Protecting our Infrastructure Investment

ASSET MANAGEMENT PLAN

Wastewater Executive Summary Report

Prepared for:

City of Big Rapids

SAW Project No. 1566-01

FINAL

December 2020

FLEIS&VANDENBRINK

DESIGN. BUILD. OPERATE.

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In December 2017, The City of Big Rapids received a Stormwater, Asset Management, and Wastewater (SAW) Grant from the Michigan Department of Environmental Quality (MDEQ), project no. 1566-01, 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 Big Rapids AMP is:

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ASSET INVENTORY & CONDITION ASSESSMENT

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

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

The wastewater collection system assets include approximately 185,060 feet (35.05 miles) of sanitary sewers (gravity pipe and force mains) and 759 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:

- coarse screening
- conventional activated sludge secondary treatment
- secondary clarification with polymer addition
- UV disinfection
- biosolids stabilization

Treated effluent is discharged to the Muskegon River in accordance with NPDES permit No. MI0022381. The design capacity of the WWTF is 2.4 million gallons per day (mgd). The current annual average flow received by the facility is approximately 1.17 mgd.

There are currently 5 sanitary sewer lift stations located throughout the wastewater collection system. The stations are all submersible style stations.

Asset Identification& Location

A comprehensive wastewater system asset inventory was developed from operation and maintenance (O&M) manuals included a review of existing record drawings, field notes, staff knowledge, and site visits, supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new (GIS) database and piping network for archiving, mapping and further evaluation purposes. The inventory includes over 429 WWTF assets, 5 Lift Station Assets, and 2,051 Collection System Assets.

The WWTP inventory was developed using information collected from O&M Manuals, record drawings, sites visits, and WWTP staff input.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP manhole field based assessments were completed on all 759 manhole structures. Pipeline cleaning and NASSCO-PACP CCTV field based inspections were conducted on 26% of the gravity pipe. Smoke Testing was performed at a few critical locations of system where flooding had been documented previously to disclose location of inflow or infiltration. Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance with 24% of the system tagged for inspection and/or cleaning. Rehabilitation accounted for 7% of the system identifying the need for replacement, point repairs and lining. The remaining 69% of assets were placed in the 20+ year category.

Overall, the condition of the assets at the WWTF range from excellent to poor. Ongoing repairs have helped to maintain the condition of many assets while some assets that were installed during improvements projects over 20 years ago 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 excellent to poor. Ongoing maintenance has upheld the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems.

LEVEL OF SERVICE

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

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

Defining the Expected Level of Service

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

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.

WASTEWATER UTILITY - LEVEL OF SERVICE STATEMENT

The City of Big Rapids pledges to maintain a high level of public health protection and performance of our wastewater collection and treatment system, while minimizing the long-term cost of operating those assets. The City strives to make the most cost-effective renewal and replacement investments and provide the highest-quality customer service possible.

To achieve this the following Level of Service (LOS) goals are proposed:

- Providing reliable collection and treatment of their customer's wastewater.
- Treated effluent discharged from the WWTP shall comply with all local, state and federal regulations at all times.
- Identified critical deficiencies will be remedied following the capital improvements as detailed in this Asset Management Plan.
- Significant attention to operation & maintenance will continue to maximize the life of all treatment assets as possible.
- Deferred maintenance budget will be used as part of the equipment replacement plan
- Operations staff shall be properly certified
- Health and Safety of operations staff shall be addressed at least annually to determine if any changes or additional resources are needed.

Measuring Performance

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

CRITICAL ASSETS

Determining Criticality

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

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

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

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

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

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

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

The WWTF and lift station categories for CoF are:

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

Criticality Results

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

Figure 1 provides the risk rating for gravity and force main pipe by number of pipe segments. Eighteen pipe segments in the collection system have an extreme risk rating and are recommended to be replaced. Much of the collection system's gravity pipes, 83 percent as shown in Figure 1, have a low to negligible risk rating and are indicative of pipes or manholes in relatively good condition.

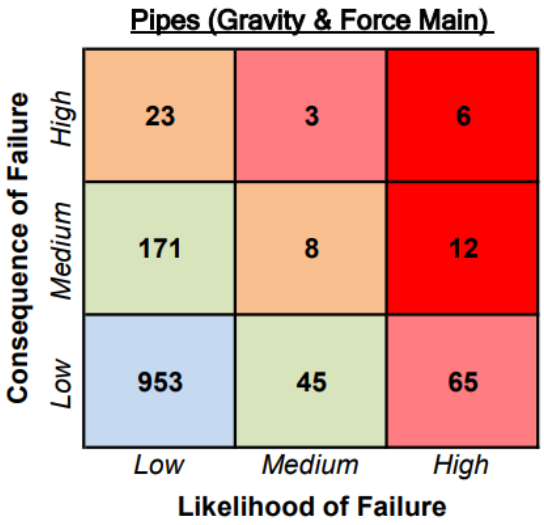

Figure 1. Business Risk Matric (Risk Rating) by Number of Gravity and Force Main Pipes

Figure 2 provides the risk rating for the collection system manholes. Eleven manholes are identified as extreme risk, and are recommended for replacement. Many manholes, 75 percent, are at low to medium risk and are indicative of pipes or manholes in relatively good condition.

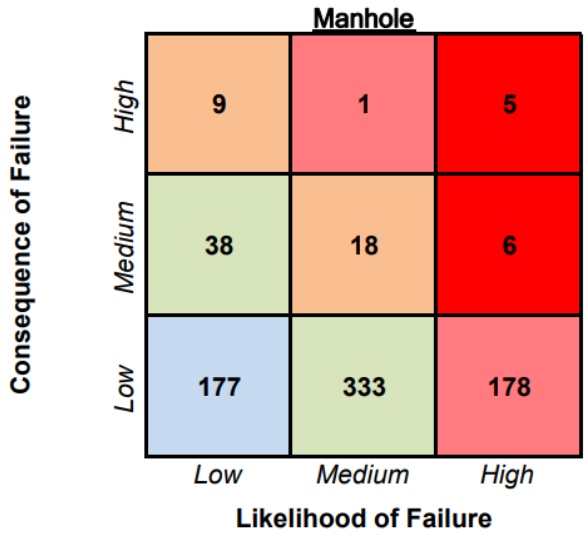

Figure 2. Business Risk Matrix (Risk Rating) by Number of Manholes

Figure 3 provides the risk ratings for the WWTF and lift station assets. No assets are identified as extreme risk. The 14 assets with high risk ratings should be inspected at regular intervals.

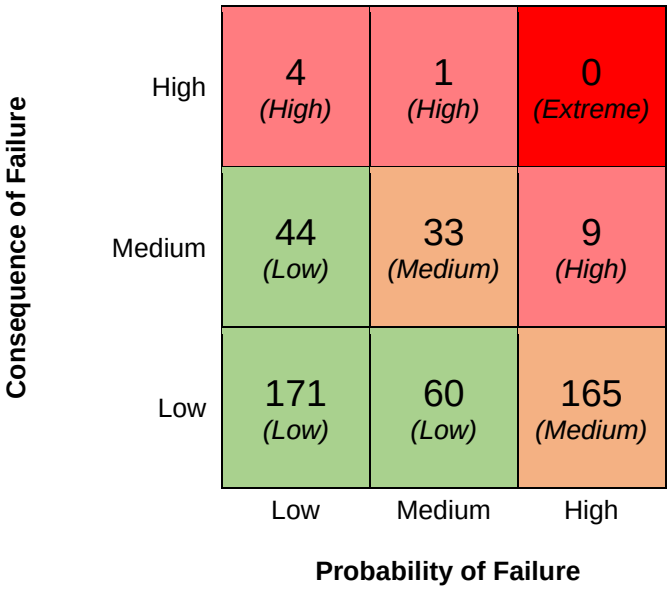

Figure 3. Business Risk Matrix (Risk Rating) by Number of WWTF and Lift Station Assets

A spreadsheet providing asset criticality for each utility asset has been included in the AMP detailed report for the collection and 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, WWTF and lift stations. From the BRE, a short-term (1-5 year CIP) and long-term

(6-20 year CIP) was developed for the utility. Table 1 shows detailed recommendations of the collection system assets needing rehabilitation in the short-term CIP.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation						
Rehabilitation Action	Total Cost (Current Year Dollars)	2021	2022	2023	2024	2025
Pipe Replacement	$ 2,750,419	$ -	$ 973,328	$ -	$ -	$ 2,032,040
Pipe Lining	$ 122,441	$ -	$ 54,767	$ -	$ 75,692	$ -
Pipe Upsize	$ 206,236	$ 206,236	$ -	$ -	$ -	$ -
Pipe Point Repair	$ 124,169	$ 52,332	$ -	$ 76,212	$ -	$ -
Pipe Point Repair and Line	$ 5,428,032	$ 219,047	$ -	$ 5,526,213	$ -	$ -
Manhole Replacement	$ 54,240	$ -	$ -	$ -	$ -	$ 61,048
Manhole Clean, Line, Repair and Adjust	$ 51,000	$ -	$ -	$ -	$ 55,729	$ -
Manhole Clean, Line and Repair	$ 169,983	$ -	$ 18,626	$ -	$ 165,985	$ -
Manhole Repair, Line and Adjust	$ 77,665	$ -	$ -	$ -	$ 84,867	$ -
Manhole Repair and Line	$ 251,025	$ -	$ 11,491	$ -	$ 262,111	$ -
Manhole Clean and Line	$ 24,613	$ -	$ -	$ -	$ 26,895	$ -
Total	$ 9,259,824	$ 477,615	$ 1,058,212	$ 5,602,425	$ 671,279	$ 2,093,087

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

Table 2. Recommended Capital Improvements for WWTP and Lift Stations			
Asset Description	Anticipated Year of Replacement	Budget (2020 Dollars)	Budget (Replacement Year)
1-5 YEAR CIP PROJECTS			
West Screw Pump Upgrades	2021	$400,000	$412,000
WWTP Water System Improvements	2021	$103,000	$106,100
Final Clarifier Rehabilitation	2022	$91,300	$96,900
Novak Lane Lift Station	2022	$324,000	$343,700
East Screw Pump Upgrades	2023	$400,000	$437,100
Vortex Grit System Upgrades	2023	$430,000	$469,900
SDC Equipment and Piping Replacement	2024	$567,000	$638,200

Operations, Maintenance & Replacement

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

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

Table 3. 5-Year Capital Improvement Plan: Maintenance												
Maintenance Action	**Total Cost (Current Year Dollars)**		**2021**		**2022**		**2023**		**2024**		**2025**	
Manhole Assessment	$	7,723	$	1,655	$	-	$	1,756	$	4,823	$	-
Manhole Cleaning	$	9,103	$	-	$	-	$	-	$	-	$	10,245
CCTV and Cleaning	$	316,034	$	-	$	-	$	333,787	$	1,538	$	-
Total	$	332,860	$	1,655	$	-	$	335,543	$	6,361	$	10,245

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

Revenue Structure

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

The rate methodology required by EGLE for SAW Grant Asset Management Plans requires an analysis of the current budget on a cash basis to determine if there is a revenue gap. The analysis performed by the City Treasurer and approved by EGLE shows that the revenues are currently sufficient to cover the wastewater system operating costs.

EGLE

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

Completion Date 12/22/2020
(no later than 3 years from executed grant date)

The City of Big Rapids *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1566-01 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: 12/4/2020 (via email).
2) Significant Progress Made: Yes or No
   (EGLE defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: _____.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on _____.

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

Mark Gifford, City Manager	at 231-592-4000	mgifford@cityofbr.org
Name	Phone Number	Email

Mark Gifford 12/21/2020

Signature of Authorized Representative (Original Signature Required) Date

Mark Gifford, City Manager

Print Name and Title of Authorized Representative