STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

C. HEIDI GRETHER
DIRECTOR

May 10, 2018

VIA E-MAIL

Mr. Christopher Korleski
Director, Water Division
United States Environmental Protection Agency, Region 5
77 West Jackson Boulevard (W-15J)
Chicago, Illinois 60604-3590

Dear Mr. Korleski:

SUBJECT: Water Infrastructure Improvements for the Nation (WIIN) Eligibility Decision, Flint Water Meter Project

The Michigan Department of Environmental Quality (MDEQ) supports the city of Flint (City) in its efforts to secure WIIN funding for the replacement of water meters. We are requesting a formal determination on the eligibility of the meter project for WIIN funding ahead of the submission of the Intended Use Plan.

Providing accurate meters is critical for maintaining water quality in the Flint distribution system and obtaining a better understanding of system water loss issues. The Flint water system currently has Non-Revenue Water (NRW) levels of approximately 50 percent. These high NRW levels result from both physical (leaks) and commercial (meter accuracy) losses of water. The proposed metering program will provide appropriate meter accuracy while also providing access to houses to allow an audit of ongoing water loss. The City will be able to determine where, when, and how water is used throughout the distribution system with accurate metering and improved loss identification.

This demand distribution data is critical to developing an accurate, calibrated hydraulic model ("calibration" of the current model is a challenge). Ultimately, the hydraulic model is the best tool for use in predicting water age. The model is also the basis for system water quality models which will be used to determine chlorine residual deterioration in the system and the fluctuation of other water quality parameters (see compatible Distribution System Water Quality Monitoring project proposed for WIIN funding). In addition, the proposed Automatic Meter Reading/Advanced Metering Infrastructure metering system can provide real-time continuous meter reads as compared to the one-time monthly meter reads with the existing system. Therefore, diurnal and weekly water use patterns can be evaluated for their impact on water age. Identifying and reducing water age issues throughout the system has a direct influence on potential biological contamination.

The Flint system also has numerous "dead-end" mains, where maintaining water quality can be an issue. Having a robust/accurate hydraulic model, with proper demand distribution, is the best way to determine which dead-end mains should be looped, where increased flushing/blow-offs may be required to maintain water quality, and where other system maintenance activities are required to improve water quality and reduce contaminants. An effective hydraulic model will also help identify stagnant water due to closed valves and location of potential leaks. Without accurate metering leading to better water demand distribution and water age information, it is impossible to properly prioritize required system improvements. This deficiency results in inefficient use of capital resources.

We have enclosed pertinent excerpts from the draft project plan for your reference. Once you and your staff have had time to review the above, please let me know if you would like to schedule a conference call or meeting to discuss the request further. I can be reached at 517-284-6524; oswalde1@michigan.gov; or by mail at MDEQ, Drinking Water and Municipal Assistance Division, P.O. Box 30817, Lansing, Michigan 48909-7741.

Sincerely,

Eric Oswald, Division Director
Drinking Water and Municipal Assistance Division

cc/enc: Mr. Tom Poy, United States Environmental Protection Agency (USEPA)
Mr. Steve Marquardt, USEPA
Ms. C. Heidi Grether, Director, MDEQ
Ms. Amy Epkey, Administration Deputy Director, MDEQ
Mr. Michael McClellan, Environment Deputy Director, MDEQ

PROJECT 1

WATER METER REPLACEMENT

1. BACKGROUND

Currently, there are approximately 29,000 Residential and 1,100 Commercial water meters, serving the City of Flint customers. Meters provide the basic function of measuring the quantity of water that an individual home or business consumes. Currently, to bill customers for the volume of potable water use, the City meters potable water delivered to each customer and manually reads each meter.

However, most of the residential meters are either defective or non-operational and outlived their normal life span of 15-20 years. As a result, consumption readings for these accounts are either not read on regular basis or being billed based on estimated quantity resulting in loss of revenue and low level of consumer trust. The more recent Water Audit Study identified the non-revenue water (NRW) amount is in the range of 40-65% of the total water demand which is much higher than the national average water loss level of around 20%.

The City of Flint, due to aging water system infrastructure, experiences inflated water demand from the wasteful water use and high degree of water loss.

Providing new meters, along with a non-revenue water reduction program, will allow the City personnel to enter each building and check the water meter and water piping inside the buildings. Some abandoned buildings have been vandalized and water is thought to be constantly flowing from these vandalized water facilities allowing for significant non-revenue water. Therefore, the new metering system will allow the City to have a clear idea of the water distribution throughout the system. This demand then allows the City to help predict water age. The end result is that the new meters provide: accurate flow measurement, accurate water usage, accurate billing, the determination of water age, and allows better management of the system for improved water quality,

The City is in the process of implementing several strategies to improve the water efficiency by improved water conservation and water demand management. Automated metering serves as the critical water efficiency strategy with the primary purpose of water conservation.

Recent advancements in technology have introduced equipment to the water industry that complies with the current ANSI "lead free" standards and enables automation of meter data storage and collection.

Currently available automated metering equipment is significantly more reliable than previous versions. Since the automated meter industry has significantly stabilized, and the reliability of the equipment has significantly improved, the City of Flint has initiated the program to transition from manual read metering to an automated metering and billing system to offer enhanced benefits to the citizens of City of Flint.

2. ALTERNATIVE ANALYSIS AND DISCUSSION

Alternative No.1: No Action

Under this alternative, no upgrade or improvement to the existing system would be performed. The water meter reading and billing system, in its condition will continue to face with challenges and limitations as summarized below:

- Continued significant water theft and revenue loss
- Manual collection of meter data is time consuming.
- Customer potable usage data is limited to a data base of monthly readings
    - This limits the amount of data available to support enhanced conservation efforts.
    - This limits the amount of data available to address customer billing disputes.
- Reading of meters located in high traffic areas requires additional time to take the precautions necessary to reduce safety risks.

Reading of meters located on easements outside of right-of-ways requires additional time to access. There is also a higher probability of aggressive animals in these areas

The existing metering system is either obsolete with low level of reading accuracy or totally non-functional and does not provide any information that could serve as the tools for effective water loss control and leakage management. Thus, this alternative would significantly reduce the City's ability to provide reliable service to its Citizen with accurate meter reading and billing as well as effectively control water loss.

The capital cost of this alternative is Zero with implementation or construction impacts not applicable. However, this alternative would result in unacceptable outcome of inaccurate billing and high amount of non- revenue water.

This Alternative does not provide a reliable solution and is therefore not recommended.

Alternative No.2: AMR/AMI SYSTEM

Under this alternative, the existing water metering system would be upgraded with lead-free new meters meeting all applicable ANSI/AWWA standards and fitted with registers and remotes capable of transmitting data using the cellular technology. The metering data would be stored in a cloud-based database and integrated with the City of Flint billing system. See the attached Project 1 figure indicating the general area where the water meters would be replaced.

The use of automated metering equipment would address the challenges and limitations of the current manual metering program by achieving the following objectives:

- Improved billing accuracy and increased revenue generation
- Additional revenue generated to meet system water quality and reliability
- Reduction in non-revenue water and water theft
- Provides a sustainable source of revenue for water infrastructure maintenance and improvements

- Improved leakage detection and demand management
- Helps customers understand their water usage profile
- Access to the metering data by the customers
- Facilitate better dispute resolution
- Enhanced customer satisfaction and trust
- Provides financial stability to the City water utility
- Additional revenue will reduce future rate increases
- Coordinates with the ongoing lead service line replacement
- See Sections 3.1.4 and 3.2.2.1 for further discussion of the project needs and benefits.

There are several technologies available for sending meter information (Meter Interface Units, MIUs) and collecting this information (Automated Meter Reading Devices, AMRs). The table below lists the advantages and disadvantages of each method and was used to screen various options.

Technology	Description	Advantages	Disadvantages
Direct read	Manually read numbers on meter	▫ Lower meter supply cost Lower installation cost	▫ Low read success rate ▫ Need access to meter ▫ Higher labor cost ▫ Need to re-enter data
Interface remote read	Use a hand-held interface to take readings from an outside location. Reading is automatically stored.	▫ No access to meter needed ▫ High read success rate ▫ Encoded signal thus captured read is from the meter register ▫ Less labor required – more reads per day due to remote reading ▫ Reduced Read to Bill time	▫ Higher supply and installation costs ▫ Higher maintenance for remote reader ▫ No transcription necessary
Cellular read **(preferred)**	Meter is connected to cellular network offered by the communication provider	▫ No access to meter needed ▫ High read success rate ▫ Encoded signal thus captured read is from the meter register ▫ Less labor required – more reads per day due to remote reading ▫ Reduced Read to Bill time	▫ Low installation and operational costs ▪ Proven technology ▫ More secured communication ▫ High reliability
Low frequency radio network read	Meter is connected to a low frequency communication network; calls periodically with the reading and receives calls to request the reading	▫ No meter readers required ▫ Can program unit to profile water use, leak detection and water theft ▫ Excellent read success rate ▫ Reduced Read to Bill time	▫ High initial investment costs for communication network infrastructure ▫ Higher operational and maintenance costs. Periodic upgrade required to address the technical obsolescence of the communication network

3 PROPOSED AUTOMATIC METER READING SYSTEM

To realize the benefits of improved water efficiency, the existing city-wide meter reading and billing system will be replaced with an AMR system consisting of a new meter with encoder and transmitter capable of transmitting data to the head end billing system hardware using cellular technology.

IMPLEMENTATION APPROACH

Our approach would include the following steps:

- Analysis and determination of the type and size of the metering hardware appropriate for each end user and flow rates
- Establish the metering data communication protocol,
- Finalize the meter interface unit / transmitter compatible with cellular technology
- Installation and testing of hardware
- Data integration with the billing system
- Data analytics and easy to understand report generation
- Web based consumer protocol

4. COST ESTIMATE

The total estimated capital cost of the proposed program will be approximately in the amount of $ 14.768 Million. The attached table outlines the preliminary cost estimates based on recent available data.

5. IMPLEMENTATION SCHEDULE

This project would be implemented in phases over a period of one year or less. Since almost all of the installations will be indoors, there are no seasonal restrictions on scheduling and the program could be initiated relatively quickly after authorization. In addition, a Public Outreach and Education program will be implemented during the construction phase to highlight the benefits of water conservation program.

This alternative provides significant improvements in revenue generation through accurate reading and billing and would achieve reduction in the operational costs by effective water loss control. Due to these benefits, this alternative is recommended as the preferred solution to mitigate the deficiencies in the current water metering and billing system.

COST BREAKDOWN
PROJECT PLAN

ITEM	UNITS	UNIT COST	TOTAL
I. RESIDENTIAL ACCOUNTS			
A. 5/8" METER BODY WITH ENCODER	28,000	$ 180.00	$ 5,040,000.00
B. TRANSMITTER	28,000	$ 200.00	$ 5,600,000.00
II. INDUSTRIAL ACCOUNTS (1"-8")			
A. METER BODY WITH ENCODER	1,000	$ 1,000.00	$ 1,000,000.00
B. TRANSMITTER	1,000	$ 250.00	$ 250,000.00
EQUIPMENT COSTS			$ 11,890,000.00
EQUIPMENT INSTALLATION (including special installation)		L.S.	$ 2,378,000.00
SOFTWARE INSTALLATION, INTEGRATION, DATA ANALYTICS			$ 500,000.00
TOTAL EQUPMENT AND INSTALLATION COST			***$ 14,768,000.00***
		TOTAL	***$ 14,768,000.00***
Note: The cost of industrial meters are average for various sizes.			

Genesee County Drain Commissioner Division of Water and Waste Services (GCDC-WWS) is the adjacent regional organization providing drinking water to Genesee County surrounding the City of Flint. This Project Plan includes a project that connects the City of Flint to the GCDC-WWS regional system for a "secondary or back-up water supply". With completion of the activities described in this Project Plan, Flint will add the capability of receiving treated water from the GCDC-WWS (a regional organization) and thereby have two reliable regional sources to supply their treated drinking water.

Consequently, a "Regional Alternative" as related to this Project Plan is being implemented, with regard to the secondary or back-up water supply, allowing for the Flint water supply to be obtained from two independent sources. The other projects that are represented in this Project Plan are part of the improvements the City of Flint needs to implement in order to make the water system more reliable, and to provide safe quality water to their customers. A "Regional Alternative" is being implemented regarding the water source through projects presented in this document.

3.1.4 PRIORITY PROJECTS

The current City of Flint water supply system is not performing adequately as is documented through previous reports, citations, water quality violations, etc. The selected priority projects will help maintain reliable service, provide a second water source connection for back-up supply, reduce water age within parts of the system, provide better system water quality information, provide capability for appropriate chemical addition, allow better revenue capture and water loss tracking, as well as reduce water losses. The priority projects listed in this Project Plan are discussed briefly in Section 3.1 with additional detailed information included in **Appendix A.** These eight (8) projects are necessary as part of the repair and rehabilitation of the existing water system and are not upgrades to the system. These projects are as listed below:

1. Water Meter Replacement
   It has been determined that the Flint residential meters are generally defective or non-operational and have outlived their normal life span of 15-20 years. In many cases billings are based on estimated quantity. This has led to a loss of revenue and a low level of consumer trust. Since the billing provides the only source of revenue for Flint to operate and maintain the water system, it is critical that it be correct, and reliable in order to obtain the necessary revenue for operations as well as to maintain customer trust. New automated meters would provide reliable usage measurements for billing, require less labor, provide more system efficiency and has been shown to lead to improved water management and conservation. Replacing the meters is critical to the Flint revenue stream and obtaining a better handle on water loss. In addition, having accurate metering gives the City a clear idea of how the water is being distributed throughout the system (demand distribution of water). This water demand distribution can be used to help predict water age. Therefore, the new meters, with their associated accuracy and the AMR/AMI flow database that will be provided with the project, can help determine where the water is actually going (water accounting), water age determination, and overall system water quality. **Appendix A** provides more detailed information and Section 3.3.3.1 provides cost comparison information.

This project is needed and provides the following:

- Public water system infrastructure improvements for the City---Water meters are an essential component of the overall water infrastructure. Without adequate, accurate metering, there is no control or accountability regarding water usage. The existing situation has led to poor water revenue collection, significant non-revenue water, and significant water theft,
- Spreading cost of water appropriately (based on accurate water usage) over the entire customer base
- The information in **Table 2-8**, based on City of Flint water records, indicates that the average non-revenue water is approximately 52-percent of the total water distributed with some years indicating that the non-revenue water is as high as 65-percent. Capturing a portion of this non-revenue water with a new meter program has a major benefit to Water Department revenue.
- Reducing water theft—Installing new meters allows City personnel to enter all buildings and perform a limited inspect each building's water system.
    - Observing the building piping to determine if it is copper, lead, galvanized or other type of piping and the water quality implications of the interior plumbing.
    - Assure that all water users have an accurate functioning meter (eliminating one method of water theft). This is expected to add new customers to the City customer base, thereby adding to the customer base.
    - Determining and the removing bypassing of existing meters (removing another source of water theft) which also provides additional revenue.
    - It is anticipated that there are cases of other unauthorized (code violating) plumbing changes have been made which could result in compromised water quality (backflow potential, for example). These would be discovered and eliminated during the process of meter replacement.
    - Some abandoned buildings, are thought to have been vandalized with water piping damaged or removed to the point that water is constantly flowing. This meter program allows entry into all buildings which will allow the elimination of this source of non-revenue water.
- Improving revenue collection. Without additional revenue, the City will not be able to sustain a reliable water system. This additional revenue is essential for maintaining and replacing aging public water infrastructure throughout the system. This includes major capital improvement projects, as well as, day to day operation and maintenance (repairing water main breaks, maintaining water meters, etc.).
- Providing financial stability with adequate revenue—Without having adequate revenue, the Flint water infrastructure system will continue to deteriorate, which will cause long term structural problems, reliability and water quality issues that lead to water quality violations and could cause a repeat of past problems.
- Helps provide long term financial stability through meter replacement. The existing situation is part of what led up to the current situation.

- Additional revenue will reduce future rate increases
- Removes older meters from the system that may contain lead
- Coordinates with the ongoing lead service line replacement
- Helps customers understand their water usage profile
- Improves customer service
- Improves system reliability
- Improves customer confidence

2. Dort and Cedar Street Storage and Pumping Station Improvements
   The Dort storage reservoir (20 MG ground storage) and pumping station is located at the Flint WTP in the northeastern portion of the City of Flint. The Cedar Street reservoir (20 MG ground storage divided into 2 cells of 10 MG each) and pumping station is located in the south central portion of the City of Flint. Both facilities were designed for a much larger demand (and customer base) than currently exist. These improvements are essential to provide adequate storage, maintain water quality and water age, as well as being able to meet the GLWA water contract restrictions on peak day and peak hour flows. The intent is to upgrade and modernize the pumping facilities with smaller, more appropriately size pumps, with appropriate size switchgear and ancillary equipment. The Cedar Street facility also needs the temporary chlorination facilities replaced with permanent facilities including all the necessary support facilities (which are currently lacking), such as bulk storage, transfer pumps, day storage, ventilation, etc. to provide safe reliable chemical addition. With the changes proposed, the system operations regarding storage usage will also be modified. The modifications are described in more detail in **Appendix A**. **Appendix I** provides a copy of the 2017 Asset Management Plan, which also includes system wide modeling and contains additional information regarding this activity.

   This project is needed and provides the following:

   - The ability to meet the GLWA water supply contract requirements
   - Provides pubic water infrastructure improvements
   - Replaces inadequate temporary facilities with permanent facilities
   - Operational flexibility
     - Appropriately sized pumping for the current reduced customer base
     - Ability/flexibility to control system storage by how the current reservoirs are utilized and operated
   - Reduced water age within the system with flexible pumping and storage options
   - Availability to add chlorine at the southern part of the distribution system thereby improving water quality and safety
   - Provide improved, reliable water quality throughout the distribution system
   - Improves customer service
   - Improves system reliability
   - Improves customer confidence

detailed information is available in Chapter 4 as well as **Appendix A.** Non-revenue water is approximately 52 percent of the total water purchased by the City of Flint. The new meters will reduce water theft and capture significant additional revenue for the City's water infrastructure improvement program. It is anticipated that the new meters will capture a minimum of 50-percent of the non-revenue water, which is revenue that is currently being lost by the City to theft and meter bypassing as well as, inaccurate meter readings.

TABLE 3-1
COST OF WATER METER REPLACEMENT - (PROJECT 1)

Item	No Action	New Meters
Average Non-Revenue Water Quantity—from Table 2.8	6,988,735 CCF/year	NA
Value of Non-Revenue Water @ current rate of $6.19/CCF	$ 43,260,270/year	NA
Present Worth of Capturing **50% of Non-Revenue Water** with Installation of New Meters	$ 410,070,000	NA
Capital Cost-New Meters		$ 14,768,000
Annual O&M		Unchanged*
Present Worth of O&M		Unchanged*
Salvage Value		0
Total Project Present Worth (w/o O&M)		**$ 14,768,000**

*No change in O&M was utilized in the cost analysis. Actual O&M cost with new meters should be less since the new meters will not require the same level of service (for meter repair or for meter reading), This reduced labor cost was not evaluated for the cost analysis presented..

As listed in the above table and based on previous reports of water loss, the present worth of capturing the lost revenue from only 50% of the non-revenue water amounts to about $410 million. This is significantly more than the cost of the meter replacement program and will provide revenue that can be used to fund the City's water infrastructure program. Converting 50-percent of the non-revenue water to funding for the City would make the Flint system closer to the average of other public water systems which have approximately 20-percent non-revenue water

3.2.2.2 DORT AND CEDAR STREET STORAGE AND PUMPING STATION IMPROVEMENTS (PROJECT 2)

Project 2 provides for improvements to the Dort and Cedar Street Storage Reservoirs and pumping Station. **Table 3-2** provides a present worth cost summary and additional detailed information is available in Chapter 4 as well as **Appendix A.**

4.0 SELECTED ALTERNATIVE

The alternative analysis in Chapter 3 indicates that the "no action" alternative, the "optimum performance" alternative and the "Regional" alternative were not acceptable. Consequently, selecting and proceeding with the "priority project" alternative is the only viable option for the City of Flint.

4.1 DESCRIPTION

Figure 3-1 provides a general location for five of the seven priority projects. Project 1 (meters) and Project 6 (water main replacement) are not shown on this figure since the locations are scattered throughout much of the City. In addition, Project 6 (water main replacement) is an update to previous information that was previously submitted. **Appendix A** provides a more detailed description and location information for each of the projects that are listed below:

1. Water Meter Replacement
2. Dort and Cedar Street Storage and Pumping Station Improvements
3. Flint Secondary Water Source (back-up water supply)
4. Northwest Transmission Main Replacement
5. Distribution System Water Quality Monitoring
6. Water Main Replacement
7. Chemical Feed Building
8. Service Line Replacement—Contingency Project

4.1.1 COSTS

The estimated cost for the proposed projects consists of: construction costs plus costs to cover engineering (design and construction); administrative tasks; and a provision to add "green" features to the project. The detailed construction cost estimates for each of the seven projects are included in **Appendix A** for reference. The estimated total cost for Projects are summarized in **Tables 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7 and 8** respectively.

TABLE 4-1
WATER METER REPLACEMENT COST ESTIMATE – PROJECT 1

Item	Cost ($)
Construction	$ 14,768,000
Engineering, Administrative, etc. (25% of Construction Cost)	$ 3,692,000
Total	**$ 18,460,000**

TABLE 4-2
DORT AND CEDAR STREET STORAGE AND PUMPING STATION IMPROVEMENTS COST ESTIMATE – PROJECT 2

Item	Cost ($)
Construction Dort PS	$ 4,850,000
Construction Cedar PS	$ 3,250,000
Total Project Construction Cost	$ 8,100,000
Engineering, Administrative etc. (25% of Construction Cost)	$ 2,025,000
Total	**$ 10,125,000**

TABLE 4-3
FLINT SECONDARY WATER SOURCE (BACK-UP WATER SUPPLY) COST ESTIMATE – PROJECT 3

Item	Cost ($)
Construction	$ 7,330,600
Engineering, Administrative, etc. (25% of Construction Cost)	$ 1,832,700
Total	**$ 9,163,300**

TABLE 4-4
NORTHWEST TRANSMISSION MAIN REPLACEMENT COST ESTIMATE – PROJECT 4

Item	Cost ($)
Construction	$ 9,837,500
Engineering, Administrative, etc. (25% of Construction Cost)	$ 2,459,400
Total	**$ 12,296,900**

TABLE 4-5
DISTRIBUTION SYSTEM WATER QUALITY MONITORING COST ESTIMATE – PROJECT 5

Item	Cost ($)
Construction	$ 490,000
Engineering, Administrative, etc. (25% of Construction Cost)	$ 122,500
Total	**$ 612,500**

TABLE 4-6
WATER MAIN REPLACEMENT COST ESTIMATE – PROJECT 6

Item	Cost ($)
Construction	$ 47,070,000
Engineering, Administrative, etc. (25% of Construction Cost)	$ 11,767,500
Total	**$ 58,837,500**

TABLE 4-7
CHEMICAL FEED BUILDING COST ESTIMATE – PROJECT 7

Item	Cost ($)
Construction*	$ 2,233,000
Engineering, Administrative, etc. (52.25% of Construction Cost)*	$ 1,167,000
Total*	**$ 3,400,000***

*see Appendix A Project 7 for the provided cost information

TABLE 4-8
SERVICE LINE REPLACEMENT – CONTINGENCY - COST ESTIMATE – PROJECT 8

Item	Cost ($)
Construction*	$ 10,000,000
Engineering, Administrative, etc. (25% of Construction Cost)	NA—Included in the Construction Cost
Total*	**$ 10,000,000**

The total estimated capital construction, cost, for all seven projects, is summarized in **Table 4-9** below.

TABLE 4-9
OVERALL TOTAL COST ESTIMATE FOR ALL EIGHT SELECTED ALTERNATIVES

Project	Estimated Cost ($)
1. Water Meter Replacement	$ 18,460,000
2. Dort and Cedar Street Storage and Pumping Station Improvements	$ 10,125,000
3. Flint Secondary Water Source (back-up water supply)	$ 9,163,300
4. Northwest Transmission Main Replacement	$ 12,296,900

5. Distribution System Water Quality Monitoring	$ 612,500
6. Water Main Replacement*	$ 58,837,500*
7. Chemical Feed Building	$ 3,400,000
8. Service Line Replacement - Contingency	$ 10,000,000
Total*	**$ 122,895,200**

*The total is more than the amount of grant funding available. Water Main Replacement will be considered the sweep-up project to utilize any remaining grant funds available after the other approved projects are completed.

It should be noted that the total above is greater than the amount of Grant funding available. Therefore, the water main replacement project may not be able to be completed at this time. Actual project cost is not known and since the above is only an estimate, the projects may cost more or less than indicated. The intent is to complete Projects 1, 2, 3, 4, 5, 7 and 8 as economically as possible with available funds. Then any additional funds up to the total amount of the $80,000,000 (including the $10,000,000 lead service line contingency discussed in Sections 3.2.2.6 and 3.2.2.8) available as Grant funds will be used to complete as much of Project 6—Water Main Replacement as the funding will allow.

4.1.2 IMPLEMENTATION SCHEDULE

The anticipated eight projects in the Project plan are anticipated to be accomplished according to the schedule shown in **Table 4-10** below.

TABLE 4-10
OVERALL PROJECT IMPLEMENTATION SCHEDULE

PROJECT	START DESIGN*	ADVERTISE BID	START CONSTRUCTION	CONSTRUCTION COMPLETED
Project 1 - Water meter Replacement	July 1, 2018	October 1, 2018	January 1 2019	December 31, 2019
Project 2 - Dort and Cedar Street Storage and Pumping Station Improvements	July 1, 2018	January 1, 2019	April 1, 2019	July 31, 2020
Project 3 - Flint Secondary Water Source (Back-up Supply)	July 1, 2018	January 1, 2019	April 1, 2019	December 31, 2019

Project 4 – Northwest Transmission Main	July 1, 2018	January 1, 2019	April 1, 2019	December 31, 2020
Project 5- Distribution System Water Quality Monitoring	July 1, 2018	October 1, 2018	January 1, 2019	July 1, 2019
Project 6 - Water Main Replacement— Numerous Contracts over multiple years	July 1, 2018 (first contracts only)	September 1, 2018 (first contracts only)	November 1, 2018 (first contracts only)	June 30, 2020**
Project 7 - Chemical Feed Building	July 1, 2018 (start final design)	December 1, 2018	March 1, 2019	December 31, 2019
Project 8 – Service Line Replacement	January 1, 2019	June 1, 2019	July 1, 2019	December 31, 2019**

* *Design Plans and Specifications will include requirements for American Iron and Steel and compliance with Davis Bacon Act, SESC, etc.*

** *There is a possibility that this date may have to be extended since the other projects need to be completed prior to utilizing funds for this project. Therefore, depending on timing of the other projects, this project could extend into 2020, 2021 or 2022.*

4.1.3 USER COST

The priority projects recommended in this Project Plan are anticipated to be completed with the assistance of the WIIN project and other funding. If no grant funds are received, the general impact on the residents/customers of the City of Flint for this program would be an increase in rates or customer cost. This impact to customer rates is generally determined by dividing the additional expenses among the users in the service area as summarized in **Table 4-11**. The annualized cost of the project was calculated using the conversion factor of 0 .0527 and the following formula:

$$A = PW \times [(i(1 + i)n)/((1 + i)n - 1)]$$

Where:

A = Equivalent Annual Cost

PW = Present Worth

i = Interest Rate through WIIN Loan (0.5%)

n = Number of Years (20)

$[(i(1 + i)n)/((1 + i)n - 1)]$ = Conversion Factor

The average Flint residential water customer generally uses about 5 CCF of water per month. The actual bill is calculated monthly, based on a water charge of $6.19 per CCF used. There is also a monthly water service charge of $22.90. Therefore, the average monthly Flint residential water bill is $30.95 for water used and $22.90 for service, making a total monthly water bill of about $53.85.