2,534,000.00

The criticality analysis completed in Chapter 3 and the condition ratings conducted during the inventory period indicated the number of assets that should be immediately replaced or rehabilitated is more than can be addresses by the current level of service funding *in one year*. As stated in Chapter 2 the BRE identifies the RC's most critical assets, not necessarily those that are at immediate failure. BRE identifies the assets with the highest potential impact should failure occur. Table 4-3 below compares the most critical assets with the number of assets serviced by the current operation and maintenance activities of the RC. Also identified, in an effort to meet NPDES requirements, are Points of the Discharge under each asset class that are within the BRE High Criticality group

Asset Type	Quantity of Assets with a High BRE Criticality (units)	Quantity of Point of Discharge Assets within High BRE Criticality	Assets Serviced Through Current Level of Service
Channel	137 miles	NA	30 miles
Pipe	69 miles	0	0
Junction	195 each	6	120
Inlet	460 each	125	120
Culvert	57 each	NA	742[1]
Outfalls	133 each	NA	120

Although at first glance it appears that the current service plan is not sufficient to meet all the identified high risk assets it should be noted that since the AMP program is in its initial stages it is anticipated that by the end of five years these numbers will have been reduced (if they are addressed). Furthermore, it is anticipated that future maintenance levels will be able to be met by the current funding.

3 levels of service were proposed as part of this Asset plan with associated projected annual costs.Level of Service C is discussed below.

COST DATA

Cost information is the foundation upon which the valuation of the assets is determined. Several different costs for each asset or groups of assets are computed. Unit cost information for each asset was determined for inspections, maintenance, rehabilitation, and replacement activities. Whether the asset was under a roadway was also taken into account in the unit cost development. By creating a database of cost information within GIS, the RC can reference this for initial cost estimates as an aid in future infrastructure decisions.

Road Commissions receive funding from gas and weight tax, various grants and cost sharing with Local Communities and MDOT. Sufficient resources may not be possible without changes to the state legislature. That is why an effective asset management plan can help focus the financial resources on the assets that need it the most.

The County Road Commission and its staff are striving to operate so as 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. The County 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.

The largest portion of the 4-year capital improvement plan will include renewal of existing assets through projects that include road improvements. The majority of the stormwater assets needing regular maintenance include gravity sewers, associated manholes, and roadside ditches. To effectively determine which assets require renewal, a comprehensive assessment program was executed. The results of the assessments are outlined for each asset class in Chapter 3. Given the resulting condition ratings and criticality scores the county can identify and implement a plan, based on the desired level of service, for renewing and replacing the most critical and worse condition assets.

Annual Inspections Assignments

Now that the large bulk of assessment work is complete, the RC will use the desired level of service from Chapter 4 to implement and execute an annual inspection task. Because a large percentage of the stormwater system is in acceptable condition, money spent on inspection can be a very good investment. For a relatively low cost, a significant number of assets can be inspected to enable making decisions on whether to rehabilitate or replace assets, or in many cases do nothing.

Level of Service C indicates that the all assets greater than 75 years would be scored by PACP CCTV inspection over a 10-year period. To meet this requirement plans should be made to start executing a re-assessment of all assets beginning in year 2027. In the meantime, should any assets exist without assessments, the RC should inventory and assess assets the year prior to a planned road project. This allows for the most efficient use of funds and least disruption of public services by identifying stormwater assets within the project area that require maintenance or replacement.

Renewal and Rehabilitation Strategy

The primary method in identifying assets for rehabilitation or renewal by the RC is directly tied to the TIP. Assets within a right-of-way for upcoming road projects should be identified and the completed assessments analyzed to financially account for stormwater improvements, where required, in the complete project plan. Assets within proximity of projects for the upcoming TIP are discussed in detail in Chapter 7.0.

Secondary identification of assets requiring improvement is conducted per Table 4-4, assuming the RC wishes to maintain a LOS equal to that outlined in the Proposed Level of Service C section. Assets meeting the requirements of corrective and preventative maintenance should be prioritize based on BRE. Renewal and rehabilitation criteria should be established for a consistent approach. An example renewal strategy for pipes is as follows:

1. Assets with an EEL less than or equal to 10 years will be replaced. Pipes assumed to be replaced with the same size pipe.
2. Assets with an EEL greater than 10 years will be rehabilitated. This assumes these assets will receive a liner to extend the effective life.
3. Gravity mains that are smaller than current county design standards will be replaced with 12 inch pipe.

Database Management

Information obtained from the annual inspection and assessment logs should continue to be incorporated into the on-line database for use in the Road Commission's GIS to identify assets with the highest probability and consequence of failure. Both assessment and maintenance logs should be maintained and information gathered inputted into the RC's GIS database with the POF and COF calculations updated annually.

This will provide an annual ranking of assets that require attention, and then renewal projects may be identified. Accumulation of CCTV inspection data will also assist in identifying trends in the data regarding asset condition as a function of age, material, and general geographic locations. The RC, in partnership with the Genesee County Metropolitan Planning Commission (GCMPC), will use this data to coordinate stormwater projects with adjacent roads project as outlined in the organization's Transportation Improvement Program (TIP).

RESULTS

Based on the field assessments completed and meeting the Proposed Level of Service C above the following quantities of assets are identified for renewal or rehabilitation from 2018-2027:

Table 6-1: Quantity of Rehabilitation and Replacement Assets

Asset Class	Rehabilitation	Replace
Pipes	5,100 ft	7,700 ft
Junctions	61 each	55 each
Inlets	130 each	395 each

Culverts		58 each
Channel	60 ft	40 ft
Outfall	136 each	271 each

COUNTY-WIDE ASSETS

For assets not included in the scope of this project, or not already inventoried on a county-wide system, data can be collected starting immediately and operational budgets can be established based on the LOS charts starting on page 86. Based on maintenance logs and information currently available, the county can prioritize the assets for assessment. Over the next 10 years the county can inventory all other stormwater assets within its jurisdiction. In addition to maintenance logs, some recommended factors to use in determining a prioritization for data collection and projects include:

- Assets that are at or near failure.
- Assets that are critical to operation, such as pump stations.
- Assets found within sensitive areas such as business districts or areas of environmental concern.

- Coordination with other infrastructure projects. During detailed design for future projects, projects should be assembled by grouping together similar types of work. For example, initiating a sewer rehabilitation program to line pipes and restore structures along the collection system separately from replacement projects which require open cut construction. Other factors to consider would be general location of the proposed repairs to confine the project to specific geographic areas in order to minimize disruption to businesses and residents.

CAPITOL IMPROVEMENTS

This section of the report identifies capital projects for assessment, design, and construction. A Level of Service C was selected as the baseline for developing projects and costs. Key differences between LOS C and existing operations include:

- Inspect all elements of the collection system including gravity mains, laterals, manholes, and catch basins over 75 years old within a 10 year period.
- Inspection of storm sewer should include PACP CCTV.
- 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 shown in Table 4-4 were used to develop funding requirements to meet this level of service. Funding needed for each level of service C is detailed in Table 4-7, on page 90 and is summarized below in Table 7-1. The capital improvement plan was based on this cost, and activities and projects were selected to meet this level of annual spending.

Table 7-1: Projected Annual Cost Level of Service C Summary

Capital Renewal	$1,243,000
O&M	$3,233,000
Planning	$200,000
Regulatory Compliance	$300,000
Development Regulation	$160,000

Specific capital improvement projects can be selected using various methods based on historical information, recent field investigations, and the results of the RC asset inventory and risk assessment. Three main categories of projects are:

- Capital projects initiated by other departments
- Previously identified stormwater projects
- Miscellaneous identified projects

Capital Projects for Other Utilities

The RC has capital improvement projects scheduled through 2020 in the most recent TIP. Other departments within Genesee County may have projects that overlap with the RC stormwater assets. Performing road, sewer, and water projects together benefits the County 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.

Streets Projects Street projects are categorized as full reconstruction or resurfacing projects. Full reconstruction projects are ideal projects for making stormwater improvements as there will not be added restoration costs for pavement replacement associated with sewer construction.

Resurfacing projects will receive less priority though are still considered. If the adjacent stormwater asset has less remaining life than the expected pavement repair, the stormwater project should be included with the street project. Costs to do any open cut replacement can be minimized due to less pavement to restore to the top of the milled profile of the surface. Excavation limits could also be limited to what is deemed necessary, rather than having to replace an entire lane or road width to avoid unsightly pavement patches which tend to settle and fail at accelerated rates.

Sewage Projects In most cases sanitary sewers are located deeper than the storm sewers. Repair of sanitary sewers often impacts both the pavement and adjacent stormwater infrastructure. Performing necessary stormwater improvements in conjunction with sanitary projects can provide greater efficiency in design, and allow for correction of sub-optimal system layouts. Ancillary project costs such as mobilization and pavement restoration can be shared with a combined project, providing an overall cost savings.

Water Projects Water Department projects provide similar benefits to projects initiated by the Sewage Department, in that pavement and traffic control costs may be split amongst participating parties. Water main design standards for separation from other utilities and installation methods used to maintain the existing water main service during replacements may also result in good opportunities to evaluate and improve system layout and efficiencies.

Project Evaluation The GCMPC has identified 109 proposed capital improvement road projects through 2020 in Genesee County. Of these projects, 29 are funded through the RC. The RC funded projects were reviewed to determine if adjacent stormwater assets, that may need renewal based on the EEL or condition rating, existed. This evaluation resulted in a total of 431 assets within 100' proximity to the assumed project areas. The assumed project areas equaled the length of the project, as supplied in the TIP project descriptions, times the width of the road ROW.

Assets within proximity of the project areas were identified using GIS. The following table summarizes assets, and their condition ratings, that overlap with planned roads project for the upcoming TIP (fiscal years 2017-2020). A detailed list of the assets, their ID's, and other pertinent data can be found in Appendix D of this report.

Twenty Year Capitol Improvement:
The TIP project plan focuses on road improvements needed within the next 4-5 years. For the twenty-year capital improvement costs, shown below in Table 7-5, it is assumed the scale of stormwater improvements will remain constant (2.5%) throughout the next twenty years.

The twenty year capital improvement expenses combined with the desired level of service will provide the total annual spending on stormwater infrastructure maintenance and renewal. As the initial improvement periods, years 1 through 5, are completed it can be expected that future costs could decrease.

Year	Stormwater Improvements
1	$154,107
2	$157,959
3	$161,908
4	$165,956
5	$170,105
6	$ 174,358
7	$ 178,717
8	$ 183,184
9	$ 187,764
10	$ 192,458
11	$ 197,270
12	$ 202,201
13	$ 207,256
14	$ 212,438
15	$ 217,749
16	$ 223,192
17	$ 228,772
18	$ 234,492
19	$ 240,354

CONCLUSIONS AND RECCOMENDATIONS

The current value of the stormwater drainage system is estimated at $125 million. Eighty-three percent of the system, by value, consists of stormwater sewers and associated inlets and junctions. Twenty-three percent of pipes, 20% of inlets, and 31% of junctions all have less than 25 years of EEL remaining.

The asset management plan developed offers a powerful tool for managing the stormwater assets and developing budgets for future work. The condition assessment established is a good baseline for long term project planning. Continual assessments will further improve asset criticality and capital improvement decision making. The established outfall and point of discharge databases are critical in identifying assets for NPDES permit requirements and providing a baseline of their condition.

The comprehensive review and planning allowed for detailed identification of assets that can be included in the next TIP cycle for improvement. The Level of Service recommendations summarized assessment, maintenance, rehabilitation, and replacement efforts over a 10-year cycle. The cost data was used to calculate annual budgets based on the various levels of service. The budgets allow for proactive management of the stormwater drainage system. In addition, the database developed will allow for efficient cost estimating for assessing and planning for future stormwater work when other projects are identified, for example when a sanitary sewer project is planned.

Although asset management software is not in use at this time, the database can be uploaded to software when purchased. In addition, capacity analysis was not included in the asset management or in the current capital improvement projects, but the framework has been established to allow for incorporation of this information at a later date.
Asset management is a continuous improvement process. As stormwater assets are added or modified and as additional information is obtained, the County's GIS 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 throughout Genesee County, including roadside assets outside the urbanized area.
- Transition the management approach from GIS only to an asset management software that uses GIS as the foundation to identifying critical or underperforming assets.
- As additional information is collected, periodically review and update the criticality parameters. The parameters include: the weights and values assigned to the probability and consequence of failure variables; unit price cost information; and the renewal strategy variables.
- Once implemented, use the asset management software 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 similar to what is done currently for the roads themselves. Historically construction of the system has occurred with major development and major infrastructure projects. This results in peak periods where major funding is required. Proactively managing the system will help level out the annual expenditures.

Data Management: 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.

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

Completion Due Date **October 31, 2017**
(no later than 3 years from executed grant date)

The Genesee County Drain Commissioner's Office *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1048-01 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:

Susanne Hogan at 810-732-1590 or shogan@co.genesee.mi.us
Name Phone Number Email

James R Gerth 30 Oct 2017
Signature of Authorized Representative (Original Signature Required) Date

James Gerth, P.E., Director, Genesee County Drain Commissioner's Office- Surface Water Management
Print Name and Title of Authorized Representative

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section, Attn: Mr. Jonathan Berman

From: Wade Trim

CC: Oakland County Water Resources Commissioner, George W. Kuhn Drainage District

Date: 10/31/2017

Re: George W. Kuhn Drainage District
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1223-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the George W. Kuhn 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 MDEQ guidance.

GRANTEE INFORMATION

George W. Kuhn Drainage District, SAW Grant Project #1223-01

Project Grant Amount: $1,392,917

Applicant Match Amount $242,083

Total Project Amount $1,635,000

Primary Contact
Mr. Jim Nash
Oakland County Water
Resources Commissioner
One Public Works Drive
Building 95 West
Waterford, MI 48328
248.858.0958

Consultant Contact
Mr. Andrew McCune, PE
Wade Trim
25251 Northline Road
Taylor, MI 48180
734.947.9700
amccune@wadetrim.com

WRC Project Manager
Mr. Gary Nigro, PE
Oakland County Water
Resources Commissioner
One Public Works Drive
Building 95 West
Waterford, MI 48328
248.858.5243
nigrog@oakgov.com

EXECUTIVE SUMMARY

The George W. Kuhn Drainage District 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 George W. Kuhn Drainage District is owned by the Oakland County Water Resources Commissioner (under jurisdiction of Chapter 20 of the Drain Code) 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 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 AND/OR 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 assist 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 and combined 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 George W. Kuhn Drainage District, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 170,000 lineal feet of combined sewer underwent condition assessment via cleaning and televising. Approximately 1,584 manholes and other related structures were evaluated using the CAMS inspection work orders. Vertical assets, including a retention treatment basin, pump stations, regulators, chambers and flow and level sensors, were inventoried using a WRC hierarchy template and condition assessment data was collected and input into the CAMS system.

CRITICALITY OF ASSETS

Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that WRC configured into the Power Plan software as part of the "Common to All" approach was 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.

The assets that have the greatest POF and the greatest COF will be the assets that are the most critical. 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.

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, 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 (storm and sanitary sewers, force mains, siphons 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 absences 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 Long-Range Plan (LRP) process form additional elements of the LOS.

The WRC Base 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.

The existing computer model representations of the collection system, storage and treatment facility and regulator system have been expanded and calibrated. These models will provide WRC with the tools that can be used to evaluate the performance of the current system, identify bottlenecks in the system, test changes to the operational protocol, and evaluate the impact to the system. A computational fluid dynamic (CFD) model of the sodium hypochlorite mixing system within the GWK RTB has been created. This model is being used to evaluate the effectiveness of the mixing system. The system was evaluated for low flow conditions using the diffuser system and for high flow conditions using the induction mixers. Alternatives are currently being evaluated to change the alignment of the mixers to improve the mixing efficiency.

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 inspections, 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 "Long Range Plan" (LRP) process.

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 George W. Kuhn Drainage District, 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 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:

- Dequindre Pump Station: Replacement of Pumps and Motors, Pipes, Valves, Generator, Electrical and I&C - Cost $2,502,000
- 8 Mile Meter Chamber – Replacement of Valves – Cost $150,000
- Regulator #1 – Replacement of Valves and I&C – Cost $428,000
- Regulator #6 – Replacement of Valves – Cost $98,000
- GWK Facility – Storage Tank, Pumps, Valves and I&C – Cost $1,492,000
- Stephenson Control Bldg – I&C – Cost $29,000
- Sewer Collection System Repair and Rehabilitation – Cost $1,100,000

Capital Projects, 6 to 20 years:

- The cost estimate provided in the 6 to 20 year capital planning period were 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 preventive 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. Cost - $100,000,000

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the Long-Range Plan (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 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 George W. Kuhn Drainage District's major assets include:

- 663,857 lineal feet of combined sewer, ranging in size from 6" to a triple 12' Box culvert, utilizing Clay, Ductile Iron, Brick, Non-reinforced and reinforced concrete, cast iron, and PVC.
- 1,345 Combined Manholes
- 239 Combined Inlets
- 64 Combined Access Points
- 5 Combined Flow Regulators
- 1 Retention Treatment Basin (124 MG Facility)
- 2 Lift/Pump Stations

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

Completion Date: October 31, 2017
(no later than 3 years from executed grant date)

The **George W. Kuhn Drain** (legal name of grantee) certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1223-01** 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 18, 2017**

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: 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:

Jim Nash at **248-858-0958** **wrc@oakgov.com**
Name Phone Number Email

Jim Nash 10/27/17
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

Memorandum

Date:	October 31, 2017
To:	Ms. Jaclyn Merchant
Company:	Michigan Department of Environmental Quality
From:	Prein&Newhof
Project #:	2130394
Re:	Grattan Township SAW Grant Summary of Wastewater Asset Management Plan

Ms. Merchant:

This memorandum provides the summary of Grattan Township's SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

SAW Grant Project Number: 1495-01

Grantee:

Grattan Township

12050 Old Belding Road NE

Belding, MI 48809

http://www.grattantownship.org/

Contact: Mr. Franklin J. Force, Supervisor

Phone: 616-691-8450

Executive Summary

Grattan Township was awarded a SAW Grant in 2014 to prepare a Wastewater Asset Management Plan. The Grant agreement indicated the following amounts:

Project Cost	Grant Amount	Local Match
$481,427	$433,284	$48,143

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 original construction drawings. Manhole and lift station locations were field verified and locations adjusted with Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, 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.

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. For sewers with prior CCTV inspections (on file from historical operations records), file videos were reviewed and conditions were logged by PACP certified inspectors. Pipes inspected with zoom cameras were rated by observing roots, deposits, joint conditions, pipe wall condition, infiltration, or other defects. Pipes inspected with CCTV were rated using the PACP condition grading standard. 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
63%	28%	7%	2%	0%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. Grattan's force main data was compared with that of several other municipalities to establish a comparative reference.

Percentage of force main pipes in each rating category

1	2	3	4	5
5%	1%	93%	0%	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
54%	41%	4%	1%	0%

Lift Stations: Visual inspections and performance testing were completed to evaluate asset conditions. Lift station assets, including pumps, valves, piping, structures, electrical, controls, etc. were rated on a scale of 1–5. Composite ratings for the station as a whole were then developed.

Number of lift stations in each rating category

1	2	3	4	5
0	11	14	0	0

Wastewater Treatment Plants: The treatment plants were broken down into an inventory of 411 assets. Visual inspections, performance testing, and discussions with maintenance staff were completed to rate the asset conditions.

Percentage of treatment plant assets in each rating category

1	2	3	4	5
11%	28%	44%	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."

Grattan Township recognizes that the people served by the system are more than customers, they are the system owners. Township staff and system operators act as stewards of the system. The Township Board evaluates the level of all public services provided based on input from citizens. The level of service currently provided with regard to the wastewater systems is generally considered satisfactory throughout the community. The current level of service goals are:

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

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 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, 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,
- 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 representing the most urgent need). The most critical assets were found to be Grattan Pump Station 3A, Grattan PS-1 force main, Grattan/Vergennes PS-8 force main, Grattan/Vergennes PS-7, Grattan/Vergennes PS-2, Grattan/Vergennes PS-2 force main, Grattan/Vergennes PS-1, Grattan/Vergennes PS-1 force main as shown in the Wastewater System Evaluation Reports.

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 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 ten (10) years. The annual investment cost was evaluated and scenarios developed for cash funding and debt financing. Based on that analysis, the Township has confirmed that current user rates are adequate for the short term. User rates will be evaluated annually and adjusted as necessary to meet projected system 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."

A capital improvement plan showing project descriptions, cost estimates, and project timelines was developed for the capital improvements needed within a 10-year planning period. The projects identified in the CIP are:

- Manhole Lining at GV-MH-01-26 and G-MH-01-13
- Grattan Vergennes WWTP Irrigation Pump Station Improvements
- Miscellaneous Grinder Station Improvements
- Grattan WWTP Irrigation Pump Station Improvements
- Grattan Pump Station 3A Improvements
- Grattan/Vergennes Pump Station 7 Improvements
- Grattan/Vergennes Pump Station 1 Improvements
- Grattan WWTP Inlet Structure Replacement
- Grattan Pump Station 1 Improvements
- Grattan/Vergennes Pump Station 5 Improvements
- Grattan Pump Station 3 Improvements
- Grattan/Vergennes Pump Station 4 Improvements
- Grattan Pump Station 4 Improvements
- Grattan/Vergennes Pump Station 3 Improvements
- Grattan/Vergennes Pump Station 6 Improvements
- Grattan/Vergennes Pump Station 17 Improvements
- Grattan/Vergennes Pump Station 11 Improvements
- Grattan/Vergennes Pump Station 16 Improvements
- Grattan/Vergennes Pump Station 14 Improvements
- Grattan WWTP Misc. Improvements and Maintenance
- Grattan/Vergennes WWTP Misc. Improvements and Maintenance

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Grattan Township's major assets include 25 pump stations, 29 grinder stations, 54,700 feet of 8" to 12" diameter gravity sewer, 71,000 feet of 1.25" to 8" diameter force main, 300 manholes, and 2 wastewater treatment plants.

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Township of Grattan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1495-01 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: April 27, 2017.
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
Franklin J Force	at	(616) 691-8450	supervisor@grattantownship.org

Franklin J Force
Signature of Authorized Representative (Original Signature Required)

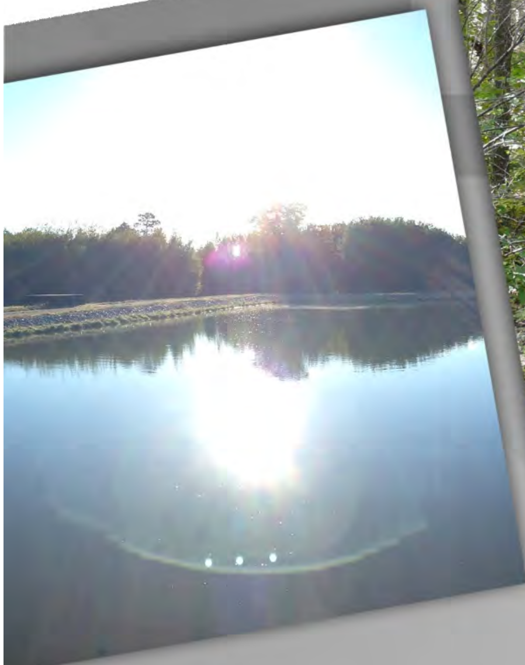
October 31, 2017
Date

Franklin J Force, Supervisor
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

City of Harrison

SAW Project No. 1618-01

October 2017

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 May 2014, The City of Harrison received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1618-01, 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 Harrison AMP is:

Tracey Beadle, City Clerk /Manager
2105 Sullivan Drive
Harrison, MI 48625
Phone number: 989-539-7145 x200
Email: tbeadle@cityofharrison-mi.gov.

ASSET INVENTORY AND CONDITION ASSESSMENT

A list of the major assets in the City'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 123,577 feet (23.4 miles) of sanitary sewers (gravity pipe and force mains) and 428 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.

Wastewater from the collection system is screened at and pumped from Lift Station No.8 to the WWTP. Aspirating aerators are utilized in the two aeration cells to provide oxygen and mixing. Waste stabilization is continued by physical settling and a combination of aerobic, anaerobic, and facultative bacteria in the subsequent lagoons. Lagoon effluent is pumped from the two storage lagoons to the irrigation fields.

Treated effluent is seasonally discharged to spray irrigation fields in accordance with NPDES permit No. GW1810177. The permitted capacity of the WWTF is 219 million gallons per year (mgy). The annual average flow received by the facility in 2015 is approximately 95.6 mgy.

The City of Harrison operates and maintains ten sanitary sewer lift stations throughout the wastewater collection system. The stations are either built-in-place suction lift style, submersible style, or pneumatic ejector (air lift) stations.

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, 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 208 WWTF assets, 205 Lift Station Assets, and 861 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 all 428 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 99% of the gravity pipe. 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 10% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 7% of the system identifying the need for point repairs and lining. The remaining 83% of assets were placed in the 20+ year category.

The condition of the assets at the WWTP ranges from good to fair (71% good and 29% fair). Ongoing repairs have helped to maintain the condition of many assets as well as the work completed during the 2002 project. Some assets are now near the end of their useful life and are deteriorated due to use and the harsh conditions associated with wastewater treatment. No immediate concerns were noted.

The condition of the assets at the lift stations ranges from good to very poor (56% good, 38% fair, 6% poor, <1% very poor). Ongoing maintenance has maintained the condition of most assets. Some assets have deteriorated due to use and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

The overall objective of the City's 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:

LEVEL OF SERVICE STATEMENT

The overall objective of the City of Harrison 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 City 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 may need to be implemented. During the LOS review with the community the need for performance measurements was discussed.

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 risk rating. Five segments are recommended point repairs and the other two segments are recommended full lining, all are included in the 1-2 Year Rehabilitation Plan.
- Four pipe segments in the collection system have a high risk rating and are recommended for point repairs in the 3-5 Year Rehabilitation Plan.
- Six pipe segments have a medium risk rating and are included in the 6-20 Year Rehabilitation Plan. Three of the pipe segments have point repair recommendations and three pipe segments have full lining recommendations.

Much of the collection system's gravity pipes, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition.

Figure 2 provides the risk rating for the collection system manholes.

- Two manholes are identified as extreme risk and are recommended for cleaning, repair and lining in the 1-2 Year Rehabilitation Plan.
- Twenty-three manholes have a high risk rating, 22 are included in the 3-5 Year Rehabilitation Plan and have recommendations that may include cleaning, repair, lining and/or adjustment. One manhole is included in the 1-2 year maintenance plan with recommended Inspection.

Many manholes (94 percent) are at low to medium risk and recommended to be included in a long-term rehabilitation or operation & maintenance strategy.

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	Medium 1	High 1	Extreme 4
Medium	Low 42	Medium 5	Extreme 3
Low	Negligible 365	Low 8	High 3

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

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	Medium 27	High 2	Extreme 0
Medium	Low 31	Medium 14	Extreme 2
Low	Negligible 239	Low 93	High 21

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

Figure 3 provides the risk ratings for the WWTF assets. There were no WWTP assets in the “Extreme or High Risk” category, which would require a plan for asset renewal or risk mitigation in the immediate term.

Figure 4 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The 34 assets with high risk ratings should be inspected at regular intervals. The Village has identified replacement/repairs/improvements to six of the lift stations in the proposed plans for system improvements

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	High 0	High 0	Extreme 0
Medium	Low 34	Medium 7	High 0
Low	Low 1	Low 72	Medium 94

Figure 3. WWTF Assets by Risk Rating

Consequence of Failure \ Likelihood of Failure	Low	Medium	High
High	High 1	High 0	Extreme 0
Medium	Low 16	Medium 37	High 33
Low	Low 15	Low 47	Medium 56

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 Cities' wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, wastewater treatment facility and pumping stations/force mains. From the BRE, a short-term (1-5 year CIP) and long-term (6-20 year CIP) was developed for the utility.

Based on the AMP condition assessment of the sanitary sewer system, the City has identified assets of the collection system, treatment facility and lift stations for improvement. Due to the large scope and needs of the system, the City of Harrison has pursued ICE Grant funding through MEDC. An improvement project is being planned for 2018. The project includes the replacement of (3) air-lift stations and (1) grinder-pump station that are in the immediate shoreline areas of Budd Lake and Little Long Lake. Upgrades to (2) larger pump stations (#6 and #8) that convey waste to the WWTF require upgrades including mechanical screen, pumps, transfer switches and backup power.

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.

The City of Harrison has pursued ICE Grant funding through MDEC to secure the purchase of a sanitary sewer jetter, camera and associated equipment. The inclusion of this equipment into the City's inventory, will allow the City DPW staff to better maintain the sewer system, allowing faster response to problems with the system and save on costs from having to hire contractors to perform these services.

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 an independent municipal financial advisor (Utility Financial Solutions, LLC) to develop a 5-year financial projection to meet the Michigan Department of Environmental Quality SAW Grant requirements.

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The **City of Harrison** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1618-01** 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: April 27, 2017.
2) Significant Progress Made: 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: 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:

_______________________ at _______________________
Tracey Beadle 989.539.7145 clerk@cityofharrison-mi.gov

Tracey Beadle 10/30/17
Signature of Authorized Representative (Original Signature Required) Date

Tracey Beadle, Manager
Print Name and Title of Authorized Representative

City of Harrisville

Sanitary Sewer System

Asset Management Plan

October 2017

OHM Advisors®

EXECUTIVE SUMMARY

The wastewater infrastructure system of Harrisville provides a critical service to its residents and businesses, providing the collection and treatment of wastewater and protecting Lake Huron by discharging clean water through an advanced treatment process. Recognizing the importance of this wastewater system, Harrisville initiated a comprehensive assessment of its wastewater infrastructure. 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 1547-01, with a total budget of $329,206 with a ten percent local match required by the City.

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 wastewater collection system using the latest available hardware and software.
- Survey 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, age, and depth to the newly created GIS database.
- Physically evaluate the structural condition of the majority of publicly owned system components, including wastewater sewer pipes, manholes, pump stations, and lagoon treatment system. 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
    - Update and rehabilitation of pump stations for accessibility and SCADA integration
- Provide recommendations for developing a prioritized Capital Improvement Plan (CIP) to be funded through the City's wastewater enterprise 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:

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 Leaders

The team leader listed in Figure 1 is committed to the asset management mission statement and was instrumental in the progress made and findings outlined in this report. Further questions on the City's AMP can be directed to this team member.

Hon. John Dobis

- Mayor of Harrisville
- harrisville1905@hotmail.com
- 989.724.6666
- 200 5th Street
  P.O. Box 278
  Harrisville, Mi 48740

Figure 1: Asset Management Team Leader

Infrastructure Technology & Know-How

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 include the following:

- Surveyed key system components to augment the City'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 City's assets and their attributes. The majority of the City's wastewater sewer infrastructure, including manholes, wastewater sewers, lagoon system and pumping stations 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. 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, install date, and condition of each wastewater asset.

Condition Assessment

With the intent of assessing the majority of the wastewater system, the City's wastewater sewer infrastructure (wastewater sewer pipes, manholes and pump stations) 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 condition or new, while five indicates the infrastructure is in very poor condition or has already failed. About 90 percent of the approximately 130-structure manhole network and about 90% of the approximately 7 miles of wastewater sewer pipe infrastructure has been condition assessed. The assets within the City's two pumping stations and Lagoon Facility were also inventoried and assessed. The major components inventoried within each station include but are not limited to pumps, check/control valves, motors, level control systems, backup power, structure, wet well, valve vault, and telemetry.

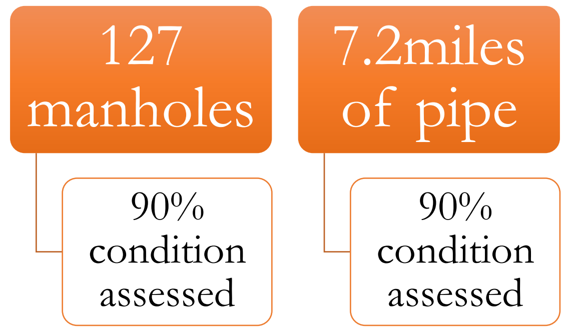


Figure 2 : Portion of Sewer System Assessed

It was also observed that:

- Manhole infrastructure exhibits age-appropriate wear with an average structural rating of approximately 1.89 and average O&M rating of 2.15. Structural manhole defects were predominately related to brickwork. O&M manhole issues were driven by deposits, roots, and infiltration.
- Sewer infrastructure has an average structural rating 1.17 and average O&M rating of 1.36. Overall the wastewater sewer system is in above average condition for the age of the system.
- The infrastructure will continue to degrade over time, for example, even though the average condition of the manhole infrastructure is between a score of 1 (minimal wear and good working) and 2 (moderate wear but still functional) per the 2015 assessment data, a small percent of the infrastructure has a condition rating of 5; 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.

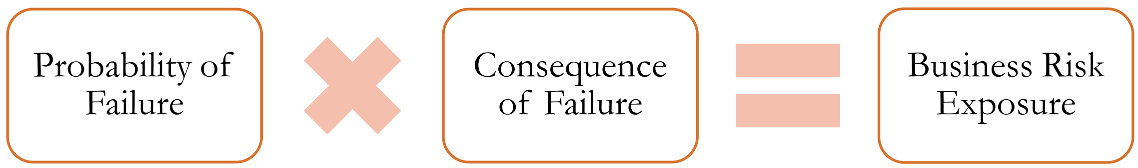


Figure 3 : Risk Equation

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:

- Network Position – the sum of upstream sewers discharging to a structure
- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Restoration Type/Accessibility – refers to the cost to restore the surface above the asset and if traffic control is needed
- Environment – proximity to sensitive environmental features like Mill Creek and Lake Huron.

For pumping station assets, PoF was based on the condition of the asset while the CoF was determined by the effect of an individual asset failure on system operations.

Level of Service

The City, in line with its mission statement outlined earlier, adopted Level of Service (LOS) criteria, which it plans to use as guidelines to manage the wastewater sewer system. These LOS criteria's 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 Inspections per Year*	• MACP inspect a minimum of 25 manholes per year or 20% of the System • PACP inspect a minimum of 20% every 5-years and the remaining 80% on a 10-year cycle.
Regulatory Compliance	Compliance with MDEQ Sanitary Sewer Overflow (SSO) Policy and the Clean Water Act	Continue to comply with the 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 within one business day
O&M Optimization	Regular cleaning and maintenance of the collection system	• Clean and maintain 20% of the manholes per year • Clean and maintain 20% every 5-years and the remaining 80% every 10 year for sewers.

*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, manhole, and pump station inspection
- Repair and rehabilitation to address structural problems resulting from aging infrastructure
- Upgrades to the City's wastewater lagoon system, as assets age beyond their useful service lives

As communities like Harrisville have developed and aged, the buried infrastructure is deteriorating. Unless the City begins to systematically repair, rehabilitate, and/or replace these aging components, City 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 impassable roadways due to failed infrastructure

The revenue structure analysis identified that an initial rate increase of 150 percent for the first year of the CIP followed by an annual rate increase of 2 percent per year is needed to support the rising expenses over time. The revenue structure analysis and associated capital improvement projects and O&M strategies, which will continue the City's AMP, are detailed in a separate document and can be made available to the public upon request.

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.

- 130 manholes
- 7.2 miles of wastewater sewer ranging from 8 to 24-inch in diameter
- 2 pump stations
- Lagoon system

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Harrisville *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1547-01 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 29, 2017
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 Dobis, Mayor at 989-724-6666 harrisville1905@hotmail.com
Name Phone Number Email

[signature] 26 October 2017
Signature of Authorized Representative (Original Signature Required) Date

John J. Dobis, Mayor, City of Harrisville Michigan
Print Name and Title of Authorized Representative

City of Harrisville

Stormwater Collection System

Asset Management Plan

October 2017

OHM Advisors®

Storm, Asset Management, and Wastewater (SAW)

Asset Management Plan Executive Summary

The City of Harrisville is responsible for the stormwater systems collection and distribution of surface runoff within City limits. Within the City, there is a network of manholes, catch basins and storm sewers to manage drainage. These assets have been installed during the 1970's and are aging. All stormwater assets owned by the City were included in this Asset Management Program (AMP). The City of 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 1547-01, with a total budget of $293,007 and a ten percent local match required by the City.

This AMP was intended to accomplish the following key goals:

- Provide the City 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 create the City'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, and location to the GIS database.
- Physically evaluate the structural condition of a representative percentage of publicly-owned system components, including manholes, catch basins and storm sewers and to store the collected data in the City's newly created 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 developing a prioritized Capital Improvement Plan (CIP) that highlights the significance of particular assets.

Mission Statement

One important element to an 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:

We are committed to providing and maintaining a 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 leader listed in Figure 1 is committed to the asset management mission statement and was instrumental in the progress made and findings outlined in this report. Further questions on the City's AMP can be directed to this team member.

Hon. John Dobis

- Mayor of Harrisville
- harrisville1905@hotmail.com
- 989.724.6666
- 200 5th Street
P.O. Box 278
Harrisville, Mi 48740

Figure 1: Asset Management Team Leader

Infrastructure Technology & Know-How

The City 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:

- Survey key system components to augment the City'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 City's assets and their attributes. The majority of the City's storm sewer infrastructure, including manholes, catch basins or inlets, outfalls and storm sewers was inventoried and digitized. The City is continuing to populate the attributes of the inventory using observations in the field while performing condition assessment. This inventory resides in the City's GIS. The GIS framework was enhanced as part of this effort, making it easier for the City to store critical data for the locations, size, material, install dates and condition of each stormwater asset.

Condition Assessment

With the intent of assessing the entire storm system, the City's storm sewer infrastructure (manholes, inlet and storm pipes) was 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. Five indicates the infrastructure is in very poor condition or has already failed. As displayed in Figure 2, about 82 percent and 69 percent of the manhole and catch basin infrastructure were condition assessed, respectively, while 49 percent of the storm sewer pipes were condition assessed. It was observed that:

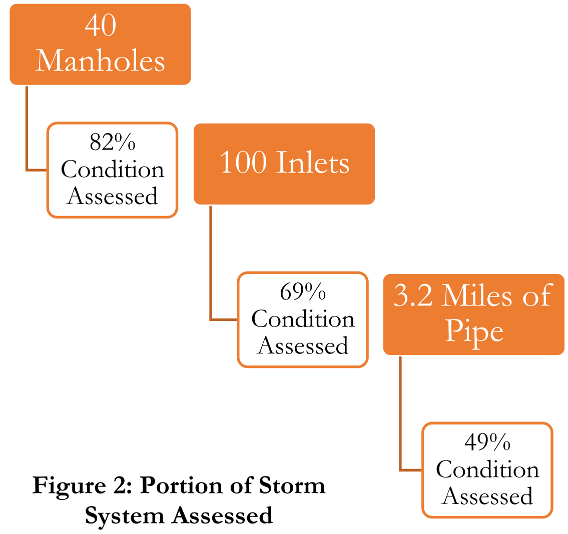


Figure 2: Portion of Storm System Assessed

- Manhole infrastructure exhibited age appropriate wear with an average structural rating of approximately 1.88 and an average Operations and Maintenance (O&M) rating of approximately 1.61.
- The majority of structural defects in the City's manholes were related to brickwork where manholes were missing bricks or mortar. The leading O&M defects present in manholes were deposits and infiltration.
- Storm inlet infrastructure exhibited age appropriate wear with an average structural rating of approximately 2.00 and an average O&M rating of approximately 1.61.
- Brickwork and surface damage defects were the most commonly occurring structural defects in the inlets while deposits and infiltration were the primary O&M defects found in the storm inlets.
- The storm sewer displayed age appropriate wear with an average structural rating of approximately 2.67 and an average O&M rating of approximately 3.05.
- The primary structural defects found in the storm sewers were cracking while the primary O&M defects where deposits, roots and infiltration.

Criticality and Risk

The investigation leading to the identification of critical storm water 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.

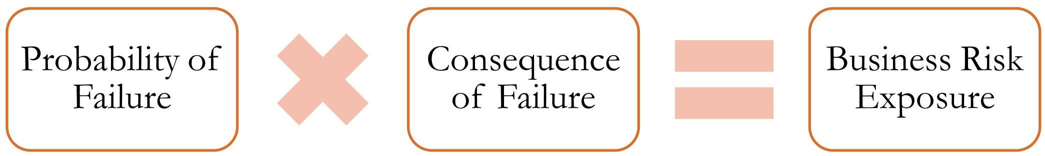


Figure 3: Risk Equation

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 CoF for manholes, catch basins and storm sewers.

- Network Position – the sum of upstream pipes discharging to a structure.
- Diameter/Size – the relative size of the asset with respect to the rest of the system.
- Location of Infrastructure – refers to the cost to restore the surface above the asset and if traffic control is needed.
- Environment – proximity to sensitive environmental features like Mill Creek and Lake Huron.

Level of Service

The City, in line with its mission statement outlined earlier, adopted Level of Service (LOS) criteria's which it plans on using as guideline to manage the stormwater collection system. The LOS criteria's are summarized in Table 1.

Table 1: Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator
Asset Condition Assessment	Continue asset condition inspection and tracking within GIS, as described in O&M Strategies
Regulatory Compliance	Compliance with MDEQ Policy and The Clean Water Act
Service Delivery and Customer Communication	Respond to customer complaints and requests efficiently
O&M Optimization	Regular Cleaning and Maintenance
Capital Improvements	Continue to upgrade stormwater infrastructure during road rehabilitation and replacement projects.

Revenue Structure and Capital Improvement Project 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 in perpetuity, including:

- Regularly-scheduled pipe, manhole and catch basin inspection
- Repair and rehabilitation to address structural problems resulting from aging infrastructure. These projects should continue to be scheduled during road projects.

As communities like Harrisville have developed and aged, the buried infrastructure is deteriorating. Unless the City begins to systematically repair, rehabilitate and/or replace these aging components, City 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.

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, ages and conditions.

- 3.30 miles of storm sewer pipe, ranging from 3-inches to 48-inches
- 40 manholes
- 100 catch basins

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Harrisville *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1547-01 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 Dobis, Mayor at 989-724-6666 harrisville1905@hotmail.com
Name Phone Number Email

John J. Dobis 26 October 2017
Signature of Authorized Representative (Original Signature Required) Date

John J. Dobis Mayor, City of Harrisville Michigan
Print Name and Title of Authorized Representative

Village of Hillman
P.O. Box 96, Hillman, MI 49746
Dave Post, Village Manager
(989) 742-4751

SAW Grant Number 1645-01

OVERVIEW

The Village of Hillman was awarded a Michigan Department of Environmental Quality (MDEQ) grant through the Stormwater, Asset Management, and Wastewater (SAW) Program for the development of both a Stormwater and wastewater asset management plan. The total grant award was $299,867 for a total project cost of $333,185 once a ten percent local match is included.

The Village of Hillman decided to develop a single Infrastructure Asset Management Plan that would include both the stormwater and wastewater systems. Developing a single plan provides a framework for other asset systems, such as drinking water or transportation networks, to be added at a later date. Developing the plan in this manner creates a more interrelated system of complete asset management. The more interrelated the asset management plan and process is between the various systems, the more powerful and beneficial it becomes.

WHAT IS ASSET MANAGEMENT

Asset Management is a program that provides financial planning and management for the effective and efficient operation and maintenance of local government's infrastructure assets. Simply put, it is a process to meet the goals of good ownership, effective management, and responsible stewardship of an agency's assets. Having an Asset Management Plan (AMP) and process can help improve an agency's performance, cost-effectiveness, communication, and credibility. The benefits of asset management include:

- Improved understanding of service level options and costs
- An ability to better communicate and justify investments to stakeholders
- An ability to demonstrate responsible investment in infrastructure
- Improved knowledge of the timing and magnitude of future investments required to operate, maintain, renew, and acquire assets
- An ability to establish and evaluate performance benchmarks
- Coordination with other utilities

The general components of an asset management plan are:

- Asset Inventory: What do we own? Where is it located? What condition is it in?
- Level of Service: How is the system managed and operated?
- Asset Criticality: What is the probability of failure? What is the consequence of that failure?

- Operation and Maintenance Strategies: What needs to be done to maintain the defined level of service (Maintenance, Replacement, System Expansion)?
- Capital Improvement Planning: What are the financial needs to meet the defined operational and maintenance strategies?

ASSET INVENTORY

The inventory process began by first categorizing assets by system such as drinking water, wastewater, stormwater, and roads. The assets within each system were then divided into groups to facilitate data collection and analysis. Asset inventory data collected included year of installation, material, size, and elevations. Each asset was identified, mapped by a physical survey, and rated, and then incorporated into the Village's Geographic Information System (GIS) database. The GIS data base utilizes the ESRI ArcMap Local Government Model.

Wastewater Inventory

The Village of Hillman Sanitary Sewer System serves 217 residential and 74 commercial customers. The system was primarily constructed in 1977, with expansions or replacements in 1998 and 2005. The system consists of three (3) wastewater lagoons, six (6) lift stations, two hundred twenty-two (222) manholes, 14,859 feet of gravity main, and 15,170 feet of force main. Wastewater is treated at the lagoons and ultimately discharged to Brush Creek, a tributary of the Thunder Bay River. The discharge is pursuant to a National Pollutant Discharge Elimination System (NPDES) permit issued by the MDEQ.

Stormwater Inventory

The Village of Hillman stormwater system is comprised of twenty-two (22) manholes, one hundred seventy-six (176) catch basins, nine (9) outlets, approximately 15,700 feet of gravity main, and one retention basin. This network primarily serves the downtown Hillman and State Street corridor area. Stormwater through the remainder of the Village is handled by roadside ditches or overland flow areas. Stormwater within the Village of Hillman ultimately drains to the Thunder Bay River system.

CONDITION ASSESSMENT

The Village of Hillman chose to use the condition assessment system from the "Asset Management Guidance for Wastewater and Stormwater Systems" (MDEQ). Each asset was assessed using either a physical inspection, cleaning and televising, or based on its original date of construction. Each asset was assigned a condition value ranging from one to five. A condition of one represents an asset in new or excellent condition while a rating of five would mean an unserviceable or failed asset.

Wastewater Condition Assessment

The Village of Hillman Wastewater System is in good condition overall. The oldest parts of the system are only forty years old; less than half of their expected service life. Virtually every component of the system received a condition rating of one or two except a few sections of gravity main that had a rating of three or four. Table 1 below provides the percentage of assets within each rating value.

Table 2 – Wastewater Condition Assessment					
	1	**2**	**3**	**4**	**5**
Manholes	4%	96%			
Lift Stations		100%			
Lagoons	100%				
Gravity Main	25%	72%	2%	1%	
Force Main	100%				

Stormwater Condition Assessment

The Village of Hillman Stormwater System is also in good condition overall. The oldest parts of the system are only forty years old; less than half of their expected service life. Every component of the system received a condition rating of one or two. Table 2 below provides the percentage of assets within each rating value.

Table 1 – Stormwater Condition Assessment					
	1	**2**	**3**	**4**	**5**
Manholes		100%			
Catch Basins	99%		1%		
Gravity Main		100%			

ASSET CRITICALITY & BUSINESS RISK

Having a condition rating is an important part of an AMP, however, condition alone is not always the best criteria for prioritizing projects. Some assets are prone to failure while others rarely fail even if in poor condition. The consequence of an asset failing is also an important consideration. An item that does not have any redundancy, or serves many users, has a higher consequence of failure than one that only serves one or two users.

The Village of Hillman chose to again use guidance from the MDEQ to assign assets a Probability of Failure and a Consequence of Failure. All assets were assigned a value from one to five for both variables. A value of one represents an unlikely probability of failure while a value of five indicates an asset that is very likely to fail. Likewise, a value of one for consequence of failure represents only a slight effect on the system, while a value of five indicates potential system failure and other severe effects.

How critical a particular asset is to the system is a product of the probability of failure and the consequence of that failure. An asset with a high probability and consequence of failure would be considered highly critical to the overall system. The Criticality rating of an asset, ranges from a low of one (1) to a high of twenty-five (25), and is determined by multiplying the Probability of Failure (1-5) and the Consequence of Failure (1-5).

The business risk of an asset takes into account the criticality and the condition assessment of that particular asset. The business risk rating can be used to plan for the maintenance, repair or replacement of an asset over time. Making a priority of assets with a high business risk rating will allow the Village of Hillman to maintain their assets in a manner that will deliver a high Level of Service. The Business Risk is determined by multiplying the Criticality (1-25) and the Condition (1-5) of an asset, and can range from a low of one (1) to a high of one hundred and twenty-five (125).

Wastewater System Criticality and Business Risk

The wastewater system is in good overall condition and defining asset criticality and business risk further demonstrates that fact. Two sections of gravity main were determined to have a business risk value of forty. Utilizing the criticality and business risk can aid in prioritizing any projects that do come up. Table 3 below provides a summary of the wastewater asset criticality and business risk.

Table 3 - Wastewater Criticality and Business Risk

	Probability of Failure	Consequence of Failure		Criticality		Business Risk	
Asset Group		Low - High	Average	Low - High	Average	Low - High	Average
Lagoons	3		5		15		15
Manholes	1	3 - 5	3	3 - 5	3	3 - 10	6
Lift Stations	3		5		15		30
Gravity Main	2	1 - 5	3	2 - 10	6	2 - 40	12
Force Main	1		5		5		5
Where no Low-High entered indicates no variation in values							

Stormwater System Criticality and Business Risk

The asset criticality and business risk for the stormwater system also points to a system with few problems. The highest determined business risk on the stormwater system was sixteen. Table 4 below provides a summary of the stormwater asset criticality and business risk.

Table 4 - Stormwater Criticality and Business Risk

	Probability of Failure	Consequence of Failure		Criticality		Business Risk	
Asset Group		Low - High	Average	Low - High	Average	Low - High	Average
Manholes	1		3		3		6
Catch Basins	2		1		2	2 - 6	2
Gravity Main	2	1 - 4	2	2 - 8	5	4 - 16	11
Where no Low-High entered indicates no variation in values							

LEVEL OF SERVICE

A major factor in the quality of life within a community is the quality of the community's infrastructure, services and amenities. Level of Service (LOS) is a measure of the amount and quality of the public facility being provided to meet the community's basic needs and expectations. One factor that controls the ability to maintain a defined LOS is the Business Risk rating of the assets. The Village of Hillman has set a LOS standard aimed at providing its residents with effective, efficient, and environmentally sound method of managing infrastructure assets to protect public health, property and economic vitality of the area.

The Village of Hillman has set the following level of service standards:

- The Village will inspect all infrastructure assets on a schedule outlined in this AMP to ensure proper and efficient operation and maintenance.
- The Village will include a budget category for system maintenance of infrastructure assets to cover routine maintenance, and repair or replacement of components of their infrastructure.
- The Village will include a Capital Improvement Fund budget item that will allow for the replacement of a given system in the future.

The Village will ensure that all maintenance and construction activities comply with County, State, and Federal design and construction standards at the time.

MAINTENANCE STRATEGIES

The strategies developed through the Village of Hillmans strategic analysis of its asset systems can be divided into three main categories: Routine Maintenance, Capital Preventive Maintenance, and Upgrade or Expansion.

Routine maintenance is the regular ongoing work and assessment of assets that is necessary to keep them operating at a desired level. Routine maintenance can be reactive, or cyclic in nature. Reactive maintenance is unplanned work in response to identified issues. Cyclic is planned work identified through strategic analysis and prioritization, and is meant to keep the system functioning at a desired level. The timing of the cyclic maintenance can vary from daily, monthly, or annually, to once every decade or more.

Capital preventive maintenance is larger scale work designed to return an existing asset to its original service potential. It can include the renewal or restoration, and even replacement, of an asset that does not increase its capacity.

Upgrade or expansion is the replacement of an asset to upgrade its capacity, or the construction of new assets that did not previously exist. The need for upgrade or expansion can result from growth, social, or environmental needs.

Wastewater Maintenance Strategies

Strategy	Timeframe
Inspect Lift Stations, Pumps, and Motors	3 times per week
Inspect and test Lagoons - inspect fencing, mow grass, remove weeds, testing (DO and Fecal Coliform) – per DEQ requirements	Weekly
Walk force main route to identify any issues	Annually
Electrician inspection of lift station pump motors	Annually
Inspect manholes (including inlets & outlets)	Ea. Once every 10 years Or approximately 20/year
Clean and televise all mains (force and gravity)	Ea. Once every 50 yrs

Stormwater Maintenance Strategies

Strategy	Timeframe
Mow roadside ditches and Caring St retention basin	Annually
Clean roadside ditches	Every 3 to 5 years
Inspect manholes (including inlets & outlets)	Ea. Once every 10 years Or approximately 2/year
Inspect & Clean catch basins	Ea. Once every 10 years Or approximately 15/year

CAPITAL IMPROVEMENTS

The Village of Hillman Stormwater and Wastewater systems are both in good condition and have been well maintained throughout the years. Both systems are also relatively new compared to their expected service life. The Village is not currently experiencing, or projecting, any significant growth that would warrant the upgrade or expansion of any infrastructure systems. Therefore, the Village does not have any planned Capital Improvement Projects within the next twenty years.

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

Completion Date 10/31/2017
(no later than 3 years from executed grant date)

The Village of Hillman *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1645-01 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: June 7, 2017 ____________.

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:

Village of Hillman at (989) 742-4751 office@hillmanmichigan.org
Name Phone Number Email

David J. Post 10/31/2017
Signature of Authorized Representative (Original Signature Required) Date

David J. Post Village 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 10/31/2017
(no later than 3 years from executed grant date)

The Village of Hillman *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1645-01 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:

Village of Hillman	at (989) 742-4751	office@hillmanmichigan.org
Name	Phone Number	Email

David J. Post 10/31/2017
Signature of Authorized Representative (Original Signature Required) Date

David J. Post Village Manager
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary

City of Holland
Transportation Services
333 Wyngarden Way, Holland, MI 49423
https://www.cityofholland.com/engineering
Brian White – 616-928-2448
SAW Grant Project Number 1144-01

Executive Summary

The City of Holland (City) owns and operates a storm sewer system consisting primarily of storm sewer, structures, open channels and basins. In October 2014, the City was awarded a Stormwater, Asset Management, and Wastewater (SAW) grant in the amount of $500,000 (with a $50,000 match) from the Michigan Department of Environmental Quality (MDEQ). The City has determined it to be in their best interest to implement an Asset Management Program (AMP) for its storm sewer collection system. The scope of the AMP was to inventory, assess, and identify areas of deficiency in order to develop recommendations for prioritizing and budgeting improvements and maintenance.

Wastewater and/or Stormwater Asset Inventory

The City owns and operates a storm sewer system consisting primarily of storm sewer, structures, open channels and basins. The system is divided into seventeen Stormwater Management Districts. The storm sewer system consists of approximately 791,153 lineal feet (lf) of storm sewer, which includes mains, culverts, leads, laterals, and underdrains. Storm sewers range from 8-inch to 90-inch diameter, and culverts range from 8-inch to 9-foot diameter. The system also includes 4,568 manhole structures, 5,931 inlets, 108 outfalls, 12,074 lf of open channel drain and 33 storage basins. The storm system generally discharges to Lake Macatawa, located on the northwest side of the City limits. Lake Macatawa ultimately discharges into Lake Michigan.

The locations and connectivity of the storm system was generally known and recorded in the City's Geographic Information System (GIS) prior to the start of the SAW grant. However, the GIS has been enhanced by integration into the Ottawa County GIS drain model file geodatabase format, as well as numerous edits and corrections made to connectivity and ownership throughout the grant period.

Condition Assessment

The Probability of Failure (PoF) rating represents the likelihood of an asset failing, based on defects and deficiencies identified in the condition assessments or the anticipated remaining useful life of the asset. The most accurate method of determining the PoF is the visual inspection of pipes and structures. In order to identify areas of potential deficiency in the system, major components were inspected including sewers, outfalls, storm manholes, open channels, storage basins and culverts. A representative portion of the total storm sewer system was televised and reviewed. Due to the size of the City, inspection of all City assets within the timeline of the project was not feasible. Therefore, inspections were limited to the centrally located Wildwood Stormwater Management District in order to evaluate and document program procedures to be used throughout the remaining system.

Inspected sewers and structures within the district were assigned a final PoF score based on results from sewer televising and visual manhole inspections using PACP and MACP standard ratings (5 high probability to 1 low probability). For the untelevised pipes and non-inspected manholes the PoF score was estimated using the age of the asset to calculate its remaining useful life as determined by industry standards for various materials.

Rating methods were developed to assess components based on their importance in the operation and reliability of the system and their current condition. A summary of the condition of the assets within the Wildwood District is presented in the following tables.

Wildwood Sewer Condition Summary

Probability of Failure Rating	Percentage of System Based on Televised Data	Percentage of System Based on Remaining Life/Age Only
5	3.2%	48.6%
4	2.8%	6.9%
3	9.3%	27.4%
2	10.5%	0.1%
1	74.2%	3.2%

Wildwood Manhole Condition Summary

Probability of Failure Rating	Percentage of System Based on Inspections
5	7.0%
4	6.3%
3	80.8%
2	5.6%
1	0.3%

Level of Service Determination

As part of the 2014 City of Holland Stormwater Master Plan (SMP), stakeholder meetings were conducted within the community and City staff to gain customer feedback about the priorities of the collection system. Stakeholder meetings were conducted as a part of the Stormwater AMP with members of the City staff to select Level of Service (LoS) goals. LoS goals were established to assist the City in developing a baseline for minimum operation and maintenance activities and corrective procedures in case of failures in the system. These goals were developed in order to set achievable objectives for operation and maintenance, and capital improvement projects. These LoS goals include:

1. Meet all federal and state stormwater regulations;
2. Address all manholes and storm sewers rated with a structural Probability of Failure (PoF) of 4 or greater and a high or medium BRE priority ranking in the next 5 years, as the availability of resources allows. Address all manholes and storm sewers rated with a structural Probability of Failure (PoF) of 4 or greater and a low BRE priority ranking in the next 10 years, as the availability of resources allows;
3. Televise and clean (as needed) the remaining storm sewers in the system within the next 10 to 15 years or as the availability of resources allows;
4. Clean inlet sumps (as needed) on the same schedule as the storm sewer, approximately every 10 to 15 years or as the availability of resources allows;

5. Inspect the remaining storm manholes in the system within the next 10 to 15 year or as the availability of resources allows;
6. Update the Geographic Information Systems (GIS) maps and database as needed.

The LoS selected considers budgetary constraints, customer expectations, and Operation and Maintenance (OM) staff available to the City.

Criticality of Assets

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 pipe diameter, which is representative of the size of the tributary area the pipe or structure serves; physical location, which is a representation of how difficult the pipe will be to rehabilitate if there is a sudden failure (major or minor road, etc.); and service area, which is representative of the type of land use that will be affected by a failure (i.e. priority given to schools, hospitals, and government buildings). Each pipe segment and structure was assigned a final CoF score based on an average of the three factors. Generally, the most critical assets were those found under major roads (causing the most disruption to repair), with the largest diameter (serving the largest area) and serving major areas of the community including the downtown sewers.

The Business Risk Exposure (BRE) rating factors both the consequence of failure and the probability of the component failing based on the condition assessment. The BRE is calculated by the formula:

$$BRE = PoF \times CoF$$

Revenue Structure

The City plans to set money aside each year from their operating budget (which is funded by Act 51 monies) to address cleaning, televising, and operations and maintenance activities identified within the plan, and to meet their LoS goals. Recommended projects will be funded through the capital improvements budget (which is funded by Act 51, general fund and Ottawa and Allegan County road millages), as the availability of resources allows.

Capital Improvement Plan

Based on the LoS goals established with the City, sewers and manholes with Probability of Failure (PoF) ratings of 4 and higher were addressed for their specific repair or maintenance needs. Detailed recommendations were prepared for 10 pipes that scored structural ratings of 4 or higher on the PACP scale. For manholes, 62 recommendations were prepared for the structures that scored 4 or higher on the MACP scale. The following tables summarize the recommended sewer repairs. The high and medium priority repairs will be addressed within the next 5 years, with the low priority recommendations completed within 10 years, or as the availability of resources allows.

Wildwood Manhole Repair Schedule and Prioritization

	Description	Number of Structures	Estimated Cost
High Priority	Cone/Wall Repair/Replace (PoF 4) OR Chimney/Frame Repair (PoF 5), High BRE	9	$42,100
Medium Priority	Cone/Wall Repair/Replace (PoF 4) OR Chimney/Frame Repair (PoF 4), Medium BRE, BRE >= 8	17	$88,600
Low Priority	Cone/Wall Repair/Replace (PoF 4) OR Chimney/Frame Repair (PoF 4), Medium BRE, BRE < 8	36	$187,000
		Estimated Total Manhole Repair Cost	**$317,700**

Wildwood Sewer Repair Schedule and Prioritization

	Type	Number of Repairs	Estimated Cost
High Priority	Excavation (High BRE)	3	$17,000
	Trenchless (High BRE)	3	$8,000
Medium Priority	Excavation (Medium BRE)	0	$0
	Trenchless (Medium BRE)	0	$0
Low Priority	Excavation (Low BRE)	1	$4,000
	Trenchless (Low BRE)	3	$18,000
		Estimated Total Sewer Repair Cost	**$47,000**

Based on the inspection results and recommendations, the City has proactively addressed two of the high priority structure repairs and one of the high priority storm sewers as part of ongoing road reconstruction projects.

Recommendations (Optional)

Based on the City's desired LoS goals, it was determined that necessary improvements to identified defective sewers and manholes will be phased over the course of approximately 10 years. Improvements to the system include primarily sewer and manhole rehabilitation. A feasible maintenance schedule was established that aligns with the City's needs and available resources.

List of Major Assets

Existing Stormwater Assets

Asset	Total Length or Count
Storm Main	564,887 lf
Culverts	12,487 lf
Leads	185,496 lf
Laterals	1,921 lf
Underdrain	26,362 lf
Open Channels	12,074 lf
Manholes	4,568
Inlets	5,931
Outfalls	108
Storage Basins	33

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

Completion Due Date __10/27/2017________
(no later than 3 years from executed grant date)

The __City of Holland_________________________ *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. _ 1144-01 ____ 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:

______ Brian White ______________________ at__616-926-2448____ B.White@CityofHolland.com___
Name Phone Number Email

10/23/2017
Signature of Authorized Representative (Original Signature Required) Date

___Brian White, Director of Transportation Services_________________________________
Print Name and Title of Authorized Representative

Facility Contact:
Joel Davenport, WRF Superintendent
625 Hastings Avenue, Holland, MI 49426
Phone: 616-355-1250

The Holland Board of Public Works (BPW) maintains an Asset Management Program for the Holland Area Water Reclamation Facility (WRF). The program is described in detail in the recently prepared *Holland Area Water Reclamation Facility Asset Management Plan* document. That document is intended to be a living document updated as the program continues to evolve over time. This document provides a brief summary of the Asset Management Plan (AMP).

Core Components

The AMP for the Holland Area WRF was developed to comply with the published Michigan Department of Environmental Quality (MDEQ) National Pollutant Discharge Elimination System (NPDES) Permit boilerplate Asset Management language. To this effect it has been developed to meet the five core elements identified in that language. The following section provides a brief discussion of these five components and how the AMP addresses them.

1. **Current State of the Assets (Asset Inventory and Condition Assessment)** - The BPW historically has maintained a robust asset inventory for the Water Reclamation Facility via the plant's Enterprise Asset Management (EAM) system. That system historically has been used as the repository for critical information relative to equipment. This inventory was updated as part of the development of the Asset Management Plan to include additional information on assets required for Business Risk Evaluation calculations. These additional items included Condition Rating, Consequence of Failure, Redundancy, Design Life, and Replacement Cost.

2. **Required Sustainable 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 BPW maintains LOS corporate metrics that the organization is measured against each year. These LOS metrics are reviewed each year and modified as determined appropriate. The Fiscal Year 2018 LOS metrics that apply at least in part to the wastewater utility are listed in Table 1.

Table 1 – HBPW Fiscal Year 2018 Level of Service Corporate Metrics

Metric	Description
Customer Satisfaction Survey Results (Residential Survey, Commercial and Industrial Survey)	Customer survey response indicating a minimum rating of 90% of better than neutral in both categories.
Sanitary Sewer Reliability	Limit sewer failures (SSO & backups) to 4.5 or fewer per 100 miles of sanitary mains per year. With 183.55 miles of pipe as of June 30, 2018, this means a target of eight or fewer events in FY 18 (or 0.67 monthly)

Environmental Compliance Infractions	Zero environmental infractions (Notice of Violation, Citation, Regulatory/Legal ruling)
Safety Infractions	Zero Safety Violations (MIOSHA citation)
Other Regulatory Compliance Infractions	Zero Regulatory Infractions (i.e. NERC, Employment practices, etc., meant to capture violations not addressed by Environmental or Safety)
Wastewater Cost Control	Operating Expenses less than $11,530,860
Safety Leading Indicator 1	Achieve an average monthly safety meeting participation level of 90% or better
Achieve 90% or better completion rate for HBPW operations discussions	Thirty-six (36) random workplace hazard analyses discussions per operational & maintenance workgroup will be conducted annually by management to assess employee awareness of the hazards associated with their work

In addition to the corporate LOS metrics, WRF staff plans to use a Business Risk LOS to drive the planning of capital improvement projects. Usage of this type of system of capital planning allows the utility to focus capital investment on the areas of highest risk rather than strictly on the oldest assets relative to their theoretical design lives. To this extent the BPW has developed the following BRE triggers/targets:

- BRE > 10 – Once the BRE of an asset exceeds 10 the WRF will begin to plan for improvements to mitigate that risk.
- BRE > 15 - Assets with a BRE > 15 are expected to be in the 5 year capital improvement plan for the facility.

3. **Assets Critical to Sustained Performance (Criticality of Assets)** – A Business Risk Evaluation (BRE) model was developed to assign Business Risk values to each WRF asset in the AMP asset inventory. The BRE calculates a Business Risk value for each asset on a scale of 1 to 25 with higher values equating to a higher business risk.

   The BRE procedure was applied to all of the existing assets in the WRF AMP Asset Inventory in order to assist in prioritizing future capital improvements and maintenance activities associated with the facility's assets.

4. **Minimum Life-Cycle Costs (Operation and Maintenance Strategies)** – WRF staff utilizes many operations and maintenance strategies to minimize life-cycle costs. Examples of strategies

Facility Contact:
Joel Davenport, WRF Superintendent
625 Hastings Avenue, Holland, MI 49426
Phone: 616-355-1250

utilized at the Holland Area WRF include:

- Project Planning – Staff looks closely at system configuration and equipment selection during the design phase of any improvement project. To this extent, equipment is selected with lowest life cycle cost in mind rather than simply looking at the lowest initial capital cost.

- Operations – Critical assets are installed with inline monitoring of key performance indicators (pressure, temperature, etc.) that will shut down equipment and/or alarm in the WRF's Supervisory Control and Data Acquisition (SCADA) system when levels deviate too far from the normal operating range. Monitoring and alarming in this manner allows for reduced life cycle costs because issues with assets are often caught early. This in turn can make the difference between a minor repair versus a complete rebuild or replacement.

- Preventative/Predictive Maintenance – WRF staff maintains a robust system of preventative and predictive maintenance with the facility's EAM system. This system is intended to maximize the life of plant assets while minimizing the associated costs.

5. **Best Long-Term Funding Strategy (Capital Improvement Plan)** - The Water Reclamation Facility (WRF) has a dedicated Equipment Replacement Fund (ERF) intended to address the capital needs for the replacement and/or rehabilitation of assets at the facility. The WRF's Administrative Committee establishes contributions to the ERF annually as part of the budgeting process with the annual contribution set as a percentage of the facility's annual operating budget. The contribution rate is established based upon meeting the capital needs of the five year capital plan while also maintaining a balance no lower than 10% of the current year's total operating budget. This system has proven extremely effective over the years and is expected to continue to serve the facility well in the future as demonstrated by the sufficiency calculations in the AMP.

   Larger projects involving expansion or new plant processes are expected to generally be financed through the usage of municipal bonds. However, ERF funding may also be used to fund all or a portion of such projects as determined feasible on a case-by-case basis.

Major Assets

Holland Area WRF major assets for the purpose of this summary are those with a BRE >15 as those are the ones to be targeted in the BPW's five year Capital Improvement Plan per the Level of Service targets previously discussed. Major assets are summarized with their associated BRE scores in Table 2.

Facility Contact:
Joel Davenport, WRF Superintendent
625 Hastings Avenue, Holland, MI 49426
Phone: 616-355-1250

Table 2 – Holland Area WRF Major Assets

Asset Number	Asset Description	Business Risk
WWRR-112	West WAS Pump #2	25
WWE-105	Primary Clarifier #1 - Rake & Center Column Assembly	20
WWE-205	Primary Clarifier #2 - Rake & Center Column Assembly	20
WWE-305	Primary Clarifier #3 - Rake & Center Column Assembly	20
WWE-405	Primary Clarifier #4 - Rake & Center Column Assembly	20
WWX-520	Sodium Hypochlorite Tank No.2	20
WWC-100	Raw Sewage Pump No.1	20
WWC-105	Raw Sewage Pump No.2	20
WWC-115	Raw Sewage Pump No.4	20
WWD-100	Raw Mix Deck - Concrete Structure	20
WWU-1003	Control Panel CP-600 (Oxygen Building)	20
WWX-108C	Water Champ Control Panel (North)	20
WWX-109C	Water Champ Control Panel (South)	20
WWX-2002	Control Panel CP-300 (Disinfection Building)	20
WWM-500	Control Panel CP-402 (Round Room by Overhead Door)	16
WWO-2001	Control Panel CP-412 (East Admin)	16
WWS-2203	Control Panel CP-400 (GBT Room)	16
WWAJ-150	Control Panel CP-200 (West RAS Building)	16
WWG-2002	Control Panel CP-900 (East RAS Building)	16
WWW-101	Final Clarifier #3 - Drive	16
WWW-106	Final Clarifier #4 - Drive	16
WWW-116	Final Clarifier #6 - Drive	16
WWX-510	Sodium Hypochlorite Tank No.1	16
WWN-430	Sludge Thickener Pump No.1	15
WWN-435	Sludge Thickener Pump No.2	15
WWA-099	bypass pump	15
WWA-100	Structure 11 (South Influent) Sluice Gate	15
WWC-110	Raw Sewage Pump No.3	15
WWC-2001	Control Panel CP-801 (Raw Pump Building)	15
WWC-300	Polymer Transfer Pump No.1	15
WWC-310	Polymer Transfer Pump No.2	15
WWH-0454	Structure 54 Sluice Gate to Structure 55	15
WWO-2000	Motor Control Center (MCC) No. 2	15
WWX-4003	Transformer No. 4 (Disinfection Building)	15

Facility Contact:
Kevin Koning, W/WW Services Superintendent
625 Hastings Avenue, Holland, MI 49423
Phone: 616-355-1564

The Holland Board of Public Works (BPW) maintains an Asset Management Program for the Holland BPW Wastewater Collection System. The program is described in detail in the recently prepared *Holland BPW Sanitary Sewer Collection System Asset Management Plan* document. That document is intended to be a living document updated as the program continues to evolve over time. This document provides a brief summary of the Asset Management Plan (AMP).

Core Components

The AMP for the Holland BPW Wastewater Collection System was developed to comply with the published Michigan Department of Environmental Quality (MDEQ) National Pollutant Discharge Elimination System (NPDES) Permit boilerplate Asset Management language. To this effect it has been developed to meet the five core elements identified in that language. The following section provides a brief discussion of these five components and how the AMP addresses them.

1. **Current State of the Assets (Asset Inventory and Condition Assessment)** - The BPW historically has maintained a robust asset inventory for the wastewater collection system in a geographic information system (GIS). Information on the fixed/vertical assets like lift stations is stored in GIS, the Enterprise Asset Management (EAM) system, and traditional digital/paper files. This inventory was updated as part of the development of the Asset Management Plan to include additional information on assets required for Business Risk Evaluation calculations.

2. **Required Sustainable 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 BPW maintains LOS corporate metrics that the organization is measured against each year. These LOS metrics are reviewed each year and modified as determined appropriate. The Fiscal Year 2018 LOS metrics that apply at least in part to the wastewater utility are listed in the table below:

Metric	Description
Customer Satisfaction Survey Results (Residential Survey, Commercial and Industrial Survey)	Customer survey response indicating a minimum rating of 90% of better than neutral in both categories.
Sanitary Sewer Reliability	Limit sewer failures (SSO & backups) to 4.5 or fewer per 100 miles of sanitary mains per year. With 183.55 miles of pipe as of June 30, 2018, this means a target of eight or fewer events in FY 18 (or 0.67 monthly)
Environmental Compliance Infractions	Zero environmental infractions (Notice of Violation, Citation, Regulatory/Legal ruling)

Safety Infractions	Zero Safety Violations (MIOSHA citation)
Other Regulatory Compliance Infractions	Zero Regulatory Infractions (i.e. NERC, Employment practices, etc., meant to capture violations not addressed by Environmental or Safety)
Wastewater Cost Control	Operating Expenses less than $11,530,860
Safety Leading Indicator 1	Achieve an average monthly safety meeting participation level of 90% or better
Achieve 90% or better completion rate for HBPW operations discussions	Thirty-six (36) random workplace hazard analyses discussions per operational & maintenance workgroup will be conducted annually by management to assess employee awareness of the hazards associated with their work

3. **Assets Critical to Sustained Performance (Criticality of Assets)** – A Business Risk Evaluation (BRE) model was developed to assign Business Risk values to each collection system asset in the AMP asset inventory. The BRE calculates a Business Risk value for each asset on a scale of 1 to 25 with higher values equating to a higher business risk.

   The BRE procedure was applied to all of the existing assets in the collection system AMP asset inventory in order to assist in prioritizing future capital improvements and maintenance activities associated with the collection system assets. The calculated Business Risk values are shown in the list of major assets included in this document.

4. **Minimum Life-Cycle Costs (Operation and Maintenance Strategies)** – BPW staff utilize a variety of methods for minimizing life cycle costs. Examples include:

   - In-Situ Rehabilitation – Before planning asset replacement, BPW staff always consider rehabilitation strategies like cured in place pipe (CIPP), manhole and wet well lining with resin-impregnated liners, polyurea, or epoxies, or other retrofit and reuse strategies.

   - Project Planning – Staff looks closely at system configuration during the design phase of any improvement project. Staff work diligently to minimize the amount of infrastructure required to reduce both the initial installation cost as well as the long term maintenance and replacement cost.

Facility Contact:
Kevin Koning, W/WW Services Superintendent
625 Hastings Avenue, Holland, MI 49423
Phone: 616-355-1564

- Lowest Maintenance – Equipment with a history of long life, low maintenance, and high efficiency (certain styles of non-clog pumps for example) are specified over lower cost options in order to reduce the total life cycle cost of the asset.

- SCADA – Key performance indicators are maintained within the SCADA system such that deteriorating performance can be investigated prior to costly failures or unnecessary repairs.

- Preventative/Predictive Maintenance – Regular maintenance is intended to maximize the life of assets while minimizing the associated costs.

5. **Best Long-Term Funding Strategy (Capital Improvement Plan)** – The BPW reviews expected operational and capital expenditures each year in association with annual rate adjustments. Budgeting includes rolling 5-year capital expenditures, however if an unusually large project is anticipated, budgeting beyond the 5-year window is possible. Unusually large projects may also be financed through the usage of municipal bonds. On May 15, 2017, the rate methodology was reviewed by the MDEQ and approved. The 2018 gap analysis is given below:

FY 18 Budget - 2018 Budget - Total Wastewater Utility		
Operating Expenses		TOTAL
5000-5590	Total Payroll Expense	$ 1,629,042
5600-5696	Total Benefits	569,869
5800-5899	Total Other Employee Cost	51,428
6200-6299	Total Production & Supplies	2,605,682
6400-6498	Total Maintenance Supplies	451,930
6600-6640	Total Vehicle Expense	52,670
6700-6791	Total Facilities Expense	177,770
7000-7060	Total Office Supplies	5,275
7400-7630	Total Other Operating Expense	267,045
8000	Depreciation	3,759,915
9400-9485	Total Allocations	1,675,601
	EXPENSE Grand Total	$11,246,227
Rate Revenue		
	Readiness to Serve	2,145,638
	Commodity	4,634,979
	Wholesale	2,369,664
	NSA Capacity Rental Fee	-
	Pollution Control	100,540

	Surcharge	2,100,000
	Fees and Other	45,500
	Total Rate Revenue	$11,396,321
	Gap	-
NON-OPERATING REVENUE/(EXPENSE)		
	Investment Earnings	$ 33,000
	Bond Interest (Expense)	$ (287,590)
	Trunkage & Assessments	$ 92,000
	Other Income (Expense)	$ 2,865,213

Major Assets

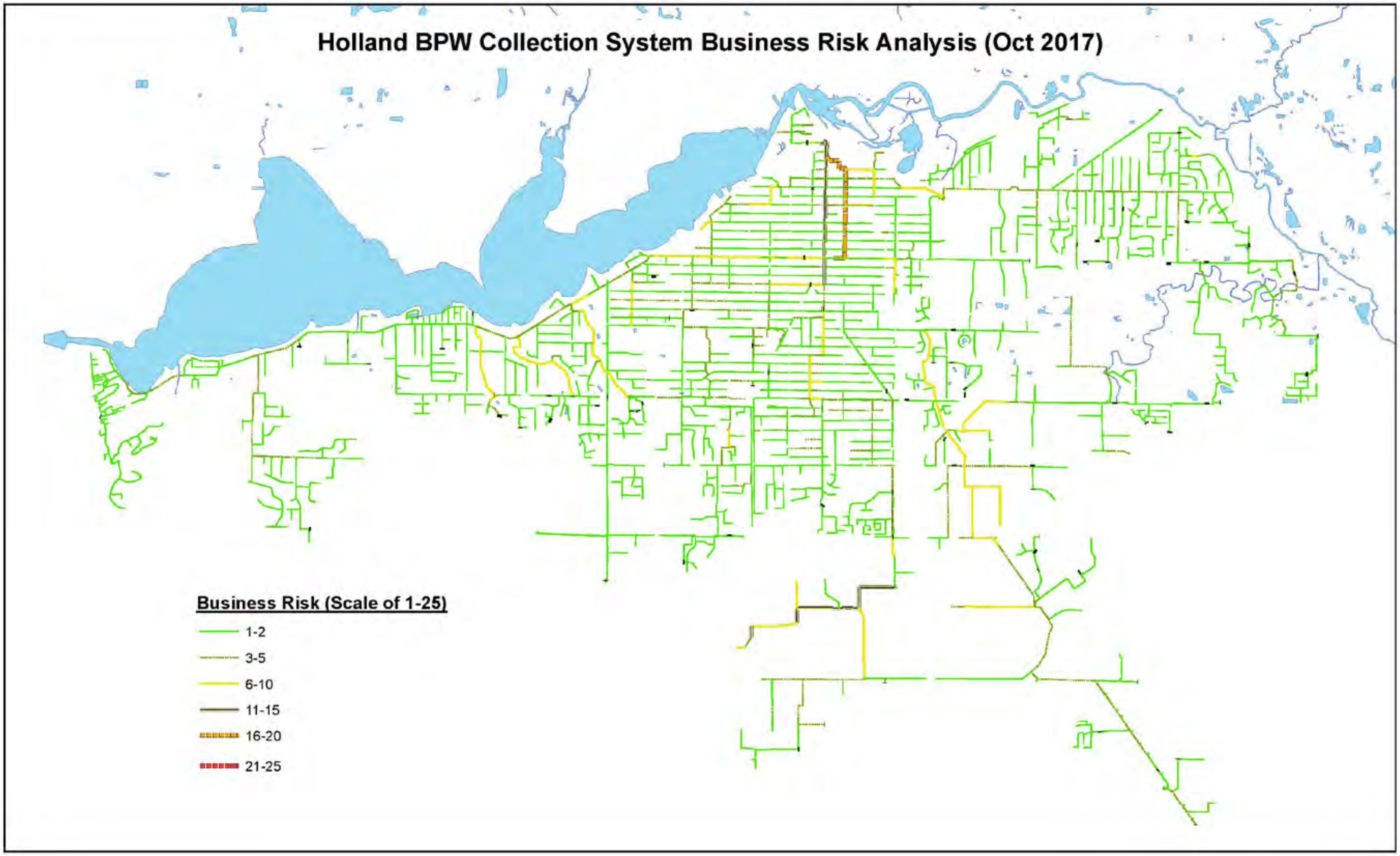
Major assets and their business risk evaluations are provided at the end of this report. A summary table is provided for fixed assets in the collection system (lift stations), and a map is provided for the other collection system assets due to the number of assets in the collection system.

Holland BPW Wastewater Collection System Asset Summary

Lift Station Business Risk Analysis Summary

Lift Station Number	Lift Station Name	Design Flow Rate (GPM)	Commission Date	Age	Design Life	Condition Rating	Probability of Failure	Consequence of Failure	Redundancy	Business Risk
1	Country Club	125	1/1/2014	3	30	2	2	2	0	4
2	8th St	2600	4/1/2017	0	30	1	1	4	0	4
3	Columbia	10	1/1/1962	55	30	4	5	2	0	10
4	Cherry St	100	1/1/1977	40	30	4	4	2	0	8
5	Pine Ave	600	1/1/1990	27	30	2	2	1	0	2
6	Mill St	1200	1/1/2014	3	30	2	2	4	0	8
7	17th St	2000	1/1/1961	56	30	3	4	4	0	16
8	Crescent-16th St	4400	1/1/1968	49	30	3	4	4	0	16
9	Azalea	3000	1/1/2015	2	30	1	1	3	0	3
10	Goldenrod	2200	1/1/2015	2	30	1	1	3	0	3
11	Myrtle	1200	1/1/2015	2	30	1	1	3	0	3
12	Grove	15	1/1/1967	50	30	5	5	3	0	15
13	Mohawk	50	1/1/1967	50	30	5	5	3	0	15
14	M-40	1200	12/1/1976	40	30	3	3	3	0	9
15	Brecado Ct	40	11/1/1979	37	30	3	3	2	0	6
16	Lincoln Ave	1200	12/1/1981	35	30	3	3	2	0	6
17	Highland	360	3/1/2017	0	30	1	1	3	0	3
18	Park	280	1/1/1978	39	30	3	3	2	0	6
19	Steketee	340	12/1/1980	36	30	3	3	2	0	6
20	Beechwood	100	1/1/1978	39	30	3	3	1	0	3
21	Cherry Walk	100	1/1/1979	38	30	3	3	2	0	6
22	Indiana	100	1/1/1978	39	30	3	3	2	0	6
23	146th Ave	150	1/1/1978	39	30	3	3	2	0	6
24	Crescent Walk	10	1/1/1985	32	30	3	3	2	0	6
25	Rolling Meadows	500	1/31/2001	16	30	2	2	2	0	4

26	M-21	450	12/1/1986	30	30	3	3	2	0	6
27	32nd St	750	1/1/1989	28	30	2	2	2	0	4
29	27th St	40	12/1/1989	27	30	2	2	2	0	4
30	Adams	250	12/1/1990	26	30	3	3	2	0	6
31	Sleepy Hollow	270	10/1/1995	22	30	3	3	2	0	6
32	Paw Paw	30	1/1/1995	22	30	3	3	2	0	6
33	Forest Beach	140	2/4/1994	23	30	2	2	2	0	4
34	Graafschap	85	12/1/1999	17	30	1	1	2	0	2
35	143rd Ave	50	7/1/2006	11	30	1	1	2	0	2
36	Legion Park	100	1/1/2015	2	30	1	1	2	0	2



Collection System Business Risk Analysis Summary

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

Completion Date October 26, 2017
(no later than 3 years from executed grant date)

The City of Holland *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1633-01 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 15, 2017.
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:

Kevin Koning at 616.355.1564 kkoning@hollandbpw.com

Name | Phone Number | Email

October 26, 2017

Signature of Authorized Representative (Original Signature Required) Date

Kevin Koning, Superintendent of Water/Wastewater Services

Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)

Asset Management Plan Executive Summary

SAW Grant No. 1308-1

City of Houghton
616 Sheldon Avenue
Houghton, MI 49931
Eric Waara, City Manager
(906)482-1700

Executive Summary

City of Houghton was awarded the SAW Grant in 2014. The City of Houghton Sewer System consists of sewer collection mains and maintenance equipment. Maintenance is performed by the Houghton Department of Public Works personnel. The City of Houghton was established in 1861, and some of the existing sewer collection system is well over 100 years old. The bulk of the existing system was constructed as a combined sewer/ storm collection system with discharge to the Keweenaw Waterway prior to development of wastewater treatment facilities, starting in 1964 with the creation of the Portage Lake Water and Sewage Authority (PLWSA) and construction of a wastewater plant in Hancock, and then the construction of a new PLWSA wastewater treatment plant in Houghton in 1990 to serve Houghton, Hancock, and surrounding communities.

With the addition of wastewater treatment plants, continuous improvements have been made to separate the sewer and storm collection systems and to reduce inflow and infiltration (I&I) into the Houghton sewer collection system, so there are no known cross connections to storm sewers. However, due to the age of the system, there are instances of I&I from ground water and storm water 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 Houghton sewer system consists of 130,000’ of sewer main and 760 man holes. Sewer mains and manholes greater than 20 years old 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 $$483,733.21 (100% grant, no local match).

Wastewater and/or Stormwater Asset Inventory

The system components included in the asset management include the 130,000’ of sanitary sewer and 760 man holes. It also includes the sewer maintenance equipment operated by the Houghton DPW. All system components were gathered in the field using surveying methods. That information was then drafted using AutoCAD then exported into the GIS mapping system for use by the City of Houghton. Televising and manhole inspection information was then linked to the various components in the GIS system.

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 Houghton. The program is easily updated and modified by City of Houghton staff when changes are made to 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 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 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 good condition with the following percentage of components in good (53%), fair (15%) and poor (32%)

Level of Service Determination

The City of Houghton desires to meet all DEQ 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. This is achieved by preventing direct discharges of untreated sewage into the environment. By completing past and future sewer separation projects and sewer improvement projects, they have taken the appropriate steps toward ensuring this goal is obtained.

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 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 Houghton's priority level on various areas of the system.

This review/ rating process required a strong understanding of the existing sewer system, which we had developed during our review of the system information throughout the course of the SAW grant project. The City of Houghton sewer interceptor serves as the most critical piece of infrastructure, since its failure results in an immediate need of bypass pumping to transmit a significant portion of the system sewage to the PLWSA Houghton liftstation.

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 a financial consultant who reviewed and updated the current and projected necessary revenues.

Capital Improvement Plan

The City of Houghton intends to undertake a series of improvement projects over the next 20 years to address deficiencies in their sewer collection system. These projects will be funded by USDA RD loan/ grant funding, and will also leverage planned proposed projects by MDOT for improvements to a couple of major corridors through the city, the College Avenue section, and Townsend Drive through the Michigan Technological University campus.

Phase 1:

Proposed Construction 2019-2024
Miscellaneous sewer segment repairs concentrating around West Houghton Avenue, Dodge Street, and East 5th Avenue.

Construction:	$ 1,589,000
Contingency:	$ 159,000
Engineering/ Administration*:	$ 227,000
Bonding/ Legal:	$ 25,000
Total:	$ 2,000,000

Phase 2:

Proposed Construction 2025-2029:
Miscellaneous sewer segment repairs throughout the system with emphasis on Zone 1 and Houghton Canal Road, and College Avenue and Townsend Drive.

Construction:	$ 1,555,000
Contingency:	$ 155,000
Engineering/ Administration:	$ 265,000
Bonding/ Legal:	$ 25,000
Total:	$ 2,000,000

Phase 3:

Proposed Construction 2030-2034:
Miscellaneous sewer segment repairs throughout the system.

Construction:	$ 1,555,000
Contingency:	$ 155,000
Engineering/ Administration:	$ 265,000
Bonding/ Legal:	$ 25,000
Total:	$ 2,000,000

Phase 4:

Proposed Construction 2035-2040:
Miscellaneous sewer segment repairs throughout the system.

Construction:	$ 1,555,000
Contingency:	$ 155,000
Engineering/ Administration:	$ 265,000
Bonding/ Legal:	$ 25,000
Total:	$ 2,000,000

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.

- 130,000 *feet of 6 - 36 inch pipe*
- 760 *manholes*
- 1,600 *sewer service lines*

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

Completion Date 10/5/2017
(no later than 3 years from executed grant date)

The City of Houghton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1308-1 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: 5/18/17.

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: 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:

City of Houghton at (906) 482-1700 citymanager@cityofhoughton.com
Name | Phone Number | Email

E. Waara 05 OCT 2017
Signature of Authorized Representative (Original Signature Required) Date

Eric Waara, City Manager
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Village of Howard City

SAW Project No. 1624-01

Heart of the Panhandle
The Village of
HOWARD CITY
Founded 1868

FINAL
October 2017

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 May 2014, The Village of Howard City received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1624-01, to provide financial assistance for the development of a Wastewater Asset Management Plan (AMP) for the Village's publicly owned wastewater utility. Working with Village staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the wastewater collection system. The utilities assets include collection system piping and manholes, a wastewater treatment facility, lift station/pump stations and force mains.

This report 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 Village of Howard City has executed the "Certification of Project Completeness" for the wastewater asset management plan and a copy has been provided at the end of this Executive Summary.

The contact person for the Village of Howard City AMP is:

Michael Falcon, Village Manager
Village of Howard City
P.O. Box 510, 125 Shaw Street
Howard City, MI 49329
Phone number: 231.937.4311

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 58,663 feet (11.11 miles) of sanitary sewers (gravity pipe and force mains) and 199 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. In addition to these public wastewater assets there is 5,363 feet (1.02 miles) of private collection system (owned and maintained by third-party), along with 21 manholes.

The WWTF currently includes the following treatment processes:

- coarse screening
- aerated lagoons
- ferric chloride addition for phosphorous removal
- facultative lagoons
- rapid infiltration basin

Treated effluent is batch discharged to Tamarack Creek in accordance with National Pollutant Discharge Elimination System (NPDES) Permit No. MI0053406. The design capacity of the WWTP is 0.20 million gallons per day (mgd). The current annual average flow received by the facility is approximately 0.14 mgd.

The Village operates and maintains four sanitary sewer lift stations located throughout the wastewater collection system. The stations are either wet well/dry well style or submersible style stations.

Asset Identification and Location
A comprehensive wastewater system asset inventory was developed based on existing record drawings, operation and maintenance manuals, 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 Close Circuit Televising (CCTV) for pipelines greater than 20 years of age. 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 future operations and maintenance use by the Village. The asset inventory includes 128 WWTF assets, 63 lift station assets, and 390 collection system assets (pipelines and manholes).

Condition Assessment and Expected Useful Life
A comprehensive condition assessment of the collection system was performed. NASSCO-MACP manhole field based assessments were completed for all manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 51% of the gravity pipe. The Village has minimal inflow/infiltration (I/I) issues, therefore, smoke testing was not performed on any part of the system.

The assets of the wastewater collection system are in fair to good condition. Recommended rehabilitation for 12% of the system includes the need for point repairs, lining and replacement. The remaining 49% of assets were identified for rehabilitation in the future, beyond five years. Continued maintenance is recommended for 39% of the system and includes both additional inspection and/or cleaning.

Overall, the assets in the WWTP and four lift stations were found to be in fair to good condition. Most assets were in good condition due to relatively recent installation or maintenance procedures. Some assets were in fair condition due to age or deterioration caused by harsh conditions associated with treating wastewater.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)
The LOS service statement was developed with DPW and City Administrative Staff. The draft LOS was presented to the Village Council at a publicly noticed meeting and was accepted for inclusion with the final wastewater asset management plan. The following is the LOS adopted for the Village of Howard City:

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Howard City 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

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 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. Three pipe segments in the collection system had an extreme risk rating and are recommended to be replaced or fully lined. The most significant need is the replacement of the force main pipe going from Lift Station No. 2 to the WWTF, which is aging and flows under the Tamarack Creek. Much of the collection system's gravity pipes, 67 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition.

Figure 2 provides the risk rating for the collection system manholes. Nine manholes are identified as extreme risk, and are recommended for lining. Many manholes have a low to negligible risk rating and are indicative of manholes in relatively good condition.

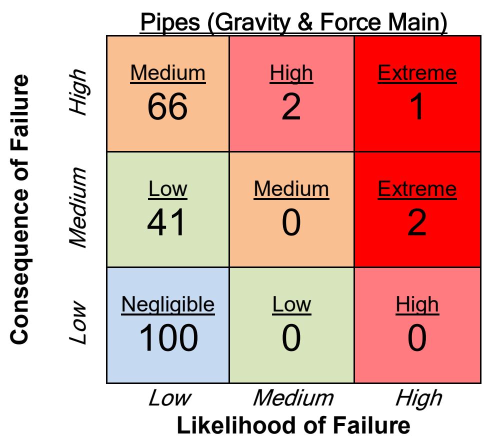


Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

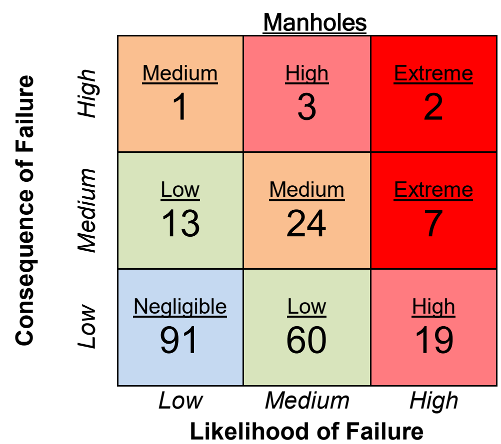


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTF assets. No assets are identified in the extreme risk category. The twelve assets with high risk ratings should be inspected at regular intervals. The Village has identified replacement/repairs/improvements of WWTF assets in the proposed plans for system improvements.

Figure 4 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The eight assets with high risk ratings should be inspected at regular intervals. The City has identified replacement/repairs/improvements of Lift Station assets in the proposed plans for system improvements.

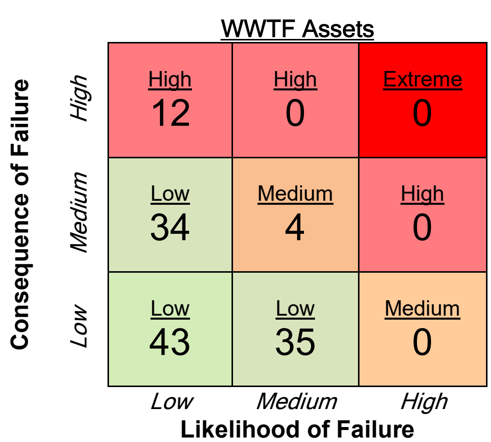


Figure 3. WWTF Assets by Risk Rating

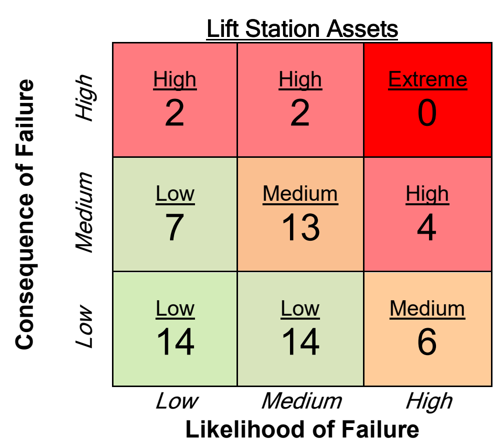


Figure 4. Lift Station Assets by Risk Rating

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 with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short Term 1-5 year and Long Term 6-20-year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

CIP DEVELOPMENT

Collection System assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Opinions of probable project costs for the WWSL and Lift Station assets were prepared and are based on conceptual layouts of new facilities, or price quotes from material and equipment representatives. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The CIP was developed by assigning each project to a CIP year (1-5) based on several factors. In addition to Risk Rating, other factors used to assign CIP year include:

- Asset rehabilitation grouping (i.e. the type of repair/construction recommended)
- Coordination with other planned projects to achieve economies of scale or limiting disruption (an example is a street reconstruction project where identified utility recommendations can be included)

The 5-Year CIP must also consider project cost when assigned to a CIP year to balance capital requirements with generated utility revenues. The recommended 5-Year Capital Improvement Plan for the wastewater collection system and WWSL/lift stations is included in Table 3A. Recommendations for the long term 6-20 year CIP are included in Table 3b.

Table 3a: Capital Improvement Plan Summary by Year

Project Description	Rehabilitation Fiscal Year					Total
	2018	2019	2020	2021	2022	
Collection System Improvements						
Replace Forcemain between LS #2 and WWTP	$ 310,000					$ 310,000
Gravity Sewer Point Repair			$ 5,591			$ 5,591
Gravity Sewer Lining		$ 23,233				$ 23,233
Manhole Lining		$ 39,305		$ 108,071		$ 147,376
Subtotal Collection System Improvements	**$ 310,000**	**$ 62,538**	**$ 5,591**	**$ 108,071**		**$ 486,200**
WWTP & Lift Station Improvements						
Replace LS #2 with Submersible Station	$ 575,000					$ 575,000
Wastewater SCADA System	$ 70,000					$ 70,000
Rehabilitate Aeration System			$ 103,968			$ 103,968
Ferric System Improvements			$ 22,279			$ 22,279
Lift Station Nos. 3 & 4 Pump Replacement				$ 43,491		$ 43,491
Variable Frequency Drives for Blowers				$ 14,205		$ 14,205

Subtotal WWTF & Lift Station Improvements	**$ 645,000**		**$ 126,247**	**$ 57,696**		**$ 828,943**
Total Project Cost	***$ 955,000***	***$ 62,538***	***$ 131,838***	***$ 165,767***		***$ 1,315,143***

**Assumes 3% Inflation per Year*

Table 3b: Capital Improvement Plan 6-20 Year	
Description	**6-20 Year**
Collection System	
Known Collection System Rehabilitation	$ 132,403
Projected Collection System Rehabilitation	$ 519,704
Wastewater Treatment System	
Known Wastewater Treatment Rehabilitation	$ 1,615,000
Total Rehabilitation Cost	***$ 2,267,107***

**Costs based on 2017 construction dollars*

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.

Table 4A identifies the recommended maintenance actions items for the wastewater collection system in a five-year summary. The total cost, as shown in the 'Total' column below, is taken and divided by five and then disbursed between 2018 to 2022, where each increasing year is multiplied by a 3% inflation factor starting at year 2 (2019).

Table 4a. Collection System Maintenance Summary Table: Year by Year

Project Description	Total (Current Year Dollars)	2018	2019	2020	2021	2022
Manhole Assessment	$ 6,000	$ 1,200	$ 1,236	$ 1,273	$ 1,311	$ 1,351
Manhole Cleaning	$ 35,250	$ 7,050	$ 7,262	$ 7,479	$ 7,704	$ 7,935
CCTV	$ 55,892	$ 11,178	$ 11,514	$ 11,859	$ 12,215	$ 12,581
CCTV & Heavy Cleaning	$ 67,603	$ 13,521	$ 13,926	$ 14,344	$ 14,774	$ 15,218
Total Project Cost	***$ 164,745***	***$ 32,949***	***$ 33,937***	***$ 34,956***	***$ 36,004***	***$ 37,084***

**Assumes 3% Inflation per Year*

A list of WWTF and lift (pump) station assets requiring replacement in the next 20 years was generated based on the expected useful life of assets included in the asset inventory. Assets addressed in the CIP were not included in the replacement cost table. Table 4b provides the results of the analysis.

Table 4b: Replacement Costs for WWTP and Lift Station

Asset Description	Year Installed	Expected Useful Life (Years)	Anticipated Year of Replacement	Replacement Cost (2017 Dollars)	Replacement Cost (Inflated 3%/yr)
Effluent sampler	1995	20	2018	$7,000	$7,200
Instrument Control Panel – Control Bldg.	1995	25	2020	$18,000	$20,300
Pump No. 1, Ensley Park (LS No. 1)	2010	15	2025	$15,200	$19,800
Pump No. 2, Ensley Park (LS No. 1)	2010	15	2025	$15,200	$19,800
Bulk chemical storage tank	1995	30	2025	$16,000	$20,900
Chemical day tank	1995	30	2025	$7,500	$9,800
Valve 5, electric actuator	2010	15	2025	$10,800	$14,100
Valve 16, electric actuator	2010	15	2025	$10,800	$14,100
Autoclave	1995	30	2025	$7,200	$9,400
Floating baffle, Aerated Lagoon No. 1	2010	20	2030	$10,000	$15,100
Floating baffle, Aerated Lagoon No. 2	2010	20	2030	$10,000	$15,100
Turbine mixer No. 1	2010	20	2030	$10,600	$16,000
Turbine mixer No. 2	2010	20	2030	$5,800	$8,800
Motor, Blower No. 1	2010	20	2030	$7,300	$11,000
Motor, Blower No. 2	2010	20	2030	$7,300	$11,000
VFD, Blower No. 1	2020	10	2030	$6,500	$9,800
VFD, Blower No. 2	2020	10	2030	$6,500	$9,800
Motor Control Center 1	2010	20	2030	$26,000	$39,300
Motor Control Center EMCC	2010	20	2030	$26,000	$39,300
Generator, N. Muenscher St LS	2010	25	2035	$32,000	$56,100
Bituminous pavement parking	1995	40	2035	$69,300	$121,500
Blower No. 2	2010	25	2035	$9,000	$15,800
Blower No. 1	2011	25	2036	$9,000	$15,800

In addition to the replacement costs listed above, an annual equipment replacement fund should be developed to replace disposable equipment. The proposed 2017/2018 operations and maintenance budget identified in the rate study report prepared by MRWA identifies $35,000 for equipment repair/maintenance and new equipment. The adequacy of this current budget recommendations should be reviewed against the replacement and cost recommendations contained in Table 4b.

REVENUE STRUCTURE

The MDEQ 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 Howard City, the rate study report was prepared by Michigan Rural Water Authority and approved by the MDEQ on May 24, 2017.

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

Completion Date 10/6/17
(no later than 3 years from executed grant date)

The Village of Howard City *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1624-01 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: 5/24/17.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on June 19, 2017 #2017.3 Chapter 53 Section 53.40

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:

Randal Heckman at 231-937-4311 rheckmanpresident@howardcity.org
Name / Phone Number / Email

[signature] 10-6-17
Signature of Authorized Representative (Original Signature Required) / Date

Randal Heckman, Village President
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

Village of Howard City

SAW Project No. 1624-01

Heart of the Panhandle
The Village of
HOWARD CITY
Founded 1868

FINAL
October 2017

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 2014, The Village of Howard City 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 Village's stormwater collection system. 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 Village of Howard City 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 Village of Howard City AMP is:

Michael Falcon, Village Manager
Village of Howard City
P.O. Box 510, 125 Shaw Street
Howard City, MI 49329
Phone number: 231-937-4311

ASSET INVENTORY AND CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 32,872 feet (6.22 miles) of storm sewers and 297 stormwater structures including outfalls and culvert ends. System outfalls are primarily located along Tamarack Creek, with some outlets to Rice Creek. There are also six culverts along the County drains located within Village limits that are owned and maintained by the Village. These assets are 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, or updated (GIS) database and piping network for archiving, mapping and further evaluation purposes.

The purchase of GIS/GPS equipment provided with the SAW grant program will greatly enhance the Village's ability to physically locate defects in storm water system assets.

CONDITION ASSESSMENT AND EXPECTED USEFUL LIFE

For the Village of Howard City, a comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field based assessments were completed on 276 structures. Twenty-one structures were located but could not be accessed for assessment. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 16.2% of the gravity pipe.

Based on discussions with the stormwater system operations staff, there have not been any known capacity issues with the Village-owned stormwater system. For this reason, a capacity analysis was not completed for the Village of Howard City.

The assets of the stormwater collection system are in good condition. Recommendations for short-term (1-5 year) and long term (6-20 year) highlight the need for a regular maintenance program; approximately

22% of the storm structures and 52% by length of the storm sewer was tagged for CCTV, inspection and/or cleaning in the next five years. Rehabilitation was recommended for approximately 13% of the storm structures and 10% by length of the storm sewer, which includes replacement, point repairs, and lining scheduled over twenty years. The remaining assets (65% of storm structures and 38% of storm sewer) were placed in the beyond 20-year planning category.

Level of Service

Defining the Expected Level of Service (LOS)

Level of Service (LOS) defines the way in which the Village stakeholders want the storm water system 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 Village wishes, if all regulatory requirements are met.

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

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 Village of Howard City:

- *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.*
- *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 of Howard City from time to time to make sure they accurately reflect the desired operation of the storm water system.

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 Village of Howard City using Innovyze-InfoMaster software. InfoMaster is an ArcGIS-based sewer asset management and capital planning software that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. Four pipe segments in the stormwater collection system have an extreme risk rating and are recommended to be for near-term rehabilitation or replacement.

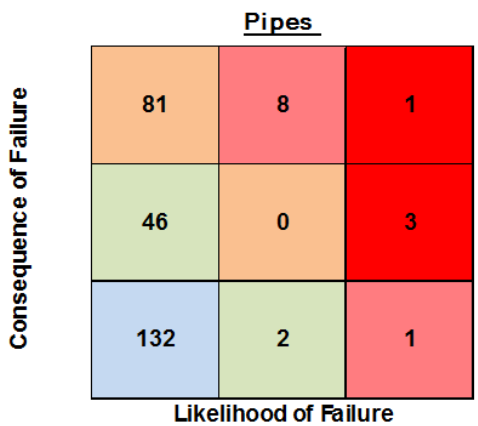


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Ten structures are identified as extreme risk, and are recommended for replacement or rehabilitation.

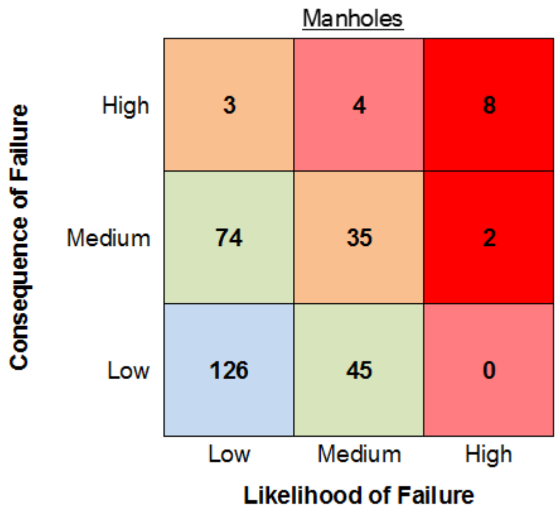


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

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

The Village of Howard City does not have a separate revenue based utility for storm water improvements and operations and maintenance (O&M). Budget for routine O&M are included in the Village's general fund for street maintenance and work is done on an "as needed" basis and carried out by the Village's DPW crews. The Village does not currently budget to perform stormwater capital improvement projects. The full AMP report includes a discussion on options for funding stormwater projects.

A Capital Improvement Plan with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term 1-5 year and Long-Term 6-20-year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

CIP Development

In order to prepare the CIP, collection system assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The CIP was developed by assigning each project to a CIP year (1-5) based on several factors. In addition to Risk Rating, other factors used to assign CIP year include:

- Asset rehabilitation grouping (i.e. the type of repair/construction recommended)

The recommended 5-Year Capital Improvement Plan for the Village-owned storm water collection system is included in Table 3a below.

Table 3a: Capital Improvement Plan Summary by Year						
Project Description	Rehabilitation Fiscal Year					Total
	2018	2019	2020	2021	2022	
Collection System Improvements						
Gravity Sewer Replacement		$ 206,731			$ 71,627	$ 278,358
Gravity Sewer Point Repair	$ 15,840		$ 44,812			$ 60,652
Manhole Lining		$ 5,171				$ 5,171
Manhole Replacement		$ 36,050			$ 5,628	$ 41,678
Total Project Cost	**$ 15,840**	**$ 247,952**	**$ 44,812**	**$ -**	**$ 77,255**	**$ 385,859**
**Assumes 3% Inflation per Year*						

OPERATIONS AND MAINTENANCE

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound stormwater system. The process of cleaning and CCTV inspection of pipelines either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every five years, or that 20% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects. The 5-year CIP maintenance total is $106,292, shown in Table 4a.

Table 4a: Operations and Maintenance Plan Summary by Year						
Project Description	Total	Preventative Maintenance Fiscal Year				
		2018	2019	2020	2021	2022
Collection System Improvements						
Manhole Assessment	$ 8,500	$ 1,700	$ 1,751	$ 1,804	$ 1,858	$ 1,913
Manhole Cleaning	$ 36,000	$ 7,200	$ 7,416	$ 7,638	$ 7,868	$ 8,104
CCTV	$ 61,792	$ 12,358	$ 12,729	$ 13,111	$ 13,504	$ 13,909
Total Project Cost	***$ 106,292***	***$ 21,258***	***$ 21,896***	***$ 22,553***	***$ 23,230***	***$ 23,926***
**Assumes 3% Inflation per Year*						

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

Completion Due Date 10/23/2017
(no later than 3 years from executed grant date)

The **Village of Howard City** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in **SAW Grant No. 1624-01** 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:

Randal Heckman, Village President at 231.937.4311 heckmanpresident@howardcity.org
Name Phone Number Email

10-23-17
Signature of Authorized Representative (Original Signature Required) Date

RANDAL HECKMAN
Print Name and Title of Authorized Representative

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section
Att: Karen Nickols

From: Hubbell, Roth and Clark, Inc.

CC: Charter Township of Independence

Date: October 31, 2017

Re: Charter Township of Independence Sanitary Sewer System
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1376-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the Charter Township of Independence. 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

Charter Township of Independence
6483 Waldon Center Drive
Clarkston, Michigan 48346

SAW Grant Project #1376-01

Project Grant Amount: $1,999,035

Applicant Match Amount $444,035

Authorized Representative
Patrick Kittle, Supervisor
(248) 625-5111 ext. 213
supervisor@indtwp.com

Dave McKee,
Director of Public Works
(248) 625-8522
dmckee@indtwp.com

Consultant Contact
Todd Sneathen, Associate
Hubbell, Roth and Clark
(517) 294-6193
tsneathen@hrcengr.com

EXECUTIVE SUMMARY

The Charter Township of Independence (Township) 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 Township owns, operates and maintains the sanitary sewer system. The Township 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.

WASTEWATER INVENTORY

Independence Township 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 by Independence to allow for efficient and consistent recording of asset condition. For sanitary sewer assets, the NASSCO-compliant inspection information was collected during sewer 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 and sewer pipes, and for most vertical asset types, such as pumps, valves, structures, etc.

As part of the grant, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 354,300 lineal feet of sanitary underwent condition assessment via cleaning and televising. Approximately 1,430 manhole and other related structures were evaluated using the NASSCO inspection protocol. Vertical assets, including pump stations, were inventoried using a hierarchy template and condition assessment data was collected and input into a pump station asset registry.

CRITICALITY OF ASSETS

The Township 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 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.

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 example of LOS goals matrix was developed to consider the goals and strategies of the Township.

The Township's strategic example Level of Service Goals included:

- Financial Viability and Impact. Goal: Maintain rate structure and sufficient for Operations, maintenance and repair and CIP Measurable: Yes or No
- Operational. Goal: Televise and inspect structures for 10% of the system annually. Measurable: % of system inspected.
- Safety of Employees. Goal: Employee training requiring continuing education Measurable: Number of injuries and any public health advisories.

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.

The Township 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.

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 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 Township 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 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 Township'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.

Capital Projects, 0 to 5 years:

- Injector Station Replacements (3) – $450,000
- Construction of N. Sashabaw Interceptor -$490,000

Capital Projects, 6 to 10 years:

- Pump Station Equipment Replacement - $90,000 per year

Capital Projects, 10 to 20 years:

- Sewer Repairs and Replacements - $400,000
- Pumps Station Equipment Upgrades -$90,000

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 Township's major assets include:

- 678,950 feet of 4-48-inch sanitary sewer pipe
- 33,500 feet of 2-8-inch forcemain
- 3,275 sanitary manholes
- 12 pump stations

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

Completion Date 10/31/2017
(no later than 3 years from executed grant date)

The Charter Township of Independence *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1376-01 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: 3/27/17.
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:

David McKee	at 248-625-8222	dmckee@indtwp.com
Name	Phone Number	Email

10-31-17

Signature of Authorized Representative (Original Signature Required) — Date

Patrick Kittle, Township Supervisor

Print Name and Title of Authorized Representative

April 2017

Stormwater Asset Management and Wastewater (SAW)
Sanitary Sewer System Asset Management Plan Summary

City of Iron Mountain
501 South Stephenson Avenue
Iron Mountain, MI 49801
http://www.cityofironmountain.com/

Mr. Jordan Stanchina, City Manager
Phone: (906) 774-8530

SAW Grant Project No. 1263-01

Executive Summary

The City of Iron Mountain (City) received $715,631 in funding through the Michigan SAW grant program in October of 2014 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 includes 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 (forcemains, gravity pipes, manholes)
- Collection System Mechanical (lift stations)

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, are located in Excel spreadsheets that are readily updated by the City.

While the City of Iron Mountain operates and maintains its own wastewater collection system, wastewater treatment is shared by the cities of Iron Mountain and Kingsford. The wastewater treatment plant is owned and operated by the Iron Mountain/Kingsford Joint Sewage Authority (Authority). Sewer rates within the cities of Iron Mountain and Kingsford are set based on treatment expenses of the Authority and the wastewater contribution of each city.

Condition Assessment

The majority of the sanitary sewer infrastructure was constructed by the City of Iron Mountain in the 1920s.

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 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 3.2, indicating moderate to severe 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 weighted condition rating of 2.2, indicating minor to moderate deterioration.

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 1 to 5, with an average condition rating of 2.8. This indicates an overall condition between minor deterioration and moderate deterioration.

Sanitary system mechanical or lift station condition was ranked by individual components rather than the lift station as a whole, since lift station 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 2.5 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 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.
- Make preventive maintenance a priority.
- 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	49.9%	48.3%	1.8%
Force Main	83.9%	16.1%	
Manholes	59.1%	40.6%	0.4%
Lift Stations	76.0%	23.3%	0.7
Sanitary Sewer System	52.6%	45.8%	1.6%

As can be seen in the table, only a small amount of the value of the system contains any asset components that are considered high risk, with the majority of the system in the low risk and medium 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 provides sufficient funds to cover operation, maintenance, replacement and debt costs.

Capital Improvement Plan

The following table shows the City's proposed capital improvement projects:

Project	Planned Project Year	Estimated Replacement Cost	Funding Source
Phase I - 2019 Sewer Replacement Project	2019	$1,244,000	USDA-RD
Phase II – 2022 Sewer Replacement Project	2022	$1,387,500	USDA-RD

* Estimated replacement cost is calculated for the year of construction.

List of Major Assets

The City's sanitary sewer system major assets consist of the following:

- Sanitary Sewer Gravity Pipe Total: 281,000 feet
- Sanitary Sewer Forcemain: 11,628 feet
- Sanitary Sewer Manholes: 1,129
- Lift Stations: 8

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

Completion Date October 27, 2017
(no later than 3 years from executed grant date)

The City of Iron Mountain *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1263-01 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: June 19, 2017.

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:

Jordan Stanchina, City Manager at 906-774-8530 citymanager@cityofironmountain.com
Name Phone Number Email

10/31/17

Signature of Authorized Representative (Original Signature Required) Date

Jordan Stanchina, City Manager
Print Name and Title of Authorized Representative

CITY OF IRON RIVER
SAW GRANT ASSET MANAGEMENT PROJECT
ASSET MANAGEMENT PLAN SUMMARY

City of Iron River
SAW Grant Asset Management Plan
Grant No. 1074-01
David A. Thayer, City Manager
106 West Genesee Street
Iron River, MI 49935
906.265.4719; ext. 100

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, the City 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	188,000	LFT
Sanitary Force-Main	3,720	LFT
Manholes	818	EACH
Lift Stations	5	EACH
On-Site Treatment Systems	2	EACH

The breakdown of pipe sizing for the system is shown in Table 1.2:

Table 1.2: Sanitary Sewer Sizing Breakdown				
Pipe Diameter	**Gravity Sewer Length**		**Force-Main Sewer Length**	
4"			3,200	LFT
6"	5,000	LFT	250	LFT
8"	131,000	LFT	270	LFT
10"	19,500	LFT		
12"	14,400	LFT		
15"	4,650	LFT		
18"	8,400	LFT		
20"	1,400	LFT		
24"	1,300	LFT		
30"	570	LFT		
36"	1,780	LFT		
Totals➔	**188,000**	**LFT**	**3,720**	**LFT**

The City has a minor amount of undersized sewer main remaining, with approximately 3% of their system measuring 6-inch. Typically, new mains are not placed with smaller than 8-inch pipe due to the propensity for plugging issues and regulatory rules and regulations require sewer mains to be at least 8-inch in diameter. The makeup of the sanitary sewer sizing is reflected in Figure 1.1 below:

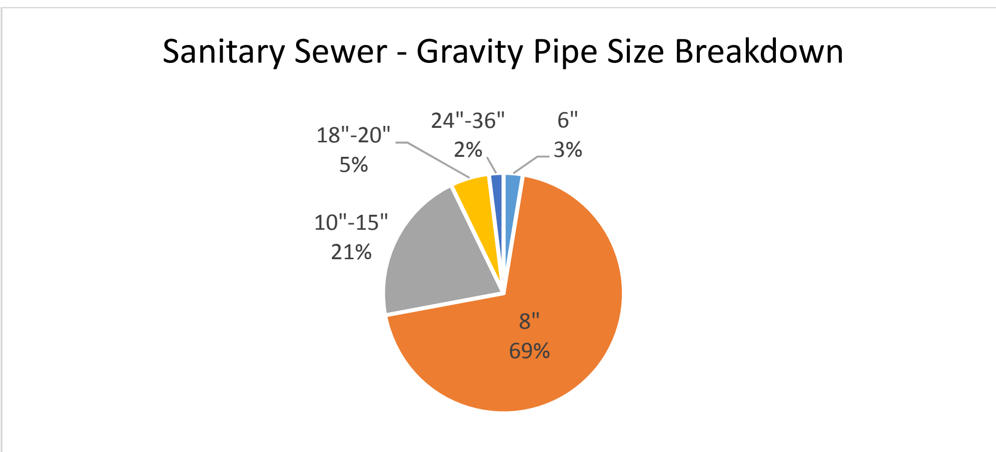


Figure 1.1: Sanitary Sewer Pipe Size

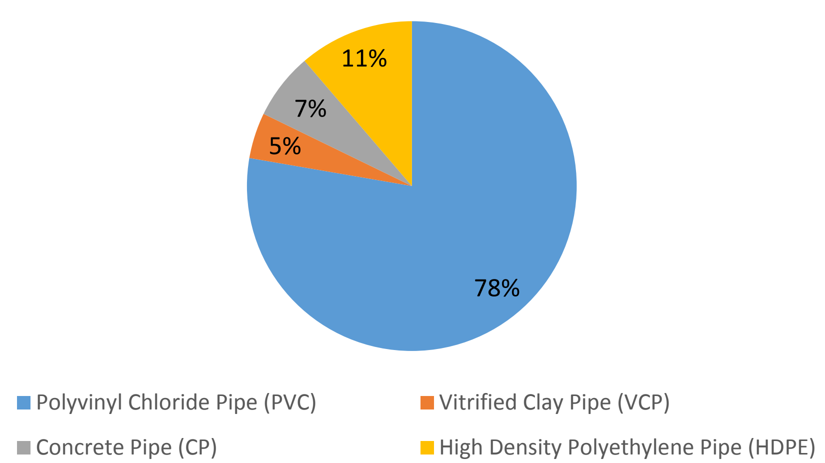
Table 1.3 indicates the quantity of each material making up the City's sanitary sewer system:

Table 1.3: Sanitary Sewer Material Breakdown

Pipe Material	Gravity Sewer Length		Force-Main Sewer Length	
Polyvinyl Chloride Pipe (PVC)	81,000	LFT		
Vitrified Clay Pipe (VCP)	58,000	LFT		
Concrete Pipe (CP)	37,100	LFT		
Cured in Place Pipe (CIPP)	4,200	LFT		
High Density Polyethylene Pipe (HDPE)	5,500	LFT	3,000	LFT
Truss Pipe (TRUSS)	2,200	LFT		
Cast Iron Pipe (CI)			800	LFT
Totals ➔	**188,000**	**LFT**	**3,800**	**LFT**

Half of the City's system (49%) has been upgraded to plastic products or has been rehabilitated using cured in place pipe lining (CIPP). The newer plastic piping and CIPP has a lower possibility of catastrophic failure from collapse or breakage, which also typically means a newer pipe and longer service life remaining. The remaining portion of the City's system consists of vitrified clay and concrete pipe. This type of pipe is significantly older than the plastic piping and much more prone to failure at this age. Figure 1.2 provides a visual breakdown of the materials within the system.

Figure 1.2 - Pipe Material Breakdown



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, asset's criticality, or 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 the City 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 1.4 summarizes the condition range of system assets.

Table 1.4: Condition Ratings System Assets

Asset Type	Rated Condition					
	1	2	3	4	5	Totals
Sanitary Sewer (LFT)	107,500	51,200	22,500	4,000	2,800	188,000
Manholes	404	178	146	61	29	818
Lift Stations	5					5
On-Site Treatment Systems	2					2

As the table above shows, the majority of the City's sewer system assets are in average to above average condition. There are some assets listed above that have been rated at 4 and 5 which will be the focus of the City over the next 20 years to address and included in the City's 20-year Capital Improvements Plan discussed later in this summary.

Wastewater Asset Inventory

A complete inventory and condition assessment of all components of the City's Sanitary Sewer System was conducted to gather information on the assets of the system. These assets are broken down into three categories: manholes, pipes, lift stations, and on-site treatment systems. 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 a majority of the manholes in the City's 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 were used to determine the condition of each section of pipe.

Lift stations were evaluated through various methods. Records research was performed to collect and determine existing information for each of the lift stations and a visual inspection of each lift station 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 performed initially 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 DPW staff to find and diagnose potential problems and to avoid future failures.

The City's two (2) on-site treatment systems were evaluated through various methods. Records research was performed to collect and determine existing information for each of the on-site treatment system and a visual inspection of each system was made. A review of the past operation performance and a review of the history of repairs was also completed.

Table 1.5 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 C-1: Sanitary Sewer Manhole Inventory, Table C-2: Sanitary Sewer Pipe Inventory, Table C-3: Sanitary Sewer Lift Station Forcemain Inventory; Table C-4: Sanitary Sewer Lift Station Inventory, and Table C-5: Sanitary Sewer Onsite Treatment System Inventory are enclosed with this summary include the condition ratings that were assigned to each asset.

Table 1.5 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

In addition to the above Condition Rating, a Business Risk Factor rating was also assigned to each asset. This rating combines the condition and criticality ratings described above to give a business risk factor, 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. The City has identified any items with a Business Risk Factor 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

The City'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 1.6 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 the City's system are the interceptor sewer and sewer mains located on the downstream sections of the system, and sewer main serving larger commercial customers. As you progress from the farther outstretches of the system towards the main collectors and interceptor sewer, 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. The City's five (5) sewage lift stations and two (2) on-site treatment systems were also given higher criticality ratings as disruptions to these components typically are more expensive and difficult to repair. 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 the City's Sanitary Sewer System has been set at being able to provide functional wastewater collection for flows from the City's residents 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, the City 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.

Revenue Structure

The City's current sanitary sewer rate is $34.00 per customer per month for up to 4,000 gallons (Basic Monthly Charge) of use and $8.50 per 1,000 gallons (Supplemental Monthly Charge) of use after 4,000.

As can be seen by the City's current budget and past audits, the City's sanitary sewer rates are sufficient to cover their sewer system costs and allows them to currently make system improvements on an annual basis with the budgeted revenue. The rates are sufficient to cover operating costs, debt retirement for both their Rural Development and MDEQ SRF loans, bond interest, short-lived depreciation, and other non-operating costs. The above rates also includes cost for wastewater treatment which is performed by the West Iron County Sewer Authority (WICSA) for which treatment is more than half their sanitary sewer budget. The City's sewer ordinance requires that the City Council review the sewer rates on an annual basis. The Sewer Ordinance also requires the City Manager to prepare a report of the review of the system by April 1 of each year and present it to the Council with a recommendation of sewer rates and charges to assure that all costs of the system will be recovered from the users of the system.

Projected annual revenues for the City's Sewer System are based on a projection of income from the City's sewer rates and charges as described in previous sections. Table 1.7 below is a summary of the revenues collected by the City from the system's Residential, Commercial, and Other users. A total of 1,816 Equivalent Dwelling Units (EDU's) were used in the revenue projections. An EDU is based on the average single family residential consumption rate of 4,000 gallons per month as measured by the user's water meter. Residential users are assumed to be one EDU while the EDU count for Other users is based on average water use during the past year.

Table 1.7: Annual Revenue Calculations

Established EDU Rate ==> 4,000

Proposed Customer Info - Users:

Customer Type	*Users*	*EDU's*
Residential	1,428	1,428
Commercial	176	517
Industrial	26	65
Government	13	13
School	3	30
Church	16	16
	1,662	**1,816**

Existing Rate Structure

	Monthly Rate	*EDU's*	*Monthly Gallons*	*Monthly Revenue*	*Annual Revenue*
Residential	$ 34.00	1,428	5,712,000	$ 48,552	$ 583,000
Commercial	$ 34.00	517	2,068,000	$ 17,578	$ 211,000
Industrial	$ 34.00	65	260,000	$ 2,210	$ 27,000
Government	$ 34.00	13	52,000	$ 442	$ 5,000
School	$ 34.00	30	120,000	$ 1,020	$ 12,000
Church	$ 34.00	16	64,000	$ 544	$ 7,000
Sewer Line Service/Fees				$ 500	$ 6,000
Penalties				$ 1,667	$ 20,000
Interest Income				$ 33	$ 400
Totals ==>		**2,069**	**8,276,000**	**$ 72,546**	**$ 871,400**

Capital Improvement Plan

As previously stated, the City has been making sanitary sewer system improvements on an annual basis since the completion of the two (2) large loan funded capital improvements project. Based on the 20-Year Capital Improvements plan presented in Section 7.4 the City needs to complete $1,390,000 over the next 20 years which equates to an annual cost of approximately $69,500. If the City continues the same path they are on currently, they will be able to address all these needs and more as the needs arises. Again, the City will need to continue to evaluate their sewer fund rates on an annual basis and make any adjustments necessary to stay on track with sewer system improvements. Based on the results of this sewer system evaluation, at this time it is not anticipated that the City will need to take on any more long-term debt to address any critical sewer system improvements. Table 1.8 below summarizes the proposed 20 Year Capital Improvements identified by this study.

Table 1.8: Capital Improvements Summary	
10-Year Capital Improvements Summary	
Location	**Estimated Construction Cost**
Manhole Replacement	$ 144,000
Sewer Main Replacement	$ 359,000
1-10 Year Total ==>	**$ 503,000**
20-Year Capital Improvements Summary	
Location	**Estimated Construction Cost**
Manhole Replacement	$ 398,200
Sewer Main Replacement	$ 489,200
11-20 Year Total ==>	**$ 887,400**
Total ==>	**$ 1,390,040**

Recommendations

In general, the City's Sanitary Sewer System is in good condition with nearly 50% of the gravity sewer and all of the lift stations and nearly all forcemain piping having been replaced in the last 5 years. The system components that are older than 20 years generally appear to be in good condition, with some minor exceptions noted and repair/replacement noted in the Capital Improvements Plan.

Additionally, the City's rate structure provides sufficient funds for proper operation and maintenance of the system and future rate increases as the City deems necessary based on their annual analysis of their sewer fund should keep sufficient monies in the sewer fund. It is recommended the City continue to review past and future expenses 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 City'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 City's major assets:

- Table C-1: Sanitary Sewer Manhole Inventory
- Table C-2: Sanitary Sewer Pipe Inventory
- Table C-3: Sanitary Sewer Lift Station Forcemain Inventory

- Table C-4: Sanitary Sewer Lift Station Inventory
- Table C-5: Sanitary Sewer Onsite Treatment System Inventory

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

Completion Date October 30, 2017
(no later than 3 years from executed grant date)

The **City of Iron River** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1074-01** 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: February 16, 2017.

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
David A. Thayer, City Manager at	906.265.4719; ext. 100	citymanager@ironriver.org

Terry Tarsi 10/30/17

Signature of Authorized Representative (Original Signature Required) Date

Terry Tarsi, Mayor

Print Name and Title of Authorized Representative

SAW (Stormwater, Asset Management, and Wastewater) Grant
Asset Management Plan Summary

City of Ironwood
213 S. Marquette Street
Ironwood, MI 49938
http://cityofironwood.org/

Mr. Scott Erickson, City Manager
Phone: (906) 932-5050

SAW Grant Project No. 1395-01

Executive Summary

The City of Ironwood (City) received $970,912 in funding through the Michigan SAW grant program in October of 2014 to develop an Asset Management Plan for their wastewater (sanitary) and stormwater (storm) sewer systems.

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 sewer systems. 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 includes the following:

- Asset Inventory and Condition Assessment
- Level of Service
- Critical Assets
- Revenue Structure
- System Maintenance, Repair, Rehabilitation, and Replacement Schedules
- Long-term Funding/Capital Improvement Plan

Asset Inventory

The City sanitary sewer system consists of the following components:

- Collection System (force mains, gravity pipes, manholes)
- Collection System Mechanical (lift stations)
- Mobile Assets

The City storm sewer system consists of the following components:

- Collection System (gravity pipes, manholes, catch basins, outfall structures)

The collection systems 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 and mobile assets are located in Excel spreadsheets that are readily updated by the City.

Condition Assessment

Sanitary and storm sewer system asset conditions were 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 sanitary gravity pipe is based on televising, smoke testing, and assumed condition. The assessed condition rating of City sanitary sewer gravity pipe within the collection system ranged from 1 to 5. The weighted average condition rating of the sanitary sewer gravity pipe is 2.8, indicating minor to moderate deterioration within the collection system.

The condition of storm gravity pipe is based on televising and assumed condition. The assessed condition rating of City storm sewer gravity pipe within the collection system ranged from 1 to 5. The weighted average condition rating of the storm sewer gravity pipe is 2.4, indicating minor deterioration with the collection system.

The condition rating of sanitary sewer force main within the collection system is assumed to have a condition rating of 2, indicating minor deterioration. Based on pipe material and soil conditions, the life expectancy of the ductile iron force main is estimated to be at least 80 years. An assumed condition of 2 was made for the entire force main pipe system because it was installed from 1994 to 2004.

Sanitary and storm sewer structures were inspected by 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 structure components were given a rating of 1 to 5 using the ranking system noted above. An overall rating was given to the structure based on the worst rating of the components evaluated.

The assessed condition rating of sanitary sewer manholes within the collection system ranged from 1 to 5, with an average condition rating of 2.7. This indicates an overall condition of minor to moderate deterioration.

The assessed condition rating of storm sewer structures (manholes, catch basins, outfalls) within the collection system ranged from 1 to 5. The average condition rating is 2.4, indicating minor deterioration within the collection system.

Sanitary system lift station condition was ranked by individual components rather than the lift station as a whole since lift station 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 Bonnie Road Lift Station assets is 2.1 indicating minor deterioration.

A spreadsheet listing the condition ratings of individual mobile assets is included in the report. The weighted condition rating of the mobile assets is 2.3 indicating minor 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 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.
- Review and adjust sewer rates on an annual basis to keep rates in line with inflation and to avoid steady declines in revenue followed by massive rate increases.
- Make preventive maintenance a priority.
- 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.

List of Major Assets

The City's sanitary sewer system major assets consist of the following:

- Sanitary Sewer Gravity Pipe: 268,000 ft. (50.75 miles)
- Sanitary Sewer Force Main: 1,630 ft.
- Sanitary Sewer Gravity Manholes: 995
- Lift Stations: 1

The City's storm sewer system major assets consist of the following:

- Storm Sewer Gravity Pipe: 132,500 ft. (25.1 miles)
- Storm Sewer Manholes: 393
- Storm Sewer Catch Basins: 877
- Storm Sewer Outfall Structures: 22

Critical Assets Determination

To determine the criticality of an asset, a consequence of failure for the asset must be determined. 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 consequence of failure, the probability of the failure, and the redundancy of assets. 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.

Probability of failure of an asset is assigned the same value (1 through 5) as the condition rating of the asset. Redundancy can significantly reduce risk. If one part of the system fails, and there is another part for redundancy and/or backup to immediately take its place, risk is decreased. None of the City collection system assets have redundant components, so redundancy is assigned a value of 1.

Business risk is found by multiplying the Consequence of Failure to the Probability of Failure and to the Redundancy of the asset. The resulting number provides a numeric value to business risk. Typically, an asset falling in the range of 1 to 8 is considered low risk, an asset falling in the business risk range of 9 to 16 is considered medium risk, and an asset above 16 is considered high risk.

All assets found to have a condition rating of 4 or higher have been placed into O&M, repair, rehabilitation, or replacement schedules. Business risk prioritizes the order in which these assets should be addressed.

Revenue Structure

A funding projection worksheet was developed to evaluate historic and future projections based on operating income, operating expenses, non-operating expenses, and current fund balances to determine when and how much funding will be available to address necessary O&M, repairs, rehabilitation, or replacement.

The City performs an annual rate analysis and adjusts sewer rates based on cost-of-living-adjustments (COLA) determined from the Consumer Price Index (CPI). It was determined that the current rate structure provides sufficient funds to cover operation, maintenance, and debt costs. The City operates with a surplus and this trend will continue assuming no change in population. The City should use these surplus funds to address identified O&M, repairs, and rehabilitation schedules that were developed.

In addition to the aforementioned schedules, a need for six water and sewer capital improvement projects (Phase 5 through Phase 10) was identified. These future capital improvement projects will be funded through USDA-Rural Development grants and/or loans.

Capital Improvement Plan

At this time, the total income of the City is not sufficient to fund the six proposed water and sewer capital improvement projects without a source of outside funding. The feasibility of funding each project will be determined by the level of funding through grants in conjunction with likely sewer rate increases and as previous project bonds are paid off in the coming years. The following table lists these proposed capital improvement projects, the target year for construction of each project, and the estimated target year cost of each project:

Project	Target Project Year	Est. Cost
Phase 5	2020	$3,000,000
Phase 6	2023	$2,000,000
Phase 7	2026	$3,300,000
Phase 8	2029	$3,600,000
Phase 9	2032	$3,750,000
Phase 10	2035	$3,200,000

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

Completion Due Date Oct 9, 2017
(no later than 3 years from executed grant date)

The City of Ironwood, County of Gogebic *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1395-01 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:

Scott Erickson at (906) 932-5050 ericksons@cityofironwood.org
Name | Phone Number | Email

Scott Erickson 10/9/17
Signature of Authorized Representative (Original Signature Required) Date

Scott Erickson, 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 Oct 9, 2017
(no later than 3 years from executed grant date)

The City of Ironwood, County of Gogebic *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1395-01 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 2, 2017.

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
Scott Erickson	at (906) 932-5050	ericksons@cityofironwood.org

Scott Erickson 10/9/17

Signature of Authorized Representative (Original Signature Required) Date

Scott Erickson, City Manager

Print Name and Title of Authorized Representative

Asset Management Plan Executive Summary

Ishpeming Area Joint Wastewater Treatment Authority

700 Sunset Drive
Ishpeming, MI 49849
(906) 486-4391

Revised
October 16, 2017

Project No. 1403500

Table of Contents

1. Executive Summary

The Ishpeming Area Joint Wastewater Treatment Authority (IAJWWTA) provided an asset management plan prior to application for the SAW Grant. This plan was developed and approved in 2013. SAW grant funds were used for two purposes. First, design and construction of a clarifier replacement project was performed partially via grant funding. Secondly, improvements were made to the asset inventory, information collection, and database development for the Authority's asset management capabilities moving forward.

The construction project was performed successfully and the clarifier has been online for 2 years. The improvements to the monitoring and tracking systems were made throughout the past two years, and the Authority has been using these tools to update their AMP as required on an annual basis. In addition, routine monitoring was put in place to identify degradation and vibration in any equipment, and infrared analysis performed did identify one issue that was resolved via maintenance.

Total grant funding was as follows: $76,000 for design engineering, $500,000 for disadvantaged community construction cost, and $85,200 for wastewater asset management plan costs, for a total grant amount of $661,200. Because the Authority was recognized as a disadvantaged community, there was no match required, though the Authority did spend some of its own funding to complete the construction project.

2. Wastewater Asset Inventory

The asset inventory for the facility was identified using the facility's depreciation schedule. This schedule is updated annually, and any items that fall out of use or are replaced are reflected on both the changing depreciation schedule and the changing asset list.

Annually, as part of the facility's efforts to maintain an up to date asset management plan, the facility reviews all of the items within the asset management plan, to determine the remaining useful life (and to add or remove assets as required based on the year's events). This summary update is submitted to MDEQ on an annual basis as part of NPDES permit requirements.

The facility maintains the list of assets in multiple locations. The facility maintains a GIS database that contains a map of the facility and pertinent information regarding each of the system assets (including plans, specifications, service history, etc.) is kept up to date. Files are maintained in pdf format so that they can be opened and modified by facility personnel.

In addition, the facility maintains the list of assets within a scheduler software. This allows for direct recording and scheduling of maintenance events, as well as record keeping in regards to vibration and infra-red analysis, or other maintenance events.

Finally, the facility maintains a spreadsheet that corresponds with the facility's depreciation schedule, which it updates each year as part of the AMP updates required by the NDPES permit.

Asset conditions were determined through a variety of means. Analysis and testing were used on appropriate assets for the testing available. Projected useful lives, maintenance history, and any other pertinent information as provided by facility staff were used to determine a remaining useful life, and the combination of these factors were used to determine asset condition.

Because IAJWWTA has maintained an aggressive replacement schedule throughout its operation, its current assets maintain a high degree of reliability, and score well from a condition rating standpoint. Because those items that were considered condition 4 and 5 were repaired or replaced, the current state of the system assets are 99 assets with a condition rating of 1, and 62 assets with a condition rating of 2, with no other current condition ratings.

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.

It should be no surprise that in a wastewater treatment facility, the mainline processes contained the most critical assets, while surrounding buildings, pumps, equipment, etc. were of a less critical nature.

Once the criticality of all items were ranked, on a scale of 1-5, the condition of the asset was multiplied to determined 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. In fact, the highest scoring asset upon the first iteration of the AMP was Clarifier No. 2. However, with the construction project that was partially funded through the grant, the condition of this asset was lowered to a 1, and the business risk factor was lowered to a 5.

4. Level of Service Determination

The wastewater treatment facility maintains the following level of service goals:

1. Perform within all requirements of their NPDES permit.
2. No reportable events to the MDEQ as required by the permit.
3. Perform maintenance and replacement as required in order to provide the lowest long term costs in maintaining a viable wastewater treatment facility.

The stakeholders of the system, including Ishpeming Township, the City of Ishpeming, and the City of Negaunee, provide personnel to serve as the Board of Directors for the Authority. All major decisions are made by the Board of Directors. The Supervisor puts forth annual budgeting indicating improvements plans, and this budget is approved by the Directors.

Because the facility has been and continues to be proactive in their maintenance and replacement schedules, certain items of work may be performed before they are determined to be absolutely necessary. This could be considered a trade-off to those who look for short term cost reductions. However, the way that this facility has operated now for many years is very much in line with the intent of an asset management plan. The facility determines that the condition and criticality of an asset may combine to project too high of a risk to leave for another year, and decide on replacement as a better long term investment.

Level of service goals were determined based on the establishment documents for the authority, as well as based on conversations with stakeholders.

5. Revenue Structure

The facility's revenue structure is determined through the governing documents that established the Authority, and the subsequent documents that provided the City of Negaunee with the ability to bring waste to the facility.

The facility determines the costs of operation each year, in line with the documents, as well as through constituent monitoring and sampling to determine appropriate cost sharing between the communities. The facility maintains a sinking fund to be used for capital improvements to the facility.

Because the rate structure for the facility is based on actual costs, the rate structure will always be sufficient for needs. However, it should be noted that the excellent care of depreciation and capital costs (sinking fund) that has been performed at this facility provide an additional layer of security and protection from large changes in rates on an annual basis due to project costs.

A more in depth review of the revenue structure for the facility is included in the initial, MDEQ approved Asset Management Plan.

6. Capital Improvement Plan

The initial Capital Improvement Plan was developed with a 5-year timeline in 2013. Each year, with their annual updates, the facility has updated the capital improvement plan to include any new items that have entered the scope of annual improvements. Of the initial plan, most items on the list have been addressed, including the two large items, replacement of Clarifier No. 2 and the construction of a screening area for biosolids composting.

The current capital improvement plan for this 5-year period is as follows.

A	B	C	
Projects	**Years Until Project Must Begin**	**Cost**	**Reserve Required Each Year**
Plant Building Window Upgrade	1	$ 50,000	$ 50,000
			$ -
Septage Receiving	1	$ 35,000	$ 35,000
			$ -
Enter project	0	$ -	$ -
Total Capital Improvement reserve required in the current year			$ 85,000

Note that there are few items on the current plan, as the major projects that have been performed by the facility over the past 10 years have made drastic improvements to the system, and no large projects are expected beyond the ones listed.

7. Recommendations

This facility was able to create an MDEQ approved asset management plan, in a very short time frame, prior to the grant application deadline, because it had already operated under so many of the principles encouraged through active asset management. The facility serves as a model agency, maintaining funding for future planning, providing depreciation for its capital costs, maintaining a list of the costs for all parts of its system, and continuously looking ahead to provide timely replacement of equipment before risks become too great.

The tools provided through this grant should only assist the facility in performing these tasks as they continue to manage their assets in a manner that provides the best value to their customers, and provides a safe method of wastewater treatment for the region.

8. List of Major Assets

	A	I	J	M
Asset No.	**Treatment Assets**	**Original Cost**	**Replacement Cost**	**Remaining Useful Life**
1	Building - Facility	7,502,013.31	7,502,013.31	40
2	Building - Barn	374,384.60	374,384.60	40
4	Elec Building Automation	24,284.32	24,284.32	20
226	Wet Well Building	76,345.00	76,345.00	30
248	Compost Building	556,457.75	556,457.75	30
252	Clarifier No. 3	596,239.20	596,239.20	30
253	Pole Barn	177,519.17	177,519.17	30
304	Drying Beds	67,844.72	67,844.72	30
329	D-Beams Garage	1,503.84	1,503.84	30
330	Drying Bed Roof	262,867.92	262,867.92	30
331	Clarifier No. 3 Canopy	5,026.00	5,026.00	30
332	Compost Drainage	43,331.00	43,331.00	30
340	Barn Repair	9,425.00	9,425.00	30
5	Generator	100,000.00	100,000.00	20
8	RAS Pump No. 3	19,067.00	19,067.00	5
10	Sludge Pump No. 4	12,800.00	12,800.00	5
30	Office Furniture	3,356.50	3,356.50	20
32	Welder and Accessories	956.71	956.71	20
83	Fuel Tank	495.00	495.00	20
91	Gantry Crane	890.00	890.00	20
108	Dryer	359.00	359.00	10
111	Domes	162,086.00	162,086.00	30
112	Boilers	31,198.00	31,198.00	20
114	Parts Washer	1,354.00	1,354.00	20
115	Scaffolding	997.66	997.66	20
122	Muffle Furance	753.05	753.05	10
123	Fecal Bath	1,228.55	1,228.55	10
124	BOD Meter	1,395.00	1,395.00	10
129	Ditch Covers	5,151.94	5,151.94	20
131	Wet Well Crane	1,348.50	1,348.50	20
136	Lawn Mower	5,524.00	5,524.00	10
140	Influent Transducer	3,766.00	3,766.00	10
141	Influent Pumps 3 & 4	19,000.00	19,000.00	15
142	Air Conditioner	3,413.56	3,413.56	15
147	Automation PLC	29,300.00	29,300.00	15
149	Influent VFD/Motors	26,400.00	26,400.00	15
150	Effluent Transducer	3,766.00	3,766.00	15
163	Wet Well Transducer (NOR)	2,246.00	2,246.00	15
165	ATV Four Wheeler	4,766.00	4,766.00	15
166	Aerators Ditch 1	172,070.00	172,070.00	15

167	Press #2	55,550.00	55,550.00	15
168	Krofta Unit No. 1	19,901.00	19,901.00	15
169	Lab Balance	1,295.00	1,295.00	20
170	DO Probe Automation	4,641.40	4,641.40	15
171	I/O Automation Expansion	12,660.00	12,660.00	15
174	Tool Cabinet	501.55	501.55	15
175	Influent No. 1 Pump	8,722.20	8,722.20	15
176	RAS Pumps 1 & 2	24,691.00	24,691.00	15
177	Ferrous Tanks	21,837.50	21,837.50	15
180	Control Panel Auto	3,240.00	3,240.00	15
181	RAS Pumps Auto	23,600.00	23,600.00	15
187	Remote Station	17,160.00	17,160.00	10
193	Aerators Ditch 2	139,718.00	139,718.00	15
194	Ditch 2 Automation	50,480.00	50,480.00	15
195	Valve Contact Chamber	2,461.23	2,461.23	15
203	Ammonia Meter	1,332.37	1,332.37	10
204	Grit Equipment	115,664.00	115,664.00	15
205	Sludge Pump No. 3	31,021.50	31,021.50	15
206	2 Recycle Pumps	19,300.00	19,300.00	15
207	2 - Daft Service Pumps	14,124.00	14,124.00	15
208	Wet Well Hoist	2,664.27	2,664.27	15
209	Refrigerator	419.00	419.00	10
212	Telephone System	2,853.42	2,853.42	10
213	Boiler Pumps	4,192.00	4,192.00	10
219	3 - Blowers 25 hp	56,392.00	56,392.00	15
220	2.9 bisulfite pump	1,024.00	1,024.00	10
221	2 Polymer Feed Pumps	17,776.36	17,776.36	10
222	Lab Incubator	755.80	755.80	20
224	Alarm System	795.00	795.00	20
225	Bar Screen	224,700.00	224,700.00	20
227	Press No. 2 Hydraulic Tank	977.00	977.00	20
228	Well Pump	4,007.21	4,007.21	15
229	Steam Cleaner	2,443.59	2,443.59	20
230	Daft Units	142,000.00	142,000.00	20
231	Lighting	54,472.00	54,472.00	20
232	Washer	369.00	369.00	10
233	Speaker System	942.50	942.50	10
234	Press No. 1 Hydraulic Tnak	1,480.05	1,480.05	20
235	A Station Building	2,703.71	2,703.71	20
236	Krofta Unit No. 2	27,750.00	27,750.00	20
237	Doors	29,086.00	29,086.00	20
239	Press No. 1 Rebuild	98,678.00	98,678.00	20
241	Influent Pump No. 2	12,385.00	12,385.00	20
242	Sludge Pit Ultrasonic	9,947.89	9,947.89	20
243	Sludge Pump No. 2	38,089.83	38,089.83	20
244	75 HP Blower	91,018.11	91,018.11	20
245	Digesters Diffusers 3 & 4	21,000.00	21,000.00	20
246	Composting Equipment	405,318.50	405,318.50	20

247	Composting Controls/Pro	50,000.00	50,000.00	10
254	RAS 4/5 Magmeter	6,500.00	6,500.00	15
255	VFD RAS 4	4,600.00	4,600.00	15
256	VFD INF 3/4	29,667.00	29,667.00	15
257	Inf Auto Controls	27,750.00	27,750.00	15
258	Inf VFD No. 2	14,833.00	14,833.00	15
259	INF RM Transfer Switch	6,000.00	6,000.00	20
260	Inf Motors	32,775.00	32,775.00	20
261	No. 3 Clarifier Auto Control	17,750.00	17,750.00	15
262	RAS Pumps 4/5	34,700.00	34,700.00	20
263	No. 3 Clarifier	173,700.00	173,700.00	20
264	No. 3 Dome	92,957.00	92,957.00	30
265	Lab Still	2,230.44	2,230.44	10
266	Phosphorous Spec	1,696.52	1,696.52	10
271	Lab Frig	529.00	529.00	10
272	pH Probe	510.00	510.00	10
273	Dishwasher	424.00	424.00	10
274	Polymer Transfer Pump	829.21	829.21	10
275	Sludge Pump No. 1	17,501.91	17,501.91	20
276	Chemical RM Vents	4,751.00	4,751.00	20
277	Chemical RM Fan	1,930.00	1,930.00	20
279	Transfer Switch	13,360.00	13,360.00	20
281	Vessel Door Pump	1,090.69	1,090.69	10
282	Effluent Flume	25,097.67	25,097.67	20
283	Screener Guards	7,664.00	7,664.00	15
284	Aerator Breaker	1,532.00	1,532.00	15
289	RAS 1/2/3 Flowmeter	7,880.00	7,880.00	15
290	Flooring Office/Lab	17,378.20	17,378.20	20
291	Acid Cabinet	929.71	929.71	15
292	Copier	990.00	990.00	5
294	Fire Extinguishers	1,558.00	1,558.00	10
295	Automation Upgrade	15,200.00	15,200.00	10
296	Drying Oven	2,442.03	2,442.03	10
297	Conveyor Rebuild	47,137.66	47,137.66	20
298	Grit RM Venting	37,750.00	37,750.00	20
299	2-Press Booster Pumps	8,480.70	8,480.70	20
301	3 Computers	4,351.97	4,351.97	5
305	BOD Incubator	3,443.00	3,443.00	20
306	Safety Ladders	1,948.58	1,948.58	20
307	Grit Bucket	891.00	891.00	20
308	A Station Meter/Totalizer	5,260.00	5,260.00	20
309	Polymer Barrel Pump	507.71	507.71	2
310	2 Daft Air Compressors	13,032.88	13,032.88	20
311	Screening Blacktop	27,650.00	27,650.00	20
312	Fuel Shed	1,716.77	1,716.77	25
313	Digester No. 1 Diffusers	3,575.00	3,575.00	20
315	Backflow Preventer	2,147.41	2,147.41	20
316	2 - 8.5 Hypo/Ferrous Pumps	2,262.72	2,262.72	2

317	2.9 Bisulfite Pump	1,025.30	1,025.30	20
318	Clarifier No. 1	329,161.00	329,161.00	20
319	Negaunee Meter/Totalizer	11,853.10	11,853.10	20
320	Overhead Doors	26,270.79	26,270.79	23
321	Portable Sampler	1,572.00	1,572.00	3
322	Heaters (21)	47,437.71	47,437.71	23
323	Negaunee Sampler	5,635.91	5,635.91	3
324	Big Fans (4)	33,736.40	33,736.40	23
325	Ventilation System	45,809.37	45,809.37	23
326	Clarifier No. 2	384,748.31	384,748.31	23
327	Asset Management Plan	69,255.82	69,255.82	8
328	Influent Sampler	1,572.00	1,572.00	3
333	No. 5 RAS VFD	8,831.50	8,831.50	10
334	Effluent Sampler	1,793.25	1,793.25	5
335	B Sampler	1,793.25	1,793.25	5
336	Surveillance Camera	1,888.50	1,888.50	5
337	(2) DO Probes - Ditch	2,835.51	2,835.51	10
339	Portable Drainage Pump	1,500.00	1,500.00	3
341	Gas Detector	911.72	911.72	3
342	B Station Meter/Totalizer	7,105.89	7,105.89	15
343	Hypo Tank	3,029.10	3,029.10	20
344	Ammonia Probe	647.10	647.10	3
345	8.5 Ferrous Pump	1,127.36	1,127.36	3
346	No. 2 Blower - 75 HP	63,799.96	63,799.96	15
347	8.5 Hypo Pump	1,128.53	1,128.53	3
348	DAFT Repairs	9,631.50	9,631.50	15
349	Extra Sampler Head	1,911.00	1,911.00	3
				0
186	Dump Truck	93,065.00	93,065.00	10
250	Screener	166,374.00	166,374.00	10
251	Mixer Truck	151,700.00	151,700.00	10
285	521 Loader	106,427.00	106,427.00	10
286	321 Loader	83,770.00	83,770.00	10
288	2012 4x4 Truck	27,813.00	27,813.00	10

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

Completion Date 10/30/17
(no later than 3 years from executed grant date)

The Ishpeming Area Joint Wastewater Treatment Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1362-01 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: June 19, 2017.
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
Deborah Pellow	at 906-486-4391	iawwts@sbcglobal.net

Deborah L Pellow   10-19-17
Signature of Authorized Representative (Original Signature Required)   Date

Deborah Pellow, Director
Print Name and Title of Authorized Representative

Kent County Road Commission

Kent County Road Commission
1500 Scribner Avenue NW
Grand Rapids, MI 49504
Kentcountyroads.net
Contact: Wayne A. Harrall
616-242-6914
wharrall@kentcountyroads.net

October 31, 2017

SAW Grant Project Number 1004-01

EXECUTIVE SUMMARY

On October 29, 2014 the Kent County Road Commission executed an agreement with the Michigan Department of Environmental Quality to receive a grant to assess our county storm sewer system and develop an asset management plan, premised on the data collected. The grant allocation was for up to $1,000,000 with a 10% local match requirement.

Establishing a county-wide Stormwater Asset Management plan was included in a Kent County Road Commission's long-range plan that was adopted in January 2017. Goals of the plan include completion of stormwater inventory of the existing 399 miles of storm sewer, 6,401 manholes and 10,172 catch basins. Information in the inventory includes location, length and diameter of storm sewers, elevations and grade of storm pipes. It also includes diameter and depth of storm sewer manholes and catch basins. As-constructed plans, where available, have been scanned and are available electronically as pdf files.

Goals of the SAW grant included assessing the condition of storm sewer facilities constructed prior to 1994. This work was performed by utilizing visual field inspection utilizing a pole type camera, as well as self-propelled video cameras (CCTV) to assess and rate the condition of storm pipes and visual inspection and cameras to assess and rate manhole and catch basin condition for both structural deficiencies as well as maintenance deficiencies.

As part of the Asset Management plan, we have established Performance Measures, which relate to the Level of Service goal, as well as anticipated funding levels required to reach established targets.

STORMWATER ASSET INVENTORY

1. System Components

Storm Sewers

KCRC Storm sewer pipes range from 6 inch diameter up to 72 inch diameter. Kent County Road Commission current standard requires concrete pipe for storm sewer pipes under the roadway. In areas where porous soils exist, perforated high density polyethylene plastic storm pipe is placed under or outside of the curb and gutter. This is a Best Management Practice identified our NPDES MS4 permit. Most of the streets bordering KCRC jurisdiction are under KCRC maintenance jurisdiction. There is approximately 399 miles of total storm sewer under KCRC jurisdiction, including 263 miles constructed prior to 1994.

Manholes
KCRC currently has 6,401 storm manholes under our jurisdiction. The majority of these manholes are 48 inch diameter and are constructed out of blocks and mortar (pre-1980) or precast reinforced concrete.

Catch Basins
KCRC currently has 10,172 catch basins under our jurisdiction. Similar to manholes, most catch basins are 48 inch diameter and are constructed out of blocks and mortar (pre-1980) or precast reinforced concrete. In some situations a 24 inch diameter catch basin was installed due to conflicts with other underground utilities. KCRC standard sump depth is 3 feet which allows the capture of more sediment than the industry standard 2 foot sump.

Road Culverts
KCRC's current inventory total's 1,099 culverts. The majority of these culverts are made of concrete (48%) or metal (40%).Other material types include high density plastic, timber and a few are a hybrid. The road culvert diameter or span length varies from 12" up to 238" or 19'-10". Small bridge type structures less than 20 feet in span length are included in the culvert inventory and are not regulated under the current State or Federal bridge inspection rules.

Detention and Retention Ponds
Kent County Road Commission owns and maintains 3 detention ponds and 1 retention pond. The detention ponds are located at our South Maintenance Complex (1) on Tim Dougherty Drive in Cascade Township and our Southwest Maintenance Complex (2) at 131 84th Street in Byron Township. The retention pond is located at our North Maintenance Complex on White Creek Avenue in Algoma Township. These ponds are identified in our NPDES municipal property inventory and are inspected on an annual basis.

2. Identification and Location

Existing plans and inventories were used to create the framework of the storm sewer system network. As-built documents were printed and all storm sewer elements highlighted. These included the diameter and length of the pipe, depth below roadway, flow line elevations, location within the roadway or right-of-way, material type and year constructed. Storm manholes and catch basins elements inventoried include the location within the roadway or right-of-way, flowline elevations and year constructed. The storm sewer manholes have all been assigned a unique ID number which includes the first 3 letters of the township preceded by a 4 digit number. This simplifies any queries that relate to a specific township. The storm sewer pipe segments are identified as links between 2 manholes. Catch basins identification is associated with the manhole it discharges to. In some cases the catch basin also functions as a manhole, and is coded such.

In 1996, KCRC partnered with Grand Valley State University to inventory all the "road/stream crossings" within our jurisdiction. The road culvert field data collected included GPS location, photos of the culvert and stream, material type, culvert diameter and length, and condition. This older data has been updated with KCRC's current culvert inventory data and merged into a culvert management system developed by Michigan Tech University. It uses the same framework developed for a bridge management system.

3. Storage of Inventory Asset Information

The stormwater system asset inventory is stored in the Grand Rapids area GIS named REGIS (regional geographic information system). The system is managed by Grand Valley Metro Council, the local Metropolitan Planning Organization.

This ArcView Software also contains information related to roadway right-of-way widths, parcel information, property owners, sanitary sewer and water mains located within the County. Hard copies of storm sewer and manhole condition rating reports are filed by township within KCRC's Engineering Division. Videos and photos are filed in directories within KCRC data server.

4. Condition Assessment Methods

CCTV storm sewer inspection contracts required 360 degree image capture and the deliverable information included report logs, electronic reports with all NASCO PACP required header information entered on each report.

Contract manhole inspection required use of the PANORAMO SI 3D optical manhole scanner in conjunction with PipeLogix software. Manhole photographs were a required deliverable. Manhole rating criteria used was good/fair/poor.

A pole mounted camera with spot light was utilized for storm sewer, manhole and catch basin inspection of the storm sewer system constructed after 1984.

Road culverts are inspected and rated every 5 years. More frequent inspections are performed where structural elements have advanced deterioration. The inspections are performed on culverts 60 diameter or larger up to 19'-11". This represents 594 of the 1099 road culverts. Smaller diameter culverts are inspected as part of ditch maintenance as well as prior to pavement resurfacing projects or other road reconstruction projects. KCRC has created their own standard culvert inspection form (see attachment --) and uses the inspection recommendations when preparing annual culvert repair program including preventative maintenance, rehabilitation and replacement projects.

CCTV structural inspection data includes coding of the defects based on both type and severity. Structural pipe defects, operations and maintenance (O&M) issues, and hydraulic restrictions discovered during the inspection were ranked by severity based on the potential to impact the system's proper operation, effective maintenance, and hydraulic capacity.

The PACP uses a numerical grading system to define the severity of pipe defects identified by the shorthand codes above. 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.

To put the entire pipe rating together, the number of occurrences for each condition grade is calculated separately for both structural and O&M defects for each pipe segment. Each pipe segment is assigned a segment grade based on the number of occurrences of each graded defect. The structural defects are added separately from the O&M grades, so each pipeline segment has two separate grades.

5. Assessment Results

<u>Storm Sewer</u> – After completion of a pilot project which included CCTV inspection of storm pipes, it was recommended that the older storm sewer pipes (pre-1979) would be the primary emphasis for the CCTV level inspection. The system installed after 1979 was in overall good condition. The post 1979 storm sewers were evaluated with pole camera technology with zoom and lighting capability to provide either video or photos representing pipe conditions for distances up to 200 feet from the manhole.

Approximately 50 miles of storm sewer was inspected utilizing 4 different contractors over the period of the grant. The inspection work included rating the storm sewer segments for both structural defects as well as operation and maintenance (O&M) defects. Below is a breakdown by percentage of various condition code levels:

Structural Defect Condition coding:	Level 0 = 32.6%
	Level 1= 8.1%
	Level 2 = 34.6%
	Level 3 = 16.7%
	Level 4 = 5.5%
	Level 5 = 2.5%
O & M Defect coding:	Level 0 = 36.5%
	Level 1 = 5.8%
	Level 2 = 52.8%
	Level 3 = 3.0%
	Level 4 = 0.8%
	Level 5 = 1.1%

For mapping purposes, Level 0 & 1 are coded as good, Level 2 & 3, are coded as fair, and Level 4 & 5 are coded as poor. In summary, the structural condition results indicate 41% good, 51% fair and 8% poor. The operation & maintenance condition results indicate 42% good, 56% fair and 2% Poor.

Common storm sewer structural defects include the following:
- Cracking – longitudinal, radial, circumferential
- Joint Separation
- Tap or break – factory, field or utility bore

Common storm sewer O & M defects include the following:
- Roots
- Sediment in bottom – sand, gravel or stones
- Tap or break – factory, field or utility bore

Road Culverts - A total of 205 culverts have been inspected within the last 3 years (no expense to the SAW grant). The culverts 5 feet or greater in diameter or span are currently being inspected on a 5-year inspection cycle. The results of the most recent inspections indicate the following:

Good Condition	= 59%
Fair Condition	= 38%
Poor Condition	= 3%

Manholes and Catch Basins – Approximately 2,000 manholes were inspected utilizing both contractors and KCRC staff and approximately 3,000 catch basins were inspected by KCRC staff. The overall rating was based on Good/Fair/Poor for the elements including casting, cover, cone and wall. The typical defects noted were related to O&M, which was primarily sediment or gravel in the bottom of the structure. Sidewall cracking was evident on approximately 15% of the manholes.

CRITICALITY OF ASSETS

Assets whose failure will result in greater impact to the community, infrastructure and environment are considered highly critical, and are assigned a high criticality rating. Likewise, assets that have a high probability of failure (poor condition) would be assigned a high condition rating. Criticality or consequence assessment, is largely based on knowledge of the system, and can be used to prioritize condition work.

The consequence assessment method used by KCRC is based on the following features or conditions:

- Diameter of Pipe or Culvert Span
- Depth of Manhole
- Traffic Volumes and Access
- Age of Facility

The features are ranked (criticality rating) in the same manner as storm sewer condition ranking, 1 to 5, with 1 being the least critical and 5 the most critical (similar to pipe and manhole rating). The following questions are part of the risk reduction and decision making:

- What are the consequences of assets rated in poor condition, and which have the highest consequences if they fail?
- What are the alternatives to avoid failure?
- What are the costs to repair/rehabilitate/replace the assets?

Structural Condition Level 4 and 5 are used as the first indicator and the second consideration for criticality rating is based on consequence assessment features. An asset with condition rating of 5 and criticality rating of 5 would be a priority site for rehabilitation or replacement, depending on the defect.

Decisions on pipe rehabilitation vs. replacement can be made based on engineering calculations, failure risk analysis, and remaining life estimation.

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. These expectations include the maintaining agency provide a safe and efficient transportation facility.

KCRC regularly partners with township government on project development. We establish and distribute a 5-year and 10-year primary road improvement plan in order to allow those local agencies to participate and coordinate any necessary sanitary sewer, water main, sidewalk, trail or street lighting project with our planned projects.

A new collaboration has developed from recent Wastewater SAW Grant projects in three of our townships. Based on the priority determinations for sanitary sewer replacement, these townships have requested both our pavement condition rating and storm sewer condition rating in order to select projects where all three elements (sanitary, storm and pavement conditions) may warrant replacement. This practice will greatly reduce the cost of any single element replacement project and will become a win/win for both agencies as well as the public due to reducing likelihood of future major infrastructure projects disrupting traffic and residents.

KCRC is currently partnering with Grand Valley Metro Council in a Regional Asset Management pilot program. The information obtained through the SAW Grant will become part of this regional planning effort.

The plan identifies 3 levels of service all with drastically varying costs.

Level 1 assumes complete system replacement at the end of the assets estimated life (75 years for concrete and 50 years for metal). In addition, preventative maintenance continues at current levels.

Level 2 assumes extending the life of the pipe 25 more years with rehabilitation or repair work when done near the estimated life. In addition, preventative maintenance continues at current levels.

Level 3 assumes extending the effective life of infrastructure 50 more years through rehabilitation work performed prior to the infrastructure reaching its estimated life. In addition, preventative maintenance continues at current levels.

Funding levels for Level 3 is approximately 50% of Level 1. Level 3 is the preferred option and Performance Measures are established based on this option.

Additional MTF funding will provide increases funding for O&M work, which includes inspection, as well as preventative and corrective maintenance.

Performance measures include maintaining at least 95% of our storm sewer system in good/fair condition. Another performance measure sets a target of repairing any condition 5 spot defect within 6 months.

REVENUE STRUCTURE

Road Commission funding is still based on State legislation dating back to 1951 (ACT 51), commonly referred to as "MTF" funding (approximately $37 million in fiscal year 2017). A portion of funding is a flat fee on gasoline and diesel fuel of $0.263/gallon. The remaining funds are generated through vehicle license plate registration fees. This revenue is distributed by formula based on population and total road mileage. In addition to these primary funding sources, townships also fund certain local road improvements and State and Federal aid is used on certain road and bridge projects.

Township Participation

For projects on local roads, including subdivision streets, full-depth asphalt pavement replacement projects are funded 50% by KCRC and 50% by township. These type projects include reconstructing existing manholes and catch basins where necessary and replacing or upgrading cast iron manhole covers and catch basin grates, as needed.

New Construction

Annually 2 to 3 miles of new subdivision public streets are constructed. These typically include storm sewer systems which become incorporated into KCRC's system for future maintenance. The initial cost of these public streets and storm sewer elements are 100% developer cost. Once the street construction is completed in accordance with approved plans and specifications, it is accepted into the public street system through Board action.

Competitive Funding

Since the Kent County Road Commission is not a governing or taxing public agency, we have no mechanism for generating stormwater fees or drain assessments. We are eligible for Federal funding on approximately 600 miles of our primary system and in the urban areas where storm sewer exists or is required, installation or repair of existing storm sewer is an eligible funding item.

LONG RANGE / CAPITAL IMPROVEMENT PLAN

In September 2016, KCRC Board of Road Commissioners adopted a 10-Year Long-Range Plan. One of the assets addressed was storm sewers and the development of an Asset Management plan. Four areas that support maintaining the storm sewer element of the roadway system are new construction, replacement, repair and preventative maintenance.

Current Annual Budget for storm sewer related features include:

- Catch Basin Cleaning = $ 200,000
- Street Sweeping = $ 200,000
- Drainage Maintenance = $1,200,000
- Culvert Work = $1,000,000

TOTAL 2018 Budget = $2,600,000 *

*This represents approximately 12% of overall maintenance budget.

On January 1, 2017, new legislation for increasing transportation revenue went into effect. The gasoline tax increased by 7.3 cents, or from 19 cents per gallon to 26.3 cents per gallon. The diesel fuel tax increased by 11.3 cents, from 15 cents per gallon to 26.3 cents per gallon. The fuel tax includes automatic annual inflationary adjustments starting in 2012. In addition, this legislation included a 20% increase in vehicle registrations. The additional revenue from this legislation results in approximately a 30% increase in KCRC MTF revenue or approximately $11 million per year. A second part to this legislation will designate an amount of General Fund dollars starting in 2021 to be allocated to roads. The overall increase generated for transportation is approximately $600 million annually statewide or approximately an additional $11 million annually for KCRC.

KCRC has committed to invest 75% of the new funding into Road and Bridge reconstruction, rehabilitation and preservation, with the remaining 25% allocated to maintenance activities. With this increase in MTF revenue, the storm maintenance items will increase $300,000 per year through 2020 and experience a $600,000 per year increase starting in 2021.

RECOMMENDATIONS

Maintaining and updating data is key to an asset management plan. As repairs are made, rating levels should be updated. As residential development continues to grow, as-built information needs to be added to the data framework. Review of the plan needs to be done periodically with every 5 years set as a target.

Prior to future road widening or full-depth repaving projects, any existing storm sewer should be video inspected to determine any needed structural or O&M repairs, prior to bidding the project. Project scoping needs to include evaluating existing manholes and catch basin covers for replacement needs and reconstruct manhole and/or catch basins when warranted.

Not unlike our efforts to shed water off from a pavement surface to extend its life, it is essential to perform jetting maintenance on storm sewer pipes to eliminate restrictions like roots or sediment that restricts flow. This will extend the life of the pipe and reduce the risk of upstream flooding.

Lastly, the relatively new technique of directionally drilling utilities under roadways to eliminate impacts to pavement and traffic presents a threat to our storm sewer system. Structural pipe failures can result if the utility intercepts any underlying storm sewer. Results from our video inspection included pipe breaks occurring from a stormwater lateral, water main service, communication cable and gas main. Extra review is required when permitting this method of utility installation in order to determine bore depth needed to avoid existing storm sewer lines. Extra attention needs to be put into determining the depth of existing storm lines and requiring utility bore depths that will not conflict with existing storm sewer.

LIST OF MAJOR ASSETS

Storm Sewer Pipes:	12" or less	= 235.2 Miles
	13" – 15"	= 58.7 Miles
	16" – 18"	= 37.2 Miles
	19" – 24"	= 38.8 Miles
	25" – 36"	= 22.7 Miles
	37" +	= 6.5 Miles

Storm Sewer Manholes = 6,401
Storm Sewer Catch Basins = 10,172
Detention Ponds – 3
Retention Ponds – 1
Storm Separator – 1

Road Culverts:	TBD	= 112 each
	24" or less	= 108 each
	25" – 59"	= 285 each
	60" – 120"	= 446 each
	121"- 238"	= 148 each

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The Kent County Road Commission *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1004-01 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:

Wayne A. Harrall at 616-242-6914 wharrall@kentcountyroads.net

Name Phone Number Email

[signature] 11/2/17

Signature of Authorized Representative (Original Signature Required) Date

Steve A. Warren, Managing Director

Print Name and Title of Authorized Representative

VILLAGE OF KINGSTON

3655 Ross Street

Kingston, MI 48741

kingstondpw@yahoo.com

Jeremy Rayl

989-683-2680

SAW GRANT # 1189-01

Executive Summary

In accordance with the Michigan Department of Environmental Quality (MDEQ), the Village of Kingston has prepared an Asset Management Plan (AMP) for their wastewater system. The purpose of the AMP is to define a method of cataloging, evaluating, and maintaining the wastewater system.

As part of this plan, the Village of Kingston has had their wastewater collection system analyzed through the NASSCO Pipeline Assessment Program. Additional input on other aspects of the village's collection and treatment systems have been analyzed by the village's Department of Public Works (DPW) and independent engineers.

Extensive investigation and analysis shows the village's system to be in good condition overall. With that, deficiencies throughout the system have been identified as short- and long-term needs. The village's rate structure will adequately address future improvements that have been identified

The village 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 village with the services they expect in the most cost-effective manner.

Asset Inventory

Kingston has had their systems independently investigated through a Closed Circuit Televised (CCTV) survey of their sanitary sewer lines and a Level 1 National Association of Sewer Service Companies (NASSCO) inspection completed on their manholes. These investigations were used to develop an inventory of the village's sanitary sewer assets.

For analysis, the sanitary system was broken into two primary categories: Collection and Treatment. These assets are analyzed independently and then grouped by similar types and condition within each subsection.

Collection System

The village's sanitary sewer collection system is composed of 15,559 feet of 8-inch, 2,503 feet of 10-inch, and 1,826 feet of 12-inch gravity sewer, and 74 manholes. Village wide sewer flows are pumped 1,150 feet to the sewage lagoon by one duplex lift station.

Sewer

The independent survey videoed 18,846 feet of gravity sanitary sewer and plans from the original lift station design show roughly 1,150 feet of force main installed within the village of Kingston. Detailed examinations of each gravity line were performed with each defect being rated and the condition of the run being assigned a rating.

Reviewing the sewer reports from the video survey shows a system overall in good working order. However, as can be seen from the inventory, several locations surveyed are in need of maintenance. Issues can be seen ranging from minor deposits or encrustations on pipe joints and walls to breaks in pipes. Through proper maintenance and planned improvements, the system should continue to provide proper service for the village.

Manholes

Based on the CCTV survey and the NASSCO Level 1 inspections, Kingston maintains 74 sanitary manholes located throughout the village and one lift station (located on the north side of Fisher Street, West of Ross Street). Of the 74 manholes, 63 were located and inspected along with the one lift station. The remaining manholes require further investigation to confirm their location and condition.

Most of the manholes throughout the village are in new or excellent condition, with only eight having minor and three with moderate deterioration. All manholes and the wet well investigated were precast structures with solid lids. The primary maintenance needs include the resetting/replacing of frames/adjustment rings and the repairs of deteriorating chimneys. Other minor issues discovered were some minor root intrusion, weeping infiltration around joints, and cleanup of some 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, most them should be operational for another 75+ years.

Treatment System

A lagoon treatment system occupying 7.8 acres treats the wastewater from the village. Made up of four cells, the lagoons are situated at the southwest region of the village. The village's National Pollutant Discharge Elimination System (NPDES) permit allows a seasonal surface water discharge from the lagoons twice a year into the Alder Creek Drain. The current system, as it stands, operates as designed and permitted through the NPDES permit.

Regular maintenance and updates in 2014 on the lagoon cells have them secure and in good condition. Three of the four cells were installed in the early 1970s with a capacity of 11.42 MG to handle the village's original wastewater treatment needs. These were operated as permitted for decades until the early 2000s when flow increased beyond the original treatment capabilities. Because of this, the village entered an Administrative Consent Order (ACO) with the MDEQ in 2007. Records show that the annual volume of wastewater was 31.1 MG, assuming a length of storage of 180 days meant an additional 4.2 MG of storage was required. In 2014, this issue was resolved with the installation of the 5.8 MG capacity fourth cell, new fences around the treatment perimeter, and riprap being added to two other cells. With the installation of the most recent lagoon the life of the treatment system is estimated to be 40+ years with regular maintenance.

Criticality of Assets

Ideally, through regular maintenance and inspection, the sanitary system would continuously function as designed. This, however, is not always the case as unforeseen events can cause components of a system to fail unexpectedly. The best way to help deter this from happening, while working within budgetary means, is prioritizing maintenance and inspections on the areas of the system that would have the most devastating effect upon failure.

Prioritization is based on the asset rating in Probability of Failure and Criticality of Asset. These two categories take into consideration Residential Equivalency Units (REUs) served, function, redundancy within the system, asset condition, age, history, and experience/knowledge of the asset. To develop a comprehensive list of prioritized assets, a spreadsheet is maintained rating the condition, probability of failure, and criticality of asset on a scale of 1-5. Multiplying these factors gives an individual score for each assets business risk, the higher the score the higher the risk.

Probability of Failure

Determining the probability of failure begins with determining the condition of the asset. Condition ratings range from 1 – New or Excellent Condition to 5 – Asset Unserviceable as seen in Table 1. NASSCO's PACP and MACP ratings are the primary focus for the ratings as they relate to pipe and manhole assets. The established NASSCO 1-5 rating system directly relates to each asset's condition so is used for this rating. All remaining asset conditions are based on engineer and/or DPW's observations and inspections.

Table 1: Condition of 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

Once the existing condition is rated, an asset's Probability of Failure can be assessed. This rating works on a 1-5 scale, 1 meaning failure is improbable and 5, failure is imminent (seen in Table II-1). The current condition of the asset is used directly to predict the probability of failure. The worse the condition, the more likely the asset is to fail.

Table II-1: 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

Criticality of Asset

The Criticality of Asset rating is most correlated to the service area if an asset was to fail. Ratings of 1 represent an insignificant disruption to the system and would correlate to an asset with little flow and REU contribution upstream, where a 5 would mean a catastrophic disruption, affecting multiple lines and/or REUs upstream. Table II-3 further shows the rating structure.

Table II-2: Criticality of Asset	
Performance Rating	**Description**
5	Catastrophic disruption
4	Major disruption
3	Moderate disruption
2	Minor disruption
1	Insignificant disruption

Criticality can also be affected by how it affects the treatment process. It is the village's goal to not only maintain a working system for the village's residents, but to keep within regulatory standards set forth by governing bodies. The ability to maintain acceptable treatment levels can be dependent on specific assets which, in turn, increases their criticality to the system.

Level of Service Determination

It is the goal of the Kingston Department of Public Works (DPW) to provide the best service possible to their residents for the fairest cost achievable. The DPW strives to meet the standards that the public expects while maintaining its obligations to regulatory offices.

A robust sanitary system exists throughout the village and the best way to keep costs low and customers satisfied is to maintain that existing system. Through periodic inspections and proactive repairs, minimal interruption can be achieved and costly system failures can be avoided.

The Kingston DPW realizes that they must maintain a knowledgeable staff to maintain a positive relationship with residents and regulators. Keeping aware of the condition of the sanitary system and keeping up to date with best management practices allows for problems that arise to be handled in a quick and effective manner.

Revenue Structure

It is important to Kingston to maintain and improve their assets. The village's sewer system is no exception. To do this, the costs associated to own and operate the sewer system, both collection and treatment, must be fully understood. To cover these costs, 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.

Goals

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 you will find the village's rate structure which was submitted and approved by MDEQ on May 15, 2017(see attached correspondence).

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 it undergoes providing its service.

Understanding how the system functions and its condition are crucial to planning a Capital Improvement Plan (CIP). Based on the business risk of each asset 5-year and 20-year needs, CIPs have been developed to maintain the village's current level of service. The business risk was developed by multiplying the probability of failure and criticality factors together giving a risk value between 1 and 25. This is then used to categorize each asset into one of three categories as can be seen in Table V-1.

Table V-I: Risk Ratings

Category	Risk	Description
Inspect	TBD	To Be Determined
Acceptable	1 - 8	Insignificant
20 Year Plan	9 – 16	Important
5 Year Plan	17 – 25	Critical

An asset falling into the risk rating 1 to 8 represents that the asset's failure is unlikely and/or insignificant to the daily running of the system. This puts the asset in the acceptable category as in its current state; it does not demand attention. The next tier of 9 to 16 represents an increase in the importance of the asset to the daily functioning of the system and/or deterioration of that asset's condition. Assets falling in this range are put in the 20-year plan since, based on its risk rating, it can be assumed that over the next 20 years it will continue to deteriorate and need replacement. If an asset falls into the 17 to 25 category, it represents the most deteriorated and critical to the continued operation of the system. The most severe ranked assets fall into the five-year plan as they have the highest risk of causing detrimental effects to the system and are deteriorated to a critical state. If there was lack of data on an asset, then it is included within the five-year CIP to be inspected. This allows the asset to be categorized and then properly inserted into the appropriate plan.

As the system continues to be monitored, investigated, and maintained, these ratings will need to be updated to reflect the most recent needs of the community, with assets able to be added, dropped, or shifted as work is done and demands determine.

Once risk was derived and the assets were sorted into their perspective categories, the work needed to improve these assets was determined. Using professional judgement, each asset was evaluated to determine if it needed inspection, replacement, or repair and what repair is recommended, if in need of repair.

The combined value of repairs and replacements for each category is $8,000 for the 5-year CIP and $594,269 for the 20-year CIP.

Five-Year Plan

Evaluated assets with a risk rating of 17 or greater or with missing data make up the projects proposed for the 5 Year CIP. Currently the 5-year plan consists only of further investigations of the village's sewer collection system. These items consist of potential assets found on existing plan sheets or from inspections on found assets. Over time some of these assets may have been removed, replaced, or forgotten. To develop comprehensive knowledge of the sanitary sewer system, all existing assets should be identified and inspected. It is proposed in the next 5 years that the village spend its resources on locating and evaluating these assets to complete this inventory.

Twenty-Year Plan

A business risk between 9 and 16 qualifies an asset for the 20-year CIP. These are assets that 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 will have time to budget for the improvements.

The 20-year CIP is made up of 2,810 feet of sewer collection lines, 1,150 feet of force main, two lift station pumps, and the lift station electrical panel. Although currently in working order, the age and condition of these assets makes them of particular note and should be in line for replacement in 20 years.

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 V-2.

Table 0-1: Capital Improvement Plan (CIP)

Project	Cost	Years Until Project Begins
Inspections	$8,000	5
Collection Upgrades	$594,269	20

Private works projects are commonly funded through conventional bonds or borrowing through various state and federal programs. On occasion, communities will take advantage of grant programs as well.

There are no major replacement projects anticipated over the next five years. It is recommended the village set aside funds to finalize the inventory of sanitary sewer assets. The cost for this task is estimated at $8,000 ($1,600 per year). Current annual revenues in the sewer fund should be adequate to complete this work.

The 20-year CIP will include replacement projects throughout various areas of the village. The estimated budget for this work is $594,269. The village anticipates utilizing a low interest loan through the United States Department of Agriculture's Rural Development program for these improvements since they have successfully used this program on past projects. The terms of this loan typically include a 4 percent interest rate financed over a 40-year period.

It is recommended the village revisit their rate structure in advance of future capital improvements to establish revenue needs for financing the proposed work.

List of Major As sets

- 16,000 feet of 8-inch sewer pipe
- 2,500 feet of 10-inch sewer pipe
- 1,800 feet of 12-inch sewer pipe
- 74 manholes
- 1 duplex lift station and 1,100 feet of force main
- 7.8-acre lagoon treatment system

R:\Projects\14C0268\Docs\amp summary.docx

DEQ

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

Completion Date August 18, 2016
(no later than 3 years from executed grant date)

The Village of Kingston *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1189-01 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:

Lou Fleury, P.E. at (810) 341-7500 lfleury@rowepsc.com
Name — Phone Number — Email

Rate Methodology was submitted to DEQ on: August 18, 2016
(within 2 ½ years from date of executed grant)

An initial rate increase of N/A % of a $__________ gap was adopted on __________

Robin La Fond 9-9-16
Signature of Authorized Representative (Original Signature Required) — Date

Robin LaFond, Village President
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary

Lakewood Wastewater Authority
839 Fourth Avenue
Lake Odessa, MI 48849
Doug Suntken, Superintendent – 616-374-3264
SAW Grant Project Number 1541-01

Executive Summary

The Lakewood Wastewater Authority (LWA) owns and operates a wastewater collection system and a wastewater treatment plant that serves the Village of Lake Odessa, Village of Woodland, Odessa Township, and Woodland Township. In October 2014, the LWA was awarded a Stormwater, Asset Management, and Wastewater (SAW) grant in the amount of $205,600, with a $20,560 local match, from the Michigan Department of Environmental Quality (MDEQ). The LWA has determined it to be in their best interest to implement an Asset Management Program (AMP) for its wastewater collection and treatment systems. The scope of the AMP was to inventory, assess, and identify areas of deficiency in the wastewater collection and treatment systems in order to develop recommendations for prioritizing and budgeting improvements and maintenance.

The LWA recently completed or has ongoing several major projects to repair and replace existing wastewater collection and treatment infrastructure. Recent and ongoing upgrades Include:

- Major wastewater treatment plant upgrade including the installation or replacement of most treatment systems and equipment to increase system treatment capacity.
- Various gravity sewer replacement projects.
- Gravity sewer lining project.
- Construction or renovation of Pump Stations 1, 2, 3, 4, 6, 8, 9, 10, and 16.

The scope of work for the AMP is the assessment and inventory of collection system manholes which was not done previously, updates to system mapping, inventory and assessment of treatment plant assets, and planning for capital improvements.

Wastewater and/or Stormwater Asset Inventory

The AMP included the inventory and condition assessment of collection system manholes and pump stations, and the inventory and condition assessment of major treatment plant assets. Under a recently completed project the collection system gravity sewers were televised in accordance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards, utilizing closed circuit television (CCTV). Pipes noted to have significant deficiencies (i.e. ratings of 3, 4, or 5) were corrected through a combination of sewer replacement, full length liner installation, and spot liner installation. This sewer rehabilitation capital project was completed in 2015. A sewer inventory map was developed at that time. Relevant information from that project was brought forward for use in the AMP.

As part of the current project, collection system manholes were inspected utilizing NASSCO Manhole Assessment Certification Program (MACP) Level 1. Manholes were previously identified and generally located in the collection system mapping completed as part of a previous project. Visual inspections were performed from the top of the manholes. Level 1 inspections were completed on 370 manholes out of approximately 450 manholes, which is about 82% of the system. Manholes that were not inspected were either newly installed as part of ongoing or recently completed work, or were inaccessible because they were buried in gravel roads, in farmed fields, or below asphalt paving. A Probability of Failure (PoF) rating of 1 to 5 was assigned to each inspected manhole.

The LWA owns and operates a wastewater treatment system that underwent significant upgrades in 2015. Major treatment system assets were inventoried and the condition of each major asset was assessed. Drawings of the treatment were used as the basis for identifying the assets. The condition of each asset was determined through an on-site, qualitative evaluation using standard criteria, and findings were documented on standard report forms. All treatment buildings are either new or in good condition and were not considered in the assessment process. Most of the major treatment equipment is new and in good working order but was included in the assessment because the expected useful life of some the equipment is shorter than the planning period.

Criticality of Assets

The Probability of Failure (PoF) rating represents the likelihood of an asset failing, based on defects and deficiencies identified in the condition assessments or the anticipated remaining useful life of the asset. The most accurate method of determining the PoF is the visual inspection of manholes, equipment, and structures. In order to identify areas of potential deficiency in the system, manholes and major treatment system components were inspected as described above.

Inspected manholes in the collection system were assigned a final PoF score based on results from visual manhole inspections using MACP standard ratings (5 high probability to 1 low probability). For the non-inspected manholes the PoF score was estimated using the age of the asset to calculate its remaining useful life as determined by industry standards. A summary of the PoF ratings for the collection system manholes is summarized below.

Lakewood Collection System Manhole Condition Summary

Probability of Failure Rating	Percentage of Manholes Based on Inspections
5	3%
4	16%
3	47%
2	17%
1	17%

For wastewater treatment system and pump station equipment, the PoF score was based on composite scoring criteria that considered the type of equipment, current physical condition, age, operation and maintenance protocols, repair history, and current operation status. The composite score ranged from a 5 as high probability to 1 as low probability. Because most of the major system components were recently replaced and were in good working order, generally the composite score was low. A summary of the PoF ratings for the treatment system and pump station equipment is summarized below.

Lakewood Treatment and Pumping Systems Equipment Condition Summary

Probability of Failure Rating	Percentage of Assets Based on Inspections
5	15%
4-4.9	0%
3-3.9	0%
2-2.9	4%
1-1.9	89%

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 for collection system manholes include pipe diameter of the adjoining sewer, which is representative of the size of the tributary area the pipe or structure serves; physical location, which is a representation of how difficult the manhole will be to rehabilitate if there is a sudden failure (major or minor road, etc.); and service area, which is representative of the type of land use that will be affected by a failure (i.e. priority given to schools, hospitals, and government buildings). Each manhole structure was assigned a final CoF score based on an average of the three factors. Generally, the most critical assets were those found under major roads (causing the most disruption to repair), with the largest diameter (serving the largest area) and serving major areas of the community including the downtown sewers.

The Business Risk Exposure (BRE) rating factors both the consequence of failure and the probability of the component failing based on the condition assessment. The BRE is calculated by the formula:

$$BRE = PoF \times CoF$$

Level of Service Determination

Level of service determinations were developed based on discussions with LWA staff and representatives. These goals were developed to set achievable objectives for operation and maintenance and capital improvements projects. The LoS selected considers budgetary constraints, customer expectations, the condition of the system and protection of the environment.

1. Meet federal and state regulations pertaining to the construction and operation of the collection system and wastewater treatment system;
2. Repair/replace all manholes with a BRE priority of High within the next 5 years, with a BRE priority rating of Medium within the next 10 years and BRE rating of Low within 20 years, as the availability of resources allows and in conjunction with other infrastructure improvements projects.
3. Replace original gravity sewers within the Village of Lake Odessa within the next 20 years with portions completed at 10-year, 15-year and 20-year intervals, as the availability of resources allows and in conjunction with other infrastructure improvements projects.
4. Eliminate repumping of collection system sewage by the construction of a gravity interceptor sewer within the next 3 years to reduce sanitary sewer overflow potential.
5. Continue to reduce infiltration, inflow, footing/foundation drains, and sump pump discharges into the collection system.

6. Refurbish or replace major wastewater treatment system components based on age and condition.
7. Upgrade collection system maps and database as needed.

The LoS selected considers budgetary constraints, customer expectations, and Operation and Maintenance (OM) staff available to the City.

Revenue Structure

As required by the MDEQ, the LWA provided an analysis of the current budget on a cash basis to determine if there is a revenue gap for the wastewater collection and treatment systems. Based on an previous rate analysis the LWA increased sewer rates in August 2016 to address bond repayment costs from recently completed capital improvements projects. The rate methodology report developed as part of the current rate evaluation shows that, according to the budget, no revenue gap is projected for the fiscal year 2017. The LWA plans to consider future rate increases to address the projects identified in their CIP and for the operation and maintenance activities identified needed to meet their LoS goals.

Capital Improvement Plan

Based on the LoS goals and the condition of the wastewater collection and treatment system determined during condition assessments, recommendations for repairs or maintenance needs were given for sewers, manholes, and lift stations. Major projects include the following;

- Capacity improvements for Pump Station 16.
- A new gravity interceptor sewer to eliminate repumping of wastewater and upgrades to Pump Station 11.
- A program of manhole replacements and upgrades to be complete over the planning period. High priority manholes will be repaired/replaced after 5 years, medium priority manholes will be repaired/replaced after 10 years and low priority manholes will be addressed after 20 years.
- A program of sewer replacements over the planning period, primarily in the Village of Lake Odessa which has the oldest sewers in the system. Sanitary sewer replacement will be completed in conjunction with road and watermain replacement projects planned within the service area of the LWA. For planning purposes, sewer replacements are forecast to be completed after 10 years, after 15 years, and at 20 years.
- General improvements to pump stations 4, 5, 14, and 12. All other pump stations are new or have a useful life extending beyond the planning period.
- No capacity increases are anticipated at the wastewater treatment plant but replacement of equipment is anticipated as equipment at the treatment plant reaches the end of its useful life.
- Decommissioning of overland flow terraces no longer used for wastewater treatment operations.

A summary of the capital projects included in the capital improvements plan and the estimated cost is summarized in the following table.

Projects	Cost
Pump Station 16 Capacity Upgrade	$ 520,000
Gravity Interceptor Sewer and Pump Station 11	$ 5,000,000
Various Collection System Pump Station Upgrades	$ 500,000
Manhole Upgrades - High Priority (Quantity = 14)	$ 50,000
Manhole Upgrades - Medium Priority (Quantity = 37)	$ 80,000
Manhole Upgrades - Low Priority (Quantity = 155)	$ 250,000
Sanitary Sewer Replacement - High Priority/Village Area 1 - 10 Year	$ 2,800,000
Sanitary Sewer Replacement - Medium Priority/Village Area 2 - 15 Year	$ 3,300,000
Sanitary Sewer Replacement - Low Priority/Village Area 3 - 20 Year	$ 3,400,000
Overland Flow Terrace Decommissioning	$ 50,000
WWTP Roadway Paving	$ 175,000
WWTP Effluent Pump Replacement	$ 100,000
WWTP Equipment Replacement Miscellaneous	$ 120,000
WWTP Equipment Replacement (After 2 Years)	$ 170,000
WWTP Equipment Replacement (After 7 Years)	$ 65,000
WWTP Equipment Replacement (After 12 Years)	$ 125,000
WWTP Equipment Replacement (After 17 Years)	$ 290,000
Total	$ 17,745,000

List of Major Assets

The LWA's major collection system assets include:

- 19 miles of gravity sanitary sewer
- 450 sanitary manholes
- 17 pump stations

The LWA's major treatment system assets include:

- Influent flow monitoring flume
- Influent channel screen
- Influent grit separator and classifier
- Primary dissolved air flotation clarifier
- Two oxidation ditches with surface aerators
- Two secondary clarifiers
- Three return and waste activated sludge pumps
- One tertiary clarifier
- Three UV disinfection units
- Effluent flow monitoring flume
- Three final effluent pumps
- Two overland flow return pumps
- Five storage lagoons
- Three aerobic digester blowers
- One aerobic digester diffuser system
- Various process instrumentation
- Various isolation and flow control gates
- Various valves and piping

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Lakewood Wastewater Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1541-01 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: April 10 2017.

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:

Stacy Storm at 616-374-3264 admin@lakewoodwastewater.org
Name — Phone Number — Email

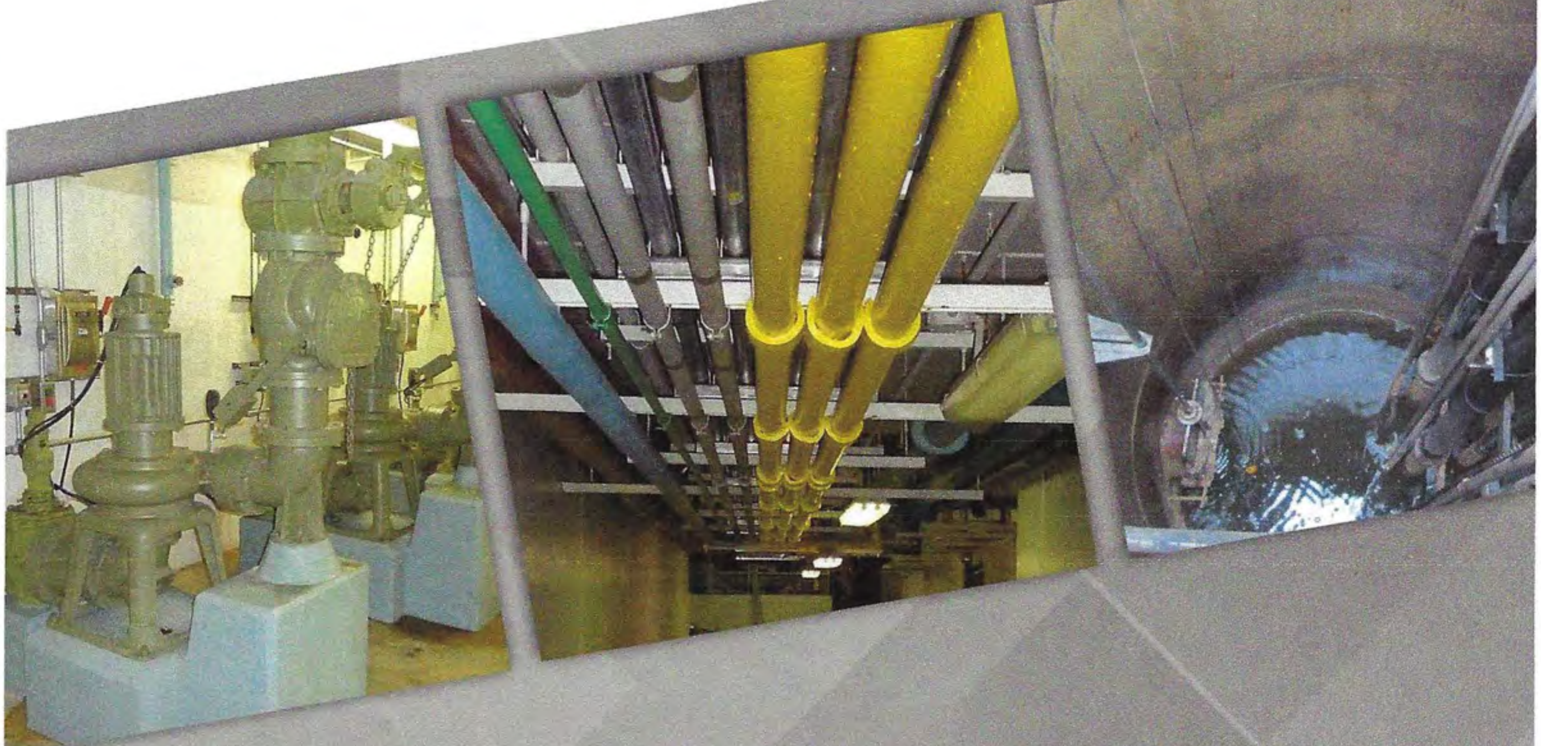
11/3/2017
Signature of Authorized Representative (Original Signature Required) — Date

Jerry Engle, Lakewood Authority Board Vice Chairman
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

City of Lapeer

SAW Project No. 1033-01

FINAL
October 2017

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for the Storm water, Asset Management, and Wastewater (SAW) Grant Program. In October 2014, the City of Lapeer received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1033-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the City's publicly owned wastewater utility. The assets that comprise the utility include collection system piping and manholes, lift station/pump station and force main.

The SAW Grant amount awarded to Lapeer was $1,108,089
The Local Match provided by Lapeer was $0.00. The City was determined to be Disadvantaged.

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.

Questions regarding the Asset Management Plan should be directed to:
Ms. Pam Reid
Public Works Director
City of Lapeer
217 Bentley Street
Lapeer, Michigan 48446
810.664.4711
Email: preid@ci.lapeer.mi.us

ASSET INVENTORY AND CONDITION ASSESSMENT

The wastewater collection system assets consist of approximately:

- Gravity Sewer: 271,920 feet (51.5 miles)
- Force Main (4 inch thru 16 inch): 18,934 feet (3.6 miles)
- Manhole Structures: 1,157
- Sewer Lift Stations: 14
- Wastewater Treatment Plant

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

The Wastewater Treatment Plant is owned and operated by the City. The City of Lapeer WWTP currently includes the following treatment processes: coarse screening, fine screening, grit removal, equalization, retention basins, oxidation ditches, secondary clarifiers, sand filtration, and chlorine disinfection. Final effluent is discharged to the South Branch of the Flint River in accordance with NPDES permit No. MI0020460. The design capacity of the WWTP is 2.3 million gallons per day (mgd). The current annual average flow received by the facility is approximately 1.55 mgd.

The City of Lapeer also operates and maintains 14 sanitary sewer lift stations, one meter station, and one bar rack station throughout the wastewater collection system. The stations are either wet well/dry well style, suction lift can style, or submersible style stations.

In summary, the inventory includes over 950 WWTP assets, 270 lift station assets and 1,465 collection system assets.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed from a review of the existing record drawings, field notes, staff knowledge, site visits and 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 survey grade GPS equipment and a comprehensive evaluation of the gravity system.

This information was organized into a new (GIS) database and piping network for archiving, mapping and future evaluation purposes.

Condition Assessment and Expected Useful Life
A comprehensive evaluation of the collection system was performed.

- NASSCO-MACP Level 1 manhole field based assessments were completed on 1050 manhole structures that were assessible.
- The manhole structure assets ranged from Excellent to Good. Only 12 manholes were found to be in the high risk category.
- Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 80,674 LF of the gravity pipe or approximately 30% of the collection system.
- The condition of the collection system assets reviewed ranged Good to Fair.
- Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified.
- It is recommended to visual inspect the collection system on an annual basis and clean and televise sections found to be restricting flows.

A comprehensive evaluation of the wastewater treatment plant was performed.

- Overall, the condition of the assets at the WWTP range from excellent to poor (22% excellent, 11% good, 61% fair, 5% poor, <1% very poor).
- Ongoing repairs have helped to maintain the condition of many assets as well as the work completed during the 2012 project.
- Some assets installed during the 1985 project are now near the end of their useful life and are deteriorated due to use and the harsh conditions associated with wastewater treatment.
- No immediate concerns were noted.
- Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified.

A comprehensive evaluation of the lift stations was performed.

- The condition of the assets at the lift stations range from good to poor (<1% excellent, 48% good, 46% fair, 5% poor, <1% very poor).
- Ongoing maintenance has maintained the condition of most assets.
- Some assets have deteriorated due to use and the harsh conditions associated with typical wastewater collection systems.
- Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified.

Level of Service

Defining the Expected Level of Service (LOS)

The overall objective of the City of Lapeer as it relates to their wastewater collection system is to adopt the following Level of Service (LOS) goals:

LEVEL OF SERVICE STATEMENT

The overall objective of the City of Lapeer 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:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with 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 the community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City annually to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

To assure that LOS goals are met, performance measurements may need to be implemented. During the LOS review with the community the need for performance measurements was discussed.

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

Criticality Results
Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical sewer asset management and capital planning template 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.

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

Figure 1 provides the risk rating for gravity main pipe by number of pipe segments. Thirteen pipe segments in the collection system that were assessed have been identified with a high-risk rating. The deficiencies found included collapsed pipe, holes in the pipe, fractured pipe and cracked pipe. The City will need to monitor these specific locations and may require occasional cleaning of the pipe until repairs can be completed. The majority of the pipes have a low to medium risk rating and are indicative of pipes in good condition.

Figure 2 provides the risk rating for the collection system manholes. Twelve structures in the collection system that were assessed have been identified with a high-risk rating. The deficiencies found included cracked frames and chimney infiltration. Manhole rehabilitation will be completed in the short term CIP's to correct these deficiencies. 86 percent of the structures assessed have a medium to negligible risk rating, which are indicative of manholes in good condition.

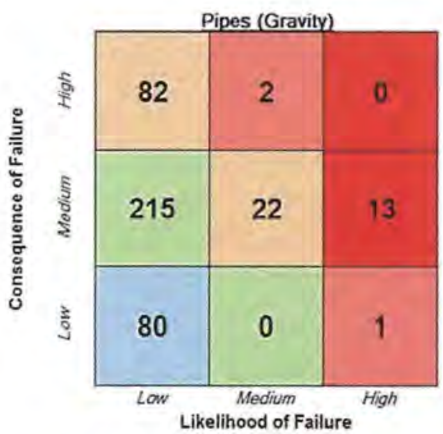


Figure 1 Business Risk Matrix (Risk Rating) by Number of Gravity and Force Main Pipes

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

A summary of the WWTP assets is shown graphically in Figure 3. A complete list of assets sorted from highest to lowest Business Risk was provided to staff and is available in the detailed AMP report. There were no WWTP assets in the "Extreme Risk" category that required a plan for asset renewal or risk mitigation.

Consequence of Failure				
	High	9 *(High)*	19 *(High)*	0 *(Extreme)*
	Medium	109 *(Low)*	83 *(Med)*	105 *(High)*
	Low	148 *(Low)*	65 *(Low)*	414 *(Med)*
		Low	Medium	High
			Probability of Failure	

Figure 3. WWTP Assets by Risk Rating

A summary of the Lift Station assets is shown graphically in Figure 4. A complete list of assets sorted from highest to lowest Business Risk was provided to staff and is available in the detailed AMP report. There was one lift station asset identified in the "Extreme Risk" category that will require a plan for asset renewal or risk mitigation. This will be addressed in the short term CIP.

Consequence of Failure				
	High	6 *(High)*	7 *(High)*	1 *(Extreme)*
	Medium	29 *(Low)*	20 *(Med)*	22 *(High)*
	Low	62 *(Low)*	27 *(Low)*	97 *(Med)*
		Low	Medium	High
			Probability of Failure	

Figure 4. Lift Station Assets by Risk Rating

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, pumping stations and force mains. From the BRE, short-term (1-5 year) and long-term (6-20 year) CIP's were developed for the utility.

This AMP included a detailed condition assessment of the collection system including televising of pipe, and field condition assessments of all accessible sanitary manholes and lift stations.

Based on the AMP condition assessment of the sanitary sewer system, the City has identified assets of the collection system and lift stations for improvement. These improvements can be completed with funding from the City's sewer reserve account. Projects will be completed as funding becomes available.

(1-5 Year) Capital Improvements include:

- WWTP Improvements
  - Variable Frequency Drives for Oxidation Ditch Rotors
  - Increase Wet Weather Hydraulic Capacity
  - Critical Building Restoration Project
  - MCC Replacement
  - Oxidation Ditch Catwalks
  - Additional Sludge Storage Tank
  - RAS Screw Pump Recoating
  - Building Restoration Project
  - Roof Repairs and Replacement
  - Plant Wide Pavement Project
  - Fawn & Lapeer Unit Substations Replacement
  - Equalization Tanks Repair
  - Sludge Storage Tank Nos. 1 & 2 Repair
  - Sludge Storage Tank Nos. 3 & 4 Recoating

- Sanitary Sewer Collection Improvements
  - Howard Street Sewer Lining
  - Fox Court Sewer Improvements
  - John Conley Sewer Extension
  - Replace McCormick Street Force Main
  - Manhole Structure Rehabilitation
  - Miscellaneous sewer main point repairs as identified in the AMP

- Lift Station Improvements
  - McCormick Lift Station Rehabilitation
  - O-2 Lift Station Upgrade
  - Albar (Whitney) Lift Station Rehabilitation
  - Lift Station Coating Project
  - Saginaw Lift Station Rehabilitation

(6-20 Year) Capital Improvements include:

- WWTP Improvements
  - Oxidation Ditch Rotor Replacement
  - Sludge Pump Replacement
- Collection and Loft Station Improvements
  - Projects are identified in the Asset Management Plan

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 function 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.

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 existing rates were determined to create sufficient funds to fulfill the day-to-day maintenance and operations of the entire sanitary collection system.

The MDEQ approved the City's rate methodology on June 7, 2017.

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

Completion Date: October 27, 2017
(no later than 3 years from executed grant date)

The **City of Lapeer** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1033-01** 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**: June 7,2017.**

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: 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:

Dale Kerbyson, City Manager	at 810-664-5231	dkerbyson@ci.lapeer.mi.us
Name	Phone Number	Email

10/27/2017

Signature of Authorized Representative (Original Signature Required) Date

Dale Kerbyson, City Manager

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Lapeer

SAW Project No. 1033-01

City of Lapeer Michigan

FINAL
October 2017

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 October 2014, The City of Lapeer received a (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), Project No.1033-01 to provide financial assistance for the development of this asset management plan (AMP). This report provides the Asset Management Plan (AMP) for the City's Stormwater collection system. 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.

The SAW Grant amount awarded for Stormwater to the City of Lapeer was $888,599.00
The Local Match provided by the City of Lapeer was $0.00. The City was determined as a disadvantaged community.

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.

Questions regarding the Asset Management Plan should be directed to:
Ms. Pam Reid
Public Works Director
City of Lapeer
217 Bentley Street
Lapeer, Michigan 48446
810.664.4711
Email: preid@ci.lapeer.mi.us

ASSET INVENTORY AND CONDITION ASSESSMENT

The Stormwater collection system assets consist of approximately:

- Storm piping; 248,160 LF. (47.0 miles)
- Manhole and Catch Basins: 2,295

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 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 database and piping network for archiving, mapping, and future evaluation.

Condition Assessment and Expected Useful Life

A comprehensive evaluation of the collection system was performed.

- NASSCO-MACP Level 1 manhole field based assessments were completed on 2046 structures.
- Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 82,500 feet of the Storm piping.
- The condition of the storm water system assets ranged from Good to Fair.
- Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified.

- It is recommended to clean and televise the system on a 7 to 10-year rotating basis.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

The City of Lapeer Level of Service (LOS) goals as it relates to the stormwater collection system is summarized as follows:

LEVEL OF SERVICE STATEMENT

The overall objective of City of Lapeer is to provide reliable stormwater 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:

- Provide adequate collection system capacity for all service areas.
- Comply with local, state and federal regulations.
- Actively maintain collection system assets in reliable working condition
- 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, to ensure sound financial management of the stormwater 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 annually to make sure they accurately reflect the desired operation of the utility.

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 Stormwater 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 the utilities ability to convey and treat Stormwater. CoF categories of the Stormwater collection system include:

- Location of asset.
- Facilities served by asset.
- Size

<u>ASSESSING CRITICALITY</u>
Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset of the City of Lapeer using an ArcGIS-based sewer asset management and capital planning template that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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 assessed by number of pipe segments. 7 pipe segments in the stormwater collection system assessed have an extreme risk rating. The repairs to these pipe segments will be repaired in the short-term CIP. Approximately 48% of the collection system assessed is in the negligible to medium risk category and are in relatively good condition.

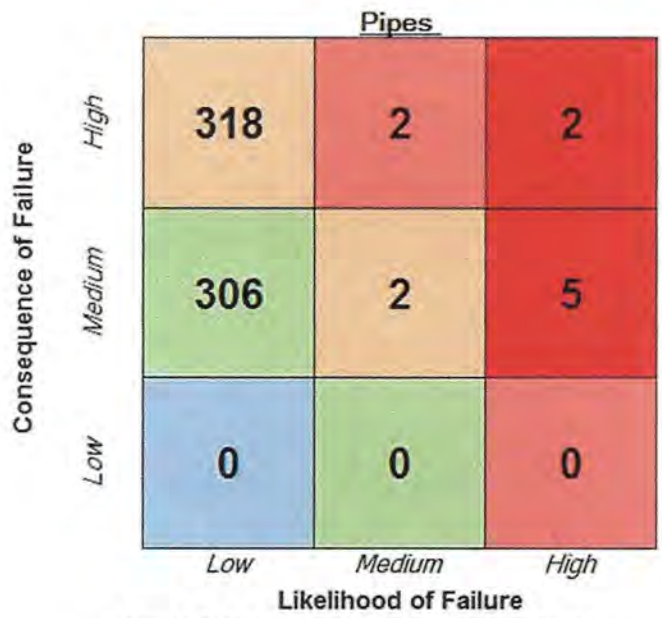


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures assessed. 49 structures are identified an extreme risk rating, and are recommended rehabilitation in the short term CIP. Approximately 94% of the collection system structures assessed is in the low to medium risk category and are in relatively good condition.

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan with recommendations was prepared for the City's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term (1-5 year) and Long-Term (6-20 year) Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

The City makes improvements to the storm drainage system as part of the Major and Local Streets Improvements Program. Where streets are improved, the storm drainage system is also improved.

The City will include the recommended improvements that have been identified as a high or extreme risk within the Short Term (1-5 year) CIP.

(1-5 Year) Capital Improvements include:
- Various sections of Storm Sewer to be repaired or replaced as identified in the AMP.
- Manhole structure rehabilitation as identified in the AMP.

(6-20 Year) Capital Improvements include:
- Various sections of Storm Sewer to be repaired or replaced as identified in the AMP.
- Manhole structure rehabilitation as identified in the AMP.

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound Stormwater system. The process of cleaning and CCTV inspection of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every 7 to 10 years. Available budget will dictate the frequency or size of yearly projects.

Revenue Structure

The revenue for storm sewer improvements will come from the City local and major street funds or the City General Fund.

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

Completion Due Date: October 27, 2017
(no later than 3 years from executed grant date)

The **City of Lapeer** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1033-01** 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:

Dale Kerbyson, City Manager	at 810-664-5231	dkerbyson@ci.lapeer.mi.us
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required)

10/27/2017
Date

Dale Kerbyson, City Manager
Print Name and Title of Authorized Representative

Lenox Township
Wastewater Asset Management Plan Summary

Municipality: Lenox Township
Physical / Web Address: 63775 Gratiot Avenue, Lenox, MI 48050, http://www.lenoxtwp.org/
Contact Name and Phone: Mr. Ronald J. Trombly, Jr., Supervisor, (586) 727-2085
SAW Grant Project Number: MDEQ 1538-01

Executive Summary

On November 12, 2014, the Department of Environmental Quality (MDEQ) approved Lenox Township to receive a Storm, Asset Management, and Wastewater (SAW) Grant assistance to aid the Township in developing its wastewater asset management plan. The awarded total Grant amount was $135,734 for the project scope ($150,815 eligible costs less $15,081 local match). Per the Grant requirements, all funded tasks must be completed within 3 years prior to the Grant end date of October 31, 2017.

The AMP was developed based on the inventory and assessment of the existing sanitary sewer assets. The inventory was based on field mapping and data collection of sewers along 26 Mile Road (older than 20 years) and GIS record data of sewers along Gratiot Avenue (less than 20 years old). Risk analysis was conducted accordingly using condition-based (field data) assessment and age-based (GIS data) assessment. All system information was organized and stored in the computer AMP model.

The Asset Management tasks are illustrated below:

1. Asset Inventory
2. Asset Assessment and Inspection
3. Condition Assessment
4. Level of Service
5. Criticality of Assets
6. Operation and Maintenance (O&M) Strategies
7. Revenue Structure
8. Long-term Funding/Capital Improvement Planning

Assumptions used in the development of asset values and condition assessments are based on current industry standards, manufacture's guidelines, National Association of Sewer Service Companies (NASSCO) standards, and historical data.

Assets Included in the Plan

The Township's wastewater asset plan is dedicated to the sanitary sewer collection system that consists of:

1. Gravity Sewer Pipes
2. Manhole Structures
3. Pump Stations
4. Wet Wells

Asset Management Plan Development and Timeline

In October 2014, the Michigan Department of Environmental Quality (MDEQ) approved Lenox Township application for the Stormwater, Asset Management, and Wastewater (SAW) grant assistance for developing and implementing a Wastewater Asset Management Plan (AMP). The SAW grant agreement allowed 3 years to complete the grant requirements with 2 ½ years to submit the Township's rate methodology.

Lenox Township
Wastewater Asset Management Plan Summary

Asset Management Plan Updates
The Township's AMP is a living document that will continue to reflect the development of the wastewater asset management. It is the Township intent to continuously improve the AMP practices and provide plan updates every 5 years. The current plan and updates will be available to the public at all times and for at least 15 years as required.

Asset Inventory
The Wastewater asset inventory was populated using record information, surveying and mapping, cleaning and televising (20 years and older assets). Inventory data includes information such as asset type, size, material, depth, construction date...etc. Asset inventory are logged, mapped, and updated periodically using ArcGIS and AutoCAD.

Asset Summary

Asset Type	Quantity	Original Cost	Current Cost	Replacement Cost at End of Life
Gravity Pipe (Concrete)	34,519	$ 16,200,000	$ 30,001,665	$ 57,003,164
Gravity Pipe (Truss)	4,702	$ 705,270	$ 1,340,013	$ 2,546,025
Manhole (Concrete)	124	$ 270,000	$ 536,600	$ 1,019,540
Pump Station	1	$ 260,000	$ 494,000	$ 938,600
Wet Well	1	$ 8,000	$ 16,000	$ 30,400
Total			$ 32,388,278	$ 61,537,728

Estimated Effective Life
The Estimated Effective Life (EEL) of an asset is a defined value assigned to each asset based on the asset type and construction material. The EEL for each type of asset was determined based on review of existing data, manufacture's recommendations, and other industry standards / studies. Based on asset installation date, related asset information populated such as the remaining useful life and the planned service date.

Pipe & Structure Assessments
The primary purpose of asset assessment and inspection is to define the current conditions of assets to evaluate the progression of deterioration, manage maintenance, repair and potential replacement. Thus, maximizing assets value, effective replacement, and minimizing failure and inspection costs.

Assessment and inspection data are used further to:

1. Record and document all asset descriptive data
2. Develop asset condition rating
3. Provide follow-up asset management recommendations
4. Develop visual results and asset mapping
5. Establish asset benchmarks

Lenox Township
Wastewater Asset Management Plan Summary

All existing assets were inventoried, checked for connectivity, rated using condition-based assessment of closed-circuit television (CCTV) field inspected (20 years and older) and age-based assessment (Record & GIS data) using NASSCO Pipe and Manhole Assessment Certification Programs (PACP & MACP). The NASSCO scoring system provides for a consistent inspection and evaluation process so that all pipe and structures inventoried have consistent Structural and Operations and Maintenance (O&M) condition ratings. (5-Most Significant Defect to 1-Minor Defect)

Condition Assessment
CCTV field inspection data were used to develop the asset assessment and condition-based scoring for assets over 20 years in age based on NASSCO industry standards. Remaining assets (less than 20 years in age) were assessed and rated based on age and type of asset. (5- Asset Unserviceable to 1- New of Excellent Condition)

Probability of Failure
The probability of an asset failure is a function of various characteristics such as the asset's condition, age, performance, reliability, and maintenance history. Predominately the age and condition are used in the rating. (5- Imminent to 1- Improbable)

Consequence of Failure
The consequence of asset failure is treated similar to the probability of failure with consideration to safety, social, economic, financial, and environmental influences. Other physical factors considered such as proximity to other infrastructure similar to roads, highways, floodplains, buildings…etc. (5-Catastrophic to 1- Insignificant)

Criticality Factor
The criticality factor is developed for each asset to aid in prioritizing potential problem areas. These factors are based on the probability and consequence of failure ratings. A simple method for assigning asset criticality is multiplying the failure probability by the consequence resulting in a 1 (Low Priority) to 25 (High Priority) rating scale that can be prioritized as follows:

Assessment Results
The overall system is rated as VERY GOOD. This reflects the young age of the infrastructure system and the effective Township operation and maintenance program.

Level Of Service
The Township's desired level of service is to deliver reliable infrastructure collection service, in compliance with regulatory requirements, meeting customer expectations, at the lowest possible cost. The desired level of service deliverables includes:

1. Adequate sanitary system planned capacity
2. Sufficient actual pipe flow carrying capability (buildup control)
3. Inflow & Infiltration control
4. Effective response service
5. Minimizing costs

Lenox Township
Wastewater Asset Management Plan Summary

Level of Service Statement

The Department of Public Works is fully engaged with the Township infrastructure management, O&M, and CIP to provide the public with an effective LOS as follows:

1. System will meet all State and Federal regulatory standards.
2. Pump station will be functional 99% of the time. Spare parts will be maintained onsite.
3. All customer complaints will be responded to within 90 minutes.
4. I&I will be controlled below 15%.
5. Emergency contractor will mobilize within 24 hours of reported breaks.
6. User Rates will be updated and published every year.

Operation & Maintenance

The Township has adopted O&M plans and standard procedures to insure appropriate protection of its assets to meet the level of service goals. The Township employs certified and qualified DPW staff to maintain the waste water collection system. All DPW personnel are local residents and available 24 hours for emergency response. Parts, spare pumps, and tools are continuously in stock at the DPW building. The Township local emergency contractor (Pamar Enterprises) also stocks pipes, structures, and appurtenances at their yard.

The sanitary sewer system maintenance program includes visual inspections, easement mowing, overhead utility crossing inspections, pipe cleaning, pipe video inspections, pump station monitoring and inspections, wet well cleaning, and periodic sub-contractor inspections and maintenance.

Capital Improvements Program (CIP)

The CIP summarizes the Township's long term master plan and budget for 5-year to 30-year period. The CIP objective is to guide the Township efforts to meet the community needs for sustainable, reliable, and high quality wastewater service. Assets identified for renewal, replacement and expansion are incorporated into the CIP to insure sustaining the desired level of service.

Capacity Analysis

The Township districts have adequate remaining flow capacities for future growth. The Township continues to monitor both district capacities through the monthly metering and billing data provided by the Township and MCOPW.

Revenue Structure

The Township residents are billed each quarter based on their water usage plus a meter charge. The commercial users are billed on a monthly basis based on the water usage plus a meter charge. The Township Board annually reviews its rates and approves the new rates for the next fiscal year. As of the date of this report the Township Board has not approved the rates for fiscal 2017-18, however it is anticipated that they will be increased 5-10%. The GAP funding analysis has not taken any increase into consideration.

The Township's projected revenues exceed the projected operating expenses. Thus, no gap has been identified.

DEQ

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

Completion Date October 24, 2017
(no later than 3 years from executed grant date)

The Lenox Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1538-01 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:

Tri-County Engineering Consultants at (810) 394-7887 SSaif@Tri-CountyEng.com
Name Phone Number Email

Rate Methodology was submitted to DEQ on: May 26, 2017 (No Gap Identified)
(within 2 ½ years from date of executed grant)

An initial rate increase of N/A % of a $ N/A gap was adopted on N/A

Oct 24. 2017
Signature of Authorized Representative (Original Signature Required) Date

Ronald Trombly, Township Supervisor
Print Name and Title of Authorized Representative

City of Litchfield

Wastewater and Stormwater Asset Management Plan 2017

Summary as required under Section 603 of Public Act 84 of 2015

Jones & Henry Engineers, Ltd.
4791 Campus Drive
Kalamazoo, Michigan
269.353.9650
www.jheng.com

Asset Inventory and Condition Assessment

The Asset Management Plan for the City of Litchfield included an Asset Inventory and Condition Assessment for all of the infrastructure and equipment for the wastewater and stormwater systems. This included gravity sewer pipes, force main pipes, manholes, lift stations, and the treatment lagoon facility for the wastewater system, and gravity storm pipes, manholes, and catch basins for the stormwater system.

The Asset Management Team of Public Works staff from the City of Litchfield and engineers from Jones & Henry (J&H) identified the major components of the wastewater and stormwater systems and collected information on each of them to establish an Asset Inventory including what assets the Utility owns and where they are located. Record drawings and documents from the Department of Public Works were assembled as a basis for completing the inventory. Field data collection was conducted to verify and expand on the attributes of each element. The locations of all of the wastewater and stormwater system elements were amassed using survey data collection tools. The Team went on to evaluate the state of all of the assets to establish their condition.

The inventory and condition assessment were recorded in the field and converted into a spreadsheet. The Condition rating ranks each asset based on physical functionality and severity of defects and the Consequence of Failure estimates the degree of impact on utility service if the asset should fail. A Business Risk Score as developed by the Michigan American Water Works Association and Michigan Water Environment Association was used to determine the “Risk” associated with each asset. This evaluation takes the “Probability of Failure,” “Criticality,” and “Redundancy” to establish the Business Risk and ultimately the need for improvement for each asset. These scores are compared in a matrix to establish the Risk assessment and ultimately the Capital Improvement Plan.

Level of Service Agreement

The Litchfield community wants dependable wastewater and stormwater services to support residents and businesses in their daily lives and activities. Wastewater systems collect sewage from homes and buildings and transport it through gravity pipes, lift stations, and force mains to treatment facilities where wastewater is processed into manageable materials – clean water and biosolids.

Stormwater is collected in swales, curb lines, and inlet structures and transported through ditches, pipes, and culverts to treatment areas or directly to inland lakes and streams. Stormwater often contains pollutants, collected from overland flow that can negatively affect our environment. Treatment is now required before stormwater can be discharged onto the ground or into the water. Treatment techniques involve the collection of contaminants through natural, chemical, and mechanical processes.

Levels of Service considerations include customer demands, regulatory requirements, and performance expectations. System capacity, operation, maintenance, rehabilitation, updates, expansion, and rate structures all reflect on a utility’s ability to meet performance expectations.

Residents and businesses have a high expectation for both wastewater and stormwater service. Their main concern is how to deal with sewage generated in their homes and buildings and rainwater accumulating on their properties and in public streets. To them, the solution is to collect sewage and storm runoff and transport it somewhere else so that it doesn’t impact them any longer. It is generally accepted that people want this done in a manner that won't have negative consequences for the environment. The public utility fails to provide satisfactory service when there are sewer backups, sanitary sewer overflows, floods, pollution releases, or other disruptions.

Regulations from the Michigan Department of Environmental Quality (MDEQ) are set up so that public infrastructure is required to collect and treat both wastewater and stormwater under permits that dictate the manner in which the services are provided. Pollutant limits and performance criteria are part of the permitting process. If the utility doesn't adhere to their regulatory requirements, permit violations and corrective action plans are put in place to resolve problems. Infractions, fines; and ultimately cease and desist orders are the penalties for not meeting permit requirements. Customer demands are impacted when regulatory violations occur because they can and will result in service disruptions.

Criticality of Assets

Some assets are more important than others in making sure that wastewater is treated effectively. The asset management team identified and prioritized critical assets in a spreadsheet format. This process included reviewing all assets and recording their conditions (likelihood of failure), criticality to the utility (consequence of failure), and redundancy (the number of back-up assets to help support each asset). This process ensures that the utility will deliver the level of service described in the previous section.

Revenue Structure

Jones & Henry prepared a Rate Methodology for submittal to the Michigan Department of Environmental Quality in May of 2017. It provided a summary of the current approved budget for the City and shows how projected revenues provide adequate funds to meet forecasted expenses needed to operate and maintain the wastewater system. The Report shows that estimated revenues will provide adequate funds to accommodate the estimated expenses for the current fiscal year.

Utility rate guides by financial analysts recommend maintaining six months of operating expenses for emergencies. Litchfield's current sewer fund balance is over seven times its annual expenses, so it could be considered excessive. It is good for small utilities to have significant reserves, however, because their infrastructure investments are a large part of their overall costs.

The User Fee that Litchfield assess each account monthly is approximately 40% less than the average for the surrounding communities. It is the same for all different sizes of service lines, however, and most other communities increase their rates for larger water service lines. The User Fee is the area where Jones & Henry recommends significant changes. There needs to be an increasing rate structure based on meter size for all customers with the base fee set for residential customers.

The Tax Increment Finance Authority for Litchfield's Industrial Park currently subsidizes the User Fee for the businesses there. Rate guidance experts do not recommend funding a utility with loans, grants, or subsidies. The reason is that these funding sources are often unreliable and can leave the utility in a lurch if the support is cut off. The User Fee for larger customers could be phased in over five or ten years to make it more palatable. In the meantime, the deficiency could continue to be subsidized by the TIFA or the City's fund balance.

The Consumption Fee for Litchfield is approximately 12% lower than the average for its surrounding communities. This rate could be raised to the average surrounding community rate to help reduce or eliminate the TIFA contribution to the sewer fund. Jones & Henry recommends that the Consumption Fee be raised an incremental amount over the next ten years until the Litchfield commodity rate catches up to the average for the other communities.

The City of Litchfield will continue to see inflationary cost increases in its sewer expenses into the future. These increases have been mild for the past several years and are not anticipated to be any different into the future. National, regional, or even local changes in the economy can take place that can have a more or less dramatic impact for a municipality. Therefore, it is recommended that Litchfield raise its rates annually by the projections for the Michigan Consumers Price Index. The projected CPI for 2018 is one to two percent.

Capital Improvement Plan

The City of Litchfield wastewater and stormwater capital improvement program (CIP) plan is the description of future capital projects over the next 5-10 years. A wastewater lagoon assessment was performed by Jones & Henry in 2015. All three cells appeared to be in excellent structural condition. It was noted that there was a buildup of solids for the influent inlet in Cell 1 that could potentially cause a sanitary sewer overflow and there was no emergency overflow. It is recommended to hydro dredge the sludge lagoons and to install new pipes to create an overflow at the influent manholes to the lagoons.

Portions of the sanitary sewer manholes and gravity pipes are rated as poor, but do not have significant I/I, root intrusion or any collapsed sections. Therefore, they will not necessarily need to be rehabilitated during the current CIP phase. They could, however, be replaced along with street improvement projects as they occur. As the system ages, many of the poorly rated assets should be re-evaluated and may need rehabilitation during the next CIP period.

Lift Station #9 serving mobile homes on St. Joe St. is in poor condition but was given a moderate criticality score due to the small number of customers serviced. It is worth considering reconstructing the lift station in 10 years but it is not critical. Lift Station #5 is in fair condition and is the only can type station in the system. Can stations are typically less safe due to entry in a confined space to access the equipment. It should be considered for replacement in the next evaluation period beyond this study. The remaining lift stations were deemed to be in good to fair condition and are not foreseen to require any work in the next 10 years.

Around 200 feet of very poor storm sewer pipe in the vicinity of Marshall St. and Warriner Ave. should be replaced. A portion of this storm sewer on Marshall St. may already be abandoned.

Table 4. City of Litchfield Wastewater and Stormwater Capital Improvement Projects

Capital Improvement Project	Total Cost	Annual Savings	Type of Capital Improvement Project	Year to Conduct
Hydro Dredge Sludge Lagoons	$35,000	$10,000 (per event)	Rehab/Replace	2018
Sludge Lagoon Overflow Pipe	$15,000	$10,000 (per event)	New Construction	2018

Capital Improvement Project	Total Cost	Annual Savings	Type of Capital Improvement Project	Year to Conduct
*LS #9 Mobile Homes	$200,000	$2,000	Reconstruct	2027
Replace Warriner/Marshall Storm Pipe (200’)	$40,000	$1,000	Rehab/Replace	2018
Replace Warriner/Marshall Storm Structures (5)	$15,000	$1,000	Rehab/Replace	2018

**if desired by Litchfield DPW*

List of Major Assets

- 8 lift stations
- 64,000 feet of 6-15 inch wastewater gravity pipe
- 11,000 feet of 4-10 inch wastewater pressure pipe
- 226 sanitary manholes
- 1 sludge lagoon
- 14,000 feet of 6-30 inch stormwater pipe
- 150 stormwater manholes and catch basins

DEQ

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

Completion Due Date September 30, 2017
(no later than 3 years from executed grant date)

The City of Litchfield *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1554-01 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 Litchfield at 517-542-2921 clerk@cityoflitchfield.org

Name Phone Number Email

D. K. Terry City Mgr. 11-21-17

Signature of Authorized Representative (Original Signature Required) Date

Douglas K. Terry, 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 30, 2017
(no later than 3 years from executed grant date)

The City of Litchfield *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1554-01 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 23, 2017.
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 Litchfield at 51-542-2921 clerk@cityoflitchfield.org
Name Phone Number Email

D. K. Terry 10-30-17
Signature of Authorized Representative (Original Signature Required) Date

Douglas K. Terry, 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

MACKINAW CITY STORMWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

Village of Mackinaw City
102 S. Huron Ave.
Mackinaw City, MI 49701
Pat Rivera – Water and Wastewater Superintendent, (231) 436-5652
SAW GRANT PROJECT NUMBER 1513-01

Executive Summary

The SAW agreement with the State of Michigan was signed on October 29, of 2014 which began the overall SAW program.

The Grant agreement included the following funding amounts:

- Total Cost = $196,359
  - Grant Value = $176,723
  - Local Match = $19,636

The Village of Mackinaw City is located at the northern end of Emmet and Cheboygan Counties, Michigan. It is located on I-75 at the northernmost tip of the lower peninsula. Mackinaw City's storm sewer collection system has approximately 37,000 feet of storm sewer and approximately 600 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:
  - 35% of assets are 1's
  - 46% of assets are 2's
  - 9% of assets are 3's
  - 5% of assets are 4's
  - 6% of assets are 5's

Condition Assessment

Overall, the system was in serviceable condition. The stormwater collection system is very segmented with numerous discharge points to the Straits of Mackinac. There are a few areas where the pipe condition warrants corrective action in the near term. There are also areas of the Village that are not currently served by storm sewers that would benefit from such service.

- 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 Village drainage system is operated and maintained using Village street funds.
- The current funding consists of Act 51 state tax funds. Those funds are expected to increase over the next several years. The future will require 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 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* (MH Project #4)
    - *Storm System Sewer Repairs with a Business Risk of 16+ or likely sewer collapse* (Sewer Project # 2)

- 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

- 36,978 feet of storm sewer
- 582 storm structures

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Mackinaw City *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1513-01 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:

Pat Rivera at 231-436-5652 privera@mackinawcity.org

Name | Phone Number | Email

Signature of Authorized Representative (Original Signature Required) 10/29/2017
Date

Patrick C. Wyman, Village Manager

Print Name and Title of Authorized Representative

123 W. Main St. Suite 200
Gaylord, MI 49735
O: 989.732.8131
www.c2ae.com

MACKINAW CITY WASTEWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

Village of Mackinaw City
102 S. Huron Ave.
Mackinaw City, MI 49701
Pat Rivera – Water and Wastewater Superintendent, (231) 436-5652
SAW GRANT PROJECT NUMBER 1513-01

Executive Summary

The SAW agreement with the State of Michigan was signed on October 29, of 2014 which began the overall SAW program.

The Grant agreement included the following funding amounts:

- Total Cost = $278,324
  - Grant Value = $250,492
  - Local Match = $27,832

The Village of Mackinaw City is located at the northern end of Emmet and Cheboygan Counties, Michigan. It is located on I-75 at the northernmost tip of the lower peninsula. The Village owns and operates a continuous discharge aerated lagoon Wastewater Treatment Plant with a rated capacity of 0.83 million gallon per day (MGD). The treatment plant discharges to Straits of Mackinac. Mackinaw City's sanitary collection system has approximately 75,000 feet of sanitary sewer and force main, approximately 300 sanitary manholes and 8 lift stations that provides sewer services to the Village.

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:
  - 23% of assets are 1's
  - 48% of assets are 2's
  - 18% of assets are 3's
  - 5% of assets are 4's
  - 5% of assets are 5's

Condition Assessment

The Village of Mackinaw City's sanitary collection system is in relatively good condition overall. Furthermore, the wastewater treatment plant well maintained and in good condition. However, there are a number of improvements that are needed for both the collection and treatment systems, which have been programmed as capital improvement projects.

- 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.

- The Village currently has sufficient fund reserves and rate structure to generate sufficient revenues and no funding gap was identified.
- No rate increase was required per the grant agreement.
- The Village is currently in the process of revising their rate structure to be more equitable to users and less complex. This is being done independently from the SAW program.

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* (MH Project #3)
    - *Sanitary System Sewer Repairs with a Business Risk of 16+ or likely sewer collapse* (Sewer Project # 1)
    - *Sanitary Collection System Lift Station repairs for Lift Station 001 (Main LS) , Lift Station 002 (Dujauncy LS) , and Lift Station 003 (Lakeside LS).*
- 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

- 54,482 feet of sanitary sewer
- 20,234 feet of force main
- 303 sanitary manholes
- 8 lift stations
- 0.83 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 October 31, 2017
(no later than 3 years from executed grant date)

The Village of Mackinaw City *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1513-01 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: June 15, 2017.

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
Pat Rivera	at	231-436-5652	privera@mackinawcity.org

PCWy
Signature of Authorized Representative (Original Signature Required)

10-29-2017
Date

Patrick C. Wyman, Village Manager
Print Name and Title of Authorized Representative

Office of the Macomb County Public Works Commissioner
21777 Dunham Rd.
Clinton Township, MI 48036
(586)469-5325
Brian Baker, brian.baker@macombgov.org
http://publicworks.macombgov.org/PublicWorks-Home

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 North Gratiot Interceptor Drain Drainage District Chesterfield Lenox New Haven Interceptor (NGIDDD-CLNHI), a legally established District under the Michigan Drain Code of 1956. By taking a proactive position in protecting the valued resources of the benefiting communities, residents and property owners the NGIDDD-CLNHI initiated an application and was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program.

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, compiling an Inflow and Infiltration (I&I) Analysis Report to determine if there was excessive I&I in the CLNHI, designating criticality of assets, analyzing long-term operation and maintenance (O&M) strategies, consider 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, and visual observation. The inventory verified that the CLNHI is comprised of 6.73 miles of gravity sewer and 105 sanitary manholes. The assets have been cataloged and stored in the Macomb County Public Works Office (MCPWO) database. This database serves as the data repository for all MCPWO 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.

A condition assessment was performed for each asset, allowing the assignment of an overall asset, Probability of Failure (POF), Consequence of Failure (COF), and Business Risk Evaluation (BRE) score. The condition assessment for sanitary sewers was performed by means of Closed Circuit Television (CCTV) investigation and provided a structural rating and Operation and Maintenance (O&M) rating while the condition assessment for sanitary structures was performed by means of visual inspection and provided an overall rating. Ratings range from 1 to 5 whereby 1 indicates new or excellent condition and 5 indicates failure or imminent failure.

Assets were then analyzed to determine their POF and COF. The POF takes into account the condition rating while the COF takes into account the following six factors:

1.) Process Impact
2.) Financial Impact
3.) Safety
4.) Environmental/Regulatory Impact
5.) Disruption to the Community
6.) Required Response Time

The POF and COF scores are then multiplied together resulting in the criticality score or the BRE score. The BRE score is used to prioritize what assets are most critically in need of repair. The MDEQ guidelines state that any asset with a BRE score of 16 or greater is considered critical. For CLNHI only two pipes were found to have a BRE score above the MDEQ critical limit, that BRE score was 17.10.

An Inflow and Infiltration (I&I) analysis was conducted by AEW by means of flow monitoring, manhole inspections and CCTV investigation. The analysis was performed to identify sources of any excessive I&I throughout the interceptor. The Sanitary Sewer Overflow Analysis Program (SSOAP) was utilized to analyze base sanitary flows, dry and wet weather flow, meter data and rain data to determine the location and amount of I&I.

Dry weather analysis concluded that the portion of sewer between Hickey Road to Deer Trail was carrying 3,344 gallons per inch diameter per mile of flow per day and the portion of sewer between Berkshire Drive and 21 Mile Road was carrying 212 gallons per inch diameter per mile of flow per day. The wet weather analysis concluded that the portion of sewer between Hickey Road and Deer Trail was carrying 1,882 gallons per inch diameter per mile of flow per day and the portion between Berkshire Drive and 21 Mile Road was carrying 3,282 gallons per inch diameter per mile of flow per day.

Review of CCTV records for both the Hickey/Deer Trail and Berkshire Drive sewer sections shows several locations where groundwater was leaking into the sewer. The leaks are proposed to be repaired. That being said, based on obvious visible leaks it appeared that some of the Hickey/Deer Trail excess flow was coming from local township sources.

The prioritized twenty (20) year capital improvement projects consist of performing a CCTV investigation of the CLNHI every ten (10) years along with manhole inspections, repairing any O&M rated 4 and 5 defect to prevent I&I, repairing any structural rated 4 and 5 defect and repairing any structure with an overall condition rating of 4 or 5.

There were a total of forty eight (48) pipes that received an O&M or structural rating of 4 or 5, no structure received an overall condition rating of 4 or 5. Of the forty eight (48) pipes, it was found that forty four (44) of these have surface aggregate visible throughout and as such were recommended for repair using Full Cured in Place Pipe (FCIPP). Two (2) of the pipes showed only isolated locations of infiltration and were recommended for repair using Sectional Cured in Place Pipe (SCIPP).

Office of the Macomb County Public Works Commissioner
21777 Dunham Rd.
Clinton Township, MI 48036
(586)469-5325
Brian Baker, brian.baker@macombgov.org
http://publicworks.macombgov.org/PublicWorks-Home

The complete CIP includes the following:

- CCTV inspection of pipes every ten (10) years ($300,000).
- Manhole inspection every ten (10) years ($25,000).
- SCIPP lining of two (2) pipes ($9,000.00 total).
- FCIPP lining of forty four (44) pipes ($1,713,316 total).
- Reset frame and cover of one (1) manhole ($1,000.00).

The average annual cost of the twenty (20) year CIP is $144,700.

A rate analysis was conducted as part of the AMP and it was found that the CLNHI revenues sufficiently cover all expenditures and a funding gap does not exist. Therefore no corrections to the rate methodology were required.

This summary provides a brief overview of the evaluation and investigation and offers initial insight into the NGIDDD-CLNHI, its assets, condition, operation and needs. A more comprehensive discussion can be found in the Wastewater Asset Management Plan. A complete list of assets is attached.

North Gratiot Interceptor Drain Drainage District
Chesterfield Interceptor Assets

No.	Asset I.D.	Asset Type
1	CLNHI-MH-104-CLNHI-MH-103	Buried Pipe
2	CLNHI-MH-103-CLNHI-MH-102	Buried Pipe
3	CLNHI-MH-102-CLNHI-MH-101	Buried Pipe
4	CLNHI-MH-101-CLNHI-MH-100	Buried Pipe
5	NGI4-MH-6-CLNHI-MH-93	Buried Pipe
6	CLNHI-MH-93-CLNHI-MH-92	Buried Pipe
7	CLNHI-MH-92-CLNHI-MH-91	Buried Pipe
8	CLNHI-MH-91-CLNHI-MH-90	Buried Pipe
9	CLNHI-MH-90-CLNHI-MH-89	Buried Pipe
10	CLNHI-MH-89-CLNHI-MH-88	Buried Pipe
11	CLNHI-MH-88-CLNHI-MH-87	Buried Pipe
12	CLNHI-MH-87-CLNHI-MH-86	Buried Pipe
13	CLNHI-MH-86-CLNHI-MH-85	Buried Pipe
14	CLNHI-MH-85-CLNHI-MH-84	Buried Pipe
15	CLNHI-MH-84-CLNHI-MH-83	Buried Pipe
16	CLNHI-MH-83-CLNHI-MH-82	Buried Pipe
17	CLNHI-MH-82-CLNHI-MH-081A	Buried Pipe
18	CLNHI-MH-81A-METER-CH-S-3	Buried Pipe
19	CLNHI-MH-80-CLNHI-MH-81	Buried Pipe
20	CLNHI-MH-80-CLNHI-MH-79	Buried Pipe
21	CLNHI-MH-79-CLNHI-MH-78	Buried Pipe
22	CLNHI-MH-78-CLNHI-MH-77	Buried Pipe
23	CLNHI-MH-77-CLNHI-MH-76	Buried Pipe
24	CLNHI-MH-76-CLNHI-MH-75	Buried Pipe
25	CLNHI-MH-75-CLNHI-MH-74	Buried Pipe
26	CLNHI-MH-74-CLNHI-MH-73	Buried Pipe
27	CLNHI-MH-73-CLNHI-MH-72	Buried Pipe
28	CLNHI-MH-72-CLNHI-MH-71	Buried Pipe
29	CLNHI-MH-71-CLNHI-MH-70	Buried Pipe
30	CLNHI-MH-70-CLNHI-MH-69	Buried Pipe
31	CLNHI-MH-68-CLNHI-MH-69	Buried Pipe
32	CLNHI-MH-68-CLNHI-MH-67	Buried Pipe
33	CLNHI-MH-67-CLNHI-MH-66	Buried Pipe
34	CLNHI-MH-66-CLNHI-MH-65	Buried Pipe
35	CLNHI-MH-65-CLNHI-MH-64	Buried Pipe
36	CLNHI-MH-64-CLNHI-MH-63	Buried Pipe
37	CLNHI-MH-63-CLNHI-MH-62	Buried Pipe
38	CLNHI-MH-62-CLNHI-MH-61	Buried Pipe
39	CLNHI-MH-61-CLNHI-MH-60	Buried Pipe
40	CLNHI-MH-60-CLNHI-MH-59	Buried Pipe
41	CLNHI-MH-59-CLNHI-MH-58	Buried Pipe
42	CLNHI-MH-58-CLNHI-MH-57	Buried Pipe
43	CLNHI-MH-57-CLNHI-MH-56	Buried Pipe

North Gratiot Interceptor Drain Drainage District
Chesterfield Interceptor Assets

No.	Asset I.D.	Asset Type
44	CLNHI-MH-56-CLNHI-MH-55	Buried Pipe
45	CLNHI-MH-55-CLNHI-MH-54	Buried Pipe
46	CLNHI-MH-54-CLNHI-MH-53	Buried Pipe
47	CLNHI-MH-53-CLNHI-MH-52	Buried Pipe
48	CLNHI-MH-52-CLNHI-MH-51	Buried Pipe
49	CLNHI-MH-51-CLNHI-MH-50	Buried Pipe
50	CLNHI-MH-50-CLNHI-MH-49	Buried Pipe
51	CLNHI-MH-49-CLNHI-MH-48	Buried Pipe
52	CLNHI-MH-48-CLNHI-MH-47	Buried Pipe
53	CLNHI-MH-47-CLNHI-MH-46	Buried Pipe
54	CLNHI-MH-41-CLNHI-MH-40	Buried Pipe
55	CLNHI-MH-40-CLNHI-MH-39	Buried Pipe
56	CLNHI-MH-39-CLNHI-MH-38	Buried Pipe
57	CLNHI-MH-38-CLNHI-MH-37	Buried Pipe
58	CLNHI-MH-37-CLNHI-MH-36	Buried Pipe
59	CLNHI-MH-36-CLNHI-MH-35	Buried Pipe
60	CLNHI-MH-35-CLNHI-MH-34	Buried Pipe
61	CLNHI-MH-34-CLNHI-MH-33	Buried Pipe
62	CLNHI-MH-33-CLNHI-MH-32	Buried Pipe
63	CLNHI-MH-32-CLNHI-MH-31	Buried Pipe
64	CLNHI-MH-31-CLNHI-MH-30	Buried Pipe
65	CLNHI-MH-30-CLNHI-MH-29	Buried Pipe
66	CLNHI-MH-29-CLNHI-MH-28	Buried Pipe
67	CLNHI-MH-28-CLNHI-MH-27	Buried Pipe
68	CLNHI-MH-27-CLNHI-MH-26	Buried Pipe
69	CLNHI-MH-26-CLNHI-MH-27	Buried Pipe
70	CLNHI-MH-26-CLNHI-MH-25	Buried Pipe
71	CLNHI-MH-25-CLNHI-MH-26	Buried Pipe
72	CLNHI-MH-25-CLNHI-MH-24	Buried Pipe
73	CLNHI-MH-26-CLNHI-MH-25	Buried Pipe
74	CLNHI-MH-24-CLNHI-MH-23	Buried Pipe
75	CLNHI-MH-23-CLNHI-MH-22	Buried Pipe
76	CLNHI-MH-22-CLNHI-MH-21	Buried Pipe
77	CLNHI-MH-21-CLNHI-MH-20	Buried Pipe
78	CLNHI-MH-20-CLNHI-MH-19	Buried Pipe
79	CLNHI-MH-19-CLNHI-MH-18	Buried Pipe
80	CLNHI-MH-18-CLNHI-MH-17	Buried Pipe
81	CLNHI-MH-17-CLNHI-MH-16	Buried Pipe
82	CLNHI-MH-16-CLNHI-MH-15	Buried Pipe
83	CLNHI-MH-15-CLNHI-MH-14	Buried Pipe
84	CLNHI-MH-14-CLNHI-MH-13	Buried Pipe
85	CLNHI-MH-13-CLNHI-MH-12	Buried Pipe
86	CLNHI-MH-12-CLNHI-MH-11	Buried Pipe

North Gratiot Interceptor Drain Drainage District
Chesterfield Interceptor Assets

No.	Asset I.D.	Asset Type
87	CLNHI-MH-11-CLNHI-MH-10	Buried Pipe
88	CLNHI-MH-10-CLNHI-MH-9	Buried Pipe
89	CLNHI-MH-9-CLNHI-MH-8	Buried Pipe
90	CLNHI-MH-8-CLNHI-MH-7	Buried Pipe
91	CLNHI-MH-7-CLNHI-MH-6	Buried Pipe
92	CLNHI-MH-6-CLNHI-MH-5	Buried Pipe
93	CLNHI-MH-5-CLNHI-MH-4	Buried Pipe
94	CLNHI-MH-4-CLNHI-MH-3	Buried Pipe
95	CLNHI-MH-45-CLNHI-MH-44	Buried Pipe
96	CLNHI-MH-44-CLNHI-MH-45	Buried Pipe
97	CLNHI-MH-44-CLNHI-MH-43	Buried Pipe
98	CLNHI-MH-43-CLNHI-MH-42	Buried Pipe
99	CLNHI-MH-42-CLNHI-MH-41	Buried Pipe
100	CLNHI-MH-96-CLNHI-MH-95	Buried Pipe
101	CLNHI-MH-97-CLNHI-MH-96	Buried Pipe
102	CLNHI-MH-95-CLNHI-MH-94	Buried Pipe
103	CLNHI-MH-94-NGI4-MH-6	Buried Pipe
104	CLNHI-MH-99-CLNHI-MH-98	Buried Pipe
105	CLNHI-MH-98-CLNHI-MH-97	Buried Pipe
106	CLNHI-MH-100-CLNHI-MH-99	Buried Pipe
107	CLNHI-MH-46-CLNHI-MH-45	Buried Pipe
108	CLNHI-MH-3-CLNHI-MH-2	Buried Pipe
109	CLNHI-MH-2-LIE-MH-29	Buried Pipe
110	LIE-MH-29-CLNHI-MH-1	Buried Pipe
111	CLNHI-MH-001	Manhole
112	CLNHI-MH-002	Manhole
113	CLNHI-MH-003	Manhole
114	CLNHI-MH-004	Manhole
115	CLNHI-MH-005	Manhole
116	CLNHI-MH-006	Manhole
117	CLNHI-MH-007	Manhole
118	CLNHI-MH-008	Manhole
119	CLNHI-MH-009	Manhole
120	CLNHI-MH-010	Manhole
121	CLNHI-MH-011	Manhole
122	CLNHI-MH-012	Manhole
123	CLNHI-MH-013	Manhole
124	CLNHI-MH-014	Manhole
125	CLNHI-MH-015	Manhole
126	CLNHI-MH-016	Manhole
127	CLNHI-MH-017	Manhole
128	CLNHI-MH-018	Manhole
129	CLNHI-MH-019	Manhole

North Gratiot Interceptor Drain Drainage District
Chesterfield Interceptor Assets

No.	Asset I.D.	Asset Type
130	CLNHI-MH-020	Manhole
131	CLNHI-MH-021	Manhole
132	CLNHI-MH-022	Manhole
133	CLNHI-MH-023	Manhole
134	CLNHI-MH-024	Manhole
135	CLNHI-MH-025	Manhole
136	CLNHI-MH-026	Manhole
137	CLNHI-MH-027	Manhole
138	CLNHI-MH-028	Manhole
139	CLNHI-MH-029	Manhole
140	CLNHI-MH-030	Manhole
141	CLNHI-MH-031	Manhole
142	CLNHI-MH-032	Manhole
143	CLNHI-MH-033	Manhole
144	CLNHI-MH-034	Manhole
145	CLNHI-MH-035	Manhole
146	CLNHI-MH-036	Manhole
147	CLNHI-MH-037	Manhole
148	CLNHI-MH-038	Manhole
149	CLNHI-MH-039	Manhole
150	CLNHI-MH-040	Manhole
151	CLNHI-MH-041	Manhole
152	CLNHI-MH-042	Manhole
153	CLNHI-MH-043	Manhole
154	CLNHI-MH-044	Manhole
155	CLNHI-MH-045	Manhole
156	CLNHI-MH-046	Manhole
157	CLNHI-MH-047	Manhole
158	CLNHI-MH-048	Manhole
159	CLNHI-MH-049	Manhole
160	CLNHI-MH-050	Manhole
161	CLNHI-MH-051	Manhole
162	CLNHI-MH-052	Manhole
163	CLNHI-MH-053	Manhole
164	CLNHI-MH-054	Manhole
165	CLNHI-MH-055	Manhole
166	CLNHI-MH-056	Manhole
167	CLNHI-MH-057	Manhole
168	CLNHI-MH-058	Manhole
169	CLNHI-MH-059	Manhole
170	CLNHI-MH-060	Manhole
171	CLNHI-MH-061	Manhole
172	CLNHI-MH-062	Manhole

North Gratiot Interceptor Drain Drainage District
Chesterfield Interceptor Assets

No.	Asset I.D.	Asset Type
173	CLNHI-MH-063	Manhole
174	CLNHI-MH-064	Manhole
175	CLNHI-MH-065	Manhole
176	CLNHI-MH-066	Manhole
177	CLNHI-MH-067	Manhole
178	CLNHI-MH-068	Manhole
179	CLNHI-MH-069	Manhole
180	CLNHI-MH-070	Manhole
181	CLNHI-MH-071	Manhole
182	CLNHI-MH-072	Manhole
183	CLNHI-MH-073	Manhole
184	CLNHI-MH-074	Manhole
185	CLNHI-MH-075	Manhole
186	CLNHI-MH-076	Manhole
187	CLNHI-MH-077	Manhole
188	CLNHI-MH-078	Manhole
189	CLNHI-MH-079	Manhole
190	CLNHI-MH-080	Manhole
191	CLNHI-MH-081	Manhole
192	CLNHI-MH-081A	Manhole
193	CLNHI-MH-082	Manhole
194	CLNHI-MH-083	Manhole
195	CLNHI-MH-084	Manhole
196	CLNHI-MH-085	Manhole
197	CLNHI-MH-086	Manhole
198	CLNHI-MH-087	Manhole
199	CLNHI-MH-088	Manhole
200	CLNHI-MH-089	Manhole
201	CLNHI-MH-090	Manhole
202	CLNHI-MH-091	Manhole
203	CLNHI-MH-092	Manhole
204	CLNHI-MH-093	Manhole
205	CLNHI-MH-094	Manhole
206	CLNHI-MH-095	Manhole
207	CLNHI-MH-096	Manhole
208	CLNHI-MH-097	Manhole
209	CLNHI-MH-098	Manhole
210	CLNHI-MH-099	Manhole
211	CLNHI-MH-100	Manhole
212	CLNHI-MH-101	Manhole
213	CLNHI-MH-102	Manhole
214	CLNHI-MH-103	Manhole
215	CLNHI-MH-104	Manhole

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Macomb County Public Works Office *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1405-01 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: ___June 19, 2017_______________.

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:

Brian Baker	at	(586) 469-5325	brian.baker@macombgov.org
Name		Phone Number	Email

[signature] 10-30-17

Signature of Authorized Representative (Original Signature Required) Date

BRIAN BAKER CHIEF DEPUTY MCPWO

Print Name and Title of Authorized Representative

North Gratiot Interceptor Drain Drainage District
Office of the Macomb County Public Works Commissioner
21777 Dunham Rd.
Clinton Township, MI 48036
(586)469-5325
Brian Baker, brian.baker@macombgov.org
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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 North Gratiot Interceptor (NGI) Drain Drainage District (NGIDDD), a legally established district under the Michigan Drain Code of 1956. By taking a proactive position in protecting the valued resources of the benefiting communities, residents and property owners the NGIDDD initiated an application and was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program.

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, a corrosion control assessment to determine pH levels of the NGI, designating criticality of assets, analyzing long-term operation and maintenance (O&M) strategies, consider 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, and visual observation. The inventory verified that NGI is composed of 3.46 miles of gravity sewer, 10.93 miles of dual forcemain, 48 sanitary manholes, 48 air release/vacuum valves and vaults, 2 pigging stations and a pump station. The assets have been cataloged and stored in the Macomb County Public Works Office (MCPWO) NEXGEN database. This database serves as the data repository for all MCPWO 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.

Assets were divided into two asset criteria, horizontal and vertical. Horizontal assets consist of gravity sewer, forcemain and sanitary manholes while vertical assets consist of vaults, chambers, wetwells, valves, pumps, gauges, etc. A condition assessment was performed for sanitary manholes and any vertical asset located within the pump station. The condition assessments were performed by means of visual assessment and assigned a an overall rating ranging from 1 to 5 whereby 1 indicates new or excellent condition and 5 indicates failure or imminent failure.

Assets were then analyzed to determine their Probability of Failure (POF) and Consequence of Failure (COF). The POF takes into account the condition rating while the COF takes into account the following six factors:

1.) Process Impact
2.) Financial Impact
3.) Safety
4.) Environmental/Regulatory Impact
5.) Disruption to the Community
6.) Required Response Time

The POF and COF scores are then multiplied together resulting in the criticality score or the Business Risk Evaluation (BRE) score. The BRE score is used to prioritize what assets are most critically in need of repair. The MDEQ guidelines state that any asset with a BRE score of 16 or greater is considered critical. For NGI the highest BRE score was found to be 12.48, therefore all assets fall below the MDEQ critical rating of 16.

As part of the AMP, a corrosion control assessment was conducted by FK Engineering (FKE). The assessment was performed as part of the condition assessment to provide insight into the hydrogen sulfide (H_2S) levels within the NGI. H_2S can be emitted into a sewer atmosphere and absorbed by bacteria which ingests and oxidizes the H_2S into sulfuric acid. The acid reacts with components of the concrete surface which can lead to concrete section loss and decreased structural capacity. A pH test was conducted to determine the acidity of various manholes throughout the NGI. It was found that the pH levels in these manholes range from 1.7 (acidic) to 11.9 (alkaline) and H_2S levels range from 11 ppm to 41 ppm.

In reviewing the inspection reports and the BRE analysis it was determined that; generally the system was in good condition and that none of the assets were failing or in danger of imminent failure. Therefore, the prioritized twenty (20) year capital improvement projects consisted of preventative maintenance, replacement of assets whose useful life will expire within the twenty (20) year capital improvement plan and a study to determine the most efficient pump size for the current capacity and demand of the system.

The complete CIP includes the following:

- CCTV inspection of pipes every ten (10) years ($224,000).
- Manhole inspection every ten (10) years ($6,400).
- Preventative Maintenance ($300,800 annually).
- Replacement of Assets ($148,000 total).
- Pump Study/Replacement ($166,000).

The average annual cost of the twenty (20) year CIP is $527,000.

A rate analysis was conducted as part of the AMP and it was found that the NGI revenues sufficiently cover all expenditures and a funding gap does not exist. Therefore no corrections to the rate methodology were required.

This summary provides a brief overview of the evaluation and investigation and offers initial insight into the NGIDDD, its assets, condition, operation and needs. A more comprehensive discussion can be found in the Wastewater Asset Management Plan. A complete list of assets is attached.

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
1	NGI1-CH-S-1-NGI1-MH-024	Horizontal	Buried Pipe
2	NGI1-CH-S-2-NGI1-MH-027	Horizontal	Buried Pipe
3	NGI1-MH-001-LSI-BLIND TAP	Horizontal	Buried Pipe
4	NGI1-MH-002-NGI1-MH-001	Horizontal	Buried Pipe
5	NGI1-MH-003-NGI1-MH-002	Horizontal	Buried Pipe
6	NGI1-MH-004-NGI1-MH-003	Horizontal	Buried Pipe
7	NGI1-MH-005-NGI1-MH-004	Horizontal	Buried Pipe
8	NGI1-MH-006-NGI1-MH-005	Horizontal	Buried Pipe
9	NGI1-MH-007-NGI1-MH-006	Horizontal	Buried Pipe
10	NGI1-MH-008-NGI1-MH-007	Horizontal	Buried Pipe
11	NGI1-MH-009-NGI1-MH-008	Horizontal	Buried Pipe
12	NGI1-MH-010-NGI1-MH-009	Horizontal	Buried Pipe
13	NGI1-MH-011A-NGI1-MH-011	Horizontal	Buried Pipe
14	NGI1-MH-011-NGI1-MH-010	Horizontal	Buried Pipe
15	NGI1-MH-012-NGI1-MH-011	Horizontal	Buried Pipe
16	NGI1-MH-013-NGI1-MH-012	Horizontal	Buried Pipe
17	NGI1-MH-014-NGI1-MH-013	Horizontal	Buried Pipe
18	NGI1-MH-015-NGI1-MH-014	Horizontal	Buried Pipe
19	NGI1-MH-016-NGI1-MH-015	Horizontal	Buried Pipe
20	NGI1-MH-017-NGI1-MH-016	Horizontal	Buried Pipe
21	NGI1-MH-018-NGI1-MH-017	Horizontal	Buried Pipe
22	NGI1-MH-019-NGI1-MH-018	Horizontal	Buried Pipe
23	NGI1-MH-020-NGI1-MH-019	Horizontal	Buried Pipe
24	NGI1-MH-021-NGI1-MH-020	Horizontal	Buried Pipe
25	NGI1-MH-022-NGI1-MH-021	Horizontal	Buried Pipe
26	NGI1-MH-023-NGI1-MH-022	Horizontal	Buried Pipe
27	NGI1-MH-024-NGI1-MH-023	Horizontal	Buried Pipe
28	NGI1-MH-025-NGI1-MH-024	Horizontal	Buried Pipe
29	NGI1-MH-026-NGI1-MH-025	Horizontal	Buried Pipe
30	NGI1-MH-027-NGI1-MH-026	Horizontal	Buried Pipe
31	NGI1-MH-028-NGI1-CH-S-2	Horizontal	Buried Pipe
32	NGI2-BLIND TAP-NGI2-PL-003	Horizontal	Buried Pipe
33	NGI2-BLIND TAP-NGI2-PL-005	Horizontal	Buried Pipe
34	NGI2-BLIND TAP-NGI2-PL-009	Horizontal	Buried Pipe
35	NGI2-BLIND TAP-NGI2-PL-012	Horizontal	Buried Pipe
36	NGI2-DC-001-NGI2-WW-001	Horizontal	Buried Pipe
37	NGI2-DC-001-NGI2-WW-002	Horizontal	Buried Pipe
38	NGI2-PL-001-NGI2-BLIND TAP	Horizontal	Buried Pipe
39	NGI2-PL-002-NGI2-VLT-002	Horizontal	Buried Pipe
40	NGI2-PL-003-NGI2-PL-001	Horizontal	Buried Pipe
41	NGI2-PL-004-NGI2-BLIND TAP	Horizontal	Buried Pipe
42	NGI2-PL-005-NGI2-PL-004	Horizontal	Buried Pipe
43	NGI2-PL-006-NGI2-VLT-001	Horizontal	Buried Pipe
44	NGI2-PL-007-NGI2-VLT-048	Horizontal	Buried Pipe
45	NGI2-PL-008-NGI2-BLIND TAP	Horizontal	Buried Pipe
46	NGI2-PL-009-NGI2-PL-008	Horizontal	Buried Pipe
47	NGI2-PL-010-NGI2-VLT-047	Horizontal	Buried Pipe

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
48	NGI2-PL-011-NGI2-BLIND TAP	Horizontal	Buried Pipe
49	NGI2-PL-012-NGI2-PL-011	Horizontal	Buried Pipe
50	NGI2-PS-VC-001-NGI2-PL-010	Horizontal	Buried Pipe
51	NGI2-PS-VC-002-NGI2-PL-007	Horizontal	Buried Pipe
52	NGI2-VC-EQ-NGI2-VC-001	Horizontal	Buried Pipe
53	NGI2-VC-EQ-NGI2-VC-002	Horizontal	Buried Pipe
54	NGI2-VLT-003-NGI2-PL-006	Horizontal	Buried Pipe
55	NGI2-VLT-004-NGI2-PL-002	Horizontal	Buried Pipe
56	NGI2-VLT-005-NGI2-VLT-003	Horizontal	Buried Pipe
57	NGI2-VLT-006-NGI2-VLT-004	Horizontal	Buried Pipe
58	NGI2-VLT-007-NGI2-VLT-005	Horizontal	Buried Pipe
59	NGI2-VLT-008-NGI2-VLT-006	Horizontal	Buried Pipe
60	NGI2-VLT-009-NGI2-VLT-007	Horizontal	Buried Pipe
61	NGI2-VLT-010-NGI2-VLT-008	Horizontal	Buried Pipe
62	NGI2-VLT-011-NGI2-VLT-009	Horizontal	Buried Pipe
63	NGI2-VLT-012-NGI2-VLT-010	Horizontal	Buried Pipe
64	NGI2-VLT-013-NGI2-VLT-011	Horizontal	Buried Pipe
65	NGI2-VLT-014-NGI2-VLT-012	Horizontal	Buried Pipe
66	NGI2-VLT-015-NGI2-VLT-013	Horizontal	Buried Pipe
67	NGI2-VLT-016-NGI2-VLT-014	Horizontal	Buried Pipe
68	NGI2-VLT-017-NGI2-VLT-015	Horizontal	Buried Pipe
69	NGI2-VLT-018-NGI2-VLT-016	Horizontal	Buried Pipe
70	NGI2-VLT-019-NGI2-VLT-017	Horizontal	Buried Pipe
71	NGI2-VLT-020-NGI2-VLT-018	Horizontal	Buried Pipe
72	NGI2-VLT-021-NGI2-VLT-019	Horizontal	Buried Pipe
73	NGI2-VLT-022-NGI2-VLT-020	Horizontal	Buried Pipe
74	NGI2-VLT-023-NGI2-VLT-021	Horizontal	Buried Pipe
75	NGI2-VLT-024-NGI2-VLT-022	Horizontal	Buried Pipe
76	NGI2-VLT-025-NGI2-VLT-023	Horizontal	Buried Pipe
77	NGI2-VLT-026-NGI2-VLT-024	Horizontal	Buried Pipe
78	NGI2-VLT-027-NGI2-VLT-025	Horizontal	Buried Pipe
79	NGI2-VLT-028-NGI2-VLT-026	Horizontal	Buried Pipe
80	NGI2-VLT-031-NGI2-VLT-027	Horizontal	Buried Pipe
81	NGI2-VLT-032-NGI2-VLT-028	Horizontal	Buried Pipe
82	NGI2-VLT-033-NGI2-VLT-031	Horizontal	Buried Pipe
83	NGI2-VLT-034-NGI2-VLT-032	Horizontal	Buried Pipe
84	NGI2-VLT-035-NGI2-VLT-033	Horizontal	Buried Pipe
85	NGI2-VLT-036-NGI2-VLT-034	Horizontal	Buried Pipe
86	NGI2-VLT-037-NGI2-VLT-035	Horizontal	Buried Pipe
87	NGI2-VLT-038-NGI2-VLT-036	Horizontal	Buried Pipe
88	NGI2-VLT-039-NGI2-VLT-037	Horizontal	Buried Pipe
89	NGI2-VLT-040-NGI2-VLT-038	Horizontal	Buried Pipe
90	NGI2-VLT-041-NGI2-VLT-039	Horizontal	Buried Pipe
91	NGI2-VLT-042-NGI2-VLT-040	Horizontal	Buried Pipe
92	NGI2-VLT-043-NGI2-VLT-041	Horizontal	Buried Pipe
93	NGI2-VLT-044-NGI2-VLT-042	Horizontal	Buried Pipe
94	NGI2-VLT-045-NGI2-VLT-043	Horizontal	Buried Pipe

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
95	NGI2-VLT-046-NGI2-VLT-044	Horizontal	Buried Pipe
96	NGI2-VLT-047-NGI2-VLT-045	Horizontal	Buried Pipe
97	NGI2-VLT-048-NGI2-VLT-046	Horizontal	Buried Pipe
98	NGI2-WW-001-NGI2-VC-001	Horizontal	Buried Pipe
99	NGI2-WW-002-NGI2-VC-002	Horizontal	Buried Pipe
100	NGI2-WW-EQ-NGI2-WW-001	Horizontal	Buried Pipe
101	NGI2-WW-EQ-NGI2-WW-002	Horizontal	Buried Pipe
102	NGI3-MH-001-CLNHI-MH-081	Horizontal	Buried Pipe
103	NGI3-MH-001-NGI2-DC-001	Horizontal	Buried Pipe
104	NGI3-MH-002-NGI3-MH-001	Horizontal	Buried Pipe
105	NGI3-MH-003-NGI3-MH-002	Horizontal	Buried Pipe
106	NGI3-MH-004-NGI3-MH-003	Horizontal	Buried Pipe
107	NGI4-MH-001-NGI3-MH-004	Horizontal	Buried Pipe
108	NGI4-MH-002-NGI4-MH-001	Horizontal	Buried Pipe
109	NGI4-MH-003-NGI4-MH-002	Horizontal	Buried Pipe
110	NGI4-MH-004-NGI4-MH-003	Horizontal	Buried Pipe
111	NGI4-MH-005-NGI4-MH-004	Horizontal	Buried Pipe
112	NGI4-MH-006-NGI4-MH-005	Horizontal	Buried Pipe
113	NGI4-MH-007-NGI4-MH-006	Horizontal	Buried Pipe
114	NGI5-MH-001-NGI4-MH-007	Horizontal	Buried Pipe
115	NGI5-MH-002-NGI5-MH-001	Horizontal	Buried Pipe
116	NGI5-MH-003-NGI5-MH-002	Horizontal	Buried Pipe
117	NGI5-MH-004-NGI5-MH-003	Horizontal	Buried Pipe
118	NGI5-MH-005-NGI5-MH-004	Horizontal	Buried Pipe
119	NGI5-MH-006-NGI5-MH-005	Horizontal	Buried Pipe
120	NGI5-MH-007-NGI5-MH-006	Horizontal	Buried Pipe
121	NGI1-MH-001	Horizontal	Manhole
122	NGI1-MH-002	Horizontal	Manhole
123	NGI1-MH-003	Horizontal	Manhole
124	NGI1-MH-004	Horizontal	Manhole
125	NGI1-MH-005	Horizontal	Manhole
126	NGI1-MH-006	Horizontal	Manhole
127	NGI1-MH-007	Horizontal	Manhole
128	NGI1-MH-008	Horizontal	Manhole
129	NGI1-MH-009	Horizontal	Manhole
130	NGI1-MH-010	Horizontal	Manhole
131	NGI1-MH-011	Horizontal	Manhole
132	NGI1-MH-011A	Horizontal	Manhole
133	NGI1-MH-012	Horizontal	Manhole
134	NGI1-MH-013	Horizontal	Manhole
135	NGI1-MH-014	Horizontal	Manhole
136	NGI1-MH-015	Horizontal	Manhole
137	NGI1-MH-016	Horizontal	Manhole
138	NGI1-MH-017	Horizontal	Manhole
139	NGI1-MH-018	Horizontal	Manhole
140	NGI1-MH-019	Horizontal	Manhole
141	NGI1-MH-020	Horizontal	Manhole

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
142	NGI1-MH-021	Horizontal	Manhole
143	NGI1-MH-022	Horizontal	Manhole
144	NGI1-MH-023	Horizontal	Manhole
145	NGI1-MH-024	Horizontal	Manhole
146	NGI1-CH-S-1	Horizontal	Manhole
147	NGI1-MH-025	Horizontal	Manhole
148	NGI1-MH-026	Horizontal	Manhole
149	NGI1-MH-027	Horizontal	Manhole
150	NGI1-CH-S-2	Horizontal	Manhole
151	NGI1-MH-028	Horizontal	Manhole
152	NGI2-VLT-001	Vertical	Vault
153	NGI2-VLT-002	Vertical	Vault
154	NGI2-VLT-003	Vertical	Vault
155	NGI2-VLT-004	Vertical	Vault
156	NGI2-VLT-005	Vertical	Vault
157	NGI2-VLT-006	Vertical	Vault
158	NGI2-VLT-007	Vertical	Vault
159	NGI2-VLT-008	Vertical	Vault
160	NGI2-VLT-009	Vertical	Vault
161	NGI2-VLT-010	Vertical	Vault
162	NGI2-VLT-011	Vertical	Vault
163	NGI2-VLT-012	Vertical	Vault
164	NGI2-VLT-013	Vertical	Vault
165	NGI2-VLT-014	Vertical	Vault
166	NGI2-VLT-015	Vertical	Vault
167	NGI2-VLT-016	Vertical	Vault
168	NGI2-VLT-017	Vertical	Vault
169	NGI2-VLT-018	Vertical	Vault
170	NGI2-VLT-019	Vertical	Vault
171	NGI2-VLT-020	Vertical	Vault
172	NGI2-VLT-021	Vertical	Vault
173	NGI2-VLT-022	Vertical	Vault
174	NGI2-VLT-023	Vertical	Vault
175	NGI2-VLT-024	Vertical	Vault
176	NGI2-VLT-025	Vertical	Vault
177	NGI2-VLT-026	Vertical	Vault
178	NGI2-VLT-027	Vertical	Vault
179	NGI2-VLT-028	Vertical	Vault
180	NGI2-VLT-031	Vertical	Vault
181	NGI2-VLT-032	Vertical	Vault
182	NGI2-VLT-033	Vertical	Vault
183	NGI2-VLT-034	Vertical	Vault
184	NGI2-VLT-035	Vertical	Vault
185	NGI2-VLT-036	Vertical	Vault
186	NGI2-VLT-037	Vertical	Vault
187	NGI2-VLT-038	Vertical	Vault
188	NGI2-VLT-039	Vertical	Vault

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
189	NGI2-VLT-040	Vertical	Vault
190	NGI2-VLT-041	Vertical	Vault
191	NGI2-VLT-042	Vertical	Vault
192	NGI2-VLT-043	Vertical	Vault
193	NGI2-VLT-044	Vertical	Vault
194	NGI2-VLT-045	Vertical	Vault
195	NGI2-VLT-046	Vertical	Vault
196	NGI2-VLT-047	Vertical	Vault
197	NGI2-VLT-048	Vertical	Vault
198	NGI2-PS-WW-EQ	Vertical	Chamber
199	NGI2-PS-VC-001	Vertical	Chamber
200	NGI2-PS-VC-002	Vertical	Chamber
201	NGI2-PS-VC-EQ	Vertical	Chamber
202	NGI2-PS-DC-001	Vertical	Chamber
203	NGI2-PS-WW-001	Vertical	Wetwell
204	NGI2-PS-WW-002	Vertical	Wetwell
205	NGI2-PL-001	Vertical	Vault
206	NGI2-PL-002	Vertical	Vault
207	NGI2-PL-003	Vertical	Vault
208	NGI2-PL-004	Vertical	Vault
209	NGI2-PL-005	Vertical	Vault
210	NGI2-PL-006	Vertical	Vault
211	NGI2-PL-007	Vertical	Vault
212	NGI2-PL-008	Vertical	Vault
213	NGI2-PL-009	Vertical	Vault
214	NGI2-PL-010	Vertical	Vault
215	NGI2-PL-011	Vertical	Vault
216	NGI2-PL-012	Vertical	Vault
217	NGI3-MH-001	Horizontal	Manhole
218	NGI3-MH-002	Horizontal	Manhole
219	NGI3-MH-003	Horizontal	Manhole
220	NGI3-MH-004	Horizontal	Manhole
221	NGI4-MH-001	Horizontal	Manhole
222	NGI4-MH-002	Horizontal	Manhole
223	NGI4-MH-003	Horizontal	Manhole
224	NGI4-MH-004	Horizontal	Manhole
225	NGI4-MH-005	Horizontal	Manhole
226	NGI4-MH-006	Horizontal	Manhole
227	NGI4-MH-007	Horizontal	Manhole
228	NGI5-MH-001	Horizontal	Manhole
229	NGI5-MH-002	Horizontal	Manhole
230	NGI5-MH-003	Horizontal	Manhole
231	NGI5-MH-004	Horizontal	Manhole
232	NGI5-MH-005	Horizontal	Manhole
233	NGI5-MH-006	Horizontal	Manhole
234	NGI5-MH-007	Horizontal	Manhole
235	NGI2-VLT-001-ARV-001	Vertical	Air Release/Vacuum Valve

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
236	NGI2-VLT-002-ARV-001	Vertical	Air Release/Vacuum Valve
237	NGI2-VLT-003-ARV-001	Vertical	Air Release/Vacuum Valve
238	NGI2-VLT-004-ARV-001	Vertical	Air Release/Vacuum Valve
239	NGI2-VLT-005-ARV-001	Vertical	Air Release/Vacuum Valve
240	NGI2-VLT-006-ARV-001	Vertical	Air Release/Vacuum Valve
241	NGI2-VLT-007-ARV-001	Vertical	Air Release/Vacuum Valve
242	NGI2-VLT-008-ARV-001	Vertical	Air Release/Vacuum Valve
243	NGI2-VLT-009-ARV-001	Vertical	Air Release/Vacuum Valve
244	NGI2-VLT-010-ARV-001	Vertical	Air Release/Vacuum Valve
245	NGI2-VLT-011-ARV-001	Vertical	Air Release/Vacuum Valve
246	NGI2-VLT-012-ARV-001	Vertical	Air Release/Vacuum Valve
247	NGI2-VLT-013-ARV-001	Vertical	Air Release/Vacuum Valve
248	NGI2-VLT-014-ARV-001	Vertical	Air Release/Vacuum Valve
249	NGI2-VLT-015-ARV-001	Vertical	Air Release/Vacuum Valve
250	NGI2-VLT-016-ARV-001	Vertical	Air Release/Vacuum Valve
251	NGI2-VLT-017-ARV-001	Vertical	Air Release/Vacuum Valve
252	NGI2-VLT-018-ARV-001	Vertical	Air Release/Vacuum Valve
253	NGI2-VLT-019-ARV-001	Vertical	Air Release/Vacuum Valve
254	NGI2-VLT-020-ARV-001	Vertical	Air Release/Vacuum Valve
255	NGI2-VLT-021-ARV-001	Vertical	Air Release/Vacuum Valve
256	NGI2-VLT-022-ARV-001	Vertical	Air Release/Vacuum Valve
257	NGI2-VLT-023-ARV-001	Vertical	Air Release/Vacuum Valve
258	NGI2-VLT-024-ARV-001	Vertical	Air Release/Vacuum Valve
259	NGI2-VLT-025-ARV-001	Vertical	Air Release/Vacuum Valve
260	NGI2-VLT-026-ARV-001	Vertical	Air Release/Vacuum Valve
261	NGI2-VLT-027-ARV-001	Vertical	Air Release/Vacuum Valve
262	NGI2-VLT-028-ARV-001	Vertical	Air Release/Vacuum Valve
263	NGI2-VLT-031-ARV-001	Vertical	Air Release/Vacuum Valve
264	NGI2-VLT-032-ARV-001	Vertical	Air Release/Vacuum Valve
265	NGI2-VLT-033-ARV-001	Vertical	Air Release/Vacuum Valve
266	NGI2-VLT-034-ARV-001	Vertical	Air Release/Vacuum Valve
267	NGI2-VLT-035-ARV-001	Vertical	Air Release/Vacuum Valve
268	NGI2-VLT-036-ARV-001	Vertical	Air Release/Vacuum Valve
269	NGI2-VLT-037-ARV-001	Vertical	Air Release/Vacuum Valve
270	NGI2-VLT-038-ARV-001	Vertical	Air Release/Vacuum Valve
271	NGI2-VLT-039-ARV-001	Vertical	Air Release/Vacuum Valve
272	NGI2-VLT-040-ARV-001	Vertical	Air Release/Vacuum Valve
273	NGI2-VLT-041-ARV-001	Vertical	Air Release/Vacuum Valve
274	NGI2-VLT-042-ARV-001	Vertical	Air Release/Vacuum Valve
275	NGI2-VLT-043-ARV-001	Vertical	Air Release/Vacuum Valve
276	NGI2-VLT-044-ARV-001	Vertical	Air Release/Vacuum Valve
277	NGI2-VLT-045-ARV-001	Vertical	Air Release/Vacuum Valve
278	NGI2-VLT-046-ARV-001	Vertical	Air Release/Vacuum Valve
279	NGI2-VLT-047-ARV-001	Vertical	Air Release/Vacuum Valve
280	NGI2-VLT-048-ARV-001	Vertical	Air Release/Vacuum Valve
281	NGI2-PS-VC-001-ARV-001	Vertical	Air Release/Vacuum Valve
282	NGI2-PS-VC-002-ARV-001	Vertical	Air Release/Vacuum Valve

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
283	NGI2-PS-VC-001-GV-001	Vertical	Gate Valve
284	NGI2-PS-VC-001-GV-002	Vertical	Gate Valve
285	NGI2-PS-VC-001-GV-003	Vertical	Gate Valve
286	NGI2-PS-VC-002-GV-001	Vertical	Gate Valve
287	NGI2-PS-VC-002-GV-002	Vertical	Gate Valve
288	NGI2-PS-VC-002-GV-003	Vertical	Gate Valve
289	NGI2-PS-VC-EQ-GV-001	Vertical	Gate Valve
290	NGI2-PS-WW-EQ-GV-001	Vertical	Gate Valve
291	NGI2-PL-001-GV-001	Vertical	Gate Valve
292	NGI2-PL-001-GV-002	Vertical	Gate Valve
293	NGI2-PL-002-GV-001	Vertical	Gate Valve
294	NGI2-PL-003-GV-001	Vertical	Gate Valve
295	NGI2-PL-003-GV-002	Vertical	Gate Valve
296	NGI2-PL-004-GV-001	Vertical	Gate Valve
297	NGI2-PL-004-GV-002	Vertical	Gate Valve
298	NGI2-PL-005-GV-001	Vertical	Gate Valve
299	NGI2-PL-005-GV-002	Vertical	Gate Valve
300	NGI2-PL-006-GV-001	Vertical	Gate Valve
301	NGI2-PL-007-GV-001	Vertical	Gate Valve
302	NGI2-PL-008-GV-001	Vertical	Gate Valve
303	NGI2-PL-008-GV-002	Vertical	Gate Valve
304	NGI2-PL-009-GV-001	Vertical	Gate Valve
305	NGI2-PL-009-GV-002	Vertical	Gate Valve
306	NGI2-PL-010-GV-001	Vertical	Gate Valve
307	NGI2-PL-011-GV-001	Vertical	Gate Valve
308	NGI2-PL-011-GV-002	Vertical	Gate Valve
309	NGI2-PL-012-GV-001	Vertical	Gate Valve
310	NGI2-PL-012-GV-002	Vertical	Gate Valve
311	NGI2-PS-VC-001-CV-001	Vertical	Check Valve
312	NGI2-PS-VC-001-CV-002	Vertical	Check Valve
313	NGI2-PS-VC-002-CV-001	Vertical	Check Valve
314	NGI2-PS-VC-002-CV-002	Vertical	Check Valve
315	NGI2-PS-VC-001-FE-001	Vertical	Magmeter
316	NGI2-PS-VC-002-FE-001	Vertical	Magmeter
317	NGI2-PS-VC-001-PTG-001	Vertical	Pressure Transducer/Guage
318	NGI2-PS-VC-001-PTG-002	Vertical	Pressure Transducer/Guage
319	NGI2-PS-VC-001-PTG-003	Vertical	Pressure Transducer/Guage
320	NGI2-PS-VC-002-PTG-001	Vertical	Pressure Transducer/Guage
321	NGI2-PS-VC-002-PTG-002	Vertical	Pressure Transducer/Guage
322	NGI2-PS-VC-002-PTG-003	Vertical	Pressure Transducer/Guage
323	NGI2-PS-DC-001-SG-001	Vertical	Sluice Gate
324	NGI2-PS-DC-001-SG-002	Vertical	Sluice Gate
325	NGI2-PS-DC-001-TB-001	Vertical	Trash Basket
326	NGI2-PS-WW-001-P-001	Vertical	Submersible Centrifugal Pump
327	NGI2-PS-WW-002-P-001	Vertical	Submersible Centrifugal Pump
328	NGI2-PS-WW-001-LS-001	Vertical	Ultrasonic Level Instrument
329	NGI2-PS-WW-002-LS-001	Vertical	Ultrasonic Level Instrument

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
330	NGI2-PS-WW-001-PI-001	Vertical	Pressure Instrument
331	NGI2-PS-WW-002-PI-001	Vertical	Pressure Instrument
332	NGI2-PS-WW-001-FSLI-001	Vertical	Float Switch Level Instrument
333	NGI2-PS-WW-002-FSLI-001	Vertical	Float Switch Level Instrument
334	NGI2-PS-WW-001-PIPE-001	Vertical	Discharge Pipe
335	NGI2-PS-WW-002-PIPE-001	Vertical	Discharge Pipe
336	NGI2-VLT-001-HTC-001	Vertical	Hatch
337	NGI2-VLT-002-HTC-001	Vertical	Hatch
338	NGI2-VLT-003-HTC-001	Vertical	Hatch
339	NGI2-VLT-004-HTC-001	Vertical	Hatch
340	NGI2-VLT-005-HTC-001	Vertical	Hatch
341	NGI2-VLT-006-HTC-001	Vertical	Hatch
342	NGI2-VLT-007-HTC-001	Vertical	Hatch
343	NGI2-VLT-008-HTC-001	Vertical	Hatch
344	NGI2-VLT-009-HTC-001	Vertical	Hatch
345	NGI2-VLT-010-HTC-001	Vertical	Hatch
346	NGI2-VLT-011-HTC-001	Vertical	Hatch
347	NGI2-VLT-012-HTC-001	Vertical	Hatch
348	NGI2-VLT-013-HTC-001	Vertical	Hatch
349	NGI2-VLT-014-HTC-001	Vertical	Hatch
350	NGI2-VLT-015-HTC-001	Vertical	Hatch
351	NGI2-VLT-016-HTC-001	Vertical	Hatch
352	NGI2-VLT-017-HTC-001	Vertical	Hatch
353	NGI2-VLT-018-HTC-001	Vertical	Hatch
354	NGI2-VLT-019-HTC-001	Vertical	Hatch
355	NGI2-VLT-020-HTC-001	Vertical	Hatch
356	NGI2-VLT-021-HTC-001	Vertical	Hatch
357	NGI2-VLT-022-HTC-001	Vertical	Hatch
358	NGI2-VLT-023-HTC-001	Vertical	Hatch
359	NGI2-VLT-024-HTC-001	Vertical	Hatch
360	NGI2-VLT-025-HTC-001	Vertical	Hatch
361	NGI2-VLT-026-HTC-001	Vertical	Hatch
362	NGI2-VLT-027-HTC-001	Vertical	Hatch
363	NGI2-VLT-028-HTC-001	Vertical	Hatch
364	NGI2-VLT-031-HTC-001	Vertical	Hatch
365	NGI2-VLT-032-HTC-001	Vertical	Hatch
366	NGI2-VLT-033-HTC-001	Vertical	Hatch
367	NGI2-VLT-034-HTC-001	Vertical	Hatch
368	NGI2-VLT-035-HTC-001	Vertical	Hatch
369	NGI2-VLT-036-HTC-001	Vertical	Hatch
370	NGI2-VLT-037-HTC-001	Vertical	Hatch
371	NGI2-VLT-038-HTC-001	Vertical	Hatch
372	NGI2-VLT-039-HTC-001	Vertical	Hatch
373	NGI2-VLT-040-HTC-001	Vertical	Hatch
374	NGI2-VLT-041-HTC-001	Vertical	Hatch
375	NGI2-VLT-042-HTC-001	Vertical	Hatch
376	NGI2-VLT-043-HTC-001	Vertical	Hatch

North Gratiot Interceptor Drain Drainage District Assets

No.	Asset I.D.	Asset Type	Sub Asset Type
377	NGI2-VLT-044-HTC-001	Vertical	Hatch
378	NGI2-VLT-045-HTC-001	Vertical	Hatch
379	NGI2-VLT-046-HTC-001	Vertical	Hatch
380	NGI2-VLT-047-HTC-001	Vertical	Hatch
381	NGI2-VLT-048-HTC-001	Vertical	Hatch
382	NGI2-PS-WW-EQ-HTC-001	Vertical	Hatch
383	NGI2-PS-VC-001-HTC-001	Vertical	Hatch
384	NGI2-PS-VC-001-HTC-002	Vertical	Hatch
385	NGI2-PS-VC-001-HTC-003	Vertical	Hatch
386	NGI2-PS-VC-001-HTC-004	Vertical	Hatch
387	NGI2-PS-VC-001-HTC-005	Vertical	Hatch
388	NGI2-PS-VC-002-HTC-001	Vertical	Hatch
389	NGI2-PS-VC-002-HTC-002	Vertical	Hatch
390	NGI2-PS-VC-002-HTC-003	Vertical	Hatch
391	NGI2-PS-VC-002-HTC-004	Vertical	Hatch
392	NGI2-PS-VC-002-HTC-005	Vertical	Hatch
393	NGI2-PS-VC-EQ-HTC-001	Vertical	Hatch
394	NGI2-PS-DC-001-HTC-001	Vertical	Hatch
395	NGI2-PS-WW-001-HTC-001	Vertical	Hatch
396	NGI2-PS-WW-002-HTC-001	Vertical	Hatch
397	NGI2-PS-PLC-001	Vertical	Programmable Logic Contorller
398	NGI2-PS-PP-001	Vertical	Power Panel
399	NGI2-PS-GEN-001	Vertical	Generator
400	NGI2-PS-CP-SCADA-001	Vertical	SCADA Interface Panel
401	NGI2-PS-CT-001	Vertical	Communication Tower
402	NGI2-PS-VFD-001	Vertical	Variable Frequency Drive
403	NGI2-PS-VFD-002	Vertical	Variable Frequency Drive
404	NGI2-PS-GATE	Vertical	Security Gate
405	NGI2-PS-FENCE	Vertical	Security Fence
406	NGI2-PS-PAVEMENT	Vertical	Pavement
407	NGI2-PS-LANDSCAPE	Vertical	Landscape

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Macomb County Public Works Office *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1406-01 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: June 19, 2017.

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:

Brian Baker	at	(586) 469-5325	brian.baker@macombgov.org
Name		Phone Number	Email

[signature] 10-30-17

Signature of Authorized Representative (Original Signature Required) Date

BRIAN BAKER CHIEF DEPUTY MCPWO

Print Name and Title of Authorized Representative

EXECUTIVE SUMMARY

Introduction

Marine City is located on the east side of St. Clair County and borders the St. Clair River. The City is defined by approximately 2.15 square miles of land and has a population of 4,248 (2010 Census). The City provides wastewater collection and treatment services throughout the City limits and for a small portion of Cottreville Township along M-29, from the southern City limits to Roberts Road. Service is provided to properties west of M-29. Water is measured through approximately 1,945 meters that serve households, as well as commercial and industrial customers. There are three pump stations within the service area. The Belle River Pump Station collects wastewater from the eastern and northern sections of the service area and transports it to the WWTP via a force main. The King Road Pump Station collects wastewater from customers along King Road near the northern City limits. The Cottreville flow is pumped from a pump station located southeast of the K-mart complex at the southern City limits. The pump station transfers wastewater to a gravity sewer located immediately north of the pump station, which then flows via gravity to the WWTP. The City owns and operates the assets within the Marine City limits. Cottreville Township is responsible for the maintenance of the collection system within the Township, as well as the Kmart Pump Station.

In 2014, Marine City was awarded Stormwater, Asset Management, and Wastewater (SAW) Grant No. 1070-01 by the Michigan Department of Environmental Quality (MDEQ) to develop an Asset Management Program (AMP) for the sanitary sewer system and wastewater treatment plant (WWTP). The grant amount was $525,591 with a local match of $58,399, for a total cost of $583,990. The grant was in place from October 2014 through October 2017.

The requirement for an AMP and associated annual report are included in National Pollutant Discharge Elimination System (NPDES) Permit No. MI0020893 that went into effect on September 1, 2015. Tetra Tech was engaged by Marine City 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 (WWTP and pump stations) were evaluated for 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 main. The WWTP inventory has been grouped by building for non-process components. The process components have been grouped by which part of the treatment process they are a part of (i.e. the Aeration Rotors are located in the

Oxidation Ditch). The King Road and Belle River Pump Stations contain assets similar to the WWTP and were considered as an extension of the WWTP.

Inspection of the entire collection system was not deemed cost effective, so areas that experience surcharging and the areas with the oldest sewers were targeted for televising. The City had a contractor televise 33 percent of the gravity mains in the system, covering 271 unique pipe reaches totaling approximately 42,100 feet of pipe. In addition, 452 manholes were inspected. National Association of Sewer Service Companies (NASSCO) scores for the sewers and manholes were developed. The force main in Marine City runs from the Belle River Pump Station to the WWTP. The force main was installed when the WWTP expansion occurred in 1994.

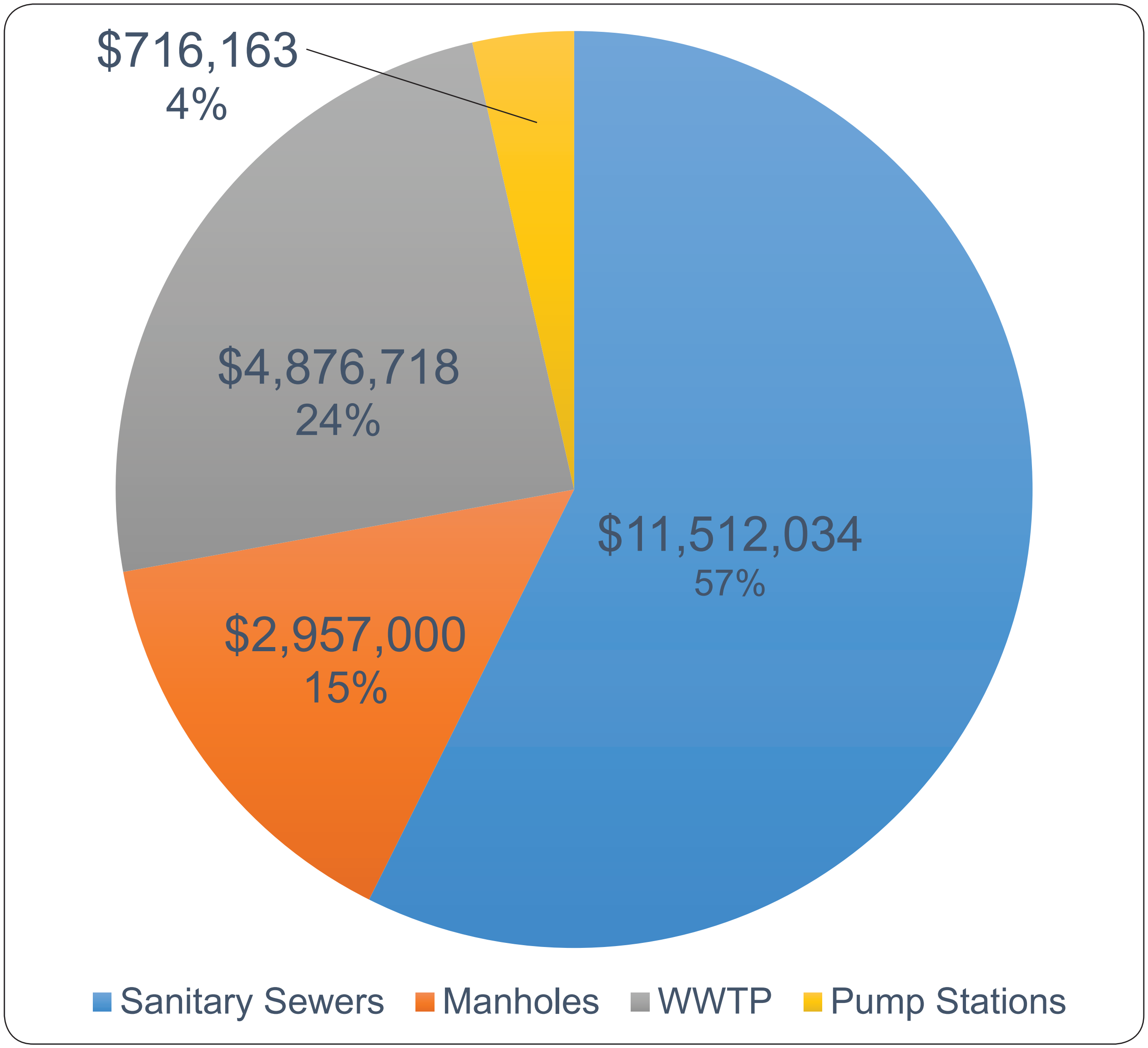
The Marine City WWTP and two pump station assets were inventoried by Tetra Tech using a discipline based approach. That is, a team was selected comprised of electrical, mechanical, and process engineers. Tetra Tech performed a condition assessment of the WWTP by visually inspecting all visible assets.

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, model numbers, and motor information. The anticipated useful life of the equipment was entered and replacement costs were developed.

The replacement value for the Marine City wastewater system is over $20 million. Figure ES-1 summarizes the replacement value for the wastewater collection and treatment system within the Marine City limits.

Figure ES-1

Value of Collection System, WWTP, and Pump Station 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 back-ups, but does experience occasional surcharging. The City has equipment and staff to clean the sewers. The City plans to implement a program to clean sewers at least once every five years.

The City's goals for this asset management plan 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-1. Sanitary Sewer System Current Level of Service

Level of Service Key Performance Indicators
Proposed
No Basement Backups
Reduce infiltration and inflow rates and volumes
Capacity to Convey MDEQ design storm
No Odor Complaints
Clean all sewers at least once in 5-year period
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 few, if any, 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 Marine City 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 WWTP and pump stations will be tracked using the Operation 10 database 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

Marine City completed a revenue structure report that demonstrated the City's rates generated sufficient revenue to fund the operation, maintenance, and replacement of the sanitary sewer collection system WWTP, and pump stations. This report was approved by MDEQ in April 2017.

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 WWTP, indicating the project is at the WWTP; CS, indicating the project is part of the sanitary collection system; or PS indicating the project is at one of the pump stations. 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, WWTP 18-1 is the first project anticipated to occur in 2018. 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 10,531 from December 2016.

Table ES-2. Capital Improvement Plan

Project No.	Description	Project Year	Project Cost
WWTP 18-1	Electrical Studies to Comply with NFPA 70E	2018	$7,000
WWTP 18-2	Instrumentation Device Replacement Phase I	2018	$12,000
CS 19-1	North Mary Street Heavy Cleaning	2019	$6,000
CS 19-2	Heavy Cleaning at Locations of City Concern ($10,000 per year)	2019-2023	$50,000
WWTP 19-1	Preventative Maintenance and IR Scans of Electrical Assets (Scheduled Every 5 years)	2019	$8,000
CS 20-1	Woodworth Street Sewer Replacement	2020	$239,000
WWTP 20-1	PLC Replacement Phase I	2020	$140,000
WWTP 20-2	Grit Pump Replacement	2020	$25,000
WWTP 21-1	PLC Replacement Phase II	2021	$70,000
WWTP 21-2	Instrumentation Device Replacement Phase II	2021	$12,000
WWTP 22-1	Final Clarifier Mechanism Rehabilitation	2022	$30,000
WWTP 22-2	Facility Power Distribution Upgrades	2022	$65,000
WWTP 23-1	Facility HVAC Replacement	2023	$210,000
WWTP 23-2	Instrumentation Device Replacement Phase III	2023	$9,000
WWTP 24-1	Influent Screw Pump Replacement	2024	$250,000
WWTP 24-2	RAS and WAS Pump Replacement	2024	$170,000
WWTP 24-3	Grit Dewatering System Replacement	2024	$100,000
WWTP 24-4	Oxidation Ditch Improvements (Scheduled Every 5 years)	2024	$75,000

Project No.	Description	Project Year	Project Cost
WWTP 24-5	Preventative Maintenance and IR Scans of Electrical Assets (Scheduled Every 5 years)	2024	$8,000
WWTP 25-1	Instrumentation Device Replacement Phase IV	2025	$45,000
WWTP 25-2	Water Heater and Emergency Shower Replacement	2025	$20,000
WWTP 25-3	Air Compressor Replacement	2025	$17,500
PS 25-1	Instrumentation Device Replacement Phase V	2025	$24,000
CS 27-1	Hill Street Sewer Replacement	2027	$138,000
PS 28-1	Generator Upgrade at Belle River Pump Station	2028	$90,000
WWTP 29-1	Final Clarifier Mechanism Replacement	2029	$200,000
WWTP 29-2	Preliminary Treatment Improvements	2029	$250,000
WWTP 29-3	Plant Effluent Water System Improvements	2029	$150,000
WWTP 29-4	Oxidation Ditch Improvements (Scheduled Every 5 years)	2029	$75,000
WWTP 29-5	Chemical Feed System Improvements	2029	$50,000
WWTP 29-6	Preventative Maintenance and IR Scans of Electrical Assets (Scheduled Every 5 years)	2029	$8,000
PS 29-1	Pump Replacement at Belle River Pump Station	2029	$165,000
PS 29-2	King Road Pump Station Rehabilitation	2029	$150,000
CS 30-1	Holland Sewer Replacement	2030	$191,000
WWTP 32-1	Transformer and Control Panel Replacement at WWTP	2032	$330,000
PS 32-1	MCC Replacement at Belle River Pump Station	2032	$75,000
PS 32-2	Transformer and Switchgear Replacement at Belle River Pump Station	2032	$55,000
WWTP 34-1	MCC Replacement at WWTP	2034	$325,000
WWTP 34-2	Gate and Telescoping Valve Replacement	2034	$205,000
WWTP 34-3	Low Voltage Unit Substation Replacement	2034	$180,000
WWTP 34-4	Sludge Transfer Pump and Scum Pump Replacement	2034	$125,000
WWTP 34-5	Oxidation Ditch Improvements (Scheduled Every 5 years)	2034	$75,000
WWTP 34-6	Sodium Hypochlorite Tank Replacement	2034	$40,000
WWTP 34-7	Preventative Maintenance and IR Scans of Electrical Assets (Scheduled Every 5 years)	2034	$8,000
WWTP 35-1	Unit Heater Replacement	2035	$30,000
	Total Cost of Projects in First Five Years	**2018-2022**	**$654,000**
	Total		**$4,507,500**

List of Major Assets

The collection system contains the following assets:

- 126,756 feet of gravity mains
- 6,357 feet of force main
- 474 manholes

The WWTP and pump station assets are organized by building or treatment process. The buildings or tanks included in the inventory are designated as follows:

- King Road Pump Station
- Belle River Pump Station
- Influent Pump Station
- Service Building
- Oxidation Ditch
- Final Clarifiers
- Chemical Building No. 1
- Chemical Building No. 2
- Chlorine Contact Tanks
- Return Sludge Pump Station
- Pump Building
- Gravity Thickening Tanks
- Sludge Holding Tanks
- Solids Drying Beds

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Marine City *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1070-01 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 XXNo XX

   If No - Date of the rate methodology approval letter: April 27, 2017.

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:

Mary Ellen McDonald at 810-765-8847 memcdonald@marinecity-mi.org
Name | Phone Number | Email

Mary Ellen McDonald — 10-30-2017
Signature of Authorized Representative (Original Signature Required) | Date

Mary Ellen McDonald, Finance Director/Treasurer
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan
Executive Summary

Meridian Charter Township
5151 Marsh Road, Okemos, MI 48864
http://www.meridian.mi.us/
Derek Perry – 517.853.4654
SAW Grant Project No. 1153-01

Executive Summary

Meridian Charter Township received a SAW Grant in October 2014 to prepare a Wastewater Asset Management Plan (AMP). The grant was awarded in the following amount:

	Amount
Wastewater AMP	$2,444,444
Match	$444,444
Grant Amount	$2,000,000

The Township has determined it to be in their 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 and/or Stormwater Asset Inventory

The Township owns and operates a wastewater collection system. The Township utilizes Geographic Information System (GIS) to maintain the inventory of assets. The GIS was created by converting an existing AutoCAD map which was built schematically from as-builts, but was not georeferenced. As part of the grant, the Township GPS located manholes, air relief valves, cleanouts and lift stations to improve their mapping. Manholes are the only item that have not been 100% located with GPS. Currently, 82% of the Township's manholes have been located with a handheld Global Positioning System (GPS) with sub-meter accuracy. The Township is considering CMMS software to maintain the asset data in the future.

Condition Assessment

To identify areas of potential deficiency in the system, major components were inspected, including manholes, air relief valves, cleanouts, lift stations, and sewers. Since 2012, approximately 55% 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). 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 3,702 manholes out of approximately 4,050, which is about 91% of the system. MACP Level 2 inspections were performed on 19 manholes utilizing a PANORAMO SI manhole scanner for a more detailed inventory. These manholes were identified through the Level 1 inspections to be in very poor condition. 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.

Sewer Condition Summary

PoF Rating	Percentage of Televised System
1	60.1%
2	20.2%
3	10.4%
4	5.2%
5	4.1%

Manhole Condition Summary

PoF Rating	Percentage of Inspected System
1	0.0%
2	16.4%
3	47.8%
4	31.5%
5	4.3%

Air Relief Valve/ Cleanout Condition Summary

PoF Rating	Percentage of Inspected System
1	0.0%
2	70.6%
3	23.5%
4	5.9%
5	0.0%

Lift Station Condition Summary

PoF Rating	Percentage of Inspected System
1	13.3%
2	30.0%
3	43.3%
4	10.0%
5	3.3%

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, and lift station was assigned a final PoF score based on results from sewer televising and visual inspections based on 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 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 Township 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 Township.

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 the Township 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 Township has established a list of attainable goals they intend to meet regarding their sanitary sewer system. These LoS goals include:

1. Meet all federal and state sanitary collection system regulations;
2. Clean and televise the remaining sanitary sewers that were not televised as part of the S2 or SAW Grants in years 1-10;

3. Re-televise all sanitary sewer PACP rated 3 and 4 within the sanitary collection system in years 10-20;
4. Address all sanitary sewer defects rated with a structural PoF of 5 that require immediate attention in years 1-5.
5. Address all manhole defects rated with a structural PoF of a 5 and a high BRE in years 5-10;
6. Perform root control treatment yearly;
7. Perform annual I/I removal project;
8. Start private property I/I removal program within 5 years.

Revenue Structure

As required by the MDEQ, the Township 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 rate methodology report shows, according to the budget, no revenue gap is projected for the fiscal year 2017. The Township plans to set money aside to address the projects in their CIP and for the operation and maintenance activities identified within the plan and to meet their 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, and lift stations. The main interceptor to Michigan State University rose to the top of the priority list during the sewer televising review with a BRE rating of 25. A portion of the interceptor had major hydrogen sulfide damage where the rebar cage was completely exposed at the crown of the pipe. This project is being recommended for completion in 2018. The remaining priority repairs for the sewers identified during sewer televising are recommended to be completed sometime during years 1-5.

There was one sewer project that was recommended for completion during the Township's S2 Grant study that is being recommended to move into the 5 year CIP. The sanitary sewer on Pebblestone Drive between Stoneycroft Drive and Boulevard Drive was tributary to a flow meter that was located on Birchwood Drive. This sewer is in poor condition and showed an inflow response due to the storm sewer in the street sharing the trench with the sanitary sewer. It is recommended to cured-in-place pipe (CIPP) line this sewer to help with capacity in the interceptor downstream from Birchwood Drive.

For manholes, 42 recommendations were prepared that scored 4 or 5 on the MACP scale with a BRE score of 16 or higher. Two of these structures are being recommended for immediate repair. The remaining 40 can be addressed in years 5-10. Based on the condition assessments of both the sewers and the manholes, it was decided to prioritize the sewer repairs over the manhole repairs due to limited funding and the number of projects that need to be completed within the 5 year CIP.

For lift stations, 1 station is being recommended for replacement within the next 5 years due to its age and proximity to Lake Lansing. In addition, the Township is looking at replacing the Quail Drive sewer that is tributary to the lift station at the same time. The Quail Drive sewer has a significant sag. Also, the replacement of the sewer would allow the Township some flexibility in relocating the lift station further from Lake Lansing. The Quail Drive sewer would add an additional $200,000 to the cost of the lift station shown below.

System Repair Recommendations

Type	Repair	Estimated Cost
Interceptor Rehabilitation	CIPP or SPR PE [1] Lining of Sewer	$500,000
Birchwood Sewer Rehabilitation	CIPP Sewer	$100,000
Sewer Spot Repairs	Miscellaneous Sewer Repairs	$450,000
Interceptor Siphon Structures	Rehabilitate Structures	$175,000
County Park Lift Station	Lift Station Replacement	$700,000
	Total Overall Cost	**$1,925,000**

1. (SPR PE), Steel Reinforced Polyethylene Pipe

Recommendations

Based on the Township's desired LoS goals, it was determined that necessary improvements to defective sewers and manholes will be phased over the course of 10 years. Improvements to the system include sewer and manhole rehabilitation and lift station replacement. A feasible maintenance schedule was established that aligns with the Township's needs and available resources for sewer televising, manhole location and assessment, and continued lift station maintenance.

List of Major Assets

Meridian Township's major assets include:

- 180 miles of gravity sanitary sewer
- 4,050 manholes
- 10.5 miles of force main
- 31 lift stations

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

Completion Date October 27, 2017
(no later than 3 years from executed grant date)

The Meridian Charter Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1153-01 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: April 27, 2017.

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:

Derek N. Perry at	517-853-4440	perry@meridian.mi.us
Name	Phone Number	Email

Frank L. Walsh — 10-23-2017

Signature of Authorized Representative (Original Signature Required) — Date

Mr. Frank L. Walsh, Township Manager

Print Name and Title of Authorized Representative

williams works

engineers | surveyors | planners

SAW Grant Number 1381-01
Duane Weeks, Village Manager
Village of Middleville
100 E Main St
Middleville, MI 49333
(269) 795-3385

October 27, 2017

Ms. Jaclyn Merchant
Revolving Loan Section
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
P.O. Box 30241
Lansing, MI 48909

Re: Wastewater AMP Summary
SAW Grant Project Number 1381-01

Dear Ms. Merchant:

The Village of Middleville was awarded a Stormwater Asset Management Plan and Wastewater Grant in 2013. This money was used to make an asset management plan and capital improvement plan for the sanitary sewer system. The sanitary sewer system consists of the wastewater treatment plant, lift stations, force mains, manholes, gravity sewer, and laterals. Using survey data and records, these assets were imported in ArcGIS. Much of the old sewer was televised to give an indication of its condition. Each pipe was ranked from 1 to 5 based on PACP and MACP standards. The lift stations, manholes, and treatment plant were visually inspected. It was found that 88% of the sanitary sewer system is in good to excellent condition, 5% is in fair condition, and 7% is in poor condition.

Each pipe in the sanitary sewer system was assigned a criticality rating between 1 and 5 based on the consequence of its failure. This was done manually by looking at a map of the system. The pipes serving less than 10 properties were given a rating of 1, and the pipes serving approximately 1/3 of the city were ranked 5. This rating was multiplied by the condition of the pipe to show the importance of maintaining the pipe.

Middleville's sanitary sewer system operates 24 hours per day, 7 days per week, 365 days per year. In order to accomplish this, the treatment plant and 4 of the 5 lift stations have backup generators to allow them to run when main line power is out. Furthermore, each lift station has a known capacity and is inspected weekly to ensure proper operation. The Village's goal is to maintain the sewer in such a way that backups never occur.

The revenue for the sanitary sewer fund comes from sewer rates charged to village residents. The Village reviews these rates on yearly basis to keep costs low. There are many factors that influence the annual sewer rates and many funds into which this money goes. The current rates are $3.35 per thousand gallons used, $17.70 readiness charge per REU, $40.48 debt charge per REU.

Using the data collected in this study, a capital improvement plan was made. It breaks down work to be done in the next 1-3 years, 4-8 years, 9-15 years, and 16-20 years. The overall cost for the 1-3 year plan is $512,000. This includes replacing and lining the critical pipes that are in the worst condition. In 4-8 years, the recommended costs total to $3,514,000. This takes care of the rest of the pipes that are in poor condition but are not critical. It also includes a major expansion of the wastewater treatment plant. The cost for the 9-15 year plan includes lining the rest of the vitrified clay and concrete pipe and re-evaluating the condition of the pipes currently in good condition. The 16-20 year plan includes re-evaluating all pipes which are currently in excellent condition and evaluating all sewer that was not televised. The current funding source should satisfy all these recommended improvements within the timeframes specified.

Sincerely,

Williams & Works

Nathan Breese, E.I.T.
Project Engineer

Enclosures: WWAMP Certification of Completeness
Table 1: List of Sanitary Sewer Major Assets

Cc: Brandon Mieras, P.E. – Williams & Works
Duane Weeks – Village of Middleville
File

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

Completion Date 10/21/17
(no later than 3 years from executed grant date)

The VILLAGE OF MIDDLEVILLE *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1381-01 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: JUNE 12, 2017.
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:

DUANE WEEKS at (269) 795-3385 weeksd@villageofmiddleville.org

Name | Phone Number | Email

Duane Weeks 10.27.17

Signature of Authorized Representative (Original Signature Required) | Date

DUANE WEEKS, VILLAGE MANAGER & FINANCE DIRECTOR

Print Name and Title of Authorized Representative

April 2017

Table 1: List of Sanitary Sewer Major Assets

Type	Amount	Unit
4 inch Force Main	466	ft
6 inch Force Main	2016	ft
6 inch Sanitary	1344	ft
8 inch Force Main	5860	ft
8 inch Sanitary	101004	ft
10 inch Sanitary	773	ft
12 inch Force Main	8874	ft
12 inch Sanitary	214	ft
Sanitary Laterals	35079	ft
Manholes	374	ea
Force Main Cleanout	4	ea
West Side L.S.	1	ea
East Side L.S.	1	ea
State Street L.S.	1	ea
Misty Ridge L.S.	1	ea
Grand Rapids St L.S.	1	ea
Wastewater Treatment Plant	1	ea

williams works

engineers surveyors planners

Saw Grant Number 1381-01
Duane Weeks, Village Manager
Village of Middleville
100 E Main St
Middleville, MI 49333
(269) 795-3385

October 27, 2017

Ms. Jaclyn Merchant
Revolving Loan Section
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
P.O. Box 30241
Lansing, MI 48909

Re: Storm Sewer AMP Summary
SAW Grant Project Number 1381-01

Dear Ms. Merchant:

The Village of Middleville was awarded a Stormwater Asset Management Plan and Wastewater Grant in 2013. This money was used to make an asset management plan and capital improvement plan for the storm sewer system. The storm sewer system consists of catch basins, gravity pipe, manholes, flared end sections, and culverts. Using survey data and records, these assets were imported in ArcGIS. Any known problematic sewer was televised to give an indication of its condition. The rest of the system was assigned a condition rating based on its age. They were ranked from 1 to 5 based on PACP and MACP standards. It was found that 93% of the storm sewer is in good condition, 6% is in fair condition, and 1% is in poor condition.

Each pipe in the storm sewer system was assigned a criticality rating between 1 and 5 based on the extent of problem caused by its potential failure. A widespread problem received a ranking of 5 and a very local problem received a ranking of 1. The condition rating and criticality rating multiplied together show the importance of keeping each pipe maintained.

The storm sewer system can be operated 24 hours per day, 7 days per week, 365 days per year. Most of the storm sewer is sized to handle a 25-year storm. The goal of the Village is to ensure the storm sewer functions to the capacity for which it was designed. If more runoff than that occurs, water will flow over the ground and flood some areas of the Village. The Village has maintenance workers to keep the storm sewer clean from leaves and debris. Special care is taken to clean catch basins and sewers in known problematic areas.

There is no revenue source devoted directly to storm sewer improvements. Any money needed for storm sewer improvements must come from the Village general fund or from Act 51 money.

Because the revenue is limited, the storm sewer improvement plan is deferred by a couple years. Is has work to be completed in the next 3-8 years, 9-15 years, 16-20 years, and 20+ years. The 3-8 year plan will cost about $50,000 and will improve all known problems with the storm sewer in the Village. The 9-15 year plan will cost $973,000 and will replace all storm sewer in the Village which is more than 50 years old. The 16-20 and 20+ year plan incorporate televising and inspecting the rest of the storm sewer in the Village to evaluate it.

Sincerely,

Williams & Works

Nathan Breese, E.I.T.
Project Engineer

Enclosures: SWAMP Certification of Project Completeness
Table 1: List of Storm Sewer Major Assets

Cc: Brandon Mieras, P.E., Williams & Works
Duane Weeks, Village of Middleville
File

DEQ

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

Completion Due Date 10/31/17
(no later than 3 years from executed grant date)

The VILLAGE OF MIDDLEVILLE *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1381-01 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:

DUANE WEEKS at (269) 795-3385 weeksd@villageofmiddleville.org

Name Phone Number Email

Duane Weeks 10.27.17

Signature of Authorized Representative (Original Signature Required) Date

DUANE WEEKS, VILLAGE MANAGER & FINANCE DIRECTOR

Print Name and Title of Authorized Representative

Table 1: List of Storm Sewer Major Assets

Type	Amount	Unit
12-inch Culvert	714	ft
15-inch Culvert	71	ft
18-inch Culvert	510	ft
24-inch Culvert	123	ft
30-inch Culvert	148	ft
36-inch Culvert	1324	ft
48-inch Culvert	144	ft
48x48 Box Culvert	65	ft
6-inch Storm	2,377	ft
8-inch Storm	1,245	ft
10-inch Storm	720	ft
12-inch Storm	48,496	ft
15-inch Storm	7,232	ft
18-inch Storm	5,988	ft
21-inch Storm	1,018	ft
24-inch Storm	8,744	ft
30-inch Storm	4,281	ft
36-inch Storm	2,706	ft
Storm Manholes	180	ea
Catch Basins	593	ea
Flared End Sections	97	ea

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	October 30, 2017
To:	Mr. Clarence Jones
Company:	Michigan Department of Environmental Quality
From:	Barbara E. Marczak, P.E., Prein&Newhof
cc:	Jake Eckholm, City Manager; Doug Kadzban, DPW Director
Re:	City of Muskegon Heights, Muskegon County, SAW Grant Summary of Storm Water System Asset Management Plan

This memorandum provides the summary of the City of Muskegon Heights' SAW grant activities required under Section 603 of Public Act 84 of 2015. This SAW grant is for the City of Muskegon Heights Storm Water System. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

City of Muskegon Heights
2724 Peck Street
Muskegon Heights, MI 49444
www.muskegonheights.org

Contact Information for the grantee:

Honorable Kimberley Sims, Mayor
2724 Peck Street
Muskegon Heights, MI 49444

Phone: 231-733-8870

SAW Grant Project Number: 1437-01

Executive Summary

The City of Muskegon Heights received a SAW Grant in 2014 to prepare a Storm Water Asset Management Plan. The grant agreement indicated the following amounts:

	Grant Amount	Local Match
Storm Water AMP	$751,187	$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
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 portion of the system locations were field verified using handheld GPS equipment and survey quality GPS and locations adjusted with Global Positioning System (GPS) coordinates.

Asset inventory data for storm sewers and culverts, including year of installation, material, and sizes, were cataloged from record drawings and visually verified where needed. Asset inventory data is managed using GIS 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 approximately 50% of the collection system piping was documented with a pole mounted zoom camera (looking down each pipe from the manholes). 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 PACP system (Pipeline Assessment Certification Program). 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
24%	49%	23%	2%	2%

Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, and structures.

Percentage of manholes within each rating category

1	2	3	4	5
13%	53%	26%	6%	1%

Catch basins were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, sumps, and structures.

Percentage of catch basins within each rating category

1	2	3	4	5
7%	78%	10%	3%	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.

The City of Muskegon Heights 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 inventory and assessments have been discussed at meetings and with 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 Waste Water 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 (RoF) rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by the 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 given a Consequence of Failure (CoF) 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 an 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). We then ran a Jenks Optimization to create 5 primary groupings, each with a rank of 1-5 (5 being 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 Muskegon Heights 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 identified and where it 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 Muskegon Heights' storm water system covers most of the City. Thirty defects in the storm sewer system were identified that can be remedied with spot repairs. These spot repairs are planned to be covered with wastewater sewer improvements and are identified in the CIP developed for the wastewater system. 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, such as road replacement, consideration will be given to assessment, rehabilitation, and replacement as needed. The RoF 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 waste water, roadway, and drinking water, it is imperative that any CIP process coordinate actions with other utility systems.

List of the major identified assets

- 276,181 feet of gravity storm sewer
- 1030 manholes and 1642 catch basins
- 21 storm water outlets

Deliverables/Reports Prepared

Information and reports prepared and provided under this grant include:

1. *GIS mapping and database and Arc Reader files*
2. *Asset Management pipe spreadsheet*
3. *Sewer Flow Study – Storm Water Collection System and Capacity Analysis*
4. *Capital Improvement Plan (including financial analysis)*
5. *Storm Water System Evaluation*
6. *Storm Water Asset Management Plan*

DEQ

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

Completion Due Date 10/31/2017
(no later than 3 years from executed grant date)

The **City of Muskegon Heights** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1437-01** 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:

Kimberley Sims at 231-733-8870 KSims@CityofMuskegonHeights.org
Name Phone Number Email

10/31/17
Signature of Authorized Representative (Original Signature Required) Date

Kimberley Sims, Mayor
Print Name and Title of Authorized Representative

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	October 30, 2017
To:	Mr. Clarence Jones
Company:	Michigan Department of Environmental Quality
From:	Barbara E. Marczak, P.E., Prein&Newhof
cc:	Doug Kadzban., Director of Public Works; Jake Eckholm, City Manager
Re:	City of Muskegon Heights, Muskegon County, SAW Grant Summary of Waste Water System Asset Management Plan

This memorandum provides the summary of the City of Muskegon Heights' SAW grant activities required under Section 603 of Public Act 84 of 2015. This SAW grant is for the City of Muskegon Heights Waste Water System. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

City of Muskegon Heights
2724 Peck Street
Muskegon Heights, MI 49444
www.muskegonheights.org

Contact Information for the grantee:

Honorable Kimberley Sims, Mayor
2724 Peck Street
Muskegon Heights, MI 49444

Phone: 231-733-8870

SAW Grant Project Number: 1437-01

Executive Summary

The City of Muskegon Heights received a SAW Grant in 2014 to prepare a Waste Water Asset Management Plan. The grant agreement indicated the following amounts:

	Grant Amount	Local Match
Waste Water AMP	$1,248,813	$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 adjusted with Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, 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.

The GIS and asset spread 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. 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, 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 PACP system (Pipeline Assessment Certification Program). 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
16%	32%	24%	18%	10%

Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, and structures.

Percentage of manholes within each rating category

1	2	3	4	5
11%	46%	37%	6%	<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 has established the following basic Level of Service Goals:

- *Meet Regulatory Requirements*
- *Minimize Service Interruptions*
- *Minimize Public Hazards*
- *Manage Storm Water Inflow and Ground Water 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 (RoF) rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by the 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, 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). We then ran a Jenks Optimization 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 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 costs 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/or restructuring possibilities were also explored.

The Capital Improvement Plan (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 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 and additional operation and maintenance.

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 RoF ratings for the assets were assigned and actions prioritized using the Criticality ratings, action timelines were predicted for maintenance/repair/replacement. Because the waste water 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 five to ten years.

The following capital improvements and additional O&M planned for the next 5 years to 10 years for the sanitary and storm system out of the wastewater fund include:

CIP and O&M Implementation Timeline

Planned Year [(1)]	Project Title	Total Est. Cost from Sewer Fund [(2)]
2018		
	3 sanitary manhole replacements	
	18 sanitary spot CIPP patches	
	2 sanitary point repairs	
	3 sanitary lateral replacements	
	3 storm point repairs	
	2 storm spot CIPP patches	
	4 storm utility penetrations	
	2 sanitary utility penetrations	
	Cleaning and Televising (O&M)	
	2018 Total	**$ 225,000**
2019		
	Hackley and Hoyt Sewer Cleaning, Televising and Chemical Grouting	
	5 sanitary point repairs	
	9 sanitary CIPP patches	
	1 sanitary manhole replacement	
	Cleaning and Televising (O&M)	
	2019 Total	**$ 350,000**
2020		
	CIPP line 7,400 feet of sanitary pipe	
	Cleaning and Televising (O&M)	
	2020 Total	**$ 450,000**
2021		
	3 sanitary point repairs	
	19 spot CIPP patches	
	1 watermain reroute out of sanitary manhole	
	15 storm point repairs	
	9 storm CIPP patches	
	Cleaning and Televising (O&M)	

	2021 Total	**$**	**425,000**
2022			
	30 storm/sanitary spot repairs TBD from additional televising		
	Cleaning and Televising (O&M)		
	2022 Total	**$**	**350,000**

Estimated future expenditures

2023	$300,000	$100,000	$400,000
2024	$300,000	$125,000	$425,000
2025	$300,000	$125,000	$425,000
2026	$300,000	$150,000	$450,000
2027	$300,000	$150,000	$450,000

Notes:

(1) Unplanned repairs may necessitate adjustments in priority.

(2) All costs estimated in 2017 dollars and rounded up to closest $1000.

The Capital Improvement Plan will be reviewed annually and adjusted based on current information and priorities and funding available.

List of the plan's major identified assets:

- 260,648 feet of gravity sanitary sewer
- 838 manholes

<u>Deliverables/Reports Prepared</u>

Information and reports prepared and provided under this grant include:

1. *GIS mapping and database and Arc Reader Files*
2. *Asset Management pipe spreadsheet*

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. *Waste 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 __10/31/2017__
(no later than 3 years from executed grant date)

The __City of Muskegon Heights__ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. __1437-01__ 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: __April 24, 2017__.

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:

__Kimberley Sims__ at __231-733-8870__ __KSims@CityofMuskegonHeights.org__

Name | Phone Number | Email

10/31/17

Signature of Authorized Representative (Original Signature Required) | Date

__Kimberley Sims, Mayor__

Print Name and Title of Authorized Representative

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan Executive Summary Guidance New Buffalo Township, Michigan

Wastewater Sewer System

Date: October 12, 2017
To: Mr. Clarence Jones
RE: Organization: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: New Buffalo Township SAW Grant: Summary of Wastewater Asset Management Plan

Grantee Information:
New Buffalo Township
17425 Red Arrow Highway
New Buffalo, MI 49117
mheit@newbuffalotownship.org
Ms. Michelle Heit; Supervisor
PH: 269-469-1011
SAW Project #: 1597-01

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:

- 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:	$538,174	$538,174
2)	Less: Match	$ 53,817	$ 53,817
3)	Net Grant:	$484,357	$484,357

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 the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

Description:
A comprehensive inventory of the Sanitary Sewer (wastewater) system assets was performed using utility drawings and on site Global Positioning System (GPS) field locations. Using the data collected, a detailed map of the wastewater system was prepared using Geographical Information Systems (GIS). The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for accurately locating the manholes and other system assets in the field utilizing handheld GPS equipment. Collecting precise locations of utility assets will help aid the Township and GRSD staff to locate assets more efficiently and respond more quickly to service calls, ensuring the highest level of customer service.

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 the completion of the comprehensive inventory of the Sanitary Sewer system assets, a conditional assessment of all asset components was performed. Wightman and Associates, Inc. (WAI) performed the conditional assessment including a complete visual and physical inspection of all lift stations and all of the manholes in the wastewater system. A more detailed inspection was required for several sewer sections. These sections of piping and manholes were inspected using video televising equipment designed for internal pipe inspection and imaging provided by Terra Contracting.

The conditional assessments for 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 or the condition of the asset. Condition grades for both structural and operational and maintenance (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 the Table below.

NASSCO Condition Assessment System	
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)

The following charts show the condition rating for the wastewater system based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database

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.*

Level of Service: The Level of Service (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how the Township of New Buffalo wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team has selected the following statements to define the desired LOS:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage, break, or lift station failure occur causing an untreated discharge, we will respond within one hour and correct the problem as soon as possible to minimize any environmental damage.

3. We will develop and implement a preventive maintenance program to reduce the likelihood of the occurrence of a blockage, break, or lift station failure.

4. We will respond to customer complaints and system alarms within one hour for an emergency and within twenty-four hours for a non-emergency during normal business hours. Communication with the complainant or customers affected will be maintained until the issue is resolved.

5. We will maintain an asset management program for the system and set rates and secure funding to maintain a sustainable funding structure.

6. We will develop a work order system to identify, assign and track preventative and reactive work on the system and report on the status of work orders to the Township monthly.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to customers annually.

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?*

Criticality is determined by multiplying the likelihood of failure by the consequence of failure and is a significant factor in prioritizing capital improvements. The higher the criticality, the more resources should be allocated to maintain the asset. The next sections evaluate the likelihood and consequence of failure for the Township wastewater system.

A. Likelihood of Failure

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include: cost of repair; social cost associated with the loss of the asset; repair/replacement costs related to collateral damage caused by the failure; legal costs related to additional damage caused by the failure; environmental costs created by the failure; loss of business revenue to the community; and any other associated costs or losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with a failure. Below is the ranking system that was used to determine the consequence of failure for the system.

<u>Rating</u> **<u>Consequence</u>**

1 **Insignificant:** <10% loss of service, limited potential human contact, minimal property damage.

2 **Minor:** 10% loss of service, potential human contact, minimal property damage.

3 **Moderate:** 25% loss of service, potential human contact, limited property damage, disruption to essential services or major industry.

4 **Major:** 90%>50% loss of service, likely human contact, moderate property damage.

5 **Catastrophic:** 90%+ loss of service, high potential of human contact with sewage, extensive property damage.

Loss of service for the wastewater system refers to number of service connections impacted due to a single isolated 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. <u>Methodology – Asset Management Financial Plan:</u>

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, 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 "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.

Management Summary

- Rates: no change at this time. Re-evaluate after GRSD Authority completes their financial plan.
- Cash Balance: Maintain cash balances above six months.
- Capital Cost: A cash, as opposed to debt, approach as modeled in the cash flow.
- A significant increase will occur in net revenue beginning in 2029/30 with the expiration of the 2013 GRSD Authority Bonds in 2028/29. The Township should review the potential rate impact at that time in order to consider all fund management options.

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. Description

To ensure that the desired LOS can be maintained, a long-term Capital Improvement Plan (CIP) is required to meet the system needs for the future. The CIP is based upon improvements determined necessary due to the condition of the assets and their criticality. Projects include those where field assessment has determined the asset is nearing the end of its useful life and through engineering judgment should be replaced such as broken gravity mains, lift stations that have equipment nearing the end of its useful life and new advances in safety equipment. These projects include: gravity main repairs, manhole rehabilitation, and lift stations repairs and upgrades. The planning period is 20 years to allow the development of an adequate rate structure, to finance the projects. Capital improvement projects are projects that the community has an extended period of time to plan for and are projects that usually cover high cost, non-recurring items.

B. Recommended Wastewater System Projects

The following table lists the recommended capital improvement projects for the next twenty years and cyclical improvement projects for the wastewater system. Detailed descriptions and cost estimates for each project can be found in the AMP.

Year	***Project Name***	***Estimated Cost***
2018	Mainline Spot Repair on Union Pier Road at Krob Road	$10,000
2018	Mainline Spot Repair on Union Pier Road at Prusa Road	$10,000
2018	LS 55 Electrical and Control Upgrades	$36,000
Annual	Annual Pump Replacements*	$330,000

2019	Replace Air Release Valves	$14,000
2019	Install Safety Grates	$29,000
2020	LS 2 Electrical and Control Upgrades	$44,000
2020	LS 3 Electrical and Control Upgrades	$44,000
2020	LS 18 Electrical and Control Upgrades	$44,000
2021	LS 56 Generator	$72,000
2021	LS 50 Piping and Valves	$29,000
2021	Manhole Lining	$29,000
2022	LS 52 Replacement and Emergency Generator Installation	$288,000
2023	LS 51 Replacement	$216,000
2024	LS 53 Replacement	$216,000
2031	Additional Manhole Lining	$29,000
2032	Level Control Updates	$61,000
2033	Telemetry and SCADA Equipment Upgrades	$81,000
Total Estimated Project Costs for Twenty Year CIP (current dollars) =		$1,582,000
Total Estimated Project Costs for Twenty Year CIP (future dollars) =		$1,842,000

*The Annual Pump Replacements will occur as needed and the cost will be spread over the full 20 years.

A. <u>List of Major Assets:</u> *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the Township Assets:

Table of Key Wastewater System Assets		
Item	Quantity	Unit
27" Sanitary Sewer	136	LF
18" Sanitary Sewer	16	LF
15" Sanitary Sewer	682	LF
12" Sanitary Sewer	35,217	LF
10" Sanitary Sewer	17,813	LF
8" Sanitary Sewer	83,531	LF
6" Sanitary Sewer	195	LF
4' Sanitary Manhole	482	EA
Service Lead, Complete	706	EA
Lift Station > 500 gpm	6	EA
Lift Station < 500 gpm	7	EA
Grinder Station	1	EA
16" Force Main	9,366	LF
10" Force Main	10,701	LF
8" Force Main	3,758	LF
6" Force Main	9,915	LF
4" Force Main	3,882	LF
2" Force Main	285	LF
Air Release Valves/Cleanouts	38	EA

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

Completion Date **October 31, 2017**
(no later than 3 years from executed grant date)

The New Buffalo Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1597-01** 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: 4/24/17.

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
Ms. Michelle Heit	(269) 469-1011	mheit@newbuffalotownship.org

Michelle Heit 10-12-17

Signature of Authorized Representative (Original Signature Required) Date

Michelle Heit 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 October 31, 2017
(no later than 3 years from executed grant date)

The New Buffalo Township *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1597-01** 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: 4/24/17.
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. Michelle Heit	(269) 469-1011	mheit@newbuffalotownship.org
Name	Phone Number	Email

Michelle Heit — 10-12-17

Signature of Authorized Representative (Original Signature Required) — Date

Michelle Heit Supervisor

Print Name and Title of Authorized Representative

April 2017

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan Executive Summary Guidance City of New Buffalo, Michigan

Stormwater Sewer System

Date: October 4, 2017
To: Mr. Clarence Jones
C/O: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: City of New Buffalo SAW Grant: Summary of Stormwater Asset Management Plan

Grantee Information:
City of New Buffalo
224 W. Buffalo St.
New Buffalo, MI 49117
manager@cityofnewbuffalo.org
Mr. David Richards; Manager
Ph: (269) 469-1500
SAW Project #: 1418-01

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:	$690,174	$344,000	$1,034,174
2)	Less: Match	$ 00	$ 34,400	$ 34,400
3)	Net Grant:	$690,174	$309,600	$ 999,774

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 first step in developing an AMP is to identify the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

Description:
Through this inventory of the storm sewer system and review of historical data, it was determined that the stormwater collection system includes more than 55,000 feet of gravity sewer, over 550 storm structures, over 3,600 feet of storm culverts, and about 14,850 feet of open drains. The storm water collection system serves the majority of the City and conveys flow with primary outfalls being in the harbor or into Lake Michigan.

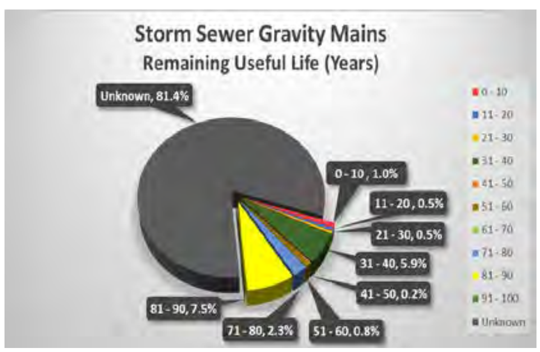
Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

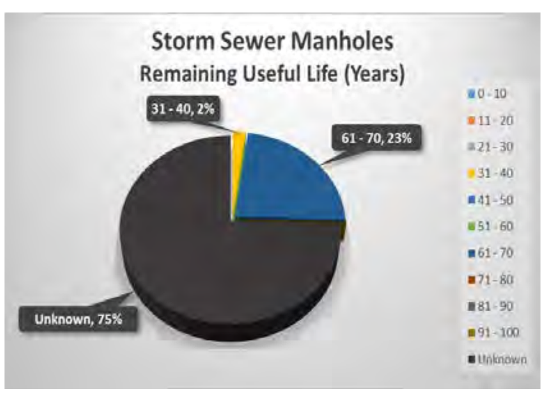
The overall stormwater system is in fair condition with some areas in poor condition that are impacting capacity of the system. A significant portion of the system is quite aged and deteriorated as expected for storm pipe. Several locations of collapsed or fractured pipe were identified in the CCTV that are in need of repair to restore capacity and reliability to the system.

The conditional assessments for 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 or the condition of the asset. Condition grades for both structural and operational and maintenance (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 the Table below.

NASSCO Condition Assessment System	
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)

The following charts show the condition rating for the wastewater system based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database





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.*

Level of Service: The Level of Service (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how the City of New Buffalo storm water system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team selected the following statements to define the desired LOS for the City of New Buffalo stormwater system:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage or break occur, we will correct the problem as soon as possible to minimize any future flooding.

3. We will develop and implement a preventive maintenance program to reduce the likelihood of the occurrence of a blockage or breakage.

4. We will respond to customer complaints during normal business hours. Communication with the complainant or customers affected will occur.

5. We will maintain an asset management program for the system and provide reports on an as needed basis.

6. We will develop a work order system to identify, assign and track preventative and reactive work on the system and report on the status of work orders to the City on an as needed basis.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to the City on an as needed basis.

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?*

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. 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

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

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.
- 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 stormwater asset, social costs and/or the costs of collateral damage caused by the failure can even outweigh the cost of repairing the failure itself.

Loss of service for the stormwater system refers to number of service connections impacted due to a single isolated failure.

The consequence of failure for City of New Buffalo stormwater assets was assessed using the following criteria:

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 1 - Consequence of failure rating scheme for stormwater 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.*

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 storm watersystem 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 City. 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.*

A. 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. To ensure that the desired LOS 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. The planning period for a CIP is 20 years to allow for the development of a rate structure adequate to finance those projects that can reasonably be predicted to be needed during that period.

B. Recommended Stormwater System Projects:

Table 6 lists the recommended capital improvement projects for the next twenty years for the stormwater system. Where appropriate, the estimated project costs shown below. Include engineering, construction observation, and contingency costs, thus representing the total estimated cost for the project. Detailed descriptions and cost estimates for each project listed can be found in Appendix E in the Asset Management Plan.

Priority	CIP Year	Project Name	Estimated Cost[1]
1	2018	Replacement of Pipe 372	$9,000
2	2018	Spot Repair of Pipe 748	$7,000
3	2018	Spot Repair of Pipe 475	$7,000
4	2018	Conflict with Pipe 336 and Sanitary Leads	$37,000
5	2019	Partial Replacement of Pipe 465	$21,000
6	2019	Partial Replacement of Pipe 453	$34,000
7	2020	Replacement of Pipe 667	$36,000
8	2020	Replacement of Pipe 999	$9,000
9	2020	Partial Replacement of Pipe 468	$9,000
10	2020	Spot Repair of Pipe 979	$7,000
11	2021	Partial Replacement of Pipe 524	$27,000
12	2021	Partial Replacement of Pipe 383	$27,000
13	2022	Ravine Project	$9,000
14	2022	Replacement of Pipe 1012	$9,000
15	2022	Replacement of Pipe 447	$9,000
16	2022	Spot Repair of Pipe 583	$7,000
17	2023	Spot Repairs of Pipe 331	$17,000
18	2024	Partial Replacement of Pipe 688	$44,000
19	2025	Partial Replacement and Root Cut of Pipe 506	$22,000
20	2025	Partial Replacement of Pipe 463	$10,000
21	2025	Repairs of Various Manholes	$7,000
22	2026	Replacement of Pipe 500	$26,000
23	2026	Spot Repair of Pipe 389	$7,000
24	2027	Replacement of Pipe 1024	$22,000
25	2028	Replacement of Pipe 904	$48,000
26	2028	Spot Repairs of Pipe 514	$17,000
2029	27	Replacement of Pipe 716 and Spot Repair of Pipe 1061	$35,000
2030	28	Replacement of Pipe 441 and Spot Repair of Pipe 450	$25,000

[1] Estimated CIP project costs shown include both engineering fees and a contingency budget, where appropriate.

2031	29	Replacement of Pipe 511	$25,000
2033	30	Replacement of Pipes 456, 457, 458, 469	$66,000
2035	31	Replacement of Pipe 1042	$16,000
2036	32	Partial Replacement of Pipe 835	$21,000
2037	33	Spot Repairs of Pipe 557	$20,000
2038	34	Replacement of Pipe 1016	$30,000
		Total Estimated Project Cost for Twenty Year Storm water CIP (current dollars) =	$722,000

Table 2 - Recommended stormwater system capital improvement projects

In addition to the capital improvement projects listed above, sufficient funds must also be budgeted to continue to provide the routine O&M services required to maintain the desired LOS within the City of New Buffalo stormwater system.

There are two projects listed within the CIP that are of high priority for replacement or repair. The first project is the 12" CMP pipe located at the intersection of S. Barton Street and W. Madison Avenue. The pipe has excessive deterioration and large portions of the pipe wall gone. This is a concern with the pipe being partially located underneath pavement. With failure imminent, the deficiency should be addressed to avoid unsafe conditions.

The other project of concern involves the 30" pipe located along N. Whittaker Street. This pipe has sanitary leads crossing through the storm pipe in three separate locations. It is not an acceptable practice to have sanitary leads running through the storm system and the leads or storm pipe should be relocated to avoid this conflict. The solution to the conflict will need to be investigated further to determine the best course of action. Possible solutions include dropping the leads under the storm or over the storm to avoid the conflict. These two projects should be addressed as soon as is feasible for the City to avoid further complications to the stormwater system.

A. <u>List of Major Assets:</u> *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the following table contains a summary of the stormwater system assets owned by City of New Buffalo that were identified and included in the stormwater AMP.

Asset Description	Quantity	Units
48" Storm Sewer	1,485	LF
42" Storm Sewer	740	LF
36" Storm Sewer	1,370	LF
30" Storm Sewer	1,600	LF
24" Storm Sewer	6,475	LF
21" Storm Sewer	300	LF
18" Storm Sewer	4,690	LF
15" Storm Sewer	2,150	LF
12" Storm Sewer	32,595	LF
10" Storm Sewer	1,650	LF
8" Storm Sewer	1,430	LF
6" Storm Sewer	580	LF
Storm Culverts	3,640	LF
Storm Manhole	98	EA
Inlet Structure	454	EA
Stormwater Open Drains	14,850	LF
Stormwater Discharge Point	64	EA

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

Completion Due Date **10/31/17**
(no later than 3 years from executed grant date)

The City of New Buffalo *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1418-01** 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. David Richards at *(269) 469-1500* *manager@cityofnewbuffalo.org*
Name Phone Number Email

10/17/17
Signature of Authorized Representative (Original Signature Required) Date

David Richards; ~~Village~~ City Manager
Print Name and Title of Authorized Representative

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
City of New Buffalo, Michigan

Wastewater Sewer System

Date: October 4, 2017
To: Mr. Clarence Jones
C/O: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: City of New Buffalo SAW Grant: Summary of Wastewater Asset Management Plan

Grantee Information:
City of New Buffalo
224 W. Buffalo St.
New Buffalo, MI 49117
manager@cityofnewbuffalo.org
Mr. David Richards; Manager
Ph: 269-469-1500
SAW Project #: 1418-01

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:	$690,174	$344,000	$1,034,174
2) Less: Match	$ 00	$ 34,400	$ 34,400
3) Net Grant:	$690,174	$309,600	$ 999,774

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 the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

Description:
A comprehensive inventory of the Sanitary Sewer and Storm system assets was performed using utility drawings and on site Global Positioning System (GPS) field locations. Using the data collected, a detailed map of the wastewater and storm system was prepared using Geographical Information Systems (GIS). The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for accurately locating the manholes and other system assets in the field utilizing handheld GPS equipment. Collecting precise locations of utility assets will help aid the City and GRSD staff to locate assets more efficiently and respond more quickly to service calls, ensuring the highest level of customer service.

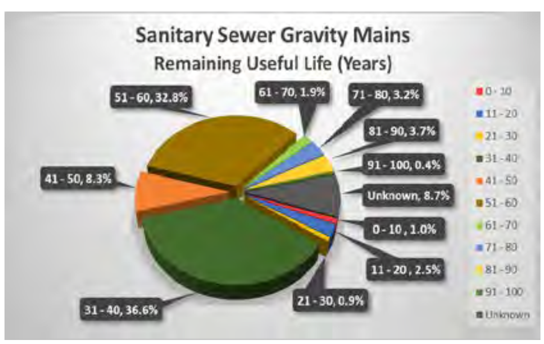
Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

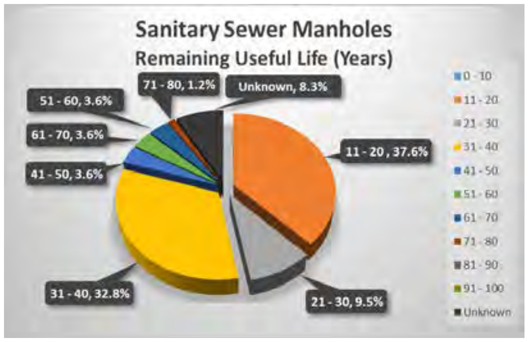
After the completion of the comprehensive inventory of the Sanitary Sewer system assets, a conditional assessment of all asset components was performed. Wightman and Associates, Inc. (WAI) performed the conditional assessment including a complete visual and physical inspection of all lift stations and all of the manholes in the wastewater system. A more detailed inspection was required for several sewer sections. These sections of piping and manholes were inspected using video televising equipment designed for internal pipe inspection and imaging provided by Terra Contracting.

The conditional assessments for 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 or the condition of the asset. Condition grades for both structural and operational and maintenance (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 the Table below.

NASSCO Condition Assessment System	
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)

The following charts show the condition rating for the wastewater system based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database





<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.*

<u>Level of Service:</u> The Level of Service (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how the City of New Buffalo wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team has selected the following statements to define the desired LOS:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage, break, or lift station failure occur causing an untreated discharge, we will respond within one hour and correct the problem as soon as possible to minimize any environmental damage.

3. We will develop and implement a preventative maintenance program to reduce the likelihood of the occurrence of a blockage or break, or lift station failure.

4. We will respond to customer complaints and system alarms within one hour for an emergency and within twenty-four hours for a non-emergency during normal business hours. Communication with the complainant or customers affected will be maintained until the issue is resolved.

5. We will maintain an asset management program for the system and set rates and secure funding to maintain a sustainable funding structure.

6. We will develop a work order system to identify, assign, and track preventative and reactive work on the system and report on the status of work orders to the City on an as needed basis.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to the City on an annual basis.

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?*

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. 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

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include: cost of repair; social cost associated with the loss of the asset; repair/replacement costs related to collateral damage caused by the failure; legal costs related to additional damage caused by the failure; environmental costs created by the failure; loss of business revenue to the community; and any other associated costs or losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with a failure. Below is the ranking system that was used to determine the consequence of failure for the system.

Rating	Consequence
1	**Insignificant:** <10% loss of service, limited potential human contact, minimal property damage.
2	**Minor:** 10% loss of service, potential human contact, minimal property damage.
3	**Moderate:** 25% loss of service, potential human contact, limited property damage, disruption to essential services or major industry.
4	**Major:** 90%>50% loss of service, likely human contact, moderate property damage.
5	**Catastrophic:** 90%+ loss of service, high potential of human contact with sewage, extensive property damage.

Loss of service for the wastewater system refers to number of service connections impacted due to a single isolated 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. Methodology – Asset Management Financial Plan:

A significant effort has been made by the City 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 "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.

Management Summary

- Rates: 25% increase to both the ready-to-serve charge and the commodity charge. 2.75% increases to both charges thereafter. Re-evaluate after GRSD Authority completes their financial plan.

- Cash Balance: Maintain cash balances above six months.
- Capital Cost: A cash, as opposed to debt, approach as modeled in the cash flow.
- A significant increase will occur in net revenue beginning in 2029/30 with the expiration of the 2013 GRSD Authority Bonds in 2028/29. The City should review the potential rate impact at that time in order to consider all fund management options.

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

To ensure that the desired LOS can be maintained, a long-term Capital Improvement Plan (CIP) is required to meet the system needs for the future. The CIP is based upon improvements determined necessary due to the condition of the assets and their criticality. Projects include those where field assessment has determined the asset is nearing the end of its useful life and through engineering judgment should be replaced such as broken gravity mains, lift stations that have equipment nearing the end of its useful life and new advances in safety equipment. These projects include: gravity main repairs, manhole rehabilitation, and lift stations repairs and upgrades. The planning period is 20 years to allow the development of an adequate rate structure, to finance the projects. Capital improvement projects are projects that the community has an extended period of time to plan for and are projects that usually cover high cost, non-recurring items.

D. Recommended Wastewater System Projects

The following table lists the recommended capital improvement projects for the next five years and cyclical improvement projects for the wastewater system. Detailed descriptions and cost estimates for each project can be found in Appendix E.

Year	***Project Name***	***Estimated Cost***
2018	Install Safety Grates	$26,000
2019	Replacement and Repair of Mechanic Street Sanitary Sewer	$79,000
2020	Replacement of Manholes	$18,000
2020	Manhole Repairs	$11,000
2021	Barker Street 8-inch Pipe Replacement	$16,000
2022	Replace and Repair 8-inch Pipe on Barton Street	$25,000
2023	Upgrade of Lift Station 72 on Lake Street	$39,000

2024	Upgrade of Lift Station 70 on Jefferson Street	$41,000
2025	Manhole Lining	$21,000
2025	Parital Pipe Replacement Willard Street	$13,000
2026	Upgrade Lift Station 71 on Harbor Isle	$31,000
2027	Upgrade Lift Station 73 on Landings Boulevard	$42,000
2027	Upgrade Lift Station 74 on Landings Boulevard	$35,000
2028	Pipe Lining Group 2	$57,000
2028	Pipe Lining Group 3	$65,000
2028	Upgrade Lift Station 75 on Whittaker N. of Bridge	$36,000
2029	LS77 Marina Grand Berrien St. Uprade to Mission Control	$6,000
2030	Replacement of Short Runs of Piping	$23,000
2030	Spot Lining Short Runs of Piping Group 1 & 2	$26,000
2031	Spot Repairs of Pipe	$58,000
2032	Pipe Lining Group 4	$64,000
2032	Pipe Lining Group 1	$54,000
2033	Line Manhole Chimneys Group 1 & Group 2	$14,000
2033	Chimney Lining Groups 3 & 4	$11,000
2034	Manhole Patching and Other Work 1 & 2	$21,000
Total Estimated Project Costs for Twenty Year CIP (current dollars) =		$832,000
Total Estimated Project Costs for Twenty Year CIP (future dollars) =		$1,021,000

The lift station ownership and lift station property ownership is unclear in some of the locations. Where available easements have been attached to the assets in the GIS platform. The lift stations currently operate as part of the City system and GRSD maintains them. However, the lift station locations should continue to be investigated and clear documentation as to the ownership and ingress and egress to each station should be pursued to the satisfaction of the City. For any stations that are not owned by the City notification should be provided to the owner of the situation and an agreement put in place detailing ongoing maintenance and the party responsible for costs.

A. List of Major Assets: *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the City Assets:

Table of Key Wastewater System Assets		
Item	Quantity	Unit
12” Sanitary Sewer	857	LF
10” Sanitary Sewer	13,078	LF
8” Sanitary Sewer	73,803	LF
6” Sanitary Sewer	737	LF
4’ Sanitary Manhole	388	EA
6” Service Lead, Complete	1,369	EA
Lift Station < 500 gpm	4	EA
Grinder Station	4	EA
6” Force Main	1,973	LF
4” Force Main	1,425	LF
2” Force Main	983	LF
1.5” Force Main	1,701	LF
Air Release Valves/Cleanouts	22	EA

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

Completion Date **October 31, 2017**
(no later than 3 years from executed grant date)

The City of New Buffalo, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1418-01 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: 4/25/17

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. David Richards at **(269)** 469-1500 manager@cityofnewbuffalo.org
Name Phone Number Email

David Richards 10/17/17
Signature of Authorized Representative (Original Signature Required) Date

City
Mr. David Richards, ~~Village~~ Manager
Print Name and Title of Authorized Representative

WASTEWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

New Lothrop

MI

VILLAGE OF NEW LOTHROP

SHIAWASSEE COUNTY, MICHIGAN

OCTOBER 2017

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: 1232-01

PREPARED BY:

Spicer group

230 S. Washington Avenue
Saginaw, MI 48607

PROJECT ID NUMBER: **121861SG2014**

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
230 S. Washington Avenue
Saginaw, MI 48607

Owner: **VILLAGE OF NEW LOTHROP**
9435 Beech Street
New Lothrop, MI 48460
Jerry Burns, Mayor

On November 12th, 2014, the Village of New Lothrop 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% Grant	$242,250
Stormwater Asset Management Plan (SWAMP) – 90% Grant	$182,750
Eligible Cost Subtotal	$425,000
LESS Local Match	($42,500)
Total Grant Amount	$382,500

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; October 2017.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Critical Assets (Risk)
- Level of Service Determination
- Revenue Structure
- Capital Improvement Plan

Wastewater Asset Inventory and Condition Assessment

The Village's wastewater system consists of three main components: The collection system (pipes and manholes), pump station, 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 a new iPad 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 queried to provide specific lists and maps, and updated easily when future improvements are made.

The Village currently has 28,289.8 feet of sanitary sewer pipes in the entire sanitary sewer collection system ranging in size from 6"-24", 109 manholes, and 237 sewer service connections, serving a total of 243 customers. City Sewer Cleaners, from Saginaw completed a comprehensive cleaning and televising program of the sanitary sewer pipes, and Spicer Group, Inc. completed a comprehensive inspection of the manholes using the NASSCO Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the defects. The MACP/PACP system is used to standardize the scoring and to quantify the condition of the wastewater assets.

The second main component of the Village's wastewater system is the pumping station located at the lagoon site. The station was constructed in 1969 and has been maintained by DPW staff with no major upgrades. Spicer Group completed an inspection and condition assessment of this 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 third main component of the Village's wastewater system is the wastewater treatment plant lagoon (WWTPL) located northeast of the Village limits. Spicer Group completed an inspection and assessment of the lagoon. Biotech Agronomics, Inc 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.

The Village is also working with Fleis & Vandenbrink on a monitoring well program for their lagoon liner. A total of two monitoring wells were installed. It is currently unknown what test results have found to date. When final reports are completed, it is recommended that the Village implements and addresses any issues found from the study. This data should be added to this report and resulting capital improvement and rate plan adjusted.

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, pumping stations, and WWTPL 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

For the collection system, 28 pipes were identified with high LoF scores (4-5), 12 pipes had high CoF scores (4-5), and 10 pipes had high risk scores (14.4-24.4). These scores were evaluated and incorporated into the resulting Capital Improvement Plan. The lagoon pumping station has high CoF (4-5), and Risk scores (10-15) based on its age and useful service life. Recommendations were made for replacing and upgrading several components. The WWTPL had overall low LoF scores which contributed to low CoF and Risk Values.

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 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 New Lothrop 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 provide the Villages desired Level of Service, the costs of the capital improvement projects associated with that LOS, and the effect 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 Villages customers.

Revenue Structure

Spicer Group teamed with Burton & Associates/MWH-Hawksley Consulting/Stantec (Burton) for the revenue structure analysis for the AMP. Wastewater account balances, expenditures, revenues, etc. were reviewed and inputted into Burton's 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 Villages customers. The result was a recommendation for an increase of 155% in fiscal year 2018. The intended rate increase was designed to be performed once and allow no future increases to be needed for about 10 years. This rate increase will allow the Village to meet the minimum level of service developed. 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.

Project Number	Level of Service	Project Location	Project Description	Defect(s)	Estimated Cost
1	Minimun	Easton Road East 120' Sanitary Sewer Manhole SA52	Pipe Patch	Infiltration Runner,Gusher,FM, CM	$4,000.00
2	Minimun	Easton Road East 263' Sanitary Sewer Manhole SA52	Pipe Patch	Fracture Longitudinal, Crack Multiple	$4,000.00
3	Minimun	South Saginaw Street North Manhole SA32	Pipe Patch	Crack Circumferential	$4,000.00
4	Minimun	Cherry Street 87' North Manhole SA46	Heavy Cleaning/pothole and remove	Calcium Deposit 45% Blockage	$10,000.00
5	Minimun	Easton Road East Manhole SA47	Pothole and Replace with Point Repair	Brocken Soil Visible, Crack Longitudinal	$10,000.00
6	Minimun	Easton Road 12.5' West Sanitary Sewer Manhole SA24	Pothole and Replace with Point Repair	Rock in sewer blocking much of flow 70%	$10,000.00
10	Minimun	North New Lothrop Road East Ash Street South SA35	Pothole and Replace with Point Repair 10' Pipe	Fracture Multiple Void Visible may be Broken	$10,000.00
19	Minimum	Various Sanitary Sewer Manholes	Inspect, Raise Structure to Grade, Replace Cover Frame as Necessary to Gain Access	Unknown	$6,000.00
22	Minimum	Maple Street West 10' Manhole SA 18.4	Calcium Cutting/Heavy Cleaning	DAE 45% at Manhole 18.4	$1,000.00
22	Minimum	Butternut Street East 20' of SA20	Heavy Cleaning	DSZ (Ragging) 45%	$1,000.00
22	Minimum	Ash Street At Manhole SA35.5	Confined Space remove Calcium deposit at manhole	DAE 50% at Manhole SA35.5	$500.00
22	Minimum	N. New Lothrop Road 110' South Manhole SA31	Calcium Cutting/Heavy Cleaning	DAE 40% From Lead	$1,000.00
22	Minimum	Easton Road at SA52	Heavy Cleaning	DSZ (Ragging) 40% at Manhole	$1,000.00
20	Minimum	Easement Along Mistequay From Sanitary Sewer Manhole SA16-SA0	Cured In Place Line RCP Sanitary Sewer and Repair Manholes	Surface Damage,Infiltration,Deposits	$835,000.00
23	Minimum	Pump Station	Lagoon Pump Station Replacement	Past Useful Service Life	$80,000.00
24	Minimum	Pump Station	Lagoon Pump Station Electrical, Controls, and Instrumentation	Past Useful Service Life	$50,000.00
25	Minimum	Pump Station	Lagoon Pump Station Pump Generator Replacement	Past Useful Service Life	$60,000.00

Conclusion

The Village of New Lothrop wastewater system is a typical, aging municipal infrastructure system. The DPW staff have completed routine operation and maintenance of the components, and the system is a relatively good shape except for the reinforced concrete gravity sewer main to the lagoon. There are a few other point areas in the smaller 8" vitrified clay pipe that need immediate attention (over the next 5 years), and there are many areas that can be monitored and left alone for years to come. Many of the components of the lagoon pumping station are operating past their useful service life. Routine maintenance has allowed this station to successfully function since 1969 with no major upgrades, but it was recommended that the Village starts budgeting money for a pump station upgrade in the future. An immediate 155% rate increase is recommended in fiscal year 2018 to cover the planned operating expenses, capital improvement projects, and inflation for the next 10 years. This will need to be reviewed annually during the Villages normal budgeting process.

In accordance with the SAW Grant requirements, the Village's 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 Village's annual budget process.

DEQ

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

Completion Date 10/31/2017
(no later than 3 years from executed grant date)

The Village of New Lothrop *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1232-01 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:

Karen Maksimchuk, Village Clerk	at 810-638-5496	nlvillageclerk@gmail.com
Name	Phone Number	Email

Rate Methodology was submitted to DEQ on: April 26, 2017
(within 2 ½ years from date of executed grant)

An initial rate increase of 0 % of a $ 0 gap was adopted on N/A - not deficient in 2.5 yr Gap Analysis

Karen L. Maksimchuk 10-23-17
Signature of Authorized Representative (Original Signature Required) Date

Karen L. Maksimchuk, Village Clerk
Print Name and Title of Authorized Representative

STORMWATER ASSET MANAGEMENT PLAN
EXECUTIVE SUMMARY

VILLAGE OF NEW LOTHROP

SHIAWASSEE COUNTY, MICHIGAN

AUGUST 2017

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: 1232-01

PREPARED BY:

230 S. Washington Avenue
Saginaw, MI 48607

PROJECT ID NUMBER: 121861SG2014

VILLAGE OF NEW LOTHROP
SAW Grant Project No. 1232-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
230 S. Washington
Saginaw, MI 48607

Owner: **VILLAGE OF NEW LOTHROP**
9435 Beech Street
New Lothrop, MI 48460
(810) 638-5496
Jerry Burns, Mayor

On November 12, 2014, the Village of New Lothrop 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) – 90% Grant	$242,250
Stormwater Asset Management Plan (SWAMP) – 90% Grant	***$182,750***
Eligible Cost Subtotal	$425,000
LESS Local Match	($42,500)
Total Grant Amount	$382,500

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; October 2017.

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 and Condition Assessment

The Village of New Lothrop's storm water collection system consists of a series of 4", 6", 8", 10", 12", 15", 18", 24" and 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 a new iPad 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 15,921 feet of storm sewer pipes ranging in size from 4"-30". Below is a table showing the diameter and materials of the storm water piping:

Table ES-1: Village-Owned Storm Water Pipes by Diameter and Material

VILLAGE STORM SEWER							
	CMP	PE	PVC	RCP	VCP	UNKNOWN	TOTAL
4"		110	28		485		624
6"		894	359		1,217		2,470
8"	64	1,404	53	72	554	150	2,298
10"	93				412		585
12"	174	2,430	294	1,103	79		4,080
15"	33	1,771		484			2,288
18"		1,022		96			1,118
24"		1,182		358			1,540
30"		177					177
Unknown		67				756	823
TOTAL (ft):	365	9,056	735	2,112	2,747	906	15,921
Percent By Material:	2.29%	56.88%	4.61%	13.27%	17.25%	5.69%	100.00%

City Sewer Cleaners from Saginaw 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 Shiawassee 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:

- Bogurt Drain
- Kribs Drain
- New Lothrop No.1 Drain
- New Lothrop No. 2 Drain

In addition to the County Drains, the New Lothrop Area Public Schools owns and maintains the entire storm water system around the Elementary and Middle Schools. The School also owns its own outlet which flows in an enclosed drain from the retention pond behind the Elementary School east to a ditch ultimately ending up in the Mistequay Creek.

All of the storm water in the Village eventually drains to the Mistequay Creek which is located on the east side of the Village. The Mistequay Creek flows into the Flint River in Spaulding Township approximately 6.3 miles east of the City of St. Charles.

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 3 pipe locations and 2 structure locations identified with high LoF scores. A total of 3 pipes locations had somewhat medium to low COF scores. When analyzing the overall risk, 1 pipe location had a high risk with 4 pipe locations having medium risk. All storm structures had an overall low risk level. These scores were evaluated and incorporated into the resulting Capital Improvement Plan.

Level of Service

Mission Statement

The Village of New Lothrop 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-3: 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 general fund. Act 51 monies 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.

Since there is no real funding mechanism for storm water assets, the Village has been maintaining a very minimum Level of Service. 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 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.

Until a funding mechanism for storm water improvements is found, the Village is forced to continue this reactionary policy. The Village would like to urge its State legislators to develop a plan to fund municipal storm water improvements, such as supporting HB 5991.

Revenue Structure

Spicer Group teamed with Burton & Associates/MWH-Hawksley Consulting/Stantec (Burton) 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 monies 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 Shiawassee County Drain Commissioner's office, using the Drain Code, PA 40 of 1956.

The financial impact analysis found that the Village's general fund does not have sufficient revenue to meet identified storm water capital improvement projects, 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 $20,000 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. Below is a listing of the Low Level Service projects that are top priority. These projects had abandoned CCTV inspections due to obstructions, roots, offset joints, protruding taps etc.

Project	Location - Pipe Segment Reference	Service Level	Defect(s)	Reason for Survey Abandon	Method of Repair	Cost
1	Saginaw Street and Beech Street Intersection (ST32.2-ST30 - 10 feet north of ST32.2)	Minimum	Hole Visible Soil		Pothole and Repair	$10,000.00
2	Beech Street - Orchard Street to Saginaw Street (ST32-ST32.2 - 80 feet east of ST32)	Minimum	Abandoned Survey	Lumber post driven through pipe	Remove lumber and patch	$10,000.00
3	Beech Street - Orchard Street to Saginaw Street (ST32-ST32.2 - 70 feet east of ST32)	Minimum	Abandoned Survey	Lumber post driven through pipe	Remove lumber and patch	$10,000.00
4	Between Charron and Beech - Orchard Street to Saginaw Street (ST22-ST21 - 113 feet west of ST21)	Minimum	Abandoned Survey	Rootball Large	Heavy Cleaning	$1,000.00
5	Between Charron and Beech - Orchard Street to Saginaw Street (ST22-ST21 - 11 feet east of ST22)	Minimum	Broken Pipe		Pothole and Repair	$10,000.00
6	Saginaw Street - Charron Drive to Beech Street (ST16.1-ST30 - 90 feet south of ST16.1)	Minimum	Abandoned Survey	Rootball Small	Heavy Cleaning	$1,000.00
7	Charon Drive - Orchard Street to Saginaw Street (ST18-ST16 - 47 feet west of ST16)	Minimum	Abandoned Survey	Sediment in pipe	Heavy Cleaning	$1,000.00
8	Charon Drive - Orchard Street to Saginaw Street (ST18-ST16 - 60 feet east of ST18)	Minimum	Abandoned Survey	Object driven through pipe	Remove and repair	$10,000.00
9	Orchard Street - North of Charon Drive (ST14-ST18 - 128 feet north of ST18)	Minimum	Abandoned Survey	Protruding Tap/Rootball Medium	Cut Tap, Heavy Cleaning	$3,000.00
10	Charon Drive - Cherry Street to Orchard Street (CE1-ST139 - 34 feet west of ST139)	Minimum	Broken Pipe		Pothole and Repair	$10,000.00
11	Charon Drive - Cherry Street to Orchard Street (CE1-ST139 - 83 feet west of ST139)	Minimum	Protruding Tap		Cut Tap	$3,000.00
12	Charon Drive - Cherry Street to Orchard Street (CE1-ST139 - 0 feet west of ST139)	Minimum	Abandoned Survey	Sediment in pipe	Heavy Cleaning	$1,000.00
13	Orchard Street - North of Charon Drive (ST14-ST18 - 144 feet north of ST18)	Minimum	Abandoned Survey	Rootball Medium	Heavy Cleaning	$1,000.00
14	Easton Road - Champion Drive to Northwood Drive (CE3-ST143 - 85 feet west of ST143)	Minimum	Protruding Tap		Cut Tap	$3,000.00
15	Northwood Avenue - Maple Street to Butternut Street (ST108-ST100 - 87 feet south of ST100)	Minimum	Abandoned Survey	Sediment in pipe	Heavy Cleaning	$1,000.00
16	Easton Rd- West of Kribs Drain-(ST 144 Connection)	Minimum	Collapsed Pipe		Pothole and Repair	$1,000.00
					Total Cost:	$76,000.00

Conclusion

The Village of New Lothrop'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 recommended a minimal discretionary budgetary line item of $20,000 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.

DEQ

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

Completion Due Date 10/31/2017
(no later than 3 years from executed grant date)

The Village of New Lothrop *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1232-01 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:

Karen Maksimchuk, Village of Clerk at 810-638-5496 nlvillageclerk@gmail.com
Name | Phone Number | Email

Karen L. Maksimchuk 10-23-17
Signature of Authorized Representative (Original Signature Required) Date

Karen L. Maksimchuk, Village Clerk
Print Name and Title of Authorized Representative

Benton Harbor Office:
2303 Pipestone Road
Benton Harbor, MI 49022

Telephone:
(269)927-0100

Fax:
(269)927-1300

Website:
www.wightman-assoc.com

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance
Ontwa Township, Michigan

Wastewater Sewer System

Date: October 12, 2017
To: Mr. David Worthington
Co: Michigan Department of Environmental Quality
From: Wightman & Associates, Inc.
Re: Ontwa Township SAW Grant: Summary of Wastewater Asset Management Plan

Grantee Information:
Ontwa Township
26225 US 12
Edwardsburg, MI 49112
ontwatownshipsupervisor@gmail.org
Mr. Jerry Marchetti; Supervisor
Ph: 269-663-2347
SAW Project #: 1419-01

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	Total
1) Total Grant:	$678,683	$678,683
2) Less: Match	$ 67,868	$ 67,868
3) Net Grant:	$610,815	$610,815

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 the equipment, infrastructure, personnel, tools, and anything else that comprises or services the utility in question.

Description:
A comprehensive inventory of the Sanitary Sewer system assets was performed using utility drawings and on site Global Positioning System (GPS) field locations. Using the data collected, a detailed map of the wastewater system was prepared using Geographical Information Systems (GIS). The mapping was prepared using the state plane coordinate system, allowing the operator to obtain coordinates for accurately locating the manholes and other system assets in the field utilizing handheld GPS equipment. Collecting precise locations of utility assets will help aid the

Township to locate assets more efficiently and respond more quickly to service calls, ensuring the highest level of customer service.

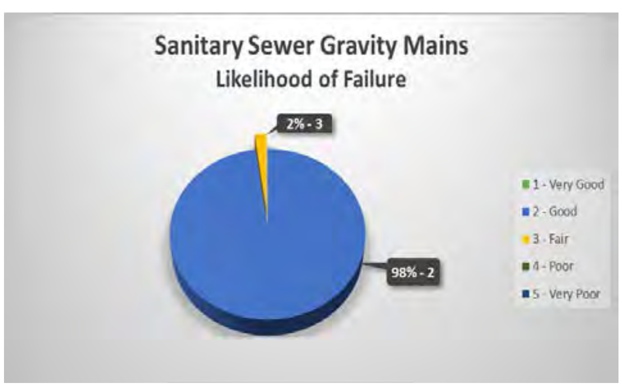
Condition Assessment: *Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category. The percentage of good, fair, and poor for each category can be used, if preferred.*

After the completion of the comprehensive inventory of the Sanitary Sewer system assets, a conditional assessment of all asset components was performed. Wightman and Associates, Inc. (WAI) performed the conditional assessment including a complete visual and physical inspection of all lift stations and all of the manholes in the wastewater system. A more detailed inspection was required for several sewer sections. These sections of piping and manholes were inspected using video televising equipment designed for internal pipe inspection and imaging provided by Clean Earth Environmental Contracting Services.

The conditional assessments for 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 or the condition of the asset. Condition grades for both structural and operational and maintenance (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 the Table below.

NASSCO Condition Assessment System	
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)

The following charts show the condition rating for the wastewater system based upon NASSCO Standards. The ratings are included as an attribute in each asset's entry in the GIS mapping database



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.*

Level of Service: The Level of Service (LOS) defines the way in which the Owner desires the facility or utility to perform over the long term. The LOS should ensure that all regulatory requirements are met and should include any technical, managerial, or financial components the Owner deems necessary to meet customer expectations. The LOS is a fundamental part in defining how Ontwa Township wastewater system will be operated and maintained in the future. As with all components of the AMP, defining the desired LOS will be an ongoing process.

The Asset Management Team has selected the following statements to define the desired LOS:

1. We will strive to maintain compliance with all regulatory requirements at all times.

2. Should a blockage, break, or lift station failure occur causing an untreated discharge, we will correct the problem as soon as possible to minimize any environmental damage.

3. We will develop and implement a preventive maintenance program to reduce the likelihood of the occurrence of a blockage, break, or lift station failure.

4. We will respond to customer complaints and system alarms within two hours for an emergency and within twenty-four hours for a non-emergency. Communication with the complainant or customers affected will be maintained until the issue is resolved.

5. We will maintain an asset management program for the system and set rates and secure funding to maintain a sustainable funding structure.

6. We will develop a work order system to identify, assign and track preventative and reactive work on the system and report on the status of work orders to the Township monthly.

7. We will inform the customers of our desired level of service and report on the compliance with the level of service to customers annually.

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?*

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. 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

The likelihood of failure is determined by the condition rating. Below is the ranking system for likelihood of failure that was used to analyze the system.

NASSCO Condition Assessment System	
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)

B. Consequence of Failure

To determine the consequence of failure, it is important to consider the significant costs of failure. These costs include: cost of repair; social cost associated with the loss of the asset; repair/replacement costs related to collateral damage caused by the failure; legal costs related to additional damage caused by the failure; environmental costs created by the failure; loss of business revenue to the community; and any other associated costs or losses. The consequence of failure can be high if any one of these costs are significant or the accumulation of several costs occur with a failure. Below is the ranking system that was used to determine the consequence of failure for the system.

Rating	**Consequence**
1	**Insignificant:** <10% loss of service, limited potential human contact, minimal property damage.
2	**Minor:** 10% loss of service, potential human contact, minimal property damage.
3	**Moderate:** 25% loss of service, potential human contact, limited property damage, disruption to essential services or major industry.
4	**Major:** 90%>50% loss of service, likely human contact, moderate property damage.
5	**Catastrophic:** 90%+ loss of service, high potential of human contact with sewage, extensive property damage.

Loss of service for the wastewater system refers to number of service connections impacted due to a single isolated 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. Methodology – Asset Management Financial Plan:

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, 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 "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.

Management Summary
Rates: no change at this time and no change in forecast.
- Cash Balance: Maintain cash balances until future capital expenditures are better known.
- Capital Cost: A cash, as opposed to debt, approach as modeled in the cash flow.
- A significant increase will occur in net revenue beginning in 2020/21 with the expiration of the 2005 County Bonds in 2019/20. The Township should review the potential rate impact at that time in order to consider all fund management options.

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. Description

To ensure that the desired LOS can be maintained, a long-term Capital Improvement Plan (CIP) is required to meet the system needs for the future. The CIP is based upon improvements determined necessary due to the condition of the assets and their criticality. Projects include those where field assessment has determined the asset is nearing the end of its useful life and through engineering judgment should be replaced such as broken gravity mains, lift stations that have equipment nearing the end of its useful life and new advances in safety equipment. These projects include: gravity main repairs, manhole rehabilitation, and lift stations repairs and upgrades. The planning period is 20 years to allow the development of an adequate rate structure, to finance the projects. Capital improvement projects are projects that the community has an extended period of time to plan for and are projects that usually cover high cost, non-recurring items.

B. Recommended Wastewater System Projects

The following table lists the recommended capital improvement projects for the next twenty years and cyclical improvement projects for the wastewater system. Detailed descriptions and cost estimates for each project can be found in the AMP.

Year	***Project Name***	***Estimated Cost***
2016	2016 Manhole Lining Project	$40,000
2017	Air Relief Valve Replacements	$11,000
2017	2017 Manhole Lining Project	$40,000
2017	Install Safety Grates at Lift Stations	$19,000
2017	Install Air Mixer at Lift Station C-1	$3,000

2017	Install Chemical Dosing Stations at B-1 and JPC-1	$9,000
2018	Install new generator at L.S. B-3	$35,000
2018	Reconstruction of Manhole B-155	$4,000
2018	C-5 Impeller Replacement	$4,000
2018	Purchase Portable Generator	$25,000
2018	Install new Generator at L.S. B-4	$35,000
2019	Lift Station Upgrades	$177,000
2019	Install Radar Level Control	$60,000
2020	Lift Station Wet Well Lining	$173,000
2021	Connect generators to SCADA	$33,000
2022	Manhole Lining Project	$48,000
2022	Install new generator at L.S. JPC-1	$42,000
2023	Lift Station Wet Well Lining	$195,000
2026	Lift Station Wet Well Lining	$195,000
2027	Manhole Lining Project	$48,000
2029	Lift Station Wet Well Lining	$195,000
2030	Telemetry and SCADA Upgrades	$98,000
2032	Manhole Lining Project	$48,000
2032	Lift Station Wet Well Lining	$130,000
	Total Estimated CIP Costs for Twenty Year CIP (current dollars) =	$1,667,000
	Total Estimated CIP Costs for Twenty Year CIP (future dollars) =	$1,951,000
	Total Estimated Pump Replacement Costs (current dollars) =	$238,000
	Total Estimated Pump Replacement Costs (future dollars) =	$286,000
	Total Estimated Project Costs (current dollars) =	$1,905,000
	Total Estimated Project Costs (future dollars) =	$2,237,000

A. <u>List of Major Assets:</u> *Provide a general list of the major assets identified in the AMP.*

The following is a summary of the Township Assets:

Table of Key Ontwa Wastewater System Assets		
Item	Quantity	Unit
15" Sanitary Sewer	56	LF
12" Sanitary Sewer	5,762	LF
10" Sanitary Sewer	42,958	LF
8" Sanitary Sewer	121,525	LF
6" Sanitary Sewer	322	LF
4' Sanitary Manhole	577	EA
6" Service Lead, Complete	1,857	EA
Lift Station > 500 gpm	2	EA
Lift Station < 500 gpm	13	EA
Grinder Station	2	EA
12" Force Main	23,154	LF
8" Force Main	9,606	LF
6" Force Main	12,660	LF
4" Force Main	10,368	LF
2" Force Main	1,242	LF
Air Release Valves/Cleanouts	34	EA

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Township of Ontwa, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 141[illegible]-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: 5/24/17

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. Jerry Marchetti at **(269) 663-2347** **ontwatownshipsupervisor@gmail.com**
Name — Phone Number — Email

Jerry Marchetti — 10/16/17
Signature of Authorized Representative (Original Signature Required) — Date

GERALD MARCHETTI
Print Name and Title of Authorized Representative

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section
Attn: Eric Pocan

From: Hubbell, Roth and Clark, Inc.

CC: City of Orchard Lake Village/WRC

Date: October 31, 2017

Re: City of Orchard Lake Village Sanitary Sewer System
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1290-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the City of Orchard Lake Village (OLC). 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 Orchard Lake, SAW Grant Project #1290-01

Project Grant Amount: $276,000

Applicant Match Amount $27,600

Authorized Representative
Gerry McCallum, City Administrator
(248)682-2400
dcs@cityoforchardlake.com

WRC Project Manager
Rick DeVisch, WRC, Project Manager
248-858-2054
devischr@oakgov.com

Consultant Contact
Karyn Stickel, HRC, Associate
(248) 454-6566
kstickel@hrcengr.com

EXECUTIVE SUMMARY

Oakland County Water Resources Commissioner (WRC) on behalf of the City of Orchard Lake Village (City) 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 City's sanitary sewer system is owned by the City 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 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 OLC, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 99,120 lineal feet of sanitary underwent condition assessment via cleaning and televising. Approximately 518 manhole and other related structures were evaluated using the CAMS inspection work orders. 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 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, 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 (storm and sanitary sewers, force mains, siphons 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.

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 OLC’s current mission statement is:

> *The City strives to sustain this thriving community and outstanding quality of life for all residents far into to the future.*

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 OLC’s sanitary sewer 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.

Capital Projects, 0 to 5 years:

- None Identified

Capital Projects, 6 to 10 years:

- Sewer lining - $25,000
- Generator Replacement – 2 generators - $60,000
- Instrumentation and Control Replacement – 9 locations - $90,000
- Pump Replacements - $120,000

Capital Projects, 10 to 20 years:

- Instrumentation and Control Replacement – 9 locations - $90,000
- Sewer lining - 13 sections of sewer - $100,000
- Forcemain Replacement – 1 section of forcemain - $20,000
- Sewer Manhole Replacement – 2 manholes - $15,000
- Wetwell Rehab – $50,000

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 OLC's major assets include:

- 99,120 feet of 8-72-inch sanitary sewer pipe
- 4,049 feet of 2-8-inch forcemain
- 518 sanitary manholes
- 11 pump stations
- 58 grinder stations

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

Completion Date October 28,2017
(no later than 3 years from executed grant date)

The City of Orchard Lake Village *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1290-01 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: 5/18/2017.
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:

Gerry McCallum at 248-682-2400 DCS@cityoforchardlake.com
Name Phone Number Email

[signature] 10-30-17
Signature of Authorized Representative (Original Signature Required) Date

Gerry McCallum, Director of City Services
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance

Charter Township of Orion – Department of Public Services
2525 Joslyn Road
Lake Orion, MI 48362
http://www.oriontownship.org/
Contact: Chris Barnett, Supervisor
Bill Ireland, Director of Public Works
248-391-0304
SAW Grant Project Number: 1176-01

Executive Summary

The Wastewater Asset Management Plan or Program (AMP) summarizes the existing physical condition of the Township's wastewater infrastructure and includes key recommendations for future capital improvements and maintenance programs. This document was prepared using grant funding from the State of Michigan Stormwater, Asset Management, and Wastewater (SAW) Grant Program, with a total budget of $420,000 for the Wastewater AMP, which is inclusive of grant proceeds and local match.

The AMP was 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 improve the Township's existing GIS database and to make it easier for future generations to access infrastructure data with greater ease.
- Add information for the sewer infrastructure, including age, depth and general condition for key manhole elements to the GIS database.
- Physically evaluate the structural condition of a representative cross section of the publicly-owned system components, including sanitary sewer pipes and manholes and store the data in the Township'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 maintenance activities
    - Repair and rehabilitation to address structural problems resulting from aging infrastructure
- Provide analysis on future rate adjustments necessary to maintain the recommended revenues and resulting fund balances.

Mission Statement

One important element to an Asset Management Plan is a mission statement, which identifies the overarching purpose of the Township's AMP. The purpose of the Township's AMP 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 Township's AMP can be directed to these team members.

Bill Ireland

- Director of Public Works
- bireland@oriontownship.org
- 248-391-0304

James Stevens

- OHM Advisors - Principal
- James.Stevens@ohm-advisors.com
- 248-751-3102

Figure 1. Asset Management Team Leaders

Wastewater Asset Inventory

This AMP includes the wastewater collection system, including manholes and sewer pipes. Although the Township had an existing geodatabase for its wastewater system, this AMP included efforts to enhance the database. The existing geodatabase was created from the original design plans and "as-built" plans where available. As part of this AMP, utilizing survey grade GPS equipment, a complete inventory of the wastewater system was achieved including accurate location and elevation information along with additional information on sewer size, sewer age, and structural condition.

Sewer sizes and invert elevations were verified during field survey and manhole inspections that were part of this AMP. The Township uses ArcGIS (ESRI) to maintain its inventory of wastewater assets and to store asset condition data.

Major Assets

The major assets are simplified in the text below. This report contains additional detail on the distribution of sizes, ages, and conditions.

- 134 miles of sanitary sewer gravity main
- 3,471 manholes

The Township discharges into the Clinton-Oakland Sewage Disposal System (COSDS), which ultimately discharges to the City of Detroit WWTP for treatment. As such, the Township's assets are limited to local and collector gravity sewers.

Condition Assessment

Through a methodical sampling procedure, a representative sample of the Township's sanitary sewer infrastructure (sanitary 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 one to five. One indicates the infrastructure is in very good condition, while five indicates the infrastructure is in very poor condition or has already failed. Just under 10% of the sewer system was televised, and approximately 25% of the manholes were inspected as part of this AMP (Figure 2).

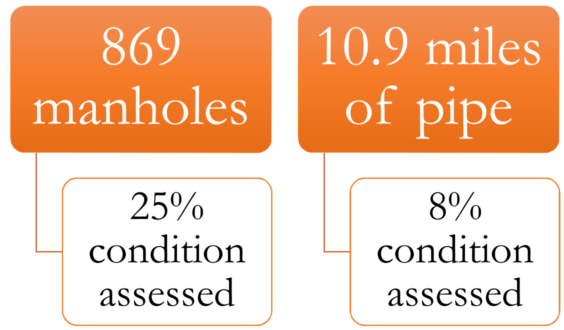


Figure 2: Portion of system assessed

It was also observed that:

- For sewer pipes, the average age is approximately 37 years, the average overall pipe rating (structural and O&M) is 2.33, on a scale of 1 to 5. Approximately 19% of the system has a PACP structural score of 3 or greater.
- For manholes, the average age is approximately 37 years, the average structural rating is 2.25, on a scale of 1 to 5. Approximately 8% of the system has a MACP structural score of 3 or greater.
- In general, the Township's wastewater collection system is in good shape, with most sewers well within their expected service lives. It would be expected that the Charter Township of Orion will require a significant increase in investment as large percentages of their system reach the end of their useful service lives, but this should not occur for another 20-25 years.

Criticality and Risk

The investigation leading to the identification of critical sewer infrastructure involved the determination of risk, which is identified as the combination of the likelihood of the infrastructure failing as well as the consequence of its failure as shown in Figure 3.

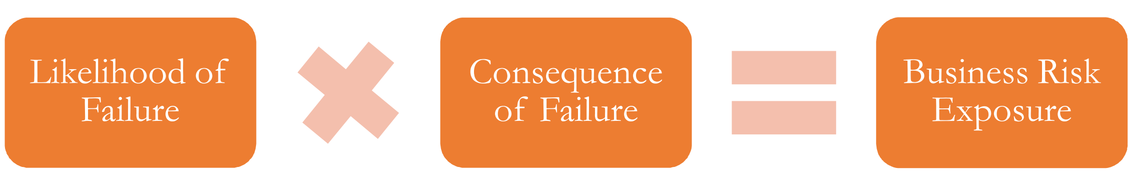


Figure 3: Risk Equation

The likelihood of failure is related to the physical condition of an asset. The consequence of failure 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:

- Network Position – the sum of upstream sewers discharging to a structure
- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Location – refers to the cost to restore the surface above the asset and if traffic control is needed
- Environment – proximity to sensitive environmental features like the Bald Mountain Recreation Area and the Township's many lakes and wetlands
- Top Users – important system users (General Motors, Lake Orion Schools)

Level of Service

The Township, in line with its mission statement outlined earlier, adopted level of service criteria's, which it plans on using as a guideline to manage the sanitary sewer asset infrastructure. These levels 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 inspections per year*	• MACP inspect a minimum of 400 manholes per year, ~12% of the System • PACP inspect a minimum of 17 miles of sewer per year, approximately ~13% of the system
Regulatory Compliance	Compliance with MDEQ Sanitary Sewer Overflow (SSO) Policy	Comply with the MDEQ SSO policy of no more than 10% of a chance of an SSO in any given year, excluding unusual natural events or man-made disasters
Service Delivery	• Response to sanitary sewer complaints • Number of basement backups	• Respond to complaints and service outages efficiently • Eliminate basement backups
Cost Control	Provide cost effective service to minimize rate increases	Proactively inspect and maintain infrastructure to minimize repair costs

** Pipe Assessment Certification Program (PACP), to assess sanitary sewer condition*
Manhole Assessment Certification Program (MACP), to assess manhole condition

Revenue Structure and Capital Improvement Plan

The Township currently has an annual budget of approximately $5 million for its wastewater collection and treatment costs, the recommendations in this Asset Management Plan would result in a decrease to the planned Capital Expenditures over the next 5 years. The plan does recommend increasing rates in the future to allow for the revenues to exceed planned expenditures as the Township nears its target fund balance. The primary reasons for this planned annual increase are:

1. Continued investment in sewer/manhole rehabilitation, repair, and/or replacement for the Township's aging infrastructure.
2. Anticipated rate increases from GLWA for transport and treatment of Orion Townships' wastewater discharge.
3. Increased attention to sewer/manhole inspections and ongoing updates to this Asset Management Plan.
4. Keep up with inflationary pressures by staying ahead of the Construction Cost Index (CCI) curve.
5. Maintain a target fund balance of $12,500,000 for unplanned expenditures.

The Township's initial rate increase of 10.3% was implemented in July 2017. Each year rates will be evaluated and increases planned based upon increases from providers, updated capital planning, and maintaining targeted fund balance reserves.

The Capital Improvement Plan (CIP) focuses on projects that are known based on current structural conditions. This includes repairing the pipes and manholes that have been inspected and have known defects, especially those with a structural ratings of 4, 5 or "end of life" indicating they have failed or are at risk of failing. These assets were ranked by their Business Risk Exposure (BRE). The tables for the CIP are in this AMP document, Section VI. The CIP tables are intended to be used for high level planning; the Township will further evaluate the wastewater infrastructure before beginning the CIP design process. The actual implementation of the CIP will depend results of the continued CCTV efforts and manhole inspections.

Recommendations

The recommendations in this AMP are to:

- Adjust user fees as necessary to implement this AMP and the current CIP along with maintaining the target fund balance. It is anticipated this will need to occur over several years as the Township's current fund balance closes in on its target fund balance.
- Implement the capital improvements as recommended in the CIP.
- Continue the AMP process in future years through systematic system inspection and updates of the Township's GIS data to re-prioritize projects in future years.
- Enhance the Township's cleaning programs to identify facilities for increased activity above and beyond the regular cycles.

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

Completion Date 10-27-17
(no later than 3 years from executed grant date)

The CHARTER TOWNSHIP OF ORION *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1176-01 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 18, 2017.

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 IRELAND at 248-391-0304 BIRELAND@ORIONTOWNSHIP.ORG

Name | Phone Number | Email

10/27/17

Signature of Authorized Representative (Original Signature Required) | Date

CHRIS BARNETT, SUPERVISOR

Print Name and Title of Authorized Representative

City of Owosso

Wastewater Collection System

Asset Management Plan

October 2017

OHM Advisors®

ASSET MANAGEMENT PROGRAM DOCUMENTATION

Executive Summary

The City of Owosso and Orchard, Hiltz & McCliment, Inc. (OHM Advisors) have successfully obtained a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) to complete an Asset Management Plan (AMP) of the City's wastewater collection system. The City is responsible for the wastewater collection system that consists of manholes, sanitary sewers and pump stations. These assets vary in age, although some are as old as 110 years. The City of Owosso is responsible for the upkeep and maintenance of their wastewater collection system and recognized the importance of preserving the integrity of their assets. This document was prepared using grant funding from the SAW Grant Program, with a total budget of $1,201,348, which is inclusive of grant proceeds (local match does not apply, as Owosso is designated as a "disadvantaged community" by the MDEQ).

The AMP was intended to accomplish the following key goals:

- Provide the City with a framework for collecting, organizing, and storing data for their wastewater collection system using the latest available hardware and software.
- Survey key system components to augment the City's existing Geographic Information System (GIS) database and to make it easier for future generations to access infrastructure data with greater ease.
- Add information including asset size, age, location, consequence of failure (CoF) and functionality to the GIS database.
- Physically evaluate the structural condition of a large portion of publicly-owned system components, including manholes, gravity mains, and pump stations and to store the data in the City's GIS database.
- Analyze the flow capacity of the City's key sanitary sewer pipes and identify issues which could contribute to Sanitary Sewer Overflows (SSO).
- 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 developing a prioritized Capital Improvement Plan to be funded through the City's wastewater enterprise fund.
- Provide recommendations for future wastewater sewer fund increases to support the Capital Improvement Plan

Mission Statement

The purpose of the City's asset management program is summarized by the following mission statement:

We are committed to providing and maintaining high quality wastewater 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 City's asset management program can be directed to these team members.

Donald Crawford

- City Manager
- 989.725.0568

Glenn Chinavare

- Utilities Director
- 989.725.0555

Randy Chesney

- City Engineer
- 989.725.0553

Figure 1: Asset Management Team Leaders

Infrastructure Technology & Know-How

The City is committed to developing a robust AMP and has invested in hardware, software and training of individuals to fulfill this its goals. These investments include the following:

- Development of a GIS-based asset infrastructure database and upgrade of associated software
- Acquisition of additional sanitary sewer flow meters and upgrading these meters with current technology for automated data collection and system monitoring

In addition, three representatives of the City of Owosso were trained and certified with the National Association of Sanitary Sewer Companies (NASSCO) for PACP/MACP. This will allow for future inspections to be made by City staff. As part of the current infrastructure assessment program through the State SAW Grant program, the City worked with NASSCO certified contractors in collecting and assessing its infrastructure assets as well as associating this information with the City's GIS for future reference.

Asset Inventory

An asset inventory is a list of the City's assets and their attributes. The City has provided several sources of information on the existing wastewater collection system including their existing GIS database and as-built records. Survey was performed for collection system components that were not a part of the original GIS database in order to provide useful data on rim/invert elevations and system connectivity. Using the information provided from the city coupled with field investigation information, a new GIS database was created. This inventory includes the City's existing wastewater pump stations and all information will reside in the new GIS database. This database will be instrumental in the City's ongoing asset management efforts.

Condition Assessment & Deterioration Forecasting

Through a methodical sampling procedure, a representative sample of the City's wastewater infrastructure (sanitary sewer pipes and manholes) has been assessed. The condition of the infrastructure is based on the NASSCO condition grading system, which uses a scale of one to five. One indicates the infrastructure is in very good condition, while five indicates the infrastructure is in very poor condition or has already failed. Roughly 45 percent of the 1,380 manhole structure network and 82 percent of the approximately 69 miles of sanitary sewer pipe infrastructure has been condition assessed. The assets within the City's three pump stations were also assessed and inventoried. The major components inventoried within each pump station include but are not limited to pumps, check/control valves, motors, level control systems, backup power, structure, wet well, valve vault, and telemetry.

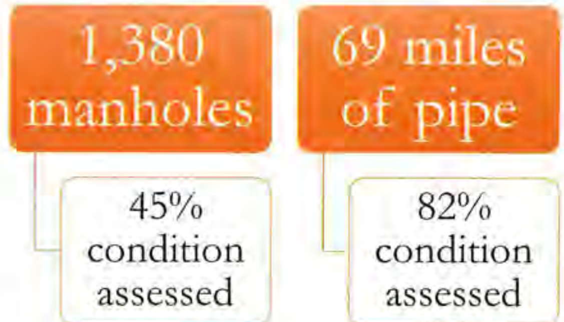


Figure 2: Portion of Sewer System Assessed

Key observations:

- The City's manholes exhibit age appropriate wear with an average overall rating of 3.08 with an average age of 84 years. A large percentage of the City's manholes are in fair to poor structural condition.
- Of the approximately 625 manholes assessed, 18 structures (approximately 3%) received a structural rating of 5, which signals the need for extensive repair or replacement.
- The City's sewers were observed to have significant structural wear, with over 40% of the system in fair to poor condition and an average overall rating of 3.27 with an average age of 82 years.
- Of the approximately 2,070 pipe segments assessed, 207 pipe segments (approximately 10%) received a structural rating of 5, which signals the need for extensive repair or replacement.
- Pump stations have numerous assets that are failing (or close to failing) and should be monitored closely based on the condition and age of the functioning assets.

Criticality

The investigation leading to the identification of critical sewer infrastructure involved the determination of risk, which is identified as the combination of the likelihood of the infrastructure failing as well as the consequence of its failure as shown in Figure 3.

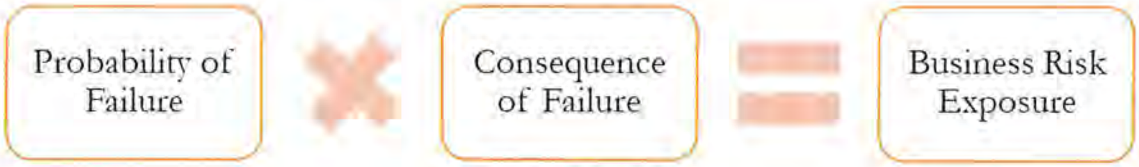


Figure 3: BRE Equation

The Probability of Failure is related to the physical condition of an asset. Consequence of Failure 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:

- Relative Network Position – the sum of upstream sewers discharging to a structure
- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Restoration Type/Accessibility – refers to the cost to restore the surface above the asset and if traffic control is needed
- Environment – proximity to sensitive environmental features like the Shiawassee River and Hopkins Lake.
- Critical Users – important system users (Baker College, Owosso Public Schools, St. Paul's School, Bryant School, Lutheran School, Lincoln High School, St. Joseph Catholic School and Memorial Hospital)

Metering & Modeling

The City of Owosso is experiencing SSOs along the main sanitary interceptor that transports flow to the Wastewater Treatment Plant (WWTP). An Existing Conditions model was developed to simulate wet weather flows in the wastewater collection system to aid in the asset management plan. This study used an Antecedent Moisture Model (AMM) with the intent of creating a model which simulates the amount of groundwater and rainwater infiltrating the sanitary system after a sizable rain event. An AMM is a continuous hydrologic model that can accurately account for antecedent moisture and its effect on sanitary sewer wet weather response over continually varying climate conditions. The AMM takes into consideration the ground's moisture and more accurately predicts the sewershed response over an extended period of time using rainfall and air temperature data.

A hydraulic model was created for the City's key wastewater system components; this model was used to determine where (and to what extent) hydraulic surcharges exist under wet weather conditions. A series of meters were installed throughout the wastewater collection system to determine which metering districts was generating the largest increase in flows due to significant wet weather events. The flow data recorded by the meters were compared against rain data collected at the WWTP. Using this data, a 10-year and 25-year peak flow rate and SSO volume were determined.

According to City staff, there are approximately 1,000 footing drains in the City which connect to the wastewater collection system. A footing drain connection assessment was conducted on approximately 10 percent of the homes identified as having a connected footing drain. This was done to verify the accuracy of the City's records on which homes have connected footing drains. Access was very limited and the assessment did not provide information that corroborated the City's data on footing drain connections. As such, we assumed that the 1,000 suspected footing drains existed as suspected by City staff.

Using the hydrologic and hydraulic models, combined with the footing drain information provided by the city, two (2) alternative solutions were developed to reduce the likelihood of SSO events. A detailed description of the AMM and hydraulic model is provided in Appendix D-A.

Level of Service

The City, in line with its mission statement outlined earlier, adopted level of service criteria, which it plans on using as guidelines to manage the wastewater infrastructure. These level of service criteria are summarized in Table 1.

Table 1: Target Level of Services

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	PACP & MACP Inspections Per Year*	• MACP inspect a minimum of 140 manholes per year, 10 percent of the System • PACP inspect a minimum of 20 percent of the system every five years and the remaining 80 percent every ten years
Flow Capacity	Active flow monitoring of the majority of the system (by service area), and Excessive Flow Removal from Sewer System	• Continue ongoing metering study • Continue Footing Drain Connection Assessment where applicable
Regulatory Compliance	Compliance with MDEQ Sanitary Sewer Overflow (SSO) Policy	No confirmed SSOs for any wet weather event up to the 10-year recurrence interval flow rate (design event)
Service Delivery	Response to Sanitary Sewer Complaints	Respond to customer complaints and requests efficiently
O&M Optimization	Allocation of Operation & Maintenance (O&M) Budget per Year	Clean and maintain wastewater collection system entirely on a ten year basis

Revenue Structure and Capital Improvement Project Plan

The condition assessment helped identify capital improvements that will allow the City to maintain an acceptable level of service and reduce the probability of a structural failure that could disrupt service or cause property damage. Additional long-term operations and maintenance strategies will provide the means to maintain a reasonable average structural condition into perpetuity, including:

- Regularly-scheduled sewer, manhole and pump station inspection
- Repair and rehabilitation to address structural problems resulting from aging infrastructure

As communities like the City of Owosso have developed and aged, the buried infrastructure is deteriorating. The City of Owosso's infrastructure is very old (average age is over 80 years); many of the City's assets are well beyond their useful service lives. The City should anticipate the need to systematically repair, rehabilitate and/or replace these aging assets. Without taking this proactive approach to asset management, City residents and businesses will, in the near future, experience a decreased level of service, which could result in the following:

- Increased threat of property damage, public health and safety
- Increase potential for environmental damage, including SSOs
- Increased potential for impassable roadways due to failed infrastructure (e.g. sinkholes, emergency construction)

The revenue structure analysis identified an initial rate increase of 22 percent in the first year of the CIP, followed by a rate increase of 1.5 percent annually for the City's wastewater enterprise fund to implement the recommendations in this AMP. The revenue structure analysis and associated capital improvement projects and O&M strategies, which will continue the City's AMP, are detailed in a separate document and can be made available to the public upon request.

List of Major Wastewater Assets

The City's major wastewater assets are listed below. The full AMP report contains additional detail on the distribution of sizes, ages, and conditions.

- 1,380 manholes
- 67 miles of sanitary sewer pipe, ranging from 6- to 48-inch diameter
- 3 pump stations

The City also owns and operates a wastewater treatment plant. The evaluation of those assets has been performed as part of a separate effort.

END EXECUTIVE SUMMARY

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

Completion Date OCTOBER 26, 2017
(no later than 3 years from executed grant date)

The CITY OF OWOSSO *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1446-01 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: APRIL 27, 2017.
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:

Donald Crawford	at 989-725-0568	donald.crawford@ci.owosso.mi.us
Name	Phone Number	Email

Donald D. Crawford — October 30, 2017

Signature of Authorized Representative (Original Signature Required) — Date

Donald Crawford, City Manager

Print Name and Title of Authorized Representative

106 W. Allegan Street, Suite 500
Lansing, MI 48933
O: 517.371.1200
www.c2ae.com

OWOSSO WASTEWATER ASSET MANAGEMENT PLAN (WASTEWATER TREATMENT FACILITY) EXECUTIVE SUMMARY

City of Owosso
301 W. Main Street
Owosso, MI 48867
Don Crawford – City Manager, (989) 725-0568
SAW GRANT PROJECT NUMBER 1501-01

Executive Summary

The SAW agreement with the State of Michigan was signed on October 29, 2014 which began the overall SAW program.

The Grant agreement included the following funding amounts:

- Total Cost = $230,120
  - Grant Value = $172,590
  - Local Match = $57,530

The City of Owosso (Owosso) is located in Shiawassee County in central Michigan. Owosso's population (2010 census) was 15,194. The city is located on the eastern side of Owosso Township, but is politically independent. The City originally built a 2 MGD (million gallon per day) primary wastewater facility constructed in the 1930s. Chlorination was added in the 1960s and in the early 1980s a 6 MGD independent physical-chemical treatment facility was constructed (Owosso/Mid-County Wastewater Treatment Plant) which serves the City of Corunna, portions of Owosso Charter Township and Caledonia Charter Township as well as the City of Owosso today. The treatment plant discharges to the Shiawassee River under permit MI0023752.

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 and field data collection.
  - Physical inspections were conducted for each asset.
    - 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 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:
  - 20% of assets are 1's
  - 20% of assets are 2's
  - 35% of assets are 3's
  - 20% of assets are 4's
  - 5% of assets are 5's

Condition Assessment

The Owosso/Mid-County Wastewater Treatment Plant is in fair condition overall. The City has made some improvements to the facility since 2000, most recently the replacement of screens, compactors, and primary clarifier equipment in 2017. The electrical switch gear, breakers, and busways replaced in 2014. Other equipment was been rehabilitated in early 2000's, but overall the plant is in need of significant upgrades and new equipment to improve treatment capabilities and performance.

During the on-site assessment of equipment, the following guidelines and information were utilized:

- Structures assessment and inventories follow NASSCO MACP guidelines.
- Sewer pipe assessment and inventories follow NASSCO PACP guidelines.
- WWTP equipment site condition assessment 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 facility 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 facilities'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 rate increase was required per the grant agreement.
- The Rate Methodology was updated to forecast future budgeting needs by Umbaugh. The current budget information is included.

Capital Improvement Plan

- The AMS identifies capital improvement projects for the future.
- The long term projects may be achieved through a combination of loan/grants or future rate adjustments to support project funding.

- An estimate of project year and financial cost was generated for each capital improvement project.
- A List of recommended projects to be completed within the next five (5) years is as follows:
    - *Replace (3) Screws, Pumps, Drives, Deflection plates with equipment to match the original pumping capacity. The drive assemblies should be mounted on top of the reducers.*
    - *Replace Sludge Thickener drive and equipment to match existing setup*
    - *Install 750lW/937.5kVA backup Generator in place of the current second primary service*
    - *Replace Main building roof*
    - *Remove Nitrification Towers and Replace*
    - *Install Grit System with chain and bucket system to fit in existing tank, and add aeration underneath grit/screw building before the chain and bucket. This will reduce weir on pumps, motors, filters, loss of capacity in the plant.*
    - *Install Secondary Clarifiers to remove suspended solids and Removal of Existing Intermediate Clarifiers*
    - *Install Scada System throughout Plant, and connect pumping stations throughout collection system. This will give the ability to significantly reduce operating costs, while improving system performance and reliability.*
    - *Install Disc Filters after the Secondary Clarifiers utilizing the existing Carbon Filter building (Main bldg.) Remove the existing pressure sand filters.*
- 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

- 6.0 MGD Wastewater Treatment Plant
- 3 raw sewage screw pumps
- 2 Primary Clarifiers
- 2 Screens and compactors
- Sludge Thickening Equipment and building
- 3 Sewerage Filtration Units
- 1 Roughing Towers
- 2 Nitrification Towers
- 2 Intermediate Clarifiers
- 1 Chlorine contact tank
- 2 sludge storage tanks
- 1 Centrifuge
- Various Chemical feed pumps and equipment
- Service vehicles
- Laboratory/Administration Building

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

Completion Date OCTOBER 25, 2017
(no later than 3 years from executed grant date)

The City of Owosso *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1515-01 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: April 27, 2017.

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:

Donald Crawford at 989-725-0568 donald.crawford@ci.owosso.mi.us

Name / Phone Number / Email

Donald D. Crawford October 30, 2017

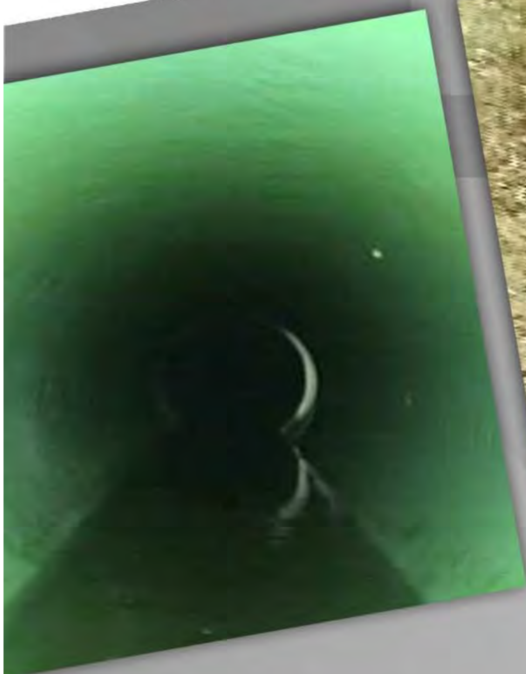
Signature of Authorized Representative (Original Signature Required) Date

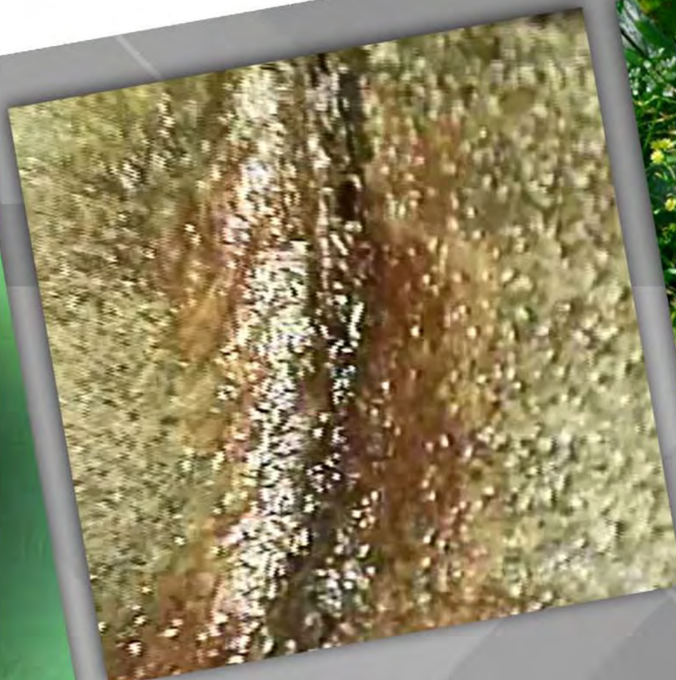
Donald Crawford City Manager

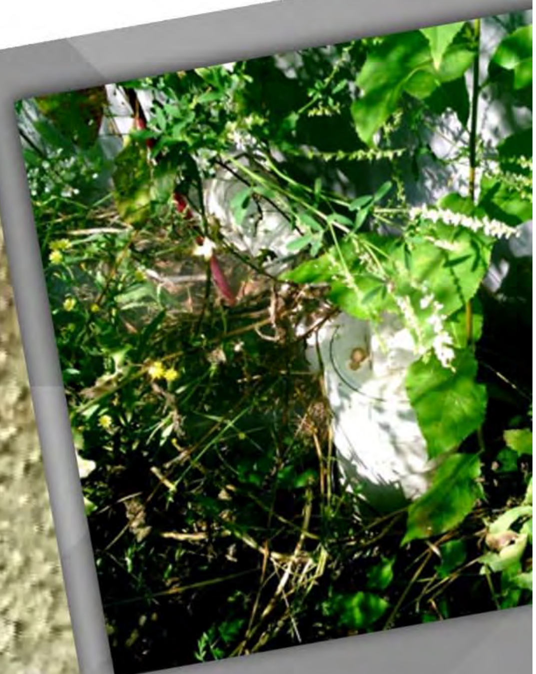
Print Name and Title of Authorized Representative

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report







Prepared for:

Paw Paw Township

SAW Project No. 1654-01

FINAL
October 2017

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 May 2014, The Township received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1654-01, 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 Paw Paw Township AMP is:

Donald Stull, Township Supervisor
PO Box 20
114 N. Gremps St
Paw Paw, MI 49079
Phone number: 269-655-1000
Email: supervisor@pawpawtownship.org.

ASSET INVENTORY AND CONDITION ASSESSMENT

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

- Collection system piping system and manholes
- Sanitary sewer lift stations in the collection system

The wastewater collection system assets consist of approximately 37,709 feet (7.14 miles) of sanitary sewers (gravity pipe and force mains) and 152 wastewater structures connecting the gravity pipe. These assets are in existing street rights-of-way, or in easements dedicated for the asset's use and maintenance.

Paw Paw Township currently discharges all waste water to the Village of Paw Paw for treatment.

Paw Paw Township owns seven submersible lift stations, three duplex grinder stations, and seven simplex grinder stations throughout the wastewater collection system. Each station is one of three styles: duplex submersible style, duplex grinder style, or simplex grinder style.

<u>Asset Identification and Location</u>

A comprehensive wastewater system asset inventory was developed from operation and maintenance 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 160 Lift Station Assets and 295 Collection System Assets.

<u>Condition Assessment and Expected Useful Life</u>

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on 133 manhole structures, 10 lift station manholes, and seven air release/cleanouts. 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, and 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) maintenance was identified, with 33% of the system tagged for inspection and/or cleaning. Rehabilitation accounted for 7% of the system identifying the need for point repairs and lining. The remaining 60% of assets were placed in the 20+ year category.

The condition of the assets at the lift stations range from good to poor (36% good, 60% fair, and 4% poor). Ongoing maintenance has maintained the condition of most assets. Some assets have deteriorated due to use and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

Defining the Expected Level of Service (LOS)

The overall objective of the Township 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 Paw Paw Township's Wastewater System is to provide reliable wastewater collection and ensure 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 an adequate collection system and ensure treatment capacity for all service areas.
- Ensure collection system assets are in reliable working condition.
- Reduce inflow/infiltration (I/I) flow volumes to meet MDEQ-acceptable levels.
- Provide rapid and effective emergency response services to customers.
- 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.

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 allocating 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 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. No pipe segments in the collection system have extreme risk ratings. The collection system's gravity pipes, 100 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition.

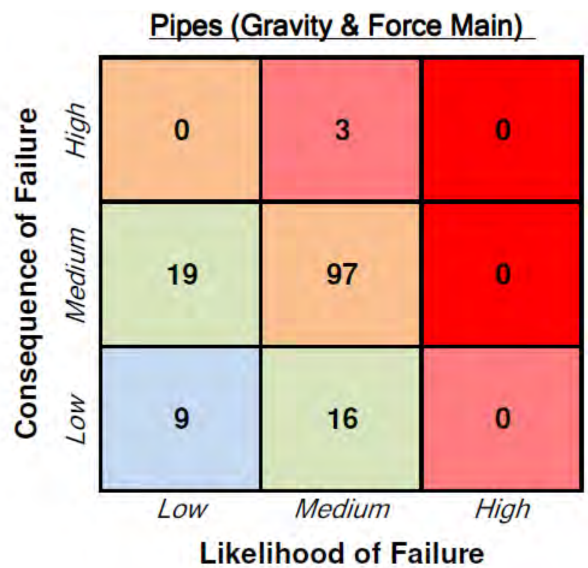


Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. Two manholes are identified as extreme risk, and are recommended for replacement. Many manholes are at low to medium risk and recommended to be included in a long-term 6-20-year rehabilitation strategy (91.5 percent).

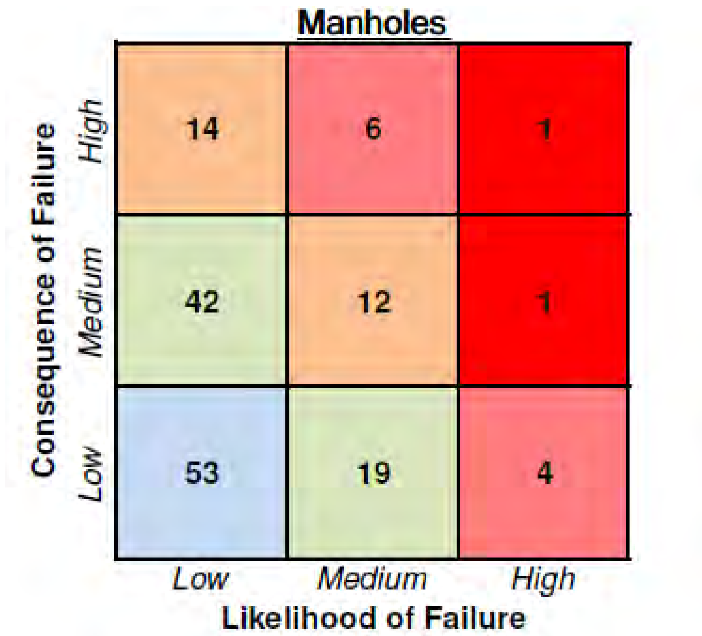


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The 36 assets with high risk ratings should be inspected at regular intervals and are included in a long-term 6-20 year rehabilitation strategy.

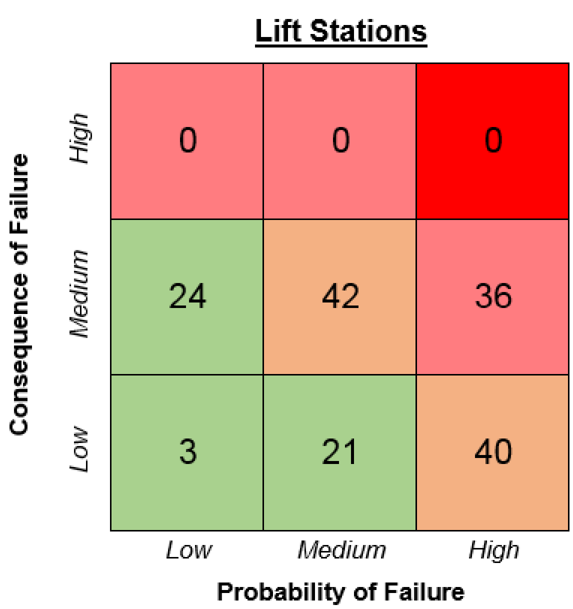


Figure 3. Business Risk Matrix (Risk Rating) for Lift Station assets

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 (BRE). The CIP recommendations are provided for the collection system, wastewater treatment facility and pumping stations/force mains. A short-term (1-5-year CIP) and long-term (6-20-year CIP) was developed for the utility from the BRE. Tables 4 and 5 summarize the rehabilitation costs for the 1-5-year collection system and lift station improvements in the Capital Improvement Plan.

Table 4. 1-5-Year Capital Improvement Plan: Rehabilitation

Year	Asset	ID	Address	Rehab Actions	Cost	2018	2019	2020	2021	2022
2	Manhole	Cleanout 6	Hillcrest Drive	MH Clean + Line + Repair	$ 5,171	$ -	$ 5,326	$ -	$ -	$ -
2	Manhole	134	Red Arrow Hwy	MH Clean + Line + Repair	$ 5,171	$ -	$ 5,326	$ -	$ -	$ -
4	Manhole	25C	North Street	MH Clean + Line + Repair	$ 5,171	$ -	$ -	$ -	$ 5,650	$ -
4	Manhole	60A	49th Ave	MH Clean + Line	$ 3,883	$ -	$ -	$ -	$ 4,243	$ -
4	Manhole	19A	Fairbanks Ave	MH Repair+Lining	$ 4,398	$ -	$ -	$ -	$ 4,806	$ -
4	Manhole	38A	Bay Ave	MH Repair+Lining	$ 4,398	$ -	$ -	$ -	$ 4,806	$ -
4	Manhole	19C	M-40	MH Repair+Lining	$ 4,398	$ -	$ -	$ -	$ 4,806	$ -
4	Manhole	2	M-40	MH Clean + Line	$ 3,883	$ -	$ -	$ -	$ 4,243	$ -
4	Manhole	10A	Park Ave	MH Repair+Lining	$ 4,398	$ -	$ -	$ -	$ 4,806	$ -
TOTAL:						$ -	$ 10,651	$ -	$ 33,360	$ -

Table 5: Recommended Lift Station Improvements

Item No.	Improvement Description	Recommended Project Year	Estimated Cost (2017 Dollars)
1	Control Panel Replacement Project	2020	$554,000
2	Mechanical Rehabilitation and Coating Project	2025	$237,000
3	Mechanical and Electrical Rehabilitation	2034	$147,000

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 O&M 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. Table 6 summarizes the operations and maintenance costs that are recommended for the next five years.

Table 6. Collection System Maintenance Summary by Year						
Maintenance Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Manhole Assessment	$ 1,545	$ 309	$ 318	$ 328	$ 337	$ 346
Manhole Cleaning	$ -	$ -	$ -	$ -	$ -	$ -
CCTV	$ 72,274	$ 14,455	$ 14,888	$ 15,322	$ 15,756	$ 16,189
CCTV - Heavy Cleaning	$ -	$ -	$ -	$ -	$ -	$ -

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 an independent municipal financial advisor (Utility Financial Solutions, LLC) dated April 17, 2017.

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 UFS showed 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 October 31, 2017
(no later than 3 years from executed grant date)

The Township of Paw Paw *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1654-01 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: May 16, 2017.
2) Significant Progress Made: 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: NA.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on NA.

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:

Linda Jordan – Township Clerk at (269) 657-4340 clerk@pawpawtownship.org
Name Phone Number Email

Donald A. Stull 10/24/17
Signature of Authorized Representative (Original Signature Required) Date

Donald Stull – Township Supervisor
Print Name and Title of Authorized Representative

Paw Paw Wastewater Asset Management Plan
Executive Summary

SAW Grant No. 1139-01

Village of Paw Paw
111 E. Michigan Ave
Paw Paw, Michigan 49079

Sarah Moyer-Cale
Village Manager
269-657-3148

The Village of Paw Paw was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) in October 2014. The grant provided funds for the creation of this Asset Management Plan (AMP) for its wastewater collection system. 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.

The village has a population of 3,534 citizens according to the 2010 Census. It manages 124,340 feet of gravity pipe, 11,332 feet of force main, 421 manholes, and 8 lift stations in the wastewater system. The Village operates their Wastewater Treatment Plant, however, this was not evaluated as it is outside the scope of this study.

At the beginning of the project, 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 the review and evaluation of the network. A total of 22% of the wastewater system was assessed when including inspections performed going to back to 2004. 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. Approximately 74% of manholes were inspected.

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 Village staff, goals were developed within the report such as cleaning and inspecting structures over a 10-year period, responding to 80% of reported problems within an hour, and having less than three (3) 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.

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 be analyzed to develop the best life cycle strategy. Twelve percent (12%) of wastewater manholes and 33% of gravity mains have a POF of 7.5 or greater. However, the COF for these pipes were typically not alarming leading all assets to be determined to be below a Business Risk Evaluation (BRE) score of 50 and into lower levels 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 continue cleaning and televising wastewater sewers on an annual basis and budget for the work accordingly. This cost is estimated to be $9,450. Additionally, the rate methodology includes a replacement schedule for short-lived assets. The breakdown identifies items owned by the Village that have a useful life of 20 years or less and contain moving parts. These replacement funds are set aside annually 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. This budget is estimated to be $58,237 per year.

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. Results from CCTV sewer inspections identified several Level 5 defects where the sewer is currently failing. It is recommended that the Village repair these defects over the next five (5) years at an estimated cost of $50,000 ($10,000 per year).

List of Wastewater Assets

- 124,340 feet of gravity sewer
- 421 manholes
- 11,332 feet of force mains
- 8 lift stations
- 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 October 31, 2017
(no later than 3 years from executed grant date)

The Village of Paw Paw *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1139-01 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 $\boxed{\text{No}}$

   If No - Date of the rate methodology approval letter: June 22, 2017.
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:

Village of Paw Paw	at 269-657-3148	s.moyer-cale@pawpaw.net
Name	Phone Number	Email

[signature] 10/29/17

Signature of Authorized Representative (Original Signature Required) Date

Sarah Moyer-Cale, Village Manager

Print Name and Title of Authorized Representative

Paw Paw Stormwater Asset Management Plan
Executive Summary

SAW Grant No. 1139-01

Village of Paw Paw
111 E. Michigan Ave
Paw Paw, Michigan 49079

Sarah Moyer-Cale
Village Manager
269-657-3148

The Village of Paw Paw was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) in October 2014. The grant provided funds for the creation of this Asset Management Plan (AMP) for its stormwater drainage system. 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.

The village has a population of 3,534 citizens according to the 2010 Census. The Village manages approximately 64,000 feet of gravity pipe, 158 manholes, and 609 catch basins in the stormwater system which discharge to Maple Lake, Ismons Pond, and the Paw Paw River.

At the beginning of the project, 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 the review and evaluation of the network. A total of 17% of the stormwater system was assessed when including inspections performed going to back to 2004. 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. Approximately 64% of structures were inspected.

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 Village staff, goals were developed within the report such as cleaning and inspecting structures over a 10-year period, responding to 80% of reported problems within an hour, and having less than three (3) flooding 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.

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 be analyzed to develop the best life cycle strategy. Forty-nine percent (49%) of stormwater structures and 18% of gravity mains have a POF of 7.5 or greater. However, the COF for these pipes were typically not alarming leading all assets to be determined to be below a Business Risk Evaluation (BRE) score of 50 and into lower levels 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 continue cleaning and televising stormwater sewers on an annual basis and budget for the work accordingly. This cost is estimated to be $9,100 per year.

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. Results from CCTV sewer inspections identified several Level 5 defects where the sewer is currently failing. It is recommended that the Village repair these defects over the next five (5) years at an estimated cost of $60,000 ($12,000 per year).

List of Stormwater Assets

- 63,937 feet of gravity sewer
- 158 manholes
- 609 catch basins

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Paw Paw *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1139-01 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
Village of Paw Paw	at	269-657-3148	s.moyer-cale@pawpaw.net

Signature of Authorized Representative (Original Signature Required) Date 10/29/2017

Sarah Moyer-Cale, Village Manager
Print Name and Title of Authorized Representative

VILLAGE OF PERRINTON
SAW Grant Project No. 1064-01

EXECUTIVE SUMMARY

Prepared by: SPICER GROUP, INC.
1400 Zeeb Drive
St. John's MI, 48879

Owner: **VILLAGE OF PERRINTON**
118 S. Robinson St.
Perrinton, MI 48871
(989) 236-5161
Douglas Antes, Mayor

In October of 2014, the Village of Perrinton 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% Grant	***$205,000***
Stormwater Asset Management Plan (SWAMP) – 90% Grant	$115,000
Eligible Cost Subtotal	$320,000
LESS Local Match	($32,000)
Total Grant Amount	$288,000

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; October 2017.

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 and Condition Assessment

The Village's wastewater system consists of three main components: The collection system (pipes and manholes), pumping facilities, and the wastewater treatment stabilization lagoons (WWSL).

For the collection system, Spicer Group, Inc. completed a survey of the entire Village's assets, 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. It is considered a detailed "smart" mapping system with databases, utilizing the ArcGIS/Arc Online platform by ESRI (Environmental Systems Research Institute). This system can be accessed and updated in the field by DPW staff from new iPads procured through the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV (closed circuit television) pipe inspections 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 has approximately 3.6 miles of sanitary sewer pipes ranging in size from 8”-12”, and 61 manholes, serving a total of 167 customers. Plummer’s Environmental Services (PES), located in Byron Center MI, completed a comprehensive cleaning and televising program of the sanitary sewer pipes, and Spicer Group, Inc. completed a comprehensive inspection of the manholes using NASSCO (National Association of Sewer Service Companies) Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the observations/defects. The MACP/PACP system is used to standardize the scoring and to quantify the condition of the wastewater assets.

The second main component of the Village’s wastewater system is the pumping facilities. The Village owns and operates two pumping stations. The Fulton Street pump station is located at the northeast corner of the Village near the intersection of E. Fulton Street and Bordon Road. The Robinson Street pump station is located at the southern Village limits on Robinson Street south of E. South Street. Spicer Group, Inc. completed an inspection and condition assessment for the station, and provided recommendations to the Village for future improvements. Based on age, condition, and criticality/risk of these stations, Spicer Group provided recommendations for improvements / replacement of equipment.

The third main component of the Village’s wastewater system is the wastewater treatment stabilization lagoons (WWSL) located southwest of Rainbow Lake on Sunset Drive. Spicer Group completed an inspection and assessment of the WWSL, and are recommending several improvements to the facility. The recommended improvement projects are that are included in the Capital Improvement Plan (CIP).

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 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 Perrinton is committed to improving and maintaining the public health protection and performance of our wastewater 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.*

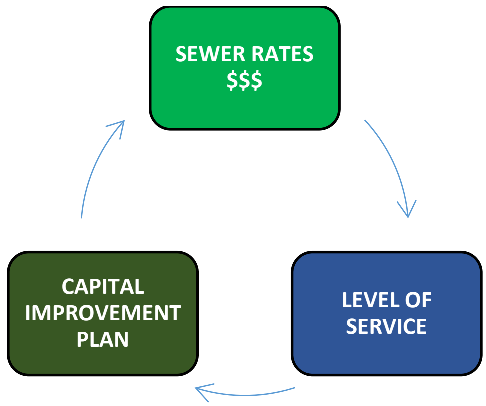
One of the basic goals is to review the capital improvement projects to determine the best value options for the Village’s customers based on life cycle costs and overall benefits to the community:

- “**MINIMUM**” Level of Service – 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 or if monies become available eariler than anticipated.
- “**HIGH**” Level of Service – Projects that are forecasted long range, some of which the current asset may have a considerable amount of useful life. Some projects may be a “want” from the client, but not necessarily a “need.”

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 determine the Village's desired Level of Service based on project costs, associated LOS, and the implication to current and future sewer rates.

Asset Management Plan Evaluation Process



The resulting capital improvement plan (CIP) and revenue structure was one that met the Village's goals, addressed the improvements that needed to be made, and established 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 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 pipes, manholes, pumping station, 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

For the collection system, there were 6 pipe locations identified with medium LoF scores, while the remaining pipes were in the low risk category. Risk scores for manholes were also determined. All risk scores were evaluated and incorporated into the resulting Capital Improvement Plan. For the pump stations CoF and LoF scores, recommendations were made to replace pumps and electrical instrumentation. For the WWSL, recommendations to the Village included the use of riprap for berm stabilization and adding gravel to the berm drives due to their high CoF.

Revenue Structure

Stantec performed the revenue structure analysis for the AMP. Wastewater account balances, expenditures, revenues, etc. were reviewed and inputted into Stantec's financial software to determine if there were any deficiencies in the rates. The Village's current rate structure was found to have deficiencies.

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/scenarios were performed to come up with a rate structure that met the Village's 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 an annual increase of $4.00 / user for 5 years to the Village's sanitary sewer rates. This should be reviewed annually as a part of the Village's 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 10-year CIP was developed that includes various collection system improvements including:

Collection System

- Sewer Lateral Rehabilitation ($275,000)
- Sewer Structural Fixes ($130,000)

Pumping Stations

- Robinson Pump Station ($120,000)
  - Replace Valves / Replace Pumps / Electrical Improvements
- Fulton Pump Station ($50,000)
  - Replace Valves / Replace Pumps / Electrical Improvements

WWSL

- Berms / Bank stabilization ($3,375,000)

Operations and Maintenance Annual Budget

Spicer Group recommends a budgetary line item be considered for the Village for annual operations and maintenance budget. The items identified below are not included in the current CIP plan. The funds set aside by the Village are at their discretion. Spicer Group recommends the Village set aside $2,000-3,000 per year to start with and re-evaluate annually to determine if those monies are in excess of deficient.

1. Cleaning and Televising
    a. Clean and Televise system within a 5-10 yr cycle
    b. Provide heavy cleaning for those areas prone to back-ups, roots, heavy debris
2. Lagoon Cleaning
    a. Evaluate sludge depths every 2-3 years
3. Maintenance and Revision of GIS system
    a. Incorporate new record drawings
    b. Update collection system maps based on development
    c. Include costs for software annual technical subscription / updates
4. Meter Calibration for
    a. Lagoon Meter
    b. Pump Stations
    c. Lagoon Effluent Flow Meter
5. Training and Development
    a. Continuing Education for City Staff
    b. Software training
    c. NASSCO PACP/MACP/LACP certification

Conclusion

The Village of Perrinton's wastewater system is a typical, aging municipal infrastructure system. The DPW staff have completed routine operation and maintenance of the components, and the system is in relatively good shape. There are a few areas that need immediate attention (over the next ten years), and there are many areas that can be monitored and left alone for years to come. A rate increase has been put in place to cover the planned operating expenses, capital improvement projects, and inflation for the next ten years. This will need to be reviewed annually during the Village's normal budgeting process.

In accordance with the SAW Grant requirements, the Village's 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 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 **October 31, 2017**
(no later than 3 years from executed grant date)

The Village of Perrinton *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1064-01 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 2, 2017.
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:

Douglas Antes, Mayor	at 989-236-5161,	perrintonclerk@yahoo.com
Name	Phone Number	Email

Douglas Antes — 10-30-17
Signature of Authorized Representative (Original Signature Required) — Date

Douglas Antes, Mayor
Print Name and Title of Authorized Representative

VILLAGE OF PERRINTON
SAW Grant Project No. 1064-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
1400 Zeeb Drive
St. John's MI, 48879

Owner: **VILLAGE OF PERRINTON**
118 S. Robinson St.
Perrinton, MI 48871
(989) 236-5161
Douglas Antes, Mayor

In October 2014, the Village of Perrinton 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:

Stormwater Asset Management Plan (SWAMP) – 90% Grant	***$115,000***
Wastewater Asset Management Plan (SWAMP) – 90% Grant	$205,000
Eligible Cost Subtotal	$320,000
LESS Local Match	($32,000)
Total Grant Amount	$288,000

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; October 2017.

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 collection system, Spicer Group, Inc. completed a survey of the entire Village's assets, 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. It is considered a detailed "smart" mapping system with databases, utilizing the ArcGIS/Arc Online platform by ESRI (Environmental Systems Research Institute). This system can be accessed and updated in the field by DPW staff from new iPads procured through the SAW grant project. From the GIS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV (closed circuit television) pipe inspections 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's stormwater collection system is approximately 18,000 feet in length and consists of storm sewer pipes ranging in diameter size from 4"- 30". The storm sewer pipes consist of mainline sewer, catch basin leads, and culverts. In addition, the Village has approximately 47 manhole structures not including catch basins. The Village's storm sewers discharge into Pine Creek which runs along the east Village limits. The summary tables shown below list storm sewer by size, length and material.

Table ES1: PIPE DIAMETER BY LENGTH

Diameter	Number of Pipes	Percent	Length(ft)
4"	4	3.4%	615.1
6"	17	16.1%	2,917.0
8"	12	20.5%	3,719.5
10"	4	7.7%	1,399.1
12"	13	21.6%	3,924.2
15"	20	16.5%	3,000.1
18"	18	8.9%	1,612.0
30"	2	5.3%	964.3
TOTAL	90	100.0%	18,151.3

Table ES2: STORM SEWER PIPE AGE

Age	Number of Pipes	Percent	Length (ft)
Before 1970	54	80.0%	14,522.4
1990's	30	15.8%	2,869.8
2000's	1	1.1%	205.4
Unknown	5	3.1%	553.7
TOTAL	90	100.0%	18,151.3

Table ES3: STORM SEWER PIPE MATERIAL

Material	Number of Pipes	Percent	Length
CP	2	5.3%	964.3
PP	30	18.7%	3,397.1
PVC	9	6.2%	1,131.9
VCP	40	61.5%	11,158.9
Unknown	9	8.3%	1,499.2
TOTAL	90	100.0%	18,151.3

Every pipe and structure owned and operated by the Village could not be investigated/inventoried due to budget constraints. Emphasis was placed on performing condition assessments for the mainline sewers and mainline manholes. Catch basin structures and their associated leads (pipes) will be evaluated in the future.

Plummer's Environmental Services (PES) located in Byron Center, MI completed a cleaning and televising program of approximately 30% of the Village owned storm sewer pipes. Spicer Group also performed comprehensive inspection for all of the Village's mainline stormwater manholes. The NASSCO Manhole/Pipeline Assessment Certification Program (MACP/PACP) 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 Village want to provide to its residents? 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 Perrinton strives to maintain a basic stormwater collection system that addresses the residents' wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our residents.*

LOS - Basic Goals:

- Operate and maintain the stormwater system to minimize flooding and property damage.
- Review the condition of stormwater assets as a part of other infrastructure construction projects.
- Seek a funding source for operation & maintenance and repair/replacement of stormwater.
- Review the maintenance and capital improvement plans/projects annually to determine the lowest cost options for our residents.

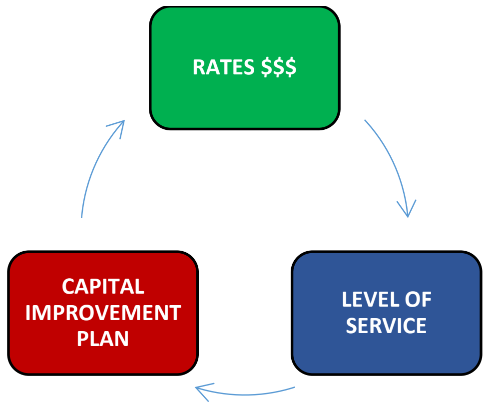
- Level of Service criteria includes the following categories:

  - "**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.

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 address the immediate concerns that residents bring to the Village's attention.

Typically, as a part of the asset management process, the Village would go through an exercise to determine a desired Level of Service, select the capital improvement projects that are needed to achieve that Level of Service, then review how those projects effect the Village's finances to determine if possible rate increases may be required. Below is a diagram of the process.

ES-3: Asset Management Plan Evaluation Process



Michigan has not created a climate which would allow municipalities to create either an enterprise fund or a utility fee system for stormwater asset improvements. As such, funding is currently only available from the Village's general fund. Act 51 monies received from the State for street/road improvements could also be used for stormwater improvements that affect the street projects directly. However, Act 51 funding is limited.

Since there is no real funding mechanism for stormwater assets, the Village has been maintaining a *Minimum* Level of Service. This has resulted in a reactionary operation and maintenance practice. Until a funding mechanism for stormwater improvements is found, the Village is forced to continue this reactionary policy.

Part 3: Criticality (Risk)

For each asset in the Village's stormwater 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 pipes, manholes, and drainage structures, etc. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences. Finally, the Criticality (Risk) score was calculated using:

RISK = LoF x CoF

For the Village's stormwater collection system, there were 2 pipe locations and 1 structure location identified with a high CoF score along with 10 pipe locations and 12 structure locations with high LoF scores. These scores were evaluated and incorporated into the resulting Capital Improvement Plan.

Part 4: Revenue Structure

Spicer Group teamed with Stantec for the revenue structure analysis for the AMP. The Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion within the Stantec financial model, utilizing the Village's General Funds. The financial review found that the Village cannot be sustainably funded by the General Fund without outside resources or raising the current user rates.

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 resulting CIP plan includes the following projects:

1. Sewer abandonment and relocation of cross lot sewer east of Robinson Street along north Village limits ($350,000)
2. Railroad Street sewer rehabilitation ($121,000)
3. Allor Street sewer rehabilitation ($25,000)
4. Elba Street sewer rehabilitation ($9,000)
5. 10 year annual operations and Maintenance budget ($10,000). Includes: cleaning and televising remaining sewers not performed in SAW grant, as well as annual miscellaneous sewer repairs.

Conclusion

The Village of Perrinton's stormwater system is a typical, aging municipal infrastructure system. Since there has been no funding mechanism for stormwater assets, the Village had been maintaining a Minimum Level of Service for its residents. At this time, the CIP projects have not been included into the current fiscal year budget, or forecasted in future FY's. The Village will evaluate where these projects should be included in the future as monies become available to sustain them.

In accordance with the SAW Grant requirements, the Village'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 Village's annual budget process.

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

Completion Due Date **October 31, 2017**
(no later than 3 years from executed grant date)

The Village of Perrinton *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1064-01 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:

Douglas Antes, Mayor	at 989-236-5161,	perrintonclerk@yahoo.com
Name	Phone Number	Email

Douglas Antes — 10-30-17
Signature of Authorized Representative (Original Signature Required) — Date

Douglas Antes, Mayor
Print Name and Title of Authorized Representative

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section, Attn: Jonathan Berman

From: Jared Buzo, Oakland County WRC

Date: October 31, 2017

Re: City of Pontiac Wastewater Treatment Facility Drainage District
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1259-01
Summary of Wastewater (and Stormwater) Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the City of Pontiac Wastewater Treatment Facility (POC WWTF) 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 MDEQ guidance.

GRANTEE INFORMATION

City of Pontiac Wastewater Treatment Facility Drainage District, SAW Grant Project #1259-01

Project Grant Amount: $2,000,000

Applicant Match Amount $0

Primary Contact Name	System Manager	WRC Project Manager	Consultant Name
Mr. Jim Nash Water Resources Commissioner One Public Works Drive Building 95 West Waterford, MI 48328 248.858.0958	Mr. Ben Lewis, PE Manager WRC Office One Public Works Drive Building 95 West Waterford, MI 48328 248.858.1539	Mr. Jared Buzo, PE Operations Engineer WRC Office One Public Works Drive Building 95 West Waterford, MI 48328 248.858.1601	Mr. Jamie Decker, PE CH2M 2 Easton Oval, Suite 500 Columbus, OH 43219 614.825.6777

EXECUTIVE SUMMARY

The City of Pontiac Wastewater Treatment Facility 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 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 of Pontiac Wastewater Treatment Facility is owned Chapter 20 Drainage District 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.

WRC's vertical assets include pumping stations, and storage and treatment facilities. As part of WRC's Common to All Program, a tool was developed to assess the condition of the various asset types present at the vertical facilities. WRC worked with CH2M to develop an assessment tool that could be used to estimate and record the condition of these assets. The tool is presently set up as spreadsheet that provides a series of condition assessment questions, specifically tailored to each asset type.

The tool was used by the individual systems to determine asset condition as part of the individual AMPs. The data will be imported into CAMS as part of the maintenance records, and used by the asset optimization software to estimate rehabilitation and replacement needs.

As part of the grant for City of Pontiac Wastewater Treatment Facility Drainage District, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 700 assets were reviewed and assessed as part of the project. In addition, a facility walk-down was conducted at both plants to ensure all assets in the GIS geodatabase were present at the plants.

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 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.

- 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 City of Pontiac Wastewater Treatment Facility Drainage District, 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 Projects, 0 to 5 years:

- Administration Building Rehabilitation, $2,500,000, 2020
- Tertiary System Improvements, $500,000 per year, 2019-2021
- Biosolids Handling and Septage Receiving, $32,000,000, 2017-2019

Capital Projects, 6 to 10 years:

- Headworks Renovations, $3,500,000, 2023
- Disinfection System Rehabilitation, $3,000,000, 2022

Capital Projects, 10 to 20 years:

- No current projections.

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 Pontiac Wastewater Treatment Facility Drainage District 's major assets include:

ASSET SUMMARY

Asset Type	Auburn	East	Total	Asset Type	Auburn	East	Total	Asset Type	Auburn	East	Total
ACTUATOR	40	4	**44**	ELECTRICAL - TRANSFORMER	8	3	**11**	PIPING	5	0	**5**
ANTENNA STRUCTURE				ELECTRICAL-BUILDING	14	0	**14**	PUMP-CENT	37	16	**53**
ATS	0	2	**2**	ENGINE	0	1	**1**	PUMP-PD	24	7	**31**
BACKFLOW PREVENTOR	4	4	**8**	FILTERS STRAINERS	7	0	**7**	PUMP-SCREW	3	0	**3**
BLOWER	10	6	**16**	FLAME ARRESTOR	1	0	**1**	PUMP-SUB	3	1	**4**
BOILER	4	1	**5**	GEARBOX	14	0	**14**	PUMP-VERT TURBINE	9	2	**11**
CHEM FEED SYSTEM	5	0	**5**	GENERAL EQUIP	0	1	**1**	SCADA - ANTENNA CABLING	1	1	**2**
CLARIFIER	4	4	**8**	GENERATOR	7	2	**9**	SCADA - COMMUNICATIONS	4	1	**5**
COMPRESSOR	6	2	**8**	HEAT COOL	20	10	**30**	SCREEN	4	4	**8**
CONVEYOR	3	0	**3**	HOIST	6	0	**6**	STRUCTURES	19	15	**34**
DEWATERING - BELT PRESS	4	0	**4**	INSTR CONTROL - PANEL	22	4	**26**	STRUCTURES - SITE	0	1	**1**
DIGESTER GAS EQUIP	3	0	**3**	INSTR CONTROL - PLC	0	1	**1**	STRUCTURE-SITE	1	0	**1**
DRIVE	0	6	**6**	INSTRUMENT	17	7	**24**	TANK	36	15	**51**
DRYER	1	0	**1**	METER	23	13	**36**	TANK - VAULT	0	3	**3**
ELECTRICAL	6	10	**16**	MIXER	1	6	**7**	VALVES	99	21	**120**
ELECTRICAL - MCC	13	0	**13**	MOTOR	60	7	**67**	WET WELL	1	2	**3**

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Pontiac Wastewater Treatment Facility *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1259-01 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: 4-25-2017.
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
Jared Buzo, PE	at	248.858.1601	buzoj@oakgov.com

______ 10/20/17
Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Oakland Co Water Resources Commissioner
Print Name and Title of Authorized Representative

CONSULTING ENGINEERS SINCE 1915

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section
Attn: Jonathan Berman

From: Hubbell, Roth & Clark, Inc.

CC: WRC/PCRDDD

Date: October 31, 2017

Re: Pontiac Clinton River No.1 Drain Drainage District
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1148-01
Summary of Stormwater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the Pontiac Clinton River No.1 Drain Drainage District (PCRDDD). 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

Pontiac Clinton River No.1 Drain Drainage District, SAW Grant Project #1148-01

Project Grant Amount: $235,000

Applicant Match Amount: None

Authorized Representative	Consultant Contact	WRC Project Manager
Jim Nash, PCRDDD, Chairman	Karyn Stickel, HRC, Associate	Mike McMahon, WRC, Chief Engineer
(248) 858-0958	(248) 454-6566	248-858-5397
wrc@oakgov.com	kstickel@hrcengr.com	mcmahonm@oakgov.com

EXECUTIVE SUMMARY

The Pontiac Clinton River No.1 Drain Drainage District (PCRDDD) applied for and received a grant to further develop an Asset Management Plan (AMP) for its stormwater 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 PCRDDD was established pursuant to Chapter 20 of the Michigan Drain Code of 1956. As such, it is governed by the Drainage Board of the PCRDDD and the drain is operated and maintained by the Oakland County Water Resources Commissioner (WRC) in accordance with applicable provisions of 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 funding strategy for each fund is evaluated annually and includes a review of the current 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.

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 appropriate 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 PCRDDD, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 11,148 lineal feet of storm underwent condition assessment via cleaning and televising. Approximately 68 access structures 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 (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 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 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. Note, at this time storm drain systems do not have Utility Reserve Budgets. In the future, the County may look at other funding sources. 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.
- 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 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 process, but the overall framework is set up to accommodate these systems in the future. Instead, periodic special assessments are levied against the district to generate the necessary revenues.

Because of the lack of funding for the drainage district, a rate sufficiency study was not completed for this task.

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 to determine revenue needs for funding the project established. A list of capital projects was developed for PCRDDD, 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 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:

- 2018 – 2020 – Program to replace two pipe outlets and one storm pipe. Total replacement cost is approximately $45,000.
- 2021 – 2023 – Replacement of several standard manholes and catch basins. Total replacement costs of approximately $45,000. Rehabilitation of two large stormwater structures. Replacement of these structures would be cost prohibitive due to the locations, therefore, it is recommended that $25,000 be budgeted for each, for a total project cost of $50,000

Capital Projects, 6 to 10 years:

- 2024 – Replacement of one storm pipe. Total replacement cost is approximately $7,000.

Capital Projects, 10 to 20 years:

- 2024 – Replacement of one storm pipe. Total replacement cost is approximately $7,000.
- 2027 – 2031 - Rehabilitation of five storm pipes, two storm catch basins and one storm manhole structure. The total rehabilitation cost is $200,000.
- 2032 – 2037 – Rehabilitation of four storm pipes, two storm catch basins and eight storm manhole structures with a total budgeted cost of $200,000.

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, overall framework has been set up to be able to utilize a portion of the LRP process for future needs. An evaluation 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 annually to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The PCRDDD's major assets include:

- 11,148 LF of storm sewer
- 68 access structures

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

Completion Due Date **October 31, 2017**
(no later than 3 years from executed grant date)

The **Pontiac-Clinton River Drain No. 1 Drainage District** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1148-01** 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:

Jim Nash	at **248-858-0958**	**wrc@oakgov.com**
Name	Phone Number	Email

Jim Nash 10/27/17
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

SAW Grant No. 1240-01

CHARTER TOWNSHIP OF PORT HURON, MICHIGAN

WASTEWATER
ASSET MANAGEMENT PLAN

EXECUTIVE SUMMARY

OCTOBER 2017

Johnson&Anderson

Johnson & Anderson, Inc.
4494 Elizabeth Lake Road
Waterford, Michigan 48328

PN: 17426

EXECUTIVE SUMMARY

INTRODUCTION

The Charter Township of Port Huron applied for and was subsequently awarded a Storm water, Asset Management, and Wastewater Grant (SAW Grant) for $1,562,020 (with a local match of $298,451) from the Michigan Department of Environmental Quality (MDEQ) for the purposes of development and implementation of a Wastewater Asset Management Plan (WWAMP). A Grant Agreement was entered into on October 29, 2014 with an effective grant period from October 2014 to October 2017. A WWAMP team consisting of Township elected officials, pertinent Township staff, and engineering and financial consultants assumed the mission of developing, implementing, and receiving MDEQ approval for the WWAMP.

The Township has a responsibility to manage its wastewater assets in a cost-effective manner because:

- these assets represent a major public investment and trust;
- well-run utilities are important to 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.

The assets that make up the Township's wastewater system depreciate over time as they age and deteriorate. As this happens, the level of service expected by Township's customers may become compromised while operation and maintenance (O&M) costs increase. The goal of WWAMP development is to mitigate the deterioration of the assets through development of a rigorous methodology for wastewater asset management designed to meet established level of service goals in a cost-effective way through the creation, acquisition, operation, maintenance, rehabilitation, and disposal of assets. Successful execution of a WWAMP will help to ensure cost effective, efficient and accountable operations to ensure long-term sustainability.

The Township's engineering consultants, Johnson & Anderson, Inc. were retained to implement the grant scope and develop the WWAMPs for the Township. A WWAMP team was developed to oversee project development and implementation.

The Township's wastewater system consists of sewer main, pressure mains, manholes, service laterals, and pumping stations. The oldest components of the system were generally constructed in the late 1970's in conjunction with the expansion of the Regional Wastewater System. The Township's system sends collected wastewater to the City of Port Huron Wastewater Treatment Plant for treatment. The Township has a purchased capacity of 13.35% of the City of Port Huron Wastewater Treatment Plant Capacity, and has purchased 12 cubic feet per second (cfs) capacity in the City of Port Huron Interceptor which conveys flow to the treatment plant. The Township does not own or operate any treatment facilities.

BACKGROUND

The WWAMP outlines the Township's strategic Wastewater Asset Management Plan (WWAMP) for years 2018-2037. The WWAMP is the framework for providing the best overall strategy for asset management of the wastewater system and to help ensure service to the residents and businesses in the Township. The WWAMP was developed to ensure optimal asset management and capital improvement planning for the Township's wastewater 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 with a wastewater conveyance system that consists of gravity main, pressure main, manhole, and pumping station assets. Table 1 summarizes the Township's wastewater system.

Table 1 – Township Wastewater System Asset Inventory

System Asset	Quantity	Unit
Sewer main – 4 inch	110	LF
Sewer main – 6 inch	2,170	LF
Sewer main – 8 inch	118,410	LF
Sewer main – 10 inch	102,300	LF
Sewer main – 12 inch	43,620	LF
Sewer main – 15 inch	14,040	LF
Sewer main – 18 inch	8,760	LF
Sewer main – 21 inch	11,500	LF
Sewer main – 24 inch	8,600	LF
Sewer main – 30 inch	5,540	LF
Sewer main – 36 inch	10,380	LF
Sewer main – 42 inch	330	LF
Manholes	1,255	EA
Service Laterals	3,400	EA
Pressure Main – 4 inch	4,810	LF
Pressure Main – 6 inch	5,350	LF
Pressure Main – 8 inch	2,290	LF
Pressure Main – 10 inch	7,340	LF
Pressure Main – 12 inch	50	LF
Pressure Main – 16 inch	1,640	LF
Pump Stations	14	EA

CONDITION/REMAINING USEFUL LIFE

To perform a condition assessment, the 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 and MACP) standards. Sewer main older than 20 years of age was inspected using closed-circuit television (CCTV) equipment. Approval was obtained from the MDEQ to inspect selected sewer main less than 20 years of age where sewer deficiencies were suspected, or pipes were identified as critical. Manholes were field-inspected using a NASSCO Level 2 inspection, photographs were taken and manhole characteristics and defects were recorded. Pump stations were evaluated and scored with critical input and historical information provided by Department of Public Works (DPW) personnel and an Engineering Study performed in 2012 by Johnson and Anderson. Ratings of pipes, manholes and pump stations were catalogued into a spreadsheet to be used for analysis, and the development of a capital improvement plan. Table 2 identifies the NASSCO rating system used for the pipe and manhole defects.

Table 2 – NASSCO Condition Grades

Condition Grade	Definition
5	Most significant defect grade
4	Significant defect grade
3	Moderate defect grade
2	Minor to moderate defect grade
1	Minor defect grade

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 sewer main 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.

Based upon the NASSCO condition assessments, sewer main and manholes were found to be in mostly good condition, with more defects related to operational and maintenance conditions than structural conditions. 84% of sewer main were found to be in good condition with 7% in fair condition and 9% in poor condition. 85% of manholes were found to be in good condition with 9% in fair condition, and 6% in poor condition. Based upon pump station condition and performance, 14% were found to be in good condition, 43% in fair condition, and 43% in poor condition.

REPLACEMENT COST

The replacement cost of the system assets was determined by multiplying the total quantity of each system asset by an estimated replacement unit cost for each asset. The estimated replacement unit cost for each asset were derived from local bids and estimated cost of materials. The total replacement cost for all of system assets is estimated to be approximately $122 million. See Table 3 for a summary of asset replacement costs.

Table 3 – Summary of Township Wastewater System Asset Replacement Costs

System Asset	Quantity	Unit	Replacement Unit Cost (estimated)	Replacement Cost (estimated)
Sewer main - 4 inch	110	LF	$ 197	$ 21,670
Sewer main - 6 inch	2,170	LF	$ 197	$ 427,490
Sewer main – 8 inch	118,410	LF	$ 197	$ 23,326,770
Sewer main – 10 inch	102,300	LF	$ 229	$ 23,426,700
Sewer main – 12 inch	43,620	LF	$ 289	$ 12,606,180
Sewer main – 15 inch	14,040	LF	$ 348	$ 4,885,920
Sewer main – 18 inch	8,760	LF	$ 407	$ 3,565,320
Sewer main – 21 inch	11,500	LF	$ 464	$ 5,336,000
Sewer main – 24 inch	8,600	LF	$ 572	$ 4,919,200
Sewer main – 30 inch	5,540	LF	$ 832	$ 4,609,280
Sewer main – 36 inch	10,380	LF	$ 1,029	$ 10,681,020
Sewer main – 42 inch	330	LF	$ 1,230	$ 405,900
Manholes	1,255	EA	$ 10,720	$ 13,453,600
Laterals	3,400	EA	$ 2,500	$ 8,500,000
Pressure Main – 4 inch	4,810	LF	$ 60	$ 288,600
Pressure Main – 6 inch	5,350	LF	$ 90	$ 481,500
Pressure Main – 8 inch	2,290	LF	$ 120	$ 274,800
Pressure Main – 10 inch	7,340	LF	$ 150	$ 1,101,000
Pressure Main – 12 inch	50	LF	$ 180	$ 9,000
Pressure Main – 16 inch	1,640	LF	$ 240	$ 393,600
Pump Stations – Small	2	EA	$ 100,000	$ 200,000
Pump Stations – Medium	10	EA	$ 200,000	$ 2,000,000
Pump Stations – Large	2	EA	$ 600,000	$ 1,200,000
Total				**$ 122,113,550**
Notes: 1) All estimated project costs in 2017 dollars 2) Replacement unit price of 8-inch main used for 4 & 6 inch sewer mains				

ASSET MANAGEMENT HARDWARE & SOFTWARE TOOLS

All wastewater pumping station and manhole assets inventoried in the Township as part of this project were located using Global Positioning System (GPS) equipment with latitude and longitude coordinates established. These locations were then utilized to map the assets, and connect the associated gravity and pressure mains into a Geographic Information System (GIS) to create a database for the development of an asset inventory.

Additionally, existing sewer lead cards and construction plans of the Township's wastewater system were scanned and integrated into the Township's GIS wastewater system infrastructure layers, as were, all sewer main CCTV inspection videos and inspection reports for quick retrieval and review.

A SAW grant total of $85,000, was allocated for software and hardware purchases and training of Township staff per SAW grant population guidelines. GIS-Centric Computerized Maintenance Management System (CMMS) software application (City works), and a CIP software (Sedaru®) applications were utilized to manage work orders. This software allows the Township to optimize staff resources through the reduction of manual paperwork and scheduling by logging resident complaints and work processes through customer service requests and work orders to ensure staff are focused on doing the right things at the right times while capturing labor, equipment, and materials needed to complete the work. In addition, computer tablets were purchased for Township staff to implement and utilize the new CMMS program.

A component of the WWAMP also included the development and implementation of a Fats, Oils, and Grease (FOG) program for commercial kitchen properties. This program will serve to minimize labor and material costs of program management, ensure regulatory compliance, and reduce potential wastewater system problems due to accumulations of FOG in the Township's system. Each commercial kitchen property in the Township that generates FOG was integrated into the Township's GIS and City works system. FOG inspection schedules have been developed in City works to automatically generate work orders for staff to perform inspections and to create additional work orders when problems are found and to provide the basis for cost recovery documentation and invoicing.

Another component of the WWAMP involved using the manhole and sewer main information from the GIS, as well as information relating to the sanitary sewerage pumping stations, to develop and calibrate a working hydraulic model of the Township's wastewater system. Strap-on flow meters at 5 pump stations were used to evaluate pump station performance by measuring discharge rates and force-main velocities. A sewer flow meter was used to assist with model calibration.

LEVEL OF SERVICE

A Level of Service (LOS) plan was developed by WWAMP team members. This plan defines how the Township wants the wastewater system to perform over the 20 year planning period against established operational and planning best management practices. The LOS standards and goals were developed with review and additional input from the DPW staff, and the Township Supervisor, Clerk, and Treasurer. Questions addressed in the development of 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 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;
- accumulation of infrastructure assets;
- review of previous reports and studies ;and
- staff and consultant knowledge of the wastewater system.

The framework for the LOS is a triple bottom-line approach that incorporates social, environmental, and economic criteria. The social component was divided into four strategic performance indicators: customer service, reliability, health and safety, and administrative organizational development. The environmental component was divided into two performance indicators: environmental stewardship, and regulatory compliance. The economic component was placed into a single performance indicator: financial. The LOS impetus was determined to be either self, customer or regulatory driven. The current and future targets were identified with their respective performance measures, data, and reporting procedure. A rating system was developed to identify strategic areas that are acceptable or need improvements.

Within the social component of the LOS framework:

- The customer service performance indicator focuses primarily on the Township's responsiveness and efficiency.
- The reliability performance indicator focuses on the dependability of the wastewater system.
- The health and safety performance indicator focuses on protecting the community's health, the health of Township staff maintaining the system, in accordance with local, state, and federal safety standards.
- The administrative/organizational performance indicator considered the optimization of resources and reduction of overall O&M, planning, and engineering costs.

Within the environmental component of the LOS framework:

- The environmental stewardship performance indicator focuses on protecting the water quality of rivers that flow through the Township.
- The regulatory compliance performance indicator focuses on complying with the local, state, and federal regulations regarding wastewater systems.

Within the economic component of the LOS framework:

- The financial performance indicators have been developed to ensure adequate funding is available to maintain the wastewater system.

A color-coded rating system was developed to identify strategic areas that: 1) do not need improvement (Green); or, 2) are acceptable but with identified improvement needed (Yellow), and 3) those that require improvement (Red). Table 4 illustrates the color-coded rating system.

Table 4 – LOS Goal Rating System

Color Code	Rating
	No Improvement Needed
	Acceptable (Perhaps Some Improvement Needed)
	Improvement Necessary

Examples of current and future LOS target goals developed by the Township are:

- Maintain trust with the public, regulatory agencies, and non-government organizations, and provide efficient and timely service to customers;
- Clean and inspect the sanitary sewer system every 10 years
- Protect community from hazards associated with wastewater collection (basement backups, traffic disturbance, etc.).
- Report 100% of SSOs as required by the State.

The following is the Mission Statement developed by the Township:

Continue to provide an exceptional quality of life for our residents through cost-efficient sewer, water, and storm drainage, Capital Improvement Planning, a diverse mix of land uses, transportation safety, and water resources and recreational opportunities.

Through the development of the LOS goals, the WWAMP team identified that the Township maintains the staff and monetary resources to properly administer its wastewater system. The Township plans to further improve upon O&M initiatives with the installation and implementation of asset management software and various programs.

By preparing a WWAMP, conducting condition assessments and determining asset criticality, the Township can now move to a more proactive approach to managing system assets. This proactive approach will assist the Township in achieving cost effective and sustainable wastewater system operations that include the rehabilitation and replacement of identified assets as well as improved project management and administration.

CRITICALITY OF ASSETS

The criticality of wastewater system assets was examined with regard to the importance of the asset to the overall operation of the system. 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 for sewer main, was determined based upon the following factor percentages outlined in Table 5.

Table 5 - Consequence of Failure Triple Bottom-Line Weighting Factors

Social – 80%	Environmental – 10%	Economic – 10%
• Number of Customers Served – 70% • Types of Customers Served (Zoning) – 5% • Surface Traffic Disturbance – 5%	• Sewer Main Proximity to Surface Water – 10%	• Sewer Main Diameter – 5% • Sewer Main Depth – 5%

Social Impact was scored at 80% of the COF determination for sewer main. The more customers out of service due to a wastewater system failure, the more severe the situation. As service is disrupted to a larger number of users, additional costs are also incurred to reroute and bypass mains, set up temporary pumping equipment and to notify the public in an expedient manner. Sewer main associated with critical business facilities and roadway areas are also an important component of this analysis.

Environmental Impact contributed 10% to the COF. Regulatory non-compliance can result in the need for public notification and/or fines and consent orders to eliminate the problem. Should a sewer main fail that is in close proximity to surface water, there are serious ramifications related to public health and environmental impacts. An asset further away from surface water is less critical as there is more time to contain overflow due to failure.

The Economic Impact of replacing a sewer main has been assigned a score of 10% in the COF analysis. In the event of an asset failure, the costs to replace that asset may be much greater than the cost to make repairs. A large diameter pipe that is buried deeply is more expensive to replace than a small diameter, shallow pipe.

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 disruption to critical system customers. Each sewer main and pump station was assigned an overall COF rating of 1 to 5. A rating of 1 being a slight effect (10 or less customers) to 5 being a severe disruption to the system (500 or more customers).

The POF for sewer main, was determined based upon the following factor percentages outlined in Table 6.

Table 6 - Probability of Failure Weighting Factors

Performance Rating – 25%	Sewer Main Structural Condition Rating – 50%	Sewer Main Age – 25%
• NASSCO Sewer Main O&M Quick Score – 20% • NASSCO Overall Sewer Main Rating – 5%	• NASSCO Structural Quick Score – 50%	• Sewer Main Age – Remaining Useful Life

Operational and maintenance criteria are considered for the Performance Rating component of the POF and are weighted at 25% of the POF scoring. This criteria includes the presence of obstructions in the sewer main. Treatment techniques for these items typically involve the scouring of the pipe or the injection of some form of corrosive material to dislodge the obstructions. This O&M activity directly impacts the structural condition of the pipe. Given the impact that O&M activities have on the structural integrity of the pipe, the POF for sewer main, was determined to be directly related to the structural condition and operation and maintenance performance. The sewer main operational and maintenance condition rating utilized the NASSCO O&M Quick Score (weighted 20%), and the NASSCO overall sewer main rating (weighted 5%) to determine the Performance Rating of the sewer main. Sewer main with structural problems such as breaks, holes, chemical surface spalling, or fractures are most in danger of failure. The pipe structural condition rating is weighted 50% of the POF score, and was determined using the NASSCO Structural Quick Score. The age of a sewer main is also an important component given that wastewater system infrastructure is designed with finite service life, and continues to deteriorate over time. Sewer main age was weighted at 25% of the POF scoring to account for potential future sewer main condition deterioration. An overall POF rating of 1 to 5 was assigned to each sewer main with a rating of 1 being excellent condition and 5 being unserviceable.

The POF for pumping stations was determined based upon an assessment of each pumping station's condition and performance. 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 a pump station engineering report completed in 2012 by Johnson & Anderson, pump station maintenance records, and input from the Township DPW. Based on this information, pumping station performance ratings were assigned on a 1-5 scale. A performance rating of 1 indicated the POF is rare, and a performance rating of 5 indicated the POF is likely. The performance and condition rating for each pumping station was weighted 50% to develop an overall POF for each pumping station.

A comprehensive BRE was developed for the sewer main and manholes using NASSCO ratings and a COF and POF scoring matrix model. Based on the asset scoring a total BRE score was developed, which was a product of COF and POF. Manholes were assigned their BRE based upon the BRE of the downstream sewer main. A second BRE was created for pumping stations based upon their COF and POF ratings. The BRE scores were used to rank system assets, determine areas of concern and to guide the projects and timing of CIP project development. Table 7 provides an outline of the BRE scale.

Table 7 – Business Risk Evaluation (BRE) Scale

Business Risk Evaluation (BRE) Total Score	
Business Risk Evaluation Scoring	
Business Risk	Total BRE Score
Critical / Intolerable Risk	16.00 - 25.00
High Risk – Tolerable and Manageable – Aggressive Monitoring	10.00 - 15.99
Medium Risk –Tolerable and Manageable – Monitoring	5.00 - 9.99
Low Risk –Failure is Tolerable	0.00 - 4.99

Based on the sewer main BRE, there was one (1) sewer main segment that was rated critical and seventeen (17) sewer main segments that were rated as high risk. 36.7% of the sewer main were rated medium risk, and the remaining 61.9% of the sewer main were rated low risk. Based upon the pumping station BRE there were four (4) pumping stations rated critical, two (2) rated high risk, seven (7) rated medium risk, and one (1) rated low risk.

REVENUE STRUCTURE

Each year the Township Board prepares an annual operating budget for the Township sewer operations that includes the estimated expenses and the revenues necessary to cover both the short and long-term needs of the system. In connection with this the Township contracts with the Township's certified public accounting firm, Stewart, Beauvais and Whipple, to assist in determining the rates that are necessary to cover the estimated operating expenses, capital needs, etc. As required by the Michigan Department of Environment Quality (MDEQ), a 2½ year Rate Methodology was submitted and approved.

The Township Board goal is to maintain a combined usable net position of approximately $1 million or approximately 6-12 months of operations, at the end of each year for cash flow and unforeseen expenses or emergencies. It is estimated that the sewer system will need approximately $5.7 million of improvement in today's dollars over the next 20 years. With inflation, it is estimated that the improvements will cost $8.1 million, using an inflation factor of 3.5%. In order to fund these capital improvements and maintain the desired net position, the Township increased the rate 10% for 2017. As part of best management practices, the Township intends to review rates every year to ensure appropriate revenue to support the WWAMP.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) was developed to outline operation, system maintenance, repairs, replacement and rehabilitation of pipes, manholes, and pump stations for a period of 20 years. Individual project cost information was determined using bid tabulations and local project information. A description of each asset and year for potential improvement was developed using the BRE, historical knowledge of the assets, and input from Township personnel. Table 8 provides a brief summary of the CIP projects.

Table 8 – 20 year CIP Plan Cost Summary

Item Description	Estimated Cost	
Sewer Main Repairs	$	1,217,500
Sewer Main Cleaning & Inspection	$	1,384,500
Force Main Replacement & Cleaning	$	593,460
Pumping Station Refurbishment	$	1,770,000
Pump Replacement	$	376,000
Manhole Repairs & Adjustments	$	310,800
Total	**$**	**5,652,260**

SUMMARY

The wastewater system will need increased attention as it continues to age, and the WWAMP is designed to provide guidance for Township staff to prioritize improvements over the 20 year planning period. The projected CIP costs include sewer main, pumping station and force main rehabilitation and replacement as well as wastewater system maintenance and inspection.

The project team developed the MDEQ approvable wastewater WWAMP as a framework for providing prioritized and cost effective wastewater service to the Township's residents and businesses, and should be viewed as a living and dynamic document to be reviewed and updated in regular periodic intervals over the 20 year planning period. It has also been developed to provide Township staff with GIS-Centric CMMS and CIP planning tools to schedule and track efforts to operate and maintain the system as well as plan for future improvements.

CONTACT INFORMATION

Mr. Robert G. Lewandowski Jr., Supervisor
Charter Township of Port Huron
3800 Lapeer Road
Port Huron Township, Michigan 48060
Phone: (810)-987-6600
http://www.porthurontownship.org

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The **Charter Township of Port Huron** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1240-01 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: April 25, 2017.
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 G. Lewandowski Jr.	at	810-987-6600	rlewandowski@porthurontownship.org

10-16-17

Signature of Authorized Representative (Original Signature Required) — Date

Robert G. Lewandowski Jr., Township Supervisor

Print Name and Title of Authorized Representative

City of Portage SAW Grant 1186-01 Executive Summary

April 17, 2017

David Worthington

Environmental Quality Analyst – Project Manager

MDEQ Revolving Loan Section – West Unit

The City of Portage (City) contracted the professional services of the consulting team Hurley & Stewart, LLC (H&S) and Kieser & Associates, LLC (K&A) for preparation of a stormwater basin Asset Management Plan. This project was funded primarily by the State of Michigan through a Stormwater, Asset Management and Wastewater (SAW) Grant administered by the Michigan Department of Environmental Quality (MDEQ) along with partial funding from the City.

The purposes of this project were to take inventory of the existing stormwater basins under the jurisdiction of the City, determine the current maintenance needs of those basins and establish an ongoing maintenance plan for each. This report summarizes the information gathered for this project and the repair and maintenance recommendations for each existing basin. The following report is divided up into eight additional content sections: Background, Methodology, Asset Inventory Assessment, Level of Service, Critical Assets, Revenue Structure, Capital Improvement Planning and Conclusions and Recommendations.

The project Background section outlines the scope of this project and the motivation behind it. The City of Portage stormwater drainage system contains 72 infiltration basins, but most of the details about them had not been documented. Establishing a detailed Asset Management Plan as established in this study will allow the annual operation and maintenance budget to be used more effectively.

The Methodology section details the work efforts and methodology carried out by the project team. This involved a review of available information from the City and an evaluation of each individual basin. These steps were used to determine the condition and requirements of each basin, which were used to create a set of recommendations for the basins, including establishing timing and funds needed to achieve Level-of-Service goals.

The Asset Inventory Assessment section is the longest section of the report, and includes a detailed assessment of each individual basin. Each basin was visited and carefully evaluated to identify and document the current state of the retention basins. This section includes detailed assessments of basin exteriors, pond areas, stormwater inlets and outlets, local flora/fauna, and local monitoring wells.

The Level of Service section of the report summarizes the service goals that the City has for its stormwater basin system. The Level of Service of a system measures the quality of a facility as it relates to the community’s needs. A determination of the level of service of a basin can be used to determine operation and maintenance requirements for a basin and basin operational lifespans.

The Critical Assets section of the report explains the method used to determine the criticality of each basin. Criticality is defined as the product of the probability that the basin will fail by the consequence of failure for that basin. The criticality of the basins was used to determine which basins require the most work to maintain their level of service. Focusing on the most critical needs can be used to focus the budget where the need is greatest.

The Revenue Structure section of the report summarizes the City's budget for stormwater improvements. The City currently has a $70,000 annual budget for all work related to stormwater basin management and repairs. While water and sanitary services have their own revenue streams, there is no dedicated revenue source for the stormwater system.

The Capital Improvement Planning section of the report examines the utility's needs for the future and details out a 10-year budget to maintain and replace necessary basins in order preserve current level of service ratings. It is proposed that immediate necessary repairs are taken care of within the current budget and once required repairs are completed, two basins per year be reconstructed.

The Conclusions and Recommendations section of the report shortly summarizes the full intent behind this study. In order to maintain the desired quality of a public facility as it relates to the community's needs, the City aims at better managing and addressing deficiencies when it comes to City owned basins. Managing all 72 stormwater basins within the City is an ongoing process that is ever changing.

City of Portage SAW Grant 1186-01 Major Asset List

April 19, 2017

David Worthington

Environmental Quality Analyst – Project Manager

MDEQ Revolving Loan Section – West Unit

The following is a list of all major stormwater assets included within the scope of this report:

Storm Water Basin #	Basin ID	Surrounding Land Use	Basin Type	Criticality of Asset	Proposed Interior Maintenance
1	Foxfire	Residential/Woods	Retention	2: Non-Critical	Semi-Natural
2	Sturgeon Bay	Residential	Retention	1: Non-Critical	Semi-Natural
3	Winters Drive	Commercial/Residential	Retention	16: Critical	Functional
4	Heverly	Residential	Retention	6: Non-Critical	Functional
5	Oakland Dr.	Woods	Retention	4: Non-Critical	Semi-Natural
6	Ohio NE	Residential	Retention	6: Non-Critical	Functional
7	Ohio SW	Residential	Retention	6: Non-Critical	Functional
8	Angling	Residential	Retention	4: Non-Critical	Semi-Natural
9	Coachlite	Residential/Woods	Retention	6: Non-Critical	Natural
10	Sunburst	Residential/Woods	Retention	6: Non-Critical	Functional
11	Romence	Residential/Woods	Retention	3: Non-Critical	Natural
12	Evergreen	Residential	Retention	1: Non-Critical	Functional
13	Hickory Point	Residential	Retention	6: Non-Critical	Functional
14	Haverhill	Residential/Woods	Retention	9: Important	Semi-Natural
15	Autumn	Commercial/Residential	Retention	3: Non-Critical	Semi-Natural
16	Oakland Drive	Residential/Woods	Retention	6: Non-Critical	Functional
17	Norfolk Circle	Residential	Retention	6: Non-Critical	Semi-Natural
18	Pasma	Commercial/Residential	Retention	6: Non-Critical	Semi-Natural

19	Pompano	Residential/Woods	Retention	6: Non-Critical	Functional
20	Marlow	Residential	Retention	3: Non-Critical	Semi-Natural
21	Point-O-Woods Circle	Residential	Retention	3: Non-Critical	Natural
22	Westcove	Residential	Retention	3: Non-Critical	Semi-Natural
23	Gabardine/Trafalgar	Residential	Retention	3: Non-Critical	Functional
24	Cherry View	Residential/Woods	Retention	3: Non-Critical	Functional
25	Chippewa	Residential	Retention	6: Non-Critical	Functional
26	Schuring	Residential	Retention	3: Non-Critical	Functional
27	Old Mission - French Bay	Residential	Retention	3: Non-Critical	Functional
28	Old Mission	Residential	Retention	3: Non-Critical	Functional
29	Brynmawr	Woods	Retention	3: Non-Critical	Natural
30	Conestoga	Residential/Woods	Retention	4: Non-Critical	Semi-Natural
31	Wishing Well	Residential	Retention	4: Non-Critical	Semi-Natural
32	Lost Pine Way	Residential	Retention	3: Non-Critical	Semi-Natural
33	Brickleton Woods	Residential	Retention	3: Non-Critical	Functional
34	Hawthorne Woods	Residential	Retention	6: Non-Critical	Functional
35	Tuscany Estates	Residential/Woods	Retention	3: Non-Critical	Semi-Natural
37	Sprinkle Woods	Residential	Retention	6: Non-Critical	Semi-Natural
38	Pfitzer	Residential/Woods	Retention	3: Non-Critical	Natural
39	Sussex	Residential	Retention	3: Non-Critical	Semi-Natural
40	Fox Valley	Residential/Woods	Forebay	6: Non-Critical	Functional
41	Andrea Lane	Woods	Retention	3: Non-Critical	Natural
42	Valleywood Lane	Residential/Woods	Forebay	4: Non-Critical	Natural
43	Corporate	Industrial/Woods	Retention	6: Non-Critical	N/A
44	Quality Way	Industrial	Retention	4: Non-Critical	Semi-Natural
45	Portage Industrial	Woods	Forebay	2: Non-Critical	Semi-Natural
46	Holiday Village	Residential	Retention	3: Non-Critical	Functional

47	Romence Ridge	Residential/Woods	Detention	4: Non-Critical	Functional
48	Meadows at Constitution	Residential	Retention	6: Non-Critical	Functional
49	Deer Crossing	Residential	Retention	6: Non-Critical	Functional
50	Lake Haven Estates	Residential/Woods	Retention	2: Non-Critical	Semi-Natural
51	The Pines	Residential	Retention	3: Non-Critical	Functional
52	Tech Parkway	Industrial	Retention	2: Non-Critical	Semi-Natural
53	Andover Woods	Residential/Woods	Retention	3: Non-Critical	Semi-Natural
54	Stteplechase	Residential	Retention	3: Non-Critical	Semi-Natural
55	Southern Oaks	Residential/Woods	Retention	6: Non-Critical	Functional
56	Romence Parkway	Woods	Forebay	4: Non-Critical	Functional
57	Ashton Farms	Residential	Retention	2: Non-Critical	Semi-Natural
58	Quality Court	Industrial	Retention	1: Non-Critical	N/A
59	Shaver Rd (Kuiper Bro)	Commercial	Retention	2: Non-Critical	Functional
60	Shaver Rd (Walmart)	Commercial/Woods	Retention	2: Non-Critical	N/A
61	E. Milham	Woods	Retention	3: Non-Critical	Functional
62	Ashton Farms West	Residential	Retention	2: Non-Critical	Functional
63	Engel Court	Residential/Woods	Retention	1: Non-Critical	Semi-Natural
64	Avalon Woods	Residential/Woods	Forebay	2: Non-Critical	Functional
65	Briarhill Court	Residential	Retention	3: Non-Critical	Functional
68	Avalon Forest	Residential/Woods	Retention	4: Non-Critical	Semi-Natural
69	Jonathan Woods	Residential/Woods	Retention	2: Non-Critical	Functional
78	Ashton Farms West	Residential	Retention	2: Non-Critical	Functional
79	Trade Center	Commercial/Woods	Forebay	2: Non-Critical	N/A
84	Trade Center / West Fork	Commercial	Forebay	4: Non-Critical	Functional
86	Oakland Farms Trail	Residential/Woods	Retention	2: Non-Critical	Semi-Natural
87	Montego Bay	Woods	Retention	3: Non-Critical	Natural
88	Bear Lake	Residential/Woods	Retention	2: Non-Critical	N/A

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

Completion Due Date April 30, 2017
(no later than 3 years from executed grant date)

The City of Portage *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1186-1 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:

Judy Graham at (269) 329-4424 grahamj@portagemi.gov
Name Phone Number Email

April 20, 2017
Signature of Authorized Representative (Original Signature Required) Date

Laurence Shaffer, City Manager
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater
Asset Management Plan
Wastewater Executive Summary

City of Riverview
14100 Civic Park Drive Riverview, Michigan 48193
Andrew Swift, Mayor
734.281.4201
SAW Grant Project Number 1183-01

Executive Summary

The City of Riverview (City) was awarded a grant by the Michigan Department of Environmental Quality (MDEQ) under the Stormwater, Asset Management, and Wastewater (SAW) Grant Program to develop both a wastewater and a stormwater Asset Management Plan (AMP). The total eligible cost was $2,444,397, less a local match of $444,433, for a total grant amount of $1,999,964. The grant was divided into two components: wastewater AMP cost ($1,129,386) and stormwater AMP cost ($1,315,011). The wastewater AMP is discussed below. A separate summary is available for the stormwater AMP.

The AMP was developed by Fishbeck, Thompson, Carr & Huber, Inc. (FTCH) and the City Engineer, C. E. Raines Company (CERCO), working closely with City staff in accordance with the five MDEQ AMP components:

1. Asset Inventory and Condition Assessment
2. Level of Service (LOS)
3. Asset Criticality
4. Revenue Structure
5. Capital Improvement Plan (CIP)

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 under the SAW Grant included the components described below.

Asset Inventory

The City's wastewater system consists of approximately 230,249 feet of pipe ranging in size from 6 inches to 48 inches. The system also includes four wastewater pump stations: Longsdorf Pump Station, Fordline Pump Station, Grange Road Pump Station, and Greentrees Pump Station. The City is a customer of the Downriver Sewage Disposal System (DSDS) which is owned and operated by Wayne County. The City discharges wastewater directly into the Wayne County's Pennsylvania Interceptor via the Riverview Interceptor. The DSDS is expected to be transferred to the Downriver Utility Wastewater Authority (DUWA), with the expectation the transfer will be completed in late 2017.

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 44 wastewater system plans and record drawings, scanned them, and incorporated them into the GIS database.

3. Developed a total of 17 different asset classes to represent the City's asset types, including sewer pipes; manholes; process equipment; pumps; structures; buildings; electrical systems; and heating, ventilation, and air conditioning equipment.
4. Reviewed existing records and conducted site visits to develop an inventory of the City assets, including:
   a. 1,055 sanitary manholes.
   b. 1,159 sanitary sewers.
   c. 64 vertical assets.
5. Developed a unique naming convention for the assets that incorporated the City's quarter section numbering 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, remaining useful life, and replacement costs. Incorporated the information into the GIS database.

Condition Assessment

1. Manhole inspections were performed in 2014 and 2015 on the majority of the sanitary manholes in the system. The inspection forms, as well as the results of the inspection, were incorporated into the City's GIS database.
2. Closed circuit television (CCTV) inspection of the sanitary sewers was performed in 2016. The work was completed in accordance with the Pipeline Assessment and Certification Program (PACP). The inspection forms, and the results of the inspection, 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 sanitary sewers are generally in good condition; however, 15 pipe segments have a structural condition rating above a 4.0, and 5 pipe segments have an O&M rating above a 4.0.
   b. There are 11 sanitary manholes with a composite (structural and O&M) rating above 4.0.

Level of Service Determination

The City developed a LOS based on commitments to their customers and the MDEQ, which included:

1. Safeguard public health and the environment.
2. Operate the system to ensure it has sufficient capacity to reduce the chances of any sanitary sewer overflows.
3. Maintain the 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 remaining life. The rating criteria was different for pipes, manholes, and vertical assets as follows:

Table 1 – Pipe Probability of Failure

<table>
<tr><td colspan="2" rowspan="2"></td><td rowspan="2">Weighting Factor</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>Imminent</td><td>Probable</td><td>Occasional</td><td>Remote</td><td>Improbable</td></tr>
<tr><td rowspan="2">POF</td><td>O&M Quick Rating (PACP)</td><td>50%</td><td colspan="5">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</td></tr>
<tr><td>Structural Quick Rating (PACP)</td><td>50%</td><td colspan="5">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</td></tr>
<tr><td colspan="2">Remaining Useful Life (used only when pipe not PACP inspected)</td><td>100%</td><td>Useful Life Remaining: 0%</td><td>Useful Life Remaining: 1-20%</td><td>Useful Life Remaining: 20-50%</td><td>Useful Life Remaining: 50-70%</td><td>Useful Life Remaining: 70-100%</td></tr>
</table>

Table 2 – Manhole Probability of Failure

<table>
<tr><td colspan="2" rowspan="2"></td><td rowspan="2">Weighting Factor</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>Imminent</td><td>Probable</td><td>Occasional</td><td>Remote</td><td>Improbable</td></tr>
<tr><td>POF</td><td>Structural and O&M Quick Rating (MACP)</td><td>100%</td><td colspan="5">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</td></tr>
<tr><td colspan="2">Remaining Useful Life (used only when pipe not MACP inspected)</td><td>100%</td><td>Useful Life Remaining: 0%</td><td>Useful Life Remaining: 1-20%</td><td>Useful Life Remaining: 20-50%</td><td>Useful Life Remaining: 50-70%</td><td>Useful Life Remaining: 70-100%</td></tr>
</table>

Table 3 – Vertical Asset Probability of Failure

		Weighting Factor	5 Imminent	4 Probable	3 Occasional	2 Remote	1 Improbable
Physical Condition (based on visual inspection)		80%	Very Poor (Condition Grade 5)	Poor (Condition Grade 4)	Fair (Condition Grade 3)	Good (Condition Grade 2)	Very Good (Condition Grade 1)
Useful Life	Frequently Operated Major	5%	Greater than 80% of useful life	Age between 60% and 80% of useful life	Age between 40% and 60% of useful life	Age between 20% and 40% of useful life	Age less than 20% of useful life
	Frequently Operated Minor		At or beyond useful life	Age between 80% and 100% of useful life	Age between 50% and 80% of useful life	Age between 25% and 50% of useful life	Age less than 25% of useful life
	Frequently Operated Rebuilt/ Reconditioned		Rebuilt over 20 years	Rebuilt 15 to 20 years	Rebuilt 10 to 15 years	Rebuilt 5 to 10 years	Rebuilt less than 5 years
	Infrequently Operated		Run time average more than 7,500 hours per year	Run time average between 5,000 and 7,500 hours per year	Run time average between 3,000 and 5,000 hours per year	Run time average between 1,000 and 3,000 hours per year	Run time average less than 1,000 hours per year
Current O&M Status		15%	Not operational and not maintained (repairs cost prohibitive)	Operational, but hard to maintain/ obsolete or parts not available	Operational, but behind on maintenance	Operational with sporadic maintenance	No operational problems, regular maintenance

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 following criteria:

Table 4 – Consequence of Failure for Pipes and Manholes

		Weighting Factor	5 Catastrophic Disruption	4 Major Disruption	3 Moderate Disruption	2 Minor Disruption	1 Insignificant Disruption
COF	Diameter Score	33%	≥ 24-inch	18-inch to 21-inch	15-inch	10-inch to 12-inch	≤ 8-inch
	Physical Location Score	33%	State Trunklines, Railroad Crossings, Water Crossing		Primary County Roads and City Major Roads		City Minor Roads
	Service Area Score	33%	Schools, Water Crossings		Churches, City Facilities, Industrial, Commercial		Single Family Residential and Multi-Family Residential

Table 5 – Consequence of Failure for Vertical Assets

		Weighting Factor	5	4	3	2	1
			Catastrophic Disruption	Major Disruption	Moderate Disruption	Minor Disruption	Insignificant Disruption
COF	Process	25%	Mission critical: unable to accomplish mission	Process shut-down	Loss of redundancy or temporary process upset	Potential process upset	No impact on process
	Financial Impact	25%	May require new borrowing or impact rates (> $100,000)	May require transfer from reserves ($25,000 - $100,000)	Absorbed within current budget ($10,000 - $25,000)	Absorbed within applicable line item ($1,000 - $25,000)	Budgeted expense (< $1,000)
	Disruption to the Community	25%	Long term impact; area wide disruption	Short term impact but substantial disruption	Sporadic service disruptions	Minor disruption	No disruption
	Required Response Time	25%	< 1 hour	1 to 4 hours	4 to 8 hours	8 to 48 hours	> 48 hours

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 were 13 wastewater assets that were inspected with BRE scores greater than 16: 7 pipe segments, 5 manholes, and 1 vertical asset. The pipe segments were 15-inch through 48-inch diameter concrete pipe and all had surface damage with variable stages of visible aggregate. These pipes will need to be rehabilitated with cured-in-place pipe liners.

One manhole will require a complete rebuild of the chimney. Three manholes require grouting to prevent infiltration through the chimney and wall sections.

The vertical asset with a high BRE included the diversion structure at the Longsdorf Pump Station. The diversion structure is severely corroded and needs to be replaced.

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.
4. Reviewed current staffing plan and updated it based on the hours and staff needed to comply with the revised preventative maintenance program.

Revenue Considerations

The City's fiscal year is from July to June. For each fiscal year, the water and sewer budget is developed and includes the typical costs needed to operate the sanitary and storm sewer system as well as perform normal maintenance activities. The associated water and sewer rates for the fiscal year 2016/17 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 2017-2037 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.

Capital Improvement Plan

A 20-year CIP was developed for the City using the results of the metering, condition assessments, BRE, remaining useful life, and repair/replacement costs. The CIP included:

1. Grouping projects based on the type of work and asset classes.
2. A schedule for repair/replacement projects through the year 2037.
3. Anticipated project costs and annual system costs through the year 2037.

Major projects anticipated to begin in the next few years are:

- Study – Inspect remaining manholes that were not inspected under the SAW Grant.
- Study – Inspect remaining sewers that were not inspected under the SAW Grant.
- Raise buried manholes to grade to provide access for maintenance.
- Rehabilitate manholes and sewers that have high POF/BRE ratings.
- Upgrade sewer system in Huntington Meadows Subdivision.

List of Major Assets

Wastewater Assets:

- 230,249 feet of 6-inch to 48-inch diameter pipe.
- 1,055 sanitary manholes.
- 4 sanitary Pump stations.

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

Completion Date October 23, 2017
(no later than 3 years from executed grant date)

The City of Riverview *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1183-01 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: March 14, 2017.
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:

Douglas Drysdale	at	734-281-4201	ddrysdale@cityofriverview.com
Name		Phone Number	Email

Andrea M. Swift — 10-23-17

Signature of Authorized Representative (Original Signature Required) — Date

Andrew Swift, Mayor

Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater
Asset Management Plan
Stormwater Executive Summary

City of Riverview
14100 Civic Park Drive Riverview, Michigan 48193
Andrew Swift, Mayor
734.281.4201
SAW Grant Project Number 1183-01

Executive Summary

The City of Riverview (City) was awarded a grant by the Michigan Department of Environmental Quality (MDEQ) under the Stormwater, Asset Management, and Wastewater (SAW) Grant Program to develop both a wastewater and a stormwater Asset Management Plan (AMP). The total eligible cost was $2,444,397, less a local match of $444,433, for a total grant amount of $1,999,964. The grant was divided into two components: wastewater AMP cost ($1,129,386) and stormwater AMP cost ($1,315,011). The stormwater AMP is discussed below. A separate summary is available for the wastewater AMP.

The AMP was developed by Fishbeck, Thompson, Carr & Huber, Inc. (FTCH) and the City Engineer, C. E. Raines Company (CERCO), working closely with City staff in accordance with the following MDEQ AMP components:

1. Asset Inventory and Condition Assessment
2. Level of Service (LOS)
3. Asset Criticality
4. Capital Improvement Plan (CIP)

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, and an updated operation and maintenance (O&M) program to routinely maintain the assets. The work completed under the SAW Grant included the components described below.

Asset Inventory

The City's stormwater system consists of approximately 188,227 feet of pipe ranging in size from 4 inches to 96 inches. The system also includes six stormwater pump stations: Fordline Pump Station, Colonial Village Pump Station, Valleyview Pump Station #1, Valleyview Pump Station #2, Valleyview Pump Station #3, and Valleyview Pump Station #4. The stormwater system discharges its flow to local drains as well as 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 31 stormwater system plans and record drawings, scanned them, and incorporated them into the GIS database.
3. Developed a total of 17 different asset classes to represent the City's asset types, including sewer pipes; manholes; process equipment; pumps; structures; buildings; electrical systems; and heating, ventilation, and air conditioning equipment.

4. Reviewed existing records and conducted site visits to develop an inventory of the City assets, including:
   a. 742 storm manholes.
   b. 1,017 catch basins.
   c. 1,921 storm sewers.
   d. 40 vertical assets.
   e. 49 storm outfalls.
5. Developed a unique naming convention for the assets that incorporated the City's quarter section numbering 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, remaining useful life, and replacement costs. Incorporated the information into the GIS database.

Condition Assessment

1. Manhole inspections were performed in 2014 and 2015 on the majority of the storm manholes in the system. Only some catch basins located along main line sewer were inspected at that time. The inspection forms, as well as the results of the inspection, were incorporated into the City's GIS database.
2. Closed circuit television (CCTV) inspection of the storm sewers was performed in 2016. The work was completed in accordance with the Pipeline Assessment and Certification Program (PACP). The inspection forms, and the results of the inspection, 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 storm sewers are generally in good condition; however, 43 pipe segments have a structural condition rating above a 4.0 and 4 pipe segments have an O&M rating above a 4.0.
   b. There are 12 storm manholes/catch basins with a composite (structural and O&M) rating above 4.0.

Level of Service Determination

The City developed an LOS based on commitments to their customers and the MDEQ, which included:

1. Safeguard public health and the environment.
2. Operate the system to ensure it has sufficient capacity to reduce the chances of surface flooding.
3. Maintain the 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 remaining life. The rating criteria was different for pipes, manholes, and vertical assets as follows:

Table 1 – 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				
Remaining Useful Life (used only when pipe not PACP inspected)		100%	Useful Life Remaining: 0%	Useful Life Remaining: 1-20%	Useful Life Remaining: 20-50%	Useful Life Remaining: 50-70%	Useful Life Remaining: 70-100%

Table 2 – 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				
Remaining Useful Life (used only when pipe not MACP inspected)		100%	Useful Life Remaining: 0%	Useful Life Remaining: 1-20%	Useful Life Remaining: 20-50%	Useful Life Remaining: 50-70%	Useful Life Remaining: 70-100%

Table 3 – Vertical Asset Probability of Failure

		Weighting Factor	5 Imminent	4 Probable	3 Occasional	2 Remote	1 Improbable
Physical Condition (based on visual inspection)		80%	Very Poor (Condition Grade 5)	Poor (Condition Grade 4)	Fair (Condition Grade 3)	Good (Condition Grade 2)	Very Good (Condition Grade 1)
Useful Life	Frequently Operated Major	5%	Greater than 80% of useful life	Age between 60% and 80% of useful life	Age between 40% and 60% of useful life	Age between 20% and 40% of useful life	Age less than 20% of useful life
	Frequently Operated Minor		At or beyond useful life	Age between 80% and 100% of useful life	Age between 50% and 80% of useful life	Age between 25% and 50% of useful life	Age less than 25% of useful life
	Frequently Operated Rebuilt/ Reconditioned		Rebuilt over 20 years	Rebuilt 15 to 20 years	Rebuilt 10 to 15 years	Rebuilt 5 to 10 years	Rebuilt less than 5 years
	Infrequently Operated		Run time average more than 7,500 hours per year	Run time average between 5,000 and 7,500 hours per year	Run time average between 3,000 and 5,000 hours per year	Run time average between 1,000 and 3,000 hours per year	Run time average less than 1,000 hours per year
Current O&M Status		15%	Not operational and not maintained (repairs cost prohibitive)	Operational, but hard to maintain/ obsolete or parts not available	Operational, but behind on maintenance	Operational with sporadic maintenance	No operational problems, regular maintenance

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 following criteria:

Table 4 – Consequence of Failure for Pipes and Manholes

		Weighting Factor	5 Catastrophic Disruption	4 Major Disruption	3 Moderate Disruption	2 Minor Disruption	1 Insignificant Disruption
COF	Diameter Score	33%	≥ 24-inch	18-inch to 21-inch	15-inch	10-inch to 12-inch	≤ 8-inch
	Physical Location Score	33%	State Trunklines, Railroad Crossings, Water Crossing		Primary County Roads and City Major Roads		City Minor Roads
	Service Area Score	33%	Schools, Water Crossings		Churches, City Facilities, Industrial, Commercial		Single Family Residential and Multi-Family Residential

Table 5 – Consequence of Failure for Vertical Assets

		Weighting Factor	5	4	3	2	1
			Catastrophic Disruption	Major Disruption	Moderate Disruption	Minor Disruption	Insignificant Disruption
COF	Process	25%	Mission critical: unable to accomplish mission	Process shut-down	Loss of redundancy or temporary process upset	Potential process upset	No impact on process
COF	Financial Impact	25%	May require new borrowing or impact rates (> $100,000)	May require transfer from reserves ($25,000 - $100,000)	Absorbed within current budget ($10,000 - $25,000)	Absorbed within applicable line item ($1,000 - $25,000)	Budgeted expense (< $1,000)
COF	Disruption to the Community	25%	Long term impact; area wide disruption	Short term impact but substantial disruption	Sporadic service disruptions	Minor disruption	No disruption
COF	Required Response Time	25%	< 1 hour	1 to 4 hours	4 to 8 hours	8 to 48 hours	> 48 hours

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.

The sewers and manholes that were inspected all had BRE scores less than 16. The City should monitor the condition of the sewers and manholes during the next round of inspections and update the BRE scores accordingly.

The vertical assets for the stormwater system all had BRE values below 14. There are no major repairs or upgrades necessary at this time. However, the City should continue to perform preventative maintenance to keep the pump stations in good working order.

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.
4. Reviewed current staffing plan and updated it based on the hours and staff needed to comply with the revised preventative maintenance program.

Capital Improvement Plan

A 20-year CIP was developed for the City using the results of the condition assessments, the BRE, remaining useful life, and repair/replacement costs. The CIP included:

1. Grouping projects based on the type of work and asset classes.
2. A schedule for repair/replacement projects through the year 2037.
3. Anticipated project costs and annual system costs through the year 2037.

Major projects anticipated to begin in the next few years are:

- Study – Inspect remaining manholes that were not inspected under the SAW Grant.
- Study – Inspect remaining sewers that were not inspected under the SAW Grant.
- Raise buried manholes to grade to provide access for maintenance.
- Rehabilitate manholes and sewers that have high POF/BRE ratings.

List of Major Assets

Stormwater Assets:

- 188,227 feet of 4-inch to 96-inch diameter pipe.
- 742 storm manholes.
- 1,017 catch basins.
- 49 storm outfalls.
- 6 storm pump stations.

DEQ

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

Completion Due Date October 23, 2017
(no later than 3 years from executed grant date)

The City of Riverview *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1183-01 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:

Douglas Drysdale	at	734-281-4201	ddrysdale@cityofriverview.com
Name		Phone Number	Email

Andrew M Swift 10-23-17
Signature of Authorized Representative (Original Signature Required) Date

Andrew Swift, Mayor
Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance

City of Rochester Hills – Department of Public Services
1000 Rochester Hills Drive
Rochester Hills, MI 48309
http://www.rochesterhills.org/
Contact: Allan Schneck
248-656-4685
SAW Grant Project Number: 1447-01

Executive Summary

The Wastewater Asset Management Plan (AMP) summarizes the existing physical condition of the City's wastewater infrastructure and includes key recommendations for future funding levels. This document was prepared using grant funding from the State of Michigan SAW Grant Program, with a total budget of $1,124,444 for the Wastewater AMP, which is inclusive of grant proceeds and local match.

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 wastewater collection system using the latest available hardware and software.
- Survey key system components to augment the City's existing Geographic Information System (GIS) database and to make it easier for future generations to access infrastructure data with greater ease.
- Add information for sewer material type, size, age, and depth to the Lucity/GIS database.
- Physically evaluate the structural condition of all publicly-owned system components, including sanitary sewer pipes, manholes, pump stations, and force mains. Store the data in the City's Lucity/GIS database.
- Analyze the flow capacity of the City's sanitary sewer pipes and identify where pipes should be enlarged to minimize overflow potential.
- Develop a capacity tracking tool to allow the City to efficiently evaluate the collection system under various flow scenarios.
- 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 developing a prioritized CIP to be funded through the City's wastewater enterprise fund.

Wastewater Asset Inventory

This AMP includes the wastewater collection system, including manholes, sewer pipes and pump stations. Although the City had an existing geodatabase for its wastewater system, this AMP included efforts to enhance the database with additional information on sewer rim/invert elevations, sewer size, sewer age, and structural condition.

Sewer sizes and invert elevations were verified during field survey and manhole inspections that were part of this AMP.

The City uses Lucity and ArcGIS to maintain its inventory of wastewater assets and to store asset condition data.

Condition Assessment

Approximately 17% of the sewer system was televised as part of this AMP. NASSCO PACP and MACP methodologies were used to assign structural and O&M conditions for inspected manholes and sewer segments. The PACP and MACP data were added to the Lucity/GIS geodatabase.

For sewer pipes, the average age is approximately 48 years, the average overall pipe rating (structural and O&M) is 2.1, on a scale of 0 to 5. Approximately 7% of the system has a PACP structural score of 3 or greater.

For manholes, the average age is approximately 42 years, the average structural rating is 1.5, on a scale of 0 to 5. Approximately 14% of the system has a MACP structural score of 3 or greater.

In general, the City's wastewater collection system is in good shape, with most sewers well within their expected service lives. It would be expected that the City of Rochester Hills will require a significant increase in investment in about 10-15 years, as a large percentage of their system will begin to age out (the majority of their system was developed in the 1970s, which means those assets will be, on average, 50-60 years old by 2030).

Level of Service Determination

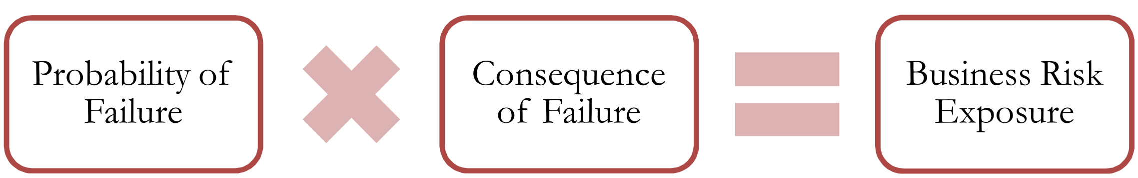
The City's Level of Service criteria for its wastewater collection system are listed in the following table:

Key Service Criteria	Performance Indicator	Target Level of Service
Asset Condition Assessment	PACP & MACP Inspections Per Year*	• MACP inspect a minimum of 806 manholes per year, approximately 10% of the System • PACP inspect a minimum of 33 miles of sewer per year, approximately 10% of the system
Evaluation of Wet Weather Response	Compliance with the EPA Policy on excessive infiltration (the City currently complies with the MDEQ SSO policy)	Target sewer districts with known issues and reduce 7-14 day average flows to the EPA target of 120 gpcd or less
Investments	Obtain Computer Hardware, Field Data Collection Equipment/Training	
O&M Optimization	Regular Cleaning and Maintenance of the Collection System	Clean and maintain 10% of the system per year. Maintain an average structural condition of 1.5 or better.

* Pipe Assessment Certification Program (PACP), to assess sanitary sewer condition
Manhole Assessment Certification Program (MACP), to assess manhole condition

Criticality of Assets

Determining the assets most critical to system operation allows a community to manage risk, support Capital Improvement Plans (CIP), and efficiently allocate O&M funds. The two key factors used to determine criticality are Probability of Failure (PoF) and Consequence of Failure (CoF). PoF and CoF are multiplied to determine the Business Risk Exposure (BRE) as shown in the following figure.



PoF considers the physical condition or age of an asset and is often based on the Structural MACP or PACP Index Rating. If an asset was not inspected, remaining useful life can be used a proxy for condition. A standardized rating of one through five was assigned to each asset with a score of five indicating worst condition as shown in the following table.

Probability of Failure

Score	Description
1	Improbable
2	Remote, unlikely but possible
3	Possible
4	Probable, likely
5	Imminent, likely in near future

CoF encourages a focus on social, environmental, and economic cost impacts. The economic CoF encompasses the impacts of direct and indirect economic losses to the affected organization and third parties due to asset failure. The social consequence represents the impact of society due to asset failure and the environmental consequence of failure considers the impact to ecological conditions occurring as a result of asset failure.

The factors were rated on a one through five scale for each asset. If one factor is deemed more important, the weighting was skewed to give that factor more influence.

The following factors were combined to determine the final CoF:

- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Environment – proximity to sensitive environmental features like the Clinton River, Paint Creek, Sargent Creek, Gibson Drain, and Honeywell Drain
- Location/Accessibility – refers to the cost to restore the surface above the asset and if traffic control is needed
- Network Position – the sum of upstream sewers discharging to a structure

Revenue Structure

In reviewing the final sanitary sewer analysis and recommendations, it appears that the City of Rochester Hills Sanitary Sewer budget, CIP, and rate setting methodology are each equipped to operate, maintain, and rehabilitate the City's sanitary sewer system and infrastructure to the level recommended in the AMP.

Many of the items identified in the AMP regarding the operation and maintenance of grinder pumps, pump stations, and manholes are already incorporated in the current and projected sanitary sewer budget. The City also adopts a Citywide CIP on an annual basis and recommendations made as part of this AMP can be incorporated into the upcoming and future CIPs.

The City's rates were shown to be consistent and in a close range with other similar sized municipalities.

While each municipality includes different components in their Sanitary Sewer rates it should be noted that:

- The City of Rochester Hills is one of the largest community members of the Clinton-Oakland Sewage Disposal System (COSDS) which is undergoing a series of major capital improvements; these improvements have allocated a significant portion of their costs (as COSDS debt service) which are passed along to the City of Rochester Hills.
- The City allows for area maintenance meters (which helps to lower water rates but increases sanitary sewer rates).
- The City incorporates annual sanitary sewer system depreciation expenses into its rate setting methodology in an effort to pre-fund finance future capital infrastructure improvements instead of issuing debt. This will help to address long-term rehabilitation and replacement needs as the City's assets begin reaching the end of their useful service lives.

Capital Improvement Plan

Rochester Hills Capital Improvement Plan for its collection system is detailed in the Appendix of the AMP for sanitary sewer pipes, pump stations and the associated force mains. The Capital Improvement Plans will aid in identifying, prioritizing, and implementing capital projects within the City's wastewater collection system during the next 20 years based on the current business risk exposure (BRE).

Recommendations

The recommendations in this AMP are to:

- Implement the capital improvements as recommended in the CIP.
- Continue the AMP process in future years through systematic system inspection and updates of the City's GIS data to re-prioritize projects in future years. Use these data to track any trends in structural condition across the entire wastewater collection system.
- Make appropriate adjustments to future rehabilitation budgets to maintain an average PACP structural score of 1.5 or below (maintaining existing overall system condition).

List of Major Assets

The major assets are simplified in the text below. The full AMP report contains additional detail on the distribution of sizes, ages, and conditions.

- *325 miles of sanitary sewer gravity main*
- *8,055 manholes*
- *6 pump stations*
- *167 sewer grinder pumps (servicing homes on low-pressure wastewater systems)*

The City discharges into the Clinton-Oakland Sewage Disposal System (COSDS), which ultimately discharges to the City of Detroit WWTP for treatment. As such, the City's assets are limited to local and collector gravity sewers.

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Rochester Hills *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1447-01 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 15, 2017.

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:

Allan E. Schneck at 248-656-4685 schnecka@rochesterhills.org

Name | Phone Number | Email

10·31·17

Signature of Authorized Representative (Original Signature Required) | Date

Bryan K Barnett, Mayor

Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance

City of Rochester Hills – Department of Public Services
1000 Rochester Hills Drive
Rochester Hills, MI 48309
http://www.rochesterhills.org/
Contact: Allan Schneck
248-656-4685
SAW Grant Project Number: 1447-01

Executive Summary

The Stormwater Asset Management Plan (AMP) summarizes the existing physical condition of the City's stormwater infrastructure 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 SAW Grant Program, with a total budget of $1,095,000 for the Stormwater AMP, which is inclusive of grant proceeds and local match.

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 with greater ease.
- Add information for sewer material type, age, and depth to Lucity/GIS.
- Physically evaluate the structural condition of publicly-owned system components, including storm sewer pipes, manholes, catch basins, and outfalls. Store the data in the City's Lucity and GIS database.
- Identify other capital improvements that will allow the City to reduce annual flow volumes and pollutant loadings to the Clinton River, Paint Creek and Sargent Creek.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
  - Regularly-scheduled sewer inspection (televising), similar to what is done for wastewater infrastructure
  - Repair and rehabilitation to address structural problems resulting from aging infrastructure
- Provide recommendations on developing a sustainable funding source for stormwater, similar to that of enterprise funds that already exist for the City's water and wastewater systems.

Stormwater Asset Inventory

This AMP includes the stormwater collection system, including manholes, sewer pipes, catch basins, outfalls, and end-of-pipe treatment BMPs. Although the City had an existing geodatabase for its storm sewer system, this AMP included efforts to enhance the database with additional information on sewer rim/invert elevations, sewer size, sewer age, and structural condition.

Sewer sizes and invert elevations were verified during field survey and manhole inspections that were part of this AMP.

The City uses Lucity and ArcGIS (ESRI) to maintain its inventory of storm sewer assets and to store asset condition data, manage work orders, and track work order status.

Condition Assessment

Roughly 80% of the City owned sewer system was televised as part of this AMP. NASSCO PACP and MACP methodologies were used to assign structural and O&M conditions for inspected manholes and sewer segments. The PACP and MACP data were added to the Lucity/GIS geodatabase.

For sewer pipes, the average age is approximately 30 years, the average structural pipe rating is 1.85 and the average O&M pipe rating is 2.16, on a scale of 0 to 5. Approximately 27% of the system has a PACP structural score of 3 or greater, although this AMP focused primarily on the City's older sewers (sewers installed prior to 1993).

For manholes, the average age is approximately 36 years, and the average structural rating is 1.54, on a scale of 0 to 5. Approximately 14% of the system has a MACP structural score of 3 or greater, although this AMP focused primarily on the City's older manholes (installed prior to 1993).

Outfalls and BMPs were not evaluated for structural condition, although they were considered for identifying future funding needs.

Level of Service

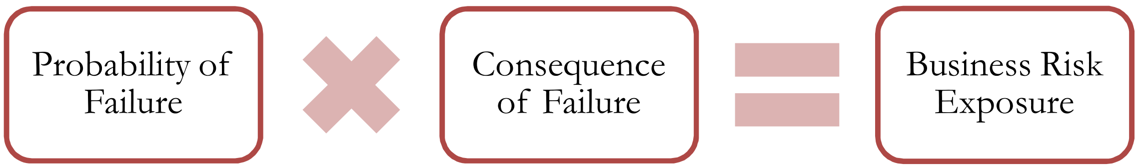
The City's current Engineering Design Standards references the 10-year storm for the collection system, with detention storage for the 25-year storm and provisions for a safe overflow for the 100-year storm event for level of protection for its collection system

The desired Level of Service for Rochester Hills' stormwater infrastructure has been, and will continue to be, a healthy mix of flood control and water quality enhancement. Adopting the Oakland County Water Resource Commission (OCWRC) stormwater rules will help to address water quality and channel protection, which will provide a solid foundation for the future health of the Clinton River. Addressing flood control and structural needs will provide a high quality of life for residents and allow for continued economic development in the City.

The collection system ownership in Rochester Hills is unique, where the majority of the system is privately owned. As Rochester Hills explores funding alternatives for its stormwater system, it is critical to consider the impact of assuming ownership for all stormwater assets in the right-of-way (excluding MDOT, RCOC, and OCWRC assets). If the City assumed ownership of the storm sewer assets within the right-of-way, its ownership would increase from 24% of the system to about 60% of the system. Currently, Homeowners' Associations or other private entities own most of the storm sewers in the City's right-of-way.

Criticality of Assets

Determining the assets most critical to system operation allows a community to manage risk, support Capital Improvement Plans (CIP), and efficiently allocate O&M funds. The two key factors used to determine criticality are Probability of Failure (PoF) and Consequence of Failure (CoF). PoF and CoF are multiplied to determine the Business Risk Exposure (BRE) as shown in the following figure.



PoF considers the physical condition or age of an asset and is often based on the Structural MACP or PACP Index Rating. If an asset was not inspected, remaining useful life can be used a proxy for condition. A standardized rating of one through five was assigned to each asset with a score of five indicating worst condition as shown in the following table.

Probability of Failure

Score	Description
1	Improbable
2	Remote, unlikely but possible
3	Possible
4	Probable, likely
5	Imminent, likely in near future

CoF encourages a focus on social, environmental, and economic cost impacts. The economic CoF encompasses the impacts of direct and indirect economic losses to the affected organization and third parties due to asset failure. The social consequence represents the impact of society due to asset failure and the environmental consequence of failure considers the impact to ecological conditions occurring as a result of asset failure.

The factors were rated on a one through five scale for each asset. If one factor is deemed more important, the weighting was skewed to give that factor more influence.

The following factors were combined to determine the final CoF:

- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Restoration Type/Accessibility – refers to the cost to restore the surface above the asset and if traffic control is needed
- Environment – proximity to sensitive environmental features like the Clinton River, Paint Creek and Sargent Creek

Revenue Structure

The City's Public Safety and Infrastructure (PS&I) Committee was expanded with other key local stakeholders to form "Stormwater Advisory Group", starting in 2016. This group met four times to discuss the prospect of long term funding for the City's stormwater system. There is currently no dedicated funding source for Rochester Hills' stormwater system, unlike water and wastewater systems. A Funding Feasibility Study with revenue analysis was developed as part of this AMP. The results are described in the following paragraphs.

The total spent annually by the City for all stormwater-related activities is approximately $575,000, which comes from the City's General Fund. Much of this annual budget is used to make debt payments on Oakland County Drain projects. Any additional costs, such as repair or replacement of catch basins, and structural repair or replacement of manholes and sewers, are generally taken from the City's Streets budget. This creates unnecessary strain on the Streets budget, as that money is needed to repair and replace the City's roadways. This further underscores the need for a dedicated funding source for stormwater assets.

The inventory and condition assessment completed for this AMP include several new O&M and CIP costs that are crucial to meeting the City's long-term goals of effective management and maintenance of stormwater infrastructure. As shown in the following table, there is a funding gap of $2.33 million between the $2.9 million proposed annually and the $575,000 currently allocated to stormwater in the City's current budget. As discussed above, if Rochester Hills elects to maintain all the existing stormwater components in the right-of-way, the proposed annual budget need would increase from $2.9 million to $4.6 million.

Program Component	Annual Cost-Current City Owned System	Annual Cost- Expanded Ownership Scenario
Proactive Management	$390,000	$1,060,000
Inspect and Clean	$260,000	$675,000
Stormwater Quality	$110,000	$110,000
Flood Control	$950,000	$1,150,000
Erosion Control	$480,000	$480,000
Administration	$639,000	$1,081,500
Total	**$2,900,000**	**$4,600,000**

To address this funding gap, the PS&I explored options, including additional taxes or dedicated revenue (i.e. stormwater utility). Based on the preliminary analysis of taxes vs. fees, it was found that a fee-based system would be more equitable than taxes, as single family residential customers would pay a disproportionately higher amount through a property tax millage (relative to a fee based on impervious coverage). This is due to the fact that taxable properties would effectively subsidize tax-exempt properties, despite the fact that many tax-exempt properties place a significant demand on the City's stormwater infrastructure.

Based on the preliminary stormwater rate model developed as part of this grant, the City can generate approximately $890,000 for every one dollar per month charged to a typical single-family residential customer. In other words, a monthly charge of about $3 to $4 per Equivalent Residential Unit (ERU) would close the stormwater infrastructure funding gap referenced in this document. A monthly charge of $4 per ERU should generate enough revenue to fully fund the recommended stormwater program. The range would increase to $5 to $6 per month for the expanded ownership scenario. In these scenarios, commercial, industrial, and institutional sites would pay a higher fee in proportion to the total measured impervious area on their property.

Capital Improvement Plan

A Capital Improvement Plan (CIP) was developed using the Business Risk Exposure (BRE) described above. The CIP detail and costs are detailed in the Appendix of the AMP document.

The CIP was developed in a two phase approach. Phase 1 incorporates storm sewers with a BRE of 7 or greater in the first five years. Phase 2 includes all remaining identified structural and O&M defects from Phase 1 that are not addressed due to a lower BRE score. Phase 1 and Phase 2 include recommended O&M (heavy cleaning) and structural repairs. Phase 2 also includes televising the collection system.

It was assumed that the annual investment in the CIP would ramp up between Years 1-5, given that it will take some time to establish a new funding source and to be fully-engaged in a CIP. The actual implementation of the CIP will depend on the establishment of a dedicated funding source.

Recommendations

The recommendations in this AMP are to:

- Establish a dedicated funding source for stormwater management; ideally through a stormwater utility.
- Implement the capital improvements as recommended in the CIP.
- Continue the AMP process in future years through systematic system inspection and updates of the City's GIS data to re-prioritize projects in future years.
- Focus on water quality management, including reducing runoff volumes to the Clinton River and Paint Creek, as part of the ongoing capital improvement efforts. Many of these initiatives are referenced in the City's Stormwater Management Plan, also completed using proceeds from the SAW Grant.

List of Major Assets

The major assets are simplified in the text below. The full AMP report contains additional detail on the distribution of sizes, ages, and conditions.

- *48 miles of storm sewer pipe*
- *157 miles of open channel*
- *785 manholes*
- *6,500 catch basins*

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The City of Rochester Hills *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1447-01 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:

Allan E. Schneck at 248-656-4685 schnecka@rochesterhills.org

Name | Phone Number | Email

10·31.17

Signature of Authorized Representative (Original Signature Required) | Date

Bryan K. Barnett, Mayor

Print Name and Title of Authorized Representative

CITY OF ROCHESTER

WASTEWATER ASSET MANAGEMENT PLAN (WWAMP) EXECUTIVE SUMMARY

SAW Grant No. 1151-01

October 2017



Johnson&Anderson

EXECUTIVE SUMMARY

INTRODUCTION

The City of Rochester (City) applied for and was subsequently awarded a Stormwater Asset Management and Wastewater (SAW) Grant for $942,793, with a local match of $104,755, from the Michigan Department of Environmental Quality (MDEQ) for the development and implementation of a Stormwater and Wastewater Asset Management Plan (AMP). A total of $563,942 was allocated for Wastewater Asset Management Plan (WWAMP) costs and a total of $458,606 was allocated for Stormwater Asset Management Plan (SWAMP) costs. A Grant Agreement was entered into on October 10, 2014 with an effective grant period from October 2014 to October 2017. A project team consisting of City staff and engineering and financial consultants was created to develop the AMP and to submit it for approval by the MDEQ.

The City desires to proactively manage its wastewater and stormwater 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.

The assets that make up the City's wastewater and stormwater systems depreciate over time as they age and deteriorate. As this happens, the level of service expected by City customers may become compromised while operation and maintenance (O&M) costs increase. The goal of AMP development is to mitigate the deterioration of the assets through development of a practical and rigorous methodology for wastewater and stormwater asset management designed to meet established level of service goals in a cost-effective way through the creation, acquisition, operation, maintenance, rehabilitation, and disposal of assets. Successful execution of an AMP will help to ensure cost effective, efficient, and accountable operations to ensure long-term sustainability.

The City's engineering consultants, Anderson, Eckstein, and Westrick (AEW) and Johnson & Anderson, Inc. (J&A) were retained to implement the grant scope and develop the AMPs for the City. J&A was tasked with development of the WWAMP and AEW was tasked with the development of the SWAMP. This summary only encompasses the WWAMP portion of the AMP.

The City's wastewater system consists of gravity mains, pressure mains, manholes, service laterals, and pump stations with the oldest components of the system being generally constructed in the late 1950s. In 1993/1994, the City retired its wastewater treatment plant and connected to the City of Detroit sanitary sewer system through the Clinton-Oakland Sewage Disposal System (COSDS). The City's wastewater is transported through the Clinton-Oakland Interceptor, which then flows into the Oakland-Macomb Interceptor and then into the Great Lakes Water Authority (GLWA) Wastewater Treatment Plant where it is treated and discharged to the Detroit River.

BACKGROUND

The City's strategic timeframe for the WWAMP is for planning years 2018-2037 and will serve as the framework to provide proactive asset management guidance and planning of the wastewater system. It was developed to meet the MDEQ SAW grant program outline requirements over the twenty (20) year planning and operational period to ensure optimal asset management and capital improvement planning for the City's wastewater infrastructure.

The five (5) core components of an MDEQ approvable AMP are listed as follows:

1) Asset Inventory
2) Level of Service
3) Asset Criticality
4) Revenue Structure
5) Capital Improvement Project Plan

ASSET INVENTORY

The entire City is served with a wastewater conveyance system that consists of gravity main, pressure main, manhole, and pump station assets. Table 1 summarizes the City's wastewater system main, manholes, laterals, pressure main and pump stations.

Table 1 City Wastewater System Asset Inventory

System Asset	Quantity	Unit
Gravity Main - 6 inch	2,318	LF
Gravity Main - 8 inch	58,840	LF
Gravity Main - 10 inch	159,418	LF
Gravity Main - 12 inch	20,172	LF
Gravity Main - 15 inch	10,243	LF
Gravity Main - 18 inch	7,051	LF
Gravity Main - 21 inch	3,497	LF
Gravity Main - 24 inch	3,840	LF
Gravity Main - 27 inch	2,609	LF
Gravity Main - 30 inch	5,386	LF
Manholes	1,456	Ea
Laterals	3,278	Ea
Pressure Main - 8 inch	2,270	LF
Pump Stations - Small	2	Ea
Pump Stations - Large	2	Ea

A comprehensive assessment was completed to determine which sewer main assets within the City were SAW Grant eligible, twenty (20) years or older, which included:

- review of existing GIS,
- review of as-built plans,
- review of previous and existing wastewater collection projects; and
- meetings with City staff.

The City is currently implementing a Sanitary Sewer/State Revolving Fund (S2/SRF) project to eliminate sources of inflow and infiltration (I/I) into the wastewater system. Information from this effort was also utilized to develop a comprehensive Capital Improvement Plan (CIP) for the SAW grant project.

Since the majority of the older sections of the City (49%) were investigated and are being rehabilitated under the SRF project, only 7% of the City's wastewater system was eligible to be evaluated under the SAW Grant. The majority of the wastewater system in the northeast portion of the City (44%) is younger than twenty (20) years and not eligible for SAW grant AMP development funding. Inspection of this portion of the wastewater system will need to be completed as part of a yearly cleaning and inspection program. Even though only 7% of the wastewater system was assessed as part of the SAW grant, a Business Risk Evaluation (BRE) was still completed for the entire wastewater system (SRF/S2 manholes, SAW sewer main, and not yet inspected sewer main).

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 20 years of age were eligible to be inspected using closed-circuit television (CCTV) equipment. Several sewer manholes that were not inspected under the S2 grant were GPS located, inspected and incorporated into the wastewater system Geographic Information System (GIS) to improve its' accuracy. City owned and operated pump stations were also evaluated and scored with input and historical information provided by Department of Public Works (DPW) staff. Ratings of sewer main and pump stations were catalogued into a spreadsheet to be used for analysis, financing and CIP development. Please refer to Table 2 for the NASSCO rating system scoring that was utilized to rate the condition of sewer main.

Table 2 NASSCO Condition Grades

Condition Grade	Definition
5	Most significant defect grade
4	Significant defect grade
3	Moderate defect grade
2	Minor to moderate defect grade
1	Minor defect grade

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 purposes of the SAW grant project evaluation, sewer mains were estimated to have a useful life of approximately 80 years.

Replacement Cost

The replacement cost of the system assets was determined by multiplying the total quantity of each system asset by an estimated replacement unit cost for each asset. The estimated replacement unit cost for each asset were derived from recent related local bids and estimated cost of materials. The total replacement cost for all of system assets was estimated to be approximately $96 million. Please refer to Table 3 for a summary of the entire City wastewater system asset replacement costs.

Table 3 Asset Summary & Replacement Costs

System Asset	Quantity	Unit	Replacement Unit Cost (estimated)	Replacement Unit Cost (estimated)**	Replacement Cost (estimated)
Gravity Main - 6 inch*	2,318	LF	$ 197		$ 456,646
Gravity Main - 8 inch	58,840	LF		$ 197	$ 11,591,480
Gravity Main - 10 inch	159,418	LF		$ 229	$ 36,506,722
Gravity Main - 12 inch	20,172	LF		$ 289	$ 5,829,708
Gravity Main - 15 inch	10,243	LF		$ 348	$ 3,564,564
Gravity Main - 18 inch	7,051	LF		$ 407	$ 2,869,757
Gravity Main - 21 inch	3,497	LF		$ 464	$ 1,622,608
Gravity Main - 24 inch	3,840	LF		$ 572	$ 2,196,480
Gravity Main - 27 inch	2,609	LF		$ 693	$ 1,808,037
Gravity Main - 30 inch	5,386	LF		$ 832	$ 4,481,152
Manholes	1,456	Ea		$ 10,400	$ 15,142,400
Laterals	3,278	Ea		$ 2,500	$ 8,195,000
Pressure Main - 8 inch	2,270	LF		$ 120	$ 272,400
Pump Station – Small	2	Ea		$ 100,000	$ 200,000
Pump Station –Large Ludlow	1	Ea		$ 200,000	$ 200,000
Pump Station – Large Creekside	1	Ea		$ 500,000	$ 500,000
Total					**$ 95,436,954**

*For 6 inch sewer main, tabulation costs are to replace with 8-inch sewer main
** Material type was not taken into account when determining replacement costs

Asset Management Hardware & Software Tools

All pump station and manhole assets inventoried in the City, as part of this project, were located using Global Positioning System (GPS) equipment and have latitude and longitude coordinates. Those coordinates were then utilized to map the assets and connect the associated sewer and pressure mains into the City's wastewater GIS.

In addition, existing plot plans and construction plans of the City's wastewater system were scanned and integrated into the City's wastewater GIS system infrastructure layers as well as all sewer main CCTV inspection videos for quick retrieval and review by City staff. The City is also currently looking into Laserfiche, which was not funded by the SAW grant, to provide an enterprise City-wide document management system to effectively manage their engineering records, account files and other documentation.

A wastewater and stormwater SAW grant total of $84,799 was allocated for software and hardware purchases and training of City staff per SAW grant population guidelines. GIS-Centric Computerized Maintenance Management System (CMMS) software (Cityworks) and CIP software (Sedaru®) applications were developed and implemented to manage work orders and to aid in the development of the wastewater system CIP. These software applications allow the City to optimize staff resources through the reduction of manual paperwork and scheduling by logging in resident complaints and work processes through customer service requests and work orders to ensure staff are focused on doing the right things at the right times while capturing labor, equipment, and materials needed to complete the work. In addition, computer tablets were purchased for City staff to implement and utilize the new CMMS program live in the field increasing productivity and accountability further.

Another component of the AMP also included the development and implementation of a Fats, Oils, and Grease (FOG) program for commercial kitchen properties. This program will serve to minimize labor and material costs of program management, ensure regulatory compliance, and reduce potential wastewater system problems due to accumulations of FOG in the City's system. Each commercial kitchen property in the City that generates FOG was integrated into the City's GIS and Cityworks CMMS system. Moving forward, inspections and work orders will be generated in Cityworks along with business pump-out records, equipment photos, etc. being uploaded to GIS and Cityworks CMMS for quick retrieval and use.

In lieu of the FOG implementation program, the *Wastewater Facilities Regulation Ordinance* was revised to allow the City proper authority to conduct these site inspections and to provide specific requirements on grease control device equipment installation and maintenance.

LEVEL OF SERVICE

A Level of Service (LOS) plan was developed by the AMP team members, which defines how the City wants the wastewater system to perform against established operational and planning best management practices. The LOS standards and goals were developed with review and additional input from the DPW staff, the City Manager, Fire Chief, Economic and Community Development Director, and Finance Director. Questions addressed in the development of the LOS included:

- Is the City ever out of compliance with regulations? If so, how often?
- How does the City 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 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;
- review of previous reports and studies (i.e. SRF report and 2025 City Master Plan); and
- staff and consultant knowledge of the systems.

During this review, it was identified that:

- few opportunities exist for development, yet there are opportunities for redevelopment of existing or underutilized areas;
- the City is comprised of a good mixture of residential, commercial, and open space land uses;
- plans are in place for multiple family residences on the east side of the City;
- the City is anticipated to increase in population by 6.5% between now and 2040, which means future wastewater capacity is not a concern, since the City's purchased capacity in the COSDS is more than adequate to serve the City plus the anticipated 6.5% growth; and
- Certain collection system areas within the City may be undersized and in need of improvement.

The 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 and safety, and administration/organizational development. The environmental component was divided into two indicators that included environmental stewardship and regulatory compliance. The economic component was centered on the financial area. 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. Table 4 shows the triple bottom line performance indicators.

Table 4 Triple Bottom LOS Line Performance Indicators

Social	Environmental	Economic
• Customer Service • Reliability • Health & Safety • Administration / Organizational Development	• Environmental Stewardship • Regulatory Compliance	• Financial

For the social indicators, customer service LOS goals focus primarily on the City'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 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 City 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 City and its residents are committed to protecting these waterways. For environmental stewardship, the focus is on protecting the water quality of the rivers that flow through the City (the Clinton River, which flows along the southern border; the Paint Creek, which flows north to south eventually flowing into the Clinton River; and Stony Creek, which flows along the east side of the side and eventually flows into the Clinton River). The length of the Paint Creek from the Village of Lake Orion to the City of Rochester is a designated trout stream managed by the Michigan Department of Natural Resources (MDNR). The Clinton River Watershed is a designated Area of Concern under the Great Lakes Water Quality Agreement, signed in 1972 and amended in 1987. Several projects have been completed over the last decade, including projects conducted within City of Rochester, and additional projects are underway to address degradation of benthos, excessive algal growth, loss of fish and wildlife habitat, beach closings, restrictions on fish and wildlife consumption, and degraded fish and wildlife populations.

The regulatory compliance component focuses on complying with all of the local, state, and federal regulations regarding wastewater systems. The City has already taken measures to reduce overflows of wastewater into our local rivers, through feasibility studies and project implementation.

LOS goals for the financial indicator have been developed to ensure adequate funding is available to maintain the wastewater 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 5 illustrates the rating/color code system.

Table 5 LOS Goals Rating System

Color Code	Rating
(Green)	No Improvement Needed
(Yellow)	Acceptable (Perhaps Some Improvement Needed)
(Red)	Improvement Necessary

As part of its mission, the City 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 City, which is outlined below:

Ensure customer confidence through the delivery of high quality services to our residents. Our core customer values are: Financial Stability, Customer Service, Sustainability, and Health and Safety.

Through the development of the LOS goals, the AMP team identified that the City currently maintains staff and monetary resources to properly administer its wastewater system. However, additional staffing and funding are needed to adequately operate and fund the wastewater system in the future. The City currently takes a proactive approach through regular inspections and O&M initiatives and is working to further improve upon this with their limited staff through the use of Cityworks, SEDARU and an organized FOG Program implementations. The City has applied for and has been successful at acquiring grants and loans for system planning an implementation and will continue to seek local, state, and federal funding, and will coordinate utility and road projects to maintain efficiency and potentially reduce costs.

By instituting an AMP, conducting condition assessments and determining the criticality of assets, the City can now move to a more proactive approach to managing the wastewater system assets. This will assist the DPW in achieving reduced project costs and improved project management. The City's approach to wastewater system improvements will now also include assessments of other utilities including water main, roads and storm sewer in the same areas to allow for a single upgrade and a reduction in improvement costs.

The LOS Goals table is a living document that should be updated and modified as tasks and initiatives are developed and implemented.

CRITICAL ASSETS

The criticality of wastewater system assets (sewer main, sewer manholes, and pump stations) was examined in regard to their overall functional importance to the operation of the wastewater system and their impacts if they failed. To determine the criticality of system assets, a 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 using the following factors:

- Economic Impacts (Diameter of Asset)
- Environmental/Regulatory Compliance (Distance to Surface Water)
- Social/Community Disruption (Number of Customers, Roadway Impact, Zoning, and Business Classification)

The COF values for the sewer mains, were determined based upon factor percentages outlined in Table 6.

Table 6 Consequence of Failure Triple Bottom Line Weighting Factors

Social/Community Disruption– 65%	Environmental / Regulatory Compliance – 15%	Economic – 20%
• Number of Customers Served – 50% • Types of Customers Served (Zoning) – 5% • Surface Traffic Disturbance – 5% • Business Disruption – 5%	• Pipeline Proximity to Water – 15%	• Pipe Diameter – 20%

Each of the weighting factors were reviewed and agreed upon by City staff. Social/Community Disruption was scored at 65% of the COF determination for manholes and sewer mains. The more customers out of service due to a wastewater system failure, the more severe the situation. As service is disrupted to a larger number of users, additional costs are also incurred to reroute and bypass mains, set up temporary pump 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.

Environmental/Regulatory Compliance was established at 15% of the COF. It is assumed that if community disruptions are kept to a minimum that the City will remain in compliance with environmental and regulatory standards. Non-compliance can result in the need for public notification and/or fines and consent orders to eliminate the problem from happening again if it reoccurs.

Replacement costs of a section of sewer main are directly related to the diameter of the pipe and has been assigned a score of 20% in the COF analysis. An asset further away from surface water is less critical as there is more time to contain overflow if a failure occurs. The COF of a pump station was determined by analyzing the number of upstream customers impacted in the event of pump station failure. Each sewer main and pump station 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 system.

The POF was determined for the sewer mains using the following factors:

- Structural Condition
- Operation & Maintenance Performance
- Pipe Age – Remaining Useful Life

The POF for the sewer mains, were determined based upon the factor percentages outlined in Table 7.

Table 7 Probability of Failure Weighting Factors

Performance Rating – 25%	Pipe Structural Condition Rating – 50%	Pipe Age – 25%
• NASSCO O&M Pipe Rating Index	• NASSCO Structural Pipe Rating Index	• Pipe Age – Remaining Useful Life

O&M criteria are considered for the Performance Rating component of the POF and are weighted at 25% of the POF scoring. This criteria includes the presence of obstructions in the sewer main. Treatment techniques for these items typically involve scouring of the sewer main or the injection of some form of corrosive material to dislodge the obstructions. This O&M activity directly impacts the structural condition of the sewer main. Given the impact that O&M activities have on the structural integrity of the sewer main, the POF for sewer mains was determined to be directly related to their structural condition and operation and maintenance performance. Sewer main with structural problems such as breaks, holes, chemical surface spalling, or fractures are in most danger of failure and are weighted at 50% of the POF scoring. The age of a sewer main is also an important component given that wastewater system infrastructure is designed with finite service life, and continues to deteriorate over time. Sewer main age was weighted at 25% of the POF scoring to account for potential future sewer main condition deterioration over time. An overall POF rating of 1 to 5 was assigned to each sewer main with a rating of 1 being excellent condition and 5 being unserviceable.

As part of the pump station POF, the age and existing condition of each component of the pump station system was reviewed. An overall POF rating of 1 to 5 was assigned to each pump station, with a rating of 1 being excellent condition and 5 being unserviceable.

A comprehensive BRE was developed for the sewer main while a second BRE was created for the pump stations. The BREs were created using NASSCO ratings and a COF and POF scoring matrix model. Based on the asset scoring, a total BRE score was developed, which is the multiplication product of COF and POF. The BRE score was utilized to rank system assets, determine areas of concern, and to guide O&M and timing of CIP project development. Table 8 provides an outline of the BRE scale.

Table 8 Business Risk Evaluation (BRE) Scale

Business Risk Evaluation (BRE) Total Score	
Business Risk Evaluation Scoring	
Business Risk	**Total BRE Score**
Critical / Intolerable Risk	16.00 - 25.00
High Risk – Tolerable and Manageable – Aggressive Monitoring	10.00 - 15.99
Medium Risk –Tolerable and Manageable – Monitoring	5.00 - 9.99
Low Risk –Failure is Tolerable	0.00 - 4.99

Based on the BRE, there were no SAW or S2 sewer main segments that were rated critical. Fifty-five (55) sewer segments were rated high risk. Of these, twenty (20) S2 sewer main segments (36%) are being rehabilitated as part of the SRF project, and the remainder are scheduled for rehabilitation or inspection as part of the City's twenty (20) year CIP program.

CAPITAL IMPROVEMENT PLAN (CIP)

Using the information obtained during the SAW grant asset inventory and assessment phases, a recommended CIP 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, sewer manhole and pump station equipment to ensure reliable operation of the wastewater system and to meet new and existing LOS goals.

A large and recurring cost component of the annual budget costs for the wastewater system CIP are related to the projected annual SRF principal and interest payments for the ongoing SRF project as well as the current OMID bond debt payments and O&M costs. It is also understood that the City is currently finalizing a comprehensive Infrastructure Management Plan (IMP) through the Infrastructure Committee (comprised of City Council members, City staff, and City consultants). The IMP encompasses coordinated road, water, and sewer infrastructure repair and replacement for the entire City including the Business District. Coordination efforts and planning with other City infrastructure work over the twenty (20) year planning period will also need to be completed on an as-needed basis. Much of the project coordination can be completed using the GIS road Pavement Surface Evaluation and Rating (PASER) rating, hydraulic water system model, S2/SRF and SAW work that has been completed. As the remaining portion of the City wastewater system infrastructure is inspected over the twenty (20) year planning period, this information will be included in the GIS and evaluated to further enhance CIP planning and coordination.

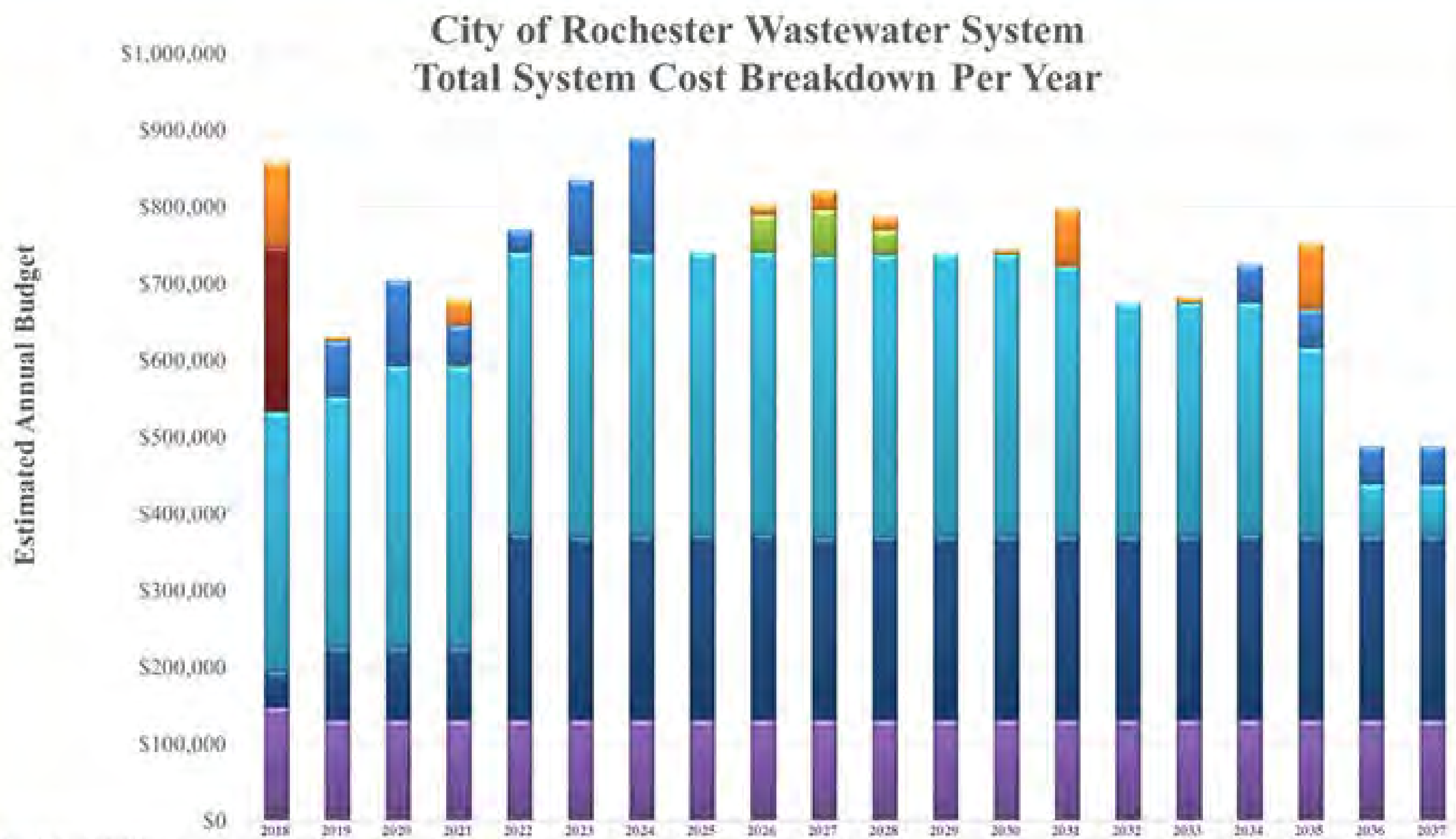
Table 9 contains a summary of costs associated with each asset class for the CIP projects identified over the twenty (20) year planning period.

Table 9 Capital Improvements

Item Description	Cost
Capital Improvement Costs	
SRF Manhole and Pipe Repairs (Principal and Interest Payments on a 25yr loan during the 20yr CIP Planning Period).	$4,176,879
OMID Interceptor Debt (principal and interest payments during the 20yr CIP planning period).	$6,330,442
Sewer Main Repairs (SAW)	$413,527
Estimated Sewer Repair Costs for Areas Not Yet Inspected	$300,000
Pump Station Refurbishment	$517,000
Sewer Force Main Abandonment & Replacement	$215,000
Capital Improvement Sub-Total	**$11,952,848**
Operation & Maintenance Costs	
Clean & Re-Inspect Sewers (10 Year Cycle)	$1,575,291
Root Control	$600,000
FOG Program	$466,500
Operations & Maintenance Sub-Total	**$2,641,791**
Wastewater System Total	**14,594,639**

Figure 1 summarizes all CIP and identified O&M expenses over the twenty (20) year planning period.

Figure 1 City Total Wastewater System CIP and O&M Costs/Year



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Pump Station Refurbishment	$109,000	$5,000	$0	$33,000	$0	$0	$0	$0	$12,000	$24,000
SAW Sewer Main Repairs	$0	$72,848	$111,469	$51,575	$28,805	$98,185	$150,645	$0	$0	$0
Pump Replacement	$0	$0	$0	$2,500	$0	$0	$0	$0	$50,000	$60,000
Force Main Replacement	$215,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
OMID Interceptor Bond Debt	$338,015	$320,333	$366,866	$365,763	$366,587	$366,702	$366,948	$366,965	$366,719	$367,009
SRF Manhole and Sewer Main Repairs	$47,250	$94,500	$94,500	$94,500	$242,625	$238,875	$240,063	$241,125	$242,063	$237,938
System Operation & Maintenance	$147,765	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Pump Station Refurbishment	$17,000	$0	$6,000	$74,000	$0	$7,000	$0	$85,000	$0	$0
SAW Sewer Main Repairs	$0	$0	$0	$0	$0	$0	$50,000	$50,000	$50,000	$50,000
Pump Replacement	$32,500	$0	$0	$0	$0	$0	$0	$0	$0	$0
Force Main Replacement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
OMID Interceptor Bond Debt	$366,745	$366,549	$366,497	$350,652	$301,878	$302,040	$301,859	$244,270	$66,146	$66,201
SRF Manhole and Sewer Main Repairs	$238,750	$239,438	$240,000	$240,438	$240,750	$240,938	$241,000	$240,938	$240,750	$240,438
System Operation & Maintenance	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265	$131,265

CIP Planning Year

REVENUE STRUCTURE

As required by the SAW Grant Implementation Project guidelines, a non-detailed wastewater system revenue/expense budget review needed to be developed and submitted to MDEQ by April 2017. The review was conducted by financial consultant, Umbaugh. Upon completion of the review, Umbaugh submitted a "*Schedule of 2017 Budgeted Operating Expenses and Adjustments – Sewer*" to the MDEQ for review and approval in March 2017. The general review indicated a negligible wastewater system revenue gap. The City subsequently received a March 23, 2017 letter from the MDEQ outlining the City 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.

The City formed an Infrastructure Committee during 2016 and 2017, which continues to meet with the task of reviewing infrastructure needs, priorities and to develop comprehensive and flexible CIP's for road, water and sewer rehabilitation and replacement. As part of their work, the committee developed a water and sewer infrastructure rate increase to strictly fund water and sewer system related repair and replacement. The rate increase recommendation was adopted by City Council and scheduled for a July 1, 2017 implementation. Table 10 outlines the water and wastewater rate increase components and the estimated annual revenue generated from it.

Table 10 Water & Sewer Capital Project Projected Revenue

Rate Increase Description	Rate Increase
Annual Water Rate Ready to Serve Fee Increase per MEU ($24/quarter)	$96.00
Annual Sewer Rate Ready to Serve Fee Increase per MEU ($24/quarter)	$96.00
Total Annual Fixed Rate Increase per MEU	$192.00
Water Rate Commodity Charge Increase per Unit	$0.19
Annual Water Rate Commodity Charge Increase per average 31 Unit/quarter user	$23.56
Sewer Rate Commodity Charge Increase per Unit	$0.20
Annual Sewer Rate Commodity Charge Increase per average 31 Unit/quarter user	$24.80
Total Estimated Average Water and Sewer Bill Annual Increase/Quarter Increase	**$240.00/$60.00**
Total MEUs 5,128 x $96 Water Rate Ready to Serve Fee Increase Revenue =	$492,288.00
Total MEUs 5,128 x $96 Ready to Serve Fee Sewer Rate Increase Revenue =	$492,288.00
Total Average Water Units w/irrigation sold 836,547 x 0.19 Commodity Charge Increase Revenue =	$159,000.00
Total Average Sewer Units sold 807,957 x 0.20 Commodity Charge Increase Revenue =	$161,000.00
Total Projected Revenue =	**$1,304,576.00**

Revenue requirements have been broken down into the categories of Capital Improvement and O&M. In addition, all OMID annual bond debt has been included as capital projects because they have been initiated for interceptor system repair and replacement.

Projected wastewater system annual capital projects are over $700,000 in 2018 and as high as $750,000 in 2024 and almost always between $500,000 and $700,000 during the twenty (20) year planning period with the exceptions of 2036 and 2037 where it is projected to be $350,000. Utilizing the projected water and sewer infrastructure rate increase revenue of $1,304,576, the projected wastewater capital projects would reduce available funding for water system capital projects to an annual range of $554,576 - $954,576 ($750,000 in 2024 and $350,000 in 3036 and 2037). 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 44% of the remaining sewer main is inspected over the next few years.

Annual O&M costs included in the report are annual maintenance activities that need to be performed. The list is not all inclusive and does not include other recurring annual expenses such as labor, retirement, insurance, administrative payments, power and other expenses in the general Water and Sewer Enterprise Fund budget. The City is in the process of implementing new BS&A general accounting financial software to better administer all City funds including the Water and Sewer Enterprise Fund. As part of this process, the DPW Director, with the help of the Financial Director, are working to implement budget revenue and expense processes in the new software to provide accurate and timely financial information related to reconciliation of revenue and expenses in the Enterprise Water and Sewer Fund. This effort will greatly aid in the analysis of annual expenses, including O&M, necessary to provide accurate information for activities including future water and sewer rate reviews.

With the exception of 2018, annual maintenance activities in the WWAMP that are comprised of only sewer main cleaning and inspection, root control and FOG, are expected to be approximately $130,000 annually. There are also many other maintenance and expense items that are part of the annual budget but not included in this analysis, which can be added as the budget improvement effort continues with the implementation of BS&A. It must also be noted that the DPW operates at a lower staffing level than in the 1980's with substantially more infrastructure to maintain as well as increased regulatory and other obligations to meet. These factors are also being included in the ongoing staffing needs analysis and budget improvement effort. As a result, it is recommended that once the comprehensive financial review and staffing levels analysis is completed, the information is used to update the annual O&M expense projections over the twenty (20) year planning period.

A comprehensive water and sewer rate review was conducted in 2015 with subsequent water and sewer rate increases implemented in 2016. As part of the rate review, it was 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 water and sewer O&M. As these reviews are completed, the information can also be included in the O&M portion of the twenty (20) year planning period to provide an accurate and comprehensive single version of the truth for the Water and Sewer Enterprise Fund's ability to meet the needs of the City.

SUMMARY

The City's WWAMP will provide a living and dynamic framework to provide the most cost effective, efficient and accountable wastewater service to the community. It 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 and metering information. Three (3) LOS goal criteria levels including social, environmental and economic were developed to provide a 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. A comprehensive twenty (20) year planning period CIP was developed to cost effectively provide needed wastewater system asset repair, replacement and O&M improvements.

The WWAMP also included the development of a comprehensive GIS that includes a geometric network of the wastewater system as well as asset attribute information including main and manhole diameter, material, date of installation, rim and invert elevations, As-Built drawings, lead locations and photos. A Cityworks CMMS was also developed and implemented to schedule and track customer complaints as well as staff labor, equipment and material costs to perform the various operational and capital improvements completed on the wastewater system. The GIS and CMMS were also developed to be mobile enabling staff to utilize and interact with the information in the field through the use of laptops or other mobile devices including tablets and smart phones. These innovative implementations will provide City staff, including 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 City's inspected sewer main and pump stations are in fair to good condition. The CIP development has identified a range of recommended CIP improvements ranging from $350,000 to $750,000 annually and an additional $130,000 for identified O&M activities. As the WWAMP is deployed and additional wastewater system inspection information is obtained, the GIS and the plan can easily 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 __10.31.2017__
(no later than 3 years from executed grant date)

The __City of Rochester__ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. __1151-01__ 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: __March 23, 2017__.
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:

Blaine Wing	at **(248) 651-9061**	**bwing@rochestermi.org**
Name	Phone Number	Email

Blaine Wing   10/26/2017
Signature of Authorized Representative (Original Signature Required)   Date

Blaine Wing, City Manager
Print Name and Title of Authorized Representative

EXECUTIVE SUMMARY

Managing existing infrastructure, while preserving a quality of life consistent with serving the public health and welfare is a primary objective of the City of Rochester. By taking a proactive position in managing the City's Stormwater system, the Rochester City Council initiated an application and was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program. A total of $483,606 was allocated to the Stormwater Asset Management Plan (SWAMP) with $48,361 of that amount coming as a local match to the grant amount of $435,245. The Stormwater Management Plan was allocated $25,000 of this grant.

The main task of the SAW grant was to compile a Stormwater Asset Management Plan (AMP), which included conducting an asset inventory, a limited asset condition assessment to determine the level of service of the system, designate the criticality of assets, analyze long-term operation and maintenance (O&M) strategies, consider long-term capital improvement planning, and recommend an implementation schedule for the asset management program. Through development of this plan, the insight and understanding of the system's storm sewer has significantly improved.

During the grant application phase, the City made a determination to focus on conducting a visual inspection of only large diameter storm sewer pipes (i.e. 18-inch and larger in diameter) and areas of known concern that were at least 20 years old. Additionally, it was decided that no CCTV of the storm system was to be performed. As a result, actual physical assessment, condition evaluation and GPS locating of the storm sewer system was limited. The visual inspection and GPS location of structures was restricted to those structures that had 18-inch or larger sewers connected and the visual inspection of the pipes that were in areas of concern. As the City opted not to proceed with full CCTV evaluation of the identified pipes, inspections were performed, from the surface, by attaching a camera to a pole and photographing sections of the pipes which were visible.

The Rochester Storm Sewer System contains 66 miles of storm sewer pipe ranging from 3-inch to 84-inch diameter, 1,369 manholes and 2,337 catch basins, of which the City owns 39 miles of storm sewer pipe, 1,065 manholes, and 1,632 catch basins. Of this 2.6 miles, or 7%, of the pipes were investigated and 922, or 25%, of the structures were inspected. Table 1 summarizes the City owned storm sewer system main, manholes and catch basins.

Table 1: Storm Sewer System Asset Inventory

System Asset	Quantity	Unit
Storm Sewer - 3-6 inch	3,483	LF
Storm Sewer - 8 inch	8,951	LF
Storm Sewer - 10 inch	5,791	LF
Storm Sewer - 12 inch	84,017	LF
Storm Sewer - 15 inch	24,098	LF
Storm Sewer - 18 inch	19,027	LF
Storm Sewer - 21 inch	6,319	LF
Storm Sewer - 24 inch	20,025	LF
Storm Sewer - 27 inch	6,695	LF
Storm Sewer - 30 inch	7,419	LF
Storm Sewer – 36 inch	7,832	LF
Storm Sewer – 42 inch	6,196	LF
Storm Sewer – 48 inch	5,846	LF
Storm Sewer – 54 inch	1,129	LF
Storm Sewer – 60 inch	205	LF
Storm Sewer – 66 inch	54	LF
Storm Sewer – 84 inch	64	LF
Manholes	1,065	Ea
Catch Basins	1,632	Ea

Structural and O&M condition ratings were assigned to the storm sewer pipe and structures that were inspected as part of the project. The ratings range from 1 to 5 whereby 1 indicates new or excellent condition and 5 indicates failure or imminent failure. Please refer to Table 2 for the NASSCO rating system scoring that was utilized to rate the condition of sewer main.

Table 2: NASSCO Condition Grades

Condition Grade	Definition
5	Most significant defect grade
4	Significant defect grade
3	Moderate defect grade
2	Minor to moderate defect grade
1	Minor defect grade

The following tables summarizes the structural ratings that the inspected pipes and structures received.

Table 3: Pipe Structural PACP Ratings

Pipe Size	1	2	3	4	5
6” to 12”		77	7	2	5
15” to 21”		37			
24” to 30”		38	2		
36” to 42”		4			
48” to 60”		4			
Total	0	160	9	2	5

Table 4: Catch Basin MACP Ratings

Diameter (inch)	Rating				
	1	2	3	4	5
18		2		1	1
24		12	3	1	
30		1	1		2
36		7	5	2	1
42		6	3	1	
48		178	20	10	10
54		1			
60		38	2	3	
72		8	2		
84		2			
120		2			
144			1		
Total	0	257	37	18	14

Table 5: Manhole MACP Ratings

Diameter (inch)	Rating				
	1	2	3	4	5
18		1			
24		4			1
36		10	2		1
42		23	2		
48	1	347	40	6	2
54		2			
60		88	6		
72		40	1		
84		6	1		
96		11			
120		1			
Total	1	533	52	6	4

The assets have been cataloged and stored in the City's Geodatabase. This geodatabase serves as the data repository for all City owned storm sewer information. The geodatabase provides a means for efficient and accurate storage of storm sewer data, access to system information/data in the office and out in the field, allows for maintenance and updating asset inventory and information, ultimately providing improved data management across the organization.

With any system it is good to know its replacement costs. Obviously with 39 miles of storm sewer and thousands of storm structures the configuration, depth, location and other physical parameters vary greatly. The ability to access some sections due to wetlands, rivers, etc., is extremely limited. All of this directly affects cost of replacement and rehabilitation. In the interest of providing some general guidance the following table gives a very preliminary estimate of the replacement cost of the entire Storm Sewer System.

The replacement cost of the system assets was determined by multiplying the total quantity of each system asset by an estimated replacement unit cost for each asset. The estimated replacement unit cost for each asset were derived from recent related local bids and estimated cost of materials. The total replacement cost for all of system assets was estimated to be approximately $85.7 million. Please refer to Table 6 for a summary of the entire City owned storm sewer system asset replacement costs.

Table 6: Asset Summary & Replacement Costs

System Asset	Quantity	Unit	Replacement Unit Cost (estimated)	Replacement Cost (estimated)
Storm Sewer - 3-6 inch	3,483	LF	$120	$417,960
Storm Sewer - 8 inch	8,951	LF	$160	$1,432,160
Storm Sewer - 10 inch	5,791	LF	$200	$1,158,200
Storm Sewer - 12 inch	84,017	LF	$240	$20,164,080
Storm Sewer - 15 inch	24,098	LF	$300	$7,229,400
Storm Sewer - 18 inch	19,027	LF	$360	$6,849,720
Storm Sewer - 21 inch	6,319	LF	$420	$2,653,980
Storm Sewer - 24 inch	20,025	LF	$480	$9,612,000
Storm Sewer - 27 inch	6,695	LF	$540	$3,615,300
Storm Sewer - 30 inch	7,419	LF	$600	$4,451,400
Storm Sewer – 36 inch	7,832	LF	$720	$5,639,040
Storm Sewer – 42 inch	6,196	LF	$800	$4,956,800
Storm Sewer – 48 inch	5,846	LF	$900	$5,261,400
Storm Sewer – 54 inch	1,129	LF	$1,000	$1,129,000
Storm Sewer – 60 inch	205	LF	$1,100	$225,500
Storm Sewer – 66 inch	54	LF	$1,200	$64,800
Storm Sewer – 84 inch	64	LF	$1,400	$89,600
Manholes	1,065	Ea	$4,000	$4,260,000
Catch Basins	1,632	Ea	$4,000	$6,528,000
Total				**$85,738,340**

Observed assets were analyzed to determine their Probability of Failure (POF) and Consequence of Failure (COF). The POF takes into account the condition rating, operation and maintenance rating, and the useful life remaining. The COF takes into account economic, environmental, and social impacts. The POF and COF scores are then 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. The MDEQ guidelines state that any asset with a BRE score of 16 or greater is considered critical.

As stated above, the program limited observation to 18-inch and larger sewers and the entire system was not inspected. Of the inspected areas, no pipes or structures were found to have a BRE of 16 or greater. Of the assets observed the range of scores for pipes, manholes and catch basins are shown in the table below.

Table 7: BRE Score Summary

Asset	Business Risk Exposure Score		
	Minimum	**Maximum**	**Average**
Pipes	1.65	12.6	4.32
Manholes	2.00	11.9	4.53
Catch Basins	1.70	11.2	4.70

The AMP contains a Capital Improvement Plan (CIP) that consists of multiple components. Repair and replacement of storm sewer pipes and structures are two (2) components of the CIP focusing on rehabilitation of the storm sewer system. The third is the continuation of the annual system operation and maintenance (O&M) activities which consists of cleaning and inspecting catch basins looking for signs of failure. The addition of an annual CCTV program to investigate of the entire storm sewer system will provide a more comprehensive understanding of the system condition. This will assist the City in determining appropriate rehabilitation methods for any failures or issues found within the system as well as providing a means to coordinate road project prioritization.

Rochester is a proponent of a "Complete Streets" philosophy, their stated position of *"Maximizing the return on investment through a triple bottom line analysis of all infrastructure needs (street, pedestrian, water reliability/quality, sanitary sewer, storm sewer, landscaping, etc.) when determining a project scope, budget and construction timing to ensure the maximum public benefit."* expresses an understanding and insight that the City and its infrastructure is a living and dynamic system where all facets are integral to enhancing the quality of life therein. Improvements and corrective measures made to the storm sewer system can have a positive impact by increasing the useful lifespan of a road

City owned detention ponds will be operated and maintained to manage both intensity and volume of discharge and to provide for continued operation in accordance with the intent of the design. Outfall inspection and stabilization is another key provision in the CIP, outfalls need to be maintained to assure they continue to function in accordance with the design while preventing erosion and transport of sediments around the outlet thus protecting the valued resources of the City. The final component of the CIP is capacity improvements. There were storm sewers in a few areas within the City that, through preliminary hydraulic analysis, were noted to have capacity issues. These sewers have been hydraulically evaluated and preliminary corrective measures have been identified and included in the CIP program.

Initially the City committed to an annual budget of $100,000 for storm sewer system O&M and improvements. Subsequently, the Infrastructure Committee identified additional financial needs for the City's Road System. The City Council in turn committed to an expenditure of approximately $2 million annually for road improvements. Given the "Complete Streets" philosophy described above, any road improvement will take into consideration the storm water drainage needs as part of the project.

Table 8 contains a summary of costs associated with each asset class for the CIP projects identified over the twenty (20) year planning period.

Table 8: Capital Improvements

Item Description	Cost
Capital Improvement Costs	
Pipe Repair & Replacement	$520,583
Structure Repair & Replacement	$541,185
Capacity Improvements	$2,900,100
Capital Improvement Sub-Total	**$3,961,868**
Operation & Maintenance Costs	
Clean & Re-Inspect Sewers (20 Year Cycle)	$1,786,985
Catch Basin Clean & Inspection	$400,000
Detention Pond Maintenance	$50,000
Outfall Stabilization	$50,000
Operations & Maintenance Sub-Total	**$2,286,985**
Stormwater System Total	**$6,248,853**

The City's focus on administering and implementing a quality stormwater operation and management program serves to provide a high level of service to residents, property owners and the community. The development of this Asset Management Plan reinforces their commitment while documenting known assets, programs and needs. The AMP identifies the need for continuous investigation and updating of the Capital Improvement Plan and notes that this is a living ongoing program. It is recognized that the initial program was limited and that expansion of the storm sewer investigative program, to areas not included in the SAW Grant serves to better understand and operate the storm sewer system throughout the City.

This summary provides a brief overview of the evaluation and investigation and offers initial insight into the City of Rochester's storm sewer system, its assets, condition, operation and needs. A more comprehensive discussion can be found in the complete Stormwater Asset Management Plan.

DEQ

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

Completion Due Date: October 31, 2017
(no later than 3 years from executed grant date)

The City of Rochester certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1151-01 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:

Blaine Wing	at (248) 651-9061	bwing@rochestermi.org
Name	Phone Number	Email

Blaine Wing   10/30/17

Signature of Authorized Representative (Original Signature Required)   Date

Blaine Wing, City Manager

Print Name and Title of Authorized Representative

Roseville
29777 Gratiot Avenue
Roseville, MI 48066
(586) 445-5410
Scott Adkins, sadkins@roseville-mi.gov
http://www.ci.roseville.mi.us

The City of Roseville is a strong steward of wastewater management and takes a proactive position in protecting its residents, property owners, and valued resources. As such, the City Council applied for, and was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program.

The City of Roseville was awarded a grant for $1,902,617, with a local match of $411,983 to investigate and evaluate the City's stormwater and wastewater assets. Specifically the SAW grant awarded was for investigating and developing a Wastewater Asset Management Plan, Stormwater Asset Management Plan and Stormwater Management Plan for the City. Of the total grant award of $2,314,600, $411,400 was designated to evaluate the City's wastewater assets and develop the Wastewater Asset Management Plan. Through development and implementation of this plan, the insight and understanding of the system's sanitary sewers and assets has significantly improved, and a comprehensive investigation included inventory and inspection of sanitary sewer assets, condition assessment of assets, capital improvement needs, and enhancement of the existing Graphical Information System (GIS) which includes mapping, database and system information that was previously not available.

Utilizing information obtained during a previous Sewer Cleaning and CCTV Investigation (S2) Program, AEW proceeded with further evaluation of the City's wastewater assets. A multi-phased approach was taken in which communication and interaction played a major role. This included a complex mixture of fact finding, criteria development, professional judgment, staff knowledge of the system, and common sense.

Roseville wastewater assets include over 152 miles of enclosed sewer and 3,591 sanitary structures, including 3,023 sanitary manholes and 568 combined manholes. The previous wastewater investigation resulted in condition assessments being perform on 65% of the sanitary sewers and 45% of the wastewater structures in the City. The evaluation results were utilized to project the condition of the remaining wastewater assets City wide. The condition assessments for the sanitary sewers were performed by means of closed circuit television (CCTV), while investigations of sanitary structures were performed by means of visual assessment.

29777 Gratiot Avenue
Roseville, MI 48066
(586) 445-5410
Scott Adkins, sadkins@roseville-mi.gov
http://www.ci.roseville.mi.us

A condition assessment was performed for each asset, allowing the assignment of an overall asset, Probability of Failure (POF), Consequence of Failure (COF), and Business Risk Evaluation (BRE) score. Ratings range from 1 to 5 whereby 1 indicates new or excellent condition and 5 indicates failure or imminent failure.

Assets were then analyzed to determine their POF and COF. The POF takes into account the condition rating while the COF takes into account the following four factors:

1.) Process Impact
2.) Financial Impact
3.) Safety
4.) Disruption to the Community

The POF and COF scores are then multiplied together resulting in the criticality score or the BRE score. The BRE score is used to prioritize what assets are most critically in need of repair. The MDEQ guidelines state that any asset with a BRE score of 16 or greater is considered critical.

The Roseville wastewater system has no sanitary sewers where the BRE scores exceed the MDEQ critical rating of 16, however, there are several sanitary structures meeting that criteria. Based on the current assessments and projections, the following exceeds the BRE of 16:

- 23 sanitary structures (51 projected)

This Wastewater Asset Management Plan presents the methodology and findings of the condition assessment of the Roseville wastewater assets, including the five (5) criteria set forth as part of the Michigan Department of Environmental Quality Stormwater, Asset Management and Wastewater (SAW) Grant.

Based on the Asset Management Plan and system evaluation, there are stormwater and sanitary sewers and structures currently in need of structural and O&M repairs. It is recommended that the locations presented in the Capital Improvement Plan be repaired or replaced as follows:

Capital Improvement, Years 1 to 5

- Repair/replace sanitary sewer structures with a BRE of 16 or higher. ($675,000)
- Develop a root control plan.

29777 Gratiot Avenue
Roseville, MI 48066
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Scott Adkins, sadkins@roseville-mi.gov
http://www.ci.roseville.mi.us

Capital Improvement, Years 6 to 10

- Replacements based on updated Asset Management Plan.

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 over an 8 to 10 year period. ($2,300,000)
- Continue with stormwater and sanitary structure assessment programs concurrent with the CCTV of the sewers. ($800,000)
- Update the Asset Management Plan on a yearly basis, incorporating newly collected data and yearly improvements.
- Develop and adopt policies to assess repair, and/or replace sanitary sewer systems concurrent with road construction projects.

The average annual cost to accomplish both the wastewater ten (10) year CIP is $456,000. A rate analysis was conducted as part of the AMP and it was found that the proposed rate for sanitary sewer revenues will sufficiently cover all expenditures related to the sanitary sewer system and a funding gap does not exist.

Roseville
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The City of Roseville has the following major assets as a part of its wastewater systems:

Sanitary Sewer Pipe	
Diameter (inch)	Total Length (feet)
6	727
8	4,423
10	7,741
12	448,320
15	124,719
18	68,158
21	32,001
24	27,537
27	6,069
30	30,678
36	8,903
42	7,886
48	3,692
54	5,116
60	5,266
72	7,913
78	12,693
115	267
144	2,649

Sanitary Structures			
Sanitary Manhole		Combined Manhole	
Diameter (inch)	Number (each)	Diameter (inch)	Number (each)
24	2	36	1
36	1	42	1
48	2978	48	553
60	12	60	4

This summary provides a brief overview of the evaluation and investigation and offers initial insight into the Roseville Wastewater System, its assets, condition, operation and needs. A more comprehensive discussion can be found in the Wastewater 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 October 31, 2017
(no later than 3 years from executed grant date)

The City of Roseville *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1413-01 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: ___June 7, 2017________________.
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:

Scott Adkins at (586) 445-5410 sadkins@roseville-mi-gov
Name Phone Number Email

____
Signature of Authorized Representative (Original Signature Required) Date

____
Print Name and Title of Authorized Representative

Roseville
29777 Gratiot Avenue
Roseville, MI 48066
(586) 445-5410
Scott Adkins, sadkins@roseville-mi.gov
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The City of Roseville is a strong steward of stormwater management, with its Sanitation Division overseeing its stormwater system, and takes a proactive position in protecting its residents, property owners, and valued resources. As such, the City Council applied for, and was awarded a grant through the Stormwater, Asset Management, and Wastewater (SAW) Program.

The City of Roseville was awarded a grant for $1,902,617, with a local match of $411,983 to investigate and evaluate the City's wastewater assets and storm water assets. Specifically the SAW grant awarded was for investigating and developing a Wastewater Asset Management Plan, Stormwater Asset Management Plan and Stormwater Management Plan for the City. Of the total grant award of $2,314,600, $1,829,700 was designated to evaluate the City's stormwater assets and develop the Stormwater Asset Management Plan. Through development and implementation of this plan, the insight and understanding of the system's storm sewers and assets has significantly improved, and a comprehensive investigation included inventory and inspection of storm sewer assets, condition assessment of assets, capital improvement needs, and enhancement of the existing Graphical Information System (GIS) which includes mapping, database and system information that was previously not available.

Recognizing the complexity of developing and implementing a comprehensive and viable Stormwater Asset Management plan the City DPW staff and AEW proceeded with cataloging and evaluating the City's stormwater assets. A multi-phased approach was taken in which communication and interaction played a major role. This included a complex mixture of fact finding, criteria development, professional judgment, staff knowledge of the system, and common sense.

Roseville stormwater assets include over 70 miles of enclosed sewer and 10,437 stormwater structures. Based on funding limitations, a condition assessment was performed on 54% of the storm sewers and 27% of the structures in the City. The evaluation results were utilized to project the condition of the remaining stormwater assets City wide. The condition assessment for the stormwater sewers was performed by means of closed circuit television (CCTV), while investigations of stormwater structures was performed by means of visual assessment.

A condition assessment was performed for each asset, allowing the assignment of an overall asset, Probability of Failure (POF), Consequence of Failure (COF), and Business Risk Evaluation (BRE) score. Ratings range from 1 to 5 whereby 1 indicates new or excellent condition and 5 indicates failure or imminent failure.

Assets were then analyzed to determine their POF and COF. The POF takes into account the condition rating while the COF takes into account the following four factors:

1.) Process Impact
2.) Financial Impact
3.) Safety
4.) Disruption to the Community

The POF and COF scores are then multiplied together resulting in the criticality score or the BRE score. The BRE score is used to prioritize what assets are most critically in need of repair. The MDEQ guidelines state that any asset with a BRE score of 16 or greater is considered critical.

The Roseville stormwater system has numerous storm sewers and structures where the BRE scores exceed the MDEQ critical rating of 16. Based on the current assessments and projections, the following exceeds the BRE of 16:

- 58 storm sewer segments (106 projected)
- 34 storm structures (126 projected)

This Stormwater Asset Management Plan presents the methodology and findings of the condition assessment of the Roseville stormwater assets, including the five (5) criteria set forth as part of the Michigan Department of Environmental Quality Stormwater, Asset Management and Wastewater (SAW) Grant.

Based on the Asset Management Plan and system evaluation, there are stormwater sewers and structures currently in need of structural and O&M repairs. It is recommended that the locations presented in the Capital Improvement Plan be repaired or replaced as follows:

Capital Improvement, Years 1 to 5

- Repair/replace stormwater sewer pipes and structures with a BRE of 16 or higher. ($966,000)
- Develop a root control plan.

Capital Improvement, Years 6 to 10

- Replacements based on updated Asset Management Plan.

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 stormwater sewer systems over an 8 to 10 year period. ($3,000,000)
- Continue with stormwater structure assessment program concurrent with the CCTV of the sewers. ($1,600,000)
- Update the Asset Management Plan on a yearly basis, incorporating newly collected data and yearly improvements.
- Develop and adopt policies to assess repair, and/or replace stormwater sewer systems concurrent with road construction projects.

The average annual cost to accomplish the stormwater ten (10) year CIP is $663,200. It was found that a funding gap of $663,200 per year exists for the stormwater system if addition funding is not procured.

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29777 Gratiot Avenue
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The City of Roseville has the following major assets as a part of its stormwater systems:

Storm Sewer Pipe	
Diameter (inch)	Total Length (feet)
6	6,867
8	9,795
10	6,534
12	186,342
15	41,147
18	38,074
21	18,960
24	20,042
27	7,046
30	15,767
36	10,822
40	34
42	4,857
60	2,705
66	527

Storm Structures			
Manhole		Catch Basin	
Diameter (inch)	Total Length (feet)	Diameter (inch)	Total Length (feet)
18	2	18	72
24	44	24	1016
30	15	30	86
36	53	36	144
42	118	42	75
48	583	48	398
54	8	54	2
60	47	60	1
72	2	66	1
84	1		
99	1		

This summary provides a brief overview of the evaluation and investigation and offers initial insight into the Roseville Stormwater System, its assets, condition, operation and needs. A more comprehensive discussion can be found in the Stormwater Asset Management Plan.

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

Completion Due Date: October 31, 2017
(no later than 3 years from executed grant date)

The *City of Roseville* *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1413-01 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:

Scott Adkins at (586) 445-5410 sadkins@roseville-mi-gov
Name Phone Number Email

Signature of Authorized Representative (Original Signature Required) Date

Print Name and Title of Authorized Representative

SAGINAW COUNTY ROAD COMMISSION

STORMWATER ASSET MANAGEMENT PLAN

SAGINAW COUNTY ROAD COMMISSION
3020 SHERIDAN AVENUE
SAGINAW, MICHIGAN 48601

October 2017

OHM
Advancing Communities®

Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan Executive Summary Guidance

Saginaw County Road Commission
3020 Sheridan Ave, Saginaw, MI. 48601
Joseph Wisniewski, Saginaw County Road Commission Director of Engineering
989.399.3761
SAW Grant Project Number 1550-01

Executive Summary

Saginaw County Road Commission (SCRC) is responsible for the stormwater collection system in the following six townships: Bridgeport, Buena Vista, Kochville, Saginaw, Thomas, and Tittabawassee. Within each township are networks of manholes, catch basins, culverts and storm sewers to manage stormwater drainage. These assets have been installed over roughly the last 70 years. The Saginaw County Department of Public Works owns a majority of the interceptor storm sewers located within these townships; SCRC ties their storm networks into these interceptors. Areas which are owned by the Saginaw County Department of Public Works are not included in this Asset Management Plan (AMP). The Saginaw County Road Commission is responsible for the upkeep and maintenance of their storm sewer systems 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 1550-01), with a total budget of $939,000, which is inclusive of grant proceeds and local match.

The Asset Management Plan (AMP) was intended to accomplish the following key goals:

- Provide the Road Commission 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 Road Commissions newly created 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, and to store the data in the Road Commissions newly created GIS database.
- CCTV was not performed as it would not be financially viable to televise, the short segments that Saginaw County Road Commission owns. Typically Saginaw County Road Commission owns enclosed sewers from catch basin to manhole and typically the Saginaw County Department of Public Works owns the main line interceptions.

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 Road Commissions AMP can be directed to these team members.

Dennis Borchard

- SCRC Director
- (989)752-6140

Daniel Medina

- Director of Maintenance
- (989)-725-0555

Joseph Wisniewski

- Director of Engineering
- (989)399-3761

Figure 1: Asset Management Team Leaders

Asset Inventory

An asset inventory is a list of the Road Commissions assets and their attributes. The Road Commission has provided several sources of information on the existing stormwater collection system including recorded as-built information. Recorded as-built information was scanned, digitized, and linked to the created GIS database. The resulting inventory of assets will reside in the SCRC's GIS database, which includes an aerial of the Road Commissions system and overlaying surveyed information.

Condition Assessment

It is assumed a large enough portion of the manholes, catch basins and culverts in the stormwater collection system were assessed to provide a representative condition of the total system. It is the intent of the Road Commission to continue evaluating the remaining structures needing to be assessed. 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 culverts were deemed sound or defective. 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. Throughout the six townships there was a total of approximately:

- 8,990 assessed of 13,240 total catch basins (68%)
- 2,150 assessed of 3,940 total manholes (54%)
- 672 assessed of 742 total road culverts assessed (90%)

It was also observed that:

- Catch basin and manhole infrastructure exhibits age-appropriate wear with an average rating of 2.5 at an average structure age of 35 years old.
- Of the approximately 11,150 total manhole and catch basin structures assessed, only 62 structures (less than one percent) received a structural rating of a 5.
- Approximately 90 percent of culverts assessed where in sound or functional condition.

Criticality and Risk

Determining the failure risk of an asset, leads to the identification of critical infrastructure. Risk is identified as the Probability of Failure (PoF) times the Consequence of Failure (CoF) as shown in Figure 2. PoF considers the physical condition of the asset while CoF considers economic and societal impacts to society due to an asset's failure. CoF is driven by the sewer diameter. When large diameter sewers fail they generally cost more to repair, service, and replace. In addition, large diameter pipes generally serve more customers, so they are assigned a higher CoF. Manholes or catch basins were assigned CoFs based on adjacent sewer diameter.

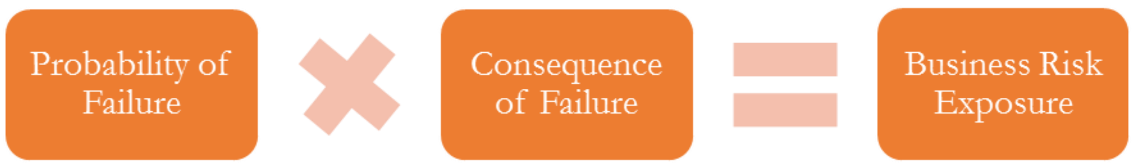


Figure 2: Risk Equation

Level of Service

The Road Commission adopted level of service criteria, which it plans on using as a guideline to manage the stormwater 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
Asset Condition Assessment	Continue asset condition inspection and tracking within GIS
Regulatory Compliance	Compliance with MDEQ Policy and The Clean Water Act
Service Delivery and Customer Communication	Respond to customer complaints and requests efficiently.
O&M Optimization	Regular Cleaning and Maintenance
Capital Improvements	Continue to upgrade stormwater infrastructure during road rehabilitation and replacement projects

Revenue Structure and Capital Improvement Project Plan

The Road Commission's revenue structure and existing CIP will not be significantly changed by the results of this project. The condition assessment helped identify assets that may be repaired to ensure the stormwater collection system continues 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:

- Continued curb sweeping to prevent dirt and debris from entering the system.
- Continued culvert replacement and repair.
- Regularly-scheduled manhole and catch basin inspection.
- Repair and rehabilitation to address structural problems resulting from aging infrastructure. These projects should continue to be scheduled during road projects.

As communities like the ones maintained by the Saginaw County Road Commission have developed and aged, the subsurface infrastructure is deteriorating. If the Road Commission does not continue performing systematic repairs, rehabilitation and/or replace these aging components, residents and businesses depending on this infrastructure will experience a decreased level of service which could result in the following:

- Increased threat of property damage and safety
- Increased potential for environmental damage
- Increased potential for impassable roadways due to failed infrastructure

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.

- 400 miles of storm sewer pipe, ranging from 4-inch to 108-inch diameter
- 3,940 manholes
- 13,240 catch basins
- 742 culverts

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

Completion Due Date October [illegible],2017
(no later than 3 years from executed grant date)

The Saginaw County Road Commission *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1550-01 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
Joseph Wisniewski, PE	at (989) 399-3761	wisniewskij@scrc-mi.org

Signature of Authorized Representative (Original Signature Required) — Date: 10-25-2017

JOSEPH G. WISNIEWSKI - DIRECTOR OF ENGINEERING.
Print Name and Title of Authorized Representative

CITY OF SAGINAW

Department of Water and Wastewater Treatment Services
1701 South Jefferson Avenue
Saginaw, MI 48601

October 30, 2017

Michigan Department of Environmental Quality
Drinking Water and Municipal Assistance Division
Revolving Loan Section
Constitutional Hall
525 West Allegan Street,
Lansing, Michigan 48909

Attn: Eric Pocan, Project Manager

Re: City of Saginaw SAW Grant Wastewater Asset Management Plan Executive Summary

Dear Eric:

We are sending you this Executive Summary of the City of Saginaw's SAW Grant Wastewater Asset Management Plan activities required under Section 603 of Public Act 84 of 2015 in the outline format as described in the recent Michigan Department of Environmental Quality (MDEQ) Stormwater, Asset Management, and Wastewater (SAW) Asset Management Plan (AMP) Executive Summary Guidance (attached).

Executive Summary – Grantee Information

SAW Grant Project Number:	1126-01
SAW Grant Award Amount:	$1,999,943
SAW Grant Award Date:	September 3, 2014
SAW Grant Deadline:	October 31, 2017

City of Saginaw, Michigan
1315 South Washington Avenue
Saginaw, MI 48601
saginaw-mi.com

Contact Information for the grantee:
Representative: Ms. Kimberly Mason, Director
Department of Water and Wastewater Treatment Services
1701 South Jefferson Avenue
Saginaw, MI 48601
Phone: 989-759-1520

Executive Summary – Project Scope

This section of the SAW AMP Executive Summary is a summary of the project scope. Methods, results and findings are covered in subsequent sections of this summary.

The City of Saginaw's (City's) Wastewater Asset Management Program project scope included:

a. Asset Inventory and Condition Assessment.
b. Criticality of Assets and Business Risk Evaluations.
c. Level of Service Determination.
d. Revenue Structure Evaluation.
e. Capital Improvement Plan.

Wastewater Asset Inventory and Condition Assessment

This section of the SAW AMP Executive Summary includes a summary of the systems used to maintain an inventory of the City's assets and assess Conditions.

1. System components included in the City's Wastewater Asset Management Program are as follows:
   - Wastewater Facilities – which includes all facilities, equipment and piping used to treat, hold or pump wastewater.
   - Water & Sewer Maintenance & Service Facilities – which includes all facilities and equipment used to maintain the Collection System.
   - Collection System – which includes all sewers, manholes and catch basins.

2. The City's assets were located and identified as follows:
   - Wastewater Facilities – field verified in conjunction with construction plans and shop drawings information.
   - Water & Sewer Maintenance & Service Facilities – field verified in conjunction with construction plans.
   - Collection System – GIS in conjunction with engineering records and construction plans.

3. The platforms used to develop and maintain the inventory of the City's assets are as follows:
   - Wastewater Facilities:
     - Infor – Enterprise Asset Management (EAM) – Computerized Maintenance Management Software (CMMS) used to store information on assets and to generate work orders.
     - BS&A – used for requisitions, purchase orders, and budgets.
     - Wonderware Supervisory Control And Data Acquisition (SCADA) – used for monitoring and operating assets.
     - Dossier – Fleet Maintenance Management – CMMS used for vehicles work orders.
     - Excel Operations and Lab Spreadsheets – used to store Operations and Laboratory information on assets.

  - Structures Assessments Word Documents and Excel Spreadsheets – used to store and quantify structural evaluations of the City's assets.
  - Excel AMP Spreadsheet – used to calculate Business Risk Evaluations and other asset evaluation values.
  - Eramosa e.RIS (Eramosa Reporting and Information System) – used for evaluating multiple databases of the City's assets, calculating Business Risk Evaluations and other asset evaluation values, assembling Capital Improvement Plans, and producing reports.

- Water & Sewer Maintenance & Service Facilities:
  - Excel Spreadsheet – used to store information on the City's assets.
  - Dossier – Fleet Maintenance Management – used for the City's vehicles parts and work orders.
  - BS&A – used for requisitions, purchase orders, budgets and work orders.
  - Sensus – Flexnet – used for collecting water meter readings for billings and other purposes.
  - Structures Assessments Word Documents and Excel Spreadsheets – used to store and quantify structural evaluations of the City's assets.
  - Excel AMP Spreadsheet – used to calculate Business Risk Evaluations and other asset evaluation values.
  - Eramosa e.RIS (Eramosa Reporting and Information System) – used for evaluating multiple databases of the City's assets, calculating Business Risk Evaluations and other asset evaluation values, assembling Capital Improvement Plans, and producing reports.

- Collection System:
  - Esri – ArcGIS (Geographic Information System) – used to store information geographically on the City's assets.
  - Esri – ArcGIS Collector Application – used to input catch basin condition assessments.
  - Cues – Granitenet – used for Closed Circuit Television (CCTV) evaluation of the City's sewers and manholes as per the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP), for loading into the City's GIS.
  - Eramosa e.RIS (Eramosa Reporting and Information System) – used for evaluating multiple databases of the City's assets, calculating Business Risk Evaluations and other asset evaluation values, assembling Capital Improvement Plans, and producing reports.

4. The City's Condition assessment processes, including what methods were used are as follows:
   - Wastewater Facilities and Water & Sewer Maintenance & Service Facilities:
     - Through visual inspections of all assets and workshops with key personnel familiar with operations and maintenance, Condition was evaluated from two perspectives: (1) **Performance** which means "Is the asset performing how it is supposed to perform?" and (2) **Life** which means "How long will the asset continue to perform at an acceptable level with only routine maintenance?"
     - A Condition Factors sheet was used as a guide and Condition was assigned to each asset based on a scale of 1 to 5, with 1 the best condition and 5 the worst (1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Broken). 0 was included for assets already assigned a Criticality of 0.
     - Based on experience, New Useful Life (Life Expectancy) was estimated for each category of assets (such as pumps, buildings, etc.). Next, the Remaining Life of each asset was estimated. This provided a Life Condition range from 1 to 5 (same scale as used for Condition Performance) based on the fraction of Remaining Life divided by New Useful Life.
     - The Final Condition was the highest (worst condition) value between the Performance Condition value and the Life Condition value.
     - The above process will be repeated and updated on a yearly basis.

   - Collection System:
     - Sewers: A third of the SAW Grant ($660,000) was used to hire a Contractor to clean, televise and rate about 10% of the Collection System. The National Association of Sewer Service Companies (NASSCO) standardized Pipeline Assessment Certification Program (PACP) Condition assessment procedures were used throughout. GIS was used to determine where the Contractor should investigate in order to get a good sampling of the Collection System's sewer pipe materials and ages. The Contractor provided their investigation results to the City in GIS format which enabled the City to readily incorporate the results into GIS.
     - Manholes: Manholes that were connected to rated sewers were themselves rated using NASSCO's Manhole Assessment Certification Program (MACP). Manhole condition assessments consisted of visual inspection from looking into the manhole from the ground surface without physical entry.
     - Catch Basins: The City established a simple process of catch basin Condition assessment using modified MACP procedures.
     - This above process will continually be used by City personnel and hired contractors in order to expand and update the database of evaluations.

5. The overall results of the Condition assessments are as follows:
   - Wastewater Facilities: generally most assets are in good Condition, whereas those assets in poor or worse Condition were noted to be addressed through the Capital Improvement Plan.
   - Water & Sewer Maintenance & Service Facilities: generally most assets are in good Condition, whereas those assets in poor or worse Condition were noted to be addressed through the Capital Improvement Plan.
   - Collection System: generally most assets are in good Condition, whereas those assets in poor or worse Condition were noted to be addressed through the Capital Improvement Plan.

Criticality of Assets and Business Risk Evaluations

This section of the SAW AMP Executive Summary includes a summary of the methods used to assess the Criticality of the assets considering the likelihood and consequence of failure.

1. The methods used to assess the Criticality of assets considering the likelihood and consequence of failure are as follows:
   - Wastewater Facilities and Water & Sewer Maintenance & Service Facilities:
     - Through workshops with key personnel familiar with operations and maintenance, using a Criticality Factors sheet as a guide, Criticality Rankings were assigned to all assets based on a scale of 1 to 5, with 1 the least critical and 5 the most (1 = Negligible, 2 = Minimal, 3 = Important, 4 = Critical, 5 = Catastrophic). 0 was assigned to any asset that had been entered into the inventory, but in reality was missing or no longer used.
     - Two types of Redundancy Reduction factors were incorporated:
       - The Number of Units on Line divided by the Total Number of Units provided a straight fractional reduction factor.
       - If an asset had a complete set of Spare Parts, a reduction factor of 0.75 was used.

   - Collection System:
     - The Collection System has been divided into seven drainage districts based on sewer flow patterns that correspond to the City's seven Retention Treatment Basins.
     - These seven drainage districts were further divided into thirty drainage sub-districts corresponding to trunk sewers and regulator structures that feed the interceptor.
     - Overall Criticality rankings were determined for the drainage districts and sub-districts based on relative importance to the entire Collection System. This was a two-step process consisting first of a mathematical calculations step, followed by an evaluation step by administrators based on their knowledge of the system.

- The mathematically calculated Overall Criticality rankings were based on:
    - Adjusted Equivalent Number of Users weighted at 70%.
    - And drainage area weighted at 30%.
    - The Interceptor was ranked higher than the districts and sub-districts.
- Through workshops with administrators calculated rankings were adjusted as needed. Printed GIS maps of each district and sub-district were presented and the mathematically calculated rankings were evaluated against additional factors such as work orders, customer complaints, critical roads, emergency routes and critical facilities such as hospitals and schools. After the evaluation step, the relative overall rankings remained as mathematically calculated with no changes.
- Through additional workshops with administrators Criticality rankings were assigned to each asset. Each drainage sub-district was examined separately as its own unique system. Printed GIS maps were used of each drainage sub-district, along with a spreadsheet for notes.
- An asset in the Collection System was defined as:
    - A stretch of pipe from manhole to manhole.
    - Or an individual manhole.
    - Or an individual catch basin.
- Criticality Rankings for the City's assets were based on a scale of 1 to 5, with 1 the least critical and 5 the most (1 = Negligible, 2 = Minimal, 3 = Important, 4 = Critical, 5 = Catastrophic).

2. Based on the condition of the City's assets and the determined risk tolerance, assets were ranked as follows:
    - Wastewater Facilities and Water & Sewer Maintenance & Service Facilities:
        - Assets were ranked using a Business Risk Evaluation (BRE) by multiplying Criticality by Condition for each asset to get a range of values from 1 (needing no attention) to 25 (needing immediate attention).

    - Collection System:
        - Assets were ranked with a BRE by following the NASSCO guidelines that Condition Ratings are assigned using a 1 to 5 scale, but are then adjusted to a 1 to 6 scale when used for BRE. NASSCO also uses a 1 to 6 scale for Criticality for BRE. This provided BRE by multiplying Criticality by Condition for each asset to get a range of values from 1 (needing no attention) to 36 (needing immediate attention).

Level of Service Determination

This section of the SAW AMP Executive Summary includes a summary of the level of service goals the City has determined that it wants to provide for the City's customers based on the City's ability to provide the service and meet customer expectations.

1. Procedures used to involve stakeholders in the level of service discussion are as follows:
   - Applicable key performance indicators (KPI's) were included as level of service goals. These were taken directly from the current City of Saginaw Approved Budget, approved by City Council representing the City's stakeholders.
   - The Northwest Utility Authority (NWUA) serves several communities outside of the City limits and pumps wastewater through a force main to the City's WWTP. A representative from the NWUA attended the level of service workshop.

2. Trade-offs for the services provided (including any technical, managerial, health standard, safety, or financial restraints) as long as all regulatory requirements are met are as follows:
   - There were no trade-offs in the development of the City's level of service goals.

3. The level of service goals were determined as follows:
   - Workshops were held with the City's project team where level of service goals were compiled from the City's applicable KPI's, along with discussions of additional level of service goals.
   - Level of service goals were established for the following major areas:
     - Regulatory Compliance
     - Environmental Stewardship
     - Customer Service
     - Health and Safety
     - Financial Viability
     - Organizational Development

Revenue Structure Evaluation

This section of the SAW AMP Executive Summary includes a summary of the funding structure and rate methodology that provides sufficient resources to implement the asset management program.

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 are as follows:
   - 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 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/or restructuring possibilities were also explored.
   - The Capital Improvement Plan provided refined cost projections for both the first 5 years and 20 years of the financial analysis, which identified the estimated investment cost by year for assets in need of repair or replacement, along with other enhancements. The annual investment cost was evaluated and scenarios developed for cash funding and debt financing.

2. If the current structure was not sufficient, discuss what increases were needed to ensure the desired level of service is sustainable and if any changes that were made:
   - The annual investment cost, along with operating cost, is forecasted to be sufficiently supported by cash balance and user rate management, so that the desired level of service will be sustainable.

Capital Improvement Plan

This section of the City's SAW AMP Executive Summary includes a summary of the long-term Capital Improvement Plan that was developed to address system needs identified in the AMP.

Attached is the Fiscal Year 2019-2038 Wastewater Capital Improvement Plan as developed through the Wastewater Asset Management Program procedure.

Recommendations

Recommendations are as presented throughout this SAW AMP Executive Summary.

List of Major Assets

This section of the City's SAW AMP Executive Summary includes a summary list of the major assets identified in the AMP as follows:

- Wastewater Treatment Plant structures with associated equipment
  - Operations Building
    - Raw Sewage Pumping
    - Screenings/Grit Handling
  - 6 Primary Settling Tanks
  - 4 Aeration Tanks
  - 6 Final Settling Tanks
  - 2 Chlorine Contact Tanks
  - 3 Sludge Storage Tanks
  - Chlorination/Dechlorination Building
  - Return Sludge Pump Station
  - Effluent Pump Station
  - Garage
  - Lesser structures such as Vehicle Parking Structure, Pole Barn, etc.
- 7 Retention Treatment Basins including equipment
- 9 Pump Stations including equipment
- 5 Water and Sewer Maintenance and Service Buildings including equipment
- Collection System
  - 330 miles of Sewers, ranging in size from 8 inches to 10 feet in diameter
  - 8,943 Manholes
  - 10,156 Catch Basins

If you have any questions, please feel free to contact me.

Sincerely,

Kimberly R. Mason

Kimberly Mason, Director
Department of Water and Wastewater Treatment Services
1701 South Jefferson Avenue
Saginaw, MI 48601

Attachments:

- MDEQ SAW AMP Executive Summary Guidance document
- Fiscal Year 2019-2038 Wastewater Capital Improvement Plan
- MDEQ SAW Grant Wastewater AMP Certification of Project Completeness

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The **City of Saginaw, County of Saginaw** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1126-01** 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: **No**

   If No - Date of the rate methodology approval letter: **April 24, 2017**.

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: **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
Kimberly Mason, Director	at	**989-759-1520**	**kmason@saginaw-mi.com**

Kimberly R. Mason — 10-30-17

Signature of Authorized Representative (Original Signature Required) — Date

Kimberly Mason, Director, Department of Water and Wastewater Services, City of Saginaw, MI
Print Name and Title of Authorized Representative

WASTEWATER ASSET MANAGEMENT PLAN (AMP) EXECUTIVE SUMMARY

Municipality:	City of Sandusky
Address:	26 West Speaker Street Sandusky, MI 48417
Web Address:	www.misandusky.com
Contact Name:	David Faber – City Manager
Phone Number:	810-648-4444
SAW Grant Project Number:	1428-01

Executive Summary

Summary of the project scope, including results and findings of activities covered by the grant.

The scope of the project in the City of Sandusky was to complete an asset management plan (AMP) for both wastewater and storm water. The AMP included cleaning, televising and rating of all sanitary sewers and manholes which was a continuation of a program that the City started in 2011. A new sanitary and storm sewer map was developed after all the manholes, storm manholes, catch basins were located with high accuracy GPS equipment and added to the GIS map. All inspected pipes, manholes and facilities and equipment at the wastewater treatment plant (WWTP) were added to the AM inventory, rating and budgeting document.

Over 100,000 feet of sanitary sewer and 376 sanitary manhole structures were inspected and added to the AMP. Over 19,000 feet of storm pipe was inspected and added to the AMP, while all 75,000 feet were inventoried. At the WWTP all buildings and major equipment was inventoried and assessed with a value of over $8 million.

The City's knowledge of their sanitary and storm sewer systems greatly increased both in location of infrastructure that they were unaware of and knowledge related to the condition and importance of each component. Many manholes were covered with asphalt or buried with dirt that were not accessible for many years. New found pipes and manholes have now been added to the GIS system map. All drawings are now available electronically in pdf format and have also been hyperlinked to the system features on the GIS map.

Considering the age of the system, both the sanitary and storm sewer systems are in good shape. For example: only 8 storm manholes need attention and only about 4 sanitary manholes need some work. The rate of decay appears to be very slow, meaning that the collection systems should have a very long life expectancy.

Evaluation of the City's revenue structure showed that no major deficit (gap) existed, so only minor updates to the revenue structure needed to be made. The method of financing capital improvement projects and replacement projects was planned.

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.
    b) The wastewater treatment plant was completely inventoried for all major components.
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) Wastewater equipment was identified by its location on the wastewater treatment plant site, mainly by the building, tank or structure that it was located in.
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 wastewater treatment plant.
    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 were first cleaned and then video equipment was used to inspect the pipes. Sewer inspection reports were completed for each section of pipe identifying the flaws in the piping system based on the location of the flaw relative to the upstream and downstream manhole structure.
    b) Manholes were visually inspected and rated. A two part rating was used with one rating being the condition of the casting and the second rating being the condition of the structure and pipe penetrations. These two ratings were then combined to provide an overall rating of each manhole.
    c) Pump Stations were visually inspected and rated.
    d) The rating system for the pump stations and all rated components of the wastewater treatment plant used was the one provided by the MDEQ 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 – Over 50% of asset requires replacement.

5) *The results of the assessment (e.g., percentage of good, fair, and poor for collection system; most of wastewater treatment facility out buildings are in good condition).*

a) Wastewater Collection Results

i) All of the sanitary sewer collection system was rated with the mains separated from the structures.

(1) Sanitary Pipe Results Tables

Assets	Districts	Ratings	All Pipe Sizes (feet)	Percent
Sanitary Pipes	All	1	36,815	36.1%
		2	953	0.9%
		3	28,168	27.6%
		4	6,376	6.3%
		5	6,542	6.4%
		6	2,692	2.6%
		N/A	20,330	20.0%
		TOTAL	101,876	

(2) Sanitary Pipe Rating Legend

Ratings	
Ratings	**Condition**
N/A	Unknown
1	Good
2	Repaired
3	Monitor
4	Review
5	Repair
6	Replace

(3) Sanitary Structure Results Table

	Rating	Number	Percent
TOTAL ALL DISTRICTS	1	352	93.6%
	3	20	5.3%
	4	2	0.5%
	5	2	0.5%
	6	0	0.0%
	7	0	0.0%
	8	0	0.0%
	TOTAL	376	

(4) Sanitary Structure Rating Legend

Ratings (Rating = Manhole Condition + Casting Condition)	
Rating	**Condition**
1	Good
2	Fair
3	Poor
4	Repair needed/Replace

(5) Wastewater Treatment Plant Results Table
- (a) 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 number the more important the attention that asset should receive. Based on our analysis this table shows the top rated assets.
- (b) It should be noted that 11 of the items that are ranked with a 16 or 20 are part of a system of redundant components. For example: Influent Pump #1 is one of 3 pumps, where one is a backup redundant unit. This is true also of the other "Pumps" listed as well.

Assets	Condition	Probability of Failure	Criticality of Asset	Business Risk
Influent Pump #1	2	4	5	**20**
Influent Pump #2	2	4	5	**20**
Influent Pump #3	2	4	5	**20**
Sump Pump	3	4	5	**20**
Ferric Storage Tank	4	5	4	**20**
UV Bank 1A (3 lights, sleeves, wipers)	2	5	4	**20**
UV Bank 1B (3 lights, sleeves, wipers)	2	5	4	**20**
MultiRanger 100	4	5	4	**20**
2 - Grinder Pump Model: PIR PE28/2	1	4	4	**16**
2 - Grinder Pump Model: PIR PE28/2	1	4	4	**16**
2 - Grinder Pump Model: PIR PE28/2	1	4	4	**16**
2 - Submersible Pumps	1	4	4	**16**
2 - Submersible Pumps	2	4	4	**16**
2 - Submersible Pumps	2	4	4	**16**
AB MCC (old)	4	4	4	**16**
SCADA Computer	4	4	4	**16**
UV Hydraulic Control Center	2	4	4	**16**
Sludge Recirculation Pump #1	3	4	4	**16**
Sludge Recirculation Pump #2	3	4	4	**16**
Cover (floating)	3	4	4	**16**

(6) Wastewater Treatment and Pump Station Rating Legends

(a) 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

(b) 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

(c) 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

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 MDEQ guidance documents.
   b) As part of our determination we used the data collected and the past history of the asset to determine our rankings. For example: With the Influent Pumps, two of the units have performed almost flawlessly for the past 10 years. The third unit has had problems since the first day. Two times in the past two years the pump has been removed for maintenance and repairs. So are the pumps reliable and likely to fail? No. But as we have seen, when one does fail it takes a fair amount of effort and time to get the unit back in service, so during that time we were lacking a redundant unit. Our actions of being proactive and getting the third unit back up and running prevented catastrophic problems, such as basement flooding from occurring in the system. Our Level of Service goals are exceeded when our actions result in a system operating unnoticeably.
   c) All items were reviewed with City staff and our engineering consultant 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, what do we have to focus on today and this week and year.
   e) Some of the items on the list were a surprise and were not on our list of top items to replace or even consider.

Level of Service Determination

1) The City used the following process to involve stakeholders in developing the level of service:

   a) The City is in a unique situation that has proven to be very timely during that last few years. Due to the age of existing staff in the Department of Public Works and at the Wastewater Treatment plant, staffing changes have been necessary. These necessities have allowed the City to modernize its approach to Level of Service issues.

   b) Being a small community with a manager who has complete buy in to the betterment of the community and a council who is involved and informed on the operations of the City the Level of Service goals originated from the top.

2) The trade-offs for the service to be provided have improved significantly over the past few years. There are still limitations and restrictions that limit the City's ability to meet its desired level of service, but things have greatly improved.

   a) During that past few years, with the beginning of staff retirements and new staff hiring many of the hurdles or restraints that previously existed have been overcome. For example: In the past the City would struggle with:

      i) Self-performing routine infrastructure repairs, thus spending money on contractors to do work that could be performed internally. This was a technical (staff ability), managerial (department level) and financial (lack of staff interest in budgeting) road block.

      ii) Equipment maintenance. Habits and concerns by staff about spending money were ill founded. New staff is now empowered to be involved with the budget process to and use/spend in order to keep maintenance up to date. This was also a managerial and financial road block as described above.

      iii) The City has also purchased a maintenance software program that integrates the geographical location of maintenance items with the task and then logs both the start of the task and its completion date. This software is intended to improve department efficiency and provide a means for tracking/monitoring the level of service through response times, types of tasks completed and the quantity thereof.

   b) Regulatory requirements were always the goal, but at times the only goal. This single sighted focus and past financial challenges that the City had led to a get by attitude that was not healthy for the staff, the community and the infrastructure. The SAW process combined with staff changes and improved financial conditions have all combined to allow the City to turn the corner to a healthy workplace filled with pride.

3) How the level of service goals were determined.

   a) The City due to the way it was organized and staffed as recently as 5 years ago was limited in its ability to develop level of service goals. Due to these restrictions the level of service was developed in a top down path. This top down approach did not happen in a vacuum, but was based on regular criticism from the community and council on how the City was performing. Things as simple as why are there 2 people driving around in trucks, to why does it take so long to fix a street or repair a water main leak, or to address any local street flooding issues.

b) The goals adopted starting with the council and management were implemented as part of the new staff's normal operating philosophy. In other words, the old means of methods of serving the City and maintaining and operating the City's infrastructure were significantly changed and improved as new staff was hired. New staff came on board living the new Level of Service goals.

c) Due to proper guidance from management the implementation of improved level of service has taken place.

Revenue Structure

1) A summary of the funding structure and rate methodology that provides sufficient resources to implement the asset management program.
   a) As determined in the rate deficit (gap) review the City is not operating the sanitary sewer system in a deficit. There is sufficient revenue to cover the cost of operating the sanitary sewer system.
   b) The City incurred significant debt in 2006 for improvements to the WWTP. At that time rates were increased to cover this expense and revenue has been sufficient to cover the debt payments on top of the operating expenses without borrowing money from the General Fund. The City has recently refinanced this debt to a lower interest rate and shorter term thus reducing the long term liability of the sewer fund.
   c) The City will continue to leverage bonds, State funding sources such as SRF and Federal funding sources such as USDA – RD for major capital improvements such as those listed below.
   d) The City as revenue allows will fund replacement items that are considered short lived assets and will begin to budget for items that have medium lives.
   e) The City in the recent past has been able to make improvements to the system, such as the upgrade of all 6 pump stations in an amount of around $150,000 without borrowing or seeking outside funding assistance. The City has also used short term bonds to complete projects like water tower coating, sanitary sewer replacement and water main replacement, thus preserving capital balances and taking advantage of low interest rates.
   f) The City will incorporate the AMP data for replacement and capital improvement in their rate analysis on an annual basis.

Capital Improvement Plan

1) The sanitary and storm information gathered regarding the condition of the system lead to the development of project and project costs that were incorporated into the City's existing citywide Capital Improvement Plan. The highest priority projects (rating of 6) are shown in the tables below for sanitary and storm.

Item No.	Sanitary Sewer Projects	Estimated Project Cost
S-1	Hart Street - Argyle to Marion Street	$ 146,326.50
S-2	South Delaware - M-46 to Marion Street	$ 165,801.60
S-3	North Delaware - Argyle to Marion Street	$ 214,131.60
S-4	North Elk - M-46 to Marion Street	$ 102,249.00
S-5	Court House Easement - Between Courthouse and Hospital	$ 27,540.00
	TOTAL	**$ 656,048.70**

Item No.	Storm Sewer Projects	Estimated Project Cost
ST-1	Morse - Speaker to Lincoln Street	$ 18,318.75
ST-2	Morse - Marion to M-46	$ 8,262.50
ST-3	Delaware - Marion to M-46	$ 158,606.25
ST-4	Fulton - Jefferson to M-46	$ 202,470.00
	TOTAL	**$ 387,657.50**

List of Major Assets

The following lists of assets summarize the major components identified as part of the asset management plan for both the Stormwater and Wastewater Systems.

Storm Sewer System

- 75,076 lineal feet of storm sewer pipe
- 238 storm manholes

Wastewater Collection System

- 376 sanitary manholes
- 101,876 lineal feet of sanitary sewer pipe
- 6 pump stations

Wastewater Treatment Plant

- 3 Influent Pumps
- Grit tank
- 2 pair of primary clarifiers
- 3 trains of Rotation Biological Contactors
- 2 final clarifiers
- 2 cloth membrane effluent filters
- 2 banks of UV disinfection
- 1 Post aeration structure
- 1 anaerobic digester
- 2 sludge storage tanks
- 2 drying beds
- Maintenance Building
- Main Building with electrical, lab, offices, blower room
- Permanent generator with auto transfer switch

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

Completion Date **October 31, 2017**
(no later than 3 years from executed grant date)

The **City of Sandusky** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1428-01** 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:

David Faber at ______________ 810-648-4444 dfaber@misandusky.com
Name Phone Number Email

Rate Methodology was submitted to DEQ on: April 21, 2017 and approved on June 22, 2017 showing that no gap existed.
(within 2 ½ years from date of executed grant)

An initial rate increase of _____% of a $____________ gap was adopted on ________________

10-31-17

Signature of Authorized Representative (Original Signature Required) Date

David Faber – City Manager
Print Name and Title of Authorized Representative

STORMWATER ASSET MANAGEMENT PLAN (AMP) EXECUTIVE SUMMARY

Municipality:	City of Sandusky
Address:	26 West Speaker Street Sandusky, MI 48417
Web Address:	www.misandusky.com
Contact Name:	David Faber – City Manager
Phone Number:	810-648-4444
SAW Grant Project Number:	1428-01

Executive Summary

Summary of the project scope, including results and findings of activities covered by the grant.

The scope of the project in the City of Sandusky was to complete an asset management plan (AMP) for both wastewater and storm water. The AMP included cleaning, televising and rating of all sanitary sewers and manholes which was a continuation of a program that the City started in 2011. A new sanitary and storm sewer map was developed after all the manholes, storm manholes, catch basins were located with high accuracy GPS equipment and added to the GIS map. All inspected pipes, manholes and facilities and equipment at the wastewater treatment plant (WWTP) were added to the AM inventory, rating and budgeting document.

Over 100,000 feet of sanitary sewer and 376 sanitary manhole structures were inspected and added to the AMP. Over 19,000 feet of storm pipe was inspected and added to the AMP, while all 75,000 feet were inventoried. At the WWTP all buildings and major equipment was inventoried and assessed with a value of over $8 million.

The City's knowledge of their sanitary and storm sewer systems greatly increased both in location of infrastructure that they were unaware of and knowledge related to the condition and importance of each component. Many manholes were covered with asphalt or buried with dirt that were not accessible for many years. New found pipes and manholes have now been added to the GIS system map. All drawings are now available electronically in pdf format and have also been hyperlinked to the system features on the GIS map.

Considering the age of the system, both the sanitary and storm sewer systems are in good shape. For example: only 8 storm manholes need attention and only about 4 sanitary manholes need some work. The rate of decay appears to be very slow, meaning that the collection systems should have a very long life expectancy.

Evaluation of the City's revenue structure showed that no major deficit (gap) existed, so only minor updates to the revenue structure needed to be made. The method of financing capital improvement projects and replacement projects was planned.

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.
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 cleaned and then video equipment was used to inspect the pipes. Sewer inspection reports were completed for each section of pipe identifying the flaws in the piping system based on the location of the flaw relative to the upstream and downstream manhole structure.
   b) Manholes were visually inspected and rated. A two part rating was used with one rating being the condition of the casting and the second rating being the condition of the structure and pipe penetrations. These two ratings were then combined to provide an overall rating of each manhole.
5) *The results of the assessment (e.g., percentage of good, fair, and poor for collection system; most of wastewater treatment facility out buildings are in good condition).*
   a) Stormwater System Results
      i) Only a portion of the storm sewer system was inspected (19,763’ or 26.3%) and the results for the sections inspected are:

(1) Storm Pipe Results Table

Storm Mains	Ratings	Length of Pipe (Feet)	Percent
TOTALS (by Ratings)	1	2,315	11.7%
	2	6,140	31.1%
	3	4,582	23.2%
	4	6,726	34.0%
	<Null>	55,313	73.7%
	TOTAL	75,076	
	Inspected	19,763	26.3%

(2) Rating Legend

Storm Mains	
Ratings	
Ratings	Condition
1	Good
2	Monitor
3	Review
4	Repair/Replace
<Null>	Not Inspected

(3) Storm Structure Results Table

	Rating	Number	Percent
TOTAL ALL DISTRICTS	2	213	89.5%
	3	17	7.1%
	4	5	2.1%
	5	1	0.4%
	6	2	0.8%
	7	0	0.0%
	8	0	0.0%
	TOTAL	238	

(4) Rating Legend

Individual Condition	
(Overall = Manhole Condition + Casting Condition)	
Individual Condition	**Condition**
1	Good
2	Fair
3	Poor
4	Repair needed/Replace

Example	Manhole Condition (1) + Casting Condition (1) = Overall Rating (2)

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 City 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 City used the following process to involve stakeholders in developing the level of service:
   a) The City is in a unique situation that has proven to be very timely during that last few years. Due to the age of existing staff in the Department of Public Works and at the Wastewater Treatment plant, staffing changes have been necessary. These necessities have allowed the City to modernize its approach to Level of Service issues.
   b) Being a small community with a manager who has complete buy in to the betterment of the community and a council who is involved and informed on the operations of the City the Level of Service goals originated from the top.
2) The trade-offs for the service to be provided have improved significantly over the past few years. There are still limitations and restrictions that limit the City's ability to meet its desired level of service, but things have greatly improved.
   a) During that past few years, with the beginning of staff retirements and new staff hiring many of the hurdles or restraints that previously existed have been overcome. For example: In the past the City would struggle with:

i) Self-performing routine infrastructure repairs, thus spending money on contractors to do work that could be performed internally. This was a technical (staff ability), managerial (department level) and financial (lack of staff interest in budgeting) road block.

ii) Equipment maintenance. Habits and concerns by staff about spending money were ill founded. New staff is now empowered to be involved with the budget process to and use/spend in order to keep maintenance up to date. This was also a managerial and financial road block as described above.

iii) The City has also purchased a maintenance software program that integrates the geographical location of maintenance items with the task and then logs both the start of the task and its completion date. This software is intended to improve department efficiency and provide a means for tracking/monitoring the level of service through response times, types of tasks completed and the quantity thereof.

b) Regulatory requirements were always the goal, but at times the only goal. This single sighted focus and past financial challenges that the City had led to a get by attitude that was not healthy for the staff, the community and the infrastructure. The SAW process combined with staff changes and improved financial conditions have all combined to allow the City to turn the corner to a healthy workplace filled with pride.

3) How the level of service goals were determined.

a) The City due to the way it was organized and staffed as recently as 5 years ago was limited in its ability to develop level of service goals. Due to these restrictions the level of service was developed in a top down path. This top down approach did not happen in a vacuum, but was based on regular criticism from the community and council on how the City was performing. Things as simple as why are there 2 people driving around in trucks, to why does it take so long to fix a street or repair a water main leak, or to address any local street flooding issues.

b) The goals adopted starting with the council and management were implemented as part of the new staff's normal operating philosophy. In other words, the old means of methods of serving the City and maintaining and operating the City's infrastructure were significantly changed and improved as new staff was hired. New staff came on board living the new Level of Service goals.

c) Due to proper guidance from management the implementation of improved level of service has taken place.

Revenue Structure

1) *A summary of the funding structure and rate methodology that provides sufficient resources to implement the asset management program.*

    a) The City will continue to fund storm sewer improvements from the general fund and from the street fund.

Capital Improvement Plan

1) The storm information gathered regarding the condition of the system lead to the development of project and project costs that were incorporated into the City's existing citywide Capital Improvement Plan. The highest priority projects (rating of 6) are shown in the tables below for storm.

Item No.	Storm Sewer Projects	Estimated Project Cost
ST-1	Morse - Speaker to Lincoln Street	$ 18,318.75
ST-2	Morse - Marion to M-46	$ 8,262.50
ST-3	Delaware - Marion to M-46	$ 158,606.25
ST-4	Fulton - Jefferson to M-46	$ 202,470.00
	TOTAL	**$ 387,657.50**

List of Major Assets

The following lists of assets summarize the major components identified as part of the asset management plan for both the Stormwater and Wastewater Systems.

Storm Sewer System

- 75,076 lineal feet of storm sewer pipe
- 238 storm manholes

DEQ

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

Completion Due Date **October 31, 2017**
(no later than 3 years from executed grant date)

The **City of Sandusky** *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. **1428-01** 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:

David Faber at	810-648-4444	dfaber@misandusky.com
Name	Phone Number	Email

10-31-17

Signature of Authorized Representative (Original Signature Required) Date

David Faber – City Manager
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

City of Scottville

SAW Project No. 1562-01

scottville
crossroads of mason county

FINAL
October 2017

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 May 2014, The City of Scottville received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1562-1, 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 City of Scottville has executed the "Certification of Project Completeness" for the wastewater asset management plan and a copy has been provided at the end of this Executive Summary.

The contact person for the City of Scottville AMP is:

Amy Williams, City Manager
105 N. Main St.
Scottville, MI 49454
Phone number: 231.757.4729
Email: citymanager@cityofscottville.org

ASSET INVENTORY AND CONDITION ASSESSMENT

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

- Collection system piping system and manholes
- Sanitary sewer lift stations in the collection system

The wastewater collection system assets consist of approximately 48,489 feet (9.2 miles) of sanitary sewers (gravity pipe and force mains), 3 lift stations, and 159 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.

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, 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 40 lift station assets and 310 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 138 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 9.4% of the gravity pipe. Smoke testing was performed on approximately half of the system to disclose location of inflow or infiltration.

The condition of the assets at the lift stations range from good to poor. Ongoing maintenance has sustained 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 short.

Recommended rehabilitation for 14% of the system includes the need for point repairs, lining and replacement. The remaining 86% of assets were identified for rehabilitation in the future, beyond five years. Continued maintenance is recommended for 86% of the system and includes both additional inspection and/or cleaning.

Level of Service

Defining the Expected Level of Service (LOS)

The below level of service statement was derived from a collaboration between the City manager, the Department of Public Works manager, and representatives of City Council. After a draft LOS statement was created it was iteratively changed to arrive at the below statement:

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The overall objective of the City of Scottville Department of Public Works 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.
- Provide operations staff that 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 City from time to time to make sure they accurately reflect the desired operation of the utility.

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; 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 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. No pipes in the collection system have an extreme rating. Two pipes segments have a high rating, one called for full lining and the other having a high risk due to its critical location within the system, but call for no action needed. Much of the collection system's gravity pipes, 78% 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	**16**	**1**	**0**
Medium	**39**	**0**	**0**
Low	**94**	**0**	**1**
	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. 2 manholes are identified as extreme risk, 1 is recommended to be replaced in the next 1-2 years. The second manhole is recommended to be cleaned, lined, and repaired in the next 1-2 years. Many manholes are at low to medium risk and recommended to be included in a long-term rehabilitation strategy.

Manholes

Consequence of Failure	Low	Medium	High
High	7	12	1
Medium	22	10	1
Low	71	25	11
	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 four assets with high risk ratings should be inspected at regular intervals.

Lift Stations

Consequence of Failure	Low	Medium	High
High	0	0	0
Medium	10	8	4
Low	7	9	2
	Likelihood of Failure		

Figure 3. Business Risk Matrix (Risk Rating) for 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 station systems.

Capital Improvement Plan

A Capital Improvement Plan with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short Term 1-5 year and Long Term 6-20-year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system. Table 1 and 2 below shows the 1-5 year CIP.

Table 1. 5-Year Capital Improvement Plan: Collection System						
	Rehabilitation Fiscal Year					
Project Description	2017	2018	2019	2020	2021	Total
Collection System Improvements						
Gravity Sewer Lining				$30,190		$30,190
MH Replace		$5,305			$5,796	$11,101
MH Clean, Line, & Repair		$5,326		$16,950		$22,276
MH Clean, Line, & Adjust Rim			$6,581			$6,581
MH Clean & Line				$38,187		$38,187
MH Repair & Line				$24,030		$24,030
Subtotal Collection System	**$0**	**$10,631**	**$6,581**	**$109,357**	**$5,796**	**$132,365**

Table 2. 5-Year Capital Improvement Plan: LS				
Project No.	Project Description	Project Fiscal Year	Project Cost (2017 dollars)	Project Cost (Inflated 3%/yr)
1	Lift Station Piping Coating	2020	$77,800	$85,000

Operations and Maintenance

Regular operation and maintenance (O&M) 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 and cleaning 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 O&M funds and can be replaced by staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors, etc. The existing O&M fund is sufficient for the current operations. Table 3 and 4 below shows the O&M recommended over the next 5 year.

Table 3. Operation and Maintenance: Collection System						
Maintenance Action	Total Cost	2017	2018	2019	2020	2021
Manhole Inspection	$11,742	$515	$0	$0	$11,227	$0
Manhole Cleaning	$1,638	$773	$0	$0	$0	$865
CCTV	$131,355	$0	$0	$131,355	$0	$0
Total:	**$144,735**	**$1,288**	**$0**	**$131,355**	**$11,227**	**$865**

Table 4. Replacement Costs for Lift Station Assets				
Asset Description	**Year Installed**	**Expected Useful Life (Years)**	**Recommended Year of Replacement**	**Replacement Cost (2017 dollars)**
Lift Station No. 4:				
Flow Meter	2003	10	2018	$3,900
Pump No. 1	2003	15 - 20	2020	$18,800
Pump No. 2	2003	15 - 20	2020	$18,800
Variable Frequency Drive No. 1	2014	10	2024	$3,500
Variable Frequency Drive No. 2	2014	10	2024	$3,500
Lift Station No. 5:				
Pump No. 1	2006	15 - 20	2021	$10,500
Pump No. 2	2006	15 - 20	2021	$10,500
Riverside Park LS:				
Air Release Valve	2003	30	2018*	$1,000

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.

The MDEQ 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 City of Scottville, the rate study report was prepared by H.J. Umbaugh & Associates and approved by the MDEQ on April 27, 2017.

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

Completion Date 10/30/17
(no later than 3 years from executed grant date)

The City of Scottville *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1562-01 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 $\boxed{\text{No}}$

   If No - Date of the rate methodology approval letter: April 27, 2017.

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:

Amy Williams at 231-757-4729 citymanager@cityofscottville.or

Name | Phone Number | Email

Amy S Williams 10/9/2017

Signature of Authorized Representative (Original Signature Required) | Date

Amy Williams, City Manager

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report

Prepared for:

City of Scottville

SAW Project No. 1562-01

scottville
crossroads of mason county

FINAL
October 2017

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 2014, The City of Scottville received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1562-1, to provide financial assistance for the development of this asset management plan (AMP). This report provides the asset management plan (AMP) for the City's stormwater collection system. 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 City of Scottville has executed the "Certification of Project Completeness" for the stormwater asset management plan and a copy has been provided at the end of this Executive Summary.

The contact person for the City of Scottville AMP is:

Amy Williams, City Manager
105 N. Main St.
Scottville, MI 49454
Phone number: 231.757.4729
Email: citymanager@cityofscottville.org

ASSET INVENTORY AND CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 55,944 feet (10.6 miles) of storm sewers and 499 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. System outfalls are primarily located along the Pere Marquette River that runs through the south and east edges of the City.

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 purposes.

CONDITION ASSESSMENT AND EXPECTED USEFUL LIFE

For the City of Scottville, a comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field based assessments were completed on 410 structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 18% of the gravity pipe. Based on discussions with the stormwater system operations staff, there have not been any known capacity issues with the City-owned stormwater system. For this reason, a capacity analysis was not completed for the City of Scottville.

The assets of the stormwater collection system are in good condition. Recommendations for short-term (1-5 year) and long term (6-20 year) highlight the need for a regular maintenance program; approximately 38% of the storm structures and 90% by length of the storm sewer was tagged for CCTV, inspection and/or cleaning in the next five years. Rehabilitation was recommended for approximately 12% of the storm structures and 4% by length of the storm sewer, which includes replacement, point repairs, and lining scheduled over twenty years. The remaining assets (50% of storm structures and 6% of storm sewer) were placed in the beyond 20-year planning category.

Level of Service

Defining the Expected Level of Service (LOS)

The below level of service statement was derived from a collaboration between the City manager, the Department of Public Works manager, and representatives of City Council. After a draft LOS statement was created it was iteratively changed to arrive at the below statement:

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 Scottville:

- 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.
- Maintenance and operations staff are to be properly trained.

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 City of Scottville using Innovyze-InfoMaster software. InfoMaster is an ArcGIS-based sewer asset management and capital planning software that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. Zero pipe segments in the stormwater collection system have an extreme risk rating and 7 have a high risk rating and are recommended for near-term rehabilitation or replacement.

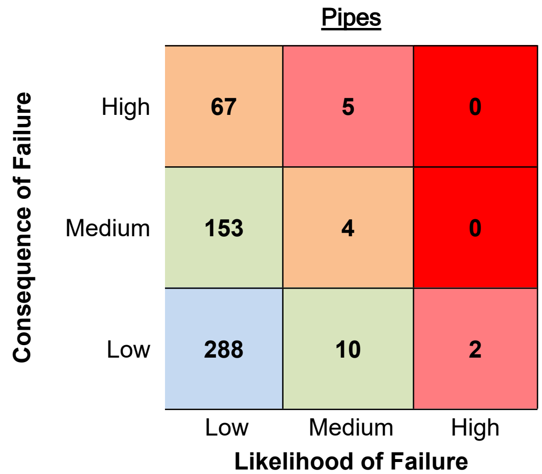


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. 21 structures are identified as extreme risk, and are recommended for replacement or rehabilitation.

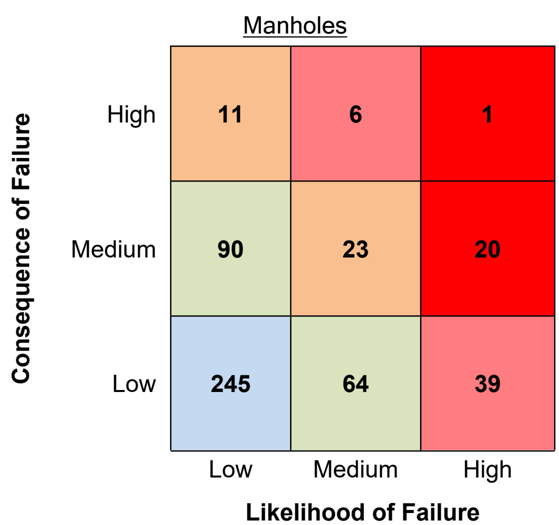


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

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 with recommendations was prepared for the City's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term 1-5 year and Long-Term 6-20 year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

CIP Development

Stormwater collection system assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The recommended 5-Year Capital Improvement Plan for the City-owned storm water collection system is included in Table 1 below.

Table 1. 5 Year Capital Improvement Plan

Rehab Action	Total Cost	2017	2018	2019	2020	2020
MH Replace	$ 16,405	$ -	$ 10,609	$ -	$ -	$ 5,796
Pipe Replacement	$ 215,625	$ -	$ 91,774	$ -	$ -	$ 123,851
Full Lining	$ 26,152	$ -	$ -	$ -	$ 26,152	$ -
MH Clean + Line + Repair	$ 149,632	$ -	$ 47,931	$ -	$ 101,701	$ -
MH Repair + Lining	$ -	$ -	$ -	$ -	$ -	$ -
Point Repair	$ 28,227	$ -	$ -	$ 28,227	$ -	$ -
Total	**$ 436,042**	**$ -**	**$ 150,315**	**$ 28,227**	**$ 127,853**	**$ 129,647**

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound stormwater system. The process of cleaning and CCTV inspection of pipelines either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every five years, or that 20% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects. Table 2 shows the 5-Year O&M costs for the City.

Table 2. Storm System Maintenance Summary Table: Year by Year

Maintenance Action	Total Cost	2017	2018	2019	2020	2021
MH Inspection	$ 49,775	$ 2,060	$ -	$ -	$ 47,715	$ -
MH Clean	$ 87,200	$ 1,545	$ -	$ -	$ -	$ 85,655
CCTV	$ 177,482	$ -	$ -	$ 177,482	$ -	$ -
Total	**$ 314,456**	**$ 3,605**	**$ -**	**$ 177,482**	**$ 47,715**	**$ 85,655**

DEQ

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

Completion Due Date 10/30/17
(no later than 3 years from executed grant date)

The City of Scottville *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1562-01 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:

Amy Williams at 231-757-4729 citymanager@cityofscottville.org
Name Phone Number Email

Amy S. Williams 10/9/2017
Signature of Authorized Representative (Original Signature Required) Date

Amy S Williams, City Manager
Print Name and Title of Authorized Representative

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized funding for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In September 2014, the South Huron Valley Utility Authority received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) Project No. 1242-01. The grant provided 100% funding based on the SAW grant application submitted in December 2013.

This report, prepared by The Authority Environmental addresses the five core components of an Asset Management Plan:

- Asset Inventory
- Level of Service
- Critical Assets
- Capital Improvement Plan (CIP)
- Revenue and Rate Structure

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 South Huron Valley Utility Authority (SHVUA) AMP is:

James Gorris, SHVUA Chairman
29450 Munro St,
Gibraltar, Michigan 48173
Phone number: 734-676-3900
Email: gorrisj@cityofgibraltar.net

ASSET INVENTORY AND CONDITION ASSESSMENT

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

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

The wastewater collection system assets consist of approximately 220,443 feet (41.7 miles) of 12-inch, 16-inch, 18-inch, 21-inch, 24-inch, 36-inch, 42-inch, 48-inch, 60-inch, 78-inch, 84-inch, and 108-inch sanitary sewer interceptor pipe (gravity pipe and force mains) and 563 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 WWTP currently includes the following treatment processes:

- fine screening (1/4")
- grit settlement
- primary sedimentation and flotation
- advanced secondary biological treatment, including BNR for phosphorus with chemical precipitation backup
- TSS, cBOD, and phosphorus reduction
- disinfection, de-chlorination, and aeration
- solids handling – thickening, Lime Stabilization, and land application with landfill disposal backup

Treated effluent is continuously discharged to The Detroit River in accordance with NPDES permit No. MI0043800. The outfall diffusers begin at the coordinates: 42º03’09.0”N, 83º09’50.0”W and end at the coordinates: 42º03’08.8”N, 83º09’47.0”W. The design capacity of the WWTP is 24 million gallons per day (mgd). The current annual average flow received by the facility is approximately 9.34 mgd.

The SHVUA transmission system also includes two pumping stations. The Trenton Arm Pumping Station, which is the larger of the two, serving Woodhaven, Gibraltar and portions of Brownstown and is located between Gibraltar Road and Vreeland Road on the east side of Jefferson Road. The flow from this pumping station contributes approximately 35% of the overall wastewater flow received by the WWTP.

The Odette Pumping Station is a can style dry well/wet well arrangement serving a portion of Huron Townships flow and is located at the intersection of Huron River Drive and Odette Road.

Asset Identification and Location

The Authority maintains the location of Plant assets by building or area. The location of collection system assets is maintained in GIS. 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 1100 WWTP assets in the WWTP, lift stations, and collection system.

Condition Assessment and Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on all 563 manhole structures. 20% of the interceptor (40,069 lf) is cleaned and CCTVed annually. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 53% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 12% of the system identifying the need for point repairs and lining. The remaining 35% of assets were placed in the 20+ year category.

Overall, the condition of the assets with a risk score of ten or higher at the WWTP range from imminent failure to good. Ongoing repairs have helped to maintain the condition of many assets while some assets that were installed during the 1989 expansion and the 1999 expansion and 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. These assets are prioritized and are being addressed as a part of the capital improvement plan.

The condition of the assets with a risk factor of ten or higher at the lift stations are good. Ongoing maintenance has upheld the condition of many assets while other assets have been replaced as a part of the ongoing capital improvement plan.

The asset evaluation and risk matrix has been updated and will be formally updated as a part of the annual AMP update. This AMP executive summary addresses the state of the SHVUA assets when the asset management plan was first submitted in 2015.

Level of Service

Level of Service (LOS) is an expectation. The LOS statements identified below represent the quality, quantity, reliability, and environmental expectations of the equipment, systems and organization. Each LOS has quantifiable performance measure(s). It is important to note that LOS “expectations” are not “goals”. Goals can be missed and there may or may not be consequences. If a LOS expectation is not met it is deemed a failure. Failure to meet the LOS requires asset management planning to raise the LOS to meet expectations. Conversely, the AMP can be updated to lower the LOS performance criteria. 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 Authority from time to time to make sure they accurately reflect the desired operation of the utility.

7.1 Organization

	Expectation	Performance Measure
1	Provide a safe working environment	Zero reportable incidents
2	Be sustainable	Review AMP annually and update if necessary
		Review wastewater service charges annually and make necessary adjustments

7.2 System

	Expectation	Performance Measure
1	Achieve full compliance with National Pollution Discharge Elimination System (NPDES) discharge permit	No avoidable wastewater quality violations
2	Adequate wastewater treatment capacity	No SSO events resulting in a consent order
3	Reliable collection system	Firm pumping capacity is available at all times and utilized when necessary.
		40,069 lf of gravity sewer televised annually
		Force mains evaluated a minimum of once every 5 years
		No gravity or force main sanitary sewers with a NASSCO[1]PACP[2] score greater than 3
		Inspect the manholes along the 40,069 lf of sewer

[1] NASSCO – National Association of Sewer Service Companies
[2] PACP – Pipeline Assessment and Certification Program

	No manhole with a NASSCO MACP[3] score greater than 3.

7.3 Equipment

	Expectation	Performance Measure
1	Reliable Headworks	Headworks shall have a firm capacity of 55 MGD
2	Reliable Primary Clarification	Primary clarification shall have a firm capacity of 55 MGD
3	Reliable Secondary Treatment	Secondary treatment shall have a firm capacity of 18 MGD indefinitely.
		Secondary treatment shall have a firm capacity 25 MGD for 24 hours.
		Secondary treatment shall have a firm capacity 28 MGD for 1 hour.
4	Reliable Disinfection	Disinfection shall have a firm capacity of 55 MGD.

[3] MACP – Manhole Assessment and Certification Program

5	Reliable Biosolids Handling	Maintain 180 days of storage or have contingency planning to avoid interference with plant operations. Sludge storage consist of the main storage tank with a volume of 4 MGs, 4 gravity thickeners with a capacity of 0.35 MGs each, and 2 Lime Reaction Tanks with a capacity of 0.35 MGs each. While the thickeners and lime reaction tanks are typically used for thickening and treating, they also provide storage during periods when sludge removal slows down. The total sludge capacity is 6.1 MGs.
6	Reliable Pump Stations	Maintain Peak lift station design capacity identified as 28,200 gpm using a firm capacity of three 9,400 gpm pumps while maintaining 4th 9,400 gpm pump for redundancy at Trenton Arm lift Station. Maintain Peak lift station design capacity identified as 880 gpm using a firm capacity of 1-880 gpm pumps while maintaining 1 = 880 gpm pump for redundancy at Odette Lift Station

Measuring Performance

In order to assure that LOS goals are met performance measurements may need to be implemented. During the LOS review with the Authority the need for performance measurements was discussed.

Critical Assets

Determining Criticality

Criticality is an integer value one through five regarding the consequence of failure related to that asset. Table 1 provides definitions of the Criticality scores.

Table 1 Criticality Score

Criticality Score	Consequence of Failure
5	Catastrophic disruption
4	Major disruption

3	Moderate disruption
2	Minor disruption
1	Insignificant disruption

Criticality is best determined by those with an intimate knowledge of the system.

Criticality Results

One of the most important objectives of the Asset Management Plan is to ensure that all of the “Critical Assets” have been identified, and that the Authority has sufficient revenue available to ensure the timely replacement of these items prior to failure. The condition assessment process has resulted in the identification of 39 assets as having a Risk Score of 10 or more using the Criticality and Condition matrix as shown in Appendix F. By definition, these projects constitute the System’s most critical assets. 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. Asset Risk Matric (Risk Rating) by Risk scores of 10 or Higher

Figure 2. Interceptor Risk Matrix (Risk Rating) by Collect System Assets with scores of 10 or Higher

Figure 1

Assets with a Risk Score of 10 or More

Description	Location	Replacement Cost	Asset Condition	Replacement Date	Asset Condition Score	Criticality Score	Risk
Standby Power Generator (Permanent Installation) GEN-3	Pump Station	$400,000	Poor	2017	4	5	20
Raw Sewage Pump (Variable Speed) Basement P-003	Pump Station	$250,000	Poor	2019	4	3	12
Raw Sewage Pump (Single Speed) Basement P-004	Pump Station	$250,000	Poor	2016	4	3	12
Pump Station Control Panel (PSCP) CP-PSCP	Pump Station	$105,485	Good	2034	2	5	10
Trenton Arm Control Panel CP-TA	Trenton Arm	$100,000	Good	2030	2	5	10
Primary clarifier cross collector D-013	Primary Tank #1	$75,000	Failure Imminent	2016	5	2	10
Primary clarifier cross collector D-014	Primary Tank #1	$75,000	Failure Imminent	2016	5	2	10
Primary clarifier cross collector D-019	Primary Tank #4	$60,000	Failure Imminent	2017	5	2	10
Primary clarifier cross collector D-020	Primary Tank #4	$60,000	Failure Imminent	2017	5	2	10
Bio tank mixer unit M-05	Bio Deck 1	$118,685	Fair	2017	3	4	12
Bio tank mixer unit M-09	Bio Deck 2	$43,158	Fair	2017	3	4	12
Bio tank mixer unit M-13	Bio Deck 2	$118,685	Poor	2017	4	4	16
Bio tank mixer unit M-24	Bio Deck 3	$86,316	Failure Imminent	2016	5	3	15
Bio tank mixer unit M-31	Bio Deck 4	$86,316	Failure Imminent	2016	5	3	15
Waste Activated Sludge Pump P-029	RAS Gallery	$12,455	Failure Imminent	2016	5	2	10
Pipe Gallery Piping drain lines section 1	Pipe Galleries (Indoors)	$100,000	Failure Imminent	2016	5	3	15
Indoor Lighting Pipe Galleries LTG-INDOOR-GALLERY section 2	Pipe Galleries (Indoors)	$75,000	Failure Imminent	2016	5	2	10
Pipe Gallery Piping drain lines section 2	Pipe Galleries (Indoors)	$75,000	Failure Imminent	2017	5	3	15
Pipe Gallery Piping drain lines section 4	Pipe Galleries (Indoors)	$100,000	Failure Imminent	2018	5	3	15
Pipe Gallery Piping drain lines section 3	Pipe Galleries (Indoors)	$100,000	Failure Imminent	2019	5	3	15

Figure 2
High Risk Interceptor Assets with a Risk Score of 10 or More

Description	Location	Replacement Cost	Asset Conditi	Replacement Date	Asset Condition Score	Criticality Scor	Risk
Section 4B	From Streicher	$2,793,854	Good	2037	2	5	10
Section 4C	From Trenton A	$6,100,020	Good	2037	2	5	10
Section 4D	West Van Horn	$2,602,051	Good	2037	2	5	10
Woodhaven-Brownstown Interce	Brownstown In	$2,574,113	Good	2037	2	5	10
Van Horn Rd Interceptor	from Allen Rd in	$767,839	Good	2026	2	5	10
Allen Rd Interceptor	in Allen Rd from	$1,646,177	Good	2037	2	5	10
Sub #4Huron River Interceptor	Flat Rock to WWTP	$12,037,431	Good	2037	2	5	10
Section 5A	from WWTP to !	$813,357	Good	2029	2	5	10
Section 5B and 6A	In Steicher Rd fr	$7,921,675	Good	2037	2	5	10
Flat Rock Huron Interceptor (Secti	from former Fla	$3,302,398	Good	2037	2	5	10
Huron River Interceptor Upstrea c	Flat Rock to WV	$34,369,429	Good	2037	2	5	10
Section 6B, 7, 8, 9, & 10A	Van Buren Arm	$24,689,509	Good	2037	2	5	10
Flat Rock Huron Interceptor (Secti	along Huron Riv	$3,215,444	Good	2037	2	5	10
Flat Rock Huron Interceptor (Secti	Shook Rd at Hu	$6,464,476	Good	2037	2	5	10
Sub Account #3 Manholes (118)	Ref GIS Map	$2,950,000	Good	2037	2	5	10
Sub Account #4 Manholes (76)	Ref GIS Map	$1,900,000	Good	2037	2	5	10
Sub Account #5 Manholes (212)	Ref GIS Map	$5,300,000	Good	2037	2	5	10
Sub Account #5 Manholes (89)	Ref GIS Map	$2,225,000	Good	2037	2	5	10

Figure 3 provides the risk ratings for the WWTP assets. No assets are identified as extreme risk. The eleven assets with high risk ratings should be inspected at regular intervals. The Authority has identified replacement/repairs/improvements of WWTP assets in the proposed plans for system improvements

Figure 4 provides the risk ratings for the lift station assets. No assets are identified as extreme risk. The seven assets with high risk ratings should be inspected at regular intervals. The Authority has identified replacement/repairs/improvements to four of the lift stations in the proposed plans for system improvements

Figure 3 Risk Score

Condition

Criticality / Likelihood of Failure	1	2	3	4	5
1	21	120	48	47	2
2	44	95	41	27	6
3	25	96	25	2	6
4	20	28	2	1	0
5	6	21	0	1	0

Likelihood of Failure

Figure 3. All 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

The Authority regularly performs operation and maintenance to meet the conditions of their permits. Efficient system operation and maintenance is essential to public health and safety.

A summary of the annual maintenance and repair work undertaken over a 12 month period is presented in Appendix G.

Manuals

Per the requirements of the NPDES permit, the wastewater treatment plant operations and maintenance manual is updated with each major improvement. The plant staff also has access to equipment specific operations and maintenance manuals.

Routine/Preventative Maintenance and Standard Operating Procedures

The Authority performs the routine and preventative maintenance utilizing several Standard Operating Procedures (SOPs). Documentation for 44 SOPs has been incorporated into eRPortal.

Emergency Procedures

The Authority has established emergency procedures including an IT Disaster Recovery Plan.

Budget

Annual expenses are determined based on operation expenses, Capital improvement expenses and replacement costs.

A Five (5) Year Capital Improvement Plan (CIP) was developed in 2013 using useful life asset data, and the CIP is updated annually and incorporated into the Authority's annual budget. Historically, the Authority has budgeted for certain capital expenditures as part of the overall operating budget, with funding for projects being derived from revenue collected from the member Communities. In addition, the Authority also periodically undertakes large capital projects with debt financing, often through the low interest SRF Loan Program. Debt financed projects are over and above the routine capital projects funded as part of the annual operating budget.

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 Authority has in its collection system.

As part of this SAW grant 10,194 feet (20 percent) of the Authority's collection system was cleaned and CCTV inspected. It is recommended that the Authority clean and CCTV inspect the remaining 41,412 feet of the remaining pipeline assets.

An annual equipment replacement fund was 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 WWTP 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 South Huron Valley Utility Authority ("Authority") operates on a calendar year beginning January 1 through December 31. Costs associated with the operation of the Authority's Wastewater Treatment Plant (WWTP) are provided for by the user rates charged to its member communities, as approved by the appointed seven-member board. Rates are set on an annual basis as to the upcoming year's budgeted operation, maintenance, and replacement (OM&R) charge. Authority debt charges are billed separately based on agreed upon allocations at the time of issuance.

7.2 Methodology

The Authority's methodology for establishing user rates has been established to develop a rate methodology that provides for the equitable sharing of OM&R costs for use of the system. The OM&R costs include WWTP costs, collection system costs, related administration cost, and other services provided by the Authority.

7.2.1 OM&R Cost Allocation and Budgeting

The OM&R cost allocation to the members is based upon the metered sewage data. The budget is established based on estimated usage which is then adjusted to actual through a lookback calculation annually. Sewage flow is metered via 15 metering sites on the Authority's interceptors. Included in the table below is the percentage of member flow relative to the total Authority flow for the period of January 1, 2015 to September 30, 2015. This percentage was used to apportion each member's share of the Authority's OM&R costs and to set the rates in effect for 2016.

	2015 (Jan to Sept)	
Community	**Flow (MG)**	**% of Flow**
Brownstown Twp.	550	23.8%
Flat Rock	391	16.9%
Gibraltar	252	10.9%
Huron Twp.	365	15.8%
South Rockwood	52	2.2%
Van Buren Twp.	389	16.8%
Woodhaven	313	13.5%
TOTAL	2312	100.0%

The OM&R budget is established annually in October, and then presented to the Board for approval in November so that it is in place prior to start of the budget year (January 1). Considerations taken into account as part of the annual budget development include evaluation of the expenditures incurred for maintenance, repair, rehabilitation and replacement of "non-capital" items from the prior budget year and for several preceding years (refer to the section below for definition of capital vs. non-capital in accordance with the Authority's board approved policy). In addition, the proposed OM&R budget is adjusted as needed to take into account projected needs for the coming year. During the budget development process, input is solicited from the Contract Operator, the Consulting Engineer and the System Manager to identify needs which accurately reflect the condition of the SHVUA facilities.

DEQ

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

Completion Date February 28, 2017
(no later than 3 years from executed grant date)

The South Huron Valley Utility Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1242-01 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:

Trevor Hamilton	at 734-397-3855	trevor.hamilton@suez-na.com
Name	Phone Number	Email

Rate Methodology was submitted to DEQ on: November 30, 2016
(within 2 ½ years from date of executed grant)

An initial rate increase of 0% of a $ 0 (Zero) gap was adopted on NA

James L. Gorris (signature) 3-14-17
Signature of Authorized Representative (Original Signature Required) Date

James Gorris, Chairman
Print Name and Title of Authorized Representative

June 2014

South Haven Wastewater Asset Management Plan
Executive Summary

SAW Grant No. 1179-01

City of South Haven
539 Phoenix Street
South Haven, MI 49090

Brian Dissette
City Manager
269-637-0700

The City of South Haven was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) in October 2014. The grant provided funds for the creation of this Asset Management Program (AMP) for its wastewater collection. 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.

The city has a population of 4,403 citizens according to the 2010 Census. Within its limits, the City manages approximately 218,000 feet of gravity pipe, 1,022 manholes, and seven (7) City-owned lift stations in the wastewater system.

At the beginning of the project, 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. Twenty-one percent (21%) of wastewater sewer was newly assessed based on established budgets. To obtain condition information of manholes, 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. Approximately 44% of manholes were inspected.

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 City staff, goals were developed within the report such as cleaning and inspecting sewers over a 10-year period, responding to 80% of reported problems within an hour, and having less than 3 odor incidents 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.

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. A small portion of assets within the systems are shown to have a POF of 7.5 or greater (out of 10). However, the COF for these pipes were typically not alarming, leading to a significant portion of assets to be determined to fall in lower Levels 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 City continue cleaning and televising storm sewers on an annual basis and budget for the work accordingly. This cost is estimated to be around $15,000 per year.

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 criticality and defect ratings. A cost estimate is provided for each project, amounting to approximately $137,500 in rehabilitation, to be performed over a five (5) year period and $215,000 in spot repairs to be performed over a ten year period.

List of Wastewater Assets

- 218,285 feet of gravity sewer
- 9,000 feet of force main
- 1,022 manholes
- 7 lift stations
- 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 October 29, 2017
(no later than 3 years from executed grant date)

The City of South Haven *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1179-01 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 $\boxed{\text{No}}$
   If No - Date of the rate methodology approval letter: June 2, 2017.
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 South Haven	at 269-637-0700	bdissette@south-haven.com
Name	Phone Number	Email

[signature] 10-25-17

Signature of Authorized Representative (Original Signature Required) Date

Brian Dissette, City Manager

Print Name and Title of Authorized Representative

South Haven Stormwater Asset Management Plan
Executive Summary
SAW Grant No. 1179-01

City of South Haven
539 Phoenix Street
South Haven, MI 49090

Brian Dissette
City Manager
269-637-0700

The City of South Haven was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ) in October 2014. The grant provided funds for the creation of this Asset Management Program (AMP) for its stormwater drainage. 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.

The city has a population of 4,403 citizens according to the 2010 Census. Within its limits, the City manages approximately 155,000 feet of gravity pipe and 2,068 manholes, catch basins, and outfalls in the stormwater system which discharge to the Black River and Lake Michigan.

At the beginning of the project, 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. Twenty-six percent (26%) of stormwater sewer was newly assessed based on established budgets. To obtain condition information of structures, 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. Approximately 79% of structures were inspected.

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 City staff, goals were developed within the report such as cleaning and inspecting structures over a 10-year period, responding to 80% of reported problems within an hour, and having less than 3 flooding 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.

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. A small portion of assets within the systems are shown to have a POF of 7.5 or greater (out of 10). However, the COF for these pipes were typically not alarming, leading to a significant portion of assets to be determined to fall in lower Levels 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 City continue cleaning and televising storm sewers on an annual basis and budget for the work accordingly. This cost is estimated to be around $20,000 per year.

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 criticality and defect ratings. A cost estimate is provided for each project, amounting to approximately $350,000 in rehabilitation, to be performed over a five (5) year period and $285,000 in spot repairs to be performed over a ten year period.

List of Stormwater Assets

- 154,767 feet of gravity sewer
- 1,891 manholes & catch basins
- 177 culvert inlets/outlets and outfalls

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

Completion Due Date October 29, 2017
(no later than 3 years from executed grant date)

The City of South Haven *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1179-01 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 South Haven	at 269-637-0700	bdissette@south-haven.com
Name	Phone Number	Email

	10-25-17
Signature of Authorized Representative (Original Signature Required)	Date

Brian Dissette, City Manager
Print Name and Title of Authorized Representative

Ms. Willene Harold, Village Administrator
Village of South Rockwood
5676 Carleton-Rockwood Road
South Rockwood, Michigan 48179
Phone – 734-379-3683
SAW Grant Project Number 1247-01

Executive Summary

1. Overview of SAW Grant Program

The Village of South Rockwood, Monroe County, Michigan was successful in obtaining a Storm Water, Asset Management and Wastewater (SAW) grant from the Michigan Department of Environmental Quality (MDEQ) in the amount of $453,060.00 to complete a thorough, detailed, conditional analysis of the existing sanitary sewer collection system throughout the entire Village, 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 Village'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 locations of infiltration through pipe joints or structural defects.
- 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.
- Develop a Geographic Information System (GIS) database of the sanitary sewer system.
- Conduct flow monitoring of the entire sanitary sewer system to identify districts of the Village experiencing higher amounts of flow during wet weather events and to identify areas of the system that may be exceeding capacity.
- Evaluate the three (3) pump stations and document the condition of each asset within each pump station and provide recommendations for future improvements or replacement.

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 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 good to fair condition with minor infiltration entering the sanitary sewer system.
- Several manholes were identified as being buried, most of them underneath asphalt streets that had been chip sealed. These manholes have since been uncovered.
- Flow monitoring of the system confirmed that the Village experiences exceedances of their contract capacity with the South Huron Valley Utility Authority (SHVUA) during large wet weather events due to areas of the system receiving disproportionately higher amounts of flow.
- 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 the contract exceedances during wet weather events. The Village has been in contact with those property owners affected and several property owners have repaired or replaced their service leads since the completion of the SAW grant study.
- The pump station evaluations identified that the South Huron River Drive and Edwards Street Pump Stations have a very high probability and consequence of failure.

This report provides a summary of the Asset Management Plan (AMP) for the Village's sanitary collection system. HEI with assistance from Village 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 Village'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 Village of South Rockwood has municipal water and sanitary sewer services throughout the majority of the Village. The water distribution and wastewater collection systems within the Village are owned and maintained by the Village's Department of Public Works. Water is purchased through the Great Lakes Water Authority (GLWA), formerly the Detroit Water and Sewerage Department (DWSD) and provided through a transmission main from Detroit on Dixie Highway at South Huron River Drive. Sewage is discharged into the South Huron Valley Utility Authority's (SHVUA) collection system by pumping the sewage discharge through a force main under the Huron River at Labo Park towards the City of Rockwood. Sewage is treated at SHVUA's wastewater treatment plant located in Brownstown Township, Wayne County. The sewage collection system within the Village of South Rockwood was installed in the late 1960's and was installed along South Huron River Drive, Carleton-Rockwood Road, Dixie Highway and within the two (2) established subdivisions within the Village. An extension was installed through the apartment complex on Carleton-Rockwood Road in the early-mid 2000's and extensions were installed in the early-mid 2000's along Brandon Road and Ready Road from South Huron River Drive to the railroad tracks east of Dixie Highway. The wastewater collection system assets consist of 37,595.4 lineal feet (7.12 miles) of gravity sewers ranging in size from eight (8) inches to twenty-four (24) inches in diameter and 175 sanitary manholes. These assets are located in existing road right-of-ways owned and maintained by the Village of South Rockwood or in dedicated utility easements to allow the Village 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	**Clay**	**Truss**	**PVC**	**Total**
8	0	40	966	263	1269
10	0	12354	0	2508	14862
12	11175	0	1492	0	12667
15	5481.4	0	935	17	6433.4
18	2304	0	0	0	2304
24	60	0	0	0	60
Total	19020.4	12394	3393	2788	
				Total Pipe Length	***37595.4***

The lift stations inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes 20 assets. The Village of South Rockwood operates and maintains three (3) sanitary sewer lift stations. Two (2) of the stations, the South Huron River Drive Pump Station at Labo Park and the Edwards Street Pump Station were installed as part of the original installation of the system in the late 1960's and early 1970's. The Ready Road Pump Station west of South Huron River Drive was installed in 2004. The South Huron River Drive and Ready Road Pump Stations are submersible pump stations while the Edwards Street Pump Station is an air compressor ejector station.

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 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 Village personnel to better track required maintenance and allow the Village to better prepare capital improvement programs and identify projects for the future. The GIS geodatabase for the entire sanitary sewer system consists of 364 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 175 manholes (100.0% of all manholes). Overall, the structural condition of the collection system was found to be in good to fair condition with structural defects such as cracked and broken pipe found sporadically throughout the system; however, there were several locations where infiltration and inflow was entering the system through pipe joints, manholes and service leads.

The lift station inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes 20 assets. Overall, the condition of the assets at the South Huron River Drive and Edwards Street Pump Stations are in poor to very poor condition and the Ready Road Pump Station overall in good to fair condition.

Significant problems encountered at the South Huron River Drive Pump Station include:

- As this station is nearing 50 years in age, many of the components have exceeded their useful life
- Frequent maintenance issues with the station, including frequent plugging of wipes
- Excessive corrosion throughout the station
- Outdated electrical and control equipment

Significant problems encountered at the Edwards Street Pump Station include:

- As this station is nearing 50 years in age, many of the components have exceeded their useful life
- The air compressor ejector station is obsolete and replacement parts are extremely difficult to locate
- Difficulty accessing valve vault for repairs or replacements
- Diaphragm valve needs replacement
- There is no access to the receiving chamber in the lower part of the station
- Transducers frequently plug with debris

- Excessive corrosion throughout the station
- Outdated electrical and control equipment

Based upon the results of the SAW grant study, the Village has elected to proceed with applying for 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 or where infiltration through joints were identified and to complete abandon and replace the two (2) original pump stations within the system that are in poor to very poor condition at an estimated cost of $1,575,000. In October 2017, the MDEQ placed the Village of South Rockwood's SRF project on the project priority list for fiscal year 2018 3rd quarter funding for construction of the project to start in July 2018. The loan will allow the Village to complete this project and pay back the loan over a 20 year period at approximately 2.5 percent interest.

3. Level of Service

The Village of South Rockwood 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 South Huron Valley Utility Authority (SHVUA) system
- 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
- 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 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 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

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 Village 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.

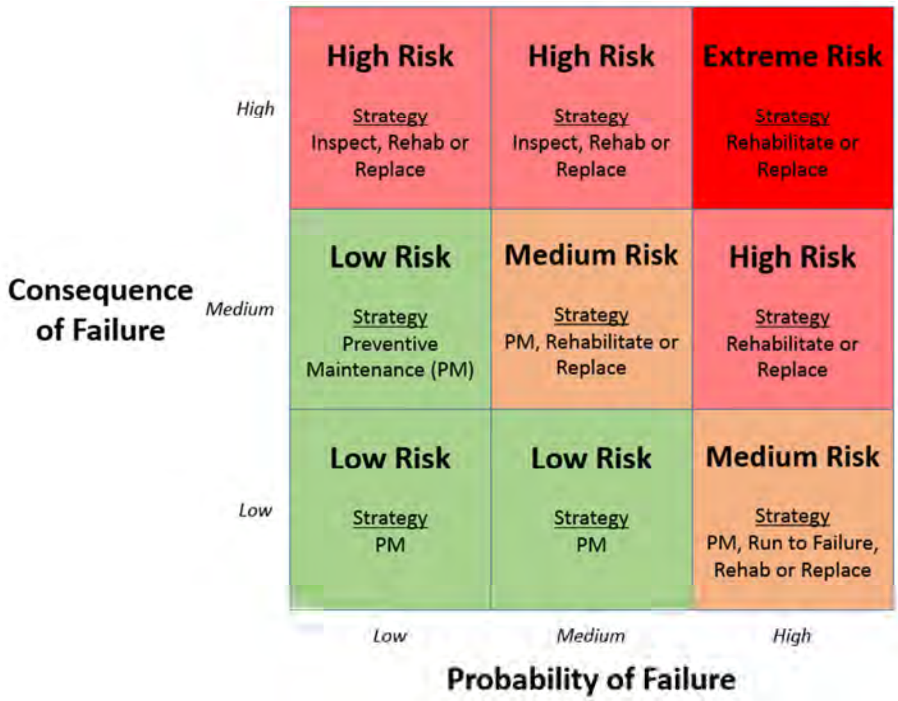
The Consequence of Failure is a measure of the impact of failure for an asset on the sanitary system's ability to convey and treat wastewater. Consequence of Failure is based on weighted factors such as location of asset, facilities or population served by the asset, size of the asset and ability to 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.



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 169 pipe assets within the collection system is shown below:

Consequence of Failure	Probability of Failure: Low	Med	High
High	High 8	High 4	Extreme 1
Med	Low 8	Medium 1	High 0
Low	Low 88	Low 59	Medium 0

A summary of the business risk analysis for the 175 manhole assets within the collection system is shown below:

Consequence of Failure	Low	Med	High
High	*High* 7	*High* 8	*Extreme* 0
Med	*Low* 3	*Medium* 7	*High* 0
Low	*Low* 92	*Low* 58	*Medium* 0

Probability of Failure

A summary of the business risk analysis for the 20 lift station assets within the collection system is shown below:

Consequence of Failure	Low	Med	High
High	*High* 2	*High* 0	*Extreme* 6
Med	*Low* 4	*Medium* 4	*High* 2
Low	*Low* 2	*Low* 0	*Medium* 0

Probability of Failure

Note in the lift station business risk analysis that 50 percent of the assets are in the extreme of high category of possible failure:

5. Capital Improvement Project Planning

Based upon the business risk evaluation, the Village 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 Village 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 infiltration through joints to alleviate sewer surcharging and work to meet the contractual capacity with SHVUA through the SRF rehabilitation program in 2018. The Village will also continue to work with property owners to address broken or leaking service leads allowing constant groundwater flow into the system to allow the Village to meet contractual capacity with SHVUA. In the future however, it is recommended to inspect the collection system; both sewers and manholes, and lift stations every five (5) years to identify any new or potential problems and identify ways to address these problems. Therefore, every five (5) years the maintenance and capital costs are estimated to be as follows:

• Sewer Cleaning and Televising Investigation Program		$100,000
• Manhole Investigation Program		$ 10,000
• Lift Station Investigation Program		$ 8,000
	TOTAL	$118,000

For the lift stations, the South Huron Drive and Edwards Street Pump Stations will be completely rebuilt as part of the SRF project in 2018. However, routine maintenance, repairs and maintenance will be required in the future within the 20 year capital improvement plan as certain components have a useful life of 20 years or less. In addition, repair and/or replacement of components will be required at the Ready Road Station within the next 20 years as certain components reach their useful life at this station. Currently, it is expected within the next 20 years beyond the SRF project, that an additional $180,000 will be required for repairs and/or replacement of components within all lift stations.

6. Revenue Structure

A rate methodology report was submitted to the MDEQ on May 30, 2017 and approved by MDEQ staff on July 20, 2017. Costs for the proposed SRF improvements project, future improvement projects; in addition to future investigative work and frequency such as cleaning and television investigation, manhole inspections, evaluations of lift stations and evaluations of the WWTP are figured into future rate adjustments. Village staff; along with the Engineering consultant, determine if the rate structures are sufficient to meet the current needs of the Village'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 Village to calculate estimated costs for future projects and assist with future rate adjustments. Based upon SAW grant study, there is an immediate need to rehabilitate sewers with poor to severe structural defects and eliminate infiltration through joints to work to meet contractual capacity with SHVUA in addition to the need of replacing two (2) of the three (3) pump stations. These immediate needs will be addressed through the SRF loan program with construction beginning in July 2018. In addition to the current needs, there will be additional needs in the future for the system within the next 20 years.

The Village's current sewer rate structure will be modified prior to the construction start of the SRF improvements project. 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.

Therefore, the total increase in rates to support the SRF improvements project for the sanitary sewer system will be $11.23 per REU per month. The total increase in rates to support the asset management plan and 20 year capital improvement plan for future improvement projects and investigative work for the sanitary sewer system would be $6.95 per REU per month.

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

Completion Date October 23, 2017
(no later than 3 years from executed grant date)

The Village of South Rockwood certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1247-01** 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: July 20, 2017

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:

R. Ryan Kern, P.E. at 734-759-1600 rrkern@hengineers.com
Name Phone Number Email

Willene Harold 10/23/17
Signature of Authorized Representative (Original Signature Required) Date

Willene Harold, Village Administrator
Print Name and Title of Authorized Representative

Southern Clinton County
Municipal Utilities Authority

CLEAN WATER FACILITY
WASTEWATER
ASSET MANAGEMENT PLAN

3671 West Herbison Road
DeWitt, MI 48820

www.sccmua.com

Brad Gurski, Director of Operations
517-669-8311

SAW Grant Project Number 1010-01

Tetra Tech Project Number 200-81922-15001

August 2017

EXECUTIVE SUMMARY

In 2014, the Southern Clinton County Municipal Utilities Authority (SCCMUA) was awarded a Stormwater, Asset Management, and Wastewater (SAW) grant by the Michigan Department of Environmental Quality (MDEQ) for the Clean Water Facility (CWF). SCCMUA's SAW grant provided financial assistance for a wastewater asset management plan (AMP), which is required by Part I.A.7 of NPDES Permit No. MI0021008 for the CWF. The grant amount was $296,028 with a local match of $32,892 for a total cost of $328,920.

As one of the aspects of the SCCMUA SAW agreement, this AMP report provides SCCMUA with a proactive and sustainable long-term plan to help ensure the well-being of the community and the environment.

Five primary elements are highlighted by the AMP approach:

1. Asset Inventory
2. Level of Service
3. Asset Criticality
4. Capital Improvement Plan
5. Revenue Structure

Asset Inventory: Engineering survey data, in addition to contract drawings, other inventory-oriented information, CWF condition assessments, and risk analysis and cost development were used to develop the AMP. The assets were inventoried by Tetra Tech using a discipline based approach. That is, a team was selected comprised of process, electrical, mechanical engineers. In addition, concrete tanks, building walls and roofs were assessed by a facilities engineer. Additional information was included, such as the installation date of the equipment. To aid in the AMP generation and analysis, as well as to simplify annual reporting needs, the inventory information gathered during the AMP generation has been integrated with Lucity™ Asset Management Software (AMS), which was upgraded as part of this program. The Lucity™ software operates as an extension of the generated inventory system and is primarily a work order and capital improvement planning tool aimed to help SCCMUA streamline administrative processes and simplify reporting.

The current value of the SCCMUA's CWF is approximately $57.9 million based on our assessment of 1,173 assets and 25,867 linear feet of pipe. Table A summarizes the CWF's assets, by location, including replacement value in 2016 dollars.

Table ES-A-CWF Baseline System Replacement Value

Location	Assets	Baseline System Value (Current Replacement Cost)
New Digester Building	180 assets, 770 ft of pipe	$3,446,000
New Sludge Storage Tank	14 assets	$7,220,000
Old Sludge Storage Tank	1 asset	$3,551,000
Equalization Basin	19 assets, 510 ft of pipe	$7,355,000
Tertiary Filters	37 assets, 1158 ft of pipe	$584,000
Grit Room	10 assets, 610 ft of pipe	$365,000
Belt Press and Dewatering	2 assets, 471 ft of pipe	$38,000
Primary Clarifiers	24 assets, 679 ft of pipe	$3,265,000
Final Clarifiers	35 assets, 960 ft of pipe	$3,551,000
Mudwells	29 assets, 42 ft of pipe	$1,405,000
Old Digester Building	63 assets, 418 ft of pipe	$2,209,000
Blower Room	24 assets, 90 ft of pipe	$318,000
Yard	9 assets, 14,077 ft of pipe	$3,012,000
Sludge Pumping Room	25 assets, 346 ft of pipe	$172,000
Sample Room	4 assets	$20,000
SO2 Building	13 assets	$82,000
RBC Room	274 assets, 1315 ft of pipe	$2,158,000
Chemical Feed Room	8 assets, 1847 ft of pipe	$218,000
Control Building Subfloor	2069 ft of pipe	$295,000
Chlorine Contact and Reaeration	44 assets, 505 ft of pipe	$2,904,000
Clearwell	1 asset	$2,285,000
Maintenance Building	11 assets	$1,013,000
Control Building	250 assets	$9,284,000
Sandhill Pump Station	96 assets	$3,115,000
Total	**1,173 assets, 25,867 ft of pipe**	**$57,864,000**

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 level of service can influence the costs for operating and maintaining the CWF, as higher levels of service cost more to provide. SCCMUA's goal is to operate and maintain the CWF such that it can meet its wastewater discharge permit requirements in a cost effective manner. Although SCCMUA has not stated specific CWF

Level of Service goals that it would like to fulfill, common key performance indicators (KPIs) that may serve as said goals are depicted below in Table B.

Table ES-B – Level of Service KPIs

Level of Service Key Performance Indicators
Reduce Odor Complaints
Meet requirements of NPDES permit
Enhance Equipment Inventory and Maintenance Tracking System

Asset Criticality: The evaluation of risk and consequence of failure is based on condition assessment information collected as part of this AMP. In many cases, inspections of assets were conducted to prepare the condition assessment. However, in some cases, survey limitations (the inability to inspect submerged equipment, the inability to assess the operation of idle equipment, and a lack of access to some equipment) prevented the gathering of asset information. When an asset was not inspected, the condition was inferred based on the age of the asset and the condition of similar assets that were inspected. The intent is to transition all assets in the inventory model to the Lucity™ model.

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 is calculated using the following formula:

Business Risk Exposure = Consequence of Failure * Probability of Failure * (1 - Redundancy)

The Consequence of Failure (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 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.

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.

A BRE score was calculated for each asset. The asset inventory and BRE scores are included in Excel spreadsheets included in Appendix C. These BRE scores, combined with SCCMUA staff experience, were used to develop a capital improvement plan.

Capital Improvement Plan: A 20-year capital improvement plan (Table C, below) was developed for the CWF using the results of the inventory assessment methodology outlined in this AMP. The capital improvement plan identifies areas in the CWF facility processes where Tetra Tech recommends funding be provided over the next 20 years. This capital improvement plan should be routinely updated to ensure that it includes short- and long-term needs. It will provide SCCMUA with defensible documentation for setting aside and safeguarding funds for projects.

Table ES-C-SCCMUA CWF 20-Year Capital Improvement Plan (2017-2037)

SCCMUA 20-Year Capital Improvement Plan (2017-2037)			
Project Number	**Description**	**Project Year**	**Project Cost (September 2016 ENR 10,403)**
CWF - 1	Facility SCADA Replacement	2017	$ 150,000
CWF - 2	Plant Composite Sampler Replacement	2017	$ 14,000
CWF - 3	RBC Improvements	2017-2022	$ 450,000
CWF - 4	North Filter Backwash Pump Replacement	2021	$ 30,000
CWF - 5	RBC Blower Replacement	2021	$ 215,000
CWF - 6	Heating and Ventilation Replacement	2023	$ 250,000
CWF - 7	Sandhill Pump Station Improvements	2023-2025	$ 350,000
CWF - 8	Primary Clarifier Mechanism Replacement	2024	$ 750,000
CWF - 9	Final Clarifier Mechanism Replacement	2025	$ 445,000
CWF - 10	Electrical Equipment Improvements	2025-2026	$ 700,000
CWF - 11	Piping and Valve Replacement	2027	$ 2,120,000
CWF - 12	Headworks Improvements	2028	$ 610,000
CWF - 13	Chemical Feed System Improvements	2030	$ 160,000
CWF - 14	HVAC and Air Compressor Improvements	2032	$ 540,000
CWF - 15	Digester Equipment Replacement	2033	$ 1,020,000
CWF - 16	Tertiary Filter Improvements	2036	$ 770,000
CWF - 17	Electrical Equipment Upgrades II	2036	$ 2,804,000
CWF - 18	Building Façade Restoration	2019-2024	$ 450,000
CWF - 19	Roof Repair and Replacement	2018-2026	$ 1,160,000
CWF - 20	Concrete Restoration	2018-2022	$ 2,990,000
		Total	**$ 15,978,000**

Revenue Structure: The Revenue Structure, included in this document, includes the rate methodology used by SCCMUA to fund the asset management program. It documents that the revenue paid by each participating municipality will recover all net SCCMUA CWF related operation, maintenance, replacement and capital reserve expenses. The rates were reviewed and it was determined that there were sufficient funds to cover these expenses. It was determined that there is no funding gap.

When the CWF's NPDES permit was reissued in 2014, it required SCCMUA to implement an asset management program. The Lucity™ AMS is designed to provide data which will be essential to completing the annual MDEQ reporting requirements. SCCMUA is required by its permit to submit reports including specific information regarding what capital improvement projects were completed, how much was spent on sewer cleaning, preventative maintenance, and other measures.

This AMP, inclusive of the Lucity™ AMS, is intended to assist SCCMUA staff in operating, maintaining and upgrading SCCMUA's CWF efficiently and cost effectively. It will be a living document to help SCCMUA staff manage the CWF.

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

Completion Date: September 30, 2017
(no later than 3 years from executed grant date)

The Southern Clinton County Municipal Utilities Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1010-01 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 **XX No XX**

   If No - Date of the rate methodology approval letter: March 23, 2017.

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:

Brad Gurski at	517-669-8311	gurski@sccmua.com
Name	Phone Number	Email

[signature]

Signature of Authorized Representative (Original Signature Required) — September 30, 2017 (Date)

Brad Gurski, Director of Operations
Print Name and Title of Authorized Representative

1211 Ludington St.
Escanaba, MI 49829
O: 906.233.9360
www.c2ae.com

CITY OF ST. IGNACE
ASSET MANAGEMENT PROGRAM SUMMARY

Grantee Information

City of St. Ignace SAW Grant
396 North State St., St. Ignace, MI 49781-1487
Cityofstignace.com

Contact Information for the Grantee

Mr. Les Therrian
Address: 396 North State St., St. Ignace, MI 49781-1487
Phone: 906-643-9671
Email: simgr@lighthouse.net

SAW Grant Project Number: 1061-01

Executive Summary

The City of St. Ignace 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 an electronic map background of the St. Ignace 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), the User Charge Report, and system 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:

A. System information and personnel worksheet
B. Summary- worksheet; listing all assets and calculating the business risk
C. Asset Rating Definitions- worksheet
D. Level of Service Statement- worksheet
E. Criticality Calculation – worksheet

F. Probability of Failure - worksheet
G. Budget and Rate formulation worksheet
H. Replacement - worksheet
I. Timing - worksheet
J. Capital Improvement Project – worksheet
K. 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 valve, 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 includes required reserves for programs such as USDA-RD. 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".

The second major component is the User Charge System Report which works with the system financials explaining the budget and rate information. It also included the detailed level of service statement and detailed capital improvement forecast.

Finally included is the data filing system which will include items such as the User Charge System above, the system televising data, the hydraulic model, easements, user data, debt documents and other relevant data.

The City of St. Ignace received second round grants as follows:

WAMP

Grant	Local Share	Total
$621,500	-0-	621,500

SAMP

Grant	Local Share	Total
$234,180	$26,020	260,200

The asset management development procedure followed the following 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 systems 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 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 all assets found

A. Wastewater Treatment Facility
B. All pump stations and force mains
C. 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;

<u>Treatment Facility</u>

a) Identifying the assets to be tracked
b) An assessment of the effectiveness of the system currently
c) An assessment of the condition of the identified assets through
   i. Testing
   ii. Visual inspection
   iii. Installation and maintenance records
   iv. Age of the asset

Pump stations(PS) followed the method as completed for the treatment facilities.

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. We utilized the NASSCO rating system 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 St. Ignace WAMP assessment were as follows.

General

WAMP

The treatment process assessment indicated that the process line is preforming in line with the basis of design and is meeting expected discharge results.

Of the 110 identified treatment and pump station (PS) assets;

65.9% were considered low business risk
34% were considered average business risk
0.1% were considered in need of effort

In ground (1,192 assets)

81% were considered low business risk
15% were considered average business risk
4% were considered in need of effort

SAMP

In ground (2,178 assets)

65% were considered low business risk
23% were considered average business risk
12% were considered in need of effort

Criticality of Assets

The criticality of assets was determined based on the following factors;

Treatment Facility

Highly Critical (5 rating)

a) Failure of a component would result in a permit violation.
b) Failure of component would cause another component to fail.

Moderately Critical (3-4 rating)

a) Failure of an asset would result in temporary process upset.
b) Failure of an asset would result in a SCADA system warning.
c) Failure of an asset would result in additional budget impact.

Slightly Critical (1-2 rating)

a) Failure of an asset can be addressed when personnel are available.

Pump Stations

Highly Critical (5 rating)

Failure of an asset disables the station resulting in sewer backup affecting customers or the environment.

Moderately Critical (3-4 rating)

Failure of an asset would results in system disruption requiring immediate attention.

Slightly Critical (1-2 rating)

Failure can be dealt with when personnel are available.

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 a team we entitled 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 found with the USER Charge Report 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.

St. Ignace in its very recent participation with the SRF and USDA-RD programs has recently worked on its operating budgets and required set aside for the wastewater system. We found the operating budget and rate support is current and meets the needs outlined by the WAMP.

The SAMP identified budget considerations which have been delivered to the City's Utility Committee to determine what should be done and when to align with other possible future utility or street improvements.

Capital Improvement Plan

St Ignace has identified five future wastewater capital improvement projects. The first one has recently been offered funding by USDA-RD. The debt involved with this project is already incorporated into the rate structure. Short term smaller projects are also incorporated, these are typically less than $100,000.

St. Ignace's Capital Improvement Plan follows major debit retirement milestones replacing debt with new debt when working on depreciating assets.

The SAMP has identified four priority project areas. The first requires MDOT participation and thus is at the mercy of MDOT's highway improvements schedule. The others the City will attempt to pursue with other utility and street projects.

List of Major Assets

Wastewater:

The Wastewater Treatment Facility incorporates 3 aerated lagoons and 2 polishing cells. The disinfection method is ultraviolet

Five major pump stations and three grinder stations

Force Main

	4"	400 ft.
	6"	2,300 ft.
	8"	1,100 ft.
	18"	4,400 ft.

Mainline Gravity Sewer

	6"	2,665 feet
	8"	70,585 feet.
	10"	7,825 feet
	12"	11,635 feet
	15"	3,665 feet
	18"	3,370 feet
	24"	5,665 feet
	27"	210 feet
Total		105,620 feet

System Value: $7,730,000
Replacement Value: $37,825,000

Stormwater:

Sewer & Culverts

- 2 inch – 40 feet
- 3 inch – 25 feet
- 4 inch – 1,090 feet
- 6 inch – 3,500 feet
- 8 inch – 8,500 feet
- 10 inch – 2,800 feet
- 12 inch – 40,100 feet
- 14 inch – 50 feet
- 15 inch – 6,400 feet
- 16 inch – 300 feet
- 18 inch – 7,300 feet
- 20 inch – 90 feet
- 24 inch – 8,200 feet
- 30 inch – 1,300 feet
- 48 inch – 1,600 feet

Total 81,295 feet

System Value: $2,235,000
Replacement Value: $17,936,000

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

Completion Date October 25, 2017
(no later than 3 years from executed grant date)

The City of St. Ignace *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1061-01 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 2, 2017

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:

Les Therrian at 906-643-9671 simgr@lighthouse.net

Name | Phone Number | Email

Les Therrian 10/25/17

Signature of Authorized Representative (Original Signature Required) Date

Les Therrian, 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 **October 25, 2017**
(no later than 3 years from executed grant date)

The City of St. Ignace *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1601-01 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:

Les Therrian	at	906-643-9671	simgr@lighthouse.net
Name		Phone Number	Email

Les Therrian 10/25/17

Signature of Authorized Representative (Original Signature Required) Date

Les Therrian, City Manager

Print Name and Title of Authorized Representative

Storm Water, Asset Management and Wastewater (SAW)

Asset Management Plan Executive Summary

City of St. Joseph SAW Grant No. 1276-01

October 31, 2017

The City of St. Joseph, Michigan's Asset Management Plan (AMP) for its Wastewater and Storm Water systems has been completed using the funding made available through the State of Michigan SAW Grant Program (Grant No. 1276-01). The City's AMP is a snapshot in time as of October 2017. The AMP provides a summary of each task completed during the SAW Grant program (November 2014 through October 31, 2017). Asset Management Plans are intended to be updated regularly, to evolve as additional data is collected and to be a reminder that Asset Management is a continuous practice that doesn't end with this report.

Recommendations have been included in each section for future evolution of the plan, specifically addressing the 5 major components of an AMP (Asset Inventory and Condition, Criticality of Assets, Level of Service, Revenue Structure and Capital Improvement Planning), plus a list of the critical assets for each utility system. This executive summary has been prepared according to the guidelines provided by the Michigan Department of Environmental Quality (MDEQ) and is hereby submitted as a summary document of the City of St Joseph's effort to use the grant to create its asset management plan for the City's storm water and wastewater systems.

Please note that while the SAW Grant covered activities related to the preparation of this asset management plan for the City's wastewater and storm water systems, the City of St. Joseph invested its own resources to expand the AMP to include the City's water distribution system and roadway network so that all four major asset classes within the public Right of Way are covered under the initial version of this Asset Management Plan.

Persons interested in viewing the complete Asset Management Plan and all the attachments should contact:

Mr. Tim Zebell P.E., City Engineer for the City of St. Joseph
City of St. Joseph
700 Broad Street
St. Joseph, Michigan 49085
Phone: (269) 983-5541
Email: tzebell@sjcity.com

Executive Summary

In December 2013, the City of St. Joseph applied for a Storm water, Asset Management and Wastewater (SAW) Grant. The SAW Grant program was offered by the State of Michigan when the State Legislature recognized the need for communities to inventory, assess and better manage their storm water and wastewater infrastructure. The City's SAW Grant application focused on the asset management area of the program with the goal of completing an asset management program (AMP) for all of the City's infrastructure in the Right-of-Way. The City SAW application included the integration of road and drinking water infrastructure as part of the AMP even though those items were not eligible for grant funding. The proposed AMP development activities were organized into ten categories listed below.

1) Asset Management Policy Development
2) Initial Collection of Existing Data/Base Plan Development (Geographical Information System (GIS))
3) Global Positioning System (GPS) Structure for GIS
4) Condition Assessment
5) Build the GIS System
6) GIS Implementation
7) Asset Management Evaluation
8) Develop Capital Improvement Plan
9) Rate and Fund Management
10) Selection and Implementation of Computerized Maintenance Management System (CMMS) Software

When the SAW Grant application was submitted, the two main goals of the AMP were to develop a long-term capital improvement plan (CIP) and implement a computerized maintenance management system (CMMS) to more effectively operate and manage City infrastructure in the Right-of-Way. The City has succeeded in accomplishing both of these goals.

Summary of Key Dates

The City was awarded a SAW Grant in October 2014 and retained Wade Trim in November 2014 to provide professional services as identified in the grant application; the grant formally expires on October 31, 2017. A summary of key dates throughout the grant period are presented below:

1. Date of Application – December 2, 2013
2. Notice of Grant Application Approval – September 3, 2014
3. Date of Commission Action to accept Grant – November 24, 2014
4. Start Work – January 2015
5. Date of MDEQ Rate Structure Approval – February 13, 2017
6. Date of Certificate of Completeness – presumably October 31, 2017

The City's application was approved for $1,110,830 with a City match of 10%. The anticipated SAW Grant funding summary is detailed in the following table.

SAW Grant Application – AMP Development- Cost Summary	
Project Planning Costs	$ 7,500
Total Wastewater & Stormwater AMP Cost	$ 1,103,330
Total SAW Grant Cost	$ 1,110,830
MDEQ Grant Total (90% of Total SAW Grant Cost)	$ 999,747
City of St. Joseph Grant Match (10% of Total SAW Grant Cost)	$ 111,083
Water Distribution & Roads – Ineligible Costs	$ 98,300
Total AMP Cost	$ 1,209,130
Total City Cost	$ 209,383

Wastewater and/or Storm Water Asset Inventory

The first step that the City and Wade Trim took in the AMP development process was to create a comprehensive inventory of City assets in the Right-of-Way. The City owns 43 miles of road, 34 miles of storm sewer gravity mains, 48 miles of sanitary sewer gravity mains, 3 miles of wastewater forcemains, 10 wastewater lift stations, 62 miles of water mains, and 460 fire hydrants. The City also owns a 1.5 million water tank and a Water Plant rated to treat up to 16 million gallons of water per day. The water tank and treatment plant were not included in the scope of the AMP which focused predominantly on infrastructure in the public Right-of-Way.

As part of the SAW Grant, the City wastewater collection system was inventoried in detail. A summary of the wastewater system assets by pipe size, including the number of segments and total length are presented below. Please note the City considers the large diameter interceptor pipes, generally 18-inch through 36-inch, to be major assets as noted in the table. It should be noted that not all 18-inch sanitary sewer within the system is considered to be an interceptor.

Sanitary Sewer			
Diameter	**Number of Segments**	**Total Length**	**Comments**
4"	3	952.6'	
6"	15	1,223.8'	
8"	151	26401.1'	
10"	502	104,520.1'	
12"	284	56,910.9'	
15"	64	13,802.9'	
18"	101	22,121.6'	Major
21"	3	689.8'	Major
24"	83	16676.7'	Major
30"	4	812.3'	Major
36"	29	4,560.0'	Major
Diameter Unknown	28	5,248.3'	

The City of St. Joseph also maintains and operates 10 wastewater lift stations. A condition assessment was performed on each lift station during the SAW grant program. In the table below, each lift station is presented by name with the approximate number of dwelling units, hotel units and businesses served by each station and the overall condition rating (from 1 to 5 with 1 being very good and 5 being very poor) of each lift station:

Sanitary Lift Stations				
Name	**Total Dwelling Units**	**Total Hotel Units**	**Total # of Businesses**	**Overall Condition Rating**
Dunham	119	82	1	4 (Poor)
Edgewater	208	92	11	2 (Good)
Fairways (Tributary to Edgewater)	7	0	0	2 (Good)
North Pier (Tributary to Edgewater)	14	0	3	4 (Poor)
Whitwam (Tributary to Edgwater)	101	92	1	3 (Fair)
Hawthorne	104	5	29	3 (Fair)
Alco (Tributary to Hawthorne)	96	0	0	5 (Very Poor)
Island Point	61	0	1	2 (Good)
Vine Street	173	0	2	2 (Good)
Lake Street (Tributary to Vine)	28	0	0	4 (Poor)

As part of the SAW Grant, the City storm water collection system was inventoried in detail. A summary of the storm water system assets by pipe size, including the number of segments and total length are presented below. Please note the City also maintains an open channel ravine system that serves as the primary carrier of storm water for a major portion of the City during rain events.

Storm Sewer		
Diameter	**Number of Segments**	**Total Length**
4"	1	19.8'
6"	27	1,656.6'
8"	65	2,362.4'
10"	280	11820.0'
12"	844	54,827.7'
15"	111	15,919.2'
18"	136	17,723.0'
21"	20	3,874.5'
24"	146	17,679.8'
27"	4	538.7'
30"	44	5,689.5'
36"	38	6,913.5'
42"	6	1,639.4'
48"	6	2,340.0'
60"	8	492.4'
Diameter Unknown	72	5658.8'

The City developed a Geographic Information System (GIS) for each asset system (i.e. wastewater, storm water, water distribution and road network). Asset locations were updated using GPS technology during the SAW Grant program. Each asset was given a unique identification number. The City used the SAW grant to collect a significant amount of condition data on its wastewater and storm water system. Approximately 122,500 feet of sanitary sewer (roughly 48% of the system) and 18,500 feet of storm sewer (roughly 10 % of the system) along with approximately 300 system manholes were inspected in accordance with NASSCO's PACP (Pipeline Assessment Condition Program) and MACP (Manhole Assessment Condition Program) guidelines. All of the data collected during the SAW Grant Program has been added to the City's GIS and is organized according to the unique asset identification number.

While only a portion of the systems were inspected, the condition assessment data was valuable in helping the City to prioritize necessary improvements and develop programs (i.e. root cutting, sewer lining, etc.) as part of its Capital Improvement Program.

Criticality of Assets

The City evaluated the criticality of many assets as part of the SAW Grant program. The City created a consequence of failure map for its wastewater system, storm water system and water system (not grant eligible). Each segment (including pipes and structures) of the City's wastewater, storm water and water system were rated on a system of 1 to 5 (with 1 representing the lowest consequence of failure and 5 representing the highest consequence of failure). In most cases, the City's largest diameter pipes were assigned a higher consequence of failure and the smaller pipes were assigned lower consequence of failure ratings. This follows from the logic that the larger diameter pipes ultimately carry more flow and serve a larger amount of people. The City did consider areas of their system that serve major users such as hospitals, schools and public buildings to be a factor that generally results in a higher consequence of failure in addition to the pipe size factor. The consequence of failure maps for each of the three systems are included in the appendix of the City's Asset Management Plan.

The condition data that was collected during the SAW Grant program was used to determine the likelihood of failure for the assets that were inspected. Since the City was not able to inspect 100% of its system, additional data will be collected in future years. A recommendation for the City to annually inspect a portion of its wastewater and storm water collection systems has been included in the Asset Management Plan. The PACP and MACP coding identifies structural and operations and maintenance deficiencies observed during the television inspection. The number of structural and operational deficiencies along a segment of pipe result in a "quick score" for that segment of pipe. The quick score is a four-digit code that describes the severity of the condition of the pipe based on the number of defects. Each pipe that was inspected during the SAW grant was assigned a quick code. The quick code was used to reflect the likelihood of failure for the assets that were inspected.

When developing the City capital improvement plan, the City used its GIS system to overlay several layers of data, including the road condition (from most current PASER ratings), location of water main breaks, project priorities from water reliability study, consequence of failure maps, and condition scores (quick codes) from the condition assessment of the City's sanitary and storm sewer inspection. The age of the system was also reviewed. Using this data, comprehensive projects were identified and listed to form the basis of the City's Capital Improvement Plan (see below).

Level of Service Determination

The City of St. Joseph currently strives to meet the desired level of service in all four of its major infrastructure system. While each system is currently functioning in a safe and adequate manner, there are many infrastructure projects that need to be completed on the City waste water, storm sewer, water distribution and roadway systems.

The Level of Service for each asset class in the City of St. Joseph has been broadly defined below as follows:

Wastewater Collection System

- The City wastewater collection system, including lift stations, shall be maintained in a safe and sound condition to provide safe collection and transport of wastewater from City users.
- The City recognizes the importance of having a properly functioning wastewater collection system in order to protect the environment.
- The City recognizes that maintaining a properly functioning wastewater collection system is important to protect the public health and welfare of the community.

- With the understanding that it is very costly to televise and clean the entire sanitary sewer system frequently, the City strives to televise (and clean) those sanitary sewer segments that are a part of each year's capital improvement program.
- The City shall endeavor to implement an annual televising and cleaning program for a portion of its sanitary sewer system (as funding allows).
- The City shall continue to implement its ongoing Combined Sewer Overflow (CSO) program to improve water quality and reduce overflows.
- The City shall budget to allow proper certifications to be maintained and regular training to occur so that City staff are properly certified and trained.
- The City shall continue to educate the public and enforce its Sewer Use Ordinance.

<u>Storm Sewer Collection System</u>

- The City storm sewer collection system shall be maintained to the extent possible (i.e. acknowledging that weather events and climate conditions are beyond our control) to provide for the safe collection and transport of storm water runoff to the surface waters.
- The City recognizes the importance of storm water management and its effect on the environment.
- The City recognizes that water quality and water quantity are important contributors to a healthy and safe environment.
- With the understanding that it is very costly to televise the entire storm sewer system frequently, the City strives to televise those storm sewer segments that are a part of each year's capital improvement program.
- The City shall endeavor to implement an annual televising and cleaning program for a portion of the storm system (as funding allows).

<u>Water Distribution System</u>

- The City water distribution system shall be maintained in a safe and sound condition to provide safe and reliable distribution of potable water to all residents, businesses, and visitors in the City.
- In accordance with Rule 1606 of Act 399, the City shall prepare and implement an Asset Management program for the water system by January 1, 2018. This AMP is intended to meet the requirements of water distribution system component of that plan.
- The City recognizes the importance of providing adequate fire flows for the protection of property. The City's 2017 Water Reliability Study makes recommendations for system improvements. The system improvements served as input into the development of the City's Capital Improvement Plan.
- The City shall budget to allow proper certifications to be maintained and regular training to occur so that City staff are properly licensed to operate and maintain the system.
- The City shall continue to educate the public and enforce its water use ordinance.

- The City recognizes that it partners with neighboring municipalities in a larger water system. The City shall strive to work cooperatively with the neighboring municipalities to create a safe and reliable system for all users.
- The City intends to continue its valve turning, hydrant assessment and flushing programs to maintain system reliability and safe drinking water for its customers.

Street Network

- The City roads shall be safe and passable for all users, including residents, visitors and emergency vehicles.
- The City recognizes that a well-maintained street network contributes to the public good, facilitates the distribution of goods and services, and helps people move around safely in their daily travels.
- The City recognizes that a well-maintained street network contributes to a high quality of life and has a positive effect on property values, community pride and public confidence.
- The City strives for its street network to be in accordance with the latest standards for safe turning movements, pedestrian activity and vehicle capacity.
- The City will strive to rate its road network every 3 years to maintain data on the condition of the roadway network.
- The City recognizes that its street network is adjacent to County and State roads and will work cooperatively and leverage funding with those agencies to achieve the best possible overall roadway network for its citizens and visitors.
- The City intends to continue to focus on pedestrian and non-motorized improvement projects, as well as its biennial sidewalk replacement program.

The level of services goals described above were determined through years of interaction with the public. These goals were discussed broadly with the residents as part of 3 public information meetings that the City held in 2017 (April 22nd, May 24th and August 22nd). The City shall review (and revise if necessary) the Level of Service goals for each asset class each year as part of its ongoing Asset Management Plan.

Revenue Structure

The City of St. Joseph retained Umbaugh & Associates to analyze the City's current revenue and expense structure. Umbaugh staff worked closely with the City finance director, City Engineer and Wade Trim to first review the City's Sewer and Water Funds. These were completed at the same time because these two enterprise funds (Sewer – Fund 590, and Water – Fund 592) are set up similarly. As part of the revenue structure review, Umbaugh prepared a comparative statement of net position, a comparative statement of revenue, expenses and changes in net position, and a comparative detail of operational expenses for the City's sewer and water funds (water fund activity was not grant eligible and was paid for separately). Umbaugh also reviewed the current debt schedules and prepared a cash flow analysis for both funds.

Umbaugh was also asked to review the City's Street Improvement Fund (Fund 204). Using the proposed capital improvement plan costs shown below, Umbaugh prepared three separate cash flow scenarios for the City's future consideration. The first cash flow analysis scenario proposed a dedicated street tax increase from 1 to 3 mills and assumed no taxable value increase; the second cash flow analysis scenario proposed a dedicated street tax increase from 1 to 3 mills plus an assumption of a 1% taxable value increase; and the third scenario proposed a dedicated street tax increase from 1 to 3.55 mills with no taxable value increase and no debt issuance. Scenarios 1 and 2 included debt issuance as part of the plan to fund the necessary street improvements. There was virtually no difference in the effect of the 1% taxable value increase between scenario 1 and 2.

As of the date of this executive summary, the City Commission is still considering which options to implement across all funds.

Copies of all revenue structure scenarios have been included in the appendix of the City's Asset Management Plan.

Capital Improvement Plan

Using the data collected during the asset inventory stage, the criticality of the system assets (based on likelihood of failure and consequence of failure), and their desired level of service, the City of St. Joseph prepared a 20-year Capital Improvement Plan for public comment and City Commission feedback. Individual projects were identified from the multiple data layers in the City's GIS. The individual projects were organized and prioritized by year with input from the City Public Works and Engineering staff. Cost estimates for each project were developed. A summary of the 20-year plan (actually 21) for Fiscal Years 2016-2017 through FY 2036-2027 is included in this executive summary.

Capital Improvement Plan				
Fiscal Year	**204 Street Improvement Fund**	**590 Sewer Fund (Incl. 450)**	**592 City Water Fund**	**TOTAL**
2016-2017	$ 303,000	$ 5,000	$ 440,000	**$ 748,000**
2017-2018	$ 428,000	$ 2,281,500	$ 150,500	**$ 2,860,000**
2018-2019	$ 742,225	$ 1,652,294	$ 75,000	**$ 2,469,519**
2019-2020	$ 451,048	$ 5,799,294	$ 160,000	**$ 6,410,341**
2020-2021	$ 2,286,838	$ 1,449,513	$ 2,216,892	**$ 5,953,242**
2021-2022	$ 2,269,277	$ 1,958,537	$ 982,925	**$ 5,210,739**
2022-2023	$ 1,780,271	$ 1,611,249	$ 747,227	**$ 4,138,747**
2023-2024	$ 1,285,959	$ 1,114,721	$ 532,489	**$ 2,933,168**
2024-2025	$ 1,947,477	$ 1,593,285	$ 835,654	**$ 4,376,415**
2025-2026	$ 1,848,431	$ 1,333,614	$ 787,146	**$ 3,969,191**
2026-2027	$ 2,237,831	$ 1,519,463	$ 960,918	**$ 4,718,211**
2027-2028	$ 1,834,922	$ 1,045,637	$ 692,130	**$ 3,572,689**
2028-2029	$ 972,269	$ 537,537	$ 308,390	**$ 1,818,196**
2029-2030	$ 1,667,341	$ 1,071,963	$ 707,694	**$ 3,446,997**

Capital Improvement Plan				
Fiscal Year	**204 Street Improvement Fund**	**590 Sewer Fund (Incl. 450)**	**592 City Water Fund**	**TOTAL**
2030-2031	$ 2,198,050	$ 1,396,887	$ 917,922	**$ 4,512,859**
2031-2032	$ 3,547,840	$ 2,398,033	$ 1,513,912	**$ 7,459,785**
2032-2033	$ 2,772,219	$ 1,827,849	$ 1,195,289	**$ 5,795,357**
2033-2034	$ 1,782,825	$ 1,147,612	$ 755,169	**$ 3,685,606**
2034-2035	$ 1,848,914	$ 1,402,134	$ 784,567	**$ 4,035,615**
2035-2036	$ 3,148,794	$ 2,090,609	$ 1,275,308	**$ 6,514,710**
2036-2037	$ 2,856,676	$ 1,753,809	$ 1,140,914	**$ 5,751,399**
Totals	**$ 38,210,203**	**$ 34,990,538**	**$ 17,180,045**	**$ 90,380,787**

The full detailed plan can be found as part of the appendix of the City's Asset Management Plan (and as a separate standalone spreadsheet).

Recommendations

Analysis indicates that in order to fund the capital improvement plan per the schedule shown above, the City would need to implement water rate increases of approximately 3.5% over the next 20 years, sewer rate increases of 7% over the next eleven years with 3.5% increases afterward and add a dedicated street mileage of approximately 2 mills. Detailed spreadsheets showing the cash flow analysis and recommended rate improvements have been included in the appendix of the City's Asset Management Plan. However, both the program and the needed funding are subject to future actual project costs, potential additional sources of funding and continued review and analysis of conditions.

The following is a list of operation and maintenance strategies discussed and recommended for the City's wastewater collection system:

- The City shall flush all known flat sewers as needed to prevent buildup of fats, oils and grease (FOG) and prevent blockages. The City shall continue to work with the business community (i.e. especially restaurants) to reinforce the importance of grease traps and to minimize the impact of FOG's on the collection system.
- The City shall regularly inspect sanitary manholes, especially along the larger collection system segments, to make sure there is proper flow within the sewer and that no backups or unusual flow levels are observed.
- The City shall conduct weekly on-site inspections of sanitary sewer lift stations. Lift stations will also have constant monitoring by staff via telemetry.
- As part of its Annual Budget, the City shall allocate resources to televise and review the video of all sanitary sewers within the planned capital project areas. Other areas of the system will be televised and assessed as funding allows. All coding during the television inspections should be completed in accordance with the NASSCO Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP).

All structural or O&M defects should be noted and assigned to the unique facility ID for that asset.

The following is a list of operations and maintenance strategies discussed and recommended for the City's storm water collection system:

- The City should regularly inspect the open channel portions of the ravine for fallen logs, tree damage, bank erosion and potential blockages.
- The City should pay close attention to the numerous road culverts along the ravine and other areas. Keeping these culverts clear of debris will help prevent flooding during large rain events.
- Whenever time and funding allows, the City should perform dry weather screening at all outfalls. Dry weather screening is a proven technique for noticing and tracking unusual or excessive flow in the storm sewer system during dry weather.
- The City should sweep streets as needed to keep leaves, twigs and unwanted debris from entering the storm inlets and catch basins. Regular street sweeping and proper disposal of surface debris keeps the storm sewers from getting clogged and keeps unwanted pollutants out of the receiving streams.
- As part of its capital improvement programs, the City shall televise and review the video of all storm sewers within the planned capital project areas. All coding during the television inspections should be completed in accordance with the NASSCO Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP). All structural or O&M defects should be noted and assigned to the unique facility ID for that asset.

In addition to the O&M strategies specifically mentioned above, the City of St. Joseph has purchased and implemented the use of Cityworks Software as its computerized maintenance management system (CMMS). Cityworks is a GIS integrated, online CMMS. The CMMS includes and allows for the creation of work orders, inspection, maintenance and inventory tracking. Cityworks was implemented in 2016 and is currently being utilized by all members of the City Department of Public Services and Engineering, as well as others in City Administration/Public Safety to centralize the maintenance activities and streamline the work order process. The CMMS will also track cost data to assist the City in future budgeting and Capital Improvement planning. The City should continue to invest in its CMMS system and provide ongoing training to staff to stay current with technology and trends.

<u>List of Major Assets</u>

All of the City's infrastructure assets are considered important as each one serves the community in some way. However, for the purpose of this Asset Management Plan, the following is a summary of the major assets that have been identified in the City's Asset Management Plan:

Wastewater System

- 44,860 feet of large diameter interceptor sewers (18 to 36-inch pipe)
- 10 Wastewater Lift Stations (the Edgewater, Hawthorne and Vine Street lift stations serve the largest population/service areas)
- There are 1217 sanitary manholes in the City's sanitary sewer system.

Storm Sewer System

- The City maintains an open channel ravine system that serves as the primary drainage collection system for a large portion of the City.
- The City has approximately 28 miles of storm sewer ranging in diameter from 4-inch to 60-inch that serve various areas of the City. All are considered important and need to function well.
- There are 641 storm manholes and 83 outlet structures within the City's storm sewer system.
- It should be noted that the City has several areas that lack a public storm sewer system. These areas are identified in the Capital Improvement plan as areas of focus and are mentioned here as future assets.

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The City of St. Joseph *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1276-01 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: February 13, 2017.
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:

Tim Zebell	at 269-983-5541	tzebell@sjcity.com
Name	Phone Number	Email

________ 10/31/2017
Signature of Authorized Representative (Original Signature Required) Date

TIM ZEBELL CITY ENGINEER
Print Name and Title of Authorized Representative

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

Completion Due Date 10/31/2017
(no later than 3 years from executed grant date)

The City of St. Joseph *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1276-01 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:

Tim Zebell	at 269-983-5541	tzebell@sjcity.com
Name	Phone Number	Email

[signature] 10/31/2017
Signature of Authorized Representative (Original Signature Required) Date

TIM ZEBELL CITY ENGINEER
Print Name and Title of Authorized Representative

CITY OF ST. LOUIS
SAW Grant Project No. 1080-01

EXECUTIVE SUMMARY

Prepared by: **SPICER GROUP, INC.**
1400 Zeeb Drive
St. John's MI, 48879

Owner: **CITY OF ST. LOUIS**
300 N. Mill Street
St. Louis MI, 48880
(989) 681-2137
Kurt Giles, City Manager

On October 29, 2014, the City of St. Louis 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 City received the follow grants:

Stormwater Asset Management Plan (SWAMP) – 90% Grant	***$375,849***
Wastewater Asset Management Plan (SWAMP) – 90% Grant	$668,176
Eligible Cost Subtotal	$1,044,025
LESS Local Match	($104,403)
Total Grant Amount	$939,622

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; October 2017.

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: Storm Water Asset Inventory and Condition Assessment

For the City's storm water collection system, Spicer Group, Inc. completed a mobile mapping LiDAR survey of the entire City, and used the survey information to develop a comprehensive Geographic Information System (GIS) including all storm water assets (manholes, catch basins, culvert outlets, etc.). The GIS information is located in the ESRI ARC GIS online 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, ownership information etc. can be accessed. This information can also be queried to provide specific lists and maps, and updated easily when future improvements are made. This data is not being integrated into Cartegraph OMS, an asset management software.

The City owned and operated storm water collection system is approximately 16.3 miles in length and consists of storm sewer pipes ranging in diameter size from 4”- 54”. The storm sewer pipes consist of mainline sewer, catch basin leads, and culverts. The City has approximately 943 structures consisting of manholes, catch basins, and outlets. In addition, there are approximately 51 blind taps into the storm sewer mains. The City’s storm sewers discharge into several sewer systems owned by MDOT (M-46 and S Main St) and multiple County Drains before ultimately discharging in the Pine River which runs through the City. Summary tables are listed below for city owned and operated structures and pipes.

Table ES-1: City-Owned Storm Water Pipes by Diameter

Diameter	Number of Pipes	Percent	Length(ft)
Could not be determined	8	0.7%	579
4"	10	0.6%	524
6"	68	4.3%	3,695
8"	147	7.8%	6,669
10"	126	8.8%	7,578
12"	408	33.2%	28,523
15"	48	7.5%	6,443
18"	73	13.2%	11,379
21"	6	1.4%	1,195
24"	59	12.1%	10,432
27"	3	0.3%	256
30"	9	1.5%	1,281
36"	17	4.0%	3,438
42"	10	2.1%	1,818
48"	10	2.3%	2,005
54"	1	0.2%	188
TOTAL	1,004	100.00%	86,003

Table ES-2: City-Owned Storm Water Structures by Type

Structure Type	Number
Catch Basin	648
Manhole	254
Outlet	41
TOTAL	943

Every pipe and structure owned and operated by the City could not be investigated/inventoried due to budget constraints and/or accessibility limitations. Emphasis was placed on performing condition assessments for the mainline sewers and mainline manholes with an emphasis on areas where the connectivity of the system was not well understood. Sewer mains and leads that were not televised and evaluated will be in the future.

Taplin Group, located in Kalamazoo, MI completed a cleaning and televising program of approximately 42% of the City owned storm sewer pipes. Spicer Group performed comprehensive inspection for all the City's mainline storm water manholes. The NASSCO Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards was used to identify and code defects, and apply standardized grading/scoring to provide overall condition ratings of the storm water assets.

Part 2: Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of storm water service does the City want to provide to its residents? How are projects going to be prioritized and included in the CIP? What cost is the City 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 City's Level of Service Statement/Goals are as follows:

> *The City of St. Louis strives to maintain a basic storm water collection system that addresses the residents' wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our residents.*

LOS - Basic Goals:

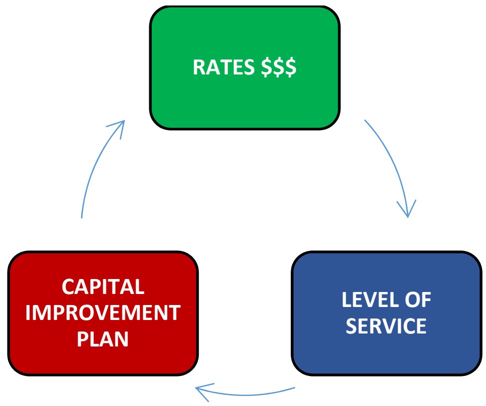
- Operate and maintain the storm water system to minimize flooding and property damage.
- Review the condition of storm water assets as a part of other infrastructure construction projects.
- Seek a funding source for operation & maintenance and repair/replacement of storm water assets.
- Review the maintenance and capital improvement plans/projects annually to determine the lowest cost options for our residents.

- Level of Service criteria includes the following categories:
  - "**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.

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 City. The "minimum" level of service projects address the immediate concerns that residents bring to the City's attention.

Typically, as a part of the asset management process, the City would go through an exercise to determine a desired Level of Service, select the capital improvement projects that are needed to achieve that Level of Service, then review how those projects effect the City's finances to determine if possible rate increases may be required. Below is a diagram of the process.

ES-3: Asset Management Plan Evaluation Process



Michigan has not created a climate which would allow municipalities to create either an enterprise fund or a utility fee system for storm water asset improvements. As such, funding is currently only available from the City's general fund. Act 51 monies received from the State for street/road improvements could also be used for storm water improvements that affect any street projects directly. However, Act 51 funding is limited.

Since there is no real funding mechanism for storm water assets, the City has been maintaining a *Minimum* Level of Service. This has resulted in a reactionary operation and maintenance practice. Until a funding mechanism for storm water improvements is found, the City is forced to continue this reactionary policy.

Part 3: Criticality (Risk)

For each asset in the City's storm water system, a criticality/risk analysis was performed to determine and prioritize the City's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including pipes, manholes, and drainage structures, etc. Next, the Consequence of Failure (CoF) was calculated and scored for each asset based on the economic, social, and environmental consequences. Finally, the Criticality (Risk) score was calculated using:

RISK = LoF x CoF

For the City's storm water collection system, there were 0 pipe locations and 6 structure locations identified with a high CoF score along with 37 pipe locations and 166 structure locations with high LoF scores. These scores were evaluated and incorporated into the resulting Capital Improvement Plan.

Part 4: Revenue Structure

Spicer Group teamed with Municipal Analytics (MA) for the revenue structure analysis for the AMP. The Capital Improvement Plan (CIP) projects were evaluated and allocated to various years of completion within the MA financial model, utilizing the City's General Funds. The financial review found that the City can be sustainably funded by the City's General Fund without outside resources and within the confines of the current millage rate and revenue.

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 storm water 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 resulting CIP plan includes the following projects:

1. Complete cleaning and televising activities for remaining sewers not performed in SAW ($83,200).
2. Complete investigation and condition assessment for remaining structures not performed in SAW ($900,000).
3. Storm sewer leads to be added for sump pump disconnections (cost included in WWAMP).

Conclusion

The City of St. Louis's storm water system is a typical, aging municipal infrastructure system. Since there has been no funding mechanism for storm water assets, the City had been maintaining a Minimum Level of Service for its residents. The City will evaluate where the above capital improvement projects should be included during the next planning cycle.

In accordance with the SAW Grant requirements, the City'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 City's annual budget process.

DEQ

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

Completion Due Date **October 31, 2017**
(no later than 3 years from executed grant date)

The City of St. Louis *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1120-01 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:

Kurt Giles, City Manager	at 989-681-2137,	kgiles@stlouismi.com
Name	Phone Number	Email

Kurt R Giles   10/31/2017

Signature of Authorized Representative (Original Signature Required)   Date

Kurt Giles, City Manager

Print Name and Title of Authorized Representative

CITY OF ST. LOUIS
SAW Grant Project No. 1080-01

EXECUTIVE SUMMARY

Prepared by: SPICER GROUP, INC.
1400 Zeeb Drive
St. John's MI, 48879

On March 14, 2014, the City of St. Louis 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 City received the follow grants:

Stormwater Asset Management Plan (SWAMP) – 90% Grant	$375,849
Wastewater Asset Management Plan (WWAMP) – 90% Grant	***$668,176***
Eligible Cost Subtotal	$1,044,025
LESS Local Match	($104,403)
Total Grant Amount	$939,622

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; October 2017.

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 and Condition Assessment

The City's wastewater system consists of three main components: The collection system (pipes and manholes), the Michigan Ave and Union St pumping stations, and the wastewater treatment plant (WWTP).

For the collection system, Spicer Group, Inc. completed a mobile mapping LiDAR survey of the entire City, and used the survey information to develop a comprehensive Geographic Information System (GIS). This GIS is located on a new computer in the City Hall office. It is considered a detailed "smart" mapping system with databases, utilizing the ArcGIS/Arc Online platform by ESRI (Environmental Systems Research Institute). 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 (closed circuit television) pipe inspections 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 City has approximately 26.8 miles of sanitary sewer pipes ranging in size from 6"-24", and 533 manholes, serving a total of 1,445 customers. Taplin Group LLC, located in Kalamazoo MI, completed a comprehensive cleaning and televising program of the sanitary sewer pipes, and Spicer Group, Inc. completed a comprehensive inspection of the manholes using NASSCO (National Association of Sewer Service Companies) Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards to identify and code the observations/defects. The MACP/PACP system is used to standardize the scoring and to quantify the condition of the wastewater assets. There was approximately 17,700 feet of sewer that scored a level 5, and 10,250 feet of sewer that scored a level 4 condition rating that need to be addressed. Addressing these pipe segments would meet what the City has characterized as providing a minimum level of service for the collection system.

The second main components of the City's wastewater system are the Michigan Ave pumping station, located at the intersection of Michigan Ave and Whitney Place and the Union St. pumping station, located south of the intersection of Union St and River Ct. Spicer Group, Inc. completed an inspection and condition assessment for each station, and provided recommendations to the City for future improvements. Based on age, condition, and criticality/risk of the stations, Spicer Group recommends that the stations be addressed within the next five years. There are two options for each station based on the Level of Service as discussed further below. A minimum level of service would consist of replacing failing equipment and provide consistent pumping capacity for the stations and reduce/eliminate system surcharging and sanitary sewer overflows. A medium level of service would consist of replacing the Michigan Avenue station to eliminate system surcharging in that area and include the construction of an equalization basin at the WWTP to eliminate the hydraulic issues at the plant during wet weather events.

The third main component of the City's wastewater system is the wastewater treatment plant (WWTP) located at the intersection of Union St and E Prospect St. Spicer Group completed an inspection and assessment of the WWTP, and are recommending several improvements to the facility. The recommended improvement projects are that are included in the Capital Improvement Plan (CIP).

Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of service does the City want to provide to its wastewater customers? How are projects going to be prioritized and included in the CIP? What cost is the City 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 City's Level of Service Statement/Goals are as follows:

> *St. Louis plans to meet DEQ standards for treatment and discharge into the river by providing capacity in the system to meet the 25 year, 24 hour storm.*

One of the basic goals is to review the capital improvement projects to determine the best value options for the City's customers based on life cycle costs and overall benefits to the community:

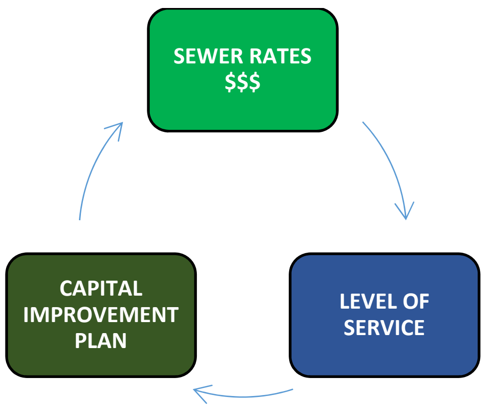
- "**MINIMUM**" Level of Service – Priority projects to meet the minimum local, State, and/or Federal regulations. Typically to be completed within the next 5 years.
- "**MEDIUM**" Level of Service – Projects that will need to be done eventually; typically when other infrastructure projects are happening or if monies become available eariler than anticipated.

- "**HIGH**" Level of Service – Projects that are forecasted long range, some of which the current asset may have a considerable amount of useful life. Some projects may be a "want" from the client, but not necessarily a "need."

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 City. 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. The minimum level of service also addresses the basic need to eliminate the frequent Sanitary Sewer Overflows (SSOs) that occur in portions of the City's sanitary sewer system. System surcharging occurs upstream of both the Michigan Avenue and Union Street Pump Station, and during wet weather events, SSOs have occurred.

As the AMP progressed, different scenarios were evaluated, to determine the City's desired Level of Service based on project costs, associated LOS, and the implication to current and future sewer rates.

Asset Management Plan Evaluation Process



The resulting capital improvement plan (CIP) and revenue structure was one that met the City's goals, addressed the improvements that needed to be made, and established a sustainable rate structure for the City's customers.

Criticality (Risk)

For each asset in the City's wastewater system, a criticality/risk analysis was performed to determine and prioritize the City's key components. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for every asset; including pipes, manholes, pumping station, and WWTF 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

For the collection system, there were 57 pipe locations identified with LoF scores of 5 or greater. Risk scores for manholes were also determined. All risk scores were evaluated and incorporated into the resulting Capital Improvement Plan. For the Michigan Ave pump station, this station was constructed in 1968 and portions of the station were upgraded in 1996 and most of its components are at the end of their useful life. The Union St pump station is in similar condition with most of its components nearing the end of their useful life. The Union St pump station serves the entire City and both stations are in the high risk range. For each of these stations, options for providing minimum and medium levels of service are provided. For the WWTP, though the City has made several improvements over the last 20 years there are still several items which require repair or replacement. The piping and valves throughout the plant as well as disinfection equipment fell into the Medium Risk range. Everything else fell into the Low Risk range. Options to provide minimum and medium levels of service are provided. For a minimum level of service, the ATI and exterior light at the Fine Screen building should be replaces along with the blowers, the primary clarifier electrical junction box and 120 volt panel in the Main Building. Capital improvement projects were established for these specific items and evaluated/prioritized by the City.

Revenue Structure

Spicer Group teamed with Municipal Analytics (MA) for the revenue structure analysis for the AMP. Wastewater account balances, expenditures, revenues, etc. were reviewed and inputted into MA's financial software to determine if there were any deficiencies in the rates. The City's current rate structure was found to have no deficiencies.

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/scenarios were performed to come up with a rate structure that met the City's Level of Service goals and completed the CIP projects that are needed. The sewer rates will be re-assessed in the spring to fund the proposed capital improvement plan. This should be reviewed annually as a part of the City's 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 and 20 year CIP was developed that includes various collection system improvements including:

Collection System

- Sewer Rehabilitation ($6,000,000)
- Manhole repairs/replacements and lining ($130,000)

Pumping Stations

- Rehabilitation of Michigan Ave pump station. ($178,750) (minimum)
- Replacement of Michigan Ave pump station. ($361,935) (medium)
- Rehabilitation of Union St pump station, construction of new pump station and sanitary sewer reconstruction for re-routing. ($2,361,840) (minimum)
- Rehabilitation of Union St pump station, construction of new pump station, sanitary sewer reconstruction for re-routing, and construction of an equalization basin. ($5,742,328) (medium)

WWTP

- ATI at Fine Screen Building. ($5,000) (minimum)
- Blower replacement ($50,000) (minimum)
- Fine Screen Building Exterior light replacement. ($5,000) (minimum)
- Primary Clarifier Electrical Junction box replacement. ($8,000) (minimum)
- 120v panel replacement in Main Building. ($25,000) (minimum)
- Replace lines to Secondary Clarifiers. ($50,000) (medium)
- Secondary Flow Splitter Box modifications. ($15,000) (medium)
- SCADA at WWTP. ($100,000) (medium)
- Oxidation Ditch access. ($50,000) (medium)

Operations and Maintenance

- Asset Management Software ($18,000)
- Cleaning and televising the sewer system ($51,000 over 5year cycle)
- Follow-up Metering for I & I removal and tracking ($30,000 over 3 years)

Conclusion

The City of St. Louis's wastewater system is a typical, aging municipal infrastructure system. There are a few areas that need immediate attention (over the next 5 years). A rate increase will be needed to generate the income to address all of the wastewater system deficiencies. This will need to be reviewed annually during the City's normal budgeting process.

In accordance with the SAW Grant requirements, the City's Wastewater Asset Management Plan (WWAMP) needs to be kept available for citizen's review for 15 years. The WWAMP should be reviewed annually, and the components updated and included in the City'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 October 31, 2017
(no later than 3 years from executed grant date)

The City of St. Louis *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1120-01 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 18, 2016.
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:

Kurt Giles, City Manager	at 989-681-2137	kgiles@stlouismi.com
Name	Phone Number	Email

Kurt Giles — 10/31/2017

Signature of Authorized Representative (Original Signature Required) — Date

Kurt Giles, 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 27, 2017______
(no later than 3 years from executed grant date)

The __Village of Stockbridge____________________________ *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. _1573-01_____ 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 18, 2017_____________.
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:

___Shane Batdorff___________________ at___(517) 851-7435______sbatdorff@vosmi.org___
Name Phone Number Email

Robert Hollenbeck 10/27/17
Signature of Authorized Representative (Original Signature Required) Date

_Robert Hollenbeck, Stockbridge Village President_____________________________________
Print Name and Title of Authorized Representative

1.0 Executive Summary

Overview

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2014, The Village of Stockbridge 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 Village's stormwater collection system. 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 City of Stockbridge AMP is:

Shane Batdorff, DPW Supervisor
305 W. Elizabeth Street, Room 107
Phone number: 517.851.7435
Email: sbatdorff@vil.stockbridge.mi.us

Asset Inventory and Condition Assessment

The stormwater collection system assets consist of approximately 23,059 feet (4.38 miles) of storm sewers and 217 stormwater manhole 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 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 purposes.

Condition Assessment and Expected Useful Life

For the Village of Stockbridge, a comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field based assessments were completed on all 217 structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 54% of the gravity pipe.

Based on discussions with the stormwater system operations staff, there have not been any known capacity issues with the Village-owned stormwater system, nor any consistent flooding areas of concern. Any flooding or drainage problems occur mainly when County drains are elevated and collected stormwater cannot flow into the County drains through the outfalls. For this reason, a capacity analysis was not completed for the Village of Stockbridge. Recommendations for short-term (1-5 year) and long term (6-20 year) identifies the need for maintenance - 72% of the system was tagged for future inspection and/or additional cleaning. A portion of this future inspection is designated for storm sewer that was not recently completed through the program and is older than 20 years of age, while the remaining is to incorporate a program to clean and televise sewers on a routine basis. Rehabilitation accounted for 65% of the existing storm structures and 6% of the storm pipe system. The remaining assets were placed in the beyond 20 year planning category.

Level of Service

Defining the Expected Level of Service (LOS)

The LOS for the Village 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 Village of Stockbridge:*
>
> - *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.*
> - *Maintenance and operations staff are to be properly trained.*

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 Village of Stockbridge using Innovyze-InfoMaster software. InfoMaster is an ArcGIS-based sewer asset management and capital planning software that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. 4 pipe segments in the stormwater collection system have an extreme risk rating and are recommended to be for near-term rehabilitation or replacement.

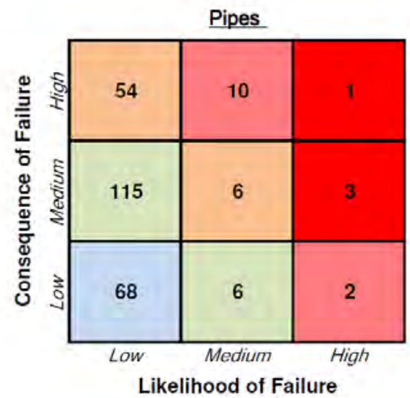


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. 87 structures are identified as extreme risk, and are recommended for replacement or rehabilitation.

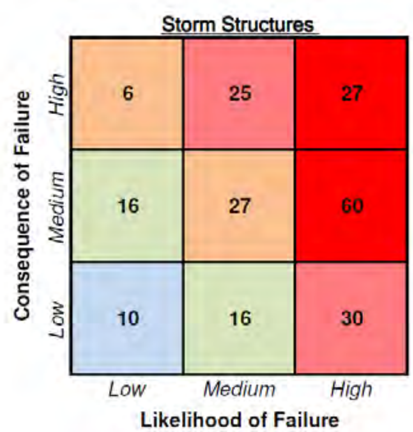


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

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 with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term 1-5 year and Long-Term 6-20 year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system. The 5-year CIP rehabilitation total is $945,194.

CIP DEVELOPMENT

Collection system assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2017 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The CIP was developed by assigning each project to a CIP year (1-5) based on several factors. In addition to Risk Rating, other factors used to assign CIP year include:

- Asset rehabilitation grouping (i.e. the type of repair/construction recommended)
- Coordination with other planned projects to achieve economies of scale or limiting disruption.

The recommended 5-Year Capital Improvement Plan for the Village-owned storm water collection system is included in Table 3 below. The Village of Stockbridge utilizes the general street funds to address storm sewer repairs. The Village will preplan storm drain improvements and incorporate those improvements into future street projects when appropriate.

Table 3: 5-Year Capital Improvement Plan Summary by Year

Project Description	Rehabilitation Fiscal Year					Total
	2018	2019	2020	2021	2022	
Storm Sewer System Improvements						
Gravity Sewer Point Repair		$ 46,087		$ 35,724		$ 81,811
Gravity Sewer Replacement			$ 10,512		$ 165,282	$ 175,794
Gravity Sewer Lining				$ 64,626		$ 64,626
Manhole Lining		$ 397,156		$ 176,128		$ 573,284
Manhole Replacement		$ 43,709			$ 5,970	$ 49,679
Total Project Cost	*$ -*	*$ 486,952*	*$ 10,512*	*$ 276,478*	*$ 171,252*	*$ 945,194*

Assumes 3% Inflation per Year

OPERATIONS AND MAINTENANCE

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound stormwater system. The process of cleaning and CCTV inspection of pipelines either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every five years, or that 20% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects. The 5-year CIP maintenance total is $56,007.

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

Completion Due Date __ October 27, 2017______
(no later than 3 years from executed grant date)

The ____ Village of Stockbridge ______________________ *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. _1573-01___ 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:

____ Shane Batdorff ____________________at____(517) 851-7435________ sbatdorff@vosmi.org __
Name Phone Number Email

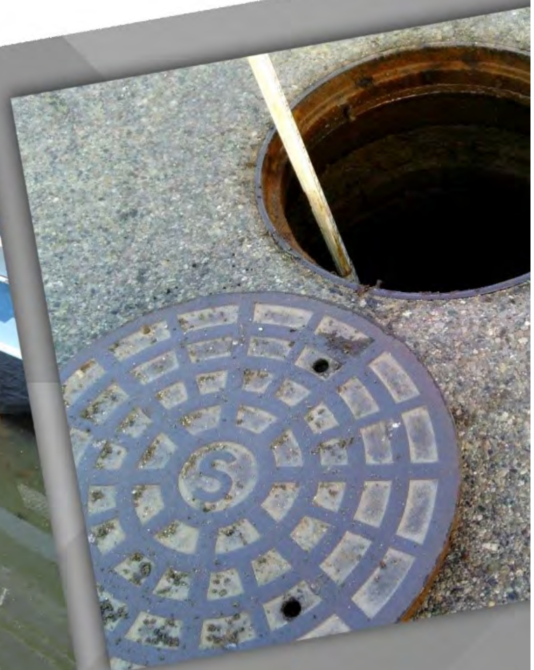
Robert Hollenbeck 10/27/17
Signature of Authorized Representative (Original Signature Required) Date

____ Robert Hollenbeck, Stockbridge Village President ______________________________
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report



Prepared for:

City of Tawas City

SAW Project No. 1035-01

TAWAS CITY

FINAL
October 2017

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for the Storm Water, Asset Management, and Wastewater (SAW) Grant Program. In October of 2014, the City of Tawas City received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), Project No. 1035-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the City's publicly-owned wastewater utility. The assets that comprise the utility include collection system piping and manholes, lift stations/pump stations, and force mains.

The SAW Grant amount awarded to City of Tawas City was $647,141.
The Local Match provided by City of Tawas City was $71,905.

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.

Questions regarding the Asset Management Plan should be directed to:
Ms. Annge Horning
City Manager
City of Tawas City
550 West Lake Street
PO Box 568
Tawas City, Michigan 48764
(989) 362-8688
Email: manager@tawascity.org

ASSET INVENTORY AND CONDITION ASSESSMENT

The wastewater collection system assets consist of approximately:

- Gravity Sewer (6-inch thru 10-inch): 74,113 feet (14.0 miles)
- Force Main (4-inch thru 14-inch): 14,832 feet (2.5 miles)
- Manhole Structures: 311
- Sewer Lift Stations: 5 each

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

The treatment of wastewater for the City of Tawas City is provided by the Tawas Utilities Authority. The wastewater collection system is owned and maintained by the City of Tawas City and the treatment system is operated and maintained by F&V Operations staff through a contract agreement.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance manuals which included a review of the existing record drawings, field notes, staff knowledge, site visits, and 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 survey grade GPS equipment, and a comprehensive evaluation of the gravity system.

This information was organized into a new database and piping network for archiving, mapping and future evaluation purposes.

Condition Assessment and Expected Useful Life
A comprehensive evaluation of the collection system was performed.

NASSCO-MACP Level 1 manhole field based assessments were completed on 272 manhole structures that were assessible.

Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 73,924 LF of the gravity pipe.

The condition of the collection system assets reviewed ranged from Excellent to Good, with only a few minor deficiencies.

Capacity analysis was analyzed for average day and peak hour conditions in areas of concern.

Recommendations for short-term (1-5 years) and long-term (6-20 years) system maintenance and improvements were identified. It is recommended to clean and televise the collection system on a 7- to 10-year rotating basis.

The condition of the assets at the lift stations range from Good to Fair. 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 minor.

Level of Service

Defining the Expected Level of Service (LOS)

The overall objective of City of Tawas City as it relates to their wastewater collection system is to adopt the following Level of Service (LOS) goals:

<u>LEVEL OF SERVICE STATEMENT</u>

The overall objective of City of Tawas City 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:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with local, state, and federal regulations.
- Actively maintain collection system assets in reliable working condition.
- Reduce inflow/infiltration (I/I) volumes to mitigate potential for sanitary overflows, water in basements, and overloading of the 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 the wastewater system.

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

Measuring Performance

To assure that LOS goals are met, performance measurements may need to be implemented. During the LOS review with the community, the need for performance measurements was discussed.

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 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 and location of asset within the utility network
- Type of asset

Criticality Results
Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a capital planning template 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.

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

Figure 1 provides the risk rating for gravity pipe by number of pipe segments. Eight pipe segments in the collection system have been identified with a high risk rating. All of these deficiencies are holes in the pipe or a broken pipe with a visible void. These sections of pipe are put into the first five years of the CIP. A majority of the collection system's gravity pipes, 68 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes in relatively good condition.

Figure 2 provides the risk rating for the collection system manholes. There are a total of 23 manholes that have a high likelihood of failure when compared to the other structures within the system, most of which are in need of chimney repair. Much of the collection system's manholes, 74 percent as shown in Figure 2, have a low to negligible risk rating and are indicative of manholes in relatively good condition.

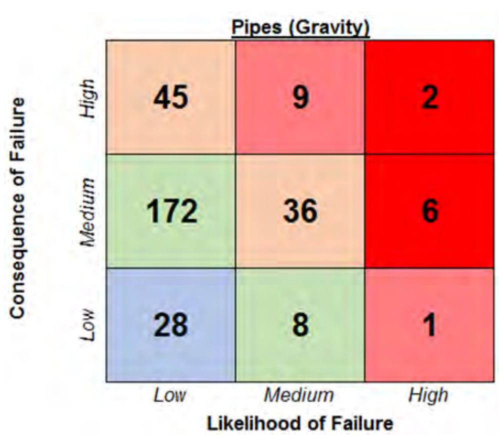


Figure 1. Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

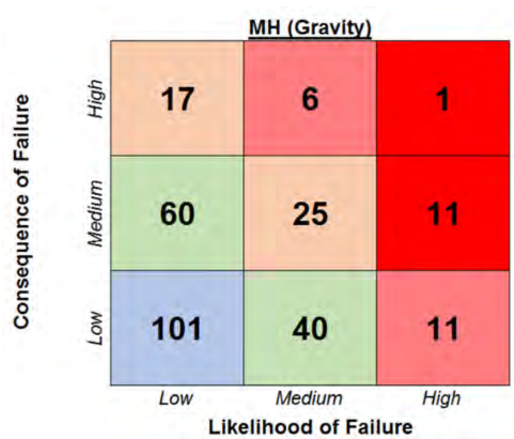


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the lift station assets. No assets are identified as an extreme risk. Most of the assets that of high risk are wet and dry well structures that will need to be replaced due to age.

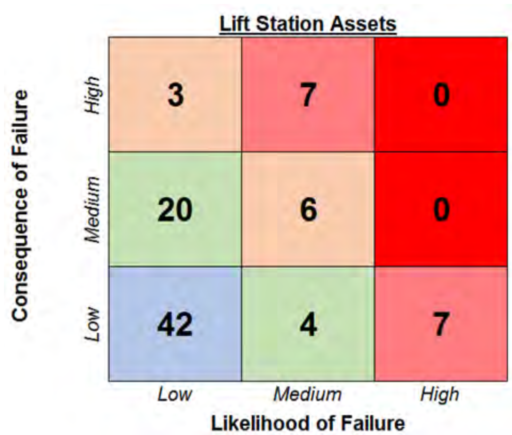


Figure 3. Business Risk Matrix (Risk Rating) by Number of Lift Station Assets

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City of Tawas City's wastewater utility assets based on the Business Risk evaluation. The CIP recommendations are provided for the collection system, pumping stations, and force mains. From the BRE, short-term (1-5 years) and long-term (6-20 years) CIPs were developed for the utility.

This AMP included a detailed condition assessment of the collection system including televising of pipe, and field condition assessments of all accessible sanitary manholes and lift stations.

Based on the AMP condition assessment of the sanitary sewer system, the City of Tawas City has identified assets of the collection system and lift stations for improvement. These improvements can be completed with funding from the City's sewer reserve account.

Short-Term (1-5 Years) Capital Improvements include:

- Make repairs to structures that are the highest likelihood of failure.
- Make repairs to pipes that are the highest likelihood of failure.
- Make repairs or replace pipe and structures that are within roads that are in the 1-5 year street CIP.
- Replace lift station assets with a high risk rating

Long-Term (6-20 Years) Capital Improvements include:

- Continue to repair structures and pipe that correlate to scheduled road work.
- Repair lift stations per AMP as components reach their normal lifespan.

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 function 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 lift station 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 outside contractors. Existing disposable materials include wear parts in pumps and motors, etc. The existing OM&R fund is scarcely sufficient for the current equipment and 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 existing rates were determined to create sufficient funds to fulfill the day-to-day maintenance and operations of the entire sanitary collection system.

The MDEQ approved the City's rate methodology on June 22, 2017.

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

Completion Date: October 31, 2017
(no later than 3 years from executed grant date)

The City of Tawas City *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1035-01** 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: **June 22, 2017**

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:

Annge Horning, City Manager	**(989) 362-8688**	**manager@tawascity.org**
Name	Phone Number	Email

Annge Horning — 30 Oct 2017

Signature of Authorized Representative (Original Signature Required) — Date

Annge Horning, City Manager
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

Village of Union City

SAW Project No. 1621-01

FINAL
October 2017

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 May 2014, The Village of Union City received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1621-01, 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 Union City AMP is:

Chris Mathis – Manager
208 North Broadway
Union City, MI 49094-1154
Phone number: 517-741-8591
Email: cmathis@visitunioncity.com

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 Plant (WWTP)
- Sanitary sewer lift stations in the collection system

The wastewater collection system assets consist of approximately 62,143 feet (11.77 miles) of sanitary sewers (gravity pipe and force mains) and 229 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 WWTP currently includes the following treatment processes:

- Aerated lagoons
- Facultative storage lagoons
- Phosphorus removal via chemical precipitation
- Cascade aeration prior to final discharge

Treated effluent is seasonally discharged to the St. Joseph River in accordance with NPDES General Permit No. MIG580000 and Certificate of Coverage MIG580409. The design capacity of the WWTP is 200,000 gallons per day (gpd). The current annual average flow received by the facility is approximately 107,000 gpd.

There are five sanitary sewer lift stations located throughout the wastewater collection system. The stations are either submersible style or grinder style stations.

<u>Asset Identification and Location</u>

A comprehensive wastewater system asset inventory was developed from operation and maintenance 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 45 WWTP assets, 61 Lift Station Assets, and 464 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 all 229 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 11% of the gravity pipe. Smoke Testing performed on 100% of system to disclose location of inflow or infiltration and 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 52.8% of the system being tagged for inspection and/or cleaning. Rehabilitation accounted for 11.9% of the system identifying the need for point repairs and lining. The remaining 35.3% of assets were placed in the 20+ year category.

The condition of the assets at the WWTP range from excellent to poor (7% excellent, 36% good, 56% fair, and 2% poor). Ongoing repairs or replacement have helped to maintain the condition of many assets as well as the work completed during a 1993 project. Most of the assets are in fair condition due to use and the harsh conditions associated with wastewater treatment. No major immediate concerns were noted.

The condition of the assets at the lift stations also range from excellent to poor (5% excellent, 39% good, 49% fair, and 7% poor). Ongoing maintenance has maintained the condition of many assets. As is the case with the WWTP, most of the assets are in fair condition due to use and the harsh conditions associated with typical wastewater collection systems. No major immediate concerns were noted for the lift stations.

Level of Service

Defining the Expected Level of Service (LOS)

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 Union City 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 WWTP.
- 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.

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 WWTP 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. Two pipe segments in the collection system have an extreme risk rating. One pipe is in need of replacement, while the other pipe needs a point repair. Much of the collection system's gravity pipes, 89.4 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition.

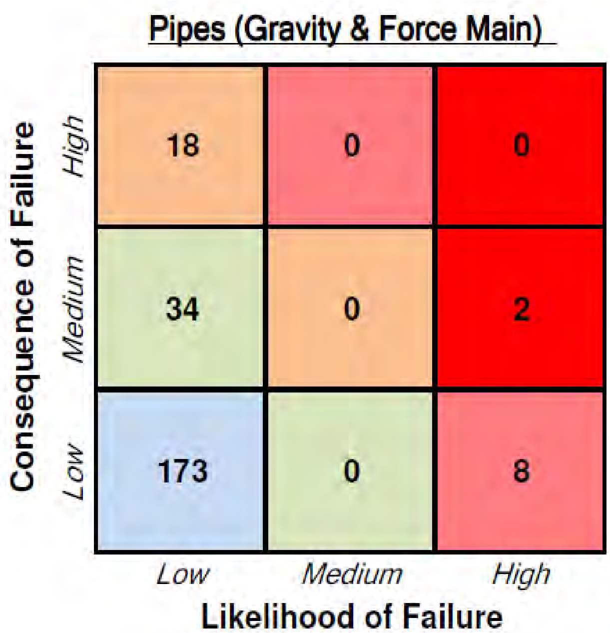


Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. 16 manholes are identified as extreme risk, 3 are recommended for cleaning in the next 1-2 years. For the other 17 manholes, repair and lining is recommended in the next 3-5 years. Many manholes are at low to medium risk and recommended to be included in a long-term 6-20-year rehabilitation strategy (86 percent).

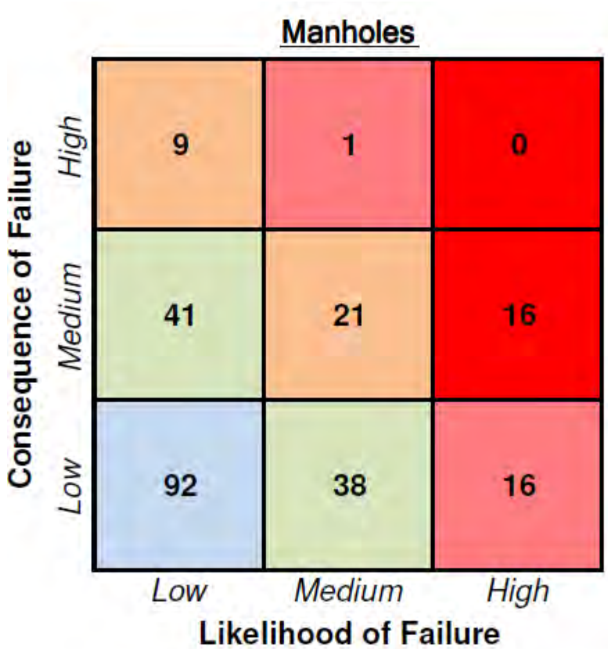


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTP and lift station assets. No assets are identified as extreme risk. The eight assets with high risk ratings should be inspected at regular intervals.

WWTP & Lift Stations

Consequence of Failure \ Probability of Failure	Low	Medium	High
High	0	1	0
Medium	22	23	7
Low	7	6	40

Figure 3. Business Risk Matrix (Risk Rating) for WWTP 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, wastewater treatment plant and lift stations/force mains. 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 a detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

Table 4. 5-Year Capital Improvement Plan: Rehabilitation

Year	Asset	ID	Address	Rehab Actions	Cost	2018	2019	2020	2021	2022
1	Gravity Main	S0655 - S0650	419 St Joseph St	Point Repair	$ 5,270	$ 5,270	$ -	$ -	$ -	$ -
2	Manhole	S0125	194-208 N Broadway St	MH Clean + Line + Repair	$ 5,020	$ -	$ 5,171	$ -	$ -	$ -
2	Gravity Main	S0060 - S0065	408 John St	Replacement	$ 112,144	$ -	$ 115,508	$ -	$ -	$ -
2	Manhole	S0440	501-505 S Broadway St	MH Clean + Line + Repair +Adjust	$ 7,520	$ -	$ 7,746	$ -	$ -	$ -
2	Manhole	S0160	125 Ellen St	MH Repair + Line + Adjust Rim	$ 6,770	$ -	$ 6,973	$ -	$ -	$ -
2	Manhole	S0355	114-128 Coldwater St	MH Clean + Line + Repair	$ 5,020	$ -	$ 5,171	$ -	$ -	$ -
2	Manhole	S0895	406 West County Line Road	MH Clean + Line + Repair	$ 5,020	$ -	$ 5,171	$ -	$ -	$ -
2	Manhole	S0145	200 W High St	MH Clean + Line + Repair	$ 5,020	$ -	$ 5,171	$ -	$ -	$ -
2	Manhole	S0150	127-199 W High St	MH Repair+Lining	$ 4,270	$ -	$ 4,398	$ -	$ -	$ -
2	Manhole	S0280	221-299 W High St	MH Clean + Line + Repair	$ 5,020	$ -	$ 5,171	$ -	$ -	$ -
2	Manhole	S0110	120 E High St	MH Clean + Line + Repair	$ 5,020	$ -	$ 5,171	$ -	$ -	$ -
2	Manhole	S0335	103-107 Coldwater St	MH Clean + Line	$ 3,770	$ -	$ 3,883	$ -	$ -	$ -
2	Manhole	S0165	129-199 Hammond St	MH Replace	$ 5,000	$ -	$ 5,150	$ -	$ -	$ -
2	Manhole	S0340	190-192 Coldwater St	MH Clean + Line	$ 3,770	$ -	$ 3,883	$ -	$ -	$ -
2	Manhole	S0635	326 St Joseph St	MH Repair+Lining	$ 4,270	$ -	$ 4,398	$ -	$ -	$ -
4	Gravity Main	S0055 - S0060	101-107 Foote St	Full Lining	$ 13,523	$ -	$ -	$ -	$ 14,740	$ -
4	Manhole	S0890	408 Calhoun St	MH Clean + Line + Repair	$ 5,020	$ -	$ -	$ -	$ 5,472	$ -
4	Manhole	S0775	425 Summit St	MH Clean + Line + Repair	$ 5,020	$ -	$ -	$ -	$ 5,472	$ -
4	Manhole	S0505	1-205 Woodruff St	MH Clean + Line + Repair	$ 5,020	$ -	$ -	$ -	$ 5,472	$ -
4	Manhole	S1090	718 N Broadway St	MH Repair + Line + Adjust Rim	$ 6,770	$ -	$ -	$ -	$ 7,379	$ -
4	Gravity Main	S0525 - S0520	302 St Joseph St	Full Lining	$ 4,817	$ -	$ -	$ -	$ 5,250	$ -
4	Gravity Main	S0520 - S0515	209-299 St Joseph St	Full Lining	$ 8,527	$ -	$ -	$ -	$ 9,294	$ -
4	Manhole	S0090	216-298 E High St	MH Repair+Lining	$ 4,270	$ -	$ -	$ -	$ 4,654	$ -
4	Manhole	S0075	312 John St	MH Repair+Lining	$ 4,270	$ -	$ -	$ -	$ 4,654	$ -
4	Manhole	S0605	311-499 S Rd	MH Clean + Line + Repair	$ 5,020	$ -	$ -	$ -	$ 5,472	$ -
4	Manhole	S0085	216-298 E High St	MH Repair+Lining	$ 4,270	$ -	$ -	$ -	$ 4,654	$ -
4	Manhole	S0135	221 W High St	MH Repair+Lining	$ 4,270	$ -	$ -	$ -	$ 4,654	$ -
4	Manhole	S0095	216-298 E High St	MH Repair+Lining	$ 4,270	$ -	$ -	$ -	$ 4,654	$ -
4	Manhole	S0855	116 Calhoun St	MH Repair+Lining	$ 4,270	$ -	$ -	$ -	$ 4,654	$ -
4	Manhole	S0290	323-399 W High St	MH Clean + Line + Repair	$ 5,020	$ -	$ -	$ -	$ 5,472	$ -
4	Manhole	S0365	215 Crane St	MH Clean + Line	$ 3,770	$ -	$ -	$ -	$ 4,109	$ -
4	Manhole	S0695	102 S Park St	MH Clean + Line	$ 3,770	$ -	$ -	$ -	$ 4,109	$ -
4	Manhole	S1070	4-54 Sycamore Bend	MH Clean + Line + Repair	$ 5,020	$ -	$ -	$ -	$ 5,472	$ -
5	Gravity Main	S0210 - S0205	504 N Broadway St	Replacement	$ 14,303	$ -	$ -	$ -	$ -	$ 16,020
5	Gravity Main	S0045 - S0050	518-598 N Broadway St	Replacement	$ 73,413	$ -	$ -	$ -	$ -	$ 82,222
5	Gravity Main	S0035 - S0045	618 N Broadway St	Replacement	$ 97,554	$ -	$ -	$ -	$ -	$ 109,261
5	Gravity Main	S0205 - S0050	518 N Broadway St	Replacement	$ 46,417	$ -	$ -	$ -	$ -	$ 51,987
5	Gravity Main	S0030 - S0035	790 N Broadway St	Replacement	$ 90,230	$ -	$ -	$ -	$ -	$ 101,057
TOTAL:						$ 5,270	$ 182,963	$ -	$ 105,639	$ 360,548

Table 5 shows detailed recommendations for the lift station system assets needing rehabilitation in the short-term CIP, and long term 6-20 year.

Table 5. Recommended Capital Improvements for WWTP and Lift Stations

Asset Description	Year Installed	Expected Useful Life (Years)	Recommended Year of Replacement	Replacement Cost (2017 Dollars)	Replacement Cost (Inflated 3%/yr)
5-YEAR CIP PROJECTS					
Woodruff Street Pump 1	1995	15	2018	$16,700	$17,200
Woodruff Street Pump 2	1995	15	2018	$16,700	$17,200
North Broadway Pump 1	1995	15	2018	$6,500	$6,700
North Broadway Pump 2	1995	15	2018	$6,500	$6,700
Lagoon Circulator 1	1995	20	2018	$40,000	$41,200
Lagoon Circulator 2	1995	20	2018	$40,000	$41,200
Electrical Building Roof[1]	1995	20	2018	$3,200	$3,300
Final Effluent Sampler	1995	25	2020	$7,400	$8,300
Lagoon Biosolids Removal[2]	--	--	2021	$714,000	$804,000
John Street Pump 1	2008	15	2023	$18,200	$22,400

6-20-YEAR CIP PROJECTS					
Lift Station Mechanical Improvements[2]	1995	--	2025	$194,000	$253,000
Electrical and Controls Improvements[2]	1995	--	2025	$340,000	$444,000
Storage Bypass Valve	1995	30	2025	$11,300	$14,700
Sycamore Bend Pump 1	2010	15	2025	$6,500	$8,500
Sycamore Bend Pump 2	2010	15	2025	$6,500	$8,500
Aeration Pond 1 Drain Sluice Gate[1]	1995	30	2025	$12,400	$16,200
Storage Pond 1 Isolation Sluice Gate[1]	1995	30	2025	$12,400	$16,200
Aeration Pond 2 Drain Sluice Gate[1]	1995	30	2025	$12,400	$16,200
Storage Pond 2 Isolation Sluice Gate[1]	1995	30	2025	$12,400	$16,200
John Street Pump 2	2011	15	2026	$18,200	$24,500
Park Street Pump 1	2015	15	2030	$16,700	$25,300
Park Street Pump 2	2015	15	2030	$16,700	$25,300
Ferric Chloride Storage Tank[2]	2002	30	2032	$129,000	$207,000

[1]Contingency added to replacement cost for contractor installation
[2]Contractor lead project with detailed scope available in Section 5.3 and Appendix F of AMP for WWTP and Lift Stations

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 WWTP 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.

Table 6 shows a summary of recommended operations and maintenance to be performed on the collection system assets.

Table 6. Collection System Maintenance Summary Table: Year by Year

Maintenance Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Manhole Assessment	$ 14,500	$ -	$ -	$ -	$ 15,805	$ -
Manhole Cleaning	$ 12,750	$ 2,250	$ -	$ -	$ -	$ 11,760
CCTV	$ 10,699	$ -	$ -	$ 11,341	$ -	$ -
CCTV - Heavy Cleaning	$ 333,790	$ -	$ -	$ 353,817	$ -	$ -

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 an independent municipal financial advisor (Utility Financial Solutions, LLC) dated April 7, 2017.

The rate methodology required by the MDEQ for SAW Grant 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 UFS showed 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 October 31, 2017
(no later than 3 years from executed grant date)

The Village of Union City *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1621-01 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: April 27, 2017.
2) Significant Progress Made: 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: NA.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on NA.

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 Nagel	at	(517) 741-8591	jennageluc@gmail.com
Name		Phone Number	Email

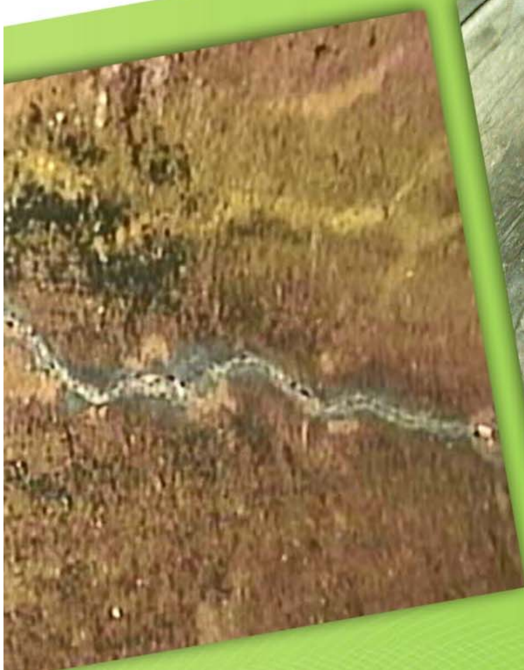
Signature of Authorized Representative (Original Signature Required) — Date: 10-25-17

Chris Mathis – Village Manager
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Stormwater Executive Summary Report



Prepared for:

Village of Union City

SAW Project No. 1621-01

FINAL
October 2017

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 2014, The Village of Union City 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 Village's stormwater collection system. 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 Union City AMP is:

Chris Mathis – Manager
208 North Broadway
Union City, MI 49094-1154
Phone number: 517-741-8591
Email: cmathis@visitunioncity.com

Asset Inventory and Condition Assessment

The stormwater collection system assets consist of approximately 18,026 feet (3.41 miles) of storm sewers and 212 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 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 an updated (GIS) database and piping network for archiving, mapping and further evaluation purposes.

Condition Assessment and Expected Useful Life

For the Village of Union City, a comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field based assessments were completed on all 212 structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 78% of the gravity pipe. Based on discussions with the stormwater system operations staff, there have not been any known capacity issues with the Village-owned stormwater system. Any flooding or drainage problems occur mainly when County drains are elevated and collected stormwater cannot flow into the County drains through the outfalls. For this reason, a capacity analysis was not completed for the Village of Union City. Recommendations for short-term (1-5 year) and long term (6-20 year) identifies the need for maintenance – 19.3% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 20.7% of the system identifying the need for replacement, point repairs or lining. The remaining assets (60%) were placed in the beyond 20 year planning category.

LEVEL OF SERVICE

DEFINING THE EXPECTED LEVEL OF SERVICE (LOS)

The overall objective is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulation.

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 Village of Union City:

- *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.*
- *Maintenance and operations staff are to be properly trained.*

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 Village of Hopkins using Innovyze-InfoMaster software. InfoMaster is an ArcGIS-based sewer asset management and capital planning software that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. 11 pipe segments in the stormwater collection system have an extreme risk rating and are recommended to be for near-term rehabilitation or replacement.

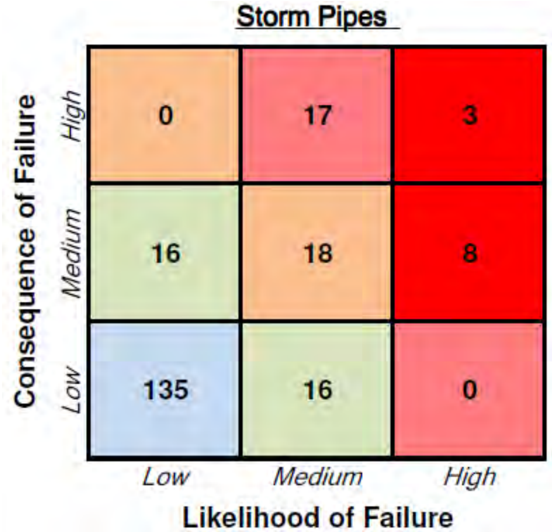


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. 25 structures are identified as extreme risk, and are recommended for replacement or rehabilitation.

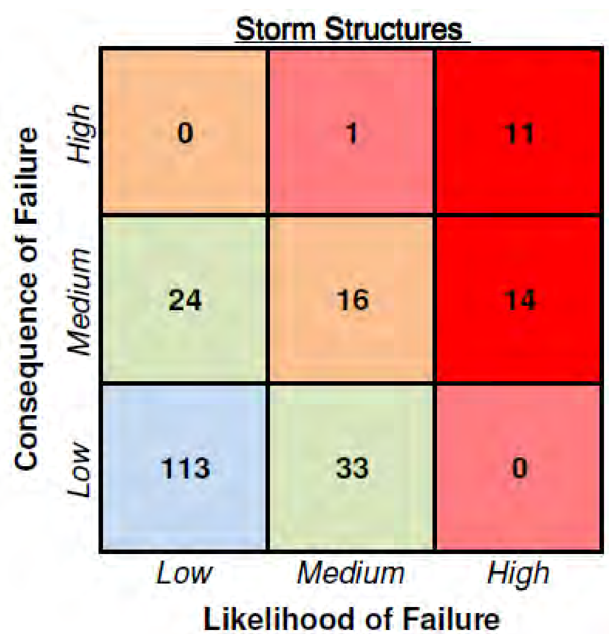


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

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 with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term 1-5 year and Long-Term 6-20-year Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system. The 5-year CIP rehabilitation total is $307,137.

CIP Development

The Village of Union City identifies assets of $5,000 or more to be capital expenditures. Collection System assets were grouped by strategy and assigned costs from a unit database. This database includes unit construction values in 2018 construction dollars based on a survey of recent projects in Michigan and includes engineering and administrative rates where applicable. Assets were categorized and prioritized by year based on risk rating and criticality score to develop the CIP.

The recommended 5-Year Capital Improvement Plan for the Village-owned storm water collection system is included in Table 4 below.

Table 4. 5-Year Capital Improvement Plan: Rehabilitation

Rehabilitation Action	Total Cost (Current Year Dollars)	2018	2019	2020	2021	2022
Pipe Replacement	$ 111,107	$ -	$ 54,296	$ -	$ -	$ 65,722
Pipe Lining	$ 59,038	$ -	$ -	$ -	$ 64,512	$ -
Pipe Point Repair	$ 89,893	$ 47,596	$ -	$ 44,873	$ -	$ -
Manhole Replacement	$ 23,100	$ -	$ 23,793	$ -	$ -	$ -
Cover Replace	$ 4,000	$ 4,000	$ -	$ -	$ -	$ -
Chimney Repair	$ 15,000	$ -	$ 15,450	$ -	$ -	$ -
MH Repair	$ 5,000	$ -	$ 4,120	$ 1,061	$ -	$ -
Total	$ 307,137	$ 51,596	$ 97,659	$ 45,934	$ 64,512	$ 65,722

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound stormwater system. The process of cleaning and CCTV inspection of pipelines either with equipment owned by the community or contracted is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every five years, or that 20% of the system be cleaned and televised annually. Available budget will dictate the frequency or size of yearly projects. The 5-year CIP maintenance total is $47,978.

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Union City *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1621-01 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:

Jennifer Nagel at (517) 741-8591 jennageluc@gmail.com
Name Phone Number Email

10-25-17
Signature of Authorized Representative (Original Signature Required) Date

Chris Mathis – Village Manager
Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Executive Summary of Wastewater Collection System

Prepared for:

Village of Vernon

SAW Project No. 1386-01

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

September 2017

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for the Storm water, Asset Management, and Wastewater (SAW) Grant Program. In December 2014, the Village of Vernon received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1386-01, to provide financial assistance for the development of a wastewater asset management plan (AMP) for the Village's publicly owned wastewater utility. The assets that comprise the utility include collection system piping and manholes, lift station/pump station and force main.

The SAW Grant amount awarded to Vernon was $97,196
The Local Match provided by Vernon was $10,800

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.

Questions regarding the Asset Management Plan should be directed to:
Ms. Ellen Glass
Clerk
Village of Vernon
120 E. Main Street
Vernon, Michigan 48476
810-288-2300
Email: eglass@villageofvernon.org

ASSET INVENTORY AND CONDITION ASSESSMENT

The wastewater collection system assets consist of approximately:

- Gravity Sewer (8 inch thru 10 inch): 23,159 feet (4.39 miles)
- Force Main (6 inch): 3,725 feet (.71 miles)
- Manhole Structures: 89
- Sewer Lift Station (Submersible): 1
- Wastewater Stabilization Lagoons (17.1 acres)

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

The Wastewater Stabilization Lagoons for the treatment of wastewater are owned and operated by the Village.

Asset Identification and Location

A comprehensive wastewater system asset inventory was developed from a review of the existing record drawings, field notes, staff knowledge, site visits and 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 survey grade GPS equipment and a comprehensive evaluation of the gravity system.

This information was organized into a PDF based piping network for archiving, mapping and future evaluation purposes.

Condition Assessment and Expected Useful Life

A comprehensive evaluation of the collection system was performed.

NASSCO-MACP Level 1 manhole field based assessments were completed on 80 manhole structures that were assessable and assessed. The manhole structure assets ranged from Poor to Excellent. There were nine manholes that were not assessed. Four manholes were abandoned.

Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on approximately 23,159 feet of the gravity pipe.

The condition of the waste stabilization lagoon assets are in excellent condition. The Village recently completed a total reconstruction of the facility in 2014.

The condition of the collection system assets reviewed ranged from Poor to Excellent, with only a few minor deficiencies.

Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. It is recommended to visual inspect the collection system on an annual basis and clean and televise sections found to be restricting flows.

The condition of the assets were not assessed due to being recently installed. The Village recently completed an entirely new lift station in 2010/2011. The recommendations for long term improvements are relatively minor.

Level of Service

Defining the Expected Level of Service (LOS)

The overall objective of the Village of Vernon as it relates to their wastewater collection system is to adopt the following Level of Service (LOS) goals:

LEVEL OF SERVICE STATEMENT

The overall objective of the Village of Vernon 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:

- Provide adequate collection system and treatment capacity for all service areas.
- Comply with 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 the community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the Village annually to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

To assure that LOS goals are met, performance measurements may need to be implemented. During the LOS review with the community the need for performance measurements was discussed.

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

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical sewer asset management and capital planning template 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.

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

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Three pipe segments in the collection system have been identified with a high risk rating. Two were wrinkled linings, and one was a defective spot lining. The Village will need to monitor these specific locations and may require occasional cleaning of the pipe. Some of the collection system's gravity pipes, 12 percent as shown in Figure 1, have a low to negligible risk rating. The majority of the pipes have a medium risk rating and are indicative of pipes in fair condition.

Figure 2 provides the risk rating for the collection system manholes. There were no manholes that need to be replaced based upon the field assessment. Few of the collection system's manholes, 14 percent as shown in Figure 2, have a low to negligible risk rating. The majority of the manholes have a medium to high risk rating and are indicative of manholes in fair condition.

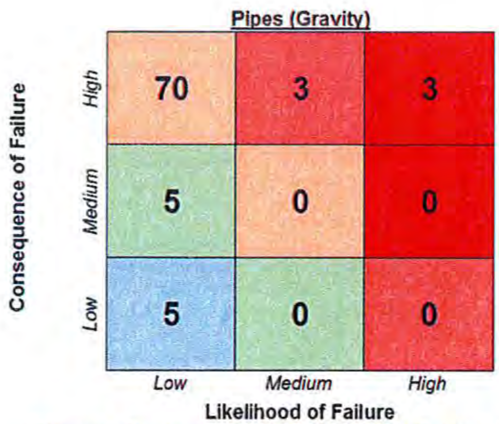


Figure 1 Business Risk Matrix (Risk Rating) by Number of Gravity and Force Main Pipes

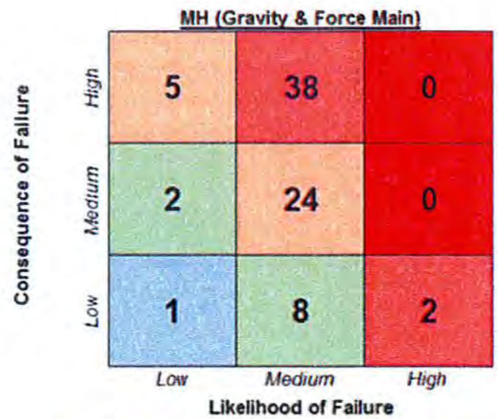


Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

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, pumping stations and force mains. From the BRE, short-term (1-5 year) and long-term (6-20 year) CIP's were developed for the utility.

This AMP included a detailed condition assessment of the collection system including televising of pipe, and field condition assessments of all accessible sanitary manholes and lift stations.

Based on the AMP condition assessment of the sanitary sewer system, the Village has identified assets of the collection system and lift stations for improvement. These improvements can be completed with funding from the Village's sewer reserve account.

(1-5 Year) Capital Improvements include:

- Rehabilitation of Lift Station Pumps
- Install debris basket in Lift Station
- Replacement of gravity pipes on Water St, Sunnybrooke Dr, Leaver St, Elm St (east of Maple St), and through an alley south of Main St due to excessive infiltration.
- Grout, repair, and spot line several sections of gravity pipe.
- Clean, Line, and Adjust rim elevations of several manholes.

(6-20 Year) Capital Improvements include:

- Grout, repair, spot line, fully CIPP several sections of gravity pipe.
- Clean, line, adjust rim elevations, and repair of several manholes.

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 function 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.

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 existing rates were determined to create sufficient funds to fulfill the day-to-day maintenance and operations of the entire sanitary collection system.

The MDEQ approved the Village's rate methodology on June 16, 2017.

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

Completion Date: October 31, 2017
(no later than 3 years from executed grant date)

The **Village of Vernon** *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No.**1386-01** 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: June 15, 2017

   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.)

2) Date of rate methodology review letter identifying the gap: n/A.
3) 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:

Ellen Glass, Clerk	(989)-288-2300	eglass@villageofvernon.org
Name	Phone Number	Email

Ellen R. Glass 10/30/2017

Signature of Authorized Representative (Original Signature Required) Date

Ellen R. Glass

Print Name and Title of Authorized Representative

Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Executive Summary of Stormwater Collection System

Prepared for:

Village of Vernon

SAW Project No. 1386-01

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

September 2017

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2014, The Village of Vernon received a (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), Project no.1386-01 to provide financial assistance for the development of this asset management plan (AMP). This report provides the Asset Management Plan (AMP) for the Village's Stormwater collection system. 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.

The SAW Grant amount awarded for Stormwater to the Village of Vernon was $82,804
The Local Match provided by Village of Vernon was $9,200

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.

Questions regarding the Asset Management Plan should be directed to:
Ms. Ellen Glass
Clerk
Village of Vernon
120 E. Main Street
Vernon, Michigan 48476
810-288-2300
Email: eglass@villageofvernon.org

ASSET INVENTORY AND CONDITION ASSESSMENT

The Stormwater collection system assets consist of approximately:

- Storm piping (6 thru 24 inch): 23,315 (4.42 miles)
- Manhole and Catchbasins: 191

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 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 database and piping network for archiving, mapping, and future evaluation.

Condition Assessment and Expected Useful Life

A comprehensive evaluation of the collection system was performed.

NASSCO-MACP Level 1 manhole field based assessments were completed on 102 structures. These are the mainline structures only.

Based on discussions with the Village DPW staff, there have not been any known capacity issues with the Village owned stormwater system.

Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 22,918 feet of the Storm piping.

The condition of the storm water system assets ranged from Poor to Excellent.

Recommendations for short-term (1-5 year) and long term (6-20 year) system maintenance and improvements were identified. It is recommended to clean and televise the system on a 7 to 10-year rotating basis.

Level of Service

Defining the Expected Level of Service (LOS)

The Village of Vernon Level of Service (LOS) goals as it relates to the stormwater collection system is summarized as follows:

LEVEL OF SERVICE STATEMENT

The overall objective of Village of Vernon is to provide reliable stormwater 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:

- Provide adequate collection system capacity for all service areas.
- Comply with local, state and federal regulations.
- Actively maintain collection system assets in reliable working condition
- 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, to ensure sound financial management of the stormwater 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 annually to make sure they accurately reflect the desired operation of the utility.

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 Stormwater 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 the utilities ability to convey and treat 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 Village of Vernon using an ArcGIS-based sewer asset management and capital planning template that will compile, analyze and assess Business Risk for each asset and develops a Capital Improvement Plan.

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. 8 pipe segments in the Stormwater collection system have a high to extreme risk rating and are recommended to be lined or replaced. This represents approximately 5% of the storm system. Approximately 49% of the collection system is in the negligible to low risk category and are in relatively good condition.

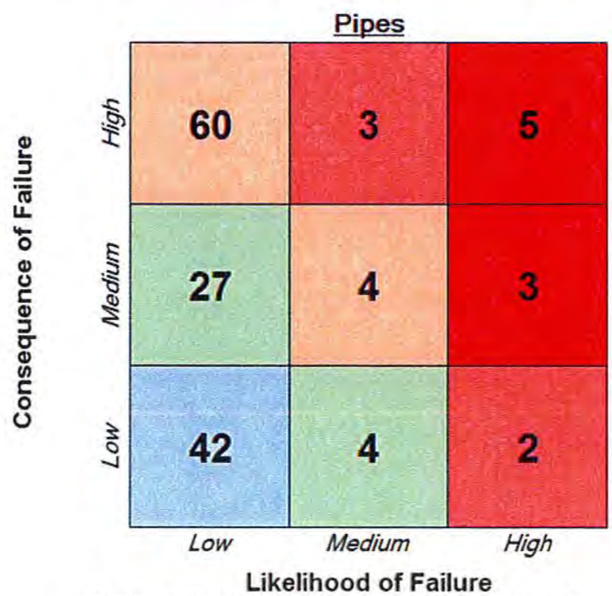


Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. 9 structures are identified an extreme risk rating, and are recommended for short term replacement or rehabilitation.

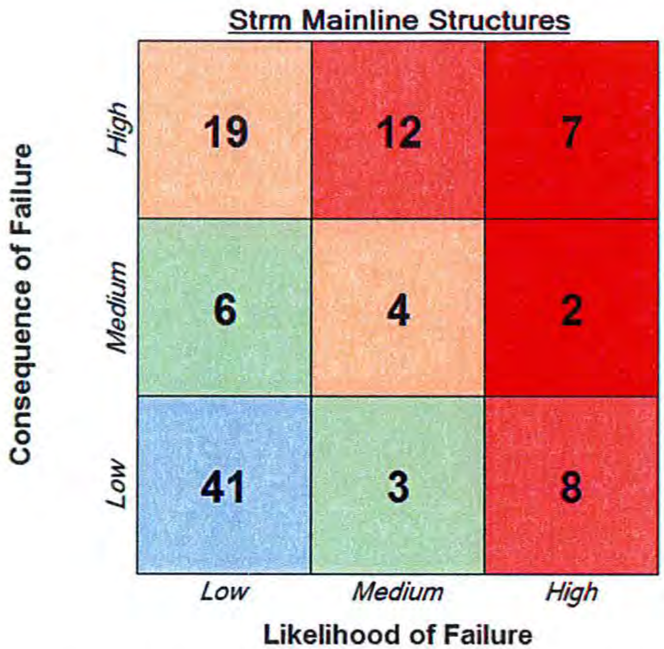


Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

Capital Improvement Plan

A Capital Improvement Plan with recommendations was prepared for the Village's assets based on the Business Risk evaluation. Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. Short-Term (1-5 year) and Long-Term (6-20-year) Capital Improvement Plan (CIP) was prepared to address the projected needs for each asset in the system.

The Village is considering funding options to make the needed improvements that have been identified as a high or extreme risk within the Short Term (1-5 year) CIP.

(1-5 Year) Capital Improvements include:

- Various sections of Storm Sewer to be repaired or replaced as identified in the AMP.

(6-20 Year) Capital Improvements include:

- Manhole Reconstruction or Replacement
- Catch basin reconstruction and frame and casting replacement
- Various sections of Storm Sewer to be replaced or repaired as identified in the AMP.

Operations and Maintenance

A preventative maintenance program to systematically clean and CCTV inspect pipelines to NASSCO-certified standards is critical for a sound Stormwater system. The process of cleaning and CCTV inspection of pipelines is a relatively inexpensive maintenance effort when compared to rehabilitation efforts. For this reason, it is recommended that at a minimum, all pipelines be cleaned and televised every 7 to 10 years. Available budget will dictate the frequency or size of yearly projects.

Revenue Structure

The revenue for storm sewer improvements will come from the Village local and major street funds or the Village General Fund.

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The **Village of Vernon** certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1041-01 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:

Ellen Glass	at (989)-288-2300	eglass@villageofvernon.org
Name	Phone Number	Email

Ellen R. Glass — 10/30/2017
Signature of Authorized Representative (Original Signature Required) — Date

Ms. Ellen Glass - Clerk
Print Name and Title of Authorized Representative

June 2014

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	October 30, 2017
To:	Mr. David Worthington
Company:	Michigan Department of Environmental Quality
From:	Prein&Newhof
Project #:	2130353
Re:	Village of Vicksburg SAW Grant: Summary of Wastewater Asset Management Plan

Mr. Worthington:

This memorandum provides the summary of the Village of Vicksburg wastewater asset management plan SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

Grantee:
Village of Vicksburg
126 N. Kalamazoo Avenue
Vicksburg, MI 49097
http://www.vicksburgmi.org/

Contact: Mr. Jim Mallery, Village Manager
Phone: 269-649-1919

SAW Grant Project Number: 1476-01

Executive Summary

The Village of Vicksburg received a SAW Grant in October 2014 to prepare a Wastewater and Stormwater Asset Management Plans. The Grant agreement indicated the following amounts:

Project Total	Grant Amount	Local Match
$1,279,376	$1,126,199	$153,177
Project Total	Wastewater Costs	Stormwater Costs
$1,279,376	$648,496	$630,880

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 inventories. 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 adjusted with survey grade Global Positioning System (GPS) coordinates.

Asset inventory data including year of installation, material, 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.

Location of non-pipe assets, such as, lift station components, building components, and other equipment is 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 condition, 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
67%	11%	5%	10%	7%

Force Mains: Force main conditions were estimated using pipe age, material, and break history records. Vicksburg'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
57%	2%	41%	0%	0%

Manholes: Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, structures, and infiltration.

Percentage of manholes in each rating category

1	2	3	4	5
0%	55%	27%	12%	6%

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	2	7	1	0

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 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 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 Michigan Avenue, Main Street, Kalamazoo Street, Prairie Street, and Highway 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 Village recognizes that the people served by the system are more than customers, they are the system owners. Village staff acts as stewards of the system. The Village has held a numerous public meetings and workshops with the Village Staff and Council members. At these meetings, the results of the condition assessments were discussed, the costs for various OM&R 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 has 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 our 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 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:

- Spruce to Washington LS Interceptor
- Centennial to Trillium LS Interceptor
- Mill and Washington
- Maple and Michigan
- Park, Main and South
- Michigan (Park to Highway)
- Kalamazoo (Prairie to Highway)

- North Main Street
- N Kalamazoo (Prairie to Vine)
- Second Street
- Highway Street (Lee to Michigan)
- Division (Davis to Wilson)
- Wilson Street
- Lee Street
- State Street
- Force mains - Highway Street LS Replacement
- Force mains - Sprinkle Rd Replacement
- Force mains – Washington Replacement
- Lift Stations – Washington - Replacement
- Non-Pipe Assets - Generator (trailer-mounted)

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Vicksburg's major assets include:

- 10 lift stations
- 91,582 feet of 6" to 16" diameter gravity sewer
- 29,866 feet of 2" to 12" diameter force main
- 373 manholes

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Vicksburg *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1476-01 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: April 25, 2017.

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 Adams at 269-823-2492 w-adams@att.net

Name | Phone Number | Email

William V. Adams 10/30/17

Signature of Authorized Representative (Original Signature Required) | Date

William V. Adams Pres Village Council

Print Name and Title of Authorized Representative

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	October 30, 2017
To:	Mr. David Worthington
Company:	Michigan Department of Environmental Quality
From:	Prein&Newhof
Project #:	2130353
Re:	Village of Vicksburg SAW Grant: Summary of Stormwater Asset Management Plan

Mr. Worthington:

This memorandum provides the summary of the Village of Vicksburg stormwater asset management plan SAW grant activities required under Section 603 of Public Act 84 of 2015. Headings and italicized quotes are from recent MDEQ guidance.

Grantee Information

Grantee:
Village of Vicksburg
126 N. Kalamazoo Avenue
Vicksburg, MI 49097
http://www.vicksburgmi.org/

Contact: Mr. Jim Mallery, Village Manager
Phone: 269-649-1919

SAW Grant Project Number: 1476-01

Executive Summary

The Village of Vicksburg received a SAW Grant in October 2014 to prepare a Wastewater and Stormwater Asset Management Plans. The Grant agreement indicated the following amounts:

Project Total	Grant Amount	Local Match
$1,279,376	$1,126,199	$153,177
Project Total	Wastewater Costs	Stormwater Costs
$1,279,376	$648,496	$630,880

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 stormwater system have been inventoried. Manhole, catch basin, sewer pipe, leaching basins, and retention/detention basin locations were plotted in a Geographic Information System (GIS) using record drawings, aerial imagery, and land contours. Locations were field verified and locations adjusted with survey grade Global Positioning System (GPS) coordinates.

Asset inventory data for storm sewers, including year of installation, material, 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.

Condition Assessment

Discuss the condition assessment process, including what methods were used. Summarize the results of the assessment for each asset category.

Storm Sewer Pipes: 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 condition, 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
66%	11%	9%	6%	8%

Manholes and Catch Basins: Manholes and catch basins were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, structures, and sediment.

Percentage of structures in each rating category

1	2	3	4	5
1%	61%	24%	8%	7%

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 network, and the surrounding property/environment.

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 generally found to be storm sewers along Prairie Street, Leja Drive, Michigan Ave, Main Street, Kalamazoo Street, Park Street and Mill 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 Village recognizes that the people served by the system are more than customers, they are the system owners. Village staff acts as stewards of the system. The Village has held a series of public meetings and workshops with the Village staff. At these meetings, the results of the condition assessments were discussed, the costs for various OM&R strategies affecting the levels of service were reviewed along with potential costs. Based on the input received during these meetings, the following Level of Service Goals have been established:

1. Meet Regulatory Requirements
2. Minimize Flood Risk
3. Minimize Public Hazards
4. Manage Storm Water Discharges into the Waste Water System
5. Support Community Growth and Development
6. Maintain Water Quality
7. 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."

Stormwater system improvements are funded with street improvements through the Village's general fund. Project costs were estimated for capital improvements within the first 10 years. Future costs beyond the 10 year capital improvement plan were projected using inventory and condition assessment data. Based on this analysis, the Village is considering property tax millage rate increases to begin increasing general fund revenues.

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 showing project descriptions, cost estimates, and project timelines, was developed for the capital improvements needed within a ten year planning period. The stormwater system projects identified in the CIP are:

- Eight (8) Point Repairs to remove utility penetrations
- Five (5) Point Repairs to fix broken pipes
- Leja Drive
- Vine & Richardson
- Main, Bowie, Vine and Michigan area

- Mill and Washington (Joint Project for Storm and Sanitary)
- Maple and Michigan (Joint Project for Storm and Sanitary)
- Park, Main and South (Joint Project for Storm and Sanitary)
- Michigan (Park to Highway) (Joint Project for Storm and Sanitary)
- Kalamazoo (Prairie to Highway) (Joint Project for Storm and Sanitary)
- North Main Street (Joint Project for Storm and Sanitary)

List of Major Assets

"Provide a general list of the major assets identified in the AMP."

Vicksburg's major assets include:

- 59,351 feet of 6" to 42" diameter storm sewer
- 114 manholes
- 485 catch basins / inlets
- 12 retention basins

DEQ

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

Completion Due Date October 31, 2017
(no later than 3 years from executed grant date)

The Village of Vicksburg *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1476-01 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:

William V. Adams at 269-823 2492 w-adams@att.net
Name Phone Number Email

William V. Adams 10/30/17
Signature of Authorized Representative (Original Signature Required) Date

William V. Adams Village Council Pres
Print Name and Title of Authorized Representative

City of Walker
Storm Water Asset Management Plan Summary

City of Walker SAW Grant

4243 Remembrance Road NW

Walker, MI 49534

www.walker.city

Contact Information for the grantee:

Ms. Rachell Nagorsen, Engineering Programs Coordinator

Address: 4243 Remembrance Rd. NW, Walker, MI 49534

Phone: 616-791-6327

SAW Grant Project Number: 1108-01

Executive Summary

The City of Walker received a SAW Grant in 2014 to prepare a Storm Water Asset Management Plan.

The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$99,941	$89,947	$9,994

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
e. Long-term Funding/Capital Improvement Plan

City of Walker
Storm Water Asset Management Plan Summary

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.

- A statistical sample of collection system manholes and catch basins were located using hand held GPS equipment.
- Remaining assets were located with as-builts or existing GIS data.

Locations for all assets are recorded in GIS. Data regarding 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 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 a pole mounted zoom camera (looking down each pipe from the manholes). The zoom camera method provided a very economical initial condition assessment of the pipes. The city's plan was to do an inventory sampling based on pipe age, location, and material. Zoom camera inspection was completed on 40% of storm system mainline pipe.

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. If no zoom videos were available, risk of failure was estimated based on surrounding pipe conditions.

City of Walker
Storm Water Asset Management Plan Summary

Percentage of mainline pipes within each rating category

1	2	3	4	5
73%	25%	1%	0.4%	0.4%

Approximately 291 manholes (20%) and 28 catch basins (1%) were visually inspected and rated on a scale of 1-5 based on factors related to the condition of castings, steps, and structures. Structures were chosen for inspection by selecting structures with three or more pipes connected, at least one structure in each storm drainage area, and with precedence given to older areas of the storm system.

Percentage of manholes within each rating category

1	2	3	4	5	Not Rated
11%	8%	0.5%	0%	0%	80%

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 acts as stewards of the system. We have reviewed the results of our condition assessments with our Engineering and Public Works Departments, looked at regulatory requirements, and discussed costs. AMP results were shared with the public at an open City Commission meeting. Based on the input received, we have established the following Level of Service Goals:

1. Meet Regulatory Requirements
    a. Maintain a specified number of Certified Operators

   b. Comply with our Municipal Separate Storm Sewer System (MS4) Permit requirements which include an Illicit Discharge Elimination Plan and Storm Water Pollution Prevention Initiatives.
2. Minimize Flooding and Public Hazards
   a. Staff/equip crews sufficiently to perform specific routine maintenance items
   b. Perform regularly scheduled monitoring and maintenance on all our storm water system assets
   c. Adopt a baseline 10-year 24-hour design storm
   d. Require storage based on prioritized stormwater zones to prevent flooding downstream
3. Manage Storm Water Inflow into the Wastewater System
4. Provide Capacity for Community Growth
5. Minimize Life Cycle Costs
6. Maintain Active Water Quality
   a. Maintain 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 (RoF) rating of 1-5 (5 being the worst) based on factors related to both physical and functional conditions. The factors considered varied by the 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, 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 (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). The Criticality ratings were considered when the comprehensive Capital Improvement Plan 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 5 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 the CIP was adjusted to reflect achievable demands on the City's General Fund.

The City's General Fund currently includes funding for O&M procedures. The CIP will be reviewed yearly to prioritize both Level of Service goals and system improvements concurrent with other infrastructure improvements, such as road reconstruction.

City of Walker

Storm Water Asset Management Plan Summary

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/replacement.

Individual project scopes for the CIP were created to maximize coordination of work on roads and the storm water system and minimize overall costs. The CIP projects include improvements to the storm water system and road system. A detailed 5-year CIP document was created, and a CIP project list was made available to the public. The following is a list of CIP projects:

City of Walker Storm Water CIP Implementation Timeline

Planned Year [1]	ID	Project Title	Total Est. Cost [2]
2018/2019	201801	Storm Sewer Spot Repairs Ph. 1	$30,000
2018/2019	201802	Pond Maintenance	$10,000
2018/2019	201803	Storm Sewer Improvements—Leonard Street	$234,000
2018/2019	201804	Storm Sewer Reconstruction—Ryan Ave., Mohler St.	$21,000
2018/2019	201805	Drain Improvements—Vista View	$27,000
2019/2020	201901	Storm Sewer Spot Repairs Ph. 2	$30,000
2019/2020	201902	Pond Maintenance	$10,000
2019/2020	201903	Chesterfield Heights Conveyance	$70,000
2019/2020	201904	Drain Improvements—Drain South of Waldorf	$147,000
2020/2021	202001	Storm Sewer Spot Repairs Ph. 3	$30,000
2020/2021	202002	Pond Maintenance	$10,000
2020/2021	202003	Road and Storm Sewer Improvements—O'Brien Rd. Culvert west of Wilson (DPW project)	$25,000
2020/2021	202004	Storm Sewer Improvements—Kinney Ave.	$78,000

City of Walker
Storm Water Asset Management Plan Summary

Planned Year [1]	ID	Project Title	Total Est. Cost [2]
2021/2022	202101	Storm Sewer Spot Repairs Ph. 4	$30,000
2021/2022	202102	Pond Maintenance	$10,000
2021/2022	202103	Drain Improvements—Kenowa Ave. Ditch, Ph. 1	$25,000
2021/2022	202104	Drain Improvements—Upstream Brandywine Creek Tributary (along Richmond St.)	$168,000
2022/2023	202201	Storm Sewer Spot Repairs Ph. 5	$30,000
2022/2023	202202	Pond Maintenance	$10,000
2022/2023	202203	Drain Improvements—Dakota-Springbrook Outlets, Ph. 1	$168,000
2022/2023	202204	Drain Improvements—Upstream Friar Kimball, Ph. 1	$61,000
Future		Storm Sewer Spot Repairs (yearly)	$20,000-$30,000
Future		Pond Maintenance (yearly)	$10,000
Future		Storm Sewer Capacity Modeling	$50,000
Future		Drain Improvements—Home Depot Drain	$94,000
Future		Drain Improvements—Moelker Outlet	$18,000
Future		Drain Improvements—Kenowa Ave. Ditch, Ph. 2	$25,000
Future		Drain Improvements—Upstream Friar Kimball, Ph. 2 (5 yr. maintenance)	$57,000
Future		Drain Improvements—Kenowa Ave. Ditch, Ph. 3	$25,000
Future		Drain Improvements—Blossom Trail Ditch	$32,000
Future		Drain Improvements—Marsman Drain	$142,000
Future		Drain Improvements—Dakota-Springbrook Outlets, Ph. 2 (5 yr. maintenance)	$40,000

Notes:
(1) Unplanned repairs may necessitate adjustments in priority.
(2) All costs estimated in 2017 dollars.

<u>List of the plan's major identified assets</u>

- 431,000 feet of gravity storm sewer
  - Current replacement value of $51,720,000
- 1,500 manholes and 2,600 catch basins
  - Current replacement value of $12,300,000
- 7 detention ponds

DEQ

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

Completion Due Date 10/31/2017
(no later than 3 years from executed grant date)

The City of Walker *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1108-01 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:

Rachell Nagorsen	at 616-791-6327	rnagorsen@walker.city
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required) — Date: 9/25/2017

Rachell Nagorsen, Engineering Programs Coordinator
Print Name and Title of Authorized Representative

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section, Attn: Ms. Karen Nickols

From: Fishbeck, Thompson, Carr & Huber, Inc. (FTCH)

CC: Oakland County Water Resources Commissioner (WRC)/Walled Lake-Novi Wastewater Treatment Plant (WWTP)

Date: October 31, 2017

Re: Walled Lake-Novi WWTP
MDEQ Stormwater, Asset Management, and Wastewater (SAW) Grant #1343-01
Summary of Wastewater Asset Management Plan (AMP)

The following is a summary of the work completed under the MDEQ SAW Grant performed by the Walled Lake-Novi WWTP. 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

Walled Lake-Novi WWTP, SAW Grant Project #1343-01

Project Grant Amount: $1,241,942

Applicant Match Amount: $191,759

Authorized Representative	Consultant Contact	WRC Project Manager
Jim Nash, Oakland County Water Resources Commissioner 248-858-0958 nashj@oakgov.com 1 Public Works Drive Building 95 West Waterford, MI 48328	Maria Sedki, PE; FTCH; Associate 248.324.2090 mesedki@ftch.com 39500 Mackenzie Drive Suite 100 Novi, Michigan 48377	Jared Buzo, PE; WRC; Operations Engineer 248-858-1601 buzoj@oakgov.com 1 Public Works Drive Building 95 West Waterford, MI 48328

EXECUTIVE SUMMARY

The Walled Lake-Novi WWTP applied for and received a grant to further develop an AMP for its sanitary system through the MDEQ's SAW program. Since 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 Walled Lake-Novi WWTP is owned by the WRC (Act 342) and is operated and maintained by the WRC. The WRC has various tools it uses to manage the assets it owns or operates and maintains, including a Geographic Information System (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 (LOS), 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 within 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 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, and 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, 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 National Association of Sewer Service Companies compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS. Inspection work orders in the CAMS 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 the Walled Lake-Novi WWTP, vertical assets of the treatment facilities were inventoried using a WRC hierarchy template and condition assessment data were collected and input into the CAMS.

CRITICALITY OF ASSETS

WRC implemented PowerPlan asset optimization software as part of the "Common to All" Program. For the treatment facilities, individual assets were reviewed by staff as part of the grant work, and Probability of Failure (POF) and Consequence of Failure (COF) factors were determined and input into the software.

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. Operation and maintenance (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 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 LOS goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be made 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 Business Risk Assessment (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 LOS. 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 POF and COF scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals is 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 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 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 used 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 O&M costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Capital Improvement Plan 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 the Walled Lake-Novi WWTP 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 as other data becomes available.

Capital Projects, 0 to 5 years:

- Raw Sewage Pump No. 5, $40,000, 2017
- Headworks and Security Improvements, $1,400,000 per year, 2017-2018
- Rehabilitation to Sludge Day Tank Nos. 1-4, $60,000 per year, 2018-2021
- Instrumentation Improvements, $15,000 per year, 2018-2021
- Building Program, $10,000 per year, 2018-2021
- Clarifier and Solids Handling Improvements, $500,000 per year, 2019-2021

Capital Projects, 6 to 10 years:

- Back Wash Pump No. 2, $20,000, 2022
- Instrumentation Improvements, $15,000, 2022
- Building Program, $10,000, 2022

Capital Projects, 10 to 20 years:

- No current projections.

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 Walled Lake-Novi WWTP's major assets include:

Asset Type	Quantity
Antenna	1
Chemical Equipment	1
Compressors	5
Disinfection Equipment	2
Drive Gears	4
Electrical Equipment	33
Facility Meters	11
Filters	4
Flow Meters	19
Hoist	6
Generator	1
Grit Removal	2
HVAC	10
Instrumentation	18
Lab Equipment	4
Motor	1
Piping	14
Valves	20
Plumbing	4
Pumps	25
Security	5
Screens	2
Aeration Diffusers	5
Blowers	11
Clarifiers	4
Thickener	1
Tanks	18
Structures	9
Wet Well	1

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

Completion Date October 31, 2017
(no later than 3 years from executed grant date)

The Walled Lake – Novi WWTP *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1343-01 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: 11-9-2017.

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:

Jared Buzo, PE	at	248.858.1601	buzoj@oakgov.com
Name		Phone Number	Email

Jim Nash 10/26/17

Signature of Authorized Representative (Original Signature Required) Date

Jim Nash, Oakland Co. Water Resources Commissioner

Print Name and Title of Authorized Representative

Stormwater, Asset Management, and Wastewater (SAW)
Asset Management Plan Executive Summary Guidance

City of Westland – Department of Public Services
36300 Warren Road
Westland, MI 48185
http://www.cityofwestland.com/
Contact: Daniel Bourdeau, Director of Innovation and Technology
734-467-7952
SAW Grant Project Number: 1642-01

Executive Summary

The Stormwater Asset Management Plan (AMP) summarizes the existing physical condition of the City's stormwater infrastructure 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 SAW Grant Program, with a total budget of $688,889 for the Stormwater AMP, which is inclusive of grant proceeds and local match.

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 City-owned system components, including storm sewer pipes, manholes, and catch basins, and to store the data in the City's GIS database.
- Identify other capital improvements that will allow the City to reduce annual flow volumes and pollutant loadings to the Rouge River.
- Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
    - Regularly-scheduled sewer inspection (televising), similar to what is done for wastewater infrastructure
    - Repair and rehabilitation to address structural problems resulting from aging infrastructure
- Provide recommendations on developing a sustainable funding source for stormwater, similar to that of enterprise funds that already exist for the City's water and wastewater systems.

Stormwater Asset Inventory

This AMP includes the stormwater collection system, including manholes, sewer pipes, and catch basins. Although the City had an existing geodatabase for its storm sewer system, this AMP included efforts to enhance the database with additional information on sewer rim/invert elevations, sewer size, sewer age, and structural condition.

Sewer sizes and invert elevations were verified during field survey and manhole inspections that were part of this AMP.

The City uses ArcGIS (ESRI) to maintain its inventory of storm sewer assets and to store asset condition data. The City Works program is used to manage work orders, and track work order status.

Condition Assessment

Over 10% of the City's sewer system was televised as part of this AMP. NASSCO PACP and MACP methodologies were used to assign structural and O&M conditions for inspected manholes and sewer segments. The PACP and MACP data were added to the GIS geodatabase.

For sewer pipes, the average age of inspected sewer is approximately 52 years, and the average overall pipe rating (structural and O&M) is 2.91 (on a scale of 0 to 5). The structural rating was 1.09 and the O&M rating was 2.84. Approximately 2% of the system has a PACP structural score of 3 or greater. This AMP focused primarily on the City's older sewers.

For manholes, the average age of inspected manholes is approximately 59 years, and the average overall rating is 1.97 (on a scale of 0 to 5). The average structural rating is 1.26 and the O&M rating is 1.59. Approximately 22% of the system has a MACP structural score of 3 or greater. This AMP is focused primarily on the City's older manholes.

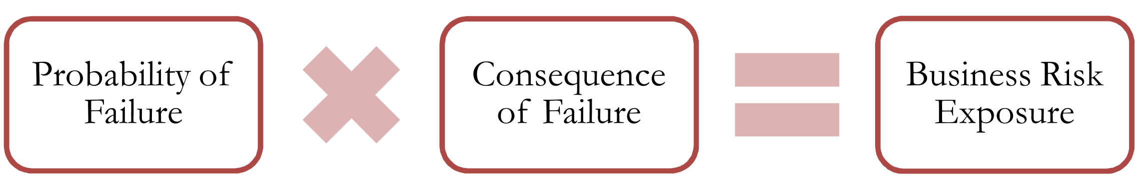
Level of Service

The City's current stormwater ordinance (Chapter 42: Stormwater Management Ordinance) provides for the establishment of a stormwater management program, and establishes standards and criteria for design of stormwater systems. The Wayne County Stormwater Management Ordinance and Administrative Rules have also been adopted by the City of Westland. These rules help to address water quality and channel protection, which will provide a solid foundation for the future health of the Rouge River. The rules specify the level of protection for its collection system as a 10-year recurrence interval event.

The desired Level of Service for Westland's stormwater infrastructure has been, and will continue to be, a healthy mix of flood control and water quality enhancement. Addressing flood control and structural needs will provided for a high quality of life for residents and allow for continued economic development in the City.

Criticality of Assets

Determining the assets most critical to system operation allows a community to manage risk, support Capital Improvement Plans (CIP), and efficiently allocate O&M funds. The two key factors used to determine criticality are Probability of Failure (PoF) and Consequence of Failure (CoF). PoF and CoF are multiplied to determine the Business Risk Exposure (BRE) as shown in the following figure.



PoF considers the physical condition or age of an asset and is often based on the Structural MACP or PACP Quick Code Rating. If an asset was not inspected, remaining useful life can be used a proxy for condition. A standardized rating of one through five was assigned to each asset with a score of five indicating worst condition as shown in the following table.

Probability of Failure

Score	Description
1	Improbable
2	Remote, unlikely but possible
3	Possible
4	Probable, likely
5	Imminent, likely in near future

CoF encourages a focus on social, environmental, and economic cost impacts. The economic CoF encompasses the impacts of direct and indirect economic losses to the affected organization and third parties due to asset failure. The social consequence represents the impact of society due to asset failure and the environmental consequence of failure considers the impact to ecological conditions occurring as a result of asset failure.

The factors were rated on a one through five scale for each asset. If one factor is deemed more important, the weighting was skewed to give that factor more influence.

The following factors were combined to determine the final CoF:

- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Restoration Type/Accessibility – refers to the cost to restore the surface above the asset and if traffic control is needed
- Environment – proximity to sensitive environmental features like the Rouge River
- Critical Users – important system users (Westland Mall)

Revenue Structure

There is currently no dedicated funding source for the City of Westland's stormwater system, unlike water and wastewater systems. A Funding Feasibility Study with revenue analysis was developed as part of this AMP. The results are described in the following paragraphs.

The total spent annually by the City for all stormwater-related activities is approximately $700,000. Any additional costs are generally taken from the City's General Fund or from the Streets budget if available. Existing funding is primarily linked to keeping the system clean (i.e. street sweeping and catch basin cleaning) and emergency services such as removal of blockages, stormwater pump station repair, and structural repairs to the collection system. Any additional costs, such as repair or replacement of catch basins, and structural repair or replacement of manholes and sewers during roadway projects, are generally taken from the City's Streets budget. This creates unnecessary strain on the Streets budget, as that money is needed to repair and replace the City's roadways. This further underscores the need for a dedicated funding source for stormwater assets.

The inventory and condition assessment completed for this AMP include several new O&M and CIP costs that are crucial to meeting the City's goals of effective management and maintenance of stormwater infrastructure. As shown in the following table, there is a funding gap of $2.9 million between the $3.6 million proposed annually and the $700,000 currently allocated to stormwater in the City's current budget.

Proposed Budget Items	Annual Cost
O&M Expenditures	
Manhole Inspection	$20,000
Catch Basin Cleaning	$85,000
Sewer system televising, cleaning	$250,000
Ongoing GIS Data Management	$25,000
Detention Pond Inspection	$20,000
Stormwater BMP Maintenance	$35,000
Pump Stations	$170,000
Additional Services	$150,000
O&M Subtotal	**$755,000**
CIP Expenditures	
Manhole Rehabilitation and Repair	$280,000
Catch Basin Replacement Program	$115,000
Sewer Rehabilitation and Replacement	$2,450,000
CIP Subtotal	**$2,845,000**
Annual Total	**$3,600,000**
Existing Stormwater Expenditures	**$700,000**
Funding Gap	**$2,900,000**

For those cities in the Midwest that have stormwater utilities, the median revenue for stormwater is approximately $45 per capita per year. Applied to Westland's current estimated population of 81,500, this would translate to approximately $3.7 million of revenue a year, which is very close to the $3.6 million/year recommended in this AMP.

Most communities that charge stormwater utility fees realize that the typical charge to a residential customer is very low. Most communities charge between $4 and $7 per month for stormwater, which is, by a significant margin, the least expensive utility fee. However, the revenues generated are indispensable for those cities.

If the City of Westland were to explore a revenue source for stormwater, it would be necessary to complete an analysis of the properties within the City to determine the appropriate charge for a typical residential customer, which is typically based on sampling of impervious area cover for residential zoned districts. This analysis would also include calculations for commercial, industrial, and institutional properties, all of which would likely pay higher fees in proportion to their total impervious coverage.

The implementation of a stormwater utility for the City of Westland is currently an option for the City, but it will likely not be practical to implement until enabling legislation is passed that can reduce the threat of litigation arising from previous judicial precedent (e.g. Bolt v. Lansing or Jackson County v. City of Jackson).

Capital Improvement Plan

A Capital Improvement Plan (CIP) was developed using the Business Risk Exposure (BRE) described above. CIP tables are detailed in the Appendix of the AMP document. These tables include recommended projects for the first three years and include maintenance (i.e. heavy cleaning) and repair (i.e. lining or spot repair).

The CIP was developed with the first projects reflecting those with the highest BRE scores. Some projects were manually moved higher on the list if a known street project is expected to occur in the affected area or if a higher priority project were occurring immediately adjacent to the project (to reduce mobilization costs). The CIP tables are intended to be used for high level planning; the City will further evaluate the stormwater infrastructure before beginning the CIP design process.

It was assumed that the annual investment in the CIP would ramp up between Years 1-3, given that it will take some time to establish a new funding source and to be fully-engaged in a CIP program. The actual implementation of the CIP will depend on the establishment of an adequate funding source.

Recommendations

The recommendations in this AMP are to:

- Implement the capital improvements as recommended in the CIP.
- Continue the AMP process in future years through systematic system inspection and updates of the City's GIS data to re-prioritize projects in future years.
- Focus on water quality management, including reducing runoff volumes to the Rouge River, as part of the ongoing capital improvement efforts.
- Continue to review funding options for stormwater. Revisit the stormwater utility concept pending enabling legislation. Without a stormwater utility, it may be necessary to review other local funding options for the City's stormwater infrastructure.

List of Major Assets

The major assets listed in the following table. The full AMP report contains additional detail on the distribution of sizes, ages, and conditions.

SUMMARY						
	TOTAL in GIS	City	Private	State/County	Inspected under SAW project	Inspected under SAW, % of City System
Sewer, FT	1,618,541	1,126,875	272,691	218,975	120,779	10.7%
Manholes	6,755	4,718	2,037		477	10.1%
Catch Basins	11,774	8,509	3,265		412	4.8%

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

Completion Due Date October 27, 2017
(no later than 3 years from executed grant date)

The City of Westland *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1642-01 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:

Daniel J. Bourdeau at 734-467-7952 dbourdeau@cityofwestland.com
Name Phone Number Email

Daniel J. Bourdeau 10/26/2017
Signature of Authorized Representative (Original Signature Required) Date

Daniel J. Bourdeau, Chief Information Officer
Print Name and Title of Authorized Representative

City of Whitehall
Wastewater Asset Management Plan Summary

City of Whitehall SAW Grant

405 East Colby Street, Whitehall, MI 49461

www.cityofwhitehall.org

Contact Information for the grantee:

Mr. Scott K. Huebler, City Manager

Address: 405 East Colby Street, Whitehall, MI 49461

Phone: 231.894.4048

SAW Grant Project Number: 1504-01

Executive Summary

The City of Whitehall received a SAW Grant in 2014 to prepare a Wastewater Asset Management Plan (AMP). The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$506,480	$455,832	$50,648

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

City of Whitehall
Wastewater Asset Management Plan Summary

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 appurtenances were located using hand held GPS equipment.
- Individual sanitary sewer services from the main to the Right-of-Way line have been mapped from in-line televising records, record drawings, or individual customer service records.

Locations for assets that have fixed geographic locations such as pipes, manholes, lift stations 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.

Location of non-pipe assets such as lift station components and other equipment is compiled in a package of inventory spreadsheets and 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.

City of Whitehall
Wastewater Asset Management Plan Summary

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 PACP system (Pipeline Assessment Certification Program). 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

5	4	3	2	1	0
4.9%	6.7%	15.5%	17.5%	55.5%	0.0%

Manholes were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, and structures.

Percentage of manholes within each rating category

5	4	3	2	1	0
4.6%	3.5%	8.3%	43.2%	34.9%	5.6%

Equipment within lift stations were rated on a scale of 1-5 based on factors relating to physical condition and operating condition. Generally, the lift station equipment is currently in good condition with no major capital improvements needed at this time.

Percentage of Lift Stations within each rating category

5	4	3	2	1
0.0%	40.0%	20.0%	20.0%	20.0%

City of Whitehall
Wastewater Asset Management Plan Summary

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 acts as stewards of the system. We will hold meetings with our City Council and present the results of our condition assessments. We have reviewed the costs for meeting various Levels of Service, and reviewed 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. Minimize opportunities for Sanitary Sewer Overflows
2. Minimize Service Interruptions
    a. Staff/equip crews sufficiently to perform specific routine maintenance items
    b. Repair/replace assets as required to limit emergency responses to less than 6 per year
3. Minimize Public Hazards
    a. Staff/equip emergency response services for 24 hour per day service and 30 minute response times
    b. Limit service interruptions to less than 6 hours
    c. Minimize Sanitary Sewer Failures, Overflows or Backups to no more than 5 per 100 miles of pipe. With nearly 22 miles of pipe in our system, we still want to keep it to no more than 1 Sewer Failure, Overflow or Backup Event each year.
4. Manage Storm Water Inflow and Ground Water Infiltration
    a. Monitor I/I and implement CIP projects to meet MDEQ/EPA guidelines
5. Provide Capacity for Community Growth
6. Minimize Life Cycle Costs
7. Foster Good Working Relationships with the City of Montague, Whitehall Township and the Muskegon County Wastewater Management System.

City of Whitehall
Wastewater Asset Management Plan Summary

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 the 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, 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/major industries/major retail/city buildings
- Are under major roads/freeways
- 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). We then ran a Jenks Optimization 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 was generated.

City of Whitehall
Wastewater Asset Management Plan Summary

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 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/or restructuring possibilities were also explored.
The CIP provided refined cost projections for the first 5 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 scenarios 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 and to fully implement the desired Capital Improvement Plan (CIP). Presentations to City Council will be held to convey the results of the asset evaluation (RoF and Criticality).

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/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 other asset systems were incorporated based on:

- Storm Water – based on Asset Management Plan work as part of SAW
- Roadway - based on roadway PASER (Pavement Surface Evaluation and Rating) evaluations
- Drinking Water – based on the Water Reliability Study and ongoing Water Asset Management Plan (WAMP)

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, storm water system, drinking water system, and road system. The CIP costs were incorporated into the revenue structure review. A 5-year CIP document was created which will be available to the public.

List of the plan's major identified assets

- 5 lift stations
- 1.8 Miles (9,730 feet) of sanitary force main
- 21.8 Miles (115,230 feet) of gravity sanitary sewer

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

Completion Date **October 31, 2017**
(no later than 3 years from executed grant date)

The City of Whitehall, Michigan *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1504-01 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: April 25, 2017.
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:

Scott K. Huebler at 231.894.4048 or huebler@cityofwhitehall.org
Name | Phone Number | Email

SKHuebler 10-27-17
Signature of Authorized Representative (Original Signature Required) Date

Scott K. Huebler, City Manager
Print Name and Title of Authorized Representative

City of Whitehall
Storm Water Asset Management Plan Summary

City of Whitehall SAW Grant

405 East Colby Street, Whitehall, MI 49461

www.cityofwhitehall.org

Contact Information for the grantee:

Mr. Scott K. Huebler, City Manager

Address: 405 East Colby Street, Whitehall, MI 49461

Phone: 231.894.4048

SAW Grant Project Number: 1504-01

Executive Summary

The City of Whitehall received a SAW Grant in 2014 to prepare a Storm Water Asset Management Plan (AMP). The Grant agreement indicated the following amounts:

Plan Cost	Grant Amount	Local Match
$501,480	$451,332	$50,148

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

City of Whitehall
Storm Water Asset Management Plan Summary

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.
- Open Drains and culverts 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) 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.

City of Whitehall
Storm Water Asset Management Plan Summary

Pipes inspected with CCTV were rated using the PACP system (Pipeline Assessment Certification Program). 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

5	4	3	2	1	0*
0.1%	0.1%	3.8%	15.6%	74.8%	5.6%

*Some pipes into/from leaching basins or minor catch basin leads were not rated

Manholes, catch basins, outlets, culverts, and open drains were visually inspected and rated on a scale of 1-5 based factors related to the condition of castings, steps, and structures.

Percentage of manholes/catch basins within each rating category

5	4	3	2	1	0*
15.0%	18.1%	27.5%	20.5%	10.9%	17.0%

*Many inlet structures with no incoming pipes and leaching basins were not rated.

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 is 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 acts as stewards of the system. We will hold meetings with our City Council and presented the results of our condition assessments. We have reviewed the costs for meeting various Levels of Service, and reviewed 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. Continue to seek out Illicit Discharges and eliminate them whenever possible
2. Minimize Flooding and Public Hazards
    a. Staff/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. Provide Capacity for Community Growth
   a. Perform Site Plan Reviews
4. Minimize Life Cycle Costs
   a. Maintain the system so that no more than 5% of our assets are in Poor (RoF – 4) or Failed (RoF – 5) condition (RoF).
5. Maintain Water Quality
   a. Continue our street sweeping and catch basin cleaning program
   b. Continue fall leaf pick up program
   c. Maintain an Illicit Discharge Program
   d. Perform regular maintenance on open drains and outlets to ensure proper function.
   e. Maintain a relationship with community partners such as the White River Watershed Partnership, Muskegon County Drain Commissioner's Office, and Muskegon Conservation District along with neighboring communities and utilities.

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 the 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 open drain 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, 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 industries/major retail/city buildings
- Are under major roads/freeways/rail lines/airport
- 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). We then ran a Jenks Optimization 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 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 5 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 Street and Capital Improvement Funds were reviewed.

Based on that analysis, the CIP was adjusted and funding allocations in the General Fund were adjusted so that both O&M activities and CIP actions could be funded. Presentations to City Council will be held to convey the results of the asset evaluation (RoF and Criticality). Funding allocations will be made to provide our desired Level of Service.

City of Whitehall
Storm Water Asset Management Plan Summary

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/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 other asset systems were incorporated based on:

- Wastewater – based on Asset Management Plan work as part of SAW
- Roadway - based on roadway PASER (Pavement Surface Evaluation and Rating) evaluations
- Drinking Water – based on the Water Reliability Study and ongoing Water Asset Management Plan (WAMP)

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, drinking water system, and road system. The CIP costs were incorporated into the budget review. A 5-year CIP document was created which will be available to the public.

List of the plan's major identified assets

- 67,170 feet of gravity storm sewer
- 162 manholes and 535 catch basins/inlets
- 29,340 feet of open drains
- 50 storm water outlets

DEQ

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

Completion Due Date **October 31, 2017**
(no later than 3 years from executed grant date)

The City of Whitehall, Michigan *(legal name of grantee)* certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1504-01 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:

Scott K. Huebler at 231.894.4048 or huebler@cityofwhitehall.org
Name Phone Number Email

SKHuebler 10-27-17
Signature of Authorized Representative (Original Signature Required) Date

Scott K. Huebler, City Manager
Print Name and Title of Authorized Representative

Executive Summary

Stormwater, Asset Management, and Wastewater (SAW) Plan

Wolf Lake Common Fund

Grass Lake Charter Township
Jim Stormont, Supervisor
517-522-8464 ext. 124
373 Lakeside Drive, Grass Lake, MI 49240
www.grasslakect.com

Napoleon Township
Kimberly Gamez, Supervisor
517-536-8694 ext. 210
124 S. Brooklyn Rd, Napoleon, MI 49261
www.napoleontownship.us

SAW Grant Project Number: 1335-01

A. Executive Summary

The Wastewater Asset Management Plan (AMP) summarizes the existing physical condition of the Wolf Lake Common Fund's (WLCF's) wastewater infrastructure and includes key recommendations for future funding levels. This document was prepared using grant funding from the State of Michigan SAW Grant Program, with a total budget of $209,703 for the Wastewater AMP, which is inclusive of grant proceeds and local match.

The AMP was intended to accomplish the following key goals:

1. Provide the WLCF with a new framework for collecting, organizing, and storing data for their wastewater collection system using the latest available hardware and software
2. Survey key system components to establish location and condition of the Fund's assets
3. Build a GIS database and populate it with the Fund's assets
4. Add information for sewer material type, and age, to the GIS database
5. Physically evaluate the structural condition of key system components (lift stations and manholes), and store the data in the WLCF's GIS database

6. Analyze the grinder pump service records to calculate the future maintenance rates and replacement costs
7. Rate the consequence of failure for unassessed assets including the force main and gravity sewer pipes
8. Identify long-term operations and maintenance strategies to maintain a reasonable structural condition into perpetuity, including:
    a. Regularly-scheduled sewer inspections
    b. Repair and rehabilitation to address structural problems resulting from aging infrastructure
9. Provide recommendations on future rate adjustments necessary to maintain the recommended budget

B. Wastewater Asset Inventory

This wastewater collection system AMP includes; force main and sewer pipes, manholes, lift stations, duplex stations, grinder pumps, sewer clean outs and air release valves. The WLCF did not have an existing geodatabase. The sewer system straddles two political boundaries with independent data management strategies. This AMP focused on building a geodatabase for the WLCF wastewater system that consolidated all of their data in one mutually accessible location.

The WLCF physically located the following assets; 2 lift stations, 4 duplex stations, 16 manholes, 632 grinder pumps, 36 sewer cleanouts and 68 air release valves and added them to the GIS database.

The WLCF database was built using ArcGIS (ESRI) to maintain its inventory of wastewater assets and to store asset condition data. The final hosting location for the database is still being debated by the Fund, but will eventually be accessed through Mobile 311. Additional maintenance and service call tracking is provided through the Mobile 311 platform.

C. Condition Assessment

The WLCF installed the majority of the sewer system in 2002 and those assets are now 15 years old. Additional residential connections are continuously added and are all less than 15 years old.

All of the manholes were condition assessed as part of this AMP. The average structural rating is 1.8, on a scale of 0 to 5. All 16 manholes have a MACP overall score of 3 or greater. The MACP data were added to the GIS geodatabase.

Most of the grinder pumps were installed in 2002 and are approaching their manufacturer predicted life of 15 years. The grinder pumps were not physically assessed. Their condition was estimated by analyzing the pump maintenance records to calculate replacement rates. A detailed analysis of the grinder pump condition assessment can be found in Appendix A: Grinder Pump Assessment.

The duplex pumps and lift stations were condition assessed, their remaining useful life estimated and replacement costs were provided for the individual components. All components receiving a Business Risk Evaluation ranking of 16 or greater were added to the Capital Improvement Plan.

The WLCF chose not to assess the air release valves because all of the valves encountered on maintenance calls have failed or failure is imminent. Therefore, replacement of the air release valves was added to the Capital Improvement Plan.

In general, the WLCF's wastewater collection system is in good shape. Most of the assets are within their expected service lives and almost 70% of the grinder pumps continue to function past the predicted service life without requiring service or replacement. A significant increase in investment is expected due to the accelerated deterioration of the lift stations, grinder pump replacement costs and the immediate need to replace the air release valves.

The Fund's Level of Service criteria for its wastewater collection system are listed in Table 1:

Table 1: Level of Service

Key Service Criteria	Performance Indicator	Target Level of Service	Measurement Frequency
Asset Condition	MACP Inspections	MACP inspect all manholes	Every 10 Years
Flow Capacity	Monitor flow at the Wolf Lake Lift Station	Install a magnetic meter at the Wolf Lake Lift station to measure the flow sent to the Leoni Treatment Plant.	None
Health and Safety	Maintain the NIOSH recommended 10-minute ceiling level of 10 ppm Hydrogen Sulfide in ambient air	Maintain safe Hydrogen Sulfide Concentrations in ambient air outside the Rexford and Wolf Lake Lift Stations	Annual
Regulatory Compliance	Compliance with MDEQ Sanitary Sewer Overflow (SSO) Policy	Reduce the frequency of SSO events to comply with the MDEQ SSO policy of no more than 10% of a chance of SSO in any given year, excluding unusual natural events	Annual
Service Delivery	Implement and Utilize Mobile 311 Software to Aide in Utility Management and Promote Customer Communication	Track service and grinder pump replacement records to support maintenance and invoicing needs	Ongoing
	Maintain Grinder Pumps for 15 years from date of first installation	Maintain 694 Grinder Pumps	Ongoing
	Response to Sanitary Sewer Complaints	Reduce response time to sanitary sewer complaints efficiently	Annual
O&M Optimization	Provide Cost Effective Service to Minimize Rate Increases	Proactively inspect and maintain infrastructure to minimize repair costs	Annual

D. Criticality of Assets

Determining the assets most critical to system operation allows a community to manage risk, support Capital Improvement Plans (CIP), and efficiently allocate O&M funds. The two key factors used to determine criticality are Probability of Failure (PoF) and Consequence of Failure (CoF). PoF and CoF are multiplied to determine the Business Risk Exposure (BRE) as shown in Figure 1.

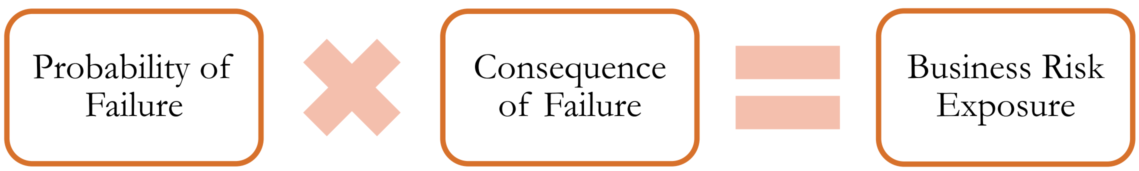


Figure 1: BRE Equation

PoF considers the physical condition or age of an asset and is often based on the Structural MACP or PACP Index Rating. If an asset was not inspected, remaining useful life can be used a proxy for condition. A standardized rating of one through five was assigned to each asset with a score of five indicating worst condition as shown in the Table 2.

Table 2: Likelihood of Failure

Score	Description
1	Improbable
2	Remote, unlikely but possible
3	Possible
4	Probable, likely
5	Imminent, likely in near future

CoF incorporates social, environmental, and economic cost impacts. The economic CoF encompasses the impacts of direct and indirect economic losses to the affected organization and third parties due to asset failure. The social consequence represents the impact on society due to asset failure. The environmental consequence of failure considers the risk of sewer overflows to rivers, lakes and wetlands as a result of asset failure.

The factors were rated on a one through five scale for each asset. These factors are weighed relative to their importance in the system. The WLCF deemed the environmental factor as more important, so the environmental factor was weighed at 40%, while social and economic were each weighed at 30%.

The following factors were combined to determine the final CoF:

- Relative Network Position – the sum of upstream sewers discharging to a structure
- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Restoration Type/Accessibility – refers to the cost to restore the surface above the asset and if traffic control is needed
- Environment – proximity to sensitive environmental features like the Big Wolf Lake, Little Wolf Lake, Olcott Lake, wetlands and streams.

A more detailed explanation of the criticality assessment can be found in Appendix B: Collection System Criticality, Business Risk and Fiscal Calculations.

E. Revenue Structure

Although the WLCF currently has an annual budget of approximately $38,334 for its wastewater collection and treatment costs, the recommendations in this Asset Management Plan would result in an annual increase in the Common Fund REU Fees. Grass Lake Township will need to raise the monthly REU fee from $8.78 to $21.46 and Napoleon Township will need to raise the REU fee from $2.90 to $14.07. The primary reasons for this planned annual increase are:

1. Increased investment in infrastructure rehabilitation, repair, and/or replacement
2. Increased attention to asset inspections
3. Keep up with inflationary pressures by staying ahead of the Construction Cost Index (CCI) curve
4. Avoid larger rate hikes (i.e. 30%-40%) that are necessary when rates are held for 5-10 years

The initial rate increase is recommended for FY2018, after which a 5% annual rate is recommended to provide a reasonable source of revenue for the Fund's wastewater system and should reduce the need for much larger rate increases that are often necessary when the rates are static for more than 5 years.

F. Capital Improvement Plan

The Capital Improvement Plan (CIP) focuses on repairing assets that have structural ratings of 4, 5 or "end of life" indicating they have failed or are at risk of failing. These assets were ranked by their Business Risk Exposure (BRE).

The CIP details can be can be found in Appendix B and the MDEQ Asset Management Spreadsheet. The CIP tables are intended to be used for high level planning. The WLCF will further evaluate the wastewater infrastructure before beginning the CIP design process. The actual implementation of the CIP will depend on the implementation of user fee adjustments, as recommended above.

G. Recommendations

The recommendations in this AMP are to:

1. Adjust user fees to keep the wastewater budget in line with maintenance costs and inflation.
2. Implement the capital improvements as recommended in the CIP.
3. Continue the AMP process in future years through systematic system inspection and updates of the WLCF's GIS data to re-prioritize projects in future years.

H. List of Major Assets

The major assets are detailed in the text below and are shown on Figure 2. The MDEQ Asset Management Spreadsheet contains additional detail on the distribution of sizes, ages, and conditions.

- *2 Lift Stations*
- *4 Duplex Stations*
- *16 Manholes*
- *694 active Grinder Pumps*
- *36 Sewer Cleanouts*
- *68 Air Release Valves*
- *20 miles of Force Main*
- *0.7 miles of Gravity Sewer*

The WLCF discharges into the Leoni Township wastewater treatment plant (WWTP), which ultimately discharges to the Grand River. As such, the WLCF's assets are limited to local and collector sewers.

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

Completion Date 9-18-17
(no later than 3 years from executed grant date)

The Wolf Lake Common Fund *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1335-01** 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: 3-20-17.
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
Tom Loveland	at	(517) 522-8464 ex 134	toml@grasslakect.com

Thomas L. Loveland — 11-13-2017

Signature of Authorized Representative (Original Signature Required) — Date

Tom Loveland: Grass Lake Township
Treasurer

Print Name and Title of Authorized Representative

SAW Grant #1423-01
Ypsilanti Community Utilities Authority
2777 State Road
Ypsilanti, MI 48198
Contact: Jeff Castro (contact information provided below)

EXECUTIVE SUMMARY

Introduction

Ypsilanti Community Utilities Authority (YCUA) provides wastewater services to the City of Ypsilanti and Ypsilanti Township. Contract services are provided to portions of several neighboring townships and the Western Townships Utilities Authority. The wastewater infrastructure system managed by YCUA provides a critical service to residents and businesses within the YCUA service area and includes collection and treatment. Recognizing the importance of this wastewater system, YCUA initiated a comprehensive assessment of its wastewater infrastructure.

In 2014, YCUA was awarded a Stormwater, Asset Management, and Wastewater (SAW) Grant by the Michigan Department of Environmental Quality (MDEQ) to develop an Asset Management Program (AMP). The grant amount was $1,945,281 with a local match of $426,205 for a total cost of $2,371,486. As one of the aspects of the YCUA SAW agreement, this AMP report provides the Authority with a proactive and sustainable long-term plan to help ensure the well-being of the community and the environment.

The requirement for an AMP and associated annual updated report are included in the draft National Pollutant Discharge Elimination System (NPDES) Permit for the Wastewater Treatment Plant (WWTP), which was public noticed by the MDEQ in May 2017.

Tetra Tech was hired by YCUA to prepare an AMP for the WWTP and four major pump stations. The sanitary sewer system and minor pump stations AMP was developed by OHM Advisors (OHM).

Mission Statement

One important element of an asset management program is a mission statement, which identifies the overarching purpose of YCUA's AMP. The Authority's mission statement is that they are:

Dedicated to Providing Top Quality, Cost Effective, and Environmentally Safe Water and Wastewater Services to Our Customers.

Asset Management Team Leaders

The team leaders listed in Figure ES-1 are committed to the mission statement. They were instrumental in the progress made and findings outlined in this report. Further questions on YCUA's AMP can be directed to these team members.

Organization

A summary of the WWTP and major pump station assets is presented first, followed by an overview of the sanitary sewer collection system and minor pump station assets.

Jeff Castro
- Director
- JCastro@ycua.org
- 734.484.4600 ext 107

Sree Mullapudi
- Director of Wastewater Operations
- SMullapudi@ycua.org
- 734.484.4600 ext. 121

Bob Fry
- Director of Service Operations
- BFry@ycua.com
- 734.484.4600 ext 307

Stacey Reynolds
- Director of Maintenance Operations
- SReynolds@ycua.org
- 734.484.4600 ext. 241

Scott Westover
- Engineering Manager
- SWestover@ycua.org
- 734.484.4600 ext. 220

Figure ES-1. Asset Management Team Leaders

Wastewater Treatment Plant and Big 4 Pump Stations

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 will provided an overview of these five elements.

Asset Inventory

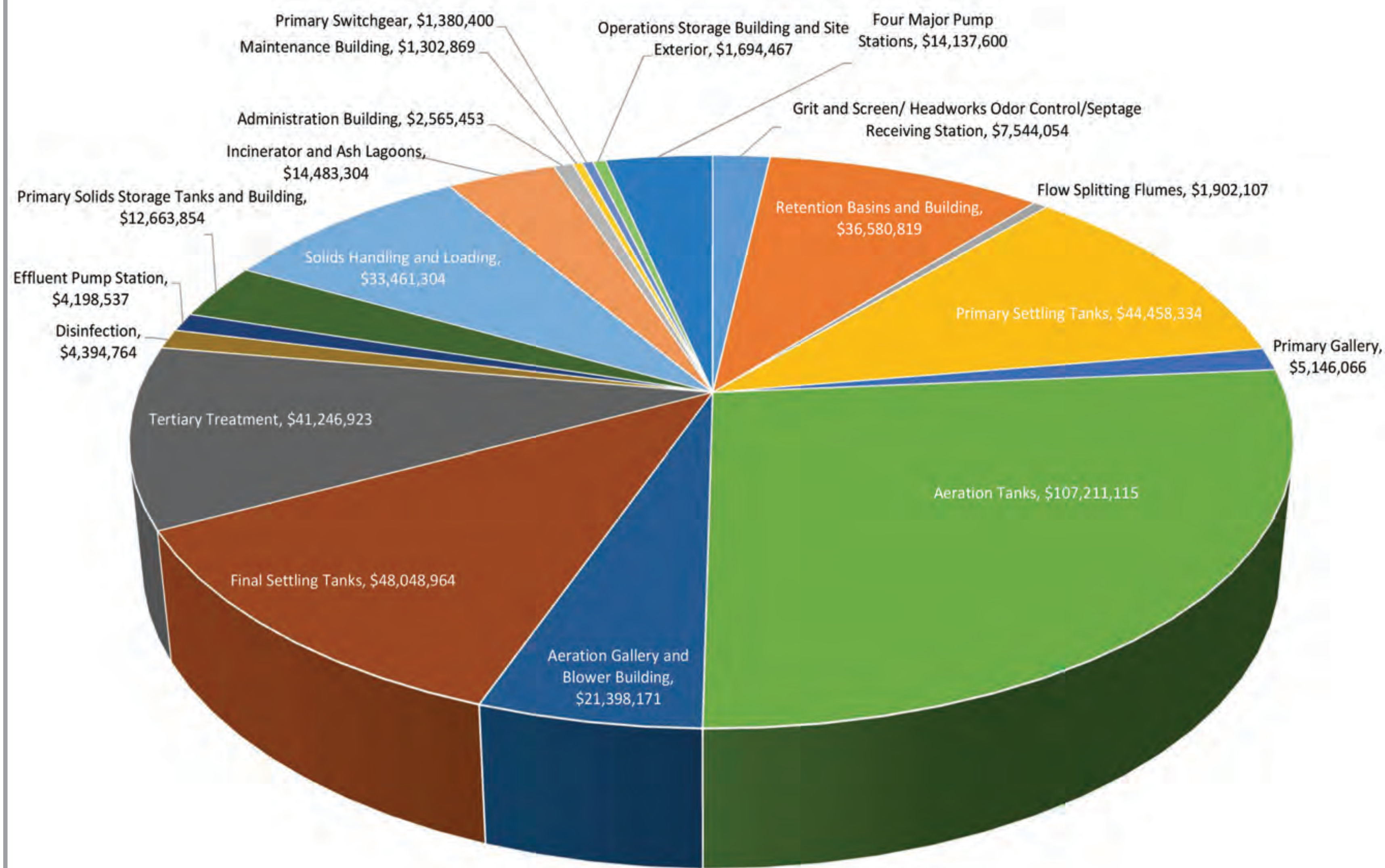
The asset inventory and condition assessment involved identifying the major WWTP and four major pump station assets that YCUA owns and assigning a condition rating to them. Tetra Tech inventoried these assets using a discipline based approach. That is, a team was selected comprised of process, electrical, and mechanical engineers. Each discipline assessed assets according to where they appeared on the 2007 WWTP expansion conforming to construction drawings. In addition, concrete tanks, building walls and roofs, and hoists were assessed by a facilities engineer. Additional information was included, such as the installation date of the equipment, as well as background information from the operation and maintenance (O&M) manual. The background information included size information, manufacturer, model numbers, and motor information. The anticipated useful life for each asset was entered and replacement costs were developed.

YCUA currently uses several different databases to develop preventative maintenance tasks, calibrations, and work orders. In order to simplify the process and ease annual reporting requirements, YCUA selected Lucity Asset Management Software. The software will replace the existing databases and will track the information required as part of the AMP. The asset inventory information collected was uploaded into Lucity.

Due to the size of the YCUA WWTP, the assets were divided into categories based on building or tank areas with which they were associated. A total of 4,343 assets were inventoried at the WWTP and four major pump stations. The value of these assets exceeds $403.8 million in 2016 dollars. Costs are based on the Engineering News Record (ENR) Index value of 10,031. A summary of asset value by building or process area is shown in Figure ES-2.

Figure ES-2

Overview Value of Assets



Level of Service

The level of service can influence the costs for operating and maintaining the WWTP, as higher levels of service cost more to provide. As mentioned previously, YCUA's mission statement is:

To provide top quality, cost effective, environmentally safe water and wastewater services to our customers.

YCUA's goal is to operate and maintain the WWTP such that it can meet the air and wastewater permit requirements in a cost effective manner. YCUA is also concerned about the safety of their employees and their customers. Operation and maintenance of the WWTP should not endanger YCUA's employees and should protect the public. YCUA interacts with customers paying their bills and accepts and responds to customer concerns and complaints. A call center accepts calls from the public and generates service requests for problems that need to be reviewed by YCUA staff.

YCUA's goal is to maintain the high level of service they are currently providing and to continue to do so in a cost effective manner.

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 * (1 - Redundancy)

The Consequence of Failure (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 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.

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

A BRE score was calculated for each asset. These BRE scores, combined with YCUA staff experience, were used to develop a capital improvement plan (CIP). The BREs for the WWTP and major pump stations were categorized by risk level from low to high. Figure ES-3 summarizes the BRE according to the number of assets, while Figure ES-4 summarizes the BRE based on the cost of the assets.

Figure ES-3

Business Risk Evaluation by Number of Assets

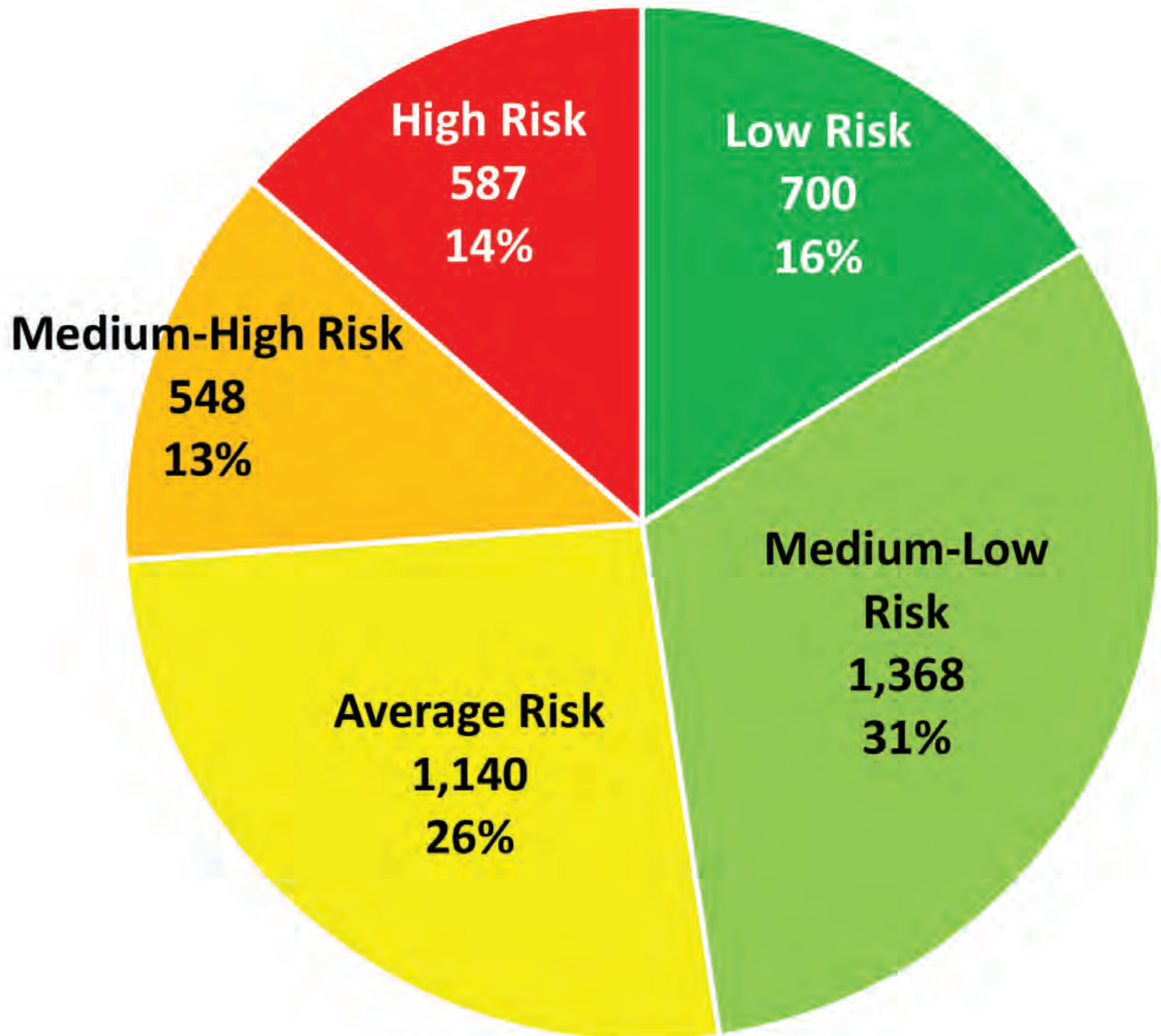
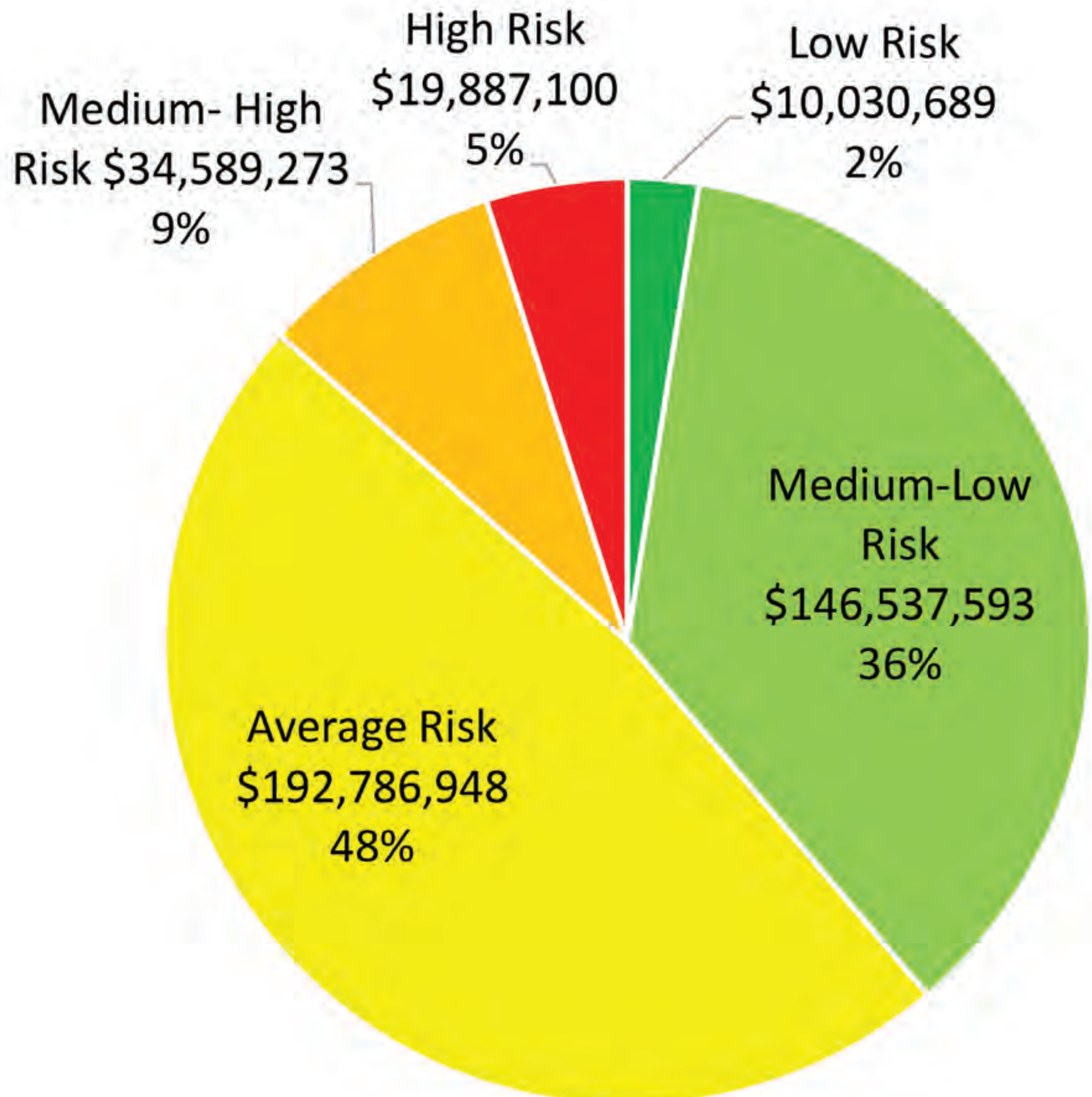


Figure ES-4

Business Risk Evaluation by Value of Assets



Revenue Structure

YCUA completed a revenue structure report that demonstrated the Authority's wastewater utility generates sufficient revenue to fund the operation, maintenance, and replacement (OM&R) of the sanitary sewer collection system and WWTP, including all major and minor pump stations. This report was approved by the MDEQ.

Capital Improvement Plan

A 20-year CIP was developed for both the WWTP and major pump stations using the results of the inventory assessment methodology outlined in this AMP. This CIP should be routinely updated to ensure that it addresses short- and long-term needs. It will provide the Authority with defensible documentation for setting aside and safeguarding funds for projects. The CIP included the replacement of assets with a cost that was equal to or greater than $10,000. YCUA typically replaces assets below this threshold using the OM&R budget. The CIP projects are shown in Table ES-1. The project costs are provided based on an ENR index value of 10,031. WWTP 18-1 and 18-2 are planned to be paid from the capital reserve fund. It is assumed that future CIP projects would be funded by low interest MDEQ State Revolving Fund Loans.

Table ES-1. Capital Improvement Plan

Project No.	Description	Project Year(s)	Project Cost (ENR Index 10,031)
WWTP 18-1	New Lime Feed System for Biosolids Handling	2018	$1,250,000
WWTP 18-2	Periodic Aeration Mixer Replacement (6 mixers, $120,000 per budgeted year, average of $60,000 per year)	2018-2037	$1,200,000
WWTP 19-1	Replace Primary Heat Exchanger (Incinerator)	2019	$1,400,000
WWTP 19-2	Replace West Tertiary Filters (2 filters, average $1,840,000 per year)	2019-2024	$11,040,000
WWTP 19-3	Replace West Primary Settling Tank Mechanisms (1 mechanism, $575,000 per year)	2019-2024	$3,450,000
WWTP 19-4	Rehabilitate West Aeration Tanks (1 tank, $495,000 per year)	2019-2024	$2,970,000
WWTP 19-5	Replace Assets in West Aeration Gallery (1 tank, average $296,000 per year)	2019-2024	$1,775,000
WWTP 19-6	Rehabilitate Final Settling Tanks (1 tank, $175,000 per year)	2019-2028	$1,750,000
WWTP 20-1	Replace Main WWTP Primary Switchgear	2020	$1,380,000
WWTP 20-2	Replace Air Conditioners	2020	$650,000
WWTP 20-3	Replace Ash Lagoon Yard Piping	2020	$490,000
WWTP 20-4	Rehabilitate Primary Solids Storage Tanks (PSSTs)	2020	$250,000
WWTP 21-1	Primary Splitting Flumes Improvements Phase I	2021	$565,000
WWTP 21-2	Replace Aeration Blowers (1 blower, average $1,601,000 per year)	2021-2024	$6,402,000
M4PS 22-1	Replace Generator and Switchgear at Willow Run Pump Station	2022	$520,000
WWTP 23-1	Rehabilitate Influent Wet Well	2023	$150,000
WWTP 23-2	Solids Building Improvements Phase I	2023	$1,740,000

Project No.	Description	Project Year(s)	Project Cost (ENR Index 10,031)
WWTP 24-1	Replace Electrical Assets at Incinerator	2024	$1,075,000
WWTP 24-2	Primary Gallery Improvements Phase I	2024	$415,000
WWTP 25-1	Solids Building Improvements Phase II	2025	$1,785,000
WWTP 25-2	Retention Basin Building Improvements	2025	$1,030,000
WWTP 25-3	Replace Secondary Effluent Pump No. 5	2025	$200,000
WWTP 25-4	New Ultraviolet Disinfection Pass and Replace Miscellaneous Assets	2025	$985,000
WWTP 25-5	Replace Valves and Control Panels at McGregor Effluent Pump Station	2025	$630,000
WWTP 26-1	Replace Incinerator	2026	$11,360,000
WWTP 27-1	Replace Valve and Air Handling Unit in Tertiary Filter Building	2027	$305,000
WWTP 27-2	Rehabilitate East Primary Settling Tanks (1 tank, $130,000 per year)	2027-2030	$520,000
WWTP 27-3	Rehabilitate East Aeration Tanks (1 tank, $380,000 per year)	2027-2030	$1,520,000
WWTP 27-4	Aeration Gallery Improvements (Average $170,000 per year)	2027-2034	$1,370,000
WWTP 27-5	Grit and Screen Building Improvements Phase I	2027	$615,000
WWTP 27-6	PSST Building Improvements Phase I	2027	$950,000
WWTP 27-7	Administration Building Improvements Phase I	2027	$375,000
M4PS 28-1	Major Pump Stations Improvements Phase I	2028	$1,355,000
WWTP 30-1	Replace Nozzles in PSSTs	2030	$770,000
WWTP 30-2	Primary Splitting Flumes Improvements Phase II	2030	$500,000
WWTP 30-3	Primary Gallery Improvements Phase II	2030	$300,000
WWTP 30-4	Grit and Screen Building Improvements Phase II	2030	$255,000
WWTP 30-5	PSST Building Improvements Phase II	2030	$205,000
WWTP 30-6	Administration Building Improvements Phase II	2030	$430,000
WWTP 31-1	Blower Building Improvements	2031	$122,000
WWTP 31-2	Solids Building Improvements Phase II	2031	$3,800,000
WWTP 32-1	Replace Gates at WWTP and Major Pump Stations	2032	$2,011,000
WWTP 33-1	Replace Electrical Assets in Retention Basin Building	2033	$85,000
WWTP 33-2	Replace East Tertiary Filters (2 filters, $2,289,000 per year)	2033-2036	$9,155,000
WWTP 34-1	Replace Ultraviolet Disinfection Banks	2034	$2,265,000
WWTP 34-2	Replace Septage Receiving Station Assets	2034	$150,000
M4PS 35-1	Major Pump Stations Improvements Phase II	2035	$2,825,000
WWTP 36-1	Primary Gallery Improvements Phase III	2036	$1,635,000
WWTP 36-2	Replace Secondary Effluent Pump No. 6	2036	$200,000

Project No.	Description	Project Year(s)	Project Cost (ENR Index 10,031)
WWTP 36-3	Replace 30-inch Butterfly Valve at McGregor Effluent Pump Station	2036	$60,000
WWTP 36-4	Grit and Screen Building Improvements Phase III	2036	$910,000
WWTP 37-1	Solids Building Improvements Phase III	2037	$3,190,000
	Total Cost of Projects in First Five Years	**2018-2022**	**$24,630,000**
	Total		**$89,900,000**

Sanitary Sewer Collection System and Minor Pump Stations

Activities completed with the SAW Grant funds were intended to accomplish the following key goals:

- Provide YCUA with a new framework for collecting, organizing, and storing data for their wastewater collection system using the latest available hardware and software, including the procurement and implementation of Lucity, a computerized maintenance management system (CMMS).
- Survey key system components to augment YCUA's existing 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 condition of YCUA owned system components, including sanitary sewer pipes, manholes, minor pump stations, and force mains. Store the data in the Authority'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 developing a prioritized CIP to be implemented using YCUA's rate structure.

Asset Inventory

An asset inventory is a list of YCUA's assets and their attributes. The Authority has inventoried and digitized the majority of its sanitary sewer infrastructure, including manholes, sanitary sewers, force mains, and pumping stations. YCUA is continuing to populate the attributes of the inventory using observations in the fiel, while performing condition assessment and as-built plans. This inventory resides in YCUA's GIS and CMMS systems. The GIS framework was enhanced as part of this effort, making it easier for YCUA to store critical data for the location, size, material, install date, and condition of each wastewater asset.

Condition Assessment

Through a methodical sampling procedure, a representative sample of the Authority's sanitary sewer infrastructure (sanitary sewer pipes and manholes) has been physically 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 condition, while five indicates the infrastructure is in very poor condition or has already failed. About 10 percent of the over 6,250-structure manhole network, 5 percent of the approximately 230 miles of sanitary sewer collector pipe infrastructure, and around 14 percent of the 52 miles of sanitary sewer interceptors have been condition assessed (see Figure ES-5).

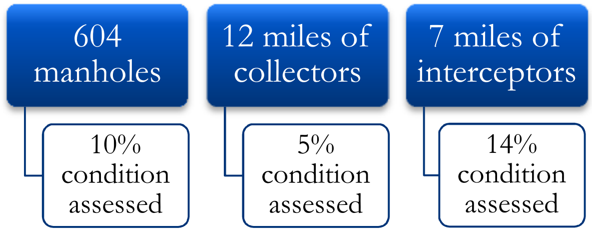


Figure ES-5: Portion of Sewer System Assessed

From this condition assessment, it was observed that:

- Manhole infrastructure exhibits age-appropriate wear with an average structural rating of approximately 1.1 and average O&M rating of 1.7. Structural manhole defects are predominately related to cracks and brickwork. O&M manhole issues are driven by deposits, infiltration, and roots.
- Collector sewer infrastructure, which is primarily vitrified clay pipe, has an average structural rating 1.3 and average O&M rating of 2.0. The predominant structural defects as observed in the collection system are cracks and fractures; the most common O&M defects in the surveyed system are roots and soil/dirt/rock deposits.
- Interceptor sewer infrastructure, mostly reinforced concrete pipes, has an average structural rating 1.2 and average O&M rating of 1.6. The predominant structural defects as observed in the wastewater system are cracks and fractures; the most common O&M defects in the surveyed system are roots and soil/dirt/rock deposits.
- The infrastructure will continue to degrade over time, for example, even though the average condition of the manhole infrastructure is between a score of 1 (minimal wear and good working) and 2 (moderate wear but still functional) per the 2015 assessment data, a small percent of the infrastructure has a condition rating of 5; this percentage will grow over time.

The assets within the Authority's 29 minor pumping stations were also inventoried and assessed. The major components inventoried within each station include but are not limited to pumps, check/control valves, motors, level control systems, backup power, structure, wet well, valve vault, and telemetry. In addition, an analysis of force main age, material, and break history determined the likelihood of failure for force main segments, which were not physically assessed due to concerns about removing and repairing force main segments.

Criticality and Risk

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 as shown in Figure ES-6.

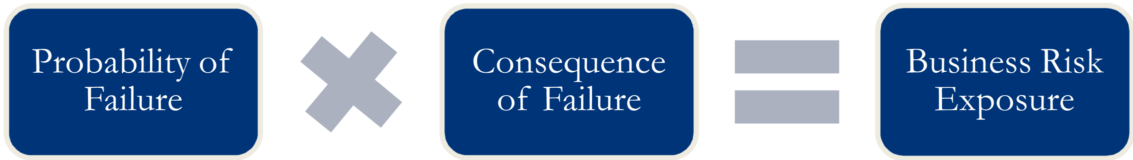


Figure ES-6. Risk Equation

The probability of failure is related to the physical condition of an asset. The consequence of failure 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 sanitary sewers:

- Network Position – the sum of upstream sewers discharging to a structure
- Diameter/Size – the relative size of the asset with respect to the rest of the system
- Location – the cost to restore the surface above the asset and if traffic control is needed. Uses average daily traffic data.
- Environment – proximity to sensitive environmental features like rivers and lakes.
- Top Users – important system users such as hospitals, healthcare facilities, schools, or large industrial users.

A physical inspection was not conducted of force mains and probability of failure was determined from age, pipe material, and history of repairs. Consequence of failure used the following factors: diameter, pump station capacity, overlying roadway types, proximity to surface water, railroad crossings, and presence of a bypass pumping plan.

For pumping station assets, probability of failure was based on the observed condition and the consequence of failure was determined by considering the effect of an individual asset failure on system operations. For redundant assets in the pumping stations, the risk was reduced based on the number of redundant units.

Level of Service

The Authority, in line with its mission statement outlined earlier, adopted level of service criteria, which it plans to use as a guide to manage the sanitary sewer system. These level of service criteria are summarized in Table ES-2.

Table ES-2. Summary of Level of Service Criteria

Key Service Criteria	Performance Indicator	Target Level of Service
Collection System Asset Condition Assessment	PACP & MACP Inspections Per Year*	• Inspect approximately 270 manholes per year, 5% of the system • Inspect approximately 18 miles of sewer per year, 6% of the system
Operator Training	Proper certifications for all operators	Perform annual checks on operators' duties and certifications.

Key Service Criteria	Performance Indicator	Target Level of Service
Regulatory Compliance	Compliance with MDEQ Sanitary Sewer Overflow (SSO) Policy and The Clean Water Act	Continue to comply with the MDEQ SSO policy and The Clean Water Act
Service Delivery and Customer Communication	Implement and Utilize Lucity Software to Aide in Utility Management and Promote Customer Communication	Respond to customer complaints and requests efficiently.
O&M Optimization	• Regular Cleaning and Maintenance of the Collection System. • Minor Pump Station Maintenance	• Clean and maintain approximately 6% of the system per year • Perform regular inspections of pump stations and repair or replace assets as needed

* Pipe Assessment Certification Program (PACP), to assess sanitary sewer condition (collectors and interceptors). Manhole Assessment Certification Program (MACP), to assess manhole condition.

Revenue Structure and Capital Improvement Plan

The condition assessment helped identify capital improvements that will allow YCUA 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, and pump station inspection
- Repair and rehabilitation to address structural problems resulting from aging infrastructure

As communities like those served by YCUA have developed and aged, the buried infrastructure is deteriorating. Unless YCUA begins to systematically repair, rehabilitate, and/or replace these aging components, 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 impassable roadways due to failed infrastructure

The recommendations in this Asset Management Plan would result in an annual O&M budget increase of approximately $470,000 for the next five years and around $630,000 annually after that. Capital projects over this same period are expected to average approximately $850,000 for the first five years and around $1.4 million for the following 15 years. The primary reasons for the increase are:

1. Increased investment in sewer/manhole rehabilitation, repair, and/or replacement for YCUA's aging infrastructure.
2. Replacement of older force mains, which have aged beyond their typical service lives.
3. Upgrades to pump stations and replacement of aging assets.
4. Increased attention to sewer/manhole inspections and ongoing updates to this AMP.

List of Major Assets

The major assets in the collection system are approximated in the text below. The buildings and tanks at the WWTP are also listed. The full AMP reports contain additional detail on the distribution of sizes, number of assets, ages, and conditions.

- 230 miles of collection sewer, ranging from 4-inch to 72-inch diameter
- 52 miles of interceptor sewer, ranging from 8-inch to 72-inch diameter
- 6,252 manholes
- 12 miles of force mains, ranging from 2-inch to 36-inch diameter
- 29 minor pumping stations
- 4 major pumping stations
- Septage Receiving Station
- Grit and Screen Building
- Headworks Odor Control Building
- Equalization and Retention Basins
- Retention Basin Building
- West Primary Splitting Flume
- East Primary Splitting Flume
- Primary Settling Tanks
- Primary Gallery
- Aeration Tanks
- Blower Building
- Aeration Gallery
- Final Settling Tanks
- Tertiary Filter Building
- Chlorine Building
- Ultraviolet Disinfection Building
- McGregor Effluent Pump Station
- Primary Solids Storage Tanks (PSSTs)
- Primary Solids Storage Tank Building
- Solids Building
- Incinerator
- Ash Lagoons
- Administration Building
- Maintenance Building
- Primary Switchgear
- Operations Storage Building

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

Completion Date: October 31, 2017
(no later than 3 years from executed grant date)

The Ypsilanti Community Utilities Authority *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1423-01 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 **XX No XX**

   If No - Date of the rate methodology approval letter: March 23, 2017.

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 Castro	at	734-484-4600	jcastro@ycua.org
Name		Phone Number	Email

[signature] ______________________________ October 31, 2017
Signature of Authorized Representative (Original Signature Required) Date

Jeffrey Castro, Director
Print Name and Title of Authorized Representative

April 2017