CIP

CAPITAL IMPROVEMENT PLAN

2021 - 2025

Preliminary Draft No. 1

October 10, 2019

GLWA

Great Lakes Water Authority

Contents

I. Overview

SECTION 1 Great Lakes Water Authority

The Great Lakes Water Authority (GLWA) was incorporated by the City of Detroit and the Counties of Macomb, Oakland and Wayne on November 26, 2014 pursuant to Act 233, Public Acts of Michigan, 1955, as amended. At the time of GLWA's incorporation, the City, through its Detroit Water and Sewerage Department (DWSD), was providing water supply services and sewage disposal services within and outside of the City of Detroit. On June 12, 2015, the City and GLWA executed a regional water system Lease, a regional sewage disposal system lease and a water and sewer services agreement, and as of December 1, 2015, the City and GLWA executed a shared services agreement. The foregoing agreements became effective on January 1, 2016, at which time GLWA, pursuant to the Lease, became responsible for the debt obligations of the City relating to the Water System, including the payment of all DWSD Water Bonds, through the substitution of GLWA for the City as the sole obligor on the DWSD Water Bonds, the assignment to GLWA of all of the revenues of the Water System, and the assumption by GLWA of the DWSD Water Bonds.

The Authority operates the regional water system and the regional sewer system (each as defined herein) for Southeast Michigan pursuant to the leases and the Water and Sewer Services Agreement. The governance structure of the Authority gives suburban water and sewer customers a substantial collaborative role in the direction of one of largest water and wastewater utilities in the nation, while also providing the City's local systems the benefits of the Authority's regional strengths. While GLWA manages and controls all regional water and wastewater wholesale services, the City and the suburban customer communities retain control of local water and sewer services within their respective borders. The City also acts as agent of GLWA with respect to setting, billing, collecting and enforcing local retail charges. Prior to January 1, 2016, DWSD's financial activities were largely governed by a series of federal court orders designed to separate the management of the regional water and sewer enterprises from local City control and to ensure environmental compliance. In contrast, GLWA is a legally independent, regional authority created pursuant to State law, governed by its own independent Board of Directors and primarily overseen, as to environmental matters, by the Environmental Great Lakes & Energy (EGLE), as are all water and sewer service providers in the state, and the federal Environmental Protection Agency (EPA).

The new Authority has adopted an unwavering commitment to its customer communities, known as "One Water," with a strong mission statement of customer collaboration and engagement:

"Through regional collaboration, GLWA strives to be the provider of choice dedicated to efficiently delivering the nation's best water and sewer service in partnership with our customers."

In open partnership with its customers, GLWA is focused on innovation in its business practices, with a commitment to providing the highest quality product and services to current and future generations.

The regional water system has a long history of providing reliable service and water quality with the Great Lakes as its source and five water treatment plants, with capacity well in excess of current and projected demands. In light of this capacity, GLWA has undertaken plans to market water services to potential new wholesale customers, as well as to right-size its facilities for financial and operational optimization of the regional water system.

1.1. Powers of the Authority

GLWA is a public body corporate organized pursuant to the provisions of Act 233. In addition to this statutory authority, the governance for the Authority is found in its Articles of Incorporation, By-Laws, policies, and ordinances including but not limited to its bond ordinances. The Authority has both express powers and implied powers necessary to carry out its powers, duties, and responsibilities. GLWA's express powers include the following:

The Authority is empowered through its Board of Directors to provide wholesale water and wastewater service to the service area. The six-member GLWA Board has the authority to execute contracts, set policy for the Authority, set service charges and set the revenue requirement for the customers.

The GLWA Board is required to appoint an Audit Committee to "review the reports related to the financial condition, operations, performance and management of the Authority" on a regular basis. Certain actions by the GLWA Board require the affirmative vote of at least five of its members, including, but not limited to, setting charges for water and sewer services, annual operating budgets, capital improvement programs, issuance of debt and any modification of the Lease.

The Authority shall formally adopt a two-year operating budget, consistent with Section 5 of the Articles of Incorporation. The two-year operating budget shall require the affirmative vote of five members.

The Authority has the ability to enter into water supply and sewage disposal contracts and may establish and fix a schedule of fees and other charges for its services.

1.2. Governance and Board Members

The GLWA Board of Directors (GLWA Board) is comprised of six voting members. Two members are residents of the City of Detroit and are appointed by the Mayor of the City of Detroit. The Counties of Macomb, Oakland, and Wayne each appoint one member who is a resident of the County from which appointed and the Governor of the State of Michigan appoints one member who is a resident of an area served by the Authority outside of the Counties. All members of the GLWA Board must have at least seven years of experience in a regulated industry, a utility, engineering, finance, accounting or law. After the initial term specified in the Articles of Incorporation, each GLWA Board member is appointed for a four-year term and serves at the pleasure of the appointing authority.

In order to more efficiently oversee the Authority's operations, the GLWA Board has adopted a committee structure. Four committees have been established: (i) Audit, (ii) Capital Improvement Planning, (iii) Operations and Resources and (iv) Legal.

The GLWA Board currently consists of:

- *Brian Baker, GLWA Board Chairman; Representative for Macomb County*
- *Abe Munfakh, GLWA Board Vice Chair; Representative for Wayne County*
- *GLWA Board Secretary, Representative for Oakland County*
- *Freman Hendrix, GLWA Board Chairman; Representative for the City of Detroit*
- *Gary A. Brown, Representative for the City of Detroit*
- *Dr. Beverly Walker-Griffea, Representative for the State of Michigan*

The GLWA Capital Improvement Planning committee provides significant input, direction and evaluation of the 2021-2025 CIP. Current members of the CIP committee include:

- *Abe Munfakh, P.E.*

1.3. Executive Leadership Team

GLWA's Executive Leadership Team has operated the Water System since 2012, and is continuing to optimize the organization through innovative job designs, lean business practices and the greater use of technology. These organizational optimization initiatives have already resulted in performance improvements in all aspects of Water and Wastewater System operations, from environmental compliance to member partner satisfaction, and have materially improved the Water System's financial metrics and results. GLWA continues on its path of performance improvement with a new focus on its role in the economic success and the public health and safety of the region it serves.

The GLWA Executive Leadership Team is committed to building upon the history of improved performance of the Water System and the Sewer System that began in 2012. GLWA key personnel are:

- *Sue F. McCormick, Chief Executive Officer*
- *William M. Wolfson, Chief Administrative and Compliance Officer*
- *Nicolette N. Bateson, CPA, Chief Financial Officer/Treasurer, Financial Services*
- *Cheryl Porter, Chief Operating Officer, Water & Field Services*
- *Navid Mehram, P.E., Chief Operating Officer, Wastewater Services*
- *Terri Tabor Conerway, Chief Organizational Development Officer*
- *Suzanne R. Coffey, P.E., Chief Planning Officer*
- *Michelle A. Zdrodowski, Chief Public Affairs Officer*
- *Jeffrey E. Small, Chief Information Officer*
- *W. Barnett Jones, Chief Security and Integrity Officer*
- *Randal M. Brown, General Counsel*

1.4. Service Area and Member Partner Relationships

The Authority's Water System is one of the largest in the United States, both in terms of water produced and population served. The Water System currently serves an area of 1,689 square miles located in eight Michigan counties and an estimated population of 3.8 million people. This includes 88 Member Partners across 112 communities.

SECTION 2 CIP STRATEGY

GLWA's Capital Improvement Plan (CIP) supports the continuation of major capital asset investment in programs and projects that will upgrade the Authority's aging water and wastewater system infrastructure, as well as the overarching Centralized Service infrastructure that supports both systems. The CIP is a five-year plan which identifies capital projects and programs and their respective financing options. Annually, this plan is updated to reflect changing system needs, priorities and funding opportunities.

> *"At GLWA the capital replacement strategy that we are striving for is to increase resiliency of water and wastewater systems, adhere to long-term planning document recommendations, active solicitation of stakeholder input and to be the best-in-class planning and execution"*

Projects and programs established in the CIP are identified and recommended from many different sources. Several projects are permit and regulatory requirements, while others have been identified in master plans, condition or need assessments. The latter of which make up the primary sources of projects within the CIP. In addition, other projects and programs are brought forward by operations and maintenance personnel tasked with continually providing a high level of service and by the engagement of our stakeholders – in particular, an engaged member partner community.

Based upon their long-term nature toward achieving a strategy, master plan capital recommendations make up a significant number of the projects. GLWA's Comprehensive Water Master Plan was completed in 2015 is a twenty-year planning tool that addresses optimization of an aging water system by recognizing that there is excess capacity from decreasing usage and a stable population while never compromising quality. GLWA's Comprehensive Regional Wastewater Master Plan will replace the existing 2003 wastewater master plan, it is expected to be complete by the end of this calendar year. This master plan focuses on the new dynamic of a regional authority to provide regional collaboration and planning to minimize capital expenditures while exceeding levels of service.

This CIP should be considered a planning document – it is a dynamic and evolving plan that requires continual review and modification during the course of the year. The estimates indicated in the early years of the report are likely more precise than those in the later years because anticipated projects in the early years are typically better defined by studies or scoped by design than projects conceptual in nature in the out years of the plan. The project descriptions and summaries represent brief synopses of the entire project scope; these descriptions are generally more precise for ongoing active projects than for newly planned projects, where specific project activities may have yet to be determined.

Based upon the execution of programs and projects identified in the CIP, existing levels of service currently provided will be met or exceeded.

Copies of this CIP and past CIPs are available on GLWA's website at https://www.glwater.org/cip.

2.1. Funded Portion of the Programs

This plan spans a 5-year period from fiscal year 2021 through fiscal year 2025. The CIP review process also includes an extensive review of the total project, or "lifetime" budget, which reflects historical spending prior to, during, and beyond the current 5-year period. The goal of the Authority's capital financing strategy is to align capital project financing sources with multiple goals including: (a) recovering the costs of capital investment over the useful lives of the capital assets; (b) minimizing the impact of the capital programs on water and sewage revenue requirements; and (c) protecting and enhancing the Authority's financial position. The potential funding source identified for each project is subject to change based upon the systems need and financial resources available at the time.

SECTION 3 LARGEST DOLLAR PROJECTS (GREATER THAN $30M)

The water and wastewater projects with the largest projected spend for the FY2021-2025 CIP are listed below. These projects are budgeted for greater than $30 Million over the FY2021-2025 time period. There are nine (9) projects in the Water category and nine (9) projects in the Wastewater category.

3.1. Water

Table I-1. Water Projects with 2021-2025 CIP Total Greater than $30M

CIP #	Project Title	Lifetime Actual Thru FY19	FY20	Projected Expenditures							
				FY21	FY22	FY23	FY24	FY25	FY26+	2021-25 CIP Total	Project Total
122003	Water Works Park to Northeast Transmission Main	2,611	1,169	11,703	18,407	18,678	18,170	20,839	65,949	87,797	157,526
122004	96-inch Water Transmission Main Relocation and Isolation Valve Installations	1,790	2,549	5,267	15,765	19,937	19,797	19,797	59,969	80,563	144,871
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	2,080	4,039	7,113	12,893	18,905	18,690	19,175	92,940	76,776	175,835
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	1,760	251	5,462	13,349	21,478	20,883	8,836	0	70,008	72,019
122013	14 Mile Transmission Main Loop	638	3,762	1,194	17,085	17,085	17,085	17,085	7	69,534	73,941
116002	Pennsylvania and Springwells Raw Water Supply Tunnel Improvements	10,200	653	14,138	21,917	8,810	5,527	0	0	50,392	61,245
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements	14	1,236	1,636	1,749	13,725	12,768	12,841	11,121	42,719	55,090
132010	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades	296	663	4,323	12,209	11,853	8,361	0	0	36,746	37,705
170800	System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation	457	2,160	6,087	6,087	6,087	4,100	11,366	22,732	33,727	59,076

3.2. Wastewater

Table I-2. Wastewater Projects with 2021-2025 CIP Total Greater than $30M

CIP #	Project Title	Lifetime Actual Thru FY19	FY20	Projected Expenditures							
				FY21	FY22	FY23	FY24	FY25	FY26+	2021-25 CIP Total	Project Total
260200	Sewer and Interceptor Rehabilitation Program	18,637	19,029	12,976	36,047	24,872	15,495	14,347	13,240	103,737	154,643
212008	WRRF Aeration Improvements 1 and 2	0	183	4,612	7,977	7,619	40,638	15,336	5,149	76,182	81,514
232002	Freud & Conner Creek Pump Station Improvements	5,631	7,364	6,445	57	9,898	23,830	30,803	138,071	71,033	222,099

CIP #	Project Title	Lifetime Actual Thru FY19	FY20	Projected Expenditures							
				FY21	FY22	FY23	FY24	FY25	FY26+	2021-25 CIP Total	Project Total
211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements	1	256	3,098	7,546	2,120	20,899	34,034	8,642	67,697	76,596
222002	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	10,592	16,199	23,634	9,786	1,465	10,014	9,986	0	54,885	81,676
260600	CSO Facilities Improvement Program	6,742	7,555	7,492	10,289	10,576	4,759	20,280	85,250	53,396	152,943
260500	CSO Outfall Rehabilitation	3,331	4,802	11,706	9,156	11,995	10,976	8,243	4,197	52,076	64,406
222004	Sewer System Infrastructure and Pumping Stations Improvements	4	1,459	2,701	5,433	16,434	9,864	3,279	1,952	37,711	41,126
222001	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	0	0	975	3,128	3,371	11,234	13,439	21,365	32,147	53,512

SECTION 4 LARGEST 2021 PROJECTED SPEND (GREATER THAN $5M)

The water and wastewater projects with the largest projected spend for 2021 are listed below. These projects are budgeted for greater than $5 Million in FY 2021. There are eleven (11) projects in the Water category and seven (7) projects in the Wastewater category.

4.1. Water

Table I-3. Water Projects with 2021 Projected Spend Greater than $5M. (Thousands of dollars)

CIP #	Project Title	Lifetime Actual Thru FY19	FY20	Projected Expenditures							
				FY21	FY22	FY23	FY24	FY25	FY26+	2021-25 CIP Total	Project Total
116002	Pennsylvania and Springwells Raw Water Supply Tunnel Improvements	10,200	653	14,138	21,917	8,810	5,527	0	0	50,392	61,245
122005	Schoolcraft Road Water Transmission Main	141	3,342	13,141	1,482	0	0	0	0	14,623	18,106
122003	Water Works Park to Northeast Transmission Main	2,611	1,169	11,703	18,407	18,678	18,170	20,839	65,949	87,797	157,526
114008	Springwells Water Treatment Plant 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements	178	3,386	10,327	331	19	0	0	0	10,677	14,241
122006	Wick Road Water Transmission Main	420	6,163	9,975	5,780	0	0	0	0	15,755	22,338
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	2,080	4,039	7,113	12,893	18,905	18,690	19,175	92,940	76,776	175,835
114011	Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements	2,373	6,948	6,932	6,932	713	0	0	0	14,577	23,898

CIP #	Project Title	Lifetime Actual Thru FY19	FY20	Projected Expenditures							
				FY21	FY22	FY23	FY24	FY25	FY26+	2021-25 CIP Total	Project Total
170800	System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation	457	2,160	6,087	6,087	6,087	4,100	11,366	22,732	33,727	59,076
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	1,760	251	5,462	13,349	21,478	20,883	8,836	0	70,008	72,019
170300	Water Treatment Plant Automation Program	1,658	3,208	5,440	2,943	1,211	3,117	1,151	0	13,862	18,728
122004	96-inch Water Transmission Main Relocation and Isolation Valve Installations	1,790	2,549	5,267	15,765	19,937	19,797	19,797	59,969	80,563	144,871
116002	Pennsylvania and Springwells Raw Water Supply Tunnel Improvements	10,200	653	14,138	21,917	8,810	5,527	0	0	50,392	61,245

4.2. Wastewater

Table I-4. Wastewater Projects with 2021 Projected Spend Greater than $5M

CIP #	Project Title	Lifetime Actual Thru FY19	FY20	Projected Expenditures							
				FY21	FY22	FY23	FY24	FY25	FY26+	2021-25 CIP Total	Project Total
222002	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	10,592	16,199	23,634	9,786	1,465	10,014	9,986	0	54,885	81,676
260200	Sewer and Interceptor Rehabilitation Program	18,637	19,029	12,976	36,047	24,872	15,495	14,347	13,240	103,737	154,643
260500	CSO Outfall Rehabilitation	3,331	4,802	11,706	9,156	11,995	10,976	8,243	4,197	52,076	64,406
260600	CSO Facilities Improvement Program	6,742	7,555	7,492	10,289	10,576	4,759	20,280	85,250	53,396	152,943
232002	Freud & Conner Creek Pump Station Improvements	5,631	7,364	6,445	57	9,898	23,830	30,803	138,071	71,033	222,099
211008	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines	178	1,239	5,522	3,886	0	0	0	0	9,408	10,825
232001	Fairview Pumping Station - Replace Four Sanitary Pumps	3,404	27,552	5,336	984	0	0	0	0	6,320	37,276

II. Development & Features

SECTION 1 Approval Process

The CIP development and approval process begins with the approval of the previous year's CIP. The CIP process is a substantial level of effort that involves many team members throughout the Authority. Modifications, adjustments and improvements are being continuously considered and vetted internally and externally through various Member Partner Outreach Work Groups. Projects and programs that ultimately get funded within the CIP are typically identified based upon master planning or condition/need assessment efforts. Projects also are identified internally based upon the needs of engineers, operations or maintenance staff. An internal effort to coordinate and prioritize all identified projects is conducted to ensure the appropriate projects are being funded in a prioritized manner.

The process typically begins in the summer of each year when modifications to the CIP itself, requested project information and process are developed. These changes are rolled out and project manager training on modifications to the CIP process and documentation occurs. At this time, an Authority-wide request for project proposals and the request for the completion of the Business Case Evaluation documentation is made to all business areas throughout the Authority. Business case evaluations from project managers are due to the Enterprise Capital Improvement Planning by late summer.

Typically, in September, the Water and Wastewater Review Committees will meet to score newly submitted CIP projects for the upcoming fiscal year. For this CIP, the projects and programs that are currently active have not been prioritized by these committees as they are currently underway, while the future planned projects that have not yet begun are only rescored if there have been significant changes to the condition of the assets in question or organizational priorities.

New this year, a new subcommittee for both Water and Wastewater was formed to meet after the scoring was completed to prioritize the project schedules with the needs of our operations and maintenance staff.

Project information related to new and substantially modified projects, as well as overall summary financial information are reviewed by the Executive Leadership Team (ELT). Following this review, a draft of the CIP is compiled typically in early fall. That draft report and back-up documentation are reviewed internally with the Asset Management and CIP work area team, several members of the ELT, Public Affairs, Chief Financial Officer/Treasurer (CFO) and the Authority's financial planning consultant. The Financial Services Area provides prior year actual expenses based upon unaudited financials.

With projects vetted internally, the draft CIP is presented and comments and feedback solicited from the CIP Member Partner Outreach Work Group, the GLWA Capital Improvement Planning Committee and the Authority's Member Partner communities. Throughout this process all feedback, comments and suggestions are welcomed. Based upon member partner and Board feedback, the CIP is modified and a second version of the plan is released with roll-out to member partners and the Board through similar avenues. Following this release, it is expected that the CIP approval process coincides with the overall budget development and approval process.

SECTION 2 CALENDAR

The schedule below is for planning purposes. It reflects the past actual dates as well as projected future dates and is subject to change. Specific approval dates and coordination with the GLWA Board of Directors is necessary to identify key milestones leading up to the ultimate approval of the 2021-2025 CIP.

Date	Description
June 21, 2019	Distribute & Train Team Members on Business Case Evaluation Database
August 23, 2019	Team Members BCE's are Due
September 16-23, 2019	Water and Wastewater Review Committee Meetings
September 30, 2019	New Meeting – Alignment of scoring & project schedules
October 1, 2019	Executive Leadership Team Reviews BCE's & Modifications to CIP
October 8, 2019	Provide Preliminary Draft #1 Data to Finance
October 9, 2019	Upload Preliminary Draft #1 to Legistar & Member Outreach (without Chapter 3)
October 15, 2019	First GLWA CIP Committee Review of CIP – Version 1Preliminary Draft #1
October 17, 2019	First Member Partner Review of CIP – Preliminary Draft #1 at Charges Rollout Meeting #1
November 5, 2019	Member Partner & Board Comments Due
November 12, 2019	Provide Preliminary Draft #2 Data to Finance
December 6, 2019	Upload Preliminary Draft #2 to Legistar and Member Outreach
December 10, 2019	Second Member Partner Review of CIP – Preliminary Draft #2 at CIP Member Partner Outreach Work Group
December 17, 2019	Second GLWA CIP Committee Member Partner Review of CIP – Preliminary Draft #2
February 2019	Request Board approval of the 2021-2025 CIP
July 1, 2020	Effective Date of 2021- 2025 CIP

SECTION 3 BUSINESS CASE EVALUATION DEVELOPMENT

3.1. Project Prioritization

GLWA has continued to utilize the project prioritization tool to provide a standardized method of prioritizing projects for the annual GLWA CIP development. This prioritization tool attempts to quantify a project ranking to allow for objective prioritization. When asset management information is available on the asset level, the information will be used to supplement the Business Case Evaluation process to ensure the effective and efficient use of public funds. The CIP development and prioritization process results in a prioritized list of projects with anticipated CIP year, schedule and overall cost for inclusion within the official 5-year CIP.

Currently, projects to be considered for inclusion in each year of the CIP are identified by the subject matter expert engineers or project managers. These engineers and project managers utilize available institutional knowledge, data, operations and maintenance reports, need and condition assessments and master plans to identify the project need. The following criteria have been identified to capture GLWA's overall strategy related to the probability and consequence of failure associated with each identified project: (i) condition, (ii) performance (Service Level/Reliability), (iii) operations & maintenance, (iv) regulatory (environmental & Legal), (v) public health & safety, (vi) public benefit, (vii) financial and (viii) efficiency and innovation.

The results of the project prioritization by each project manager and by the individual review committees are included in Chapter V. These provide a quick glance prioritization of each project as they relate to others. This will be very useful to identify lower priority projects that may be delayed in the event of emergencies that may redirect funding away from the existing project or to prioritize procurement activities.

3.2. Review Committee

Currently, each New and Future Planned projects are scored by the project manager during the completion of the Business Case Evaluation and by a Review Committee. The Review Committee is comprised of a core group of members from leadership in the Financial Service Group, Planning Services Group, and from the business unit associated with Water or Wastewater Service Area. To facilitate transparency in this process, a member from one or more of GLWA's member partner communities also participates as a scoring member of the Review Committee. The 2021-2025 Capital Improvement Program Development Water and Wastewater Review Committee members are identified below in Table II-1 and Table II-2, respectively.

Table II-1. Water Review Committee Members

Name	Group
Eric Witte	Member Partner Rep. – City of Dearborn
Ali Khraizat	GLWA Systems Planning
Jody Caldwell	GLWA Systems Planning
Suzanne Coffey	GLWA Systems Planning
Todd King	GLWA Water and Field Services
John Barron	AECOM CIPMO
Scott Schultz	GLWA Financial Services
Dana Thurman	GLWA Systems Planning
John Norton	GLWA Water and Field Services
Bill Fritz	GLWA Systems Planning
Cheryl Porter	GLWA Water Operations
Terry Daniel	GLWA Water Operations
Biren Saparia	GLWA Systems Control
Grant Gartrell	GLWA Water Engineering
Anjanette Custard	GLWA Systems Planning
Andrew Sosnoski	GLWA Financial Services
Desiree Barrett	GLWA Financial Services
Chandan Sood	GLWA Systems Analytics & Meter Ops

Table II-2. Wastewater Review Committee Members

Name	Group
Tom Murray	Member Partner Rep. – City of Allen Park
Ali Khraizat	GLWA Systems Planning
Jody Caldwell	GLWA Systems Planning
Bill Fritz	GLWA Systems Planning
Dana Thurman	GLWA Systems Planning
John Barron	AECOM CIPMO
Suzanne Coffey	GLWA Wastewater Operations
Chris Nastally	GLWA Wastewater Operations
Chris Wilson	GWLA Wastewater Operations
Philip Kora	GLWA Wastewater Engineering
Dan Alford	GLWA Wastewater Engineering
Navid Mehram	GLWA Wastewater Operations
Sajit George	GLWA Wastewater Operations
Biren Saparia	GLWA Systems Control
Anjanette Custard	GLWA Systems Planning
Andrew Sosnoski	GLWA Financial Services
Tina Gillery	GLWA Financial Services
Todd King	GLWA Field Services
Chandan Sood	GLWA Systems Analytics & Meter Operations

3.3. BCE Guidance Document

To aid in evaluating and understanding the project prioritization and process, a Capital Improvement Project Prioritization Guidance Document has been developed. This document details the purpose of the prioritization tool, identifies the anticipated CIP schedule and key milestones, provides details about each criterion and the associated weighting factor and demonstrates the overall prioritization calculation. Most importantly, this document provides the detailed guidance related to each category and displays examples of the information needed for project managers or the review committees to make accurate scoring decisions. In addition, as this methodology continues to evolve within the Authority, it is anticipated that future BCE's will contain specific data related to each criteria being evaluated thus creating a better and more well defined project justification that can be easily relatable to other projects submitted.

SECTION 4 KEY FEATURES

4.1. Project Status Description

In order to determine a particular projects progress within the CIP, a status is assigned to each project within the CIP. The project status designation provides a high-level understanding of the progress. Projects are often divided into multiple phases or categories based upon the contract type. As such, each phase of a multi-phase project will have its own status and contract number. Descriptions of each status are provided in Table II-3 on the following page. Projects that have been newly introduced into the CIP this year have been designed as "New to the CIP" based upon a checkmark within the Business Case Evaluation. In addition, projects new to the CIP are included in tabular format within Chapter IV, Section 1.

Table II-3. Project status descriptions

Project Status	Description
Future Planned	Project that was included in the previous CIP and does not have an assigned BS&A Project Number.
Active	Project that has an assigned BS&A Project Number in the financial system and the procurement process has been initiated for one or more the project's phases.
Pending Close-out	Project that has an assigned BS&A Project Number, a Notice to Start Work has been issued, has projected expenditures for the current fiscal year equal to $100,000 or less - with no future projected expenditures and has reached substantial completion.
Closed	Project that has been officially completed.
Reclassified	Project that has been merged into the scope of work of an existing project.
Cancelled	Project that has been completely cancelled and removed from the CIP.
Archived	Project that has been identified as Closed within the CIP the previous year.

4.2. Phase Categories

Often projects are broken up into several phases related to how the particular project will be delivered and managed. Categories may be grouped to align with work to be performed within each individual phase. Individual categories are identified and named below, however, in reality several categories may exist for each phase. In this case, this implies the same vendor, under one contract, will be performing multiple categories of the overall project. The current project categories are identified below.

S....................Study
D....................Design
C ....Construction
CA ....Construction Assistance
DB ....Design and Build
DBA.............Design Build Assistance
CM.................Construction Management
PM ....Project Management
TBD.............To Be Determined

4.3. CIP Types

Multiple CIP types are necessary to distinguish the differences in intent of how a particular CIP item is to be used. This CIP contains two primary CIP types: Projects and Programs. A typical project that has a specific scope and timeframe is considered a Project. Whereas Programs and do not have specifically developed scopes and typically extend over many years. Last year there was an additional CIP type, Allowances that were used to address unanticipated pipeline and equipment failures, this has since been removed and is being funded differently. Table II-4 defines each CIP Type.

SECTION 5 Report Format

The 2021-2025 CIP format is similar to the 2020-2024 CIP document for a transparent, navigable and user-friendly report.

5.1. Varying Degrees of Project Detail

Within the document, projects and programs are portrayed in varying degrees of detail that should meet the needs of most readers. Projects can be viewed in the basic line item format that provides general information about the project and the projected expenditures. Within this format, projects have been rolled up by their major category of Water, Wastewater and Centralized Services. Totals are provided. Projects have also been identified separately within each category to provide the reader more information on the type and amount of each project within specific service areas. One-page summaries of each project (old and new) give the reader more detail of the project phases, purpose, scope of work and potential challenges. Finally, for greater detail on each project, the BCE documents are provided in Appendix A, B and C.

Table II-4. CIP Types

CIP Type	Description
Project	A "Project" consists of the replacement and/or rehabilitation of specific capital assets within a finite timeframe and scope.
Program	A "Program" consists of the replacement and/or rehabilitation of specific capital assets on an ongoing or reoccurring basis. The program scope and/or projected expenses may vary from year-to-year depending on the needs identified within the program and as newly established programs develop consistent schedules, requirements and history over time. Although not typically identified in the CIP future years projected expenses, these programs will typically be funded in perpetuity.
Allowance	An "Allowance" consists of unanticipated replacement and/or rehabilitation of currently unidentified capital assets. Engineering studies, evaluations, testing, construction assistance directly related to the unforeseen replacement or rehabilitation are also included in the projected expenses.

5.2. Revised Project Categories & Numbering

The revised categorization methodology and numbering scheme of CIP projects and programs introduced in the 2018-2022 CIP is continued in the 2021-2025 CIP. The project characterization is extremely beneficial to align CIP project budgets by managing business area cost centers. In addition, these directly align with costs centers in the operating budget within the Authority's financial system.

As in the 2019-2023 CIP, projects within programs and allowances are assigned a CIP number within that program or allowance. This is required within the BS&A Financial system to accurately track and report expenses incurred. These project "carve outs" have been shown within this CIP as phases within the parent program or allowance.

This numbering is based on the "smart" numbering system as identified in Table II-5 below.

5.3. General Purpose

The General Purpose category within Project Category 2 and Project Category 3 in Table II-5 are necessary to identify projects that cross over multiple project categories. Projects that are not specifically attributed to one particular area will be identified here.

5.4. Programs

As identified previously, programs consist of the replacement and/or rehabilitation of specific capital asset on an ongoing or reoccurring basis. The program scope and/or projected expenses may vary from year-to-year, depending on the needs identified within the program, and as newly established programs develop consistent schedules, requirements and history over time. Although not typically identified in the CIP future years projected expenses, these programs will typically be funded in perpetuity. The numbering structure of the "Program" category is slightly different in order to allow up to 99 separate projects to be attributable to each program. As discussed previously, these projects identified under a parent program will be issued a CIP number, however will be displayed within the CIP as a phase of the overall parent program.

Table II-5. Capital Project/General Ledger Account Numbering Protocol - Six Numeric Digits (4th Segment of GL String)

Digit 1	Digit 1 + Digit 2	Digit 1 + Digit 2 + Digit 3 (+ Digit 4)	Digits 4 - 6 / Digits 5 - 6
Project Category 1	Project Category 2	Project Category 3	Number 000-999 / Number 00-99
1XX -Water	11X - Water Treatment Plants & Facilities	111 - Lake Huron	
		112 - Northeast	
		113 - Southwest	
		114 - Springwells	
		115 - Water Works Park	
		116 - General Purpose	
	12X - Field Services	121 - General Purpose	
		122 - Transmission System	
	13X - Systems Control Center	131 - General Purpose	
		132 - Pump Stations & Reservoirs	
	14X - Water Quality	141 - General Purpose	
	15X - Metering	151 - General Purpose	
	16X - General Purpose	161 - General Purpose	
	17X - Programs	1701 - Programs	
2XX - Wastewater	21X - Water Resource Recovery Facility	211 - Primary Treatment	
		212 - Secondary Treatment & Disinfection	
		213 - Residuals Management	
		214 - Industrial Waste Control	
		215 - CSO RTB & SDF	
		216 - General Purpose	
	22X - Field Services	221 - General Purpose	
		222 - Interceptor	
	23X - Systems Control Center	231 - General Purpose	
		232 - Pump Stations	
		233 - In System Devices (Dams, ISD's)	
	24X - Metering	241 - General Purpose	

Digit 1	Digit 1 + Digit 2	Digit 1 + Digit 2 + Digit 3 (+ Digit 4)	Digits 4 - 6 / Digits 5 - 6
Project Category 1	Project Category 2	Project Category 3	Number 000-999 / Number 00-99
	25X - General Purpose	251 - General Purpose	
	26X - Programs	2601 - Programs	
	27X – CSO Facilities	270 - Multiple CSO facilities	
		271 - Puritan Fenkell	
		272 - Seven Mile	
		273 - Hubbell Southfield	
		274 - Leib	
		275 - St. Aubin	
		276 - Conner Creek	
		277 - Baby Creek	
		278 - Oakwood	
		279 - Belle Isle	
3XX - Central Services	31X - Information Technology	311 - General Purpose	
		312 - Service Desk	
		313 - Infrastructure	
		314 - Enterprise Applications	
		315 - Business Applications	
		316 - Security	
		317 - Project Management Office	
	32X - Fleet	321 - General Purpose	
	33X - Facilities	331 - General Purpose	
	34X - Security	341 - General Purpose	
	35X - Energy Management	351 - General Purpose	
	36X - Engineering	361 - General Purpose	
	37X - General Purpose	371 - General Purpose	
	38X - Programs	3801 - Programs	

5.5. Navigation

Links have been included throughout this document to direct the reader to varying level of project details. Links to major sections are embedded within the table of contents, and CIP numbers within the master project table are consistent throughout the CIP materials, so that a digital search for the CIP number will quickly locate each mention of the project. Due to the size of the Appendices, these documents will be maintained separately from the main body text.

5.6. CIP and Business Unit Overview

In order to understand the full extent of the Water and Wastewater Systems under the responsibility of GLWA, sections are included to provide an overview of the services provided and infrastructure maintained within each category. While the information is not all-inclusive, it does contain a substantial amount of reference information that will help the reader familiarize themselves with the capital assets and responsibilities of each business unit. As the CIP document evolves annually, these sections will be continuously updated to provide a great source of reference material related to the GLWA infrastructure.

5.7. CIP Database

Continuing with improvements seen in the 2020-2024 CIP related to the development of the CIP database for the data management of project business case evaluation information and the generation of reports, the database has been improved to allow for better usability, user support, and access control.

5.8. Project Risk Matrix

Project risks are identified specifically related to their Probability of Failure (PoF) and Consequence of Failure (CoF) and portrayed on an overall Risk Matrix. The overall criteria remain unchanged, however, in order to show each project on the risk matrix, the eight criteria used in the project prioritization framework are designated as either a PoF or CoF primary risk driver. The designation of PoF and CoF to each criterion as primary risk driver is shown in Table II-6.

After each criterion is scored for each project, the weighted PoF and CoF factors have been calculated. This provides a 1 to 5 vertical axis value for probability of failure and a 1 to 5 horizontal axis value for the consequence of failure. This point is plotted with the other projects to show its relative position compared to others within the matrix. A sample of the matrix is shown in Figure II-1.

This provides the varying audiences additional information related to the overall project risk as it relates to its consequence and probability of failure.

Table II-6. Risk Criteria.

	Criteria	Primary Risk Driver
1	Condition	Probability
2	Performance (Service Level / Reliability)	Probability
3	Regulatory (Environmental/Legal)	Consequence
4	O&M	Probability
5	Public Health & Safety	Consequence
6	Public Benefit	Consequence
7	Financial	Consequence
8	Efficiency & Innovation	Consequence

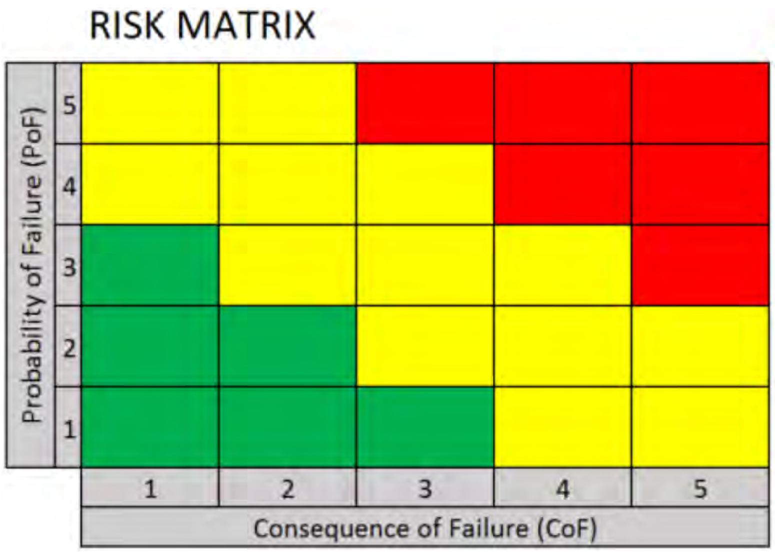


Figure II-1. Risk Matrix.

5.9. Cost Estimation Classifications

The cost estimate classification rating has again been included for each phase of most projects, based upon the estimates' degree of accuracy according to the level of project definition. This cost estimate rating gives the reader an idea of whether the cost estimate is a ballpark-level estimate, generally for work projected in the out years, or a higher-confidence estimate, such as for work projected to start sooner or already under contract.

GLWA has adopted the American Association of Cost Engineering (AACE) International system for classifying cost estimates. This standardized method for classifying project phases will be very beneficial in managing expectations related to the accuracy of the associated procurement contracts.

Table II-6. AACE Cost Estimate Classes

Estimate Class	Project Definition	End Usage	Method	Average Expected Accuracy Range	
Class 5	0% to 2%	Screening or feasibility	Judgement, trend analysis, parametric	120 %	- 60%
Class 4	1% to 15%	Concept study or feasibility	More parametric, expert opinion, trend analysis	85%	- 43%
Class 3	10% to 40%	Budget authorization or control	Combinations (detailed, unit cost, activity-based + class 4 & 5 methods	40%	- 20%
Class 2	30% to 70%	Control or bid/tender	Primarily deterministic	20%	- 10%
Class 1	50% to 100%	Check estimate or bid/tender	Deterministic	10%	-5%

5.10. Innovation, Master Plan Right-Sizing, Redundancy/Reliability & NE WTP Related Projects

The development of the database and means to intake and report out on project BCE's has allowed GLWA to classify and coordinate projects based on key areas of interest. Several areas of interest have been identified and can be seen in Chapter IV. These areas are:

- Innovation: Projects that may have a possibility at utilizing an innovative solution or process.
- Master Plan Right-Sizing: Projects that have incorporated the 2015 Water Master Plan recommendations to "Right-Size" infrastructure to allow for future capital cost avoidance by derating the water supply system.
- Redundancy & Reliability: Projects that have a direct impact at improving system redundancy and reliability.
- NE WTP Repurposing: Projects necessary to meet the 2015 Water Master Plan recommendations to repurpose the Northeast Water Treatment Plant to allow for future capital cost avoidance.

5.11. Program Projects

Projects that were performed under programs were identified by the CIP group and issued a CIP number. These projects have been derived from the outcome of their parent program. The CIP number associated with these projects is numerically relevant to the parent CIP number. To better portray this relationship in the CIP, these projects are rolled up as phases under the parent CIP program.

5.12. Project Year-to-Year Comparison

In order to compare a project's projected expenses from one year to the next, comparison tables have been included in each project summary and BCE. This also allows the reader to identify how the project schedule may have changed from year-to-year. Project Managers' and Engineers' description of the change is typically also included at the project level.

Total Project Expenses (in $1,000s) Comparison to Prior Year CIP

CIP Version	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
2018			1,000	3,000	1,600				0	5,600
2019	0		251	3,919	1,187	0	0	0	0	5,357

Description of CIP Changes: moved construction start to FY2019, added GLWA costs, changed project delivery from DBB to DB

5.13. Project Phase Schedule

A significant benefit for stakeholders associated with GLWA's CIP process is related to the information provided for project phase scheduling. Many projects have multiple phases and, in the past, an accurate understanding of when these project phases were scheduled was unknown. Starting with the 2019 CIP, most project phases have been scheduled to show the high-level tasks of Scope Development, Procurement, Project Execution and Project Closeout. This information is beneficial to GLWA's Procurement Group to determine overall procurement needs and resources, as well as, for the engineering work areas to manage project delivery. Finally, this schedule provides the vendor community with an estimate of timing related to projects they may be interested in pursuing. Understanding that this is the first year of tracking the project phase schedules in this manner, it is anticipated that each future year will provide better and more concise information related to these schedules.

Phase Tasks and Dates

Phase Category	DB
Budget	Water
Phase Status	Future Planned Start
Contract No	NA
Cost Est Class	

Design and Build

Task Name	Start Date	Duration	End Date
Scope Development	1/22/2018	100	5/2/2018
Procurement	7/1/2018	220	2/6/2019
Project Execution	2/6/2019	750	2/25/2021
Project Closeout	2/25/2021	90	5/26/2021

SECTION 6 **2020 CIP CHANGES**

Several new enhancements are visible in the 2021-2025 CIP. The CIP continues to improve and evolve to provide the various stakeholders accurate and timely information at their fingertips.

Modifications to the 2021 CIP include updates to the BCE forms with focus on the problem statements and alternative analysis, alignment with procurement terminology and stage-gates. In addition, the 2021 CIP now includes an Integrated Master Schedule (IMS) for both Water and Sewer projects.

With the addition of the Capital Improvement Program Manager (AECOM Team) major changes will be identified and many more changes, improvements and modification are in conceptual form now and will likely be available for the 2022 CIP. This document, the format and content will continue to change and improve from year-to-year as the process matures.

III. CIP Financial Considerations

Section III will be included in a subsequent draft.

IV. CIP SUMMARY

SECTION 1 PROJECT UPDATES

Many projects have changed status since the last CIP update. These projects are shown in the following tables.

Table IV-1. New Projects Added to the CIP

CIP #	Title	2021 Status
111010	Lake Huron Water Treatment Plant -Filtration and Pretreatment Improvements	Future Planned
111011	Lake Huron WTP Pilot Plant	Future Planned
114018	Springwells Water Treatment Plant - Service Building Electrical Substation and Miscellaneous Improvements	Future Planned
115006	Water Works Park Site/Civil Improvements	Future Planned
122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation	Future Planned
132026	Franklin Pumping Station Valve Replacement	Active
211010	Rehabilitation of Sludge Processing Complexes A and B	Future Planned
211011	WRRF PS1 Screening and Grit Improvements	Future Planned
212009	WRRF Aeration Improvements 3 and 4	Future Planned
212010	WRRF Conversion of Disinfection of all Flow to Sodium Hypochlorite and Sodium Bisulfite	Future Planned
216009	LM Facilities Assessment and Rehabilitation/Replacement	Active
216010	WRRF Facility Optimization	Future Planned
232004	Condition Assessment at Blue Hill Pump Station	Future Planned
233003	Rouge River In-system Storage Devices	Future Planned
270001	Pilot CSO Netting Facility	Future Planned
270002	Meldrum Sewer Diversion and VR-15 Improvements	Future Planned
270003	Long Term CSO Control Plan	Future Planned
277001	Baby Creek Outfall Improvements Project	Future Planned
341001	Security Infrastructure Improvements on Water Facilities	Active
341002	Security Infrastructure Improvements for Wastewater Facilities	Active

Table IV-2. Projects Progressed to Active Status

CIP #	Title	2020 Status	2021 Status
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements	Future Planned	Active
112005	Northeast Water Treatment Plant - Replacement of Covers for Process Water Conduits	Future Planned	Active
122013	14 Mile Transmission Main Loop	Future Planned	Active
122016	Downriver Transmission Main Loop	Future Planned	Active
132010	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades	Future Planned	Active
132012	Ypsilanti Booster Pumping Station Improvements	Future Planned	Active
132015	Newburgh Road Booster Pumping Station Improvements	Future Planned	Active
211006	WRRF PS No. 1 Improvements	Future Planned	Active
211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements	Future Planned	Active
213008	WRRF Rehabilitation of the Ash Handling Systems	Future Planned	Active
216006	Assessment and Rehabilitation of WRRF yard piping and underground utilities	Future Planned	Active

Table IV-3. Projects Progressed to Pending Closeout Status

CIP #	Title	2020 Status	2021 Status
132008	Various Pumping Stations - Needs Assessment Study	Active	Pending Closeout

Table IV-4. Projects Progressed to Cancelled Status

CIP #	Title	2020 Status	2021 Status
132025	Northwest Booster Station Yard Piping Improvements	Future Planned	Cancelled

CIP #	Title	2020 Status	2021 Status
171400	LED Lighting & Lighting Control Improvements at All Water Facilities	Future Planned	Cancelled
213002	WRRF Rehabilitation of Central Offload Facility	Active	Cancelled
213005	WRRF Complex I Incinerators Decommissioning and Reusability	Future Planned	Cancelled
222003	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	Future Planned	Cancelled
222007	NIEA Rehabilitation from WRRF to Gratiot Ave. and Sylvester St.	Future Planned	Cancelled
232003	Northeast Pumping Station	Future Planned	Cancelled
331001	Roofing Systems Replacement at Water Plants and Booster Pump Stations	Future Planned	Cancelled

Table IV-5. Projects Progressing to Closed Status

CIP #	Title	2020 Status	2021 Status
113004	Southwest Water Treatment Plant, Raw Water Sampling Modifications	Active	Closed
114006	Springwells Water Treatment Plant Replacement of 1958 Rapid Mixing Units	Active	Closed
114009	SPW WTP Service Area Redundancy Study	Pending Closeout	Closed
114015	Springwells Water Treatment Plant Emergency Grating Replacement	Active	Closed
122001	Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road	Pending Closeout	Closed
122002	Replacement of Five (5) PRV Pits of Treated Water Transmission System	Pending Closeout	Closed
122009	Water System Improvements in Joy Road from Southfield Road to Trinity	Pending Closeout	Closed
122010	Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from Lindwood to Livernois	Pending Closeout	Closed
132001	Wick Road Booster Pumping Station Rehabilitation	Pending Closeout	Closed
132004	North Service Center Pumping Station - Hydraulic Surge Control	Pending Closeout	Closed

CIP #	Title	2020 Status	2021 Status
260100	WRRF, Lift Station and Wastewater Collection System Structures Allowance	Active	Closed
380400	As-needed CIP Implementation Assistance and Related Services	Active	Closed
380500	Wastewater General Engineering Services on an As-needed Basis	Pending Closeout	Closed
380800	Geotechnical and Related Services on an As-Needed Basis	Pending Closeout	Closed
380900	General Engineering Services	Pending Closeout	Closed

SECTION 2 HIGHLIGHTS

2.1. Possible Innovative Projects

One of the Great Lakes Water Authority's main pillars is to provide high quality through innovation. In order to ensure CIP projects are being considered for new and innovative technologies, during the project review process, projects that may be considered for innovative technologies, practices or procedures were identified by the GLWA Energy, Research & Innovation group. The following projects will be further evaluated for innovative opportunities during scope development process:

Table IV-6. Innovation Projects

CIP	Title
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements
111006	Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements
111011	Lake Huron WTP Pilot Plant
113003	Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocculation and Filtration System Improvements
113007	Southwest Water Treatment Plant Architectural and Building Mechanical Improvements
122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation
132007	Energy Management: Freeze Protection Pump Installation at Imlay Pump Station
132019	Wick Road Pumping Station Improvements

CIP	Title
132021	Imlay Pumping Station Improvements
132022	Joy Road Pumping Station Improvements
170600	Water Transmission Main Asset Assessment Program
171400	LED Lighting & Lighting Control Improvements at All Water Facilities
211006	WRRF PS No. 1 Improvements
211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements
211008	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines
211009	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System
211011	WRRF PS1 Screening and Grit Improvements
212004	WRRF Chlorination and Dechlorination Process Equipment Improvements
212008	WRRF Aeration Improvements 1 and 2
212009	WRRF Aeration Improvements 3 and 4
213005	WRRF Complex I Incinerators Decommissioning and Reusability
213008	WRRF Rehabilitation of the Ash Handling Systems
216004	Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF
216006	Assessment and Rehabilitation of WRRF yard piping and underground utilities
216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station
222003	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation
222007	NIEA Rehabilitation from WRRF to Gratiot Ave. and Sylvester St.
232003	Northeast Pumping Station
331001	Roofing Systems Replacement at Water Plants and Booster Pump Stations
331002	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)
351001	LED Lighting and Lighting Control Improvements

2.2. Master Plan Right-Sizing Projects

Based upon the recent completion and acceptance of the Comprehensive Water Master Plan, many water projects are being considered with reduced capital investment in order to reduce the rated capacity to master plan identified levels based upon current population and water usage. The following projects have capital expenditure avoidance based upon water master planning efforts to right-sizing the system for current needs:

Table IV-7 . Master Plan Right-Sizing Projects

CIP	Title
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements
111011	Lake Huron WTP Pilot Plant
112003	Northeast Water Treatment Plant High-Lift Pumping Station Improvements
113003	Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocculation and Filtration System Improvements
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements
114009	SPW WTP Service Area Redundancy Study
114013	Springwells Water Treatment Plant, Reservoir Fill Line Improvements
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement
122003	Water Works Park to Northeast Transmission Main
122007	Merriman Road Water Transmission Main Loop
122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station
132007	Energy Management: Freeze Protection Pump Installation at Imlay Pump Station
132021	Imlay Pumping Station Improvements
132025	Northwest Booster Station Yard Piping Improvements
216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station

GLWA is also in the process of completing a Wastewater Master Plan. The following projects are a part of the conceptual wastewater master plan.

Table IV-8. Conceptual Wastewater Master Plan Projects

CIP	Title
232004	Condition Assessment at Blue Hill Pump Station
233003	Rouge River In-system Storage Devices
270001	Pilot CSO Netting Facility
270002	Meldrum Sewer Diversion and VR-15 Improvements

2.3. Redundancy & Reliability Projects

Finally, redundancy and reliability in the transmission system and wastewater facilities is of high importance to GLWA. The following projects will enhance the redundancy and/or reliability within the water transmission system or within the wastewater system:

Table IV-9 . Redundancy & Reliability Projects

CIP	Title
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements
111004	Lake Huron Water Treatment Plant, Electrical Tunnel Rehabilitation
111006	Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements
111009	Lake Huron Water Treatment Plant - High Lift Pumping, Water Production Flow Metering and Yard Piping Improvements
111010	Lake Huron Water Treatment Plant -Filtration and Pretreatment Improvements
112003	Northeast Water Treatment Plant High-Lift Pumping Station Improvements
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements
114009	SPW WTP Service Area Redundancy Study
114010	Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements
114013	Springwells Water Treatment Plant, Reservoir Fill Line Improvements
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement
116002	Pennsylvania and Springwells Raw Water Supply Tunnel Improvements
122001	Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road
122002	Replacement of Five (5) PRV Pits of Treated Water Transmission System
122003	Water Works Park to Northeast Transmission Main
122004	96-inch Water Transmission Main Relocation and Isolation Valve Installations
122005	Schoolcraft Road Water Transmission Main
122006	Wick Road Water Transmission Main
122007	Merriman Road Water Transmission Main Loop
122009	Water System Improvements in Joy Road from Southfield Road to Trinity
122010	Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from Lindwood to Livernois
122011	Park-Merriman Road Water Transmission Main
122012	36-inch Water Main in Telegraph Road
122013	14 Mile Transmission Main Loop
122016	Downriver Transmission Main Loop
122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station
122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation
132003	West Service Center Pumping Station, Isolation Gate Valves for Line Pumps
132006	Ford Road Pumping Station, Pressure and Control Improvements
132007	Energy Management: Freeze Protection Pump Installation at Imlay Pump Station
132008	Various Pumping Stations - Needs Assessment Study
132010	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades
132015	Newburgh Road Booster Pumping Station Improvements
132016	North Service Center Pumping Station Improvements
132017	North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping & Valve Replacement
132018	Schoolcraft Pumping Station Improvements
132019	Wick Road Pumping Station Improvements
132021	Imlay Pumping Station Improvements
132022	Joy Road Pumping Station Improvements
132025	Northwest Booster Station Yard Piping Improvements
170400	Water Transmission Improvement Program
170500	Transmission System Valve Rehabilitation and Replacement Program
170800	System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation
211001	WRRF Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery
211002	WRRF PS No. 2 Pumping Improvements - Phase 1
211004	WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements

CIP	Title
211005	WRRF PS No. 2 Improvements Phase II
211006	WRRF PS No. 1 Improvements
211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements
211008	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines
211009	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System
211010	Rehabilitation of Sludge Processing Complexes A and B
211011	WRRF PS1 Screening and Grit Improvements
212003	WRRF Aeration System Improvements
212004	WRRF Chlorination and Dechlorination Process Equipment Improvements
212006	WRRF Rouge River Outfall (RRO) Disinfection (Alternative)
212007	WRRF Rehabilitation of the Secondary Clarifiers
212008	WRRF Aeration Improvements 1 and 2
212009	WRRF Aeration Improvements 3 and 4
213002	WRRF Rehabilitation of Central Offload Facility
213005	WRRF Complex I Incinerators Decommissioning and Reusability
213006	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities
213007	WRRF Modification to Incinerator Sludge Feed Systems at Complex -II
213008	WRRF Rehabilitation of the Ash Handling Systems
214001	WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations
216004	Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF
216006	Assessment and Rehabilitation of WRRF yard piping and underground utilities
216007	DTE Primary Electric 3rd Feed Supply to WRRF
222001	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District
222002	Detroit River Interceptor (DRI) Evaluation and Rehabilitation
222003	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation
222007	NIEA Rehabilitation from WRRF to Gratiot Ave. and Sylvester St.
232001	Fairview Pumping Station - Replace Four Sanitary Pumps
232002	Freud & Conner Creek Pump Station Improvements
232003	Northeast Pumping Station
232004	Condition Assessment at Blue Hill Pump Station

CIP	Title
260100	WRRF, Lift Station and Wastewater Collection System Structures Allowance
260200	Sewer and Interceptor Rehabilitation Program
260500	CSO Outfall Rehabilitation
260600	CSO Facilities Improvement Program
270002	Meldrum Sewer Diversion and VR-15 Improvements
331002	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)
381000	Power Quality: Electric Metering Improvement Program

2.4. Northeast Water Treatment Plant Repurposing Related Projects

The 2015 Comprehensive Water Master Plan has identified the ability to reduce the number of water treatment facilities in full operation at GLWA. Initially, for long-term capital expenditure avoidance, the plan has identified the repurposing of the Northeast Water Treatment Plant. In order to repurpose this facility into a reservoir and pump station, several capital projects are necessary to achieve the savings identified in the master plan. The following projects are associated with the repurposing of the Northeast Water Treatment Plant:

Table IV-10 . Northeast Water Treatment Plant Repurposing Related Projects

CIP	Title
112003	Northeast Water Treatment Plant High-Lift Pumping Station Improvements
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements
114013	Springwells Water Treatment Plant, Reservoir Fill Line Improvements
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement
122003	Water Works Park to Northeast Transmission Main
122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation
132025	Northwest Booster Station Yard Piping Improvements

2.5. Projects by Jurisdiction

Projects are listed below under the jurisdiction of the physical location of the project. Because many projects are planned for multiple facilities within multiple jurisdictions, many of these projects are identified as “Multiple Counties”. In addition, to get a spatial view and understanding of these project locations, approximately one month after the CIP has been officially adopted by the Board, these projects and the associated BCE information will be shown in the CIP Viewer located within the WAMR and GDRSS Member Partner Outreach Portals.

Table IV-11. Projects by Physical Jurisdiction

Jurisdiction	CIP Projects				
City of Detroit					
112002	122003	211005	212007	216004	232003
112003	122009	211006	212008	216006	232004
112005	122010	211007	212009	216007	233003
112006	122017	211008	212010	216008	270001
115001	122018	211009	213002	216009	270002
115003	132025	211010	213005	216010	
115004	132026	211011	213006	222002	
115005	211001	212003	213007	222007	
115006	211002	212004	213008	232001	
116002	211004	212006	214001	232002	
Lapeer County					
132007	132021				
Macomb County					
122001					
Oakland County					
122013	132004	132014	132016	132017	132020
132003	132010				
Saint Clair County					
111001	111004	111007	111009	111011	
111002	111006	111008	111010		
Wayne County - Outside Detroit					
113002	114002	114010	114017	122012	132018
113003	114005	114011	114018	122016	132019
113004	114006	114012	122005	132001	132022
113006	114007	114013	122006	132006	
113007	114008	114015	122007	132012	
114001	114009	114016	122011	132015	
Multiple Counties					
114003	170300	171400	260200	331002	380600
122002	170400	171500	260500	341001	380700
122004	170500	222001	260600	341002	380800
132008	170600	222003	270003	351001	380900
170100	170800	222004	277001	380400	381000
170200	170900	260100	331001	380500	

SECTION 3 5-YEAR CIP SUMMARY TABLES

The Great Lakes Water Authority 2021-2025 Capital Improvement Plan overall summary tables can be seen below. Please note that projected expenses and project categories shown in Table IV-14 (Centralized Services) are also included in Table IV-12. Water CIP Categories and Table IV-13. Wastewater CIP Categories

Table IV-12. Water CIP Categories

Financial figures are in thousands of dollars ($1,000's).

Category	Category Number	Lifetime Actual Thru FY 2019 (Unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total
Water											
Treatment Plants & Facilities											
Lake Huron	111	$ 11,226	$ 10,260	$ 7,160	$ 5,538	$ 25,155	$ 29,669	$ 23,347	$ 19,389	$ 90,869	$ 131,744
Northeast	112	1,152	939	3,869	3,040	889	1,228	2,383	53,914	11,409	67,414
Southwest	113	3,266	2,348	1,354	2,238	2,238	17	0	14,412	5,847	25,873
Springwells	114	118,841	24,861	28,653	25,132	25,403	34,174	31,213	187,652	144,575	475,929
Water Works Park	115	8,960	2,687	7,461	16,959	24,017	21,262	8,836	5,643	78,535	95,825
General Purpose	116	10,200	653	14,138	21,917	8,810	5,527	0	0	50,392	61,245
Treatment Plants & Facilities Total		**153,645**	**41,748**	**62,635**	**74,824**	**86,512**	**91,877**	**65,779**	**281,010**	**381,627**	**858,030**
Field Services											
General Purpose	121	-	-	-	-	-	-	-	-	-	-
Transmission System	122	52,751	23,057	47,123	65,965	73,072	71,238	74,743	183,856	332,141	591,805
Field Services Total		**52,751**	**23,057**	**47,123**	**65,965**	**73,072**	**71,238**	**74,743**	**183,856**	**332,141**	**591,805**
SCC											
General Purpose	131	-	-	-	-	-	-	-	-	-	-
Pump Station/Reservoir	132	3,150	5,792	12,032	16,321	21,196	26,958	23,841	83,244	100,348	192,534
SCC Total		**3,150**	**5,792**	**12,032**	**16,321**	**21,196**	**26,958**	**23,841**	**83,244**	**100,348**	**192,534**
Water Quality											
General Purpose	141	-	-	-	-	-	-	-	-	-	-
Water Quality Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Metering											
General Purpose	151	-	-	-	-	-	-	-	-	-	-
Metering Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
General Purpose											
General Purpose	161	-	-	-	-	-	-	-	-	-	-
General Purpose Total		**-**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Programs											
Programs	170	22,037	16,085	19,426	18,199	18,429	19,001	24,683	131,276	99,738	269,136

Category	Category Number	Lifetime Actual Thru FY 2019 (Unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total
Programs Total		**22,037**	**16,085**	**19,426**	**18,199**	**18,429**	**19,001**	**24,683**	**131,276**	**99,738**	**269,136**
Water Total		**231,583**	**86,682**	**141,216**	**175,309**	**199,209**	**209,074**	**189,046**	**679,386**	**913,854**	**1,911,505**
Water Central Services											
Information Technology	31X	-	-	-	-	-	-	-	-	-	-
Fleet	32X	-	-	-	-	-	-	-	-	-	-
Facilities	33X	-	-	-	-	-	-	-	-	-	-
Security	34X	0	4,029	4,018	2,603	0	0	0	0	6,621	10,650
Energy Management	35X	6	0	50	248	252	0	0	0	550	556
Engineering	36X	-	-	-	-	-	-	-	-	-	-
General Purpose	371	-	-	-	-	-	-	-	-	-	-
Programs	38XX	56	1,415	715	0	0	86	445	2,904	1,247	5,621
Water Central Services Total		**62**	**5,444**	**4,783**	**2,851**	**252**	**86**	**445**	**2,904**	**8,418**	**16,827**
Grand Total		**231,645**	**92,126**	**145,999**	**178,160**	**199,461**	**209,160**	**189,491**	**682,290**	**922,272**	**1,928,332**

Table IV-13. Wastewater CIP Categories

Financial figures are in thousands of dollars ($1,000's).

Category	Category Number	Lifetime Actual Thru FY 2019 (Unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total
Wastewater											
WRRF											
Primary Treatment	211	$ 73,669	$ 12,301	$ 13,353	$ 13,237	$ 11,925	$ 44,809	$ 41,230	$ 152,872	$ 124,554	$ 363,396
Secondary Treatment & Disinfection	212	58,238	6,793	6,462	7,992	8,046	41,517	15,896	113,158	79,913	258,102
Residuals Management	213	9,357	8,502	3,770	1,021	14,432	6,058	0	0	25,281	43,140
IWC	214	2,301	10,369	1,331	0	0	0	0	0	1,331	14,001
CSO RTB & SDF	215	-	-	-	-	-	-	-	-	-	-
General Purpose	216	1,556	7,642	8,516	9,084	22,282	18,690	6,081	273	64,653	74,124
WRRF Total		**145,121**	**45,607**	**33,432**	**31,334**	**56,685**	**111,074**	**63,207**	**266,303**	**295,732**	**752,763**
Field Services											
General Purpose	221	-	-	-	-	-	-	-	-	-	-
Interceptors	222	10,596	17,658	27,310	18,347	21,270	31,112	26,704	23,317	124,743	176,314
Field Services Total		**10,596**	**17,658**	**27,310**	**18,347**	**21,270**	**31,112**	**26,704**	**23,317**	**124,743**	**176,314**

Category	Category Number	Lifetime Actual Thru FY 2019 (Unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total
SCC											
General Purpose	231	-	-	-	-	-	-	-	-	-	-
Pumping Stations	232	9,035	34,916	12,067	1,041	9,898	23,830	30,803	138,071	77,639	259,661
In System Devices	233	-	-	-	32	86	3,374	1,984	41,321	5,476	46,797
SCC Total		**9,035**	**34,916**	**12,067**	**1,073**	**9,984**	**27,204**	**32,787**	**179,392**	**83,115**	**306,458**
Metering											
General Purpose	241	-	-	-	-	-	-	-	-	-	-
Metering Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
General Purpose											
General Purpose	251	-	-	-	-	-	-	-	-	-	-
General Purpose Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Programs											
Programs	260	28,710	31,386	32,174	55,492	47,443	31,230	42,870	102,687	209,209	371,992
Programs Total		**28,710**	**31,386**	**32,174**	**55,492**	**47,443**	**31,230**	**42,870**	**102,687**	**209,209**	**371,992**
CSO Facilities											
CSO Facilities	27X	0	147	4,067	3,226	2,400	904	4,669	6,466	15,266	21,879
CSO Facilities Total		**0**	**147**	**4,067**	**3,226**	**2,400**	**904**	**4,669**	**6,466**	**15,266**	**21,879**
Wastewater Total											
Wastewater Central Services											
Information Technology	31X	-	-	-	-	-	-	-	-	-	-
Fleet	32X	-	-	-	-	-	-	-	-	-	-
Facilities	33X	802	321	91	1,745	1,724	1,708	1,702	1,652	6,970	9,745
Security	34X	0	1,579	1,051	0	0	0	0	0	1,051	2,630
Energy Management	35X	-	-	-	-	-	-	-	-	-	-
Engineering	36X	-	-	-	-	-	-	-	-	-	-
General Purpose	37X	-	-	-	-	-	-	-	-	-	-
Programs	38XX	-51	86	446	1,540	1,337	26	0	0	3,348	3,384
Central Services Total		**751**	**1,986**	**1,588**	**3,285**	**3,061**	**1,734**	**1,702**	**1,652**	**11,369**	**15,759**
Grand Total		**194,213**	**131,700**	**110,638**	**112,757**	**140,843**	**203,258**	**171,939**	**579,817**	**739,434**	**1,645,165**

Table IV-14. Centralized Services Categories

Please note that these project categories and projected expenses also appear in Water and Wastewater tables, Table IV-12 and Table IV-13, respectively. Financial figures are in thousands of dollars ($1,000's).

Category	Category Number	Lifetime Actual Thru FY 2019 (Unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total
Information Technology	31X										
Water		$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Wastewater		-	-	-	-	-	-	-	-	-	-
Information Technology Total		-	-	-	-	-	-	-	-	-	-
Fleet	32X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Fleet Total		-	-	-	-	-	-	-	-	-	-
Facilities	33X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		802	321	91	1,745	1,724	1,708	1,702	1,652	6,970	9,745
Facilities Total		**802**	**321**	**91**	**1,745**	**1,724**	**1,708**	**1,702**	**1,652**	**6,970**	**9,745**
Security	34X										
Water		0	4,029	4,018	2,603	0	0	0	0	6,621	10,650
Wastewater		0	1,579	1,051	0	0	0	0	0	1,051	2,630
Security Total		**0**	**5,608**	**5,069**	**2,603**	**0**	**0**	**0**	**0**	**7,672**	**13,280**
Energy Management	35X										
Water		6	0	50	248	252	0	0	0	550	556
Wastewater		-	-	-	-	-	-	-	-	-	-
Energy Management Total		**6**	**0**	**50**	**248**	**252**	**0**	**0**	**0**	**550**	**556**
Engineering	36X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Engineering Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
General Purpose	37X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
General Purpose Total		-	-	-	-	-	-	-	-	-	-
Programs	38XX										

Category	Category Number	Lifetime Actual Thru FY 2019 (Unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total
Water		56	1,415	715	0	0	86	445	2,904	1,247	5,621
Wastewater		-51	86	446	1,540	1,337	26	0	0	3,348	3,384
General Purpose Total		**5**	**1,501**	**1,161**	**1,540**	**1,337**	**112**	**445**	**2,904**	**4,595**	**9,005**
Grand Total		**813**	**7,430**	**6,371**	**6,136**	**3,313**	**1,820**	**2,147**	**4,556**	**19,787**	**32,586**

V. Project Prioritization and Risk Evaluation

New and Future Planned water and wastewater projects were prioritized based upon eight criteria. The criteria and their weighting factors are identified in Table V-1.

Figure I-1 and Figure I-2 display the distribution of project risk in terms of Probability and Consequence. For the Probability of Failure coordinate on the plot, an equally weighted average was taken of the scores for the Condition, Performance, and O&M criteria. For the Consequence of Failure coordinate, the Regulatory, Public Health & Safety, Public Benefit, Financial, and Efficiency & Innovation criteria were averaged. These plots provide the reader a better understanding of which function (probability or consequence of failure) of the overall risk is driving the need for the project.

In addition, the following pages provide the detailed prioritization of each project compared to one another along with the individual score by Project Manager and by the Review Committee.

Table V-1. Project Prioritization

No.	Weight	Criteria	Risk Factor
1	12%	Condition	Probability
2	15%	Performance (Service Level/Reliability)	Probability
3	18%	Regulatory (Environmental/Legal)	Consequence
4	11%	O&M	Probability
5	17%	Public Health & Safety	Consequence
6	8%	Public Benefit	Consequence
7	10%	Financial	Consequence
8	9%	Efficiency & Innovation	Consequence

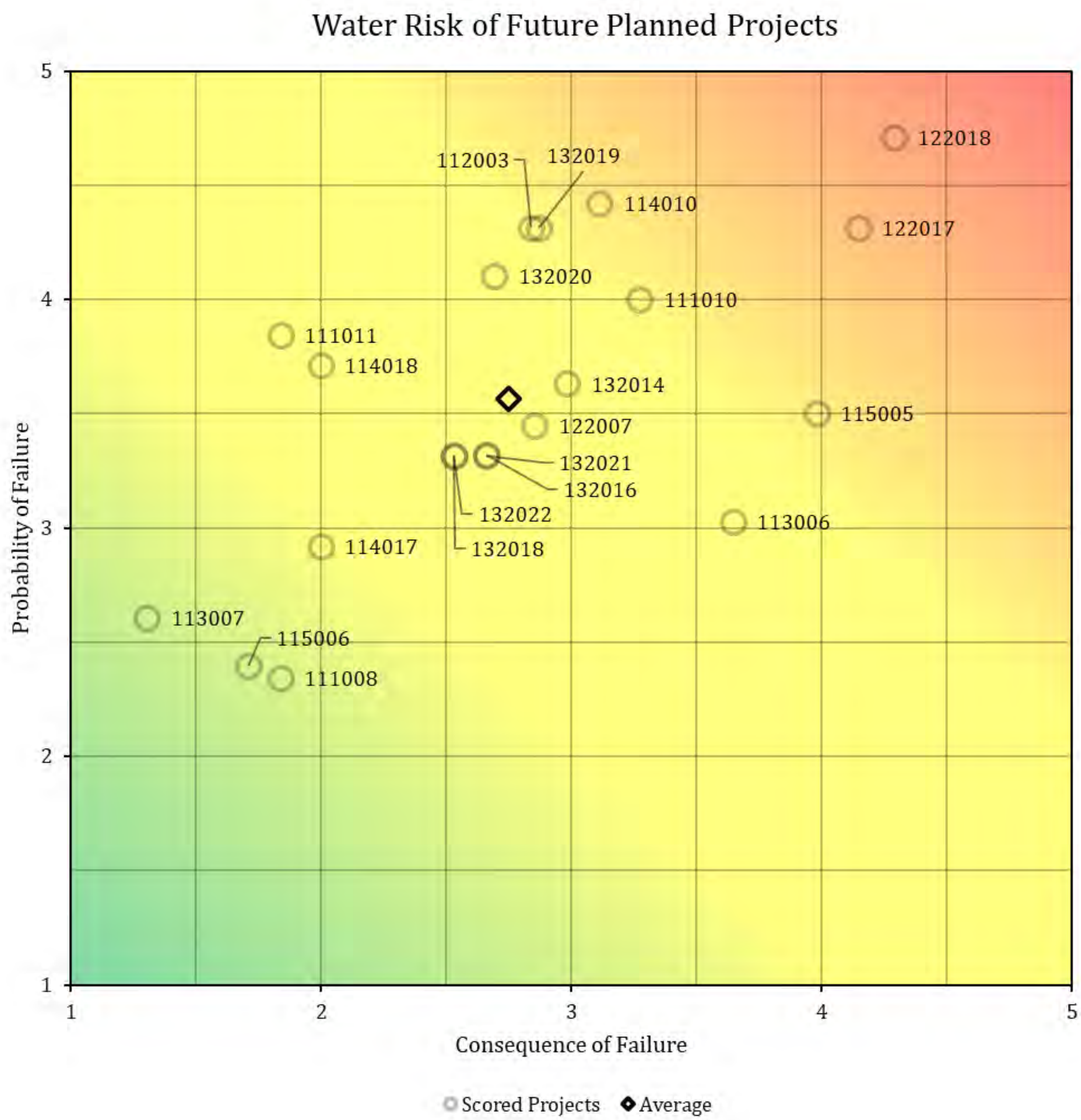


Figure I-1. Water Project Risk Matrix

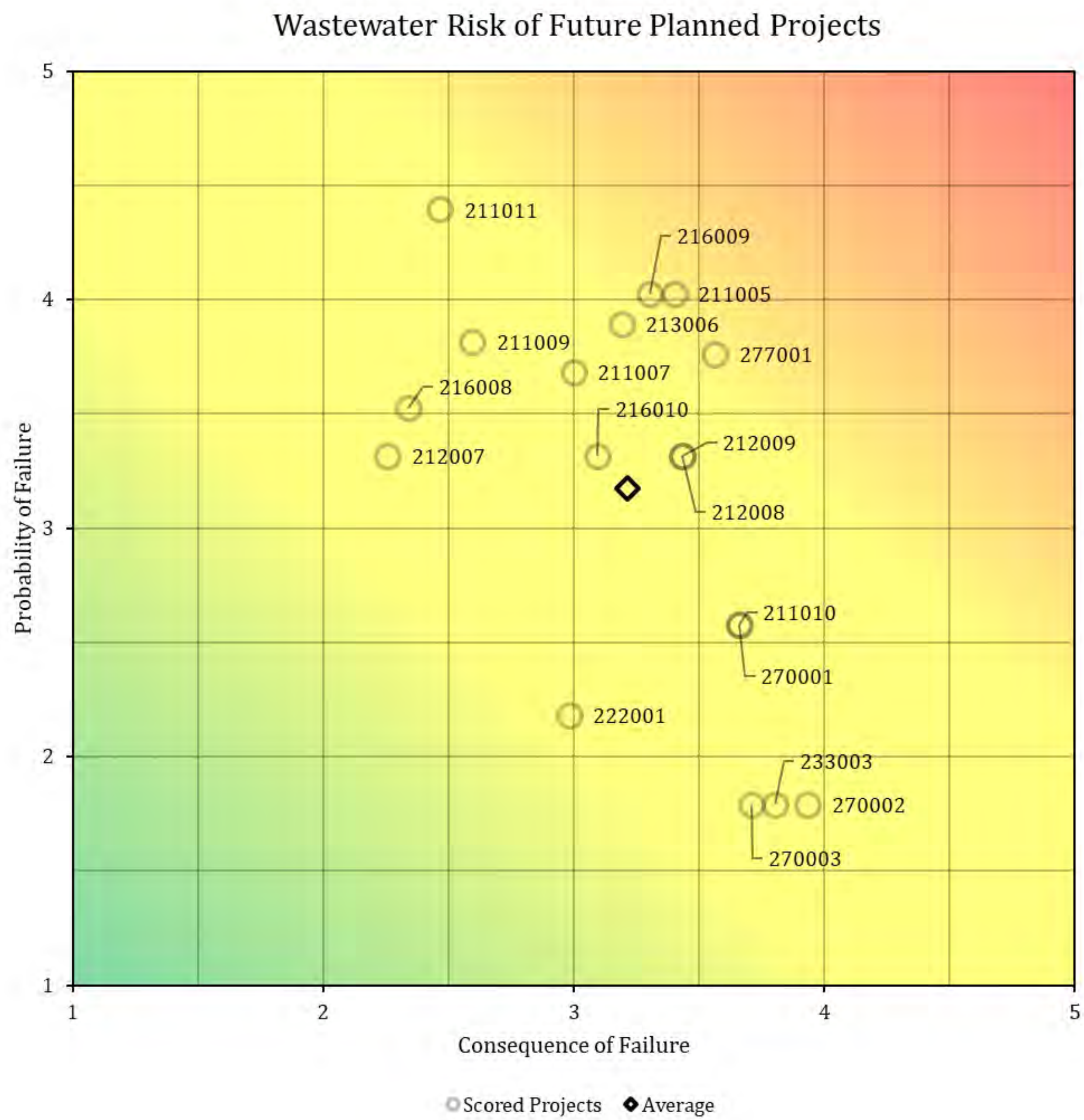
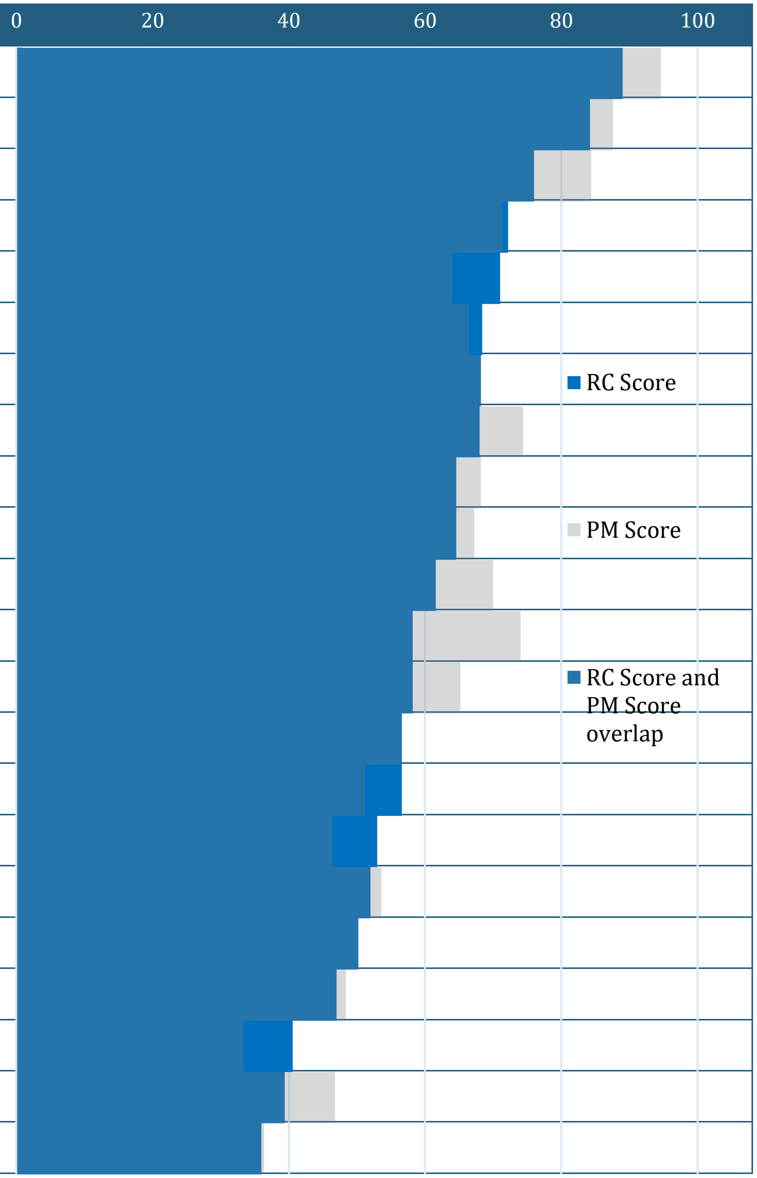


Figure I-2. Wastewater Project Risk Matrix

SECTION 2 PROJECT MANAGER CRITERIA SCORES: WATER

Rank	CIP No.	Title	
1	122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation	122018
2	122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control...	122017
3	115005	WWP WTP Building Ventilation Improvements	115005
4	114010	Springwells Water Treatment Plant, Yard Piping and High-Lift Header...	114010
5	111010	Lake Huron Water Treatment Plant -Filtration and Pretreatment...	111010
6	132019	Wick Road Pumping Station Improvements	132019
7	113006	Southwest Water Treatment Plant Chlorine Scrubber, Raw Water Screens &...	113006
8	112003	Northeast Water Treatment Plant High-Lift Pumping Station Improvements	112003
9	132014	Adams Road Pumping Station Improvements	132014
10	132020	Franklin Pumping Station Improvements	132020
11	122007	Merriman Road Water Transmission Main Loop	122007
12	132016	North Service Center Pumping Station Improvements	132016
13	132021	Imlay Pumping Station Improvements	132021
14	132022	Joy Road Pumping Station Improvements	132022
15	132018	Schoolcraft Pumping Station Improvements	132018
16	114018	Springwells Water Treatment Plant - Service Building Electrical Substation ...	114018
17	111011	Lake Huron WTP Pilot Plant	111011
18	113003	Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, ...	113003
19	114017	Springwells Water Treatment Plant Flocculator Drive Replacements	114017
20	111008	Lake Huron Water Treatment Plant, Architectural Programming for...	111008
21	115006	Water Works Park Site/Civil Improvements	115006
22	113007	Southwest Water Treatment Plant Architectural and Building Mechanical...	113007

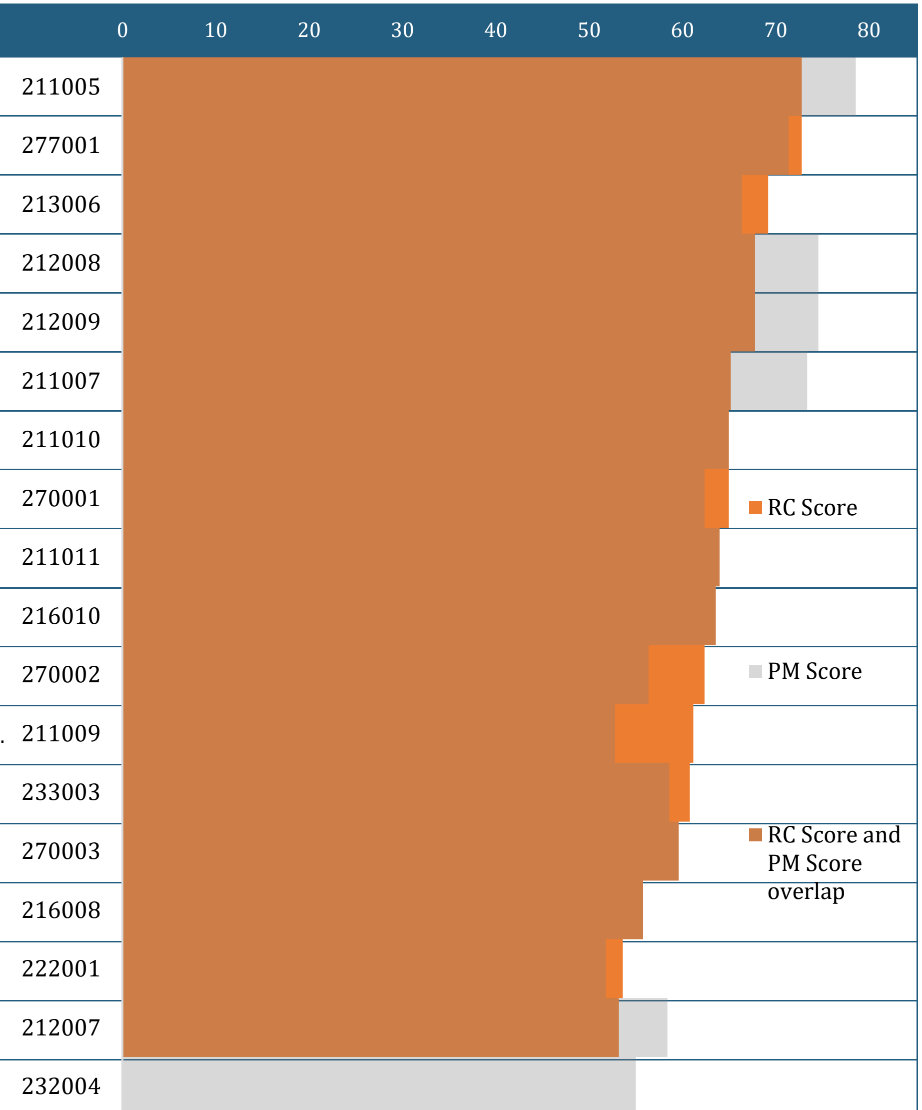


SECTION 3 Project Manager Criteria Scores: Water

Rank	CIP No.	Title	1	2	3	4	5	6	7	8	PM Score	1	2	3	4	5	6	7	8	RC Score
1	122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation	5	5	4	5	5	5	5	4	94.6	5	5	4	4	4	5	5	4	89
2	122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow...	5	5	4	5	4	4	4	4	87.6	5	4	4	4	4	4	4	5	84.2
3	115005	WWP WTP Building Ventilation Improvements	4	5	5	4	5	4	3	2	84.4	3	5	5	2	5	3	3	2	76
4	114010	Springwells Water Treatment Plant, Yard Piping and High-Lift...	5	4	2	4	3	5	3	4	71.4	5	5	2	3	3	5	3	4	72.2
5	111010	Lake Huron Water Treatment Plant -Filtration and Pretreatment...	4	4	3	4	3	2	2	3	64	4	4	4	4	4	2	2	3	71
6	132019	Wick Road Pumping Station Improvements	5	4	2	4	3	3	3	3	66.4	5	4	2	4	3	3	4	3	68.4
7	113006	Southwest Water Treatment Plant Chlorine Scrubber, Raw Water...	4	3	4	2	5	4	1	3	68.2	4	3	4	2	5	4	1	3	68.2
8	112003	Northeast Water Treatment Plant High-Lift Pumping Station...	5	5	2	4	5	2	2	4	74.4	5	4	2	4	4	2	2	4	68
9	132014	Adams Road Pumping Station Improvements	5	4	2	4	2	4	3	5	68.2	5	3	2	3	3	4	3	4	64.6
10	132020	Franklin Pumping Station Improvements	4	5	3	4	2	3	3	3	67.2	4	5	2	3	3	3	2	4	64.6
11	122007	Merriman Road Water Transmission Main Loop	3	5	1	4	3	5	5	4	70	1	5	1	4	3	4	4	4	61.6
12	132016	North Service Center Pumping Station Improvements	5	4	2	5	3	4	4	4	74	4	3	2	3	3	4	1	4	58.2
13	132021	Imlay Pumping Station Improvements	4	5	1	4	3	3	3	4	65.2	4	3	2	3	3	4	1	4	58.2
14	132022	Joy Road Pumping Station Improvements	4	4	1	3	3	2	3	3	56.6	4	3	2	3	3	3	1	4	56.6
15	132018	Schoolcraft Pumping Station Improvements	3	3	1	4	3	3	2	2	51.2	4	3	2	3	3	3	1	4	56.6
16	114018	Springwells Water Treatment Plant - Service Building Electrical ...	4	3	1	3	3	1	2	1	46.4	4	4	2	3	3	1	2	1	53
17	111011	Lake Huron WTP Pilot Plant	5	5	2	1	1	4	1	3	53.6	5	5	2	1	1	3	1	3	52
18	113003	Southwest Water Treatment Plant, Low- and High-Lift Pumping...	4	3	2	4	2	2	1	2	50.2	4	3	2	4	2	2	1	2	50.2
19	114017	Springwells Water Treatment Plant Flocculator Drive Replacements	4	3	2	3	1	2	2	3	48.4	4	2	2	3	2	2	2	2	47
20	111008	Lake Huron Water Treatment Plant, Architectural Programming for...	3	2	1	2	2	1	1	1	33.4	4	2	2	1	2	2	1	2	40.6
21	115006	Water Works Park Site/Civil Improvements	4	3	1	3	2	1	3	2	46.8	2	3	1	2	3	1	2	1	39.4
22	113007	Southwest Water Treatment Plant Architectural and Building...	4	2	1	3	1	1	1	2	36.4	3	2	1	3	1	1	2	2	36

SECTION 4 PROJECT MANAGER CRITERIA SCORES: WASTEWATER

Rank	CIP No.	Title
1	211005	WRRF PS No. 2 Improvements Phase II
2	277001	Baby Creek Outfall Improvements Project
3	213006	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities
4	212008	WRRF Aeration Improvements 1 and 2
5	212009	WRRF Aeration Improvements 3 and 4
6	211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System...
7	211010	Rehabilitation of Sludge Processing Complexes A and B
8	270001	Pilot CSO Netting Facility
9	211011	WRRF PS1 Screening and Grit Improvements
10	216010	WRRF Facility Optimization
11	270002	Meldrum Sewer Diversion and VR-15 Improvements
12	211009	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal...
13	233003	Rouge River In-system Storage Devices
14	270003	Long Term CSO Control Plan
15	216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station
16	222001	Oakwood District Intercommunity Relief Sewer Modification at...
17	212007	WRRF Rehabilitation of the Secondary Clarifiers
18	232004	Condition Assessment at Blue Hill Pump Station



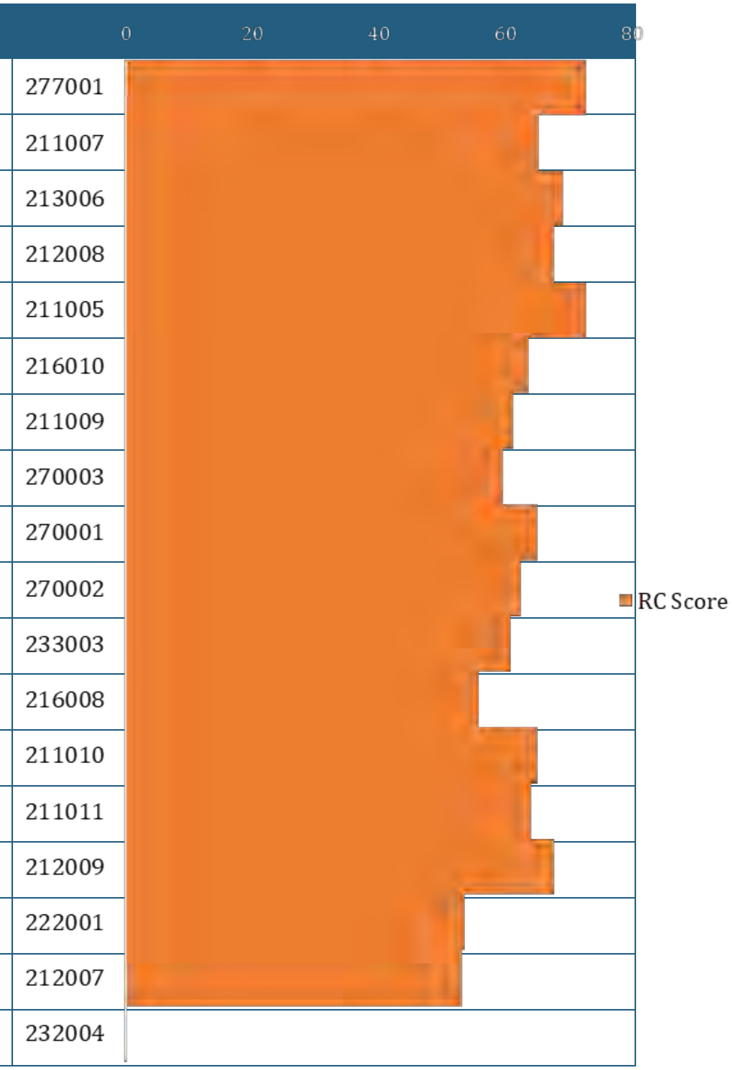
SECTION 5 PROJECT MANAGER CRITERIA SCORES: WASTEWATER

Rank	CIP No.	Title	1	2	3	4	5	6	7	8	PM Score	1	2	3	4	5	6	7	8	RC Score
1	211005	WRRF PS No. 2 Improvements Phase II	5	4	4	3	4	3	4	4	78.6	5	4	4	3	4	3	2	3	72.8
2	277001	Baby Creek Outfall Improvements Project	2	5	3	5	3	4	3	4	71.4	2	5	4	4	3	4	3	4	72.8
3	213006	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	3	4	4	3	3	3	2	4	66.4	4	3	4	5	2	2	4	4	69.2
4	212008	WRRF Aeration Improvements 1 and 2	4	4	5	3	3	3	4	3	74.6	4	3	4	3	3	3	3	4	67.8
5	212009	WRRF Aeration Improvements 3 and 4	4	4	5	3	3	3	4	3	74.6	4	3	4	3	3	3	3	4	67.8
6	211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements	4	4	4	4	3	2	4	4	73.4	3	4	4	4	3	3	3	1	65.2
7	211010	Rehabilitation of Sludge Processing Complexes A and B	2	2	4	4	5	4	2	2	65	2	2	4	4	5	4	2	2	65
8	270001	Pilot CSO Netting Facility	1	4	5	1	4	3	2	3	62.4	1	5	5	1	4	4	1	3	65
9	211011	WRRF PS1 Screening and Grit Improvements	4	5	2	4	2	2	4	3	64	4	5	2	4	2	2	4	3	64
10	216010	WRRF Facility Optimization	4	3	1	3	4	5	3	4	63.6	4	3	1	3	4	5	3	4	63.6
11	270002	Meldrum Sewer Diversion and VR-15 Improvements	1	1	5	1	4	5	1	4	56.4	1	3	5	1	4	5	1	4	62.4
12	211009	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System	3	3	3	2	2	2	3	3	52.8	4	5	3	2	2	2	3	3	61.2
13	233003	Rouge River In-system Storage Devices	1	1	5	1	4	4	2	5	58.6	1	3	5	1	4	4	1	4	60.8
14	270003	Long Term CSO Control Plan	1	3	5	1	4	3	3	2	59.6	1	3	5	1	4	3	3	2	59.6
15	216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station	5	2	2	4	1	2	4	4	55.8	5	2	2	4	1	2	4	4	55.8
16	222001	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	1	4	2	1	3	4	3	3	51.8	1	4	2	1	3	4	3	4	53.6
17	212007	WRRF Rehabilitation of the Secondary Clarifiers	4	3	4	3	3	3	1	1	58.4	4	3	4	3	1	4	1	1	53.2
18	232004	Condition Assessment at Blue Hill Pump Station	3	3	2	3	2	2	3	5	55	0	0	0	0	0	0	0	0	0

SECTION 6 BCE PRIORITIZATION SCHEDULE ALIGNMENT

Meetings were held with stakeholders from Water Engineering and Wastewater Engineering, respectively, to align the scoring with the planned execution timelines. Water's intended execution order was aligned with the scoring, so is identical to the chart shown in Chapter V, Section 2 above. Wastewater projects were discussed, and the following order of execution was determined:

	CIP No.	Title	Reason For Shift
1	277001	Baby Creek Outfall Improvements Project	NA
2	211007	WRRF PS #2 Bar Racks Replacements and Grit Collection…	Needs to be done before 211005; RFP is in development
3	213006	WRRF Improvements to Sludge Feed Pumps at Dewatering…	NA
4	212008	WRRF Aeration Improvements 1 and 2	Aeration 1 & 2 priority over 3 & 4
5	211005	WRRF PS No. 2 Improvements Phase II	Phase I results needed prior to execution. Improvements for PS 1 & 2 must be staggered to meet capacity req's.
6	216010	WRRF Facility Optimization	NA
7	211009	WRRF Rehab of the Circular Primary Clarifier Scum Removal…	NA
8	270003	Long Term CSO Control Plan	More clarity required through this plan to prioritize other CSO projects.
9	270001	Pilot CSO Netting Facility	Depends on the results of the CSO long-term plan
10	270002	Meldrum Sewer Diversion and VR-15 Improvements	NA
11	233003	Rouge River In-system Storage Devices	NA
12	216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station	NA
13	211010	Rehabilitation of Sludge Processing Complexes A and B	NA
14	211011	WRRF PS1 Screening and Grit Improvements	NA
15	212009	WRRF Aeration Improvements 3 and 4	Want to do Aeration 1 & 2 prior to 3 & 4
16	222001	Oakwood District Intercommunity Relief Sewer Modification at…	NA
17	212007	WRRF Rehabilitation of the Secondary Clarifiers	Last on the list
18	232004	Condition Assessment at Blue Hill Pump Station	This project may be removed from CIP, contingent on executive direction



VI. Projects by Category

SECTION 1 Water

All financial figures are in thousands of dollars ($1,000's). The Project Status column shows which projects are Active (A), Future Planned (FP), or Pending Closeout (PC). Projects that have been Reclassified to a different number, Closed, or Cancelled are not shown in this list; a list of Closed projects can be found in Chapter IV. For projects in the "Centralized Services" category (CIP number begins with 3), only portions of projects funded by the water budget are included in this section. Projects new to the CIP this year are denoted by bolded CIP number and title. Following these tables is a chart from the Integrated Master Schedule showing the planned sequencing of projects. This was done by updating our scheduler software (Primavera P6) with the updated information from the CIP database.

Table VI-1. Water CIP Projects: Active, Ranked by 2021-2025 CIP Total

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	Projected Expenditures FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
122003	Water Works Park to Northeast Transmission Main	A	2014	2,611	1,169	11,703	18,407	18,678	18,170	20,839	65,949	87,797	157,526	9.5%
122004	96-inch Water Transmission Main Relocation and Isolation Valve Installations	A	2016	1,790	2,549	5,267	15,765	19,937	19,797	19,797	59,969	80,563	144,871	8.7%
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	A	2004	2,080	4,039	7,113	12,893	18,905	18,690	19,175	92,940	76,776	175,835	8.3%
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	A	2007	1,760	251	5,462	13,349	21,478	20,883	8,836	0	70,008	72,019	7.6%
122013	14 Mile Transmission Main Loop	A	2017	638	3,762	1,194	17,085	17,085	17,085	17,085	7	69,534	73,941	7.5%
116002	Pennsylvania and Springwells Raw Water Supply Tunnel Improvements	A	2016	10,200	653	14,138	21,917	8,810	5,527	0	0	50,392	61,245	5.5%
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements	A	2010	14	1,236	1,636	1,749	13,725	12,768	12,841	11,121	42,719	55,090	4.6%
132010	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades	A	2017	296	663	4,323	12,209	11,853	8,361	0	0	36,746	37,705	4.0%
170800	System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation	A	2016	457	2,160	6,087	6,087	6,087	4,100	11,366	22,732	33,727	59,076	3.7%
122016	Downriver Transmission Main Loop	A	2017	24	1,398	1,748	3,793	7,984	8,007	7,984	6,806	29,516	37,744	3.2%
111009	Lake Huron Water Treatment Plant - High Lift Pumping, Water Production Flow Metering and Yard Piping Improvements	A	2018	30	548	1,856	3,554	8,991	10,561	3,686	0	28,648	29,226	3.1%
132012	Ypsilanti Booster Pumping Station Improvements	A	2017	21	712	846	846	3,827	9,721	11,936	3,708	27,176	31,617	3.0%
132015	Newburgh Road Booster Pumping Station Improvements	A		3	581	973	1,595	5,216	6,286	9,133	6,890	23,203	30,677	2.5%
122006	Wick Road Water Transmission Main	A	2016	420	6,163	9,975	5,780	0	0	0	0	15,755	22,338	1.7%
111006	Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements	A	2014	778	236	235	235	2,330	6,184	6,628	0	15,612	16,626	1.7%
122005	Schoolcraft Road Water Transmission Main	A	2016	141	3,342	13,141	1,482	0	0	0	0	14,623	18,106	1.6%

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	FY 2020	Projected Expenditures FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
114011	Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements	A	2012	2,373	6,948	6,932	6,932	713	0	0	0	14,577	23,898	1.6%
170500	Transmission System Valve Rehabilitation and Replacement Program	A	2017	7,159	642	1,177	3,119	3,175	3,210	3,203	4,784	13,884	26,469	1.5%
170300	Water Treatment Plant Automation Program	A	2017	1,658	3,208	5,440	2,943	1,211	3,117	1,151	0	13,862	18,728	1.5%
114008	Springwells Water Treatment Plant 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements	A	2014	178	3,386	10,327	331	19	0	0	0	10,677	14,241	1.2%
171500	Roof Replacement at WWP, SP, LH, NE, SW, NSC, Orion, Franklin, and Conner Creek Facilities	A	2018	71	2,828	173	317	2,907	3,126	2,255	11,996	8,778	23,673	1.0%
115005	WWP WTP Building Ventilation Improvements	A	2018	0	1,614	1,999	3,610	2,539	379	0	0	8,527	10,141	0.9%
170400	Water Transmission Improvement Program	A	2010	1,643	1,781	1,776	1,776	1,776	1,781	1,046	16,578	8,155	28,157	0.9%
114005	Springwells Water Treatment Plant, Administration Building Improvements & Underground Fire Protection Loop	A	2014	264	417	2,302	4,198	1,515	0	0	0	8,015	8,696	0.9%
170600	Water Transmission Main Asset Assessment Program	A	2017	0	54	54	54	775	2,183	4,183	23,450	7,249	30,753	0.8%
170100	Water Treatment Plant /Pump Station Allowance	A	2012	9,747	1,813	1,499	1,359	1,359	1,363	1,359	51,665	6,939	70,164	0.8%
112006	Northeast Water Treatment Plant Flocculator Replacements	A	2018	3	460	2,773	3,026	849	0	0	0	6,648	7,111	0.7%
341001	Security Infrastructure Improvements on Water Facilities	A	2019	0	4,029	4,018	2,603	0	0	0	0	6,621	10,650	0.7%
170900	Suburban Water Meter Pit Rehabilitation and Meter Replacement	A	2014	1,238	2,542	2,535	2,535	1,139	121	120	71	6,450	10,301	0.7%
132007	Energy Management: Freeze Protection Pump Installation at Imlay Pump Station	A	2014	97	685	4,211	206	0	0	0	0	4,417	5,199	0.5%
111007	Lake Huron Water Treatment Plant, Raw Sludge Clarifier and Raw Sludge Pumping System Improvements	A	2016	649	4,896	3,392	0	0	0	0	0	3,392	8,937	0.4%
122011	Park-Merriman Road Water Transmission Main	A	2015	988	4,474	2,163	0	0	0	0	0	2,163	7,625	0.2%
132006	Ford Road Pumping Station, Pressure and Control Improvements	A	2014	289	1,036	987	959	8	0	0	0	1,954	3,279	0.2%
112005	Northeast Water Treatment Plant - Replacement of Covers for Process Water Conduits	A	2018	14	269	1,096	14	0	0	0	0	1,110	1,393	0.1%
113002	Southwest Water Treatment Plant, High-Lift Pump Discharge Valve Actuators Replacement	A	2014	2,479	2,313	1,094	0	0	0	0	0	1,094	5,886	0.1%
132026	Franklin Pumping Station Valve Replacement	A	2019	0	449	613	349	0	0	0	0	962	1,411	0.1%
380700	As-Needed Geotechnical and Related Engineering Services	A	2006	0	1,415	715	0	0	0	0	0	715	2,130	0.1%
170200	As-Needed Construction Materials, Environmental Media and Special Testing Services, Construction Inspection, and Other Technical Services	A	2014	64	1,057	685	9	0	0	0	0	694	1,815	0.1%
132003	West Service Center Pumping Station, Isolation Gate Valves for Line Pumps	A	2014	248	1,666	65	0	0	0	0	0	65	1,979	0.0%
111002	Lake Huron Water Treatment Plant, Miscellaneous Mechanical HVAC Improvements	A	2014	6,991	1,972	41	0	0	0	0	0	41	9,004	0.0%
111004	Lake Huron Water Treatment Plant, Electrical Tunnel Rehabilitation	A	2014	2,764	1,372	0	0	0	0	0	0	0	4,136	0.0%

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
					Projected Expenditures									
112002	Northeast Water Treatment Plant, Low-Lift Pumping Plant Caisson Rehabilitation	A	2014	1,135	210	0	0	0	0	0	0	0	1,345	0.0%
114001	Springwells Water Treatment Plant, 1958 Filter Rehabilitation and Auxiliary Facilities Improvements	A	2002	96,174	5,794	0	0	0	0	0	0	0	101,968	0.0%
114003	Water Production Flow Metering Improvements at Northeast, Southwest and Springwells Water Treatment Plants	A	2014	6,333	2,149	0	0	0	0	0	0	0	8,482	0.0%
114012	SPW WTP Water Treatment Plant 1930 Filter Building-Roof Replacement	A	2016	3,911	0	0	0	0	0	0	0	0	3,911	0.0%
114013	Springwells Water Treatment Plant, Reservoir Fill Line Improvements	A	2016	2,830	1,991	0	0	0	0	0	0	0	4,821	0.0%
115003	Water Works Park Water Treatment Plant Comprehensive Condition Assessment	A	2014	514	68	0	0	0	0	0	0	0	582	0.0%
115004	Water Works Park Water Treatment Plant Chlorine System Upgrade	A	2017	6,686	754	0	0	0	0	0	0	0	7,440	0.0%
Active Water Projects Total				**177,763**	**91,754**	**141,764**	**171,086**	**182,891**	**181,420**	**162,623**	**378,666**	**839,784**	**1,487,967**	**91.2%**

Table VI-2. Water CIP Projects: Pending Closeout, Ranked by Total Cost

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
					Projected Expenditures									
122012	36-inch Water Main in Telegraph Road	PC	2012	9,959	0	0	0	0	0	0	0	0	9,959	0.0%
132008	Various Pumping Stations - Needs Assessment Study	PC	2014	1,838	0	0	0	0	0	0	0	0	1,838	0.0%
Pending Closeout Water Projects Total				**11,797**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11,797**	**0.0%**

Table VI-3. Water CIP Projects: Future Planned, Ranked by Prioritization Score

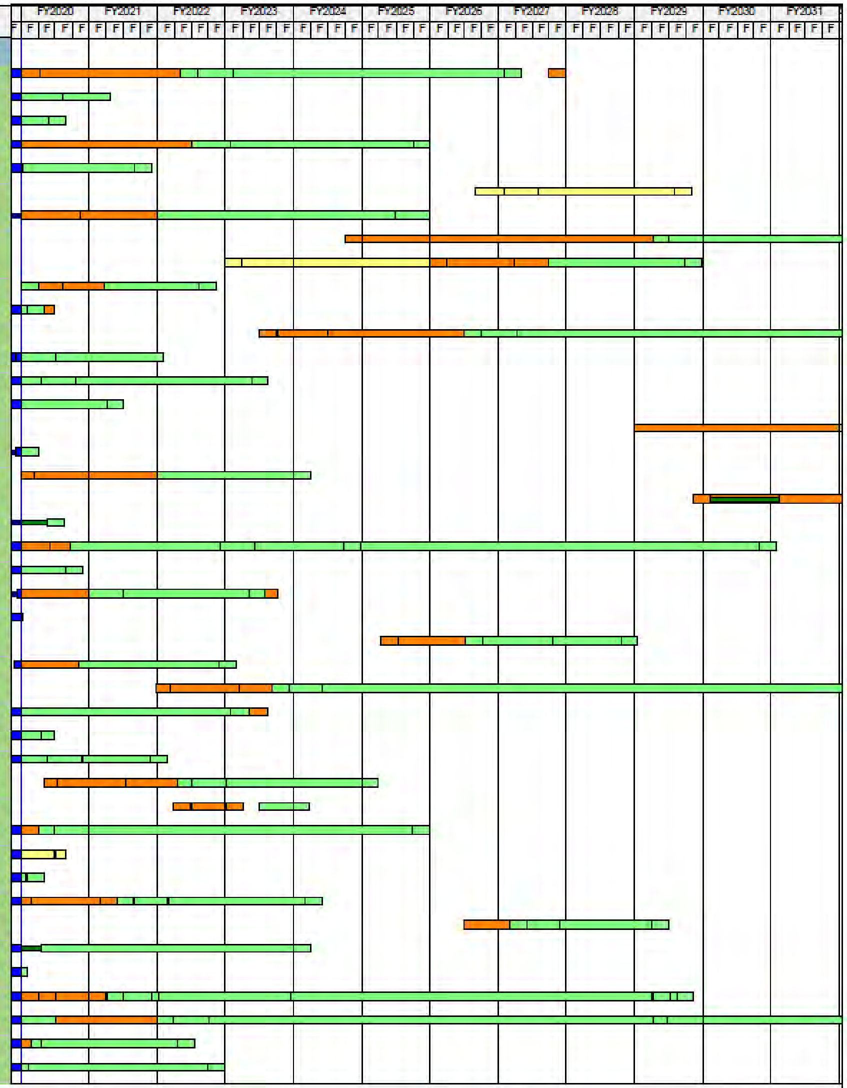
CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	Projected Expenditures FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP	Prioritization Score (RC)
122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation	FP	2019	0	121	138	143	150	169	169	586	769	1,476	0.1%	89.0
122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station	FP	2019	0	74	1,794	3,510	9,223	7,620	7,572	30,784	29,719	60,577	3.2%	84.2
114010	Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements	FP	2012	4	0	1	46	608	9,409	11,958	90,587	22,022	112,613	2.4%	72.2
111010	Lake Huron Water Treatment Plant -Filtration and Pretreatment Improvements	FP	2019	0	0	0	0	0	12	48	5,572	60	5,632	0.0%	71.0
132019	Wick Road Pumping Station Improvements	FP	2018	0	0	0	0	0	0	15	2,925	15	2,940	0.0%	68.4
113006	Southwest Water Treatment Plant Chlorine Scrubber, Raw Water Screens & Related Improvements	FP	2017	0	0	260	2,238	2,238	17	0	0	4,753	4,753	0.5%	68.2
112003	Northeast Water Treatment Plant High-Lift Pumping Station Improvements	FP	2017	0	0	0	0	40	1,228	2,383	53,914	3,651	57,565	0.4%	68.0
132014	Adams Road Pumping Station Improvements	FP	2017	0	0	0	0	13	205	925	26,393	1,143	27,536	0.1%	64.6
132020	Franklin Pumping Station Improvements	FP	2018	0	0	0	0	0	0	0	2,442	0	2,442	0.0%	64.6
122007	Merriman Road Water Transmission Main Loop	FP	2016	0	0	0	0	15	390	1,297	19,755	1,702	21,457	0.2%	61.6
132016	North Service Center Pumping Station Improvements	FP	2017	0	0	0	21	279	2,385	1,832	40,825	4,517	45,342	0.5%	58.2
132021	Imlay Pumping Station Improvements	FP	2018	0	0	0	0	0	0	0	13	0	13	0.0%	58.2
132018	Schoolcraft Pumping Station Improvements	FP	2018	0	0	0	0	0	0	0	0	0	0	0.0%	56.6
132022	Joy Road Pumping Station Improvements	FP	2018	7	0	0	0	0	0	0	48	0	55	0.0%	56.6
114018	Springwells Water Treatment Plant - Service Building Electrical Substation and Miscellaneous Improvements	FP	2019	0	0	0	90	1,378	40	0	0	1,508	1,508	0.2%	53.0
114016	Springwells Water Treatment Plant 1958 Settled Water Conduits and Loading Dock Concrete Pavement Replacement	FP	2018	0	94	1,663	7	0	0	0	0	1,670	1,764	0.2%	52.0
111011	Lake Huron WTP Pilot Plant	FP	2019	0	0	0	0	109	144	144	1,397	397	1,794	0.0%	52.0
113003	Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocculation and Filtration System Improvements	FP	2014	0	0	0	0	0	0	0	14,314	0	14,314	0.0%	50.2
114017	Springwells Water Treatment Plant Flocculator Drive Replacements	FP	2018	0	29	315	635	2,265	6,035	17	0	9,267	9,296	1.0%	47.0
114007	Springwells Water Treatment Plant Powdered Activated Carbon System Improvements	FP	2014	0	0	0	0	0	0	63	4,125	63	4,188	0.0%	46.6
111008	Lake Huron Water Treatment Plant, Architectural Programming for Laboratory and Admin Building Improvements	FP	2017	0	0	0	0	0	0	0	1,299	0	1,299	0.0%	40.6
115006	Water Works Park Site/Civil Improvements	FP	2019	0	0	0	0	0	0	0	5,643	0	5,643	0.0%	39.4
113007	Southwest Water Treatment Plant Architectural and Building Mechanical Improvements	FP	2017	0	0	0	0	0	0	0	98	0	98	0.0%	36.0
Future Planned Water Projects Total				**11**	**318**	**4,171**	**6,690**	**16,318**	**27,654**	**26,423**	**300,720**	**81,256**	**382,305**	**8.8%**	

Table VI-4. Water CIP Projects: Totals

Totals	Lifetime Actual Thru FY 2019 (unaudited)	Projected Expenditures FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
Active Water Projects Total	177,763	91,754	141,764	171,086	182,891	181,420	162,623	378,666	839,784	1,487,967	91.2%
Pending Closeout Water Projects Total	11,797	0	0	0	0	0	0	0	0	11,797	0.0%
Future Planned Water Projects Total	11	318	4,171	6,690	16,318	27,654	26,423	300,720	81,256	382,305	8.8%
Water Projects Total	**189,571**	**92,072**	**145,935**	**177,776**	**199,209**	**209,074**	**189,046**	**679,386**	**921,040**	**1,882,069**	**100.0%**

Table VI-5. Primavera P6 Integrated Master Schedule for Water Projects

Activity Name	Remaining Duration	Start	Finish
Water Projects	9950	07-Jul-2013 A	26-Sep-2046
111001: Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pu	2922	15-Aug-2018 A	30-Jun-2027
111002: Lake Huron Water Treatment Plant, Miscellaneous Mechanical HVAC Improve	481	27-Oct-2015 A	23-Oct-2020
111004: Lake Huron Water Treatment Plant, Electrical Tunnel Rehabilitation	243	29-Jan-2017 A	28-Feb-2020
111006:Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flo	2190	21-Sep-2015 A	28-Jun-2025
111007: Lake Huron Water Treatment Plant, Raw Sludge Clarifier and Raw Sludge Pun	700	07-Mar-2017 A	30-May-2021
111008: Lake Huron Water Treatment Plant, Architectural Programming for Laborato	1826	01-Jul-2025	30-Jun-2030
111009: Lake Huron Water Treatment Plant, Two New High-Lift Pumps, Water Produc	2188	01-Jan-2019 A	26-Jun-2025
111010: Lake Huron Filtration & Pretreat Improv	4472	01-Apr-2024	28-Jun-2036
111011: Lake Huron WTP Pilot Plant	2551	01-Jul-2022	24-Jun-2029
112001: Phase 1 WWP to NE Transmission - Flow Control Station at NE WTP	1049	01-Jul-2019	14-May-2022
112002: Northeast Water Treatment Plant, Low-Lift Pumping Plant Caisson Rehabilita	184	25-May-2018 A	31-Dec-2019
112003: Northeast Water Treatment Plant High-Lift Pumping Station Electrical Improv	3287	01-Jan-2023	31-Dec-2031
112005: NE - Replacement of Covers for Process Water Conduits	761	01-Feb-2019 A	31-Jul-2021
112006: NE Plant Flocculator Replacements	1327	08-Mar-2019 A	16-Feb-2023
113002: Southwest Water Treatment Plant, High-Lift Pump Discharge Valve Actuators	550	01-Oct-2018 A	31-Dec-2020
113003: Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocc	4018	01-Jul-2028	01-Jul-2039
113004: Southwest Water Treatment Plant, Raw Water Sampling Modifications	91	15-May-2018 A	29-Sep-2019
113006: Southwest Water Treatment Plant Chlorine Scrubber, Raw Water Screens & Re	1552	01-Jul-2019	29-Sep-2023
113007: Southwest Water Treatment Plant Architectural and Building Mechanical Imp	2367	11-May-2029	02-Nov-2035
114001: Springwells Water Treatment Plant, 1958 Filter Rehabilitation and Auxiliary F	233	07-Jul-2013 A	18-Feb-2020
114002: Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station In	8919	02-Nov-2016 A	30-Nov-2043
114003: Water Production Flow Metering Improvements at Northeast, Southwest and	336	21-Jul-2017 A	31-May-2020
114005: Springwells Water Treatment Plant, Administration Building Improvements &	1381	24-Feb-2018 A	11-Apr-2023
114006: Springwells Water Treatment Plant Replacement of 1958 Rapid Mixing Units	14	07-Jan-2018 A	14-Jul-2019
114007: Springwells Water Treatment Plant, Powdered Activated Carbon System Impr	1380	08-Oct-2024	18-Jul-2028
114008: Springwells Water Treatment Plant, 1930 Sedimentation Basin Sluice Gates, G	1155	26-May-2019 A	28-Aug-2022
114010: Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improv	4552	24-Jun-2021	09-Dec-2033
114011: Springwells Water Treatment Plant Steam, Condensate Return, and Compress	1329	01-Feb-2019 A	18-Feb-2023
114013: Springwells Water Treatment Plant, Reservoir Fill Line Improvements	184	22-Jan-2018 A	31-Dec-2019
114016: Springwells 1958 Settled Water Conduits Concrete Pavement	784	01-May-2019 A	22-Aug-2021
114017: Springwells Floculator Replacement	1794	01-Nov-2019	28-Sep-2024
114018: Springwells Substation	725	30-Sep-2021	24-Sep-2023
115001: Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Me	2188	26-Mar-2016 A	26-Jun-2025
115003: Water Works Park Water Treatment Plant Comprehensive Condition Assessn	244	05-Jul-2017 A	29-Feb-2020
115004: Water Works Park Water Treatment Plant Chlorine System Upgrade	122	01-Jul-2016 A	30-Oct-2019
115005: WWp Building Ventilation Improv	1611	01-Jan-2019 A	27-Nov-2023
115006: Water Works Park Site Improvments	1094	01-Jan-2026	29-Dec-2028
116002: Pennsylvania, Springwells and Northeast Raw Water Supply Tunnel Improven	1827	21-Dec-2018 A	30-Jun-2024
122002: Replacement of Five (5) PRV Pits of Treated Water Transmission System	33	15-May-2015 A	02-Aug-2019
122003: WWP to NE Transmission Main	3653	14-Sep-2017 A	30-Jun-2029
122004: 96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main	9556	22-Apr-2017 A	28-Aug-2045
122005: Schoolcraft Road Water Transmission Main Replacement	930	01-Oct-2016 A	15-Jan-2022
122006: Wick Road Water Transmission Main Construction	1096	26-Nov-2017 A	30-Jun-2022



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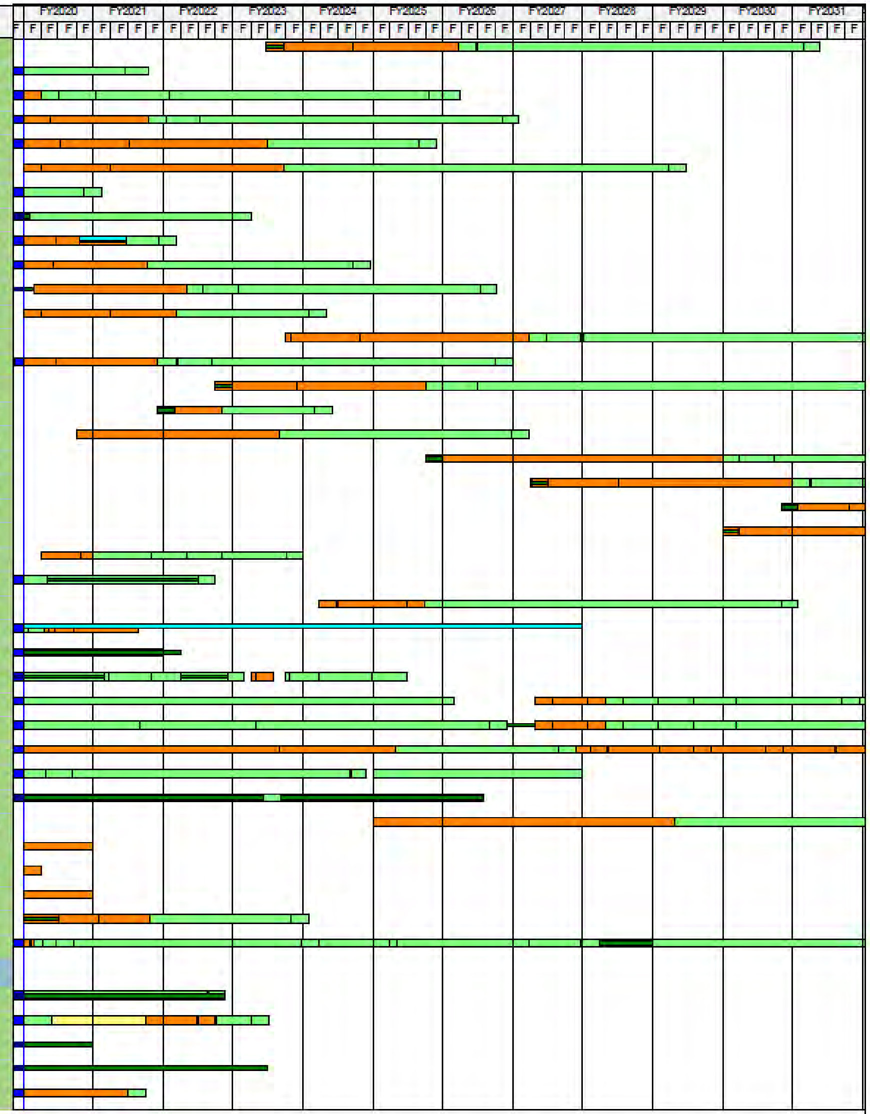
Activity Name	Remaining Duration	Start	Finish
122007: Newburgh Road Water Transmission Main	2896	20-Dec-2022	23-Nov-2030
122011: Park-Merriman Water Transmission Main Construction	655	11-Mar-2019 A	15-Apr-2021
122013: 14 Mile Transmission Main Loop	2283	07-Dec-2017 A	29-Sep-2025
122016: Downriver Transmission Main Loop	2593	05-Apr-2019 A	05-Aug-2026
122017: 7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control St	4026	01-Mar-2019 A	08-Jul-2030
122018: Garland Hurlbut Bewick WTM Rehab	3461	01-Jul-2019	20-Dec-2028
132003: West Service Center Pumping Station, Isolation Gate Valves for Line Pumps	411	26-Nov-2018 A	14-Aug-2020
132006: Ford Road Pumping Station, Pressure and Control Improvements	1167	06-Jun-2016 A	29-Sep-2022
132007: Imlay Pumping Station - Energy Management: Freeze Protection Pump Install	798	05-Feb-2018 A	05-Sep-2021
132010: West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Div	1611	17-Jul-2018 A	14-Jun-2024
132012: Ypsilanti Booster Pumping Station Improvements	2477	05-Mar-2018 A	11-Apr-2026
132013: Adams Road Pumping Booster VFD & Gate Valves to Optimize Service Deliver	1584	01-Jul-2019	31-Oct-2023
132014: Adams Road Booster Pumping Station Improvements	3104	31-Mar-2023	28-Sep-2031
132015: Newburgh Road Booster Pumping Station Improvements	2558	01-Jan-2019 A	01-Jul-2026
132016: North Service Center Pumping Station Improvements	4474	31-Mar-2022	29-Jun-2034
132017: North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping &'	910	01-Jun-2021	27-Nov-2023
132018: Schoolcraft Booster Pumping Station Improvements	9676	31-Mar-2020	26-Sep-2046
132019: Wick Road Booster Pumping Station - Switchgear, Control Valves and Hydrop	3470	01-Apr-2025	30-Sep-2034
132020: Franklin Booster Pumping Station - Isolation Gate Valves & Electrical Actuator	3281	04-Oct-2026	27-Sep-2035
132021: Imlay Booster Pumping Station - Replace Pumps, Motors, VFDs, and HVAC Sys	4163	02-May-2030	23-Sep-2041
132022: Joy Road Booster Pumping Station, Reservoir Pumping System Improvement	2830	01-Jul-2029	30-Mar-2037
132025: WTP	1369	01-Oct-2019	30-Jun-2023
132026: Franklin Pumping Value Replace	1004	01-Feb-2019 A	30-Mar-2022
132028: Schoolcraft Booster Station	2497	26-Sep-2023	29-Jul-2030
170100: Water Treatment Plant / Pump Station Allowance	2922	30-Nov-2016 A	30-Jun-2027
170200: As Needed Construction Materials, Environmental Media and Special Testing	827	23-May-2018 A	04-Oct-2021
170300: Water Treatment Plant Automation Program	2008	31-May-2017 A	28-Dec-2024
170400: Water Transmission Improvement Program	7431	22-Nov-2016 A	03-Nov-2039
170500: Transmission System Valve Rehabilitation and Replacement Program	8540	01-Jan-2018 A	16-Nov-2042
170600: Water Transmission Main Asset Assessment Program	5426	01-Jul-2018 A	10-May-2034
170800: System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation	2922	17-Oct-2017 A	30-Jun-2027
170900: Suburban Water Meter Pit Rehabilitation and Meter Replacement	2407	01-Jan-2018 A	31-Jan-2026
171000: LH - WTP Sanitary Survey Improvements	4095	01-Jul-2024	16-Sep-2035
171100: NE - WTP Sanitary Survey Improvements	366	01-Jul-2019	30-Jun-2020
171200: SW-WTP Sanitary Survey Improvements	91	01-Jul-2019	29-Sep-2019
171300: WWP - WTP Sanitary Survey Improvements	366	01-Jul-2019	30-Jun-2020
171400: Energy Management Program @ All Water Facilities	1490	01-Jul-2019	29-Jul-2023
171500: Roof Replacement - Various Water Facilities	4474	24-Apr-2018 A	29-Sep-2031
Water Projects - Central Services	2951	01-Jul-2015 A	29-Jul-2027
341001: Secuity Upgrades Project - Water	1055	15-Apr-2019 A	20-May-2022
351001: LED Lighting and Lighting Control Improvements	1284	30-Jun-2017 A	04-Jan-2023
380500: Wastewater General Engineering Services on an As-needed Basis	366	01-Jul-2015 A	30-Jun-2020
380600: As-Needed General Engineering Services	1277	01-Jul-2015 A	28-Dec-2022
380700: As-needed Geotechnical Services	642	01-Jun-2016 A	02-Apr-2021



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Activity Name	Remaining Duration	Start	Finish	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031
381000: Energy Management - Water - Electric Metering Improvement Program	1490	01-Jul-2023	29-Jul-2027												

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The regional water system draws its water from the largest fresh water source in North America, the Great Lakes, with Lake Huron to the north, the Detroit River to the south and Lake St. Clair to the east. With access to nearly 2 billion gallons of high quality source water and with three separate intakes, the Authority has highly reliable and more than sufficient source water for current and projected demands.

The major components of the regional water system include three intake facilities, five treatment plants, an extensive conveyance system consisting of over 800 miles of transmission mains throughout the service area, 19 booster pumping stations and 32 water storage reservoirs (14 at the water treatment plants and 18 at booster stations). Water flow and pressure throughout the Water System are monitored and controlled by a Systems Control Center located in the Central Services Facility.

Physical Facilities

Intake Facilities

The Water System's three intake facilities are listed below and are generally in adequate to good working order and repair.

- The **Lake Huron intake,** located in Lake Huron, approximately 5 miles north of Port Huron and 5 miles into the lake, was placed in operation in 1974. This intake supplies raw water through a tunnel to the Lake Huron Water Treatment Plant.
- The **Belle Isle intake**, located at the eastern end of Belle Isle where Lake St. Clair flows into the Detroit River, was placed in operation in 1931. This intake supplies raw water to the Water Works Park, Springwells and Northeast Water Treatment Plants.
- The **Fighting Island intake** and tunnel, located under the Detroit River on the Canadian side just west of the northern end of Fighting Island, was placed in operation in 1964. This intake supplies raw water to the Southwest Water Treatment Plant.

Water Treatment Plants

Raw water from the intake facilities is treated at the regional water system's water treatment plants, which includes screening, filtering, bacteria control, and taste and odor control. Each of the five water treatment plants in the regional water system was constructed with the capability to treat the water in accordance with federal requirements under the Safe Drinking Water Act. In the opinion of the Authority, based upon physical evaluations conducted by its consultants, no significant improvements to the water treatment plants are presently required to meet such requirements. In addition, each treatment plant is equipped with its own laboratory facilities for the examination of drinking water which are recertified periodically (every three years) by the Michigan Department of Public Health. The treatment plants are more particularly described in the following table. A summary of the treatment plants is shown in Table VI-6 on the following page.

Table VI-6. Treatment plant history and rated capacity

Plant	Placed in Operation	Rated Capacity (MGD)
Lake Huron	1974	400
Southwest	1964	240
Northeast	1956	300
Springwells[1]	1931/1958	540
Water Works Park	2003	240

[1] A major addition was completed in 1958, doubling the capacity of such water treatment plant by adding a new reservoir, sedimentation basin and filtration facility. Filter upgrades at Springwells limit plant capacity to 300 million gallons per day (MGD) until construction is complete.

Water Delivery System

The Authority operates and maintains a regional water system consisting of over 800 miles of main including most of the transmission mains within the City limits and certain transmission mains throughout the wholesale service area. The regional water system connects with the transmission and distribution mains owned and operated by the wholesale municipal member partners including the City of Detroit.

The transmission system is laid out to provide adequate pressures that are reinforced by use of booster stations and reservoirs, where necessary. Much of the transmission system is interconnected and flow of water can be controlled, particularly in emergency conditions, to flow in either direction by opening or closing valves. Water pressures can be boosted to overcome typical losses due to an emergency situation.

Monitoring Facilities

The Water System Control Center controls and monitors the transmission of water throughout the regional water system. Operators in the Systems Control Center can remotely control the pump stations at the treatment plants and the 19 booster stations to adjust flows and pressures to meet the changing demands of member partner communities.

Regional Water System Master Plan

The Water Master Plan Update was accepted by the GLWA Board on August 24, 2016. This plan was materially completed in 2015 (the “2015 Water Master Plan Update” or the “Update”) with final closeout in 2016. Member Partner communities were engaged in the preparation of the 2015 Water Master Plan Update. This provided a broader perspective utilizing the region’s entire infrastructure for public benefit to leverage existing infrastructure before investing in new infrastructure. The 2015 Water Master Plan Update has been utilized to develop the Regional Water System CIP.

The 2015 Water Master Plan Update, which covers a period of 20 years, instead of the 50 years of prior master plans, recognizes the national trend of declining demand. A key focus was to establish a strategic infrastructure and operating plan associated with this reality. The update recommended right-sizing the capacity of the regional water system based on the current lower projections of population and water volumes.

The 2015 Water Master Plan Update found that the Authority’s combined water treatment plant design capacity was estimated to be over 60 percent greater than the forecasted 20-year water demands. The total rated capacity of the existing five water treatment plants is 1.7 billion gallons per day. The 2015 Master Plan Update identified likely maximum demands in the range of up to 1.0 billion gallons per day during the 20-year planning period. This provided the rationale to evaluate the possibility of repurposing one or more water treatment plants to strategically align capacity and service requirements and planning for structural de-rating of capacity as warranted at the remaining four water treatment plants. The 2015 Master Plan Update recommended converting the existing Northeast Water Treatment Plant into a storage and pumping facility, thereby eliminating the need to invest in improvements that would otherwise be required to maintain rated capacity, and investing in the four remaining water treatment plants.

The 2015 Water Master Plan Update is designed to provide the System with flexibility to meet multiple growth scenarios and regulatory changes in the future, furthering GLWA’s sustainability goals. Realigning water treatment plant capacity with forecasted demands will require additions and modifications to the existing water transmission system. The first five years of the 2015 Water Master Plan Update contain several capital projects related to the additions and modifications to the existing water transmission system, a number of which are in the GLWA 2021-2025 CIP. An example of the update’s financial benefits is an estimated $400 million of capital cost avoidance. In August 2016, the 2015 Water

Master Plan Update was further updated to decommission and repurpose the Northeast Water Treatment Plant, provide a new transmission system serving the Authority's northeast service area and add enhanced water System redundancy and long- term serviceability to a large (96 inch) water main through completion of a repair, relocation and isolation valve installation project for that water main.

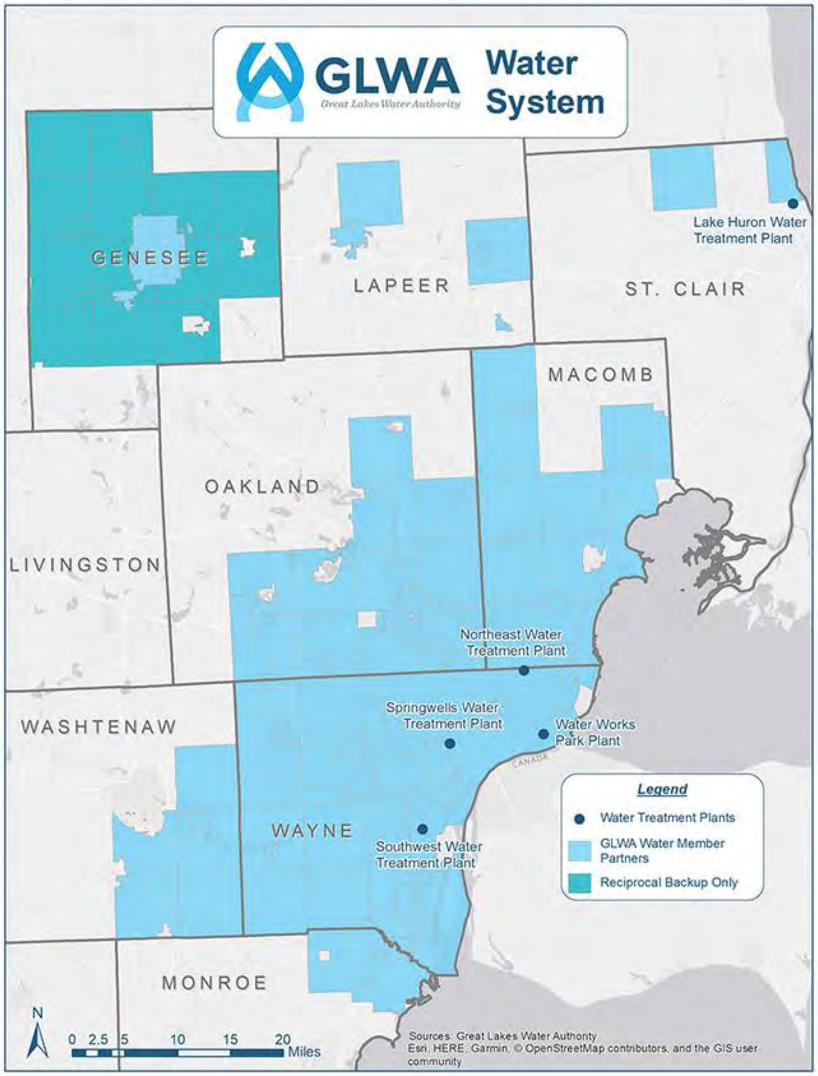
Service Area and Member Partners

The Authority currently provides wholesale water services in a service area encompassing 981 square miles and serves all or a portion of eight Michigan counties in southeast Michigan, including Oakland, Macomb, Wayne, Lapeer, Genesee, Washtenaw, St. Clair and Monroe Counties. Figure VI-1 displays GLWA's service area. Approximately 4 million people, or nearly 40 percent of the total population of the State of Michigan, live in the Authority's water service area. Suburban member partners comprise approximately 82 percent of the population served by the Authority, and the City of Detroit comprise the remainder served by the Authority. Under certain circumstances, subject to the Authority's System optimization guidelines, the Authority's water service area may be expanded to include additional communities. The Authority's member partner communities are served via wholesale service contracts and the City retail customer class is served via the terms of the Water and Sewer Services Agreement.

Wholesale Water Member Partners

The member partners of the regional water system include 127 communities served through various forms of contracts. The City of Detroit is served pursuant to the Water and Sewer Services Agreement. To date, model contracts for 78 of the 88 wholesale member partners have been negotiated, approved, and are in effect. Of the other 10 wholesale member partners, 7 are served under older contract structures, the Genesee County Drain Commissioner is served via a 30-year Reciprocal Backup Water Service Contract and 2 member partners receive water services on a non-contract basis.

Figure VI-1. GLWA water service area



The 78 member partners served by the new model contracts comprise over 92% of total billed revenues from regional water system wholesale member partners (exclusive of Detroit).

The model water service contracts generally provide for (i) delivery of water by the Authority to the wholesale member partner at designated metered points at specified rates of flow and pressure and (ii) payment by the wholesale member partner for all water supplied at reasonable charges established by the Authority. The Authority is responsible for meeting all water quality requirements at the designated metered points. The wholesale member partner is solely responsible for distributing water from the points of delivery to its retail customers, for local billing, collection and rate setting.

The model contracts have a 30-year initial term and automatically renew for an additional 10-year term unless a party to the contract provides written prior notice of intent to terminate at least five years prior to the end of the then-current contract term. In the event of an early termination, the model contract provides that wholesale member partners are liable to GLWA for the payment of any costs incurred by the Authority related to the provision of services to the member partner community, unless the termination is for cause, in which case GLWA has cure rights. The model contract provides that GLWA has no responsibility for distributing, operating, repairing, replacing or maintaining any portion of the member partner community's retail water or wastewater system, that GLWA shall be the sole supplier of service to the member partner's service area and that the member partner is prohibited from commingling Authority water with water from any other source without the prior approval of GLWA.

The model contracts also provide that the Water Technical Advisory Committee (the "TAC"), established to facilitate a cooperative working relationship between GLWA and its member partner communities, will remain in place for the contract term.

In addition, the model contracts include other provisions required for the orderly operation of an integrated water supply and distribution system such as the following: (i) restrictions on redistribution outside the limits of the particular municipality or other public entity without the consent of the Authority; (ii) measurement of water furnished by meters; (iii) the metered flow of water is the basis for billing; (iv) prohibition against combining of regional water system supplied water with water from any other source without prior written approval of the Authority to ensure a uniform quality of water throughout the area; (v) municipal acceptance of the Authority's standards for construction of distribution mains and Authority approval of construction plans therefor to ensure a uniform standard throughout the area; (vi) Authority commitments regarding notification of rate changes; (vii) payment and late payment terms; (viii) delineation of maintenance responsibilities; (ix) specific water pressure commitments by the Authority; and (x) maximum day, peak hour and annual volume commitments by the wholesale member partner.

1.1. Water Treatment Plants & Facilities

GLWA operates and maintains five water treatment facilities that provide water to GLWA member partner communities in Southeast Michigan. The Springwells, Northeast, Southwest, Lake Huron, and Water Works Park Water Treatment Plants have a maximum rated treatment capacity of 1,720 million gallons per day and firm high service pumping capacity of 2,400 million gallons per day. The high service pumping capacity exceeds the rated treatment capacity to assist in meeting peak hourly demands from finished water storage. Applicable treatment and pumping capacities and other data can be seen in Table VI-7 on the following page.

Four of the five plants (Northeast, Springwells, Southwest and Water Works Park) are conventional treatment facilities with the following process trains: rapid mix, coagulation, flocculation, sedimentation, granular media filtration, and disinfection. Lake Huron is the only facility operated as a "modified direct filtration" plant, which means the sedimentation basins do not require a minimum detention time of 4 hours. In addition, Water Works Park is the only plant that employs intermediate ozonation for primary disinfection control. All five plants use the same chemical systems including alum for coagulation, chlorine for pre-oxidation and primary disinfection (excluding Water Works Park), powdered activated carbon (PAC) for taste and odor (T&O) control, phosphoric acid for corrosion control, and fluoride for dental health protection. Polymers are also added at several facilities to enhance coagulation and filtration as well as for thickening and dewatering of alum residuals. Two of the five plants, Southwest and Water Works Park, employ automated residuals removal from the sedimentations basins. The residuals are thickened and dewatered on site along with backwash wastewater, and disposed of at landfills. Lake Huron's basins are cleaned manually on an annual basis and the sludge is discharged to the sludge drying lagoons. The lagoons also receive thickened solids from the waste wash water treatment facility, which processes filter backwash wastewater. The Springwells and Northeast plants do not have automated alum residuals collection in the sedimentation basins or a thickening treatment process on site for alum residuals or backwash wastewater. At both facilities, the basins have been manually cleaned on an annual or biannual basis and the solids discharged to the wastewater collection system; backwash wastewater is also discharged to the wastewater collection system.

Table VI-7. Water Treatment Plant Capacity, Finished Water Storage and Areas Served Summary

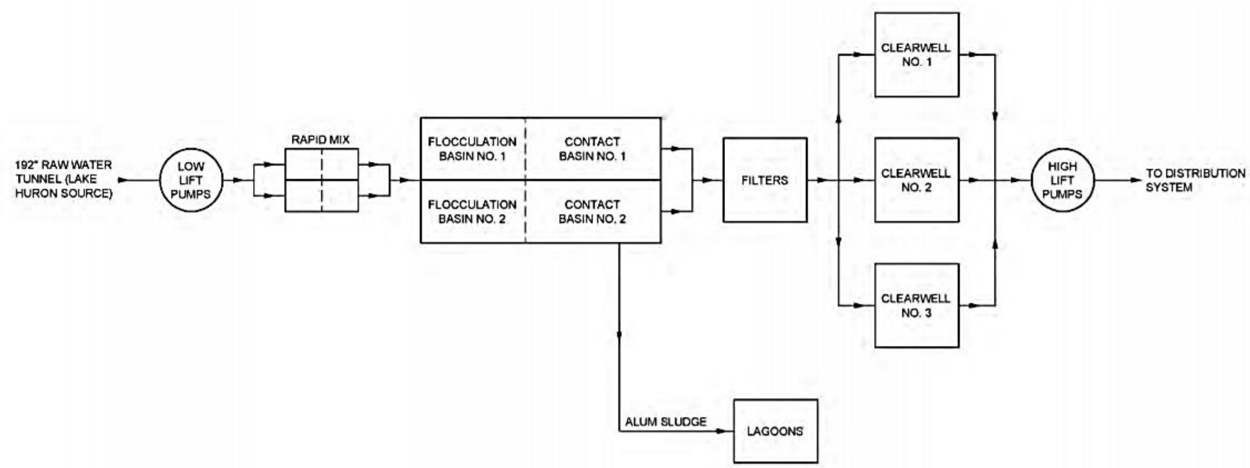
Facility	Year Placed in Service	Rated Treatment Capacity (MGD)	Firm High Service Pumping Capacity (MGD)	Finished Water Storage Volume (MG)	Areas Served
Springwells WTP	1931 First Train; 1958 Second Train	540(1)	260, IPD* 450, HPD*	60	Detroit, Northern Wayne County, Eastern Washtenaw County, Oakland County, Southeastern Macomb County, Western Wayne County
Northeast WTP	1956	300	400	30	Northeast Detroit/Wayne County, Southern Macomb County, Southeast Oakland County
Southwest WTP	1964	240	310	30	Southern Wayne County, Northern Monroe County, Eastern Washtenaw County
Lake Huron WTP	1974	400	420	44	Genesee County, Lapeer County, St. Clair County, Macomb County, Oakland County
Water Works Park WTP	2003	240	560	28	Eastside of Detroit, Eastern Wayne County
System Totals:		**1,720**	**2,400**	**192**	***IPD = Intermediate Pressure District, HPD = High Pressure District**

1.1.1. Lake Huron Water Treatment Plant

The Lake Huron Water Treatment Plant began full-scale operations in 1974. The plant is located at 3993 Metcalf Road in Fort Gratiot, Michigan. The Lake Huron plant was designed to be easily expandable to meet the needs of growing populations in the communities it serves to the north of Detroit. In 2004, after completion of a pilot study along with various upgrades to the process trains, the MDEQ rated the maximum capacity of Lake Huron at 400 MGD. Lake Huron is the only GLWA facility that is operated in "modified" direct filtration mode. The sedimentation basins do not meet 10-State standards and thus are not considered to be true settling basins by the MDEQ. The raw water source for the plant is Lake Huron. The raw water tunnel is designed for a maximum capacity of 1200 MGD and 800 MGD during cold weather. The plant was constructed with provisions to increase the capacity by adding additional process trains and pumping units to obtain the maximum production capacity of 1200 MGD. In the early 2000's a variety of process treatment improvements were constructed at the Lake Huron Water Treatment Plant. These improvements included new high lift and backwash water pumps (including discharge piping and valves), rehabilitation of two clear wells and the high service suction well, filtration capacity improvements, pretreatment improvements and filter control modification, and a new treatment facility for filter backwash wastewater.

Figure VI-2. Lake Huron WTP process diagram

Figure VI-3. Lake Huron WTP



1.1.2. Northeast Water Treatment Plant

The Northeast Water Treatment Plant at 11000 E. Eight Mile Road in Detroit became the former Detroit Water System's third water treatment plant. Dedicated in 1956, the plant was built to meet the needs of suburban communities located east and north of the city. The source of raw water is the Belle Isle intake, located in the Detroit River, which also serves Springwells and Water Works Park. The raw water is chlorinated, fluoridated and screened at Water Works Park before it flows to Northeast by gravity. Low lift pumps lift the raw water to the process trains, which operate in parallel. With a maximum rated capacity of 300 MGD, the plant process trains consist of rapid mix, flocculation, sedimentation, and dual-media gravity filtration.

Figure VI-4. Northeast WTP

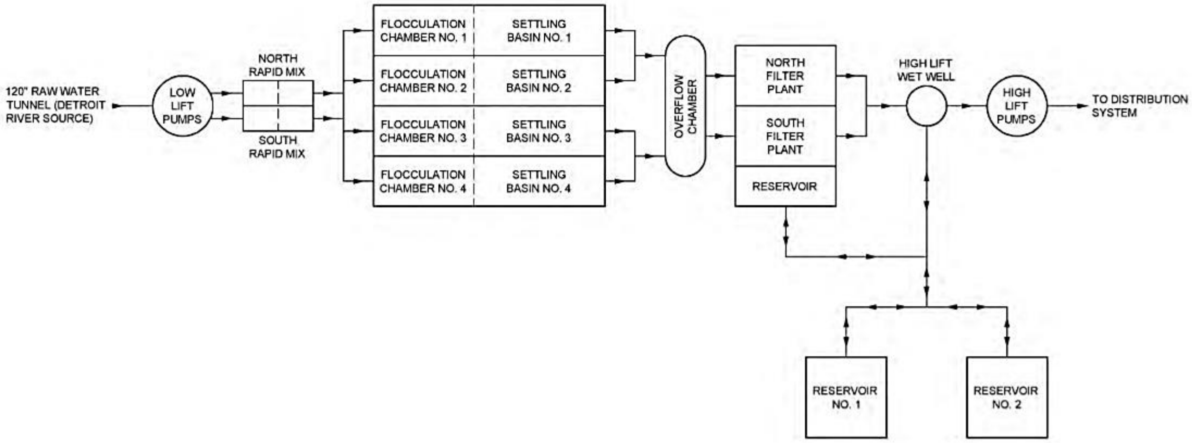


Figure VI-5. Northeast WTP process diagram

1.1.3. Southwest Water Treatment Plant

Detroit's fourth water treatment plant, Southwest, located at 14700 Moran Road in Allen Park, became operational in 1964. The Southwest Water Treatment Plant was constructed in 1963, at which time it was owned and operated by Wayne County. Through an agreement with Wayne County, the City of Detroit purchased this plant to regionalize water services in Southeast Michigan. Raw water for Southwest flows by gravity from the Detroit River through an intake at Fighting Island. The plant has a rated capacity of 240 MGD. The original plant was designed with the ability to be upgraded to 320 MGD via equipment replacement. There are also spare raw water conduits that can accommodate an expansion up to 480 MGD. The low lift pumps lift the raw water for treatment through the process trains, which operate in parallel. The Southwest Water Treatment Plant also has a Residuals Handling Facility to treat filter backwash wastewater and alum sludge residuals.

Figure VI-6. Southwest WTP

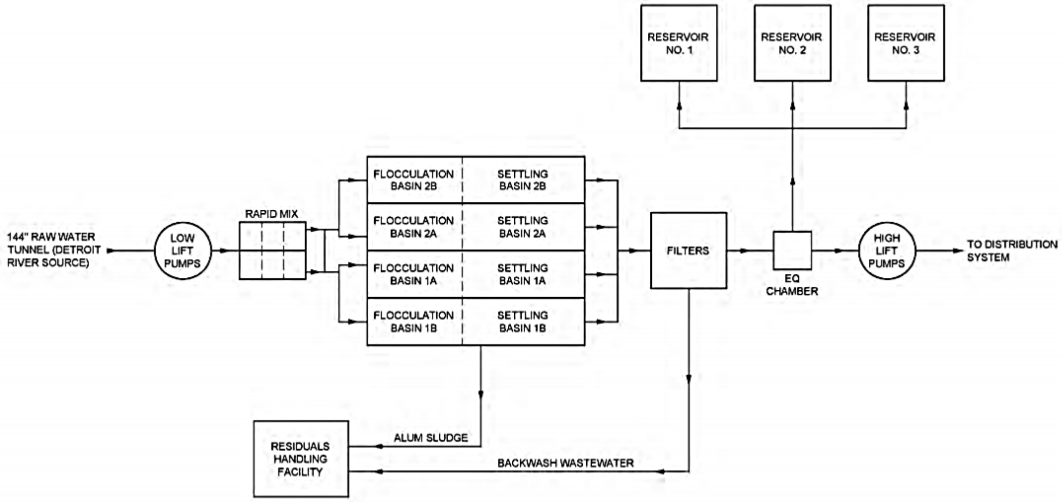


Figure VI-7. Southwest WTP process diagram

1.1.4. Springwells Water Treatment Plant

The Springwells Water Treatment Plant at 8300 W. Warren Avenue in Dearborn is the oldest of the GLWA water treatment facilities. At the time of its dedication in 1935, it was the largest water treatment facility in the world. The first train was constructed in 1930 and has a maximum rated capacity of 340 MGD and the second train constructed in 1958 has a maximum rated capacity of 200 MGD, for a total capacity of 540 MGD. Like Northeast, the Springwells plant receives its raw water from the Belle Isle Intake. The raw water influent is screened, chlorinated and fluoridated at Water Works Park before it is conveyed to Springwells. The low lift pumps lift the raw water for treatment through the process trains, which operate independently. The 1930 train provides hydraulic mixing through a baffled chamber for rapid mixing while the 1958 train has mechanical rapid mixers. Both trains have flocculation, sedimentation and filtration treatment units. A major project to upgrade the Springwells plant, SP-563, is currently underway and should be closed out in 2020. This project includes a complete replacement of the 1958 filters and a limited replacement of some of the 1930 filters. A laboratory upgrade, yard piping and other site improvements, and electrical improvements are also included in this project.

Figure VI-8. Springwells WTP

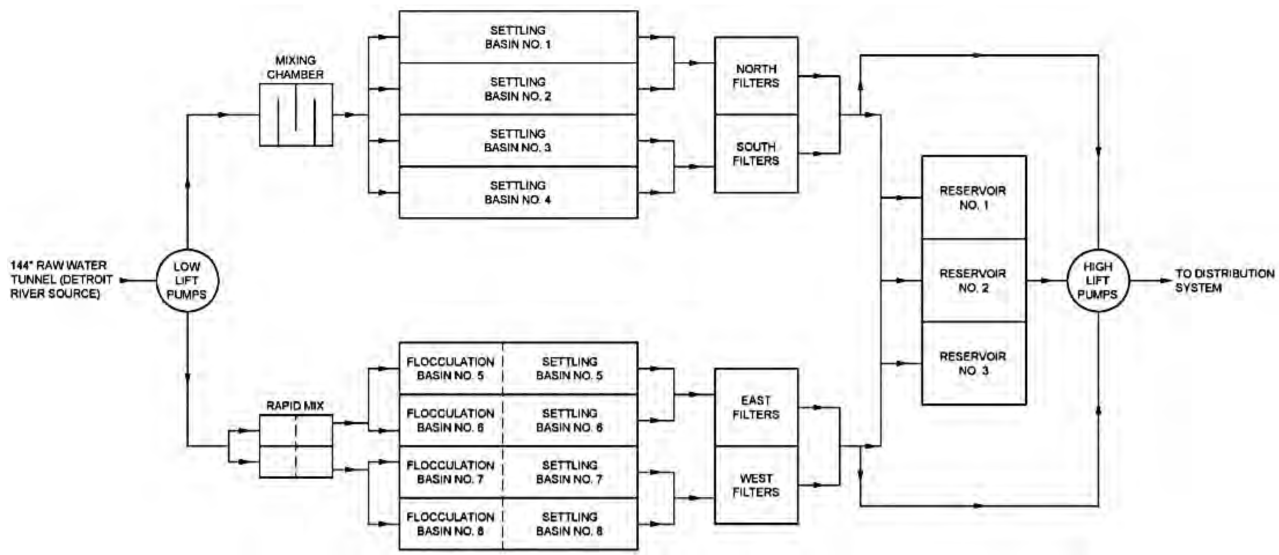


Figure VI-9. Springwells WTP process diagram

1.1.5. Water Works Park Water Treatment Plant

Water Works Park Water Treatment Plant can produce up to 240 million gallons of superior quality drinking water per day (MGD) with room for expansion to 320 MGD. The end result of the city's $275 million investment in this state-of-the-art facility is water the way it is meant to be: colorless, odorless, and great tasting; even better tasting than the water for which DWSD has been justifiably lauded for more than 150 years.

Figure VI-10. Water Works Park WTP

GLWA's newest water treatment plant is located at 10100 E. Jefferson Avenue in Detroit. Water Works Park II began operating in 2003 as a conventional surface water treatment plant. The original Water Works Park water treatment plant was razed and a new facility was constructed on the same site. The raw water source for the plant is the Belle Isle intake on the Detroit River. The plant has a maximum rated capacity of 240 MGD and is GLWA's first facility with ozone disinfection facilities, as well as a Residuals Handling Facility to treat filter backwash wastewater and alum sludge residuals. Water Works Park is the largest plant in Michigan to use ozone as a disinfectant. The plant was designed to use independent process trains - a minimum of two process units are provided for each treatment process. In addition, all conveyance facilities such as pipelines, junction chambers, channels, and wet wells are configured to provide a minimum of two treatment pathways.

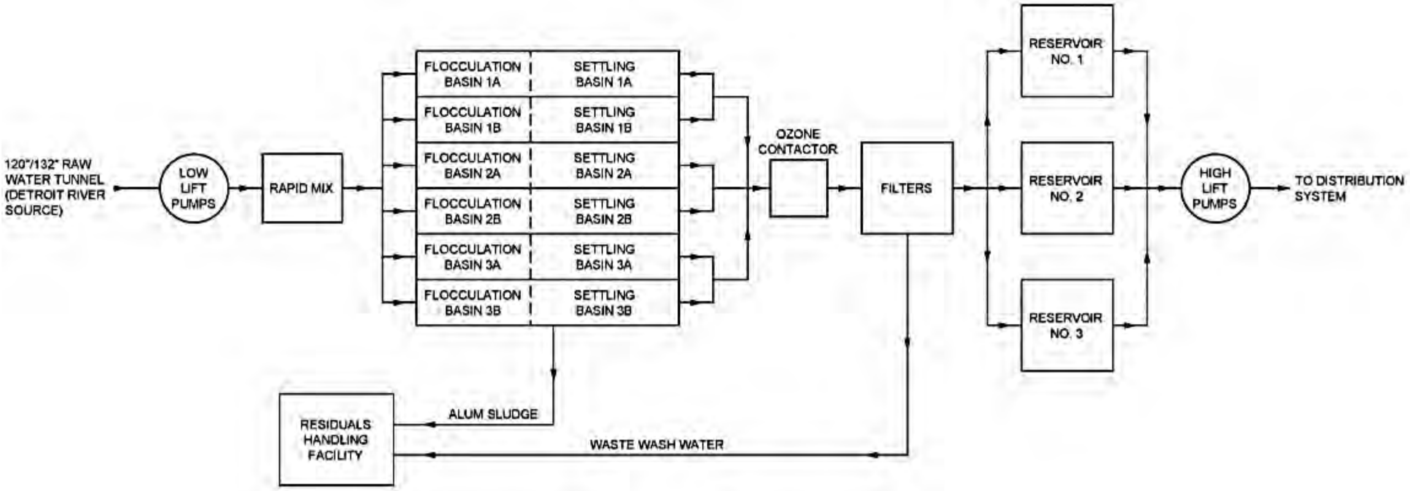


Figure VI-11. Water Works Park process diagram

1.1.6. General Purpose

Refer to the General Purpose description on page II-6.

1.2. Field Services

1.2.1. General Purpose

Refer to the General Purpose description on page II-6.

1.2.2. Transmission System

The Regional Water Transmission System (RWTS) consists of approximately 803 miles of water main typically 24-inch and greater with the responsibility for the transport of potable water from the five water treatment facilities to the regional wholesale water member partner communities and the City of Detroit.

Figure VI-12, Figure VI-13, and Figure VI-14 depict the potable transmission main inventory by material, diameter, and decade installed/age, respectively. The RWTS ranges from 4 to 120 inch in diameter with an average age of 69 years. Additionally, there are approximately 23 miles of raw water transmission main ranging from 120 to 186 inch in diameter supplying the five water treatment plants from the three raw water intakes.

Most of RTWS is Prestressed Concrete Cylinder Pipe (54%), Cast Iron Pipe (19%), and Steel Pipe (17%). The majority of RTWS are typically 24 inches and larger, of which 24 inch (20%), 42 inch (15%), and 48 inch (13%) are the most common diameters; however, some smaller diameter pipe exists on site at the treatment and pumping facilities and limited areas of the system to maintain needed connectivity. Detroit and the region went through several growth periods of time evidenced by the greatest periods of water main installation of the 1960s (32%), 1920s (19%) and 1950s (11%).

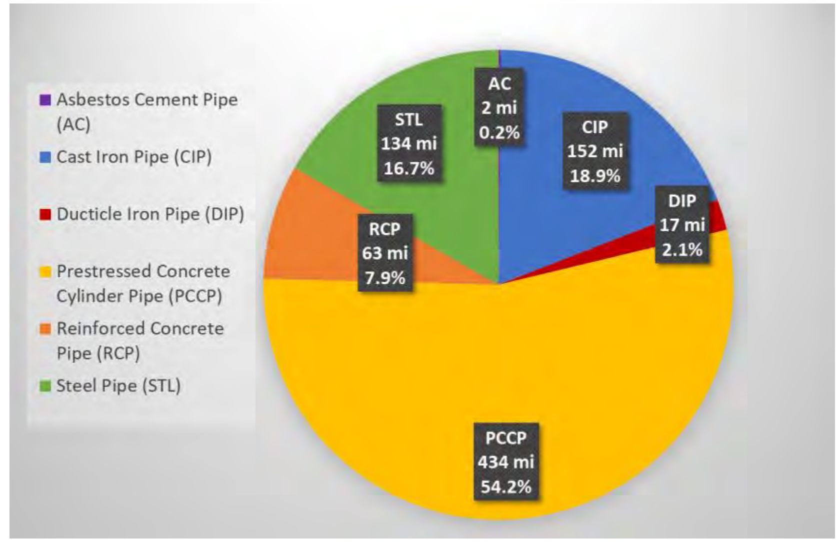


Figure VI-12. Transmission system inventory by material

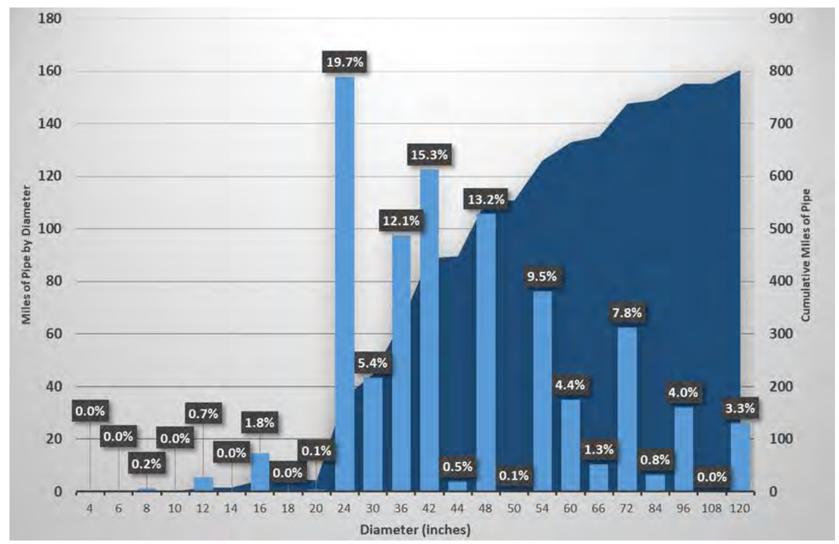


Figure VI-13. Transmission system inventory by diameter

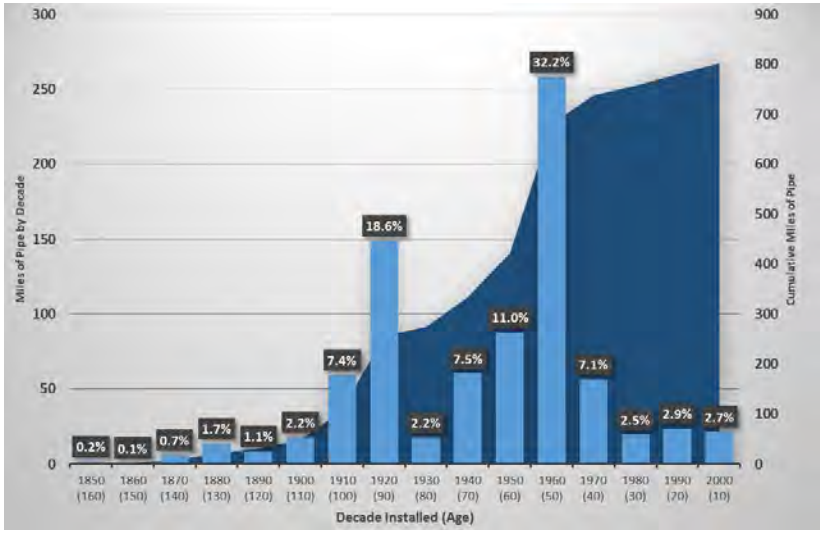


Figure VI-14. Transmission system inventory by decade installed / age

Water Transmission Main Pipe Integrity Program

Given the large transmission main size (24-inch and greater) and the significant population served, pipeline failures have a significant consequence. Previously, a traditional approach to manage deteriorating pipes has been to perform large-scale capital improvement projects to replace the mains. However, this strategy has been shown to be resource-consuming and often ends with the replacement of pipes that may still have significant remaining useful life. GLWA has chosen a more fiscally responsible asset management strategy to implement a pipeline integrity program, which consists of condition assessment and targeted repair, replace or renewal of pipelines to mitigate the risk of pipe failure.

In this predictive approach, refer to Figure VI-15, GLWA's implementation of the pipe integrity program will minimize both the probability and consequence of pipeline failures. The program includes a pipeline risk assessment of each transmission main to determine the priority, as well as recommendations on implementation and execution of a condition assessment and renewal program. This baseline risk assessment of GLWA's transmission system was accomplished by calculating the consequence and probability of failure for each pipeline operated by GLWA, then prioritizing the pipelines based on the total risk.

It is anticipated that GLWA's holistic pipeline integrity program will minimize transmission failures overall, however due to the nature of buried pressure pipe, some pipe breaks may not be preventable, regardless of the intensity of the program. As such and like most utility owners, GLWA will continue to be exposed to the risk of pipeline failure. Operational practices that minimize the consequences of a pipe break, such as a valve exercising program or maintaining a minimum inventory of replacement pipes, continue to be in place.

Each segment of transmission main planned for assessment has both capital and O&M related projected expenses. The capital expenses related to actual repairs of the pipe resulting from the assessment or from the installation of monitoring equipment are accounted for within the CIP. O&M budget related items consist of projected expenses related to the planning of the condition assessment itself, development of a detailed inspection plan, contingency and communication plan for each segment, performing the actual condition assessment and any annual monitoring fees for the installed assessment equipment. A significant effort is required within each pipe assessment to communicate and coordinate activities with member partners to ensure continuity of service to the extent possible during the assessment. In addition, it is critical to evaluate appropriate technologies and approaches to successfully perform the condition assessment that provides an appropriate level of information while maintaining the highest water quality and levels of service.

Figure VI-15. Proposed transmission system program cycle

Figure VI-18 depicts only those water transmission mains operated/maintained (leased) by GLWA within the City of Detroit. Figure VI-19 depicts the water transmission mains operated/maintained (leased) by GLWA over the entire service area. The suburban communities own, operate, and maintain all of their transmission and distribution systems from the points of connection to the RWTS.

1.3. Systems Control Center

1.3.1. General Purpose

Refer to the General Purpose description on page II-6.

Pressure Reducing Valve (PRV)

Pressure Reducing Valves (PRV) regulate water pressure at critical locations throughout the Regional Water Transmission System. Pressure reduction is needed to protect portions of the Water System from being impacted by above normal operating pressures. Downstream of the PRVs, pressure is maintained at a relatively consistent lower pressure.

Pressure Monitoring Site

Fifty-three Pressure Monitoring Sites in the transmission system provide suction/upstream and discharge/downstream pressure readings to aid in system operation.

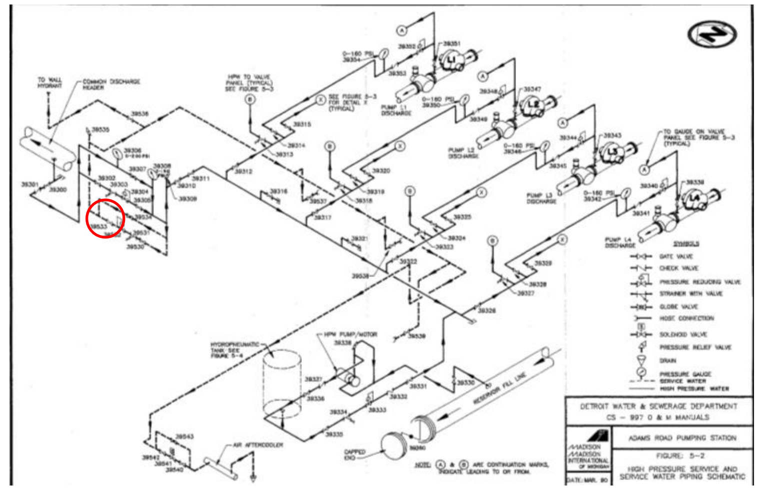


Figure VI-16. Adams Road Pumping Station: PRVs can be seen throughout drawing. The one circled for example reduces pressure before feeding to service water line.

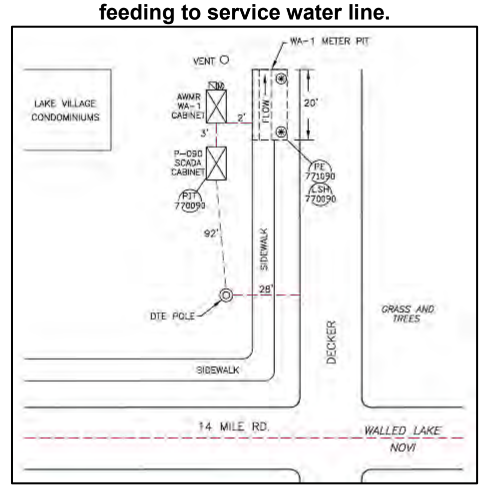


Figure VI-17. Pressure Monitoring Site at 14 Mile and Decker.

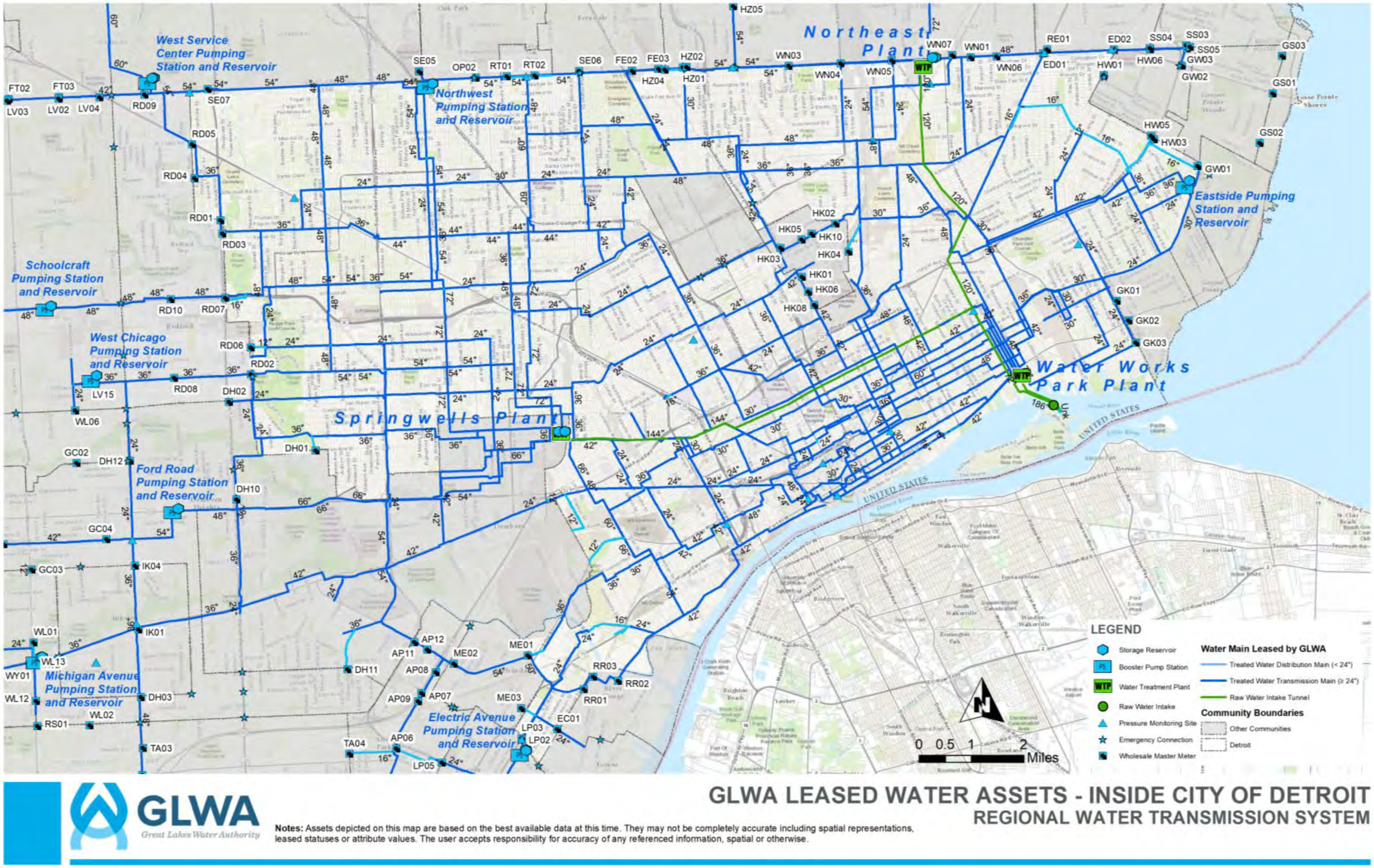


Figure VI-18. GLWA Leased Water Assets inside the City of Detroit

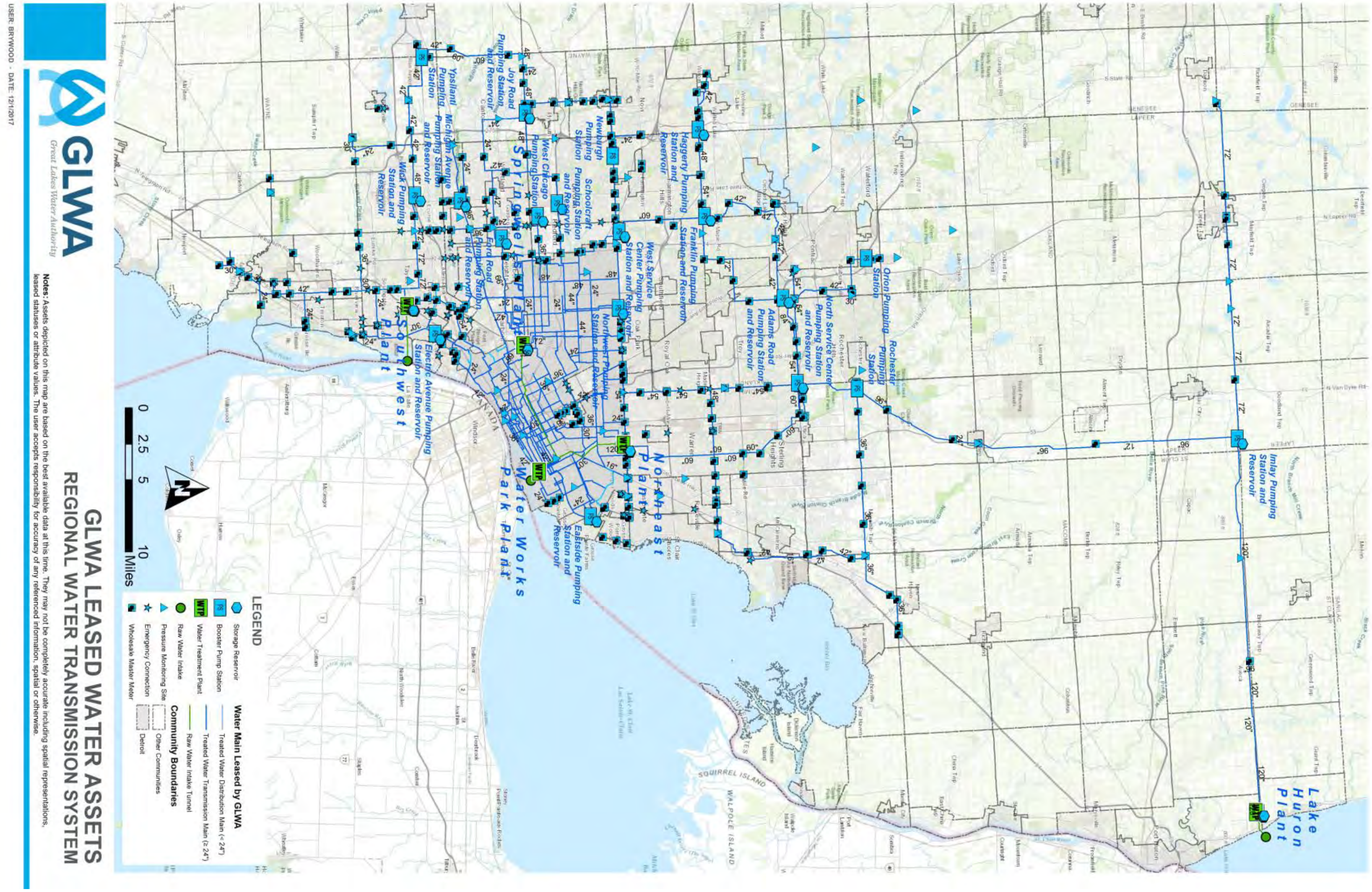


Figure VI-19 . GLWA Leased Regional Water Assets

1.3.2. Pump Stations & Reservoirs

Water Booster Station

Booster stations are located within the regional System and distribute water received from the Water Treatment Facilities to communities and other stations to meet pressure and demand requirements. Some water is diverted to reservoirs at the station until needed during times of high demand. Pumping stations re-pump the water in transmission mains and reservoirs to maintain these pressures. There are 19 water booster stations in the GLWA transmission system.

Adams Road Pump Station

Figure VI-20. Adams Road Pump Station

The Adams Road Station consists of a pump house and a primary unit substation. The station's purpose is to increase the pressure in the 42-inch water main running along Adams Road. The station is fed by the North Service Center Station, which receives its water from the Lake Huron Water Treatment Plant through the Imlay Station. The discharged water from the station flows north through the 42-inch water main along Adams Road. The station serves the member partner communities of Rochester Hills, Auburn Hills, Pontiac, as well as Bloomfield Hills and West Bloomfield, during high demand periods.

Elevation	881.50
Suction Pressure	40 - 55 psi
Discharge Pressure	120 -150 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 1500 Hp, 10 MGD, 350 TDH R2 - 1500 Hp, 10 MGD, 350 TDH
Line Pumps	L1 - 750 Hp, 18.2 MGD, 191 TDH, VFD L2 - 750 Hp, 18.2 MGD, 191 TDH L3 - 750 Hp, 18.2 MGD, 191 TDH L4 - 750 Hp, 14 MGD, 191 TDH
Electric Feeds	2

Eastside Pump Station

Figure VI-21. Eastside Pump Station

The Eastside Pump Station consists of a pump house and a reservoir. The purpose of the station is to store water during the off-peak hours and use the stored water to supplement the supply during the hours of high demand. The discharged water from the station flows through the 36-inch water main along Canyon Avenue. The station serves the communities of East Detroit and Grosse Pointe.

Elevation	579.26
Suction Pressure	
Discharge Pressure	55 - 70 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1- 350 Hp, 10 MGD, 350 TDH R2- 350 Hp, 10 MGD, 350 TDH R3- 350 Hp, 10 MGD, 350 TDH
Electric Feeds	1

Electric Avenue Pump Station

Figure VI-22. Electric Avenue Pump Station

The Electric Avenue Pumping Station increases the water pressure in the 36-inch water main running along Electric Avenue. The station receives its water from the intermediate pressure district of the Southwest Water Treatment Plant. Water from Electric Avenue Pump Station serves the communities of Lincoln Park, Southgate, Riverview, and Trenton.

Elevation	577.71
Suction Pressure	55 - 70 psi
Discharge Pressure	55 - 80 psi
Reservoir Capacity	2 X 3.3 MG
Reservoir Pumps	R3 - 200 Hp, 5.56 MGD, 150 TDH R4 - 300 Hp, 5.56 MGD, 150 TDH
Line Pumps	L1 - 100 Hp, 5.04 MGD, 75 TDH L2 - 100 Hp, 5.04 MGD, 75 TDH
Electric Feeds	2

Haggerty Pump Station

Figure VI-23. Haggerty Pump Station

The Haggerty Pumping Station consists of a pump building, 10-million gallon aboveground reservoir, and exterior primary power area. The primary purpose of the station is to boost water pressure and increase flow to the existing water main. The station also has the capacity to provide an emergency supply of water of up to 28 MGD emergency demand in the event of a water main break between Haggerty and Franklin pumping stations. When operating at full capacity during periods of high demand, the Haggerty Pumping Station will boost the transmission system pressure in the existing 42-inch water main serving City of Novi, Commerce Township, City of Walled Lake, City of Wixom, West Bloomfield, and Wolverine Lake.

Elevation	880.00
Suction Pressure	55 - 100 psi
Discharge Pressure	80 - 105 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 700 Hp, 14 MGD, 200 TDH R2 - 700 Hp, 14 MGD, 200 TDH
Line Pumps	L1 - 700 Hp, 21 MGD, 100 TDH, VFD L2 - 700 Hp, 21 MGD, 100 TDH, VFD L/R3 - 700 Hp, 21 MGD, 100 TDH, VFD
Electric Feeds	2

Ford Road Pump Station

Figure VI-24. Ford Road Pump Station

The Ford Road Station consists of a pump house and a reservoir that stores water to supplement the normal water supply during high demand periods. The station receives water from the intermediate district of the Springwells Water Treatment Plant. The station increases the pressure in the 48-inch water main running along Ford Road. Dearborn Heights, Garden City, Westland, Inkster, and parts of Canton Township are serviced by Ford Road Pump Station.

Elevation	618.26
Suction Pressure	35 - 50 psi
Discharge Pressure	75 - 95 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R6 - 450 Hp, 10.08 MGD, 210 TDH R7 - 450 Hp, 10.08 MGD, 210 TDH R8 - 450 Hp, 10.08 MGD, 210 TDH R9 - 450 Hp, 10.08 MGD, 210 TDH R10 - 450 Hp, 10.08 MGD, 210 TDH
Line Pumps	L1 - 250 Hp, 18.14 MGD, 60 TDH L2 - 250 Hp, 10.08 MGD, 120 TDH L3 - 250 Hp, 10.08 MGD, 120 TDH L4 - 250 Hp, 10.08 MGD, 120 TDH L5 - 250 Hp, 10.08 MGD, 120 TDH
Electric Feeds	2

Franklin Pump Station

Figure VI-25. Franklin Pump Station

The Franklin Pumping Station consists of a pump house and reservoir. The station increases pressure in the 42-inch water main running north and the 54-inch water main running south along Inkster Road. The 60-inch main comes from the high pressure district of the West Service Center that, in turn, is fed by the Northeast and Springwells Water Treatment Plants. The station also stores water to supplement normal supply during the peak demand periods. The station serves Farmington Hills, Franklin Township, Bloomfield, and West Bloomfield.

Elevation	832.58
Suction Pressure	35 - 60 psi
Discharge Pressure	135 - 155 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 1570 Hp, 22 MGD, 320 TDH R2 - 1570 Hp, 22 MGD, 320 TDH
Line Pumps	L1 - 2000 Hp, 30 MGD, 250 TDH L2 - 2000 Hp, 30 MGD, 250 TDH L3 - 2000 Hp, 30 MGD, 250 TDH L4 - 2000 Hp, 30 MGD, 250 TDH
Electric Feeds	2

Michigan Avenue Pump Station

Figure VI-26. Michigan Avenue Pump Station

The Michigan Avenue Pumping Station increases the water pressure in the 36-inch water main running along Michigan Avenue. The 36-inch water main is supplied by the intermediate pressure district of the Springwells Water Treatment Plant and when demand requires it, by the Southwest Water Treatment Plant intermediate pressure district. The station also stores water to supplement the normal water supply during peak demand periods. Water from Michigan Avenue Station serves the communities of Canton and Wayne.

Elevation	638.10
Suction Pressure	40 - 60 psi
Discharge Pressure	55 - 75 psi
Reservoir Capacity	1X 3.5 MG
Reservoir Pumps	R4 - 350 Hp, 8.64 MGD, 150 TDH R5 - 350 Hp, 8.64 MGD, 150 TDH
Line Pumps	L1 - 75 Hp, 3.60 MGD, 90 TDH L2 - 75 Hp, 3.60 MGD, 90 TDH L3 - 125 Hp, 4.32 MGD, 110 TDH
Electric Feeds	2

Joy Road Pump Station

Figure VI-27. Joy Road Pump Station

The Joy Road Pumping Station consists of one pump house, two reservoirs, and one primary unit substation. The purpose of the station is to increase the pressure in the 48-inch water main running along Joy Road. The station is fed by the Ford Road and Schoolcraft stations, which are fed by the Springwells Water Treatment Plant. The discharged water from the station flows west through the 48-inch water main along Joy Road to Sheldon Road. Then, the water main runs north along Sheldon Road to Eight Mile in Northville. The station serves the member partner communities of Plymouth and Northville and the townships of Plymouth, Northville, and Canton.

Elevation	686.00
Suction Pressure	35 - 55 psi
Discharge Pressure	130 - 150 psi
Reservoir Capacity	2 X 5 MG
Reservoir Pumps	R1 - 1200 Hp, 16.13 MGD, 332 TDH R2 - 1200 Hp, 16.13 MGD, 332 TDH R3 - 1250 Hp, 14.8 MGD, 332 TDH
Line Pumps	L1 - 1050 Hp, 15.84 MGD, 288 TDH, VFD L2 - 1050 Hp, 15.84 MGD, 288 TDH L3 - 1000 Hp, 14.8 MGD, 288 TDH
Electric Feeds	2

Imlay Pump Station

Figure VI-28. Imlay Pump Station

The Imlay Pumping Station consists of a pump house and reservoir. The station maintains the required water pressure in the 72-inch supply line to the Flint area and the 96-inch supply line to North Service Center Pumping Station. The station receives water through a 120-inch water main from the Lake Huron Water Treatment Plant. It also stores water to supplement the water supply during the high demand period. The supply water can bypass the station and go directly from the 120-inch main to the 96- and 72- inch water mains.

Elevation	787.87
Suction Pressure	65 - 95 psi
Discharge Pressure	85-w/-75-170-s psi
Reservoir Capacity	18 MG
Reservoir Pumps	R1 - 5250 Hp, 75 MGD, 335 TDH R2 - 5250 Hp, 75 MGD, 335 TDH
Line Pumps	LR3 - 6000 Hp, 75 MGD, 335 TDH, VFD LR4 - 6000 Hp, 70 MGD, 390 TDH LR5 - 6000 Hp, 70 MGD, 390 TDH LR6 - 6000 Hp, 70 MGD, 390 TDH, VFD LR7 - 6000 Hp, 70 MGD, 390 TDH, VFD LR8 - 6000 Hp, 70 MGD, 390 TDH, VFD
Electric Feeds	2

Newburgh Pump Station

Figure VI-29. Newburgh Pump Station

The Newburgh Pumping Station increases the pressure in the 42-inch water main that runs along Eight Mile from West Service Center intermediate pressure line. This main is fed by the high pressure district of the Northeast and Springwells Water Treatment Plants. Discharged water from the station flows west through the 42-inch water main and serves Livonia, Northville, Novi, and Farmington Hills.

Elevation	737.00
Suction Pressure	30 - 60 psi
Discharge Pressure	110 - 130 psi
Line Pumps	L1 - 450 Hp, 8 MGD, 200 TDH L2 - 450 Hp, 8 MGD, 200 TDH L3 - 515 Hp, 12 MGD, 200 TDH L4 - 515 Hp, 12 MGD, 200 TDH L5 - 515 Hp, 12 MGD, 200 TDH
Electric Feeds	2

Northwest Pump Station

Figure VI-30. Northwest Pump Station

The Northwest Pumping Station consists of a pump house and a reservoir. The station stores water during the off-peak hours and uses the stored water to supplement the water supply during the hours of high demand. The discharged water from the station flows north, through the 42-inch discharge header along Greenfield Road, to the Southeastern Oakland County Water Association Pump Station. A 24-inch branch line, running south along Greenfield Road, supplies water to the Springwells high pressure district. A 54-inch branch line, running west along Eight Mile, supplies water to the West Service Center. The station serves the communities of northwest Detroit.

Elevation	657.00
Suction Pressure	
Discharge Pressure	40-55 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 350 Hp, 10.08 MGD, 150 TDH R2 - 350 Hp, 10.08 MGD, 150 TDH R3 - 350 Hp, 10.08 MGD, 150 TDH R4 - 350 Hp, 10.08 MGD, 150 TDH R5 - 350 Hp, 10.08 MGD, 150 TDH
Electric Feeds	1

North Service Center

Figure VI-31. North Service Center

The North Service Center receives its water from Lake Huron Water Treatment Plant through the Imlay Station. North Service Center maintains adequate pressure in the 84-inch water main supplying Pontiac and Utica, supplies water to the service are of Northeast Water Treatment Plant and to Eight Mile water main, and stores water during low demand periods to be used to supplement normal water supply during peak periods. North Service Center serves Pontiac, Adams Pumping Station, Utica, Northeast Water Treatment Plant service area, and supplies water to the Eight Mile water main.

Elevation	697.70
Suction Pressure	30 - 50 psi
Discharge Pressure	135 - 150 psi
Reservoir Capacity	2 X 10 MG
Reservoir Pumps	R1 - 250 Hp, 15 MGD, 75 TDH R2 - 250 Hp, 15 MGD, 75 TDH R3 - 350 Hp, 20 MGD, 76 TDH R4 - 350 Hp, 20 MGD, 76 TDH
Line Pumps	L2 – 2500/1250 Hp, 23-30 MGD, 240-370 TDH L3 – 2500/1250 Hp, 19.3-25.5 MGD, 260-400 TDH L4 – 2500/1250 Hp, 23-30 MGD, 240-370 TDH L5 – 2500/1250 Hp, 19.3-25.5 MGD, 260-400 TDH L6 - 2500/1250 Hp, 19.3-25.5 MGD, 260-400 TDH L7 - 2500 Hp, 30 MGD, 370 TDH, VFD L8 - 2500 Hp, 30 MGD, 370 TDH, VFD L9 - 2500 Hp, 30 MGD, 370 TDH, VFD L10 - 2500 Hp, 30 MGD, 370 TDH, VFD
Electric Feeds	2

Orion Pump Station

Figure VI-32. Orion Pump Station

The Orion Station supplies water at an adequate pressure to Orion's distribution mains. The water comes though the northbound 42-inch water main from Adams Station or North Service Center's 54-inch main, which, in turn, is fed by the Lake Huron Water Treatment Plant through the Imlay Pumping Station. The discharge from the station flows though the 30-inch water main running long Giddings Road and serves the Orion area.

Elevation	946.25
Suction Pressure	75 - 95 psi
Discharge Pressure	105 - 130 psi
Line Pumps	L1 – 75 Hp, 2 MGD, 85 TDH L2 – 75 Hp, 4 MGD, 85 TDH L3 – 75 Hp, 4 MGD, 85 TDH L4 – 75 Hp, 4 MGD, 85 TDH
Electric Feeds	2

Rochester Pump Station

Figure VI-33. Rochester Pump Station

The Rochester Pump Station consists of a pump house and a transformer yard. The station supplies water at an adequate pressure to the City of Rochester Hills and Shelby Township distribution mains. The station replaced a temporary station at the site. It is fed by the Imlay Station, which receives its water from the Lake Huron Water Treatment Plant. Discharged water will boost pressures in communities currently being served by a 36-inch main running east-west along 24 Mile. The station serves City of Rochester Hills, Shelby Township, City of Rochester, Lennox Township, Macomb Township, and Chesterfield Township.

Elevation	687.00
Suction Pressure	65 - 95 psi
Discharge Pressure	75 - 140 psi
Line Pumps	L1 - 700 Hp, 14.4 MGD, 205 TDH, VFD L2 - 700 Hp, 14.4 MGD, 205 TDH L3 - 700 Hp, 14.4 MGD, 205 TDH, VFD L4 - 700 Hp, 14.4 MGD, 205 TDH L5 - 700 Hp, 14.4 MGD, 205 TDH
Electric Feeds	2

West Service Center

Figure VI-34. West Service Center

The West Service Center consists of one main pump house, two reservoir pump houses, and two reservoirs. It increases the pressure in the 54-inch water main running along Eight Mile Road, from the high pressure district of the Northeast and Springwells Plants. There are six line pumps in the main pump house. Three line pumps supply high pressure water to the Franklin station and other upstream member partner communities. The three remaining pumps supply the intermediate pressure line, which serves the Newburgh Station, Farmington Station, and other upstream communities. During low demand periods, water is diverted to the reservoirs. During high demand periods, the reservoir water is pumped to the suction header of the line pumps. The intermediate pressure line running along Eight Mile serves Redford Township and Livonia before reaching the Newburgh Station. High pressure lines running along Inkster Road serve the Farmington Hills and Southeast Oakland County Water Association before reaching the Franklin Station.

Elevation	646.89
Suction Pressure	35 - 50 psi
Discharge Pressure	110 - 140 psi
Reservoir Capacity	2 X 10 MG
Reservoir Pumps	R1 - 400 Hp, 24 MGD, 96 TDH R2 - 400 Hp, 24 MGD, 96 TDH R3 - 400 Hp, 20 MGD, 85 TDH R4 - 400 Hp, 20 MGD, 85 TDH
Line Pumps	L1 - 700 Hp, 30 MGD, 110 TDH L2 - 700 Hp, 30 MGD, 110 TDH L3 - 700 Hp, 30 MGD, 110 TDH L4 - 1250 Hp, 28.8 MGD, 188 TDH L5 - 1250 Hp, 29.5 MGD, 188 TDH L5 - 1250 Hp, 29.5 MGD, 188 TDH
Electric Feeds	2

Schoolcraft Pump Station

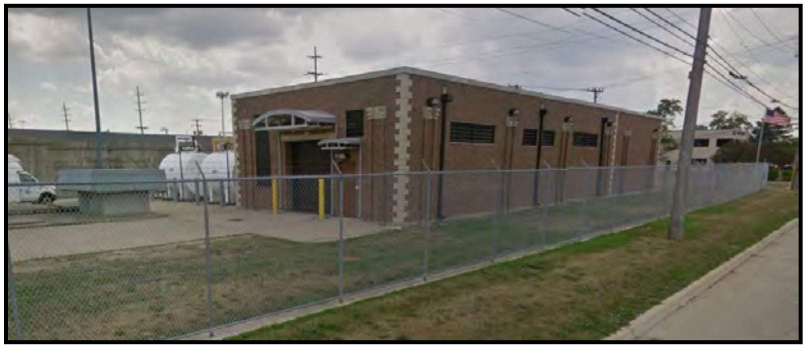


Figure VI-35. Schoolcraft Pump Station

The Schoolcraft Pump Station consists of one pump house, an electrical building, one reservoir, and one primary unit substation. The station increases the pressure in the 48-inch water main running along Schoolcraft Road. The station is fed by the Springwells Water Treatment Plant and itself feeds the Joy Road Station. The station serves the City of Livonia and interconnects with the Joy Road Station, which services Canton, Westland, and Plymouth.

Elevation	626.83
Suction Pressure	35 - 55 psi
Discharge Pressure	80 - 110 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 1200 Hp, 20 MGD, 238 TDH R2/L3 - 1200 Hp, 20 MGD, 238 TDH, VFD
Line Pumps	L1 - 1000 Hp, 20 MGD, 170 TDH, VFD L2 - 1000 Hp, 20 MGD, 170 TDH, VFD
Electric Feeds	2

West Chicago Pump Station

Figure VI-36. West Chicago Pump Station

The West Chicago Station increases the water pressure in the 26-inch water main running along West Chicago Road. The 36-inch water main comes from the high pressure district of the Springwells Water Treatment Plant. The station helps increase the pressure in the intake lines for Schoolcraft and Newburgh Stations. Water from the station serves the member partner communities of southern Livonia, West Service Center intermediate district, and Westland.

Elevation	636.71
Suction Pressure	40 - 60 psi
Discharge Pressure	70 - 80 psi
Reservoir Pumps	R4 - 300 Hp, 7.2 MGD, 185 TDH R5 - 300 Hp, 7.2 MGD, 185 TDH R6 - 300 Hp, 7.2 MGD, 185 TDH
Line Pumps	L1 - 300 Hp, 7.4 MGD, 180 TDH L2 - 300 Hp, 7.4 MGD, 180 TDH L3 - 125 Hp, 4.3 MGD, 180 TDH
Electric Feeds	2

Wick Road Pump Station

Figure VI-37. Wick Road Pump Station

The Wick Road Station consists of a pump house, a reservoir, and an electrical building. The station increases pressure in the 48-inch water main running along Wick Road. The station is fed mainly by the Southwest Water Treatment Plant, which is affected by the Springwells Plant's intermediate pressure line. The discharged water from the station flows west through the 48-inch water main along Wick Road. The main is reduced to 42 inches and feeds the Ypsilanti Station. A 24-inch branch from the 48-inch main serves the Van Buren, Sumpter, Huron, and Ash Townships. The station serves the member partner communities of Romulus, Belleville, Carleton, Wayne, and Ypsilanti.

Elevation	626.83
Suction Pressure	40 - 60 psi
Discharge Pressure	80 - 135 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 1000 Hp, 12 MGD, 238 TDH R2 - 1000 Hp, 12 MGD, 238 TDH R3/L3 - 1000 Hp, 12 MGD, 238 TDH, VFD
Line Pumps	L1 - 1000 Hp, 18 MGD, 252 TDH, VFD L2 - 1000 Hp, 18 MGD, 252 TDH, VFD
Electric Feeds	2

Ypsilanti Pump Station

Figure VI-38. Ypsilanti Pump Station

The Ypsilanti Station consists of a pump house and a transformer yard. The station supplies water at adequate pressure to the City of Ypsilanti's distribution mains. It is fed by the Wick Road Station which receives its water from the Southwest Water Treatment Plant's intermediate pressure line. Discharged water from the station flows through the 42-inch water main running along Old Ecorse Road. It serves the City of Ypsilanti as well as Augusta, Pittsfield, and Superior.

Elevation	703.90
Suction Pressure	30 - 60 psi
Discharge Pressure	110 - 130 psi
Line Pumps	L1 - 1000 Hp, 18 MGD, 250 TDH, VFD L2 - 1000 Hp, 18 MGD, 250 TDH, VFD L3 - 1000 Hp, 18 MGD, 250 TDH, VFD
Electric Feeds	2

1.4. Water Quality

The Water Quality Group is responsible for the majority of the testing and reporting of water quality throughout the Water System. The Water Quality Group manages the state and federal rules and their application to the entire Water System. Functions include the collection, monitoring and reporting requirements associated with these rules. Total coliform rule (TCR), the consumer confidence rule (CCR) and the lead and copper (LCR) are exclusively managed by the GLWA water quality group for the entire System except in those communities which choose not to participate. The Safe Drinking Water Act (SDWA) rules that apply exclusively to the distribution system, other than TCR and LCR, are the exclusive responsibility of each local water system.

Currently the GLWA Water Quality Group performs a majority of its work for the overall benefit of the GLWA System. These functions include water quality testing, member partner response, disinfection services and the overall program management related to the Water System water quality compliance.

1.4.1. General Purpose

Refer to the General Purpose description on page II-6.

1.5. Metering

The System Analytics and Meter Operations Group is responsible for maintenance and operation of numerous remote assets used in the metering of water, as well as the communication network used to transmit data from the water metering locations to the head end.

The System Analytics and Meter Operations Group maintains assets with the responsibility to meter wholesale water usage at 290 metering sites. Each of the 290 water metering sites contain equipment that is located in a control cabinet, as well as assets that are located in a water meter vault. The assets that are housed in the control cabinet include Remote Terminal Units, radios, batteries, battery chargers and flow transmitters. The assets that are housed in the water meter vault include differential pressure transmitters, venturi tubes, magnetic meters, pressure transmitters, mechanical flow meters, bypass valves, inlet/outlet gate valves, butterfly valves, and sump pumps.

In addition to metering equipment, the System Analytics and Meter Operations Group maintains a 900MHz telemetry network and a Wholesale Automated Meter Reading (WAMR) system. The 900 MHz telemetry network is composed of 445 repeater sites. Each repeater location consists of radios and antennas. The WAMR system collects flow and pressure information from GLWA wholesale water meter sites every five minutes. The portal provides a customizable, web-based interface that displays meter and member partner data in both graphical and tabular formats in increments of five minute, hourly and daily intervals. Member partner and site usage can also be downloaded for off-line examination. Billed Consumption with adjustments can be reviewed for member partner usage analysis.

1.5.1. General Purpose

Refer to the General Purpose description on page II-6.

1.6. General Purpose

Refer to the General Purpose description on page II-6.

1.7. Programs

Refer to the Programs description on page II-6.

SECTION 2 WASTEWATER

All financial figures are in thousands of dollars ($1,000's). The Project Status column shows which projects are Active (A), Future Planned (FP), or Pending Closeout (PC). Projects that have been Reclassified to a different number, Closed, or Cancelled are not shown in this list; a list of Closed projects can be found in Chapter IV. For projects in the "Centralized Services" category (CIP number begins with 3), only portions of projects funded by the wastewater budget are included in this section. Projects new to the CIP this year are denoted by bolded CIP number and title. Following these tables is a chart from the Integrated Master Schedule showing the planned sequencing of projects. This was done by updating our scheduler software (Primavera P6) with the updated information from the CIP database.

Table VI-8. Wastewater/Sewer Projects: Active, Ranked by 2021-2025 CIP Total

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	Projected Expenditures FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
260200	Sewer and Interceptor Rehabilitation Program	A	2013	18,637	19,029	12,976	36,047	24,872	15,495	14,347	13,240	103,737	154,643	14.1%
232002	Freud & Conner Creek Pump Station Improvements	A	2016	5,631	7,364	6,445	57	9,898	23,830	30,803	138,071	71,033	222,099	9.7%
211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements	A	2016	1	256	3,098	7,546	2,120	20,899	34,034	8,642	67,697	76,596	9.2%
222002	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	A	2016	10,592	16,199	23,634	9,786	1,465	10,014	9,986	0	54,885	81,676	7.5%
260600	CSO Facilities Improvement Program	A	2017	6,742	7,555	7,492	10,289	10,576	4,759	20,280	85,250	53,396	152,943	7.3%
260500	CSO Outfall Rehabilitation	A	2017	3,331	4,802	11,706	9,156	11,995	10,976	8,243	4,197	52,076	64,406	7.1%
222004	Sewer System Infrastructure and Pumping Stations Improvements	A	2017	4	1,459	2,701	5,433	16,434	9,864	3,279	1,952	37,711	41,126	5.1%
211006	WRRF PS No. 1 Improvements	A	2016	6	929	645	551	8,532	12,772	3,341	0	25,841	26,776	3.5%
216006	Assessment and Rehabilitation of WRRF yard piping and underground utilities	A	2017	3	270	4,291	4,754	4,754	4,767	5,400	273	23,966	24,512	3.3%
213008	WRRF Rehabilitation of the Ash Handling Systems	A	2017	0	166	1,338	636	11,061	5,342	0	0	18,377	18,543	2.5%
211008	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines	A	2017	178	1,239	5,522	3,886	0	0	0	0	9,408	10,825	1.3%
331002	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)	A	2017	802	321	91	1,745	1,724	1,708	1,702	1,652	6,970	9,745	0.9%
232001	Fairview Pumping Station - Replace Four Sanitary Pumps	A	2011	3,404	27,552	5,336	984	0	0	0	0	6,320	37,276	0.9%
211001	WRRF Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery	A	1999	45,069	6,225	3,775	0	0	0	0	0	3,775	55,069	0.5%
216009	LM Facilities Assessment and Rehabilitation/Replacement	A	2019	0	227	253	1,318	970	0	0	0	2,541	2,768	0.3%

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	FY 2020	Projected Expenditures						2021-2025 CIP Total	Project Total	Percent of W/S CIP
						FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond			
213007	WRRF Modification to Incinerator Sludge Feed Systems at Complex -II	A	2016	9,352	8,336	2,258	0	0	0	0	0	2,258	19,946	0.3%
216007	DTE Primary Electric 3rd Feed Supply to WRRF	A	2017	738	3,062	1,296	727	0	0	0	0	2,023	5,823	0.3%
212004	WRRF Chlorination and Dechlorination Process Equipment Improvements	A	2010	190	3,726	1,850	0	0	0	0	0	1,850	5,766	0.3%
216004	Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF	A	2010	815	3,493	1,300	121	0	0	0	0	1,421	5,729	0.2%
214001	WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations	A	2014	2,301	10,369	1,331	0	0	0	0	0	1,331	14,001	0.2%
341002	Security Infrastructure Improvements for Wastewater Facilities	A	2019	0	1,579	1,051	0	0	0	0	0	1,051	2,630	0.1%
211002	WRRF PS No. 2 Pumping Improvements - Phase 1	A	2003	1,912	1,860	0	0	0	0	0	0	0	3,772	0.0%
211004	WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements	A	2008	26,502	1,771	0	0	0	0	0	0	0	28,273	0.0%
212003	WRRF Aeration System Improvements	A	2008	16,356	136	0	0	0	0	0	0	0	16,492	0.0%
212006	WRRF Rouge River Outfall (RRO) Disinfection (Alternative)	A	2014	41,692	2,748	0	0	0	0	0	0	0	44,440	0.0%
	Active Wastewater Projects Total			194,258	130,673	98,389	93,036	104,401	120,426	131,415	253,277	547,667	1,125,875	74.4%

Table VI-9. Wastewater/Sewer CIP Projects: Pending Closeout, Ranked by Total Cost

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	FY 2020	Projected Expenditures						2021-2025 CIP Total	Project Total	Percent of W/S CIP
						FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond			
	-none-			-	-	-	-	-	-	-	-	0	0	
	Pending Closeout Wastewater Projects Total			0	0	0	0	0	0	0	0	0	0	0.0%

Table VI-10. Wastewater/Sewer Projects: Future Planned, Ranked by Prioritization Score

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	FY 2020	Projected Expenditures						2021-2025 CIP Total	Project Total	Percent of W/S CIP	Prioritization (RC) Score
						FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond				
211005	WRRF PS No. 2 Improvements Phase II	FP	2014	1	0	0	0	471	2,245	949	30,384	3,665	34,050	0.5%	72.8
277001	Baby Creek Outfall Improvements Project	FP	2019	0	79	1,251	907	0	0	0	0	2,158	2,237	0.3%	72.8

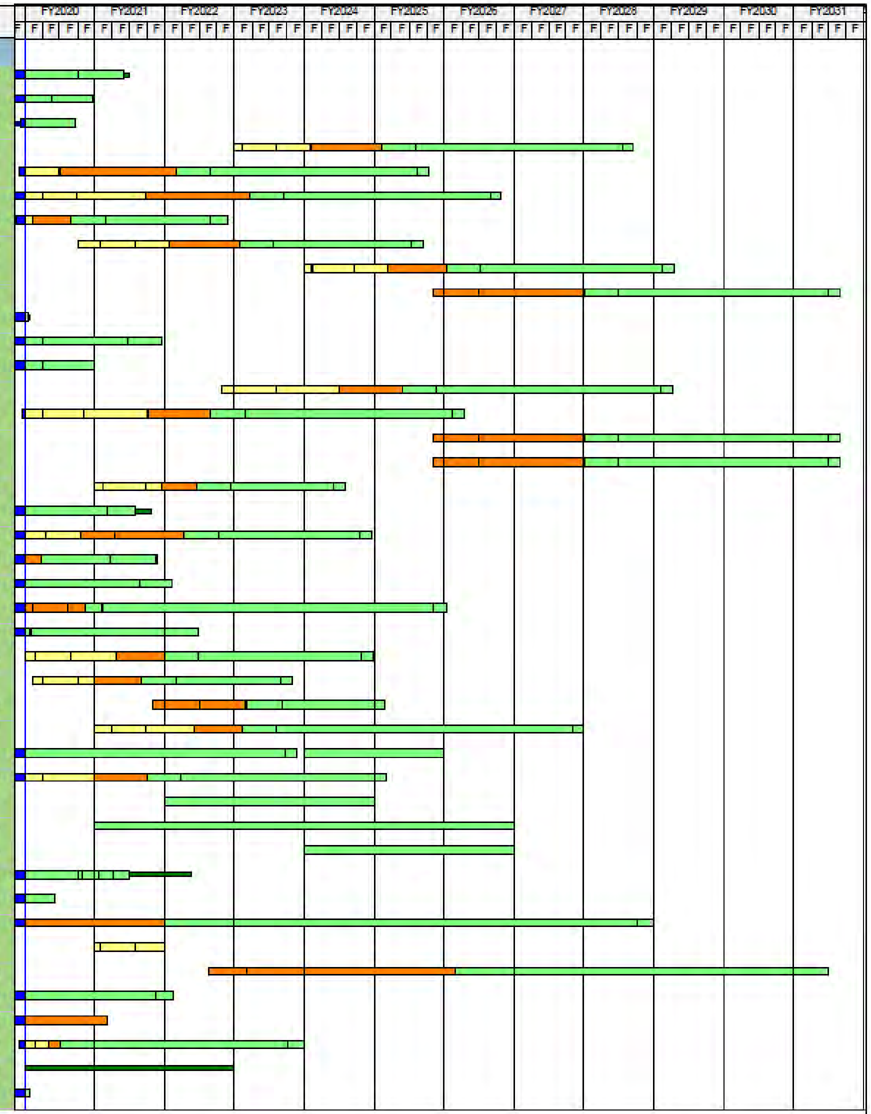
CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2019 (unaudited)	Projected Expenditures FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP	Prioritization (RC) Score
213006	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	FP	2016	5	0	174	385	3,371	716	0	0	4,646	4,651	0.6%	69.2
212008	WRRF Aeration Improvements 1 and 2	FP	2017	0	183	4,612	7,977	7,619	40,638	15,336	5,149	76,182	81,514	10.3%	67.8
212009	WRRF Aeration Improvements 3 and 4	FP	2019	0	0	0	0	0	0	14	73,749	14	73,763	0.0%	67.8
211010	Rehabilitation of Sludge Processing Complexes A and B	FP	2019	0	0	0	0	0	178	748	13,113	926	14,039	0.1%	65
212010	WRRF Conversion of Disinfection of all Flow to Sodium Hypochlorite and Sodium Bisulfite	FP	2019	0	0	0	0	0	0	14	5,972	14	5,986	0.0%	65
270001	Pilot CSO Netting Facility	FP	2019	0	0	20	86	1,604	318	4,507	1,234	6,535	7,769	0.9%	65
211011	WRRF PS1 Screening and Grit Improvements	FP	2019	0	0	0	0	0	0	14	100,733	14	100,747	0.0%	64
216010	WRRF Facility Optimization	FP	2019	0	0	14	657	987	7,999	681	0	10,338	10,338	1.4%	63.6
270002	Meldrum Sewer Diversion and VR-15 Improvements	FP	2019	0	0	0	13	86	586	162	5,232	847	6,079	0.1%	62.4
211009	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System	FP	2017	0	21	313	1,254	802	8,715	2,144	0	13,228	13,249	1.8%	61.2
233003	Rouge River In-system Storage Devices	FP	2019	0	0	0	32	86	3,374	1,984	41,321	5,476	46,797	0.7%	60.8
270003	Long Term CSO Control Plan	FP	2019	0	68	2,796	2,220	710	0	0	0	5,726	5,794	0.8%	59.6
216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station	FP	2018	0	590	1,362	1,507	15,571	5,924	0	0	24,364	24,954	3.3%	55.8
222001	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	FP	2014	0	0	975	3,128	3,371	11,234	13,439	21,365	32,147	53,512	4.4%	53.6
212007	WRRF Rehabilitation of the Secondary Clarifiers	FP	2017	0	0	0	15	427	879	532	28,288	1,853	30,141	0.3%	53.2
232004	Condition Assessment at Blue Hill Pump Station	FP	2019	0	0	286	0	0	0	0	0	286	286	0.0%	0
	Future Planned Wastewater Projects Total			6	941	11,803	18,181	35,105	82,806	40,524	326,540	188,419	515,906	25.6%	

Table VI-11. Wastewater/Sewer CIP Projects: Subtotals

Subtotals	Lifetime Actual Thru FY 2019 (unaudited)	Projected Expenditures FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
Active Wastewater Projects Total	194,258	130,673	98,389	93,036	104,401	120,426	131,415	253,277	547,667	1,125,875	74.4%
Pending Closeout Wastewater Projects Total	-	-	-	-	-	-	-	-	-	-	-
Future Planned Wastewater Projects Total	6	941	11,803	18,181	35,105	82,806	40,524	326,540	188,419	515,906	25.6%
Total Wastewater Projects	194,264	131,614	110,192	111,217	139,506	203,232	171,939	579,817	736,086	1,641,781	100.0%

Table VI-12. Primavera P6 Integrated Master Schedule for Wastewater Projects

Activity Name	Remaining Duration	Start	Finish
Wastewater Projects	4262	20-Jul-2010 A	01-Mar-2031
211001: WRRF Rehabilitation of Primary Clarifiers Rect Tanks, Drain Lines, Elec/Mecl	550	18-Jul-2016 A	31-Dec-2020
211002: WRRF PS No. 2 Pumping Improvements - Phase 1	356	20-Jul-2010 A	20-Jun-2020
211004: WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements	264	18-Nov-2013 A	20-Mar-2020
211005: WRRF PS No. 2 Improvements Phase II	2086	01-Jul-2022	18-Mar-2028
211006: WRRF PS No. 1 Improvements	2115	31-May-2019 A	14-Apr-2025
211007: WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvemei	2495	01-Apr-2019 A	29-Apr-2026
211008: WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sl	1063	23-May-2019 A	28-May-2022
211009: WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System	1807	01-Apr-2020	12-Mar-2025
211010: Rehabilitation of Sludge Processing Complexes A and B	1934	01-Jul-2023	15-Oct-2028
211011: WRRF PS1 Screening and Grit Improvements	2130	01-May-2025	28-Feb-2031
212003: WRRF Aeration System Improvements	26	03-Oct-2016 A	26-Jul-2019
212004: WRRF Chlorination and Dechlorination Process Equipment Improvements	722	01-Jul-2016 A	21-Jun-2021
212006: WRRF Rouge River Outfall (RRO) Disinfection (Alternative)	366	19-Feb-2016 A	30-Jun-2020
212007: WRRF Rehabilitation of the Secondary Clarifiers	2355	29-Apr-2022	08-Oct-2028
212008 :WRRF Aeration Improvements 1 & 2	2297	24-Jun-2019 A	13-Oct-2025
212009: WRRF Aeration Improvements 3 & 4	2131	01-May-2025	01-Mar-2031
212010: WRRF Conversion of Disinfection of all Flow to Sodium Hypochlorite and Sod	2131	01-May-2025	01-Mar-2031
213006: WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	1312	01-Jul-2020	02-Feb-2024
213007: WRRF Modification to Incinerator Sludge Feed Systems at Complex -II	661	30-Oct-2017 A	21-Apr-2021
213008: WRRF Rehabilitation of the Ash Handling Systems	1813	31-Mar-2019 A	16-Jun-2024
214001: WRRF Relocation of Industrial Waste Control Division and Analytical Laborat	692	12-Oct-2016 A	22-May-2021
216004: Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at \	772	01-Jan-2017 A	10-Aug-2021
216006: Rehabilitation of WRRF yard piping and underground utilities	2200	15-Jan-2019 A	08-Jul-2025
216007: DTE Primary Electric 3rd Feed Supply to WRRF	911	07-May-2019 A	27-Dec-2021
216008: Rehabilitation of Screened Final Effluent (SFE) Pump Station	1821	01-Jul-2019	24-Jun-2024
216009: L&M Facility Assessment and Rehabilitation/Replacement	1358	12-Aug-2019	30-Apr-2023
216010:WRRF Facility Optimization	1218	01-May-2021	30-Aug-2024
222001: Oakwood District Intercommunity Relief Sewer Modification at Oakwood Dis	2556	01-Jul-2020	30-Jun-2027
222002: Detroit River Interceptor (DRI) Evaluation and Rehabilitation	2192	03-Jul-2017 A	30-Jun-2025
222004A: Conveyance System Infrastructure Improvements	1890	01-Oct-2018 A	01-Sep-2024
222004B: Regulator Expansions	1096	01-Jul-2021	30-Jun-2024
222004C: PS Allowance	2191	01-Jul-2020	30-Jun-2026
222004D: Future Conveyance System infrastructure Improvements	1096	01-Jul-2023	30-Jun-2026
232001: Fairview Pumping Station - Replace Four Sanitary Pumps	869	01-Jan-2019 A	15-Nov-2021
232002A: CON-109 Freud & Conner Creek Pump Station Improvements	153	01-Feb-2019 A	30-Nov-2019
232002B: CS-120 Freud & Conner Creek Pump Station Improvements	3288	27-Mar-2017 A	30-Jun-2026
232004: Condition Assessment at Blue Hill Pump Station	365	01-Jul-2020	30-Jun-2021
233003: Rouge River In-system Storage Devices	3237	16-Feb-2022	27-Dec-2030
260201: CON-149, Emergency Sewer Repair	779	14-Jul-2017 A	17-Aug-2021
260202: CS-168, FK Engineering, Sewer and Interceptor Evaluation and Rehabilitation	428	01-Aug-2018 A	31-Aug-2020
260204: Conveyance System Engineering Services-1802575	1461	01-Jun-2019 A	30-Jun-2023
260500A: CSO Outfall Rehabilitation	784	01-Jul-2019	30-Jun-2022
260503: Phase1 CON-260	26	01-Aug-2018 A	26-Jul-2019



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CIP 2021 - Integrated Master Schedule - WWTP Projects
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Run Date: 04-Oct-2019
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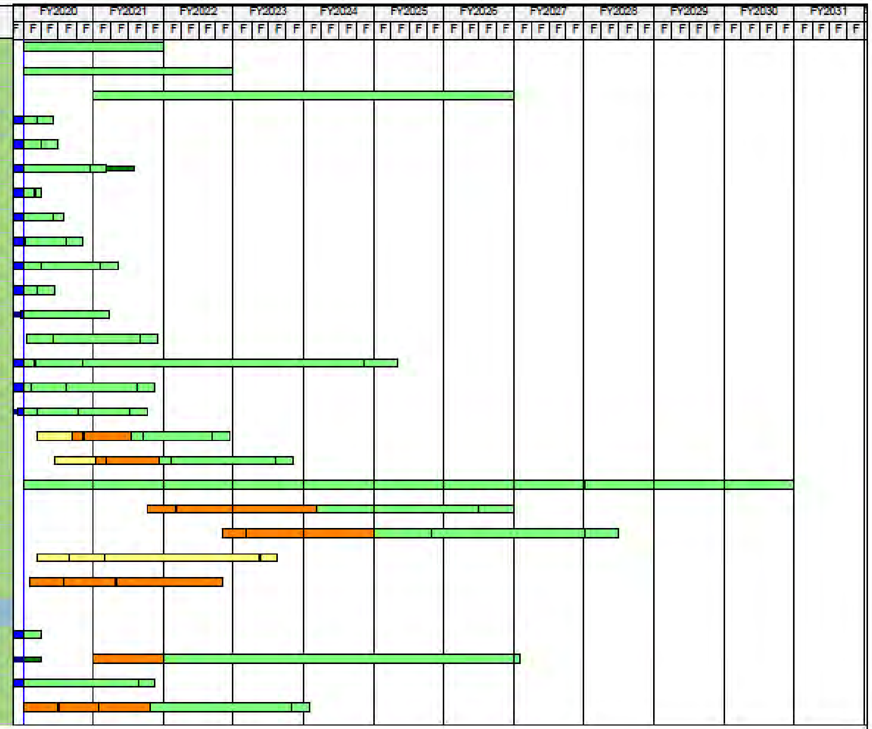
GLWA

Activity Name	Remaining Duration	Start	Finish
260504: Phase 2 Outfalls- 19000796	731	01-Jul-2019	30-Jun-2021
260505: Phase 4 Outfalls	1096	01-Jul-2019	30-Jun-2022
260500B:TBD	2191	01-Jul-2020	30-Jun-2026
260601: Oakwood CSO Control Facility Drain Valve Improvements	163	18-Jun-2018 A	10-Dec-2019
260602: CSO Facilities Fire Alarm System Improvements	184	09-May-2018 A	31-Dec-2019
260603: Conner Creek CSO RTB Automation Improvements	640	27-Feb-2017 A	31-Mar-2021
260606: Puritan Fenkell Roof Replacement	93	01-Apr-2018 A	01-Oct-2019
260607: Leib SDF - Electrical Improvements	215	01-Jul-2018 A	31-Jan-2020
260608: 7 Mile CSO Facilities - Roof Replacement	315	01-Mar-2018 A	10-May-2020
260609: Seven Mile RTB - Parking Lot Replacement & Misc. Site Work	493	01-Oct-2018 A	04-Nov-2020
260610: Baby Creek SDF - HV Units Replacement	164	01-Nov-2018 A	11-Dec-2019
260611: Leib SDF - HVAC System Improvements	445	01-Dec-2018 A	17-Sep-2020
260613: Baby Creek HVAC Improvements	682	17-Jul-2019	28-May-2021
212004: WRRF Chlorination and Dechlorination Process Equipment Improvements	1953	01-Nov-2018 A	03-Nov-2024
260615: Puritan Fenkell & Leib Site Improvements	681	01-Nov-2018 A	11-May-2021
260616: Baby Creek Towards Treatment Sewer Improvements	647	01-Nov-2018 A	07-Apr-2021
260617: St. Aubin Chemical Disinfection Improvements	1003	15-Sep-2019	13-Jun-2022
260618: Oakwood HVAC Project	1238	15-Dec-2019	05-May-2023
260600 TBD1: Unallocated (TBD)	4018	01-Jul-2019	30-Jun-2030
270001: Pilot Netting Facility	1910	07-Apr-2021	29-Jun-2026
270002: Meldrum Diversion & VR-15 Connection (WWMP)	2065	07-May-2022	31-Dec-2027
270003: Long Term CSO Control Plan	1249	15-Sep-2019	14-Feb-2023
277001: Baby Creek - Outfall Improvements	1003	01-Aug-2019	29-Apr-2022
Wastewater Projects - Central Services	2586	01-Apr-2019 A	29-Jul-2026
331002B: Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Bas	92	01-Apr-2019 A	30-Sep-2019
331002A: Construction Future Allocation	2586	01-Apr-2019 A	29-Jul-2026
341002: Security Improvements - WasteWater	690	15-Apr-2019 A	20-May-2021
381000: Energy Management - WasteWater - Electric Metering Improvement Program	1490	01-Jul-2019	29-Jul-2023



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CIP 2021 - Integrated Master Schedule - WWTP Projects
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Run Date: 04-Oct-2019
Data Date: 01-Jul-2019

2.1. Water Resources Recovery Facility

The Water Resources Recovery Facility (WRRF, formerly referred to as the Wastewater Treatment Plant or WWTP) is the largest single-site wastewater treatment facility in the United States. Of the more than $22.5 million spent to ready the plant for its February 1940 startup, $10 million was spent on plant construction with the balance going to complete the network of huge interceptor sewers through which a combined stream of storm and sanitary wastewater flows to the plant from member partner communities throughout metro Detroit.

The treatment plant was originally designed to provide primary treatment (screening, grit removal, primary sedimentation and chlorination) for the wastewater generated by 2.4 million people and, with modifications, as many as 4 million people. The plant's service area in 1940 included Detroit and 11 nearby suburban communities. Secondary treatment (biological treatment and secondary clarification for removal of biodegradable solids, resulting in an even cleaner effluent) was introduced in the 1960s. GLWA's WRRF continues to be the recipient of continual upgrades in order to ensure it is capable of staying abreast of ever more stringent regulatory standards.

Currently, the WRRF services the needs of 35 percent of the state's population contained within Detroit and 76 other communities in a service area of more than 946 square miles. In 1999, the Michigan section of the American Society of Civil Engineers named the WRRF one of the top 10 engineering projects of the 20th century.

The WRRF treats, on average, 650 MGD. Currently, the peak rated capacity is 1,700 MGD for primary treatment and 930 MGD for secondary treatment. The WRRF has been in service since 1940, at which time it removed approximately 50-70 percent of the pollutant loads. It was upgraded to full secondary treatment in the 1970s. After the upgrade to secondary treatment, the WRRF removes in excess of 85 percent of the pollutant loads to meet federal and state requirements.

Currently, the WRRF serves approximately 3 million residents in southeast Michigan. The WRRF receives wastewater flow from three main interceptors: the Detroit River Interceptor (DRI), the Oakwood Interceptor (OWI), and the North Interceptor East Arm (NIEA). Approximately 36 percent of the flow comes from the DRI, 35 percent from the OWI, and the remaining 29 percent from the NIEA. After the flow reaches the WRRF via the three interceptors, it is pumped to the primary and secondary treatment processes at Pump Station No. 1 (PS-1) and Pump Station No. 2 (PS-2). Each pump station has eight pumps with a combined total pumping capacity in excess of 2 billion gallons per day (BGD).

A diagram of the WRRF layout is shown on the following page in Figure VI-39.

2.1.1. Primary Treatment

The primary treatment area of the WRRF consists of the following major units:

- Raw wastewater pumping to Pump Station No. 1 (PS-1) and Pump Station No. 2 (PS-2), grit and screenings removal, and chemical addition.
- 12 Rectangular Primary Clarifiers
- 6 Circular Clarifiers
- 7 Rectangular Clarifier Scum Buildings
- 6 Circular Clarifier Scum Buildings
- Rectangular Clarifier Pipe Gallery (including 12 Sludge Pumps)
- 6 Rectangular Clarifier Electrical/Mechanical Buildings
- 3 Circular Clarifier Sludge Pumping Stations
- 1 Scum Concentrator Building
- 1 Thin Sludge Pumping Station
- Miscellaneous Hydraulic Structures and Gates

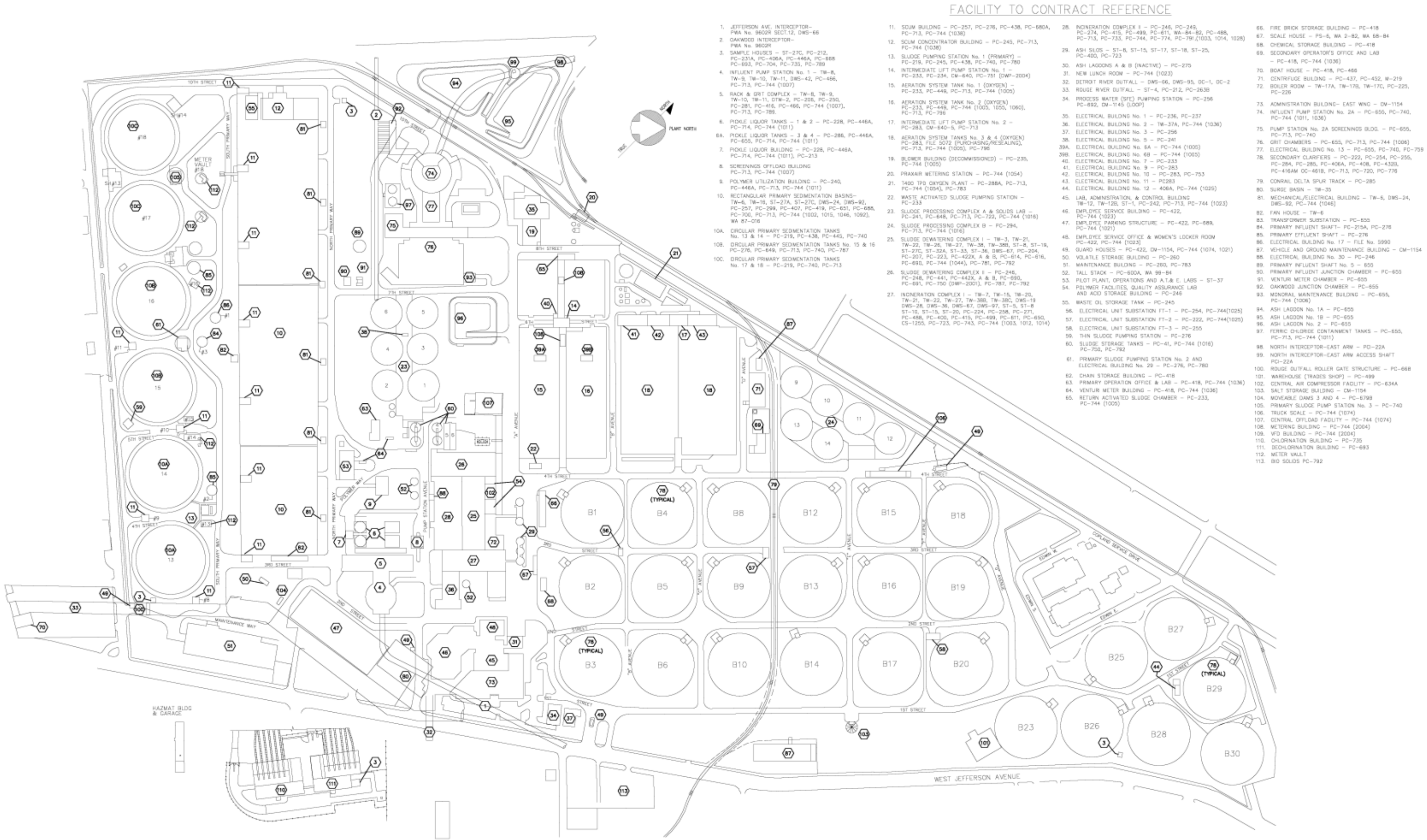


Figure VI-39. Water Resource Recovery Facility Layout

Wastewater from PS-1 and PS-2 flows by gravity to the rectangular and circular primary clarifiers. Under normal dry weather flow conditions, the rectangular clarifiers typically receive flow from PS-1, while the circular clarifiers typically receive flow from PS-2, and all the primary effluent receives secondary treatment. Under wet weather conditions, a portion of the flow from PS-1 may need to be directed to the circular clarifiers to meet the permit primary flow requirement of 1,700 MGD. The permit requires that flow up to 930 MGD be directed to secondary treatment and that flow above 930 MGD receive chlorination and be discharged through the Detroit River Outfall.

2.1.2. Secondary Treatment & Disinfection

The secondary treatment area of the WRRF consists of the following major units (continued after next page):

- ILP Station No. 1 with ILP Nos. 1 and 2
- ILP Station No. 2 with ILP Nos. 3, 4, and 7
- Four Covered Oxygen Tanks (Aeration Deck Nos. 1, 2, 3 and 4)
- One Oxygen Gas Delivery Pipeline
- One Cryogenic Oxygen Production Plant
- Twenty-five Circular Final Clarifiers
- Chlorination/Dechlorination/Outfalls
- Intermediate pumping (ILP Station Nos. 1 and 2).
- Secondary treatment using high purity oxygen activated sludge tanks and 25 secondary clarifiers.
- Disinfection of the final effluent using chlorination and dechlorination.

The Intermediate Lift Pumps (ILPs) lift primary effluent from the Primary Effluent to Activated Sludge (PEAS) Tunnel to the aeration decks. Primary effluent is mixed with return activated sludge at the head of each aeration basin. Aeration Basins Nos. 1 through 4 employ a high purity oxygen activated sludge process.

All required oxygen for the aeration system is supplied by Praxair through a dedicated pipeline. The Praxair pipeline ends at a metering station located where the old T-180 Cryogenic Plant was located (this plant was demolished as part of DWP-1013). From the metering station, an oxygen piping system ties into each aeration deck and the liquid oxygen backup system.

Four covered aeration decks use high purity oxygen for biological treatment. Aeration Deck Nos. 1 and 2 each have 10 bays, while Aeration Deck Nos. 3 and 4 have eight bays each. The volume of each aeration deck is approximately 17.8 million gallons. Oxygen is fed to the headspace at the first bay of each deck. High efficiency aerators dissolve oxygen into the wastewater and keep the mixed liquor in suspension. Primary effluent and return activated sludge (RAS) enter at the first bay of each aeration deck. All decks are equipped with mixers, a purge blower, oxygen feed and vent valves, an oxygen flow meter, and Lower Explosive Limit (LEL) and dissolved oxygen monitoring equipment.

Each aeration deck has a rated capacity of 310 MGD (+50 MGD RAS). The plant typically maintains three decks in service at all times to be able to meet the required wet weather flow of 930 MGD through secondary treatment. The fourth deck is always offline and acts as a backup. Aeration Deck No. 1 was converted to a pure oxygen system, and Aeration Deck Nos. 2, 3, and 4 were rehabilitated in 2004 through 2006 under DWP-1005 "Aeration Deck Conversion and Rehabilitation."

The mixed liquor flows by gravity from the aeration decks and is distributed to the secondary clarifiers for solids/water separation. Variable speed vertical wet pit pumps return the activated sludge from the clarifiers to the aeration decks. Sludge is wasted on a continuous basis from the return activated sludge to Complex B gravity thickeners.

The secondary effluent is chlorinated and dechlorinated before discharge to the river through the Detroit River Outfall (DRO).

As indicated above, the secondary treatment capacity is 930 MGD during wet weather. The 930 MGD capacity is based on the following assumptions:

- 3 out of 5 ILPs each at 310 MGD
- 3 out of 4 aeration decks each at 310 MGD
- 23 of 25 clarifiers each at 40.4 MGD

The conversion of Aeration Basin No. 1 to high purity oxygen in 2004 increased its capacity from 150 MGD to a maximum of 310 MGD, providing the plant with any one basin as backup capacity. Additionally, the replacement of ILP Nos. 1 and 2 and modification to their flow metering installation under DWP-2004, increased their maximum pumping capacity from 260 MGD to 365 MGD during the year 2004. These improvements have, therefore, provided GLWA adequate redundancy to allow the maintenance staff to schedule shutdowns of aeration basins or ILPs to conduct preventive maintenance throughout the year regardless of weather conditions.

2.1.3. Residuals Management

Solids generated in primary and secondary treatment are gravity-thickened in separate facilities for primary sludge and thickened waste activated sludge for drying and disposal. A portion of the thickened sludge is pumped to the new Biosolids Drying Facility (BDF). The thickened solids are dewatered using both high solids centrifuges and belt filter presses (BFPs). Portions of the dewatered solids are incinerated. The remainder of the dewatered solids are offloaded after lime addition to trucks for either land application or landfill disposal.

2.1.4. Industrial Waste Control

The Authority's Industrial Waste Control (IWC) Division, located at 303 S. Livernois, is responsible for implementing and enforcing city and federal regulations pertaining to the pretreatment of industrial wastewater.

Industrial Waste Control charges are assessed to all commercial and industrial end users that send wastewater to the GLWA wastewater treatment plant. The IWC charges are to offset the costs incurred in administering regulatory activities under the Sewer Use Ordinance/Industrial Waste Control Ordinance as required in the National Pollutant Discharge Elimination System (NPDES) Permit Program and the Clean Water Act (CWA). There is a delegation Agreement with each community to collect the industrial waste control charges from the end-users even though most communities are contracting agency member partner s to the wholesale sewer contract member partner.

In addition to the IWC Charges, a commercial or industrial end user may also have to pay pollutant surcharges if they discharge high-strength wastewater into the System that has compatible pollutant levels higher than is allowed for domestic sources. The IWC Group evaluates users and does testing to identify those users that have excess pollutants. The charges are used to offset the higher chemical and treatment costs for these excess pollutants in the wastewater.

2.1.5. CSO RTB & SDF

The Authority provides treatment at Combined Sewer Overflow (CSO) Retention Treatment Basins (RTB) and Screening and Disinfection Facilities (SDF) on many of its largest outfalls to provide for removal of floatable material and disinfection of wastewater prior to discharge. The CSO basins are also designed with storage capacity to contain a volume of wastewater from each storm event, including the first flush of the storm. When the storm event subsides, the captured flows are pumped back through the system for treatment at the WRRF.

GLWA operates eight of the 18 CSO control facilities tributary to GLWA's Regional Sewer System in Wayne, Oakland and Macomb Counties. GLWA operates these facilities as prescribed in a shared services agreement. The facilities are an outgrowth of the Long-Term CSO Control Plan, started in 1993 to address CSO discharges from 78 outfalls along the Detroit and Rouge Rivers. Of the eight facilities, five are CSO RTBs and three are SDFs. The location of CSO RTBs and SDFs assets can be found on Figure VI-51.

Combined Sewer Overflow Retention Treatment Basins

CSO control is needed because the Sewer System can become overloaded during heavy rain events. In older, large metropolitan areas like Detroit, combined sewers are used to transport both wastewater and storm water in the same pipe. During rainstorms, these sewers can receive many times the volume of flow that is normally transported on a dry day. CSO control facilities capture, storage and treat these excess flows during wet weather to prevent the discharge of untreated CSO into a lake or river. Newer communities have two separate sewer systems: one to handle wastewater flow and the other for storm flow.

A CSO RTB is an underground tank that temporarily stores and treats combined sewage that previously was discharged through outfalls during storms. Flows diverted to the RTB are screened and treated with a disinfectant and discharged to the river if RTB storage capacity is exceeded. Materials removed by the screens are sent to the WRRF for disposal. The stored flows are sent to the WRRF after the storm has subsided and capacity is available in the sewer system. Many times the flows are small enough to be completely captured and stored in the RTB.

Some RTBs have a first-flush compartment used to store flow with the highest level of pollutants from the first part of the storm. These pollutants include organic material, oil, sediment, salt and lawn chemicals that are picked up by the storm water as it runs off roads and lawns. Flows from this compartment are always stored and sent to the WRRF when the RTB is emptied.

GLWA adopted a four-part strategy to address CSO:

- Source reduction – reduce the amount of storm flow that enters the wastewater system.
- In-system storage – maximize the use of existing storage space in the sewer system during storms.
- Wastewater treatment plant expansion – expand capacity of primary treatment from 1.5 to 1.7 billion gallons per day to treat more flows during storms.
- End-of-pipe treatment – construct facilities to store and treat the combined sewage, preventing it from entering area waterways unless treated and disinfected.

A summary of the overall flow and treatment capacity of the GLWA CSO RTB Facilities is shown in Table VI-13 on the following pages.

Table VI-13. Flow and Treatment Capacity of GLWA CSO RTBs[b]

	Hubbell- Southfield	Seven Mile	Puritan-Fenkell	Conner Creek	Oakwood
Year of Startup	2000	1999	1999	2005	2012
Drainage Area (Acres)[a]	14,440	463	649	83,000	1,500
Retention Volume (MG)	22	2.2	2.8	30	9.0
In-System Storage (MG)[b]	4.4	1.9	2.5	32	0
Peak Flow Rates (cfs)	3,200	656	845	13,962	1,660
Compartments	2	2	2	4	2
Sanitary Pump Station	No	No	Yes	No	Yes
Influent	Gravity	Gravity	Gravity	Gravity	Pumped
Effluent	Gravity				
Dewatering	Gravity / Pumped	Pumped	Gravity / Pumped	Pumped	Gravity / Pumped
Screening	1.5-inch Catenary- Type Bar Screens	0.5-inch Open Space Centenary-Type Bar Screens		1.5-inch Centenary Type Bar Screens	Perforated Plate Screens (6-8 mm)
Odor Control	Horizontal Wet Scrubber with Sodium Hypochlorite	Vertical Wet Scrubber with Sodium Hypochlorite		Carbon Absorption	
Flushing	Flushing Nozzles	Tipping Buckets		Flushing Gates	
Ventilation	Forced-Air				
Disinfection	Sodium Hypochlorite				

[a] Combined wet weather flow sources drained from tributary districts (acreage) is preferentially transported to the WRRF until Primary capacity is exceeded per established Operational Protocols; residual flows are transported to CSO Facilities.
[b] Tributary upstream wet weather flow volume also captured and drained to basin during events and subsequently dewatered.

Conner Creek CSO RTB

Figure VI-40. Conner Creek CSO RTB

Detroit's largest CSO control facility, the Conner Creek CSO RTB eliminated three outfalls and has dramatically improved water quality in Conner Creek and the Detroit River since going into operation in November 2005. This RTB provides 62 million gallons of total storage, with 30 million gallons in the retention treatment basin and 32 million gallons in upstream structures. High-speed mixers are used to rapidly disinfect flows and achieve the required fecal coliform limits. This facility was sized to provide five minutes of detention for settling and disinfection for the peak flow from the 10-year, one-hour storm.

Hubbell-Southfield CSO RTB

Figure VI-41. Hubbell-Southfield CSO RTB

The Hubbell-Southfield CSO RTB is one of GLWA's most active, longest operating CSO facilities and the largest on the Rouge River. Since August 1999, it has been effectively capturing and treating combined sewage through screening, settling and disinfection to meet discharge permit requirements that protect public health. Sized to fit into the available land and site constraints, the basin has a 22-million-gallon storage capacity. Located next to the Tournament Players Championship Golf Course (TPC) in Dearborn, this RTB serves as an example of how these facilities can be good neighbors and blend in with the surrounding environment. The facility features an innovative design component that enables three different operational modes within the RTB and prevents resuspension of solids during large storms with high flow rates.

OAKWOOD CSO RTB

Figure VI-42. Oakwood CSO RTB

The Oakwood CSO RTB was placed in service in 2012. Located on the lower portion of the Rouge River immediately south of I-75, the 9-million-gallon RTB is designed to provide CSO treatment through storage plus fine screening and disinfection. This facility includes a major influent pumping station with capacity to pump 1,800 cubic feet per second (cfs). This pumping station increases the level of service for the Oakwood District and helps to alleviate basement flooding in the upstream area.

PURITAN-FENKELL CSO RTB

Figure VI-43. Puritan-Fenkell CSO RTB

Located in Eliza Howell Park, the Puritan-Fenkell CSO RTB is the third Rouge River CSO RTB. This facility successfully demonstrated that a facility sized to provide 20 minutes of detention time for settling and disinfection of the one-year, one-hour storm event peak flow is sufficient to meet protection of public health standards. The 2.8-million-gallon facility became operational in August 1999, and eliminated two untreated CSO outfalls.

Seven Mile CSO RTB

Figure VI-44 Seven Mile CSO RTB

The Seven Mile CSO RTB was constructed at the same time as the Hubbell-Southfield and Puritan-Fenkell CSO RTBs with funding from the Rouge River National Wet Weather Demonstration Program. Located on the northeast corner of West Seven Mile Road and Shiawassee Drive, the roof of the basin also serves as the parking lot for the Greater Grace Temple. The RTB is sized to provide 30 minutes of detention time for settling and disinfection of the one-year, one-hour storm event peak flow. It has a 2.2-million-gallon storage capacity. Two untreated CSO outfalls were eliminated when it went into operation in December 1998.

Combined Sewer Overflow Screening and Disinfection Facilities

A CSO Screening and Disinfection Facility (SDF) treats combined sewage without ever storing it. Called flow-through facilities, they use fine screens to remove solids and sanitary trash from the combined sewage. Flows are injected with Sodium Hypochlorite disinfectant to kill bacteria before discharging to receiving waters (Detroit and Rouge Rivers). Materials removed by the screens are sent to the WRRF for disposal. A summary of the overall flow and treatment capacity of the GLWA CSO SDFs is shown in Table VI-14 below.

Table VI-14. Flow and Treatment Capacity CSO Screening and Disinfection Facilities

Component Criteria	Baby Creek	Leib	St. Aubin
In Service Date	2007	2002	2002
Peak Hydraulic Capacity	5,100 cfs	2,000 cfs	310 cfs
Toward Treatment Capacity	Not Applicable	150 cfs	Not Applicable
Screening Capacity	5,100 cfs	1,550 cfs	250 cfs
Disinfection Capacity (10 minute contact)	5,100 cfs	1,550 cfs	250 cfs
Dewatering Capacity		Static Volume in 24 hours	Static Volume in 24 hours
Total Disinfection Volume		225 MG	98 MG

Baby Creek Screening and Disinfection Facility

Figure VI-45. Baby Creek SDF

The Baby Creek facility is another screening and disinfection facility that uses fine screens and disinfection to treat combined sewage flows that pass through it. It is located at Miller and Industrial Drive in southwest Detroit at the city limit shared with Dearborn. The facility is rated for 5,100 cfs treatment capacity. The site area includes the Woodmere Pumping Station that services a 450-acre portion of the Baby Creek tributary area.

Leib Screening and Disinfection Facility

Figure VI-46. Leib SDF

The Leib facility was constructed to address a large outfall on the Detroit River and to demonstrate the effectiveness of fine screening (horizontal and vertical) in combination with 10 minutes of disinfection time for the design flow to meet protection of public health standards. High-energy mixers are being used to mix sodium hypochlorite to maximize bacterial kill and minimize discharge of residual chlorine to the Detroit River. The facility can treat a flow rate of up to 1,500 cfs. It began operation in 2002, and successfully achieved the required treatment levels during the demonstration period.

St. Aubin Screening and Disinfection Facility

Figure VI-47. St. Aubin SDF

The St. Aubin facility was built at the same time as the Leib facility; it uses the same technology, but a different type of screen. While St. Aubin is much smaller, with about one fifth of the treatment capacity of Leib, it is important in addressing water quality along Chene Park (which frequently hosts concerts and other events). This facility has operated successfully since 2002.

2.1.6. General Purpose

Refer to the General Purpose description on page II-6.

2.2. Field Services

2.2.1. General Purpose

Refer to the General Purpose description on page II-6.

2.2.2. Interceptor

The Regional Wastewater Collection System (RWCS) is responsible for the conveyance of wastewater and stormwater flows to the GLWA WRRF. The collection system is the oldest part of the wastewater treatment and transportation system. Some sewers are over 130 years old and are still in service today.

The RWCS is comprised of approximately 195 miles of sewer mains. Approximately 184 miles of the mains are considered "Common Use" interceptors or trunk sewers, with the remaining 11 miles of mains being considered "Member Partner Connection" (i.e., a dedicated line connecting a suburban member partner to the GLWA WRRF with no other member partner taps to it). In addition, there are approximately 0.1 miles of force main operated and maintained by GLWA. See Figure VI-51, the map of the RWCS, and the list of all of GLWA-leased sewer main assets below. Information has been gathered in this table from best available sources, including various reference documents, as well as GIS information.

Figure VI-48, Figure VI-49, and Figure VI-50 depict the collection system inventory by material, diameter, and decade installed/age, respectively. The collection system ranges from 12 to 348 inch in diameter with an average age of 78 years.

Most of RWCS is Concrete Pipe (72%) and Brick Pipe (23%). The majority of RWCS are typically 60 inches and larger, of which 161-169 inch (12%), 120-129 (12%), and 102-108 inch (9%) are the most common conduit diameters / heights. Detroit and the region went through several growth periods of time evidenced by the greatest periods of water main installation of the 1920s (37%), 1960s (12%) and 1930s (9%).

In recent history, a condition inspection of the Detroit River Interceptor and Outfalls was performed in 2012. A prioritized condition assessment and renewal program has been underway since 2016 on the collection system gravity mains. This effort was initiated to address the aging collection system infrastructure in a proactive and methodic fashion. Over the past two years all 184 miles of sanitary sewer interceptor has been inspected as part of this program. Follow-up repairs and inspections are being planned and are in various stages of completion.

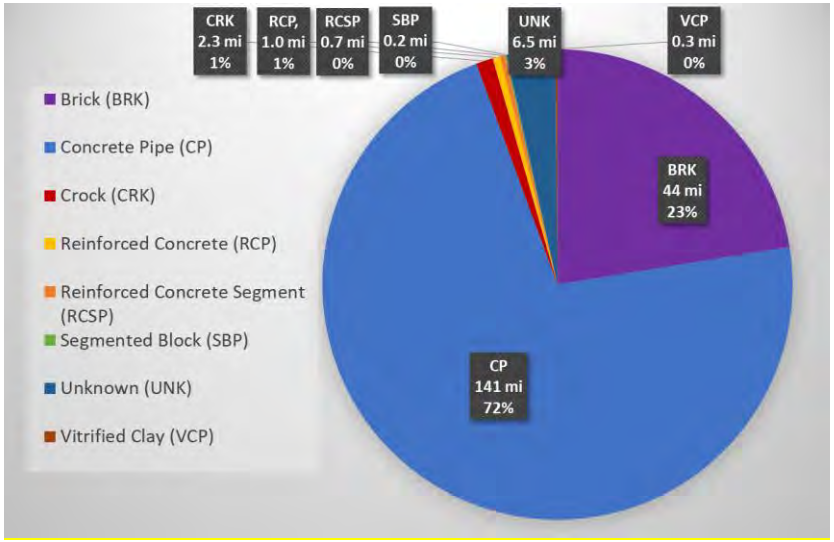


Figure VI-48. Collection system inventory by material

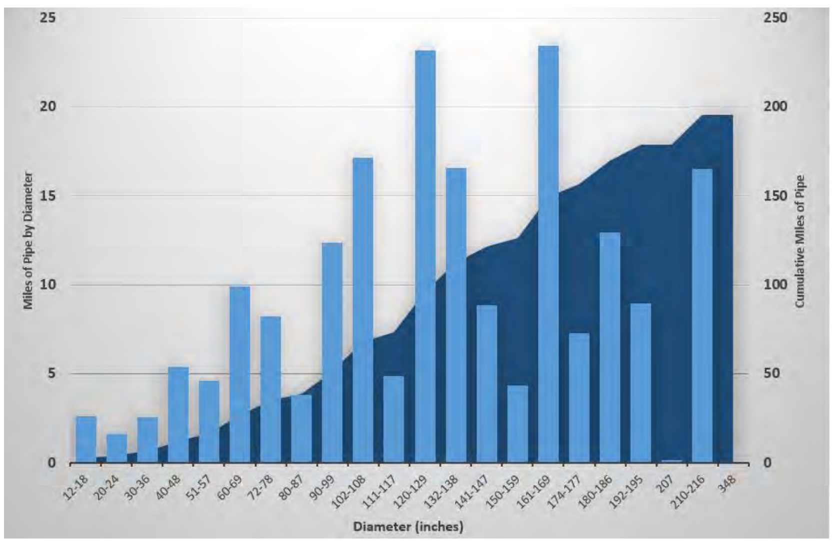


Figure VI-49. Collection system inventory by diameter / height

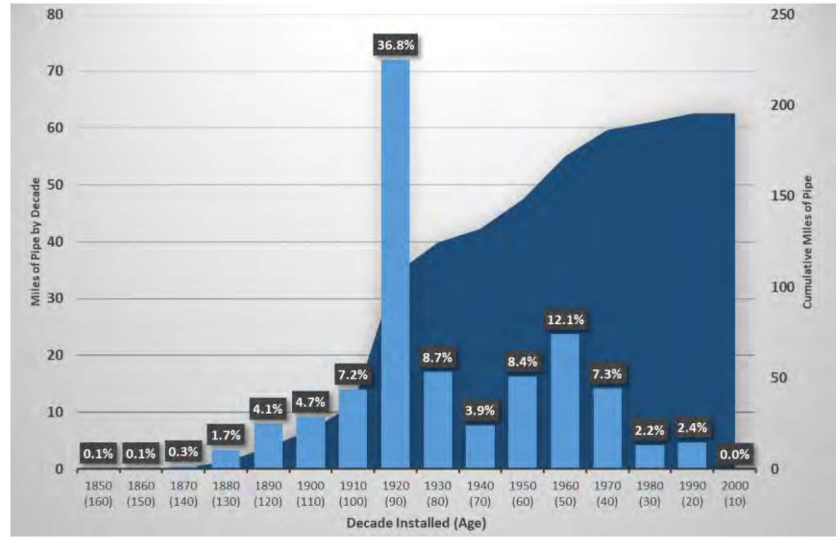


Figure VI-50. Collection system inventory by decade installed / age

Figure VI-51 depicts only those interceptors and trunk sewers operated/maintained (leased) by GLWA. The suburban communities own, operate, and maintain all of their collection system up to the points of connection to the RWCS.

There are three primary interceptors that make up the RWCS and ultimately serve all the combined drainage districts. Those interceptors are the Detroit River Interceptor (DRI), Oakwood-Northwest Interceptor (O-NWI), and North Interceptor East Arm (NI-EA). These interceptors are shown in red/green. These primary interceptors total approximately 44 miles in length with the remaining 151 miles being trunk sewers that primarily service the City of Detroit's 9 drainage districts.

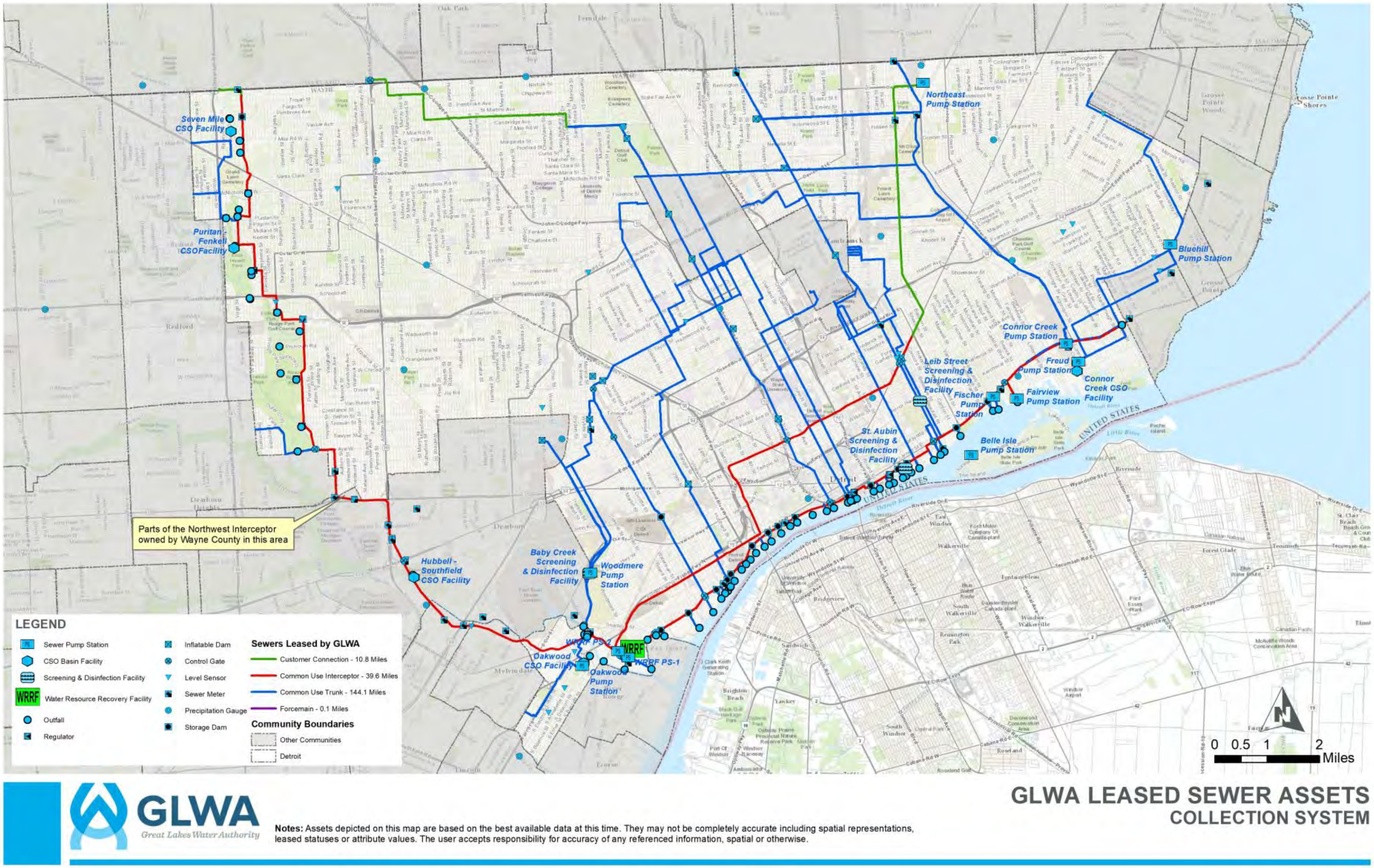


Figure VI-51. Sewer interceptors and trunk sewers operated/maintained by GLWA

Table VI-15. Sewer interceptors and trunk sewers operated/maintained by GLWA

Sewer Name	Type	Length (miles)	Size	Material	Drains to Interceptor	Years Constructed (year - year)		Age Range (years - years)		Average Age	Inspection Month / Year
6 Mile Sewer	Trunk	5.0	9'-10.5'	Concrete / Brick	DRI	1921	1927	98	92	95	9/2017 to 1/2018
6 Mile Sewer East	Trunk	0.4	10.5'	Concrete	DRI	1921	-	98	-	98	9/17
6 Mile Sewer West	Trunk	0.5	6.25'-7.25'	Concrete	O-NWI	1930	-	89	-	89	12/2017
7 Mile Sewer	Trunk	4.2	5.5'-11.5'	Concrete	DRI & NIEA	1921	1924	98	95	97	8/2017 to 11/2017
7 Mile Sewer West	Trunk	0.8	9.25'	Brick	O-NWI	1931	-	88	-	88	10/2017
7 Mile Sewer West Relief	Trunk	0.7	10'	Concrete	DRI & NIEA	1965	1967	54	52	53	8/2017 to 10/2017
7 Mile Sewer East Relief	Trunk	3.2	9'-13.75'	Concrete	DRI	1960	1962	59	57	58	10/2017
8 Mile-Centerline Sewer / Connors Ave. Arm	Trunk	0.7	1.5'-8.5'	Concrete / Brick / Unknown	DRI	1928	1930	58	-	58	4/2018 to 8/2018
Ashland Relief Sewer	Trunk	1.7	11.5'-16'	Concrete	DRI	1961	-	81	-	81	11/2016 to 12/2016
Baby Creek (Dry Weather Line)	Trunk	4.3	3'	Concrete	O-NWI	1938	-	57	-	57	12/2017 to 1/2018
Baby Creek (Wet Weather Line)	Trunk/CSO Storage	4.3	14.5'x17.5'	Concrete	N/A - Rouge River, Miller Rd Gate Outfall	1962	-	97	-	97	12/2017 to 1/2018
Bates St. Sewer	Trunk	5.4	1' - 13.5' 3'x4.5' (Box)	Concrete / Brick / Clay / Unknown	DRI	1922	-	90	-	90	9/2017 to 10/2017
Berg Sewer	Customer Connection	0.1	1.75'	Concrete / Brick	O-NWI	1929	-	107	96	102	9/2017 to 10/2017
Clark Sewer, Morell St. Sewer, Extension to Morrell, Tuxedo Ave. Sewer	Trunk	8.2	5'-14'	Concrete / Brick / Unknown	DRI	1912	1923	65	62	64	8/2017 to 10/2017
Conant-Mt. Elliot Relief Sewer	Trunk	8.2	10.5'-16.25'	Concrete	DRI & NIEA	1954	1957	97	91	94	9/2017 to 10/2017
Connors Creek Enclosure	Trunk	11.5	12'x17.5' (Box) 12.9'x17.5' (Box)	Concrete / Brick	DRI	1922	1928	49	-	49	9/2016 to 12/2017
Dequindre Interceptor	Trunk	0.9	9'	Concrete	DRI & NIEA	1970	-	98	92	95	-
Detroit River Outfalls	Outfalls	10.7	1'-15.5' (Varying Shapes)	Concrete / Brick / Clay / Unknown	Detroit River	1885	1967	134	52	93	10/2016
Detroit River Interceptor (DRI)	Interceptor	12.7	6'-16'	Concrete / Brick	WRRF	1913	1939	106	80	93	07/2012 to 10/2016

Sewer Name	Type	Length (miles)	Size	Material	Drains to Interceptor	Years Constructed (year - year)		Age Range (years - years)		Average Age	Inspection Month / Year
East Jefferson Relief Sewer	Trunk	1.1	14'	Concrete	DRI	1927	-	92	-	92	12/2016
Elmer-Ternes Sewer (West End Relief)	Trunk	2.6	14.5' 14.5x14.5' (Box)	Concrete	O-NWI	1962	1965	57	54	56	8/2017 to 10/2017
Evergreen-Farmington Connection	Customer Connection	4.8	8'	Concrete	DRI & NIEA	1991	-	28	-	28	-
First-Hamilton Relief Sewer	Trunk	8.8	7'-15.5' 2.7'x4' - 10'x10.5' (Box)	Concrete	DRI & NIEA	1956	1970	63	49	56	8/2017 to 10/2017
Fisher Ave. Storm Sewer	Trunk	0.5	10.5'x13.75'	Concrete	DRI / Detroit River	1928	1965	91	54	73	-
Fort Street Sewer	Trunk	2.7	2'-10'	Concrete / Crock / Brick / Segmented Block	O-NWI	1924	1939	95	80	88	9/2017 to 3/2018
Fox Creek Relief Sewer, Cadieux Road Sewer	Trunk	4.0	9.25'-16'	Concrete	DRI	1923	1953	96	66	81	11/2016 to 12/2016
Jos. Campau Sewer	Trunk	5.0	3.5'-11.5'	Concrete / Brick	DRI	1921	1957	98	62	80	9/2017 to 11/2017
Joy Road Sewer, Highland Park Sewer - Edison Ave. Arm, Highland Park Arm	Trunk	4.1	8.25'-14'	Concrete / Brick	DRI & NIEA & O-NWI	1922	1975	97	44	71	9/2017 to 11/2017
Linwood Ave. Sewer, Lateral Sewer - Puritan & Linwood - Puritan Ave. Arm	Trunk	3.1	1.25'-9.5' 3'x4.5' (Box) 3.3'x5' (Box)	Concrete / Brick / Clay	DRI	1919	1921	100	98	99	9/2017 to 2/2018
Livernois Relief Sewer	Trunk	5.0	3'-10.5' 10'x10' (Box)	Concrete	DRI & NIEA	1949	1972	70	47	59	9/2017 to 10/2017
Lonyo Sewer	Trunk	3.4	13.6' 14.5'x14' (Box)	Concrete / Brick	O-NWI	1922	-	97	-	97	9/2017
Lynch Road Sewer, Davison Ave. Sewer, Chrysler Freeway Davison Sewer Alterations, Connor Creek Connection	Trunk	4.9	5.5'-11.5'	Concrete / Brick	DRI	1920	1975	99	44	72	7/2017
Mack Avenue Relief Sewer	Trunk	2.2	9.25'-14'	Concrete	DRI	1967	-	52	-	52	11/2016
Mt. Elliot Ave. Sewer, Miller Road Sewer, Carrie Ave. Relief, and Laterals	Trunk	6.4	1.25'-9'	Crock / Brick	DRI	1913	1930	106	89	98	7/2017 to 3/2018
North Interceptor East Arm (NIEA) - Upper Portion, Northeast SPS to Gratiot	Interceptor	6.4	12'-17.5'	Concrete	WRRF & DRI	1971	1974	48	45	47	7/2015 to 8/2015

The RWCS serves 77 suburban communities that cover an area of 1,100 square miles. A large majority of the suburban communities are served by separated storm/sewer systems. The RWCS is comprised of 27 sewer districts representing drainage districts within the City of Detroit, drainage districts from adjoining counties/municipal districts, and various districts serving individual suburban communities. The sewer service areas served by the RWCS are as shown in Figure VI-52.

Nine sewer districts: Rouge River, Hubbell, Southfield, Baby Creek, Conner Creek, Oakwood, Central City, Fox Creek, and East Jefferson.

City of Detroit Sewer Districts

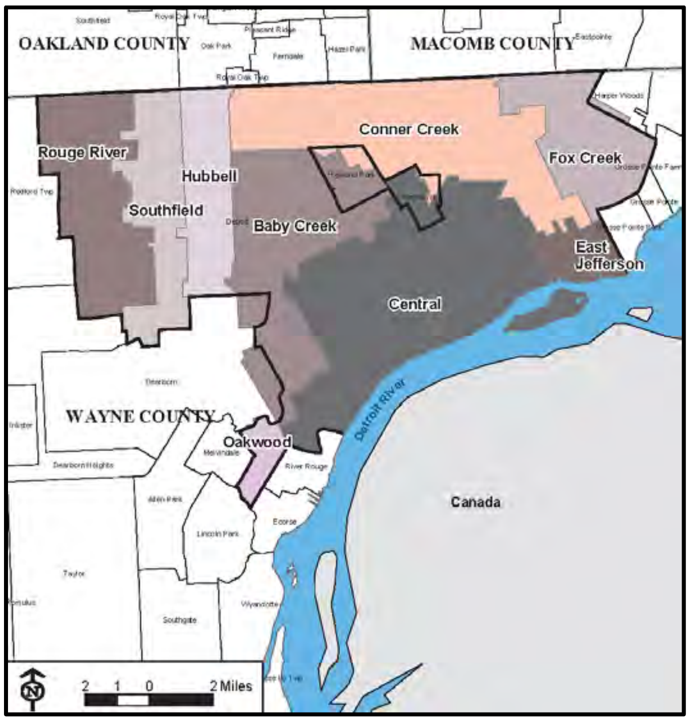


Figure VI-52. Sewer districts within Detroit

GLWA Regional Sewer Districts

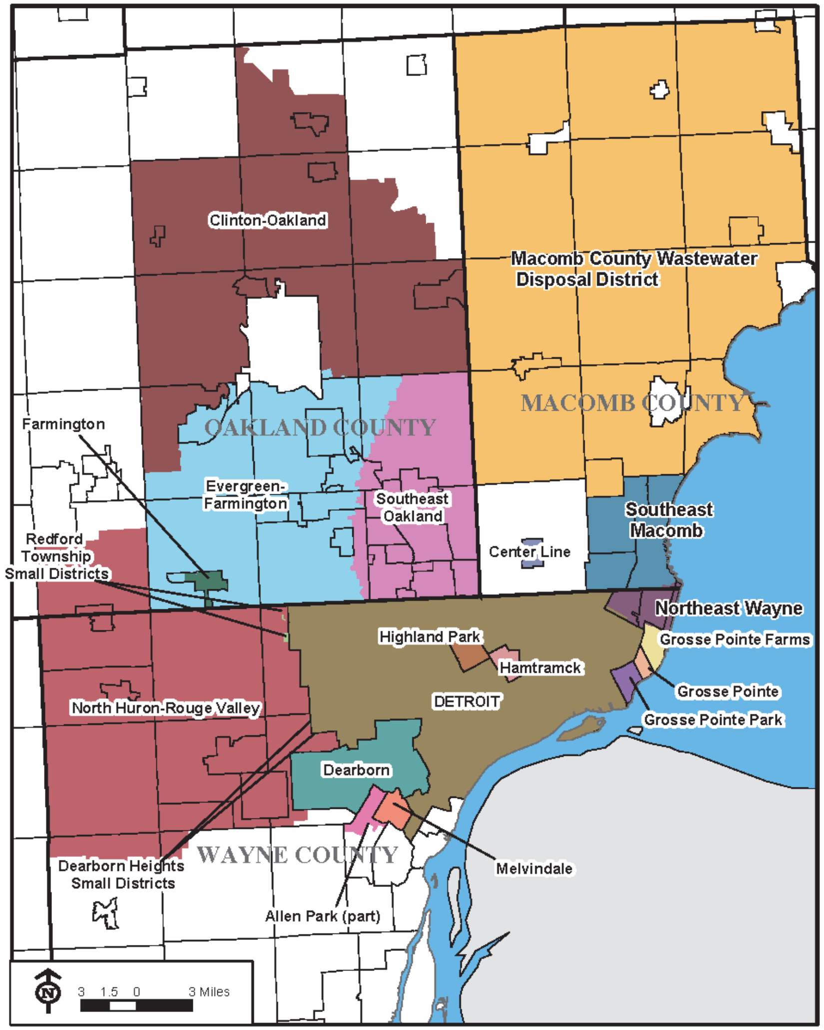


Figure VI-53. Sewer districts served by GLWA

Total GLWA Sewer Districts

Communities served by the varying sewer districts are provided below.

Table VI-16. GLWA Service Districts & Communities Served

County/ City	District	Communities
Detroit	Rouge River	City of Detroit
Detroit	Hubbell	City of Detroit
Detroit	Southfield	City of Detroit
Detroit	Baby Creek	City of Detroit, Highland Park
Detroit	Conner Creek	City of Detroit, Highland Park, Hamtramck
Detroit	Oakwood	City of Detroit
Detroit	Central City	City of Detroit
Detroit	Fox Creek	City of Detroit
Detroit	East Jefferson	City of Detroit
Macomb	Southeast Macomb Sanitary Sewer District (SEMSD)	St. Clair Shores, East Pointe, Roseville (Through NESDS)
Macomb	Macomb County Wastewater District (part of Oakland Macomb Interceptor Drainage District)	Fraser, Sterling Heights, Clinton Twp, Harrison Twp, Shelby Twp, Utica, Macomb Twp, Waldenburn, Chesterfield, New Haven, Lenox, Ray, Washington Twp
Macomb	Centerline	City of Centerline
Oakland	Evergreen-Farmington District	Farmington Hills, Orchard Lake Village, Keego Harbor, Bloomfield Hills, Bloomfield Twp, Birmingham, Franklin, Beverly Hills, Lathrup Village, Southfield, Troy
Oakland	Southeast Oakland County District (George W. Kuhn Drainage District)	Troy, Oak park, Madison Heights, Clawson, Hazel Park, Royal Oak, Pleasant Ridge, Huntington Woods, Berkley, Royal Oak Twp, Ferndale
Oakland	Clinton Oakland District (part of Oakland Macomb Interceptor Drainage District)	West Bloomfield Twp, Waterford Twp, Lake Angelis, Auburn Hills, Rochester Hills, Rochester, Oakland Twp, Orion Twp, Village of Clarkston, Independence Twp, Orion Twp, Lake Orion, Oxford Twp, City of Oxford
Oakland	City of Farmington	City of Farmington
Wayne	Rouge Valley Sewage Disposal System (RVSDS)	City of Inkster, City of Wayne, Canton Twp, Van Buren Twp, City of Westland, Garden City, Dearborn heights, Redford Twp, City of Livonia, City of Plymouth, City of Northville, City of Novi, Novi Twp, Romulus
Wayne	Northeast Sewage Disposal System (NESDS)	Harper Woods, Grosse Pointe Shores, Grosse Pointe Woods
Wayne	Grosse Pointe Farms	Grosse Pointe Farms
Wayne	Grosse pointe Park	Grosse pointe Park
Wayne	Grosse Pointe	Grosse Pointe
Wayne	City of Dearborn	City of Dearborn
Wayne	Melvindale	Melvindale
Wayne	Allen Park	Allen Park
Wayne	Redford Township	Redford Township
Wayne	Dearborn heights	Dearborn heights
Wayne	Harper Woods	Harper Woods

2.3. Systems Control Center

The Systems Control Center operates and maintains five Wastewater Pumping Stations located in the GLWA collection system that assist conveyance of wastewater and stormwater flows to the WRRF. They are Conner Sewage Pumping Station, Fairview Sewage Pumping Station, Freud Sewage Pumping Station, Northeast Sewage Pumping Station, and Oakwood Sewage Pumping Station. These facilities are described in the table below.

GLWA maintains 13 in-system storage devices throughout central Detroit and seven in-system gates throughout the west side of Detroit to maximize the storage capacity of sewers during storms. The in-system storage devices are rubber, inflatable dams located inside large trunk sewers. The in-system gates are mechanical gates located inside outfall sewers. These devices are designed to temporarily retain flows in the Sewer System during storm events up to a certain level before discharge to the river occurs. These devices operate automatically but are monitored by GLWA staff. These staff members coordinate and apply operational protocols prior to storm events to dewater the wastewater collection system and treatment facilities to maximize the available in-system storage capacity. Along with the flow control devices, the Systems Control Center team also operates and maintains many rain gauges and level sensors throughout the RWCS.

2.3.1. General Purpose

Refer to the General Purpose description on page II-6.

2.3.2. Wastewater Pumping Stations

Wastewater Pump Stations pump wastewater, and when necessary excess storm water, to the WRRF. Most of the wastewater collection system is gravity fed, but in low-lying areas, lift stations are necessary to lift wastewater to a higher elevation in order for flow by gravity to be possible. There are nine sewer lift stations in the wastewater collection system; an example is shown in Figure VI-54.

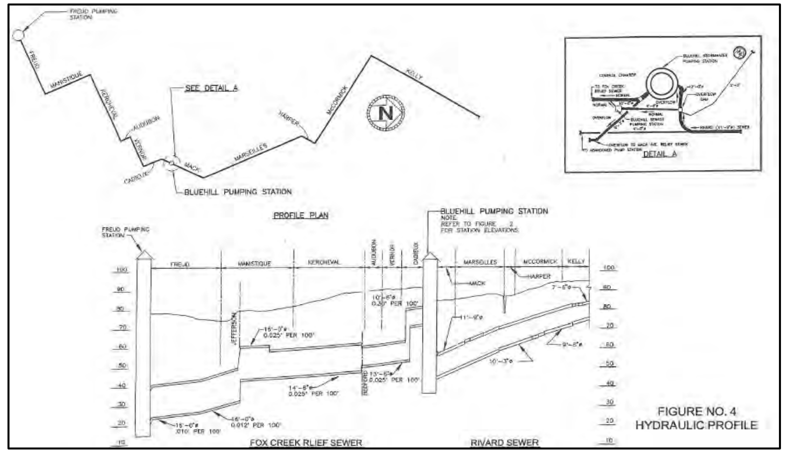


Figure VI-54. Hydraulic Profile at Bluehill Station

Conner Creek Pump Station

Figure VI-55. Conner Creek Pump Station

Max Wet Well Level	74 ft
Sanitary Pumps	SN9 - 500 Hp, 96 MGD SN10 - 350 Hp, 96 MGD SN11 - 500 Hp, 96 MGD SN12 - 200 Hp, 48 MGD
Storm Pumps	ST1- 2300 Hp, 320 MGD ST2- 2300 Hp, 320 MGD ST3- 2300 Hp, 320 MGD ST4- 2300 Hp, 320 MGD ST5- 2250 Hp, 320 MGD ST6- 2250 Hp, 320 MGD ST7- 2300 Hp, 320 MGD ST8- 2300 Hp, 320 MGD

Sewage flows by gravity to the Conner Creek Pumping Station though the western and eastern East Jefferson Avenue relief sewers. These sewers are designed to carry both sanitary sewage and storm water to the Conner Creek Pumping Station wet wells. The Conner Creek Pumping Station is required because the elevation of the relief sewers is too low to allow the sewage to continue to flow by gravity to subsequent treatment facilities or to the Conner Creek CSO Basin. During normal dry weather flow, wastewater is discharged to the DRI. During wet weather, the wastewater is discharged to the Conner Creek CSO.

This station consists of a sanitary pump house, stormwater pump house, switch house, and backwater gates. During normal dry weather flow, wastewater is discharged by four sanitary pumps (two 71 MGD, one 48 MGD, and one 38 MGD) to the Detroit River Interceptor (DRI). During wet weather, eight stormwater pumps (318 MGD each) discharge combined wastewater to the Conner Creek CSO

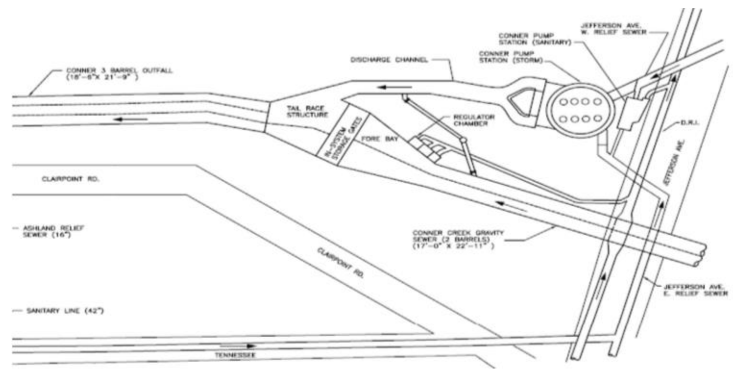


Figure VI-56. Schematic of Conner Creek Pump Station

Table VI-17. Summary of Major Rehabilitation and Improvements Projects at the Conner Pump Station

Contract No.	Contract Title	Summary of Work	Year
TW-24-A	Conner Creek	N/A.	
PC-265	Regulator Improvement-Conner Station	N/A.	
PW-212	Conner Creek Pumping Station Motor Driven Pumping Unit Nos. 5 and 6	Installation of Storm Water Pumps 5 and 6.	1947
PW-3042	Conner Creek Sanitary Pumping Station	Construction of the sanitary pump station.	1958
PC-674	Conner Station Rehabilitation	Rehabilitation of buildings at the Conner Station site and Fox Creek Backwater Gate Building. Rehabilitation of the buildings include masonry work, windows and doors, roofing and sheet metal, heating and ventilating systems, toilet facilities, lighting and electrical systems, and interior finishes. Rehabilitation of the sanitary pumps, sanitary pump motors and controls, replacement of the control switchboard for the storm water pumps, and repair the stormwater pumps. Also included are new sanitary pump isolation valves, revised suction and discharge piping, hydraulic modeling of the sanitary wet well, and replacement of stormwater sump pumps. Rehabilitation of the site shall include replacement of all roadways, curbs, sidewalks, site lighting, and demolition of the oil pump house.	May 2009
PC-713	Authority-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
DWS-828	Emergency Generators	Installed the four (4) Emergency Generators with power of 2MW.	December 1999
Maintenance Contract	Transformer	Replaced the powerhead on Transformer 1 and painted.	2015
PC-773	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016

Fairview Pump Station

Figure VI-57. Fairview Pump Station

Max Wet Well Level	20 ft
Sanitary Pumps	SN1 - 700 Hp, 96 MGD SN2 - 700 Hp, 96 MGD SN3 - 700 Hp, 96 MGD SN4 - 400 Hp, 48 MGD

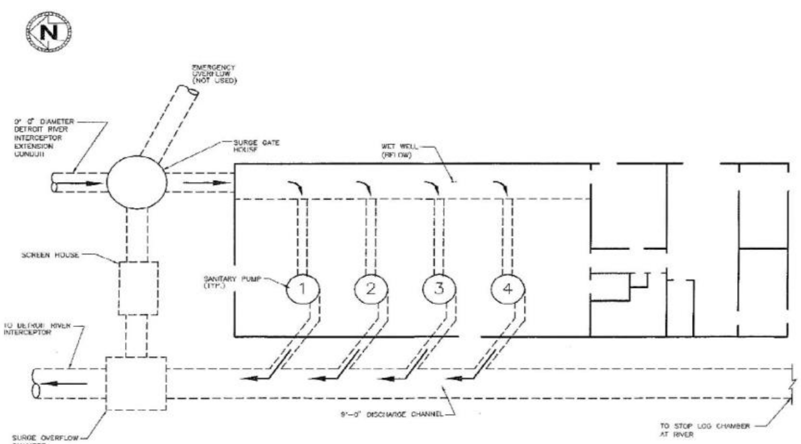


Figure VI-58. Fairview Pump Station Schematic

The Fairview Pumping Station is an interceptor pumping station on the DRI, which provides about 22 feet of lift. Wastewater flow from the DRI is lifted by pumps at the Fairview Pumping Station and discharged into the downstream DRI to continue on to the Detroit WWTP. The function of this station is to pump the wastewater received in the wet well and return it as efficiently and quickly as possible to the downstream DRI. The station facilities include the influent DRI, gatehouse, and pumping station. The pumping station consists of the pump house and wet well.

Table VI-18. Summary of Major Rehabilitation and Improvements Projects at the Fairview Pump Station

Contract No.	Contract Title	Work Summary	Year
PW	Fairview Pumping Station	Construction of Fairview Pump Station.	1913
PW-679	Fairview Additions and Alterations	Modification and upgrades at Fairview Pump Station.	1949
PC-264	Modifications to Fairview Pumping Station	Modification of riser chamber and cover, stop log chamber, and surge overflow.	Set of the drawings: April 1972
PC-606	Fairview Seawall Phase II	N/A.	
PC-684	Fairview Pumping Station Rehabilitation	Replacement of the Pump 2 and associated equipment.	1995
PC-713	Authority-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
PC-773	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016

Freud Pump Station

Figure VI-59. Freud Pump Station

Max Wet Well Level	71 ft
Sanitary Pumps	SN9 - 200 Hp, 27 MGD SN10 - 200 Hp, 13 MGD
Storm Pumps	ST1 - 3000 Hp, 290MGD ST2 - 3000 Hp, 290MGD ST3 - 3000 Hp, 290MGD ST4 - 3000 Hp, 290MGD ST5 - 3000 Hp, 290MGD ST6 - 3000 Hp, 290MGD ST7 - 3000 Hp, 290MGD ST8 - 3000 Hp, 290MGD

The Freud Pump Station consists of a pump house, wet well, and transformer enclosure area. All wastewater flow to the Freud Pumping Station is combined sanitary sewage and stormwater overflow from the East Jefferson Relief Sewer. This overflow occurs when the handling capacity of the Conner Creek Station has been exceeded. The station's primary goal is to store as much wastewater as possible until it can be pumped back to the Conner Creek Pumping Station using dewatering and sanitary pumps. From the Conner Creek Station, the wastewater is transported to Detroit WRRF. The Freud Pumping Station wet well and corresponding relief sewers provide 20 million gallons of in-line storage.

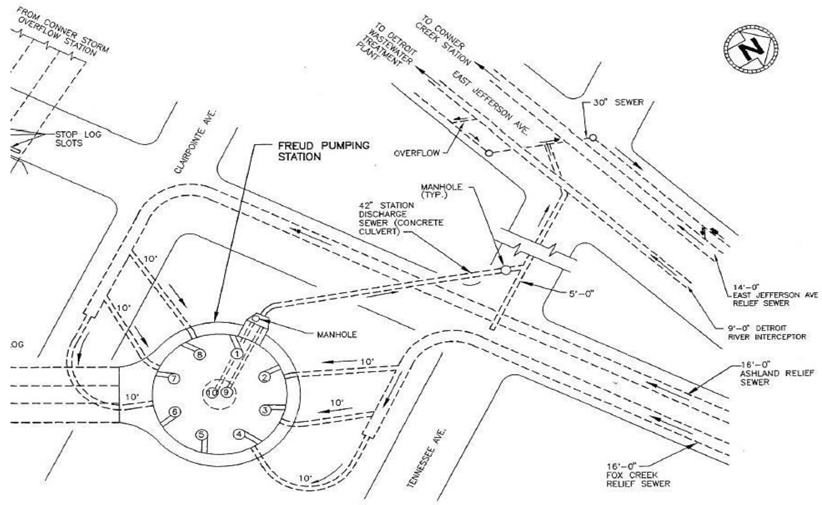


Figure VI-60. Freud Pump Station Schematic

Table VI-19 Summary of Major Rehabilitation and Improvements Projects at the Freud Pump Station

Contract	Contract Title	Work Summary	Year
PC-268	Freud Station Sewerage Discharge	N/A.	
PC-664	Freud Station Improvements Pump Replacement	Replacement of pumps.	1989
PC-685	Bluehill and Freud Sewage Pumping Station Rehabilitation	Freud Sewage Pumping Station work includes removal and replacement of switchgear and protective relaying and controls; maintaining of four bus electrical architecture; extensive rework of conduit and cables for power and control system; and other electrical work due to relocation of switchgear.	2011
PC-713	Authority-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
DWS-828	Emergency Generators	Installed the four (4) Emergency Generators with power of 2MW.	December 1999
PC-773	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016

Northeast Pump Station

Figure VI-61. Northeast Pump Station

Max Wet Well Level	26 ft
Sanitary Pumps	SN1 - 2000 Hp, 96 MGD SN2 - 2250 Hp, 96 MGD SN5 - 2000 Hp, 65 MGD SN6 - 2000 Hp, 96 MGD

The Northeast Pump Station consists of a wet well and pump house. The station receives wastewater from the 12.75-foot Corridor Interceptor. The Corridor Interceptor receives flow from the 15 Mile Interceptor, which receives flow from the Romeo Arm and Lakeshore Interceptor through the Clintondale Station. The wastewater flow to the station is nearly all sanitary sewage, with only a small portion of stormwater from suburban communities. The main goal of the pumping station is to transport wastewater to the Detroit WRRF as quickly as possible. The Northeast Pump Station is designed to pump all wastewater from the Corridor and Lakeshore connection into the 17.5-foot North Interceptor, East Arm. The wastewater flow from the North Interceptor East Arm is currently diverted to the Seven Mile Relief Sewer where it is transported by gravity through the Conant-Mt. Elliot Sewer and the DRI to the Detroit WRRF. The station receives wastewater flow from all the communities of Macomb County (except the cities of Centerline and Warren), northeastern communities of Oakland County, and all areas served by the Lakeshore Interceptor through the Clintondale Station. The pumping station currently has six sanitary pumps with a total combined capacity of 355.4 MGD.

Table VI-20. Summary of Major Rehabilitation and Improvements Projects at the Northeast Pump Station

Contract No.	Contract Title	Work Summary	Year
PC-216	Northeast Sewage Pumping Station	The Northeast Sewage Pumping Station was built with this contract. The station consists of wet well, pump house (three sanitary pumps 1, 5, and 6), and transformer.	1969
PC-672	Northeast Sewage Station Improvements	N/A.	
PC-713	Authority-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
PC-736	Northeast Sewage Station-Pump No. 2 Installation	Installation of the new Pump No. 2.	May 2006 (As-built drawings)
DWS-828	Emergency Generators	Installed the tree (3) Emergency Generators with power of 2MW.	December 1999
PC-773	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016

Oakwood Pump Station

Figure VI-62. Oakwood Pump Station

Max Wet Well Level	79 ft	
Sanitary Pumps	SN1 - 6.4 MGD SN2 - 6.4 MGD SN3 - 6.4 MGD SN4 - 6.4 MGD	
Storm Pumps	ST1 - 97 MGD ST2 - 97 MGD ST3 - 177 MGD ST4 - 177 MGD	ST5 - 177 MGD ST6 - 177 MGD ST7 - 177 MGD ST8 - 177 MGD

The Oakwood Pump Station receives flow through a combined sewer collection system from Junction Chamber No. 1, which is upstream from the pumping station. Once all flows are combined at Junction Chamber No. 1, they are conveyed into the pump station through a pair of 18-foot diameter influent conduits. The combined wastewater, consisting of both sanitary and storm flows, are managed by the pump station. During normal operation, the combined wastewater is pumped by the sanitary pumps to the Detroit WRRF. When the flows into the facility exceed the capacity of these pumps during storm events, the pump station storm pumps convey any excess flow to the screenings facility and then into two 4.5 MG CSO Basins.

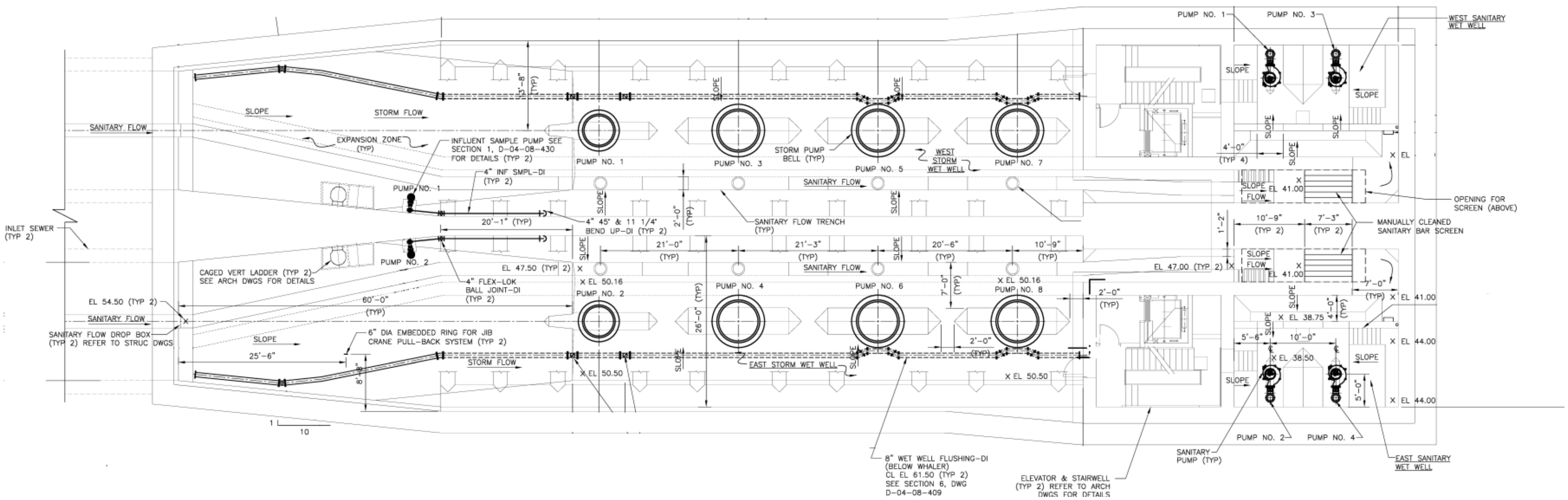


Figure VI-63. Oakwood Pump Station Schematic

Table VI-21. Wastewater Pumping Stations

Name of Pump Station	Location	Function	Sanitary Capacity				Storm Capacity				No. of Pumps	
			DESIGN		MAXIMUM		DESIGN		MAXIMUM		SANITARY	STORM
			MGD	CFS	MGD	CFS	MGD	CFS	MGD	CFS		
Conner / GLWA	12244 East Jefferson, Detroit	Sanitary / Storm	158.4	245	229.5	355	2226	3444	2544	3936	4	8
Fairview / GLWA	202 Parkview, Detroit	Sanitary	242.3	375	339.3	525	-	-	-	-	4	-
Freud / GLWA	12300 Freud, Detroit	Sanitary / Storm	12.96	20	35.64	55	2031	3143	2322	3592	2	8
Northeast / GLWA	11000 East Eight Mile, Detroit	Sanitary	162	251	258.4	400	-	-	-	-	4	-
Oakwood / GLWA	12330 Sanders, Detroit	Sanitary / Storm	13	20	26	40	246.9	382	315.4	488	4	8
Puritan-Fenkell / GLWA	Fenkell East of Telegraph, Detroit, MI 48223	Sanitary Pumps	1.4	2.2	2.8	4.4	-	-	-	-	2	-

2.3.3. In System Devices (Dams, ISD's)

Level Sensor (LS)

Level sensors detect the level of liquid in the sewers. This information is used to determine the best way to store stormwater, locate possible sewer overflows, and monitor dry weather wastewater pumping operations. There are 25 sewer level sensors located and monitored throughout the collection system. Overall, there are more than 150 level sensors in the entire System. An example is shown in Figure VI-64.

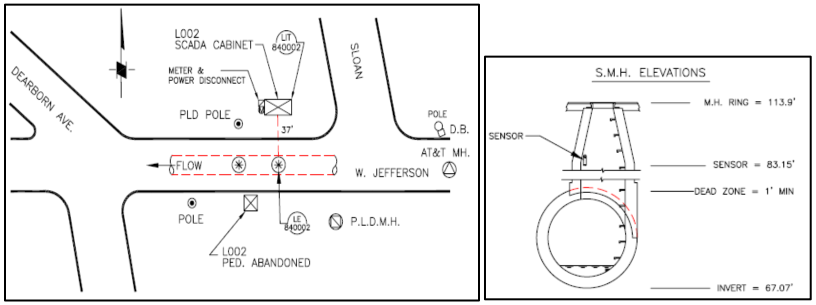


Figure VI-64. Example of a level sensor at West Jefferson and Sloan

Inflatable Storage Dam (ISD)

Inflatable Storage Dams, as illustrated in Figure VI-65, are utilized to detain upstream sewage in order to regulate flows to the WRRF. The dams can be remotely deflated and inflated as necessary.

Valve Remote (VR)

The GLWA Wastewater conveyance system has 17 Valve Remote (VR) gate locations. At these locations, one or more gates are used to selectively load the interceptors, provide in-system storage and route the flow. These gates are operated locally and remotely from the SCC during wet weather periods. During dry weather, remotely controlled gates are opened to direct flow to the interceptors, and during wet weather they are typically closed when the flow in the interceptors reach predetermined levels. Some are operated by electric operators, but the majority of them are operated by hydraulic units (SCUBA). Most of these gates were installed in the 1970s and rehabilitated in 1998 under PC-695. Average life expectancy is 20 to 35 years. An example of a valve remote location is shown in Figure VI-66.

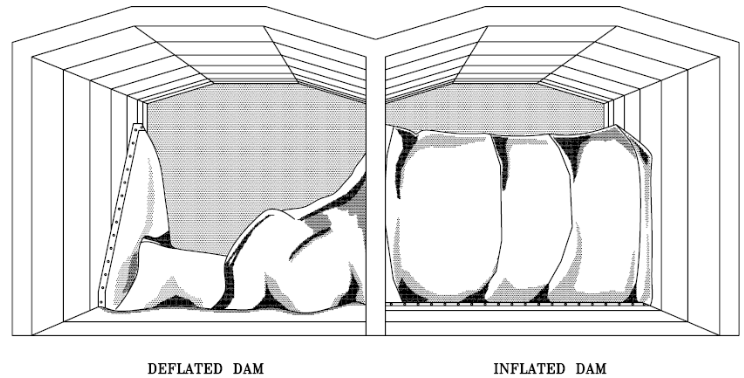


Figure VI-65. Inflatable dam illustration

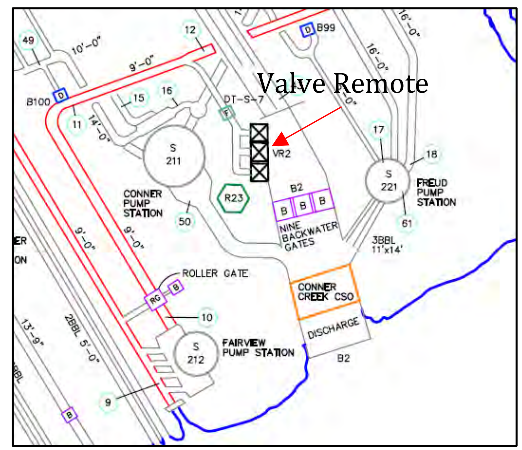


Figure VI-66. Example of VR located at Conner Pump Station

Precipitation Gage

A precipitation gauge (PG, see Figure VI-67) measures the amount of liquid precipitation over a set time period. Ovation, the Authority's Supervisory Control and Data Acquisition system, reports the precipitation data to aid the operation of the collection system and minimize combined sewer overflows during storm events. Thirty-three tipping bucket rain gages are installed throughout the service area.

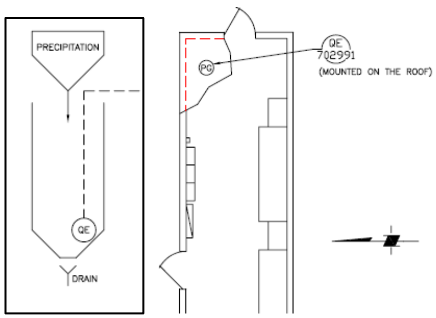


Figure VI-67. Example of Precipitation Gauge mounted on roof at Schoolcraft Pump Station

2.4. Metering

The System Analytics and Meter Operations Group is responsible for maintenance and operation of numerous remote assets used in the metering of wastewater, as well as the communication network used to transmit data from the metering locations to the head end.

The System Analytics and Meter Operations Group maintains assets at 46 sewer meter locations. Each of these locations contain equipment that is located in a control cabinet, as well as assets that are located in meter vaults. The assets that are housed in the control cabinet include Remote Terminal Units, radios, flow transmitters and level transmitters. The assets that are housed in the meter vault include flow meters and level sensors.

In addition to metering equipment, the System Analytics and Meter Operations Group maintains a 900MHz telemetry network and a Greater Detroit regional sewer system (GDRSS). The 900 MHz telemetry network is composed of 445 repeater sites. Each repeater location consists of radios and antennas. The GDRSS system collects flow and depth information from GLWA sewerage meters in five-minute increments and from rain gauges in 15-minute increments. The GDRSS portal provides a web-based interface that displays meter data (collected the day before) in both graphical and tabular formats in increments of five minute, hourly, daily, monthly, and yearly intervals. Data can be exported for off-line examination. Billing reports can be reviewed for member partner analysis, as well as precipitation data.

2.4.1. General Purpose

Refer to the General Purpose description on page II-6.

2.5. General Purpose

Refer to the General Purpose description on page II-6.

2.6. Programs

Refer to the Programs description on page II-6.

SECTION 3 CENTRALIZED SERVICES

All financial figures are in thousands of dollars ($1,000's). The Budget column denotes whether this item is funded by the Water (W) or Wastewater (S) budget. The Project Status column shows which projects are Active (A), Future Planned (FP), or Pending Closeout (PC). Projects that have been Reclassified to a different number, Closed, or Cancelled are not shown in this list; a list of Closed projects can be found in Chapter IV. Projects new to the CIP this year are denoted by bolded CIP number and title.

Table VI-22. Centralized Services Projects

CIP #	Title	Budget	Project Status	Year Added	Lifetime Actual Thru FY 2019	FY 2020	Projected Expenditures FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026 & Beyond	2021-2025 CIP Total	Project Total	Percent of W/S CIP
341001	Security Infrastructure Improvements on Water Facilities	W	A	2019	0	4,029	4,018	2,603	0	0	0	0	6,621	10,650	0.6%
351001	LED Lighting and Lighting Control Improvements	W	A	2017	6	0	50	248	252	0	0	0	550	556	0.1%
380600	As-Needed General Engineering Services	W	A	2004	56	0	0	0	0	0	0	0	0	56	0.0%
380700	As-Needed Geotechnical and Related Engineering Services	W	A	2006	0	1,415	715	0	0	0	0	0	715	2,130	0.1%
381000	Power Quality: Electric Metering Improvement Program	W	FP	2016	0	86	133	345	345	112	445	2,904	1,380	4,370	0.1%
331002	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)	S	A	2017	802	321	91	1,745	1,724	1,708	1,702	1,652	6,970	9,745	0.9%
341002	Security Infrastructure Improvements for Wastewater Facilities	S	A	2019	0	1,579	1,051	0	0	0	0	0	1,051	2,630	0.1%
380600	As-Needed General Engineering Services	S	A	2004	-51	0	0	0	0	0	0	0	0	-51	0.0%
381000	Power Quality: Electric Metering Improvement Program	S	FP	2016	0	0	313	1,195	992	0	0	0	2,500	2,500	0.3%
Water Centralized Services					62	5,530	4,916	3,196	597	112	445	2,904	9,266	17,762	62
Wastewater Centralized Services					751	1,900	1,455	2,940	2,716	1,708	1,702	1,652	10,521	14,824	751
Total Centralized Services					813	7,430	6,371	6,136	3,313	1,820	2,147	4,556	19,787	32,586	813

3.1. Information Technology

Information Technology (IT) at GLWA provides centralized technology implementation, support and services across all business functions. This includes infrastructure and cloud technologies, software and applications, desktop and computing hardware, System security, portfolio and project management services, technology forecasting and budgeting management, as well as print services and document management. The goal of the IT team is to provide reliable and forward-thinking technologies that meet the needs today, and in the future, of GLWA's various business groups, enabling them to realize their goals and make processes more effective and efficient.

3.1.1. General Purpose

Refer to the General Purpose description on page II-6.

3.1.2. Service Delivery

The Service Delivery Group provides core technology support services, including troubleshooting, desktop and laptop configuration, software installation, mobile device management, smart boards, and printers/scanners. This group also provides physical document management services, in additional to full print shop services. Projects in this area include workstation computing replacements and upgrades, software and system replacements and purchases, mobile computing technologies, printers, scanners and other all in ones devices.

3.1.3. Infrastructure

The Infrastructure Group provides administration and continuous monitoring of the GLWA business network, Internet services, data center, storage, and servers. It maintains Intermediate Distribution Facilities (IDF) and Main Distribution Facilities (MDF) across more than 40 facilities spanning the region. It also provides telephony services and all wireless internet access points. Projects that fall within this group work to improve network and telecommunications infrastructure, server hardware and systems, storage devices and related hardware, enterprise Active Directory and Office 365 infrastructure and licensing.

3.1.4. Enterprise Applications

The Enterprise Applications Group monitors and manages applications that are used by the entire organization and may be public and/or forward facing, web-based and cross-functional. These include the Geographic Information System (GIS), public website, internal (Intranet) Sharepoint site, enterprise content management systems, business intelligence, reporting analytics (KPIs), and Legistar. Projects in this group include system replacements and/or upgrades, and new application implementations.

3.1.5. Business Applications

The Business Applications Group monitors and manages line of business applications, including database administration, for Oracle WAM (Asset Management), ServiceLink, BS&A Financials, Ceridian DayForce, LIMS/PIMS, and many other specialized software packages designed to help individual business groups improve data management and daily operations. Projects in this group include system replacements and/or upgrades, and new application implementations.

3.1.6. Security

The Enterprise Technology Security Group provides secure infrastructure support, administration, monitoring and training for network and computing security across the Authority. It participates in and supports Homeland Security initiatives and exercises, and participates in other desktop security efforts to ensure breaches are monitored, repelled and remediated on a continuous basis. Projects in this area provide additional security features, penetration testing, disaster recovery planning and implementation, and security training.

3.1.7. Project Management Office

The Program Management Office provides various administrative and strategic functions, including overall portfolio and project management, budgeting and forecasting, policy development and strategic planning, and shared services administration. Projects that fall within this group will strengthen the overall management of technology implementations at GLWA, including but not limited to project management software and systems, process and workflow development, analysis, and strategic planning.

3.2. Fleet

The Fleet Group is responsible for efficiently and effectively maintaining all GLWA Fleet and Fleet-related equipment.

The Fleet Group provides the vehicles and proper equipment for GLWA staff to accomplish their required work. The vehicles and equipment acquisition, disposal, record management, inventory and maintenance are accomplished through coordination with the DWSD Garage. All vehicles must be kept in a safe and proper manner in order to provide GLWA staff with reliable equipment to accomplish their work.

3.2.1. General Purpose

Refer to the General Purpose description on page II-6.

3.3. Facilities

The Facilities Group is responsible for efficiently and effectively maintaining all GLWA facilities and structures.

The facilities house the operations of GLWA and must remain clean, secure, environmentally safe and attractive. All systems must operate in a proper and acceptable manner in order to provide a clean and safe working environment for staff, visitors and member partners. The group's objectives are accomplished by maintenance mechanics with specific skills in various trades, team leaders, administrative staff, and a manager.

3.3.1. General Purpose

Refer to the General Purpose description on page II-6.

3.4. Security

The Water and Wastewater Systems are vulnerable to a variety of security breaches and attacks. If these breaches/attacks were realized, the result could be large numbers of illnesses or casualties and/or a denial of service that would also affect public health and economic vitality. Critical services such as firefighting and healthcare (hospitals), and other dependent and interdependent sectors, would suffer negative consequences from a denial of service from the Water and Wastewater Systems. GLWA's critical security systems, both physical and electronic, require continual upgrade and replacement to minimize the ever-present threats to GLWA staff and infrastructure.

3.4.1. General Purpose

3.5. Energy Management

The Energy Management Team has been very active in pursuing new solutions for GLWA to improve operational efficiency with new concepts and technologies to achieve sustainability. Much of the team's current work revolves around auditing existing facilities, evaluating equipment, studying various processes and developing an overall understanding of the Authority's energy consumption. Many of these initial studies, pilot projects, and evaluations will directly result in future capital investments. To ensure long-term sustainability, the Energy Management Team is in the process of developing a Strategic Energy Plan that will detail the challenges facing GLWA, establish goals and identify the methodology for measuring success.

The Energy Management Group continues to work alongside GLWA's Business Intelligence staff to collect and compile energy consumption data. The effort is evolving from the original concept of monitoring pumps' electric consumption to a broader vision of modeling the entire set of business activities that bring value to our member partner communities. As this specifically relates to energy management, it is anticipated that consumption data will be compiled across multiple business areas to enable the crossreferencing between business areas by using a single data warehouse. This allows for flexibility in data mining, dashboard construction and process tracking. The results of many of these initiatives will allow the team to identify specific, prioritized areas within the Authority for future capital investment to improve efficiency.

3.5.1. General Purpose

Refer to the General Purpose description on page II-6.

3.6. Engineering

Overall engineering services required because of emergencies, immediate investigations, evaluations, and support to ensure continued operation and the highest level of service will typically be charged against projects and programs within this category. In addition, the engineering work performed will directly result in capital projects. Several categories exist that are typically needed in this manner. These categories are general engineering services, geotechnical services and CIP implementation services.

3.6.1. General Purpose

Refer to the General Purpose description on page II-6.

3.7. General Purpose

Refer to the General Purpose description on page II-6.

3.8. Programs

Refer to the Programs description on page II-6.

VII. Ten-Year Outlook

New to the 2021-2025 CIP are longer-turn outlooks related to projects and programs that are anticipated within the water and wastewater systems. These 10-year outlooks rely heavily on input from long-term needs assessments, master plans and condition assessment documents. The planning horizon for these outlooks extend from FY2021 through FY2030. Projects within the 2021-2025 CIP that carry over into the FY2026+ are now shown within the following tables by the anticipated fiscal year in which projected expenditures are anticipated.

Only project level data will be provided within these outlooks. These are subject to change and are based upon the best available data at the time of compiling this report.

SECTION 1 10-Year Water Outlook

The primary source of longer-term projects used for the 10-Year Water Outlook are from the 2015 Water Master Plan. In addition, it is anticipated that most programs will continue into the 10-year horizon. The project level data can be seen in Table VII-1.

The specific Water 10-Year Outlook projects is summarized in Table VII-2. Due to the higher likelihood of unknown projects, programs and overall needs within this 10-Year Outlook, in the later years FY2028-FY2030, a line item titled, "Not Yet Specified Projects" has been included.

In addition, a graphical representation of this summary is shown in Figure VII-1.

Table VII-1. Water 10-Year Outlook Projects; All figures are in $1,000's

CIP #	Bud-get	Title	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	2021-2025 Total	2026 - 2030 Total	TOTAL 2021-2030
111001	W	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements	1,236	1,636	1,749	13,725	12,768	12,841	11,015	106	0	0	0	42,718	11,121	53,840
111002	W	Lake Huron Water Treatment Plant, Miscellaneous Mechanical HVAC Improvements	1,972	41	0	0	0	0	0	0	0	0	0	41	0	41
111004	W	Lake Huron Water Treatment Plant, Electrical Tunnel Rehabilitation	1,371	0	0	0	0	0	0	0	0	0	0	0	0	0
111006	W	Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements	236	236	236	2,330	6,184	6,628	0	0	0	0	0	15,613	0	15,613
111007	W	Lake Huron Water Treatment Plant, Raw Sludge Clarifier and Raw Sludge Pumping System Improvements	4,896	3,392	0	0	0	0	0	0	0	0	0	3,392	0	3,392
111008	W	Lake Huron Water Treatment Plant, Architectural Programming for Laboratory and Admin Building Improvements	0	0	0	0	0	0	103	284	498	414	0	0	1,299	1,299
111009	W	Lake Huron Water Treatment Plant - High Lift Pumping, Water Production Flow Metering and Yard Piping Improvements	547	1,856	3,554	8,991	10,561	3,686	0	0	0	0	0	28,649	0	28,649
111010	W	Lake Huron Water Treatment Plant -Filtration and Pretreatment Improvements	0	0	0	0	12	48	65	65	79	79	5,286	60	5,572	5,633

111011	W	Lake Huron WTP Pilot Plant	0	0	0	109	144	144	109	291	548	449	0	396	1,397	1,794
112002	W	Northeast Water Treatment Plant, Low-Lift Pumping Plant Caisson Rehabilitation	210	0	0	0	0	0	0	0	0	0	0	0	0	0
112003	W	Northeast Water Treatment Plant High-Lift Pumping Station Improvements	0	0	0	40	1,228	2,383	1,334	8,817	12,455	15,336	15,972	3,651	53,915	57,566
112005	W	Northeast Water Treatment Plant - Replacement of Covers for Process Water Conduits	268	1,097	14	0	0	0	0	0	0	0	0	1,111	0	1,111
112006	W	Northeast Water Treatment Plant Flocculator Replacements	460	2,773	3,026	849	0	0	0	0	0	0	0	6,649	0	6,649
113002	W	Southwest Water Treatment Plant, High-Lift Pump Discharge Valve Actuators Replacement	2,313	1,094	0	0	0	0	0	0	0	0	0	1,094	0	1,094
113003	W	Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocculation and Filtration System Improvements	0	0	0	0	0	0	0	0	0	7,157	7,157	0	14,314	14,314
113004	W	Southwest Water Treatment Plant, Raw Water Sampling Modifications	35	0	0	0	0	0	0	0	0	0	0	0	0	0
113006	W	Southwest Water Treatment Plant Chlorine Scrubber, Raw Water Screens & Related Improvements	0	260	2,238	2,238	17	0	0	0	0	0	0	4,754	0	4,754
113007	W	Southwest Water Treatment Plant Architectural and Building Mechanical Improvements	0	0	0	0	0	0	0	0	0	12	86	0	98	98
114001	W	Springwells Water Treatment Plant, 1958 Filter Rehabilitation and Auxiliary Facilities Improvements	5,794	0	0	0	0	0	0	0	0	0	0	0	0	0
114002	W	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	3,039	7,113	12,893	18,906	18,690	19,176	18,902	18,738	18,551	18,374	18,374	76,778	92,940	169,718
114003	W	Water Production Flow Metering Improvements at Northeast, Southwest and Springwells Water Treatment Plants	2,149	0	0	0	0	0	0	0	0	0	0	0	0	0
114005	W	Springwells Water Treatment Plant, Administration Building Improvements & Underground Fire Protection Loop	417	2,302	4,199	1,515	0	0	0	0	0	0	0	8,016	0	8,016
114006	W	Springwells Water Treatment Plant Replacement of 1958 Rapid Mixing Units	14	0	0	0	0	0	0	0	0	0	0	0	0	0
114007	W	Springwells Water Treatment Plant Powdered Activated Carbon System Improvements	0	0	0	0	0	63	329	1,109	2,682	6	0	63	4,125	4,188
114008	W	Springwells Water Treatment Plant 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements	3,385	10,327	331	19	0	0	0	0	0	0	0	10,677	0	10,677
114010	W	Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements	0	1	46	609	9,409	11,959	14,831	17,573	19,105	19,758	19,320	22,024	90,587	112,611
114011	W	Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements	6,948	6,933	6,933	713	0	0	0	0	0	0	0	14,580	0	14,580
114013	W	Springwells Water Treatment Plant, Reservoir Fill Line Improvements	1,990	0	0	0	0	0	0	0	0	0	0	0	0	0
114016	W	Springwells Water Treatment Plant 1958 Settled Water Conduits and Loading Dock Concrete Pavement Replacement	94	1,663	7	0	0	0	0	0	0	0	0	1,671	0	1,671
114017	W	Springwells Water Treatment Plant Flocculator Drive Replacements	29	314	635	2,265	6,035	17	0	0	0	0	0	9,267	0	9,267

114018	W	Springwells Water Treatment Plant - Service Building Electrical Substation and Miscellaneous Improvements	0	0	90	1,378	40	0	0	0	0	0	0	1,508	0	1,508
115001	W	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	251	5,462	13,348	21,477	20,883	8,837	0	0	0	0	0	70,007	0	70,007
115003	W	Water Works Park Water Treatment Plant Comprehensive Condition Assessment	68	0	0	0	0	0	0	0	0	0	0	0	0	0
115004	W	Water Works Park Water Treatment Plant Chlorine System Upgrade	754	0	0	0	0	0	0	0	0	0	0	0	0	0
115005	W	WWP WTP Building Ventilation Improvements	1,614	1,999	3,610	2,540	378	0	0	0	0	0	0	8,527	0	8,527
115006	W	Water Works Park Site/Civil Improvements	0	0	0	0	0	0	467	500	3,737	939	0	0	5,642	5,642
116002	W	Pennsylvania and Springwells Raw Water Supply Tunnel Improvements	653	14,138	21,916	8,810	5,527	0	0	0	0	0	0	50,391	0	50,391
122002	W	Replacement of Five (5) PRV Pits of Treated Water Transmission System	5	0	0	0	0	0	0	0	0	0	0	0	0	0
122003	W	Water Works Park to Northeast Transmission Main	1,169	11,703	18,406	18,678	18,169	20,839	21,940	20,774	17,636	5,600	0	87,795	65,950	153,745
122004	W	96-inch Water Transmission Main Relocation and Isolation Valve Installations	2,550	5,267	15,765	19,937	19,797	19,797	19,376	18,815	18,815	2,946	17	80,563	59,969	140,532
122005	W	Schoolcraft Road Water Transmission Main	3,342	13,141	1,482	0	0	0	0	0	0	0	0	14,624	0	14,624
122006	W	Wick Road Water Transmission Main	6,163	9,975	5,779	0	0	0	0	0	0	0	0	15,754	0	15,754
122007	W	Merriman Road Water Transmission Main Loop	0	0	0	15	390	1,298	371	2,235	4,931	7,213	5,004	1,702	19,754	21,457
122011	W	Park-Merriman Road Water Transmission Main	4,474	2,164	0	0	0	0	0	0	0	0	0	2,164	0	2,164
122013	W	14 Mile Transmission Main Loop	3,762	1,194	17,085	17,085	17,084	17,085	7	0	0	0	0	69,533	7	69,540
122016	W	Downriver Transmission Main Loop	1,398	1,748	3,793	7,985	8,006	7,985	6,796	10	0	0	0	29,517	6,806	36,323
122017	W	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station	74	1,794	3,510	9,223	7,620	7,572	7,408	7,408	7,428	5,326	3,215	29,718	30,784	60,502
122018	W	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation	121	138	144	150	169	169	169	169	169	80	0	770	586	1,356
132003	W	West Service Center Pumping Station, Isolation Gate Valves for Line Pumps	1,666	65	0	0	0	0	0	0	0	0	0	65	0	65
132006	W	Ford Road Pumping Station, Pressure and Control Improvements	1,036	987	960	8	0	0	0	0	0	0	0	1,955	0	1,955
132007	W	Energy Management: Freeze Protection Pump Installation at Imlay Pump Station	685	4,212	206	0	0	0	0	0	0	0	0	4,417	0	4,417
132010	W	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades	663	4,323	12,209	11,854	8,361	0	0	0	0	0	0	36,746	0	36,746
132012	W	Ypsilanti Booster Pumping Station Improvements	712	846	846	3,827	9,721	11,936	3,708	0	0	0	0	27,176	3,708	30,884
132014	W	Adams Road Pumping Station Improvements	0	0	0	13	205	926	926	125	3,789	8,674	12,880	1,144	26,393	27,537
132015	W	Newburgh Road Booster Pumping Station Improvements	581	973	1,596	5,216	6,287	9,133	6,891	0	0	0	0	23,204	6,891	30,094
132016	W	North Service Center Pumping Station Improvements	0	0	21	279	2,385	1,832	4,723	9,019	9,044	9,019	9,019	4,518	40,825	45,343
132017	W	North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping & Valve Replacement	0	14	136	0	0	0	0	0	0	0	0	150	0	150
132018	W	Schoolcraft Pumping Station Improvements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132019	W	Wick Road Pumping Station Improvements	0	0	0	0	0	15	59	569	572	571	1,154	15	2,925	2,940
132020	W	Franklin Pumping Station Improvements	0	0	0	0	0	0	0	50	239	1,380	774	0	2,442	2,442
132021	W	Imlay Pumping Station Improvements	0	0	0	0	0	0	0	0	0	0	13	0	13	13
132022	W	Joy Road Pumping Station Improvements	0	0	0	0	0	0	0	0	0	0	48	0	48	48
132025	W	Northwest Booster Station Yard Piping Improvements	0	0	0	0	0	0	0	0	0	0	0	0	0	0

132026	W	Franklin Pumping Station Valve Replacement	449	613	349	0	0	0	0	0	0	0	0	962	0	962
170100	W	Water Treatment Plant /Pump Station Allowance	1,812	1,499	1,359	1,359	1,363	1,359	13,753	37,912	0	0	0	6,938	51,665	58,604
170200	W	As-Needed Construction Materials, Environmental Media and Special Testing Services, Construction Inspection, and Other Technical Services	1,057	685	9	0	0	0	0	0	0	0	0	694	0	694
170300	W	Water Treatment Plant Automation Program	3,208	5,440	2,943	1,211	3,116	1,152	0	0	0	0	0	13,862	0	13,862
170400	W	Water Transmission Improvement Program	1,781	1,776	1,776	1,776	1,781	1,046	0	0	26	5,613	10,939	8,154	16,578	24,732
170500	W	Transmission System Valve Rehabilitation and Replacement Program	802	1,350	3,291	3,348	3,381	3,317	2,265	86	420	1,194	1,249	14,687	5,214	19,901
170600	W	Water Transmission Main Asset Assessment Program	54	54	54	775	2,183	4,183	6,372	6,399	3,073	4,541	3,065	7,249	23,451	30,699
170800	W	System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation	2,160	6,087	6,087	6,087	4,100	11,366	11,366	11,366	0	0	0	33,728	22,732	56,460
170900	W	Suburban Water Meter Pit Rehabilitation and Meter Replacement	2,542	2,535	2,535	1,139	121	120	71	0	0	0	0	6,451	71	6,522
171400	W	LED Lighting & Lighting Control Improvements at All Water Facilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171500	W	Roof Replacement at WWP, SP, LH, NE, SW, NSC, Orion, Franklin, and Conner Creek Facilities	2,666	0	144	2,734	2,954	2,140	2,135	156	460	4,408	4,408	7,971	11,566	19,537
341001	W	Security Infrastructure Improvements on Water Facilities	4,029	4,018	2,603	0	0	0	0	0	0	0	0	6,621	0	6,621
351001	W	LED Lighting and Lighting Control Improvements	0	50	248	252	0	0	0	0	0	0	0	550	0	550
380500	W	Wastewater General Engineering Services on an As-needed Basis	0	0	0	0	0	0	0	0	0	0	0	0	0	0
380600	W	As-Needed General Engineering Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0
380700	W	As-Needed Geotechnical and Related Engineering Services	1,415	715	0	0	0	0	0	0	0	0	0	715	0	715
381000	W	Power Quality: Electric Metering Improvement Program	0	0	0	0	86	445	1,540	1,337	28	0	0	531	2,904	3,435
		Totals	91,118	146,001	178,163	199,463	209,156	189,495	157,029	163,912	124,285	119,087	117,979	922,279	682,292	1,604,571

Table VII-2. 10-Year Water CIP Outlook Summary.

10-Year Water CIP Outlook

Note: Figures below are in thousands of dollars

2020 Outlook	FY2020	FY2021	FY2022	FY2023	FY2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total 2020-2029
Projects	117,829	142,981	158,855	144,811	164,373	140,250	133,489	73,450	68,604	72,152	NA	1,216,795
Programs	25,418	23,618	23,740	24,195	26,493	42,875	42,875	42,875	42,875	41,681	NA	336,643
Not Yet Specified Projects								60,000	70,000	70,000	NA	200,000
Subtotal 2020 Water CIP	**143,247**	**166,599**	**182,595**	**169,006**	**190,866**	**183,125**	**176,364**	**176,325**	**181,478**	**183,833**	**NA**	**1,753,438**

Proposed 2021 Outlook	FY2020	FY2021	FY2022	FY2023	FY2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY2030	Total 2021-2030
Projects	NA	125,861	159,965	181,034	190,072	164,367	119,527	106,655	120,279	103,332	98,319	1,369,411
Programs	17,498	20,141	18,198	18,429	19,084	25,128	37,502	57,256	4,007	15,756	19,660	235,160
Not Yet Specified Projects	NA								49,145	59,145	40,577	148,867
Subtotal 2021 Water CIP	**NA**	**146,001**	**178,163**	**199,463**	**209,156**	**189,495**	**157,029**	**163,912**	**173,431**	**178,232**	**158,556**	**1,753,438**

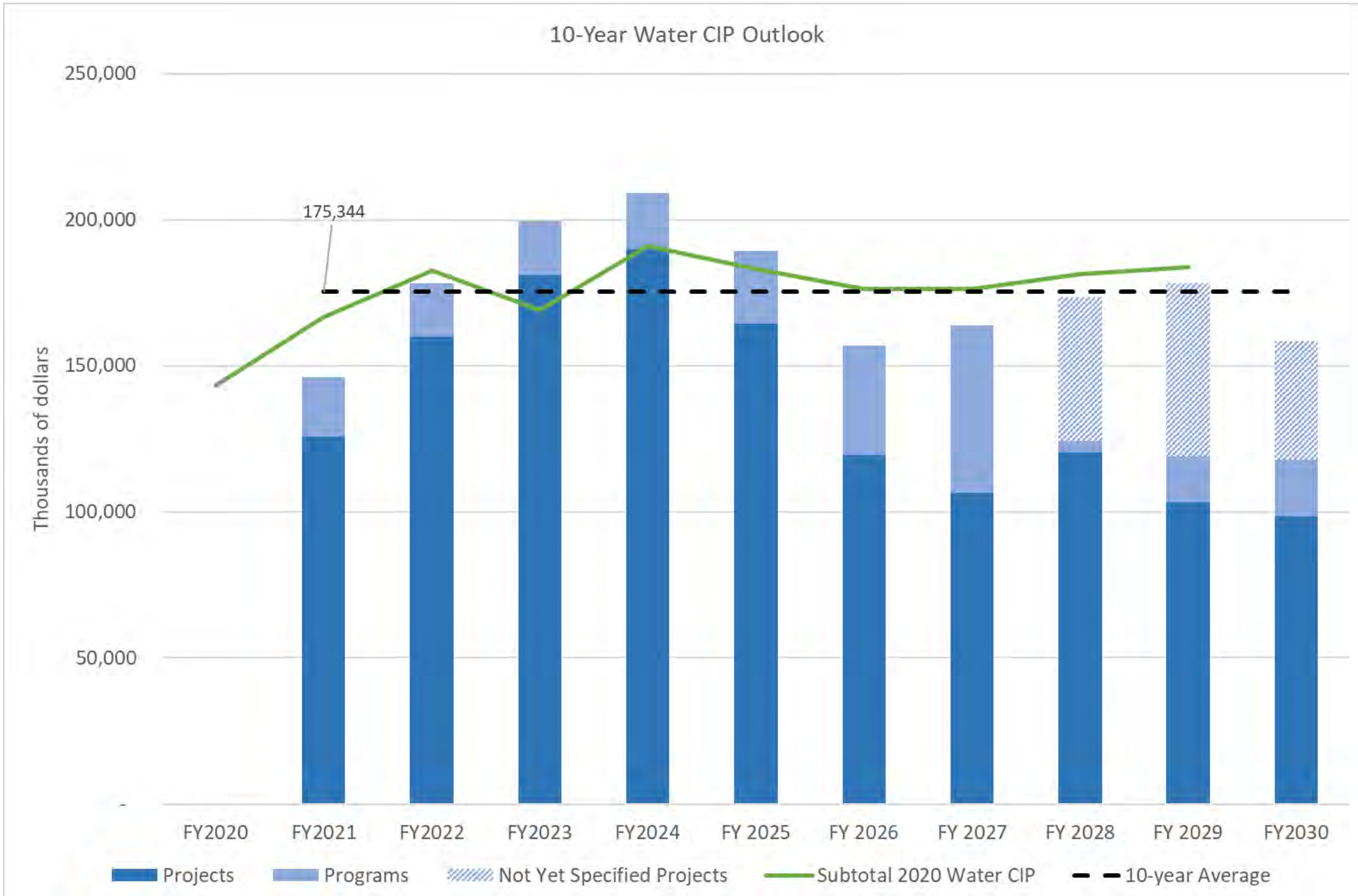


Figure VII-1. 10-Year Water CIP Outlook Chart

SECTION 2 10-YEAR WASTEWATER OUTLOOK

The primary source of long-term projects used for the 10-Year Wastewater Outlook are from the 2015 Wastewater Needs Assessment and various condition assessment that have been performed. Unlike the water system, the Comprehensive Regional Wastewater Master Plan is currently being prepared and limited data is available to include herein. It is anticipated that most programs will continue into the 10-year horizon. The project level data used in the development of this outlook can be seen in Table VII-3.

The specific Wastewater 10-Year Outlook projects can be summarized into the following table. Due to the higher likelihood of unknown projects, programs and overall needs identified within the Wastewater Master Plan within this 10-Year Outlook, in the later years FY2028-FY2030, a line item titled, "Not Yet Specified Masterplan Projects" has been included.

In addition, a graphical representation of this summary is shown in Figure VII-2.

Table VII-3. 10-Year Wastewater CIP Outlook Projects.

CIP #	Bud-get	Title	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	2021-2024 Total	2026 - 2030 Total	TOTAL 2021-2030
211001	S	WRRF Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery	6,225	3,775	0	0	0	0	0	0	0	0	0	3,775	0	3,775
211002	S	WRRF PS No. 2 Pumping Improvements - Phase 1	1,860	0	0	0	0	0	0	0	0	0	0	0	0	0
211004	S	WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements	1,771	0	0	0	0	0	0	0	0	0	0	0	0	0
211005	S	WRRF PS No. 2 Improvements Phase II	0	0	0	472	2,245	949	12,142	14,878	3,365	0	0	3,666	30,384	34,050
211006	S	WRRF PS No. 1 Improvements	929	645	551	8,531	12,773	3,341	0	0	0	0	0	25,841	0	25,841
211007	S	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements	256	3,098	7,547	2,121	20,899	34,033	8,643	0	0	0	0	67,697	8,643	76,340
211008	S	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines	1,239	5,522	3,886	0	0	0	0	0	0	0	0	9,408	0	9,408
211009	S	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System	21	313	1,254	802	8,716	2,143	0	0	0	0	0	13,228	0	13,228
211010	S	Rehabilitation of Sludge Processing Complexes A and B	0	0	0	0	177	748	640	7,745	4,452	275	0	926	13,113	14,038
211011	S	WRRF PS1 Screening and Grit Improvements	0	0	0	0	0	14	6,723	8,849	4,514	40,248	40,398	14	100,733	100,747
212003	S	WRRF Aeration System Improvements	136	0	0	0	0	0	0	0	0	0	0	0	0	0
212004	S	WRRF Chlorination and Dechlorination Process Equipment Improvements	3,727	1,850	0	0	0	0	0	0	0	0	0	1,850	0	1,850
212006	S	WRRF Rouge River Outfall (RRO) Disinfection (Alternative)	2,748	0	0	0	0	0	0	0	0	0	0	0	0	0
212007	S	WRRF Rehabilitation of the Secondary Clarifiers	0	0	15	427	879	532	4,904	16,303	4,998	2,082	0	1,852	28,288	30,140
212008	S	WRRF Aeration Improvements 1 and 2	183	4,612	7,977	7,619	40,638	15,335	5,149	0	0	0	0	76,181	5,149	81,329
212009	S	WRRF Aeration Improvements 3 and 4	0	0	0	0	0	14	4,943	6,499	3,325	29,382	29,600	14	73,750	73,764
212010	S	WRRF Conversion of Disinfection of all Flow to Sodium Hypochlorite and Sodium Bisulfite	0	0	0	0	0	14	388	484	332	2,376	2,393	14	5,972	5,986

CIP #	Bud-get	Title	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	2021-2024 Total	2026 - 2030 Total	TOTAL 2021-2030
213006	S	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	0	174	385	3,371	716	0	0	0	0	0	0	4,646	0	4,646
213007	S	WRRF Modification to Incinerator Sludge Feed Systems at Complex -II	8,335	2,257	0	0	0	0	0	0	0	0	0	2,257	0	2,257
213008	S	WRRF Rehabilitation of the Ash Handling Systems	166	1,338	636	11,060	5,341	0	0	0	0	0	0	18,376	0	18,376
214001	S	WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations	10,369	1,330	0	0	0	0	0	0	0	0	0	1,330	0	1,330
216004	S	Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF	3,494	1,301	121	0	0	0	0	0	0	0	0	1,422	0	1,422
216006	S	Assessment and Rehabilitation of WRRF yard piping and underground utilities	271	4,291	4,754	4,754	4,767	5,400	273	0	0	0	0	23,966	273	24,239
216007	S	DTE Primary Electric 3rd Feed Supply to WRRF	3,061	1,297	727	0	0	0	0	0	0	0	0	2,024	0	2,024
216008	S	Rehabilitation of Screened Final Effluent (SFE) Pump Station	591	1,362	1,506	15,571	5,925	0	0	0	0	0	0	24,365	0	24,365
216009	S	LM Facilities Assessment and Rehabilitation/Replacement	226	253	1,318	970	0	0	0	0	0	0	0	2,541	0	2,541
216010	S	WRRF Facility Optimization	0	14	657	987	7,999	680	0	0	0	0	0	10,338	0	10,338
222001	S	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	0	975	3,128	3,371	11,234	13,439	13,451	7,914	0	0	0	32,147	21,366	53,513
222002	S	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	16,199	23,633	9,785	1,465	10,014	9,986	0	0	0	0	0	54,884	0	54,884
222004	S	Sewer System Infrastructure and Pumping Stations Improvements	1,459	2,701	5,433	16,434	9,864	3,279	1,952	0	0	0	0	37,711	1,952	39,663
232001	S	Fairview Pumping Station - Replace Four Sanitary Pumps	27,552	5,337	984	0	0	0	0	0	0	0	0	6,321	0	6,321
232002	S	Freud & Conner Creek Pump Station Improvements	7,363	6,446	57	9,899	23,830	30,803	36,174	46,903	54,993	0	0	71,035	138,070	209,106
232004	S	Condition Assessment at Blue Hill Pump Station	0	286	0	0	0	0	0	0	0	0	0	286	0	286
233003	S	Rouge River In-system Storage Devices	0	0	32	86	3,373	1,984	401	3,918	16,574	16,512	3,917	5,476	41,321	46,797
260200	S	Sewer and Interceptor Rehabilitation Program	19,029	12,976	36,048	24,871	15,495	14,347	13,240	0	0	0	0	103,737	13,240	116,977
260500	S	CSO Outfall Rehabilitation	4,802	11,706	9,156	11,995	10,976	8,243	4,197	0	0	0	0	52,076	4,197	56,273
260600	S	CSO Facilities Improvement Program	7,556	7,492	10,290	10,576	4,759	20,280	20,250	12,000	12,000	12,000	29,000	53,396	85,250	138,646
270001	S	Pilot CSO Netting Facility	0	20	86	1,604	318	4,507	1,233	0	0	0	0	6,535	1,233	7,769
270002	S	Meldrum Sewer Diversion and VR-15 Improvements	0	0	13	86	586	162	2,915	2,160	157	0	0	847	5,232	6,079
270003	S	Long Term CSO Control Plan	68	2,796	2,220	710	0	0	0	0	0	0	0	5,726	0	5,726
277001	S	Baby Creek Outfall Improvements Project	79	1,251	907	0	0	0	0	0	0	0	0	2,158	0	2,158
331002	S	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)	321	91	1,745	1,724	1,707	1,703	1,649	2	0	0	0	6,969	1,652	8,621
341002	S	Security Infrastructure Improvements for Wastewater Facilities	1,579	1,051	0	0	0	0	0	0	0	0	0	1,051	0	1,051
381000	S	Power Quality: Electric Metering Improvement Program	86	445	1,540	1,337	26	0	0	0	0	0	0	3,348	0	3,348
		Totals	131,703	110,640	112,758	140,841	203,259	171,938	139,267	127,656	104,711	102,875	105,308	739,436	579,817	1,319,253

Table VII-4. 10-Year Wastewater CIP Outlook Summary

10 -Year Wastewater CIP Outlook

Note: Figures below are in thousands of dollars

FY2020 Outlook	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**FY2030**	**Total 2020-2029**
Projects	124,674	93,830	117,326	117,857	85,596	49,184	50,286	33,393	21,000	16,438	NA	709,584
Programs	36,806	38,600	32,851	41,527	44,563	34,600	33,600	38,600	38,600	43,600	NA	383,347
Not Yet Specified Masterplan Projects						65,000	70,000	85,000	100,000	110,000	NA	430,000
Subtotal 2020 Wastewater CIP	**161,480**	**132,430**	**150,177**	**159,384**	**130,159**	**148,784**	**153,886**	**156,993**	**159,600**	**170,038**	**NA**	**1,522,931**
10-year average												

Proposed FY2021 Outlook	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**FY2030**	**Total 2021-2030**
Projects		78,021	55,725	92,062	172,003	129,068	101,580	115,656	92,711	90,875	76,308	1,004,008
Programs		32,619	57,033	48,779	31,256	42,870	37,688	12,000	12,000	12,000	29,000	315,245
Not Yet Specified Masterplan Projects							10,000	23,000	40,000	60,000	70,678	203,678
Subtotal 2021 Wastewater CIP		**110,640**	**112,758**	**140,841**	**203,259**	**171,938**	**139,267**	**127,656**	**104,711**	**102,875**	**105,308**	**1,319,253**

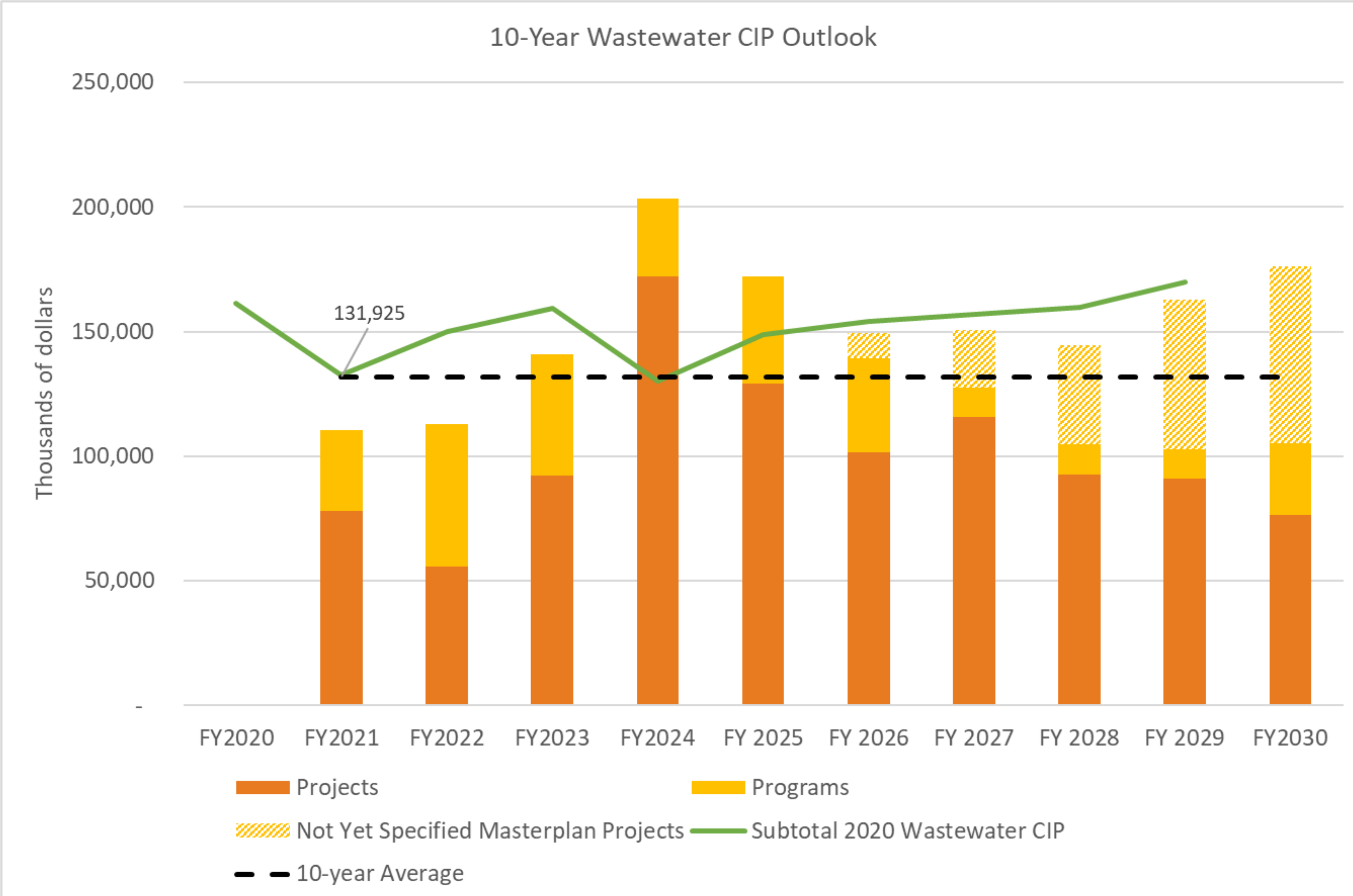


Figure VII-2. 10-Year Wastewater CIP Outlook Chart.

VIII. PROJECT DESCRIPTIONS

This chapter contains a one-page description of each CIP project. These descriptions are intended to be at-a-glance information related to each project that provides a general understanding of the scope of work, project phasing and projected expenses. The full Business Case Justification documentation related to each project can be found within the Appendices.

SECTION 1 WATER

CIP Number: 111001

Project Title Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Lake Huron

Location Saint Clair County

- [x] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Lake Huron WTP

Project Engineer/Manager Eric Kramp

Director Grant Gartrell

71.6

Project Score

Problem Statement Improvements needed to align the existing low lift pumping rate with the Lake Huron WTP production rate per the 2015 Water Master Plan Update.

Currently, constant speed pumping at the low-lift portion of the plant can force it to operate in a semi-batch mode during night-time, low-demand periods. Existing electrical gear for low- and high-lift pumping units and filter backwash pumps are original to plant, beyond useful service life and need to be replaced to improve reliability, serviceability, maintainability, and efficiency.

Similarly, phosphoric acid chemical storage tanks and associated fill piping are also past their useful service life and in the case of the piping has had leaks and many repairs.

Scope of Work / Project Alternatives This CIP will be delivered using a design-bid-build project delivery method. The project's scope of improvements will generally include replacement of the following systems and equipment:

1. High-voltage electrical system at the facility
2. Replace low-lift pumps 3 and 4 with new pumps, right-sized to current and projected demands.
3. Rehabilitate or replace high-lift pumping units, right-sized to current and projected demands.
4. Rehabilitate or replace filter wash water pumps and related equipment.
5. Replace phosphoric acid storage tanks and fill piping.
6. Update instrumentation, controls and supervisory, control and data acquisition (SCADA) systems related to above-mentioned the pumping system equipment.

Other Important Info *Innovation note: Ensure energy efficiency.
Coordination between existing pumping unit and motor required during design. Critical speed analysis may show pump improvements needed to operate at reduced speeds. Uncovering an innovative rehabilitation design to minimize maintenance of existing drives.

CIP Number: 111001

Project Title Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	14	1,236	1,636	1,749	13,725	12,768	12,841	11,121	55,090	42719
2020	0	0		0	401	1,611	3,169	4,450	10,000	32,757	0	52,388	19631
2019	0				401	1,611	3,169	4,450	42,757	0	0	52,388	9631
2018		200	2,500	3,000					0	0	0	5,700	5500

CIP Number: 111002
Project Title Lake Huron Water Treatment Plant, Miscellaneous Mechanical HVAC Improvements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Lake Huron
Location Saint Clair County

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

The photo shows the condition of the heating system hot water piping.

Project Engineer/Manager Brian VanHall

Director Grant Gartrell

Project Score 77

Problem Statement Existing heating, ventilating and air-conditioning systems Lake Huron are 40 years old and are either not operable or are energy-inefficient. Ventilation is inadequate in the filter areas of the plant. Indoor summer-time temperatures exceed 90F in the administration building and process control laboratory due to no air conditioning in this building. These elevated temperatures make for very uncomfortable working conditions for the chemists stationed in the laboratory full-time and plant team member who work in this building.

Scope of Work / Project Alternatives This CIP project is being delivered using a design-bid-build project delivery model. The scope of work generally includes installing:

1. High-efficiency, natural gas-fired hot-water boilers, hot-water radiators, and hot-water and cold-water return piping throughout the facility.
2. Air-conditioning system for the administration building, including the process control laboratory and control room.
3. Roof-top mounted air handlers to ventilate the filter buliding.
4. Heating and ventilating system for the high-voltage electrical switchgear room.
5. Heating and ventilating system for the chlorine storage and feeder rooms.
6. Dehumidification system for the filter piping galleries.
7. Doors and vestibules to segregate areas of different indoor air control - zones.
8. Back flow preventers to protect water quality in potable water systems at the plant from non-potable uses.

Other Important Info There are three contracts associated with this CIP, including:
CS-1732 Engineering Design and Construction Administration Contract (active)
CON-182 Backflow Preventer Construction Contract (closed)
CON-212 HVAC Construction Contract (active)

CIP Number: 111002

Project Title Lake Huron Water Treatment Plant, Miscellaneous Mechanical HVAC Improvements

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	6,991	1,972	41	0	0	0	0	0	9,004	41
2020	0	0	2,020	4,422	1,882	0	0	0	0	0	0	8,324	1882
2019	0	309	781	3,666	3,873	13				0	0	8,642	7552
2018		270	1,030	3,130	3,050	422			0	0	0	7,902	7632

CIP Number: 111004
Project Title Lake Huron Water Treatment Plant, Electrical Tunnel Rehabilitation

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Lake Huron
Location Saint Clair County

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Lake Huron WTP Electrical Tunnel

Project Engineer/Manager Jorge Nicolas
Director Grant Gartrell

38.6
Project Score

Problem Statement Existing electrical tunnel concrete has failed in the past and has seen emergency repairs. This project will provide permanent concrete and structural improvements to this tunnel that carries the primary electrical feed to the entire plant. The existing medium voltage two electrical feeders are old and beyond their 30-years service life. This project will replace the two electrical feeders with new.

Scope of Work / Project Alternatives This CIP project is being delivered using a design-bid-build project delivery model. The scope of work generally includes restoring concrete within the medium-voltage feeder electrical tunnel to prevent water intrusion and further damage to concrete, electrical cables, conduits, duct banks, and cable trays. The work also includes replacing the medium-voltage electrical feeders between the site's primary transformers and the low-lift pumping plant.

Other Important Info Moved construction start to FY2019, added GLWA costs. JN 2019

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,764	1,372	0	0	0	0	0	0	4,136	0
2020	0	0	63	384	4,296	6	0	0	0	0	0	4,749	4302
2019	0		116	414	4,296	6				0	0	4,832	4716
2018			1,000	3,000	1,600				0	0	0	5,600	5600

CIP Number: 111006

Project Title Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Lake Huron

Location Saint Clair County

- ☑ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Raw Water Flow Meter

Project Engineer/Manager Eric Kramp

Director Grant Gartrell

62.2

Project Score

Problem Statement The filter instrumentation and raw water metering at the Lake Huron WTP is not functioning and is in need of replacement. Replacement of this equipment is needed for reliable plant operations.

Signifiacnt improvements to the LHWTP Ovation control system network "backbone" will be performed under this CIP 111006.

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. The scope of work will generally include the following:
1. Installation of new filter instrumentation and controls.
2. Installation of new raw water flow metering instrumentation.
3. Installation of new programmable logic controllers (PLCs) and associated process control computer workstations throughout the plant.
4. Installation of new process control network backbone.
5. Installation of new process control system (i.e. Ovation) hardware.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	778	236	235	235	2,330	6,184	6,628	0	16,626	15612
2020	0	0	735	55	3,333	3,333	3,333	0	0	0	0	10,789	9999
2019	0	253	643	43	8,647	9,816	6,909	4		0	0	26,315	25419
2018		100	600	12,150	11,780				0	0	0	24,630	24530

CIP Number: 111007

Project Title Lake Huron Water Treatment Plant, Raw Sludge Clarifier and Raw Sludge Pumping System Improvements

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Lake Huron

Location Saint Clair County

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Raw sludge clarifier at Lake Huron WTP

Project Engineer/Manager Brian VanHall

Director Grant Gartrell

53.2

Project Score

Problem Statement The existing WWRB and clarifiers have noticeable deteriorating concrete and walls that have permanently deflected. There is also concrete deterioration in the sludge pumping station as well as difficulties with maintenance and operation of the existing pumps. For example, the existing pumps are not equipped with permanent lifting mechanisms. A truck with a crane has to be mobilized to the plant to pull an existing pump when maintenance or repairs are needed. The new sludge pumping units will be equipped with permanent lifting mechanisms so that pumps can be pulled by plant staff without mobilizing a specialty crew to perform these types of tasks.

Spent filter backwash is conveyed to the Waste Wash Water Retention Basin (WWRB) that was constructed in the early 1970s. Twice yearly, as part of the settling basin cleaning, the flush water and alum sludge from the Lake Huron Water Treatment Plant settling basins are drained to the clarifiers that are adjacent to the WWRB. Clarifiers Nos. 1 and 2 were constructed at the same time as the WWRB. Sludge is discharged from these clarifiers to drying lagoons using a sludge pumping station. The clarifiers also serve as redundant waste wash water retention volume during normal plant operations.

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. GLWA retained an engineering consultant under GLWA Contract No. CS-171 "Raw Sludge Clarifiers and Raw Sludge Pumping Station Improvements" to conduct a condition assessment and design improvements for LH raw sludge handling. The WWRB, Clarifier Nos. 1 and 2, and the sludge pumping station all require improvement. The scope of construction involves:
1. Demolish existing clarifiers and sludge pumping station
2. Construct new cast-in-place reinforced concrete waste wash water retention basin
3. Construct new cast-in-place reinforced concrete sludge pumping station equipped with new pump lifting
mechanisms

CIP Number: 111007

Project Title Lake Huron Water Treatment Plant, Raw Sludge Clarifier and Raw Sludge Pumping System Improvements

4. Install new diversion gate structures between sludge drying lagoons
5. Install new junction structures between existing and new waste wash water retention basins
6. Install new yard lighting around the WWRB and clarifiers

Other Important Info This project should be completed prior to cessation of treatment at the Northeast WTP.

Project History: The clarifier/backwash structure is original to the plant. The tank walls appear to have been inadequately designed and/or constructed to withstand the loading of the surround soils.

Challenges: Improvements will require coordination with plant operations (filter backwashing, sedimentation basin cleaning) and requires bypass pumping due to signficant leakage from filter outlet valves.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	649	4,896	3,392	0	0	0	0	0	8,937	3392
2020	0	0	284	194	4,660	4,661	0	0	0	0	0	9,799	9321
2019	0	9	422	212	1,612	3,608	1,221			0	0	7,084	6653
2018			50	920	6,163				0	0	0	7,133	7133

CIP Number: 111008

Project Title Lake Huron Water Treatment Plant, Architectural Programming for Laboratory and Admin Building

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Lake Huron

Location Saint Clair County

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Lake Huron Water Treatment Plant

Project Engineer/Manager Shiyu Yang

Director Grant Gartrell

40.6

Project Score

Problem Statement The Lake Huron Water Treatment Plant was constructed in the early 1970s and started operating in 1976. The existing process control laboratory and administration building interiors are original construction, including but not limited to flooring, wall coverings, ceilings, lab cabinetry, control room boards, bathroom fixtures, and lighting fixtures. The original control room board is still located in the laboratory and consumes a large amount of space that is not used and inefficient. The architectural layout of the laboratory and administration building is designed around the early 1970s workflows and technology.

Scope of Work / Project Alternatives This will be a study phase project that will involve architectural programming to determine the most efficient architectural layout that meets current process laboratory control technology and administrative workflow practices; and that can be provided through a construction renovation project within the existing building footprint.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	1,299	1,299	0
2020	0	0		0	0	0	0	0	0	300	0	300	0
2019	0								300	0	0	300	0

CIP Number: 111009

Project Title Lake Huron Water Treatment Plant - High Lift Pumping, Water Production Flow Metering and Yard Piping

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Lake Huron

Location Saint Clair County

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Brian VanHall

Director Grant Gartrell

62.2

Project Score

Problem Statement Three new, smaller capacity, high-lift pumping units are needed to provide reduced finished water flows out of Lake Huron WTP to accommodate the relocation of the 96-inch transmission main south of Dorsey-Dickenson valve and to accommodate the installation of a new water production flow meter at the Lake Huron WTP. The three, new smaller capacity high-lift pumping units will also serve a longer term need to better match lower diurnal demands seen at the Lake Huron WTP. Installation of the new water production flow meter can only occur after the three new smaller high-lift pumping units are installed.

Scope of Work / Project Alternatives This project will be delivered using a design-build project delivery method. The scope of work involves designing and building a new water production flow meter and associated meter vault to more accurately measure finished water production flows from the facility. This work will also entail constructing additional high-lift, finished water header piping, valves and appurtenances to facilitate construction of the new metering infrastructure. The scope also includes installing three new 35 million-gallon-per day (MGD) high-lift pumping units, including pumps, motors, instrumentation, control, and electrical work.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	30	548	1,856	3,554	8,991	10,561	3,686	0	29,226	28648
2020	0	0		16	9,030	10,030	7,030				0	26,106	26090

CIP Number: 111010

Project Title Lake Huron Water Treatment Plant -Filtration and Pretreatment Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Lake Huron

Location Saint Clair County

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Lake Huron Water Treatment Plant

Project Engineer/Manager Eric Kramp

Director Grant Gartrell

71

Project Score

Problem Statement Significant issues exist in the pretreament and filtration portions of the LHWTP:
Approximately half of the flocculators are in service.
Standing water on top of the sedimentation basins and flocculators creates concerns regarding water quality
Filter influent and drain valves do not seal well, creating water loss
Filter underdrains and media have not been evaluated and require confirmation of condition
Isolation valves between the filters, filtered water conduit, and clearwells are known to leak heavily

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. The scope of work will generally include the following:
1. Replace the existing flocculation system with a new system.
2. Construct filtration improvements, including filter media, filter auxiliary scoring equipment, filter wash water troughs,and other filter tank work.
3. Replace the existing filter control valves and valve operators with new.
4. Rehabilitate concrete associated with the filters.
5, Conduct civil/site drainage control improvements at the sedimentation basins and flocculator chambers.

Flocculators: following an O&M-funded study, replace the filters with best available technology -- horizontal cross flow, vertical, or passive
Add drainage to the sedimentation basins and flocculator roofs
Replace isolation and valves as necessary
Repaint WW Conduit
Replace underdrain and/or media as necessary

CIP Number: **111010**

Project Title **Lake Huron Water Treatment Plant -Filtration and Pretreatment Improvements**

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	12	48	5,572	5,632	60

CIP Number: 111011
Project Title Lake Huron WTP Pilot Plant

Project Status	Future Planned
Class Lvl 1	Water
Class Lvl 2	Treatment Plants and Facilities
Class Lvl 3	Lake Huron
Location	Saint Clair County

- [x] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [x] **Project New To CIP**

Lake Huron Water Treatment Plant

Project Engineer/Manager Eric Griffin

Director John Norton

52

Project Score

Problem Statement Water Operations staff at Lake Huron would benefit from the ability to test potential changes to existing water treatment practices and investigate new and innovative treatment advances.

Scope of Work / Project Alternatives A small scale pilot plant provides opportunity for testing and investigation without disruption to the full scale facility. Skid mounted units mimicking treatment at Lake Huron: Chemical addition, modified direct filtration facilities and data monitoring and recording would be provided for team education and training.

Other Important Info Scope of work to include engineering services for planning, construction and training.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	109	144	144	1,397	1,794	397

CIP Number: 112002
Project Title Northeast Water Treatment Plant, Low-Lift Pumping Plant Caisson Rehabilitation

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Northeast
Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Low Lift Pumping Plant at Northeast WTP

Project Engineer/Manager Govind Patel
Director Grant Gartrell

51.6
Project Score

Problem Statement Low Lift Pump Discharge flumes were leaking and had significant concrete deterioration within the Low-Lift Pumping Plant Caisson at the Northeast WTP. Water leaks posed hazards to nearby electrical equipment as well as presented potential slip hazards for employees. Additionally, the glazed tile at the upper elevations of the low-lift motor floor were unstable which presented a safety hazard to those working on the low lift pump motor floor.

Scope of Work / Project Alternatives The low lift pump discharge flumes have been lined with stainless steel plates to stop water leakage into the low lift pump station operating floors. The unstable glazed tile blocks were replaced with new.

Other Important Info The project is under construction and is substantially complete.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,135	210	0	0	0	0	0	0	1,345	0
2020	0	0	473	889	203	0	0	0	0	0	0	1,565	203
2019	0	163	70	831	619	30	4			0	0	1,717	1484
2018		150	1,183						0	0	0	1,333	1183

CIP Number: 112003
Project Title Northeast Water Treatment Plant High-Lift Pumping Station Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Northeast
Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☑ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☑ NEWTP Repurposing

☐ **Project New To CIP**

Northeast Water Treatment Plant

Project Engineer/Manager Mike Garrett
Director Grant Gartrell

68
Project Score

Problem Statement Existing mechanical, electrical, instrumentation, and control system equipment within the high-lift pumping plant at the Northeast Water Treatment Plant is mostly original (i.e. 1956). Both medium-voltage and low-voltage switchgear are beyond their useful service life. Stock replacement parts are no longer available. When repairs are needed to the switchgear, then either un-used redundant gear are used for parts or custom-manufactured gear is obtained at a high cost with long lead times. In some cases, certain medium-voltage switchgear cubicles are irrepairable. All medium-voltage cables are beyond their useful life especially with respect to insulation properties and therefore require replacement. Primary sevice transformers are beyond their useful service life and will be evaluated for replacement. An existing, former City of Detroit Public Lighting Department (PLD) transformer is not used because it is incapable of delivering adequate power to its connedcted bus. Removal of this former PLD feed will be evaluated. DTE primary feeder cables will be evaluated and replaced as needed. Mechanically, the existing high-lift pumping units are also beyond their useful service life and in addition pump motors noise levels are approaching the maximum 8-hour time-weighted average for noise levels per OSHA regulations. Likewise, the steam heating system is past its usefull service life, and there is no redudancy in the heating system. New heating for the high-lift pumping plant is needed and will be separated from the rest facility's heating system. Lastly, the interior and exterior windows, doors, handrails, and grating systems are original to the plant and need to be replaced with new, more energy efficient styles.

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. The scope of work generally includes:
1) Replace medium voltage switchgear, Unit Substation 1, all motor control centers (MCCs), power panels, transformers, and lighting panels.
2) Replace HL Pumps and size according to projected demands.
3) Replace pump motor controls to accommodate remote operation.
4) Replace primary transformers and test/replace feeders to property lines. Coordinate with DTE to

CIP Number: 112003

Project Title Northeast Water Treatment Plant High-Lift Pumping Station Improvements

ensure that all 3 remaining medium-voltage transformers are capable of delivering the required power.
5) Replace all heating equipment in high lift area and install new boiler.
6) Replace windows, doors, handrails and grating systems.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	40	1,228	2,383	53,914	57,565	3651
2020	0	0		0	0	0	0	0	0	62,234	0	62,234	0
2019	0								62,265	0	0	62,265	0

CIP Number: 112005

Project Title Northeast Water Treatment Plant - Replacement of Covers for Process Water Conduits

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Northeast

Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

61

Project Score

Problem Statement The existing steel covers that cover entry openings into filtered water conduits at the plant are significantly deteriorated to the point where they are not water-tight and require replacement. Therefore, these covers are unsafe and have been identified by the MDEQ in the most recent sanitary survey as requiring replacement. Temporary barricades are in place to prevent injury and further damage.

Scope of Work / Project Alternatives Replace steel covers, frames and associated structural support beams over the settled water and filtered water conduits.

Other Important Info Challenges: Temporary support of sluice gate operators and partial shutdown of certain portions of the plant to facilitate replacement of the existing steel covers, frames,and associated structural supports that are located immediately above the filtered water conduits.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	14	269	1,096	14	0	0	0	0	1,393	1110
2020	0	0			166	647					0	813	813

CIP Number: 112006
Project Title Northeast Water Treatment Plant Flocculator Replacements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Northeast
Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Project Engineer/Manager Peter Fromm
Director Grant Gartrell

67.4
Project Score

Problem Statement Most of the existing flocculators are not operable and are beyond repair, which reduces sedimentation effectiveness and creates a greater load on the filtration process. It should be noted that treatment at the Northeast Water Treatment Plant is planned to be decommissioning, as recommended in the 2015 Water Master Plan Update, in order to align overall system water treatment capacity with current as well as 20-year projected water demands. As such, the scope of improvements to flocculation under this CIP will only involve replacing 1/2 the flocculators.

Scope of Work / Project Alternatives This CIP project is being delivered under a design-bid-build project delivery method and generally includes the following scope of work:
1. Demolition of all existing flocculators including drives, motors, shafts, and paddles.
2. Installation of half of the flocculators including drives, motors, shafts, and paddles.
3. Associated architectural, structural, and electrical upgrades within both of the flocculator buildings.

Other Important Info Only 1/2 of the existing flocculators will be replaced under this CIP because the treatment works at Northeast are slated for decommissioning.

Challenges: Water production during construction.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	3	460	2,773	3,026	849	0	0	0	7,111	6648
2020	0	0		3	1,356	1,356	3				0	2,718	2715

CIP Number: 113002

Project Title Southwest Water Treatment Plant, High-Lift Pump Discharge Valve Actuators Replacement

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Southwest

Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Oil hydraulic valve actuators leaking oil

Project Engineer/Manager Shakil Ahmed

Director Terry Daniel

53.2

Project Score

Problem Statement Existing oil hydraulic high lift valve actuators are leaking oil and at the end of service life. The leaking actuators pose safety concerns and replacement of valve actuators is needed.

Scope of Work / Project Alternatives This project involves replacement of the existing oil hydraulic actuators on the high lift pumping units with electric motor operators. A new gas-fired generator is being installed to provide backup power to the electric motor operators. In addition, a section of new high lift header is being installed along with header isolation valves for the high lift pumps.

Other Important Info The construction contract, CON-281, for this CIP project was awarded to Weiss Construction and the notice to proceed issued on October 1, 2018. The project is scheduled for completion by November 2021.

Challenges: Sequencing the demolition and replacement of the existing oil hydraulic power system will require shutdown of individual high lift pumping units.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,479	2,313	1,094	0	0	0	0	0	5,886	1094
2020	0	0	249	1,157	2,876	1,144	6	0	0	0	0	5,432	4026
2019	0	115	186	1,157	2,876	1,144	6			0	0	5,484	5183
2018		160	160	900	900				0	0	0	2,120	1960

CIP Number: 113003

Project Title Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocculation and Filtration System

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Southwest

Location Wayne County - Outside Detroit

- ☑ Innovation
- ☐ Conc. WW Master Plan
- ☑ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Example of a butterfly valve

Project Engineer/Manager Shakil Ahmed

Director Grant Gartrell

50.2

Project Score

Problem Statement Most of the plant's process mechanical, building mechanical and electrical systems are original to the plant (circa1962) and are nearing or are past end of useful service life. As a result, additional plant maintenance effort is necessary to meet plant operational needs.

Scope of Work / Project Alternatives The work includes design and construction services for the replacement of numerous large-diameter butterfly valves and water-control gates throughout the low-lift, high-lift, filtration, and flocculator buildings. The low- and high-lift pumping units, flocculators and filters will all be improved considered the current and 20-year projected demands so that they are all right sized.

Other Important Info This work is included in the 2015 water master plan update. The aforementioned water master plan update also recommends that GLWA consider decommissioning treatment at the Southwest Water Treatment Plant if water demand continues to trend in a downward direction, which has been the case.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	14,314	14,314	0
2020	0	0		0	0	0	0	0	0	148,286	0	148,286	0
2019	0								148,286	0	0	148,286	0
2018								2,940	0	0	0	2,940	0

CIP Number: 113004
Project Title Southwest Water Treatment Plant, Raw Water Sampling Modifications

Project Status Closed
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Southwest
Location Wayne County - Outside Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**


Access manhole

Project Engineer/Manager Shakil Ahmed

Director Grant Gartrell

44.8
Project Score

Problem Statement Existing raw water sampling location include recycled decant flows from residual handling facilities and do not represent a true raw water sample. A new sample pump system located upstream of the recycled decant flows is needed to obtain a true raw water

Scope of Work / Project Alternatives This project will design the modifications necessary to eliminate the decant and recycle of solid handling flows from the raw water sample location serving the Southwest WTP. This project will provide for a representative raw water only sample that will improve process monitoring and associated chemical usage.

Other Important Info The construction contract, CON-247, was awarded and the notice to proceed issued to the contractor on May 1, 2018. The project is scheduled for completion in January 2019.

Challenges: Improvements may require another tap to the existing raw water tunnel requiring a plant shutdown (low lift pumping as a minimum). Coordination with operations required.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	787	35	0	0	0	0	0	0	822	0
2020	0	0	198	319	380	1	0	0	0	0	0	898	381
2019	0	142	165	1,054	1,785	206				0	0	3,352	3045
2018		100	3,100	2,309					0	0	0	5,509	5409

CIP Number: 113006

Project Title Southwest Water Treatment Plant Chlorine Scrubber, Raw Water Screens & Related Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Southwest

Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Southwest Water Treatment Plant

Project Engineer/Manager Shakil Ahmed

Director Grant Gartrell

68.2

Project Score

Problem Statement The existing chlorine gas scrubber is nearing its end of useful service life and its absorption media will be expiring within the next few years; and therefore requires replacement. Similarly, the existing raw water screening system are original to the plant (circa 1962), are not functional, and are beyond repair. As a result, this system also requires replacement. Both the chlorine gas scrubber and raw water screening systems will require ancillary equipment improvements related to electrical, alarms, instrumentation, and controls.

Scope of Work / Project Alternatives This project will be delivered under a design-build project delivery model. The existing gas chlorine scubber and raw water screens will be replaced with new system equipment meeting current building codes and industry best practices. The new gas chlorine scrubber and raw water screens that will be installed will be designed for current and projected water demans in accordance with the recommendations of the 2015 Water Master Plan Update project; therefore this new equipment will be right-sized.

Other Important Info GLWA intends to use the services of AECOM under its CIP program management contract to implement this design-build project.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	260	2,238	2,238	17	0	0	4,753	4753
2020	0	0		0	0	0	0	0	0	7,032	0	7,032	0
2019	0								7,032	0	0	7,032	0

CIP Number: 113007

Project Title Southwest Water Treatment Plant Architectural and Building Mechanical Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Southwest

Location Wayne County - Outside Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Southwest Water Treatment Plant

Project Engineer/Manager Shakil Ahmed

Director Grant Gartrell

36

Project Score

Problem Statement Most of the existing low- and high- lift pumping station and administration buildings' mechanical equipment (HVAC, dehumidification, plumbing) and architectural components such as doors, windows, floors, and furnishings, are over 50 years old; and therefore are beyond their normal useful service life. Additional architectural improvements at Southwest Water Treatment Plant will include renovation of staff locker rooms and bathrooms, including a restroom designed for female staff.

Scope of Work / Project Alternatives This project would be delivered using a design-bid-build project delivery method. The scope of work would generally include:

1. Design of the project.
2. Remove existing building mechanical and architectural systems.
3. Install new heating and ventilating systems process and administration areas.
4. Install new air-conditioning systems for administration areas.
5. Install new dehumidification systems for the high-lift header vault.
6. Install new interior and exterior doors and windows.
7. Install new lockers, bath fixtures, water closets, flooring, ceiling, and related items in men's locker rooms and bathrooms
8. Construct new locker room and related bath facilty for women's changing and bathing facilities.
9. Provide new furnishings for administration offices.

Other Important Info CS-1528 water master plan update included these improvements.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	98	98	0
2020	0	0		0	0	0	0	0	0	37,336	0	37,336	0

CIP Number: **113007**

Project Title **Southwest Water Treatment Plant Architectural and Building Mechanical Improvements**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0								37,336	0	0	37,336	0

CIP Number: 114001

Project Title Springwells Water Treatment Plant, 1958 Filter Rehabilitation and Auxiliary Facilities Improvements

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Treatment Plants and Facilities
Class Lvl 3	Springwells
Location	Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Springwells filter building

Project Engineer/Manager Khader Hamad

Director Grant Gartrell

62.2

Project Score

Problem Statement The existing filtration system equipment (i.e. filter media, surface wash sweeps, filter piping, filter control valves & operators, electrical, lighting, instrumentation and controls) in the 1958 Filter Plant are original to construction and are all well beyond their useful service life. Reconstruction of the 40 filters in the 1958 Filter Plant and 19 filters in the 1930 Filter Plant that have experienced failures to their plastic-block underdrains is required to maintain reliable water production from Springwells. The existing HVAC and dehumidification system serving both the 1958 and 1930 Filter Buildings is inadequate to maintain an environment suitable for modern electrical and controls equipment. The Administration Building Laboratory requires renovation to its facilities and HVAC to meet modern code and to provide an adequate space for laboratory functions.

Scope of Work / Project Alternatives This project includes the study, design (CS-1425) and construction assistance (CS-1425 and CS-200) of improvements to the Springwells WTP that includes the rehabilitation of the 1958 Filters, rehabilitation of failed 1930s Filters, update of Operation and Maintenance Manuals, and replacement of Phosphoric Acid feed system. Provide construction services to furnish and install new filter media, underdrains, filter valves, and rate controllers; replace the existing filter control consoles, hydraulic control valves with electric control valves, enclosures; add appurtenances to enable automatic backwashing of the filters; provide a Filter Aid Polymer System to the 1930 and 1958 filter complexes; Programmable Logic Controller-based controls for automatic control of the polymer system. Conversion of the overhead bridge cranes and elevators from DC to AC power, and upgrades to meet modern codes..

Other Important Info There are a total of 108 filters at the Springwells Water Treatment Plant. This project has reconstructed 59 of these filters, including all 40 filters at the 1958 filter building and 19 filters at the 1930 filter building. The 19 filters at the 1930 filter building were previously equipped with plastic-block underdrains with porous plates. These underdrains failed and were replaced with low-profile type 316 stainless steel, slotted direct-media retaining underdrains.

CIP Number: 114001

Project Title Springwells Water Treatment Plant, 1958 Filter Rehabilitation and Auxiliary Facilities Improvements

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	96,174	5,794	0	0	0	0	0	0	101,968	0
2020	0	0	89,310	7,978	0	0	0	0	0	0	0	97,288	0
2019	0	82,682	7,281	3,501						0	0	93,464	3501
2018	56759	20,353	310						0	0	0	77,422	310

CIP Number: 114002
Project Title Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [x] Reliability/Redundancy
- [x] NEWTP Repurposing
- [ ] **Project New To CIP**

High Lift Station showing high lift pump pits and windows to be replaced.

Project Engineer/Manager Erich Klun

Director Grant Gartrell

69.2

Project Score

Problem Statement Existing low- and high-lift pumping system electrical switchgear is original (1930s) and are well beyond their useful service life. This switchgear is unsafe, not reliable and is oversized for current and projected demands. In addition, the existing pumping units are a mix of 1930s and 1950s units and are also in need of either replacement or in the case of the pumps rehabilitation. The exterior windows on the pumping plant building are also original (1930s), are in poor condition and are not well insulated. As a result, all of the exterior windows on the pumping plant building need to be replaced with new, energy efficient windows.

Scope of Work / Project Alternatives This CIP project will be delivered under a design-bid-build project delivery using a single-prime engineering consultant and multiple prime construction contracts to deliver the entire built project. The scope of work generally includes:
1. Replacement of low- and high-lift pumping units, including pumps, motors, valves, and piping.
2. Replacement of exterior windows in the pump house, turbine house, boiler house, and switch house.
3. Replacement of medium-voltage electrical system.
4. Replacement of all pump isolation gates.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,080	4,039	7,113	12,893	18,905	18,690	19,175	92,940	175,835	76776
2020	0	0	498	2,607	5,985	9,302	13,724	13,724	26,145	42,831	0	114,816	68880
2019	0	22	463	1,433	2,481	1,453	11,228	8,675	59,748	0	0	85,503	25270
2018			1,500	2,000	12,500	22,000	21,500	26,500	0	0	0	86,000	59500

CIP Number: 114003
Project Title Water Production Flow Metering Improvements at Northeast, Southwest and Springwells Water Treatment Plants

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Springwells
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Water production flow metering device

Project Engineer/Manager Jorge Nicolas
Director Grant Gartrell

50.6
Project Score

Problem Statement Existing water production flow meters need to be rehabilitated to place back into reliable and accurate service.

Scope of Work / Project Alternatives Northeast Water Plant: rehabilitate 4 venturi meters, associated vaults, and replace 4 isolation gate valves.
Springwells Water Plant: rehabilitate 7 venturi meters and associated vaults.
Southwest Water Plant replace 4 venturi meters with new, including rehabilitation of the existing vaults.

Other Important Info Challenges: Removing and replacing existing meters in original piping requires isolation using existing yard piping and valving.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	6,333	2,149	0	0	0	0	0	0	8,482	0
2020	0	0	3,445	3,561	80	19	0	0	0	0	0	7,105	99
2019	0	186	704	2,506	2,506	1,257				0	0	7,159	6269
2018		1,000	8,800	2,100	1,000				0	0	0	12,900	11900

CIP Number: 114005

Project Title Springwells Water Treatment Plant, Administration Building Improvements & Underground Fire Protection Loop

Project Status Active

Class Lvl 1 Water

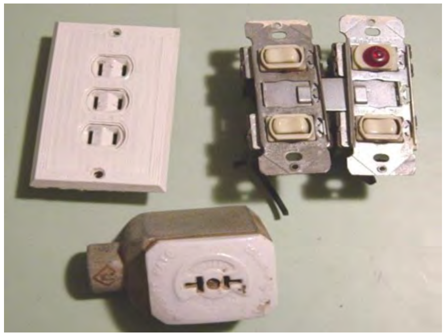
Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**



Outdated electrical outlets

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

67.4

Project Score

Problem Statement Existing administration building is nearly 90 years old with many of its facilities being original. The building needs architectural, plumbing and electrical improvements. Improvements will provide reliable fire protection to all plant facilities, replace non-functioning isolation valves and hydrants, provide fire system backflow protection, and bring the fire system into conformance with the requirements of the Dearborn Fire Marshal.

Scope of Work / Project Alternatives The work includes, but not necessarily limited to, removal and replacement of the existing plumbing piping, fittings, valves, plumbing fixtures, and any other necessary accessories. The existing underground fire protection line loops the Pump, Switch, Boiler and Turbine houses and is supplied water off the high lift headers in the Pump House Header Vault. The supply does not currently have backflow prevention and several branches off the loop used to feed an irrigation system serving the grassy areas covering the reservoirs, 1930 Sed. Basin and 1958 Sed. Basin. Isolation valves and fire hydrants are non-functioning and are beyond their useful life, and the old cast iron piping is susceptible to frequent breaks.

Other Important Info The project was first identified in the November 2002 Needs Assessment completed by Hazen & Sawyer under CS-1304. The opinion of probable construction at that time for just replacing the existing piping was $1,076,400.

Project History: The fire loop and appurtenances are original to the existing plant commissioned around 1930. The loop crosses the construction staging area (blue tarps shown in the Project Map from Contract SP-563) in the northeast corner of the site and has been exposed to heavy construction traffic over the years.

Challenges: . All plumbing needs to be replaced, the majority of which is existing walls. The underground facilities (e.g., electrical duct banks, gas service mains, fiber optic, tunnels, conduits, major pipelines, etc.) at Springwells have been modified several times since initially being commissioned around 1930.

CIP Number: 114005

Project Title Springwells Water Treatment Plant, Administration Building Improvements & Underground Fire Protection Loop

The new fire loop will cross a lot of buried utilities and structures, and identification of these facilities and showing them accurately in Contract Documents will be critical to minimizing interruptions/complications during construction. Even then, with all of the underground utilities between the Pump House and Administration Building, and between the Machine Shop/Garage and the 1930 Mixing Chamber, surprises during construction will be difficult to avoid.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	264	417	2,302	4,198	1,515	0	0	0	8,696	8015
2020	0	0		30	413	2,258	3,820	1,604	0	0	0	8,125	8095
2019	0			30	413	2,258	3,820	1,604		0	0	8,125	8125
2018				300	1,700				0	0	0	2,000	2000

CIP Number: 114006

Project Title Springwells Water Treatment Plant Replacement of 1958 Rapid Mixing Units

Project Status Closed

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Springwells WTP

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

69.4

Project Score

Problem Statement Existing rapid mixing units at the 1958 treatment train are not operable and are needed for effective water treatment at Springwells.

Scope of Work / Project Alternatives The work includes removal and replacement of all of the four rapid mixers including electrical, mechanical and structural components.

Other Important Info The construction contract, CON-251, was awarded and the notice to proceed issued to J.F. Cavanaugh on May 15, 2018. CON-251 is scheduled for completion in July 2019.

Challenges: Work requires treatment trains to be shut down to complete the installation/replacement, so coordination with operations and overall system demands required.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,017	14	0	0	0	0	0	0	1,031	0
2020	0	0	177	886	61	0	0	0	0	0	0	1,124	61
2019	0	104	123	1,284	211					0	0	1,722	1495
2018		100	875	275					0	0	0	1,250	1150

CIP Number: 114007

Project Title Springwells Water Treatment Plant Powdered Activated Carbon System Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing
- ☐ **Project New To CIP**

Springwells WTP

Project Engineer/Manager Justin Kietur

Director Grant Gartrell

46.6

Project Score

Problem Statement Powdered activated carbon (PAC) is added to the treatment process to control taste and odor issues in the raw water supply. Taste and odor issues are infrequent, but the existing PAC system is difficult to operate and maintain when called upon for use. A more operator friendly and easier to maintain system is needed. The plant is only able to feed PAC through extraordinary measures due to deficiencies in the system. These extraordinary measures create additional operations and maintenance expense and inefficiencies that should be corrected in the long term. If raw water quality deteriorates unexpectedly and taste and odor causing compound concentrations steadily increase replacement of the PAC system at an earlier date would be warranted.

Scope of Work / Project Alternatives Replacement of the existing powdered activated carbon system with a new system of a design that provides improved operations and maintainability when PAC dosing is needed.
The scope of work will generally include the following:
1)Repair of concrete and piping at the dry carbon delivery station and replacement of dust collectors.
2)Inspection of underground carbon slurry tanks and repair of damage to concrete and fiberglass lining.
3)Replacement of PAC transfer pumps and associated piping, valves and controls.
4)Replacement of PAC metering pumps and associated piping, valves and controls.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	63	4,125	4,188	63
2020	0	0		0	0	0	0	0	0	3,938	0	3,938	0
2019	0								3,939	0	0	3,939	0
2018					900	2,000			0	0	0	2,900	2900

CIP Number: 114008

Project Title Springwells Water Treatment Plant 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

52.8

Project Score

Problem Statement Existing sedimentation basin gates, guides and hoists are early 1930s and are in need of replacement. Also, operation of the sluice gates in their existing condition and design does not meet current best practices for safe maintenance and operation.

Scope of Work / Project Alternatives This CIP project is being delivered under a design-build project delivery method and generally includes the following scope of work:
1. Demolition of the existing eight (8) 1930 sedimentation basins gates, guides, and hoist.
2. Installation of the new eight (8) 1930 sedimentation basins gates, guides, and actuators.
3. Concrete restoration within the four (4) 1930 sedimentation basins.
4. Concrete repairs to the air vents, access ramp, access hatches on top of the 1930 sedimentation basin.
5. Electrical upgrades to the four (4) sedimentation basin gate houses.

Other Important Info Challenges: Work will require the 1930's plant to be shutdown during three low demand seasons to complete the work. This contractor will need to coordination with CON-170: Sludge Removal and Disposal for cleaning the sedimentation basins, SP-563, CON-253, and other construction projects to ensure that the system can handle the long duration shutdown.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	178	3,386	10,327	331	19	0	0	0	14,241	10677
2020	0	0		442	4,153	6,830	5,697	3	0	0	0	17,125	16683
2019	0			424	4,153	6,830	5,697	3		0	0	17,107	17107
2018			1,200	2,000	4,000	300			0	0	0	7,500	7500

CIP Number: 114009
Project Title SPW WTP Service Area Redundancy Study

Project Status Closed
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Springwells
Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Timothy Kuhns
Director Grant Gartrell

78
Project Score

Problem Statement Hydraulic analysis and Evaluation of options to maintain adequate pressure at Springwell's high pressure district. FROM 132010: Construction of West Service Center Division Valves is needed to convey Lake Huron flows through the West Service Center to the Springwells high service area while the Springwells raw water tunnel is out of service for repairs. Construction of active bypass around the Newburgh Pump Station.

Scope of Work / Project Alternatives This study involves hydraulic analyses and evaluation of options to transmit finished water from the Lake Huron Water Treatment Plant through the West Service Center in order to provide finished water to the Springwells Water Treatment Plant's high-pressure district. FROM 132010: Lake Huron WTP needs to provide flows to the Springwells high service area while the Springwells raw water tunnel is out of service for repair.

Other Important Info Challenges: N/A - Under Procurement. FROM 132010: Coordination with operations critical meet testing of existing valves. Isolation, shutdown and operation of Lake Huron and Springwells WTPs, North Service Center, and other facilities.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	311	0	0	0	0	0	0	0	311	0
2020	0	0	311	0	0	0	0	0	0	0	0	311	0
2019	0	193	145							0	0	338	0
2018		450							0	0	0	450	0

CIP Number: 114010
Project Title Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Springwells WTP - Pipe Main - Note the wood plug.

Project Engineer/Manager John McCallum

Director Grant Gartrell

72.2

Project Score

Problem Statement Six (6) of the seven (7) 72-inch mains leaving the site are original to the 1930 plant construction and consist of riveted steel pipe material. Main No. 7 is a prestressed concrete cylinder pipe material installed in 1958. The steel mains are known to be leaking and are in need of replacement to maintain system reliability. Additionally, isolation valves associated with the 72-inch mains need to be replaced because several are known to leak to the point where they are unable to isolate flow. It is suspected that the other large-diameter isolation valves are in similar poor condition. Other yard piping, including gravity sewers and miscellaneous utility piping are also 1930 and 1958 vintage and therefore require rehabilitation/renewal or replacement.

Scope of Work / Project Alternatives This project would be delivered using in phases using multiple design-build contracts developed and managed by AECOM under its CIP program management contract. The scope of work generally includes:
1. Replace and/or slip-line existing yard piping.
2. Replace and/or structurally reinforce high-lift header piping.
3. Replace existing isolation valves in the header vault.
4. Repace existing isolation valves in the yard piping.
5. Conduct site restoration work.

B) Replace and/or renew/rehabilitate all high-lift header and yard piping. Note that the limits of yard piping replacement will extend to the fence line and out to the first valve outside the fence line as well as the 1930 pipe along Warren from Indiana to McDonald Avenue.
C) This project also involves other site improvements, including replacement of access drives, construction of a new guard building, construction of trailer utility hook-up station, and other site miscellaneous site improvements.

Other Important Info This CIP will be delivered using a design-bid-build project delivery method. It is contemplated that there

CIP Number: 114010

Project Title Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements

will be one, single design engineering services contract that will design multiple construction contracts. The construction of the project would be released in separate construction contract packages that coincide with the as-designed plan to sequence the construction to maintain adequate service/plant operation during construction. It is not known at this time the number of construction contract packages that will be required. This will be determined during the design of the project when the design consulting engineer is under contract. This CIP will be updated at that point when better information is available.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	4	0	1	46	608	9,409	11,958	90,587	112,613	22022
2020	0	0		0	0	0	0	0	72	110,578	0	110,650	72
2019	0								110,129	0	0	110,129	0
2018				2,000	7,000	8,000	8,000		0	0	0	25,000	25000

CIP Number: 114011

Project Title Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

SP-563 – Rehabilitated 1958 Pipe Gallery (in progress)

Project Engineer/Manager Brian VanHall

62.4

Project Score

Director Grant Gartrell

Problem Statement The steam, condensate return, compressed air, and natural gas piping systems at the Springwells Water Treatment Plant need to be replaced to ensure overall reliability of the plant. These systems are original to the plant (i.e. from 1930s or 1950s) and are beyond their useful life. These existing steam and condensate systems are in poor condition and require multiple repairs each heating season due to frequent failures. These repairs often require taking the entire steam system out of service which places equipment at risk of freezing due to exposure to low temperatures. Some failures have occurred in difficult areas to access and have not been repaired over many seasons because they are cost prohibitive to repair. The active steam, condensate, and air leaks require that the steam generators and air compressors run at higher loads to keep up with demand, resulting in additional stress on this equipment and is not energy efficient. Leaking steam and condensate contribute to significant moisture and condensation within the facility, which creates ideal conditions for corrosion of other aging plant infrastructure critical for continued water production. Failure of these lines is unsafe to nearby personnel since steam and condensate could cause severe burns, and high pressure lines would result in fast moving air that can cause injury.

Scope of Work / Project Alternatives This project is being delivered using a design-bid-build project delivery method. This engineering services contract involves designing a new, more energy-efficient steam heating system for the entire Springwells Water Treatment Plant, including all steam unit heaters, steam piping, condensate return piping, condensate return pumping stations, steam pressure reducing valves, and appurtenances. This project also involves replacing the compressed air piping in the plant used for service air. Once completed, the project will provide energy savings by eliminating extensive steam and condensate leaking currently inherent in the antiquated system. This project includes design and construction administration (CS-1671) and construction (CON-252) to replace the leaking steam piping, condensate return piping and compressed air piping throughout the Springwells WTP. The scope of work includes replacing unit

CIP Number: 114011

Project Title Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements

heaters, radiators, condensate return pump stations, pressure reducing valves, regulators, and heating system appurtenances throughout the plant. Once completed, the project will provide energy savings by eliminating extensive steam and condensate leaking currently inherent in the antiquated system.

Other Important Info Many components of the existing system are original to the existing heating system, are not functioning and need to be demolished/removed. Seasonal work and sequencing with the heating season is required.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,373	6,948	6,932	6,932	713	0	0	0	23,898	14577
2020	0	0	473	3,109	5,392	7,754	8,261	0	0	0	0	24,989	21407
2019	0	280	450	1,406	4,824	4,654	7			0	0	11,621	10891
2018		300	3,450	2,500					0	0	0	6,250	5950

CIP Number: 114012
Project Title SPW WTP Water Treatment Plant 1930 Filter Building-Roof Replacement

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Springwells
Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Filter Building roof

Project Engineer/Manager Paula Anderson
Director Paula Anderson

61
Project Score

Problem Statement The existing roof over the 1930 filters is leaking in places and poses water quality concerns due to roof leaks.

Scope of Work / Project Alternatives This project encompasses replacement of the existing 1930 Filter Building roofing system, including the built-up roofing material, flashing, roof drains/conductors and sealing cap stones to prevent water from penetrating the building envelop and causing water damage. Construction activity under Contract SP-563 in 2014-2015 revealed that water damage has been on-going and is causing clerestory window lintel deterioration. Additionally, construction traffic under Contract SP-563 has shown the built-up material to be blistering and spongy.

Other Important Info Challenges: Seasonal construction work, and construction will require working around new rooftop equipment installed under SP-563.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	3,911	0	0	0	0	0	0	0	3,911	0
2020	0	0	1,124	2,788	0	0	0	0	0	0	0	3,912	0
2019	0		486	2,420						0	0	2,906	2420
2018		3,000							0	0	0	3,000	0

CIP Number: 114013
Project Title Springwells Water Treatment Plant, Reservoir Fill Line Improvements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Springwells
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☑ Water MP Right Sizing
☑ Reliability/Redundancy
☑ NEWTP Repurposing
☐ **Project New To CIP**


Springwells WTP

Project Engineer/Manager Khader Hamad
Director Grant Gartrell

77.2
Project Score

Problem Statement A new reservoir fill line to the Springwells Water Treatment Plant is needed to provide finished water to the Springwells high service area from the GLWA Southwest and Waterworks Park treatment plants while the Springwells raw water tunnel is rehabilitated under a separate contract. The new reservoir fill line will allow the Springwells high-lift pumping facility to operate and feed its high-pressure district while the treament works at Springwells are temporairly out of service. For example, there are times when the low-lift pumps need to be shutdown to allow for underwater inspection of the low-lift pump isolation gates and other raw water conveyance infrastructure upstream of the low-lift pumping station at Springwells.

Scope of Work / Project Alternatives This project is being delivered under a design-bid-build project delivery method. The scope of work generally includes:
1. Designing the project.
2. Constructing the new reservoir fill piping, flow control energy disappaiting valves, valve vault, and appurtenances.
3. Connecting new piping to existing 72-inch diameter steel water transmission main.
4. Commissioning and testing the new reservoir filling facility.
5. Restoring the site.

Other Important Info Potential delays due to isolation of 1926 main and coordination with CON-133 (WTP metering) requiring expercising and using old valves. Control of the reservoir filling operation by SCC with significant roles played by SWP, WWP, NEP and SPP operators.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,830	1,991	0	0	0	0	0	0	4,821	0
2020	0	0	332	2,849	1,551	0	0	0	0	0	0	4,732	1551

CIP Number: **114013**

Project Title **Springwells Water Treatment Plant, Reservoir Fill Line Improvements**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0	120	181	2,469	3,656	61	21			0	0	6,508	6207
2018		200	3,300	4,000					0	0	0	7,500	7300

CIP Number: 114015
Project Title Springwells Water Treatment Plant Emergency Grating Replacement

Project Status Closed
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Springwells
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Deteriorated support beams holding up Low Lift Station. Dewatering and Sump Pumps at Elev. 42'-0" (left). Deteriorated grating and access ship's ladder in Low Lift Station - Looking down at Elev. 50'-0" and 42'-0" from Elev. 62'-0" (right).

Project Engineer/Manager Erich Klun

Director Grant Gartrell

Project Score 100

Problem Statement Emergency replacement of original 1930 steel grating and structural steel in the Low Lift Station, Pump House Cable Vault and Garage basement (5 locations total).

Scope of Work / Project Alternatives Emergency replacement of original 1930 steel grating and structural steel in the Low Lift Station, Pump House Cable Vault and Garage basement (5 locations total).

Other Important Info Replacement of structural steel in the Low Lift Station required the demolition of pump Nos. 9 and 10, as well as the replacement of sump pump S1 and S2.

Challenges: Maintaining system operations during construction and eliminating the potential for flooding the Low Lift Station during construction. LOTO of low lift pumping units for diver work associated with plugging the suction line to pump Nos. 9 and 10.

Project History: Work was originally included in CS-1474, but due to reconsideration of system demands and putting SP-569 on hold, the structural improvements were necessary to protect the safety of operators and others working on-site.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	3,366	0	0	0	0	0	0	0	3,366	0

CIP Number: **114015**
Project Title **Springwells Water Treatment Plant Emergency Grating Replacement**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2020	0	0	2,737	729	0	0	0	0	0	0	0	3,466	0
2019	0	254	2,507	11						0	0	2,772	11
2018		500	2,000						0	0	0	2,500	2000

CIP Number: 114016

Project Title Springwells Water Treatment Plant 1958 Settled Water Conduits and Loading Dock Concrete Pavement

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

52

Project Score

Problem Statement The existing concrete pavement that covers the 1958 settled water conduits has failed with significant concrete deterioration and corrosion of the reinforcement embedded steel. The condition of the concrete pavement has become much worse over the past 12 months. The condition so bad that the concrete is friable and crumbling in many major areas. The conditions in certain areas are such that there are now potential safety hazards to those who have to walk on the pavement. The plant chemists have to walk some of the areas to obtain settled water samples at times. The concrete pavement over the 1958 settled water conduits also serves as a service road that provides vehicular access to the 1958 filter building. This paved service road also serves as the roof to the settled water conduit that conveys settled water to the 1958 filter train at Springwells.

Scope of Work / Project Alternatives This CIP project is being delivered under a design-bid-build project delivery method and generally includes the following scope of work:

1. Demolition of the existing concrete pavement that covers the 1958 settled water conduit and the loading dock.
2. Placement of new concrete pavement that covers the 1958 settled water conduit and the loading dock.
3. Demolition and installation of handrail around the 1958 settled water conduit.

Other Important Info Challenge: Equipment limitations on the settled water conduit and not damaging the structure concrete of the settled water conduit.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	94	1,663	7	0	0	0	0	1,764	1670
2020	0	0			206	656					0	862	862

CIP Number: 114017
Project Title Springwells Water Treatment Plant Flocculator Drive Replacements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Springwells
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Project Engineer/Manager Peter Fromm
Director Grant Gartrell

47
Project Score

Problem Statement The existing flocculator drives, motors, and control panels are beyond useful service life.

Scope of Work / Project Alternatives This CIP will be delivered under a design-bid-build project delivery model. The scope of work will generally include the following:
1. Replacement of the existing flocculator drives, motors, and control panels.
2. Replacement of all drive shaft bearings and associated grease lines.
3. Replacement of access doors between the flocculator chambers
4. Replacement of ladder rungs into all flocculators.
5. Improvement of flocculation system related instrumentation and controls.

Other Important Info Implementation of this CIP project is being sequenced and coordinated with another Springwells WTP CIP project, namely the 1930 Sedimentation Basins Sluice Gate Improvements Project.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	29	315	635	2,265	6,035	17	0	9,296	9267
2020	0	0					10	2,314	4		0	2,328	2328

CIP Number: 114018

Project Title Springwells Water Treatment Plant - Service Building Electrical Substation and Miscellaneous Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Springwells

Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [x] **Project New To CIP**

Project Engineer/Manager Justin Kietur

Director Terry Daniel

53

Project Score

Problem Statement The electrical substation located inside the Service Building provides electrical service to the entire service building including the filter wash water pumping units. The existing electrical substation is a double-ended unit that has experienced corrosion to its interior components and electrical cables. As a result the substation does not automatically switch-over during power trips and requires manual switch-over, which defeats the purpose of the automatic switch-over feature of the substation. This substation provides power to the filter wash water pumps and as a result when there are power disruptions associated with the substation, the plant is not able to wash filters. This situation causes water production issues at the plant whenever there are failures of the substation. Although certain components (e.g. breakers) of the electrical substation can be replaced, there are corroded internal electrical circuits, cables and contactors that cannot be replaced and are still causing problems with the substation's performance.

The electrical breaker panel located in the 1930 filter building is original construction and is severely corroded. This panel supplies power to a portion of the 1930 Filter Building and its failure would result in loss of water production capacity.

The concrete area of the phosphoric acid outdoor fill station is deterioated and the water service to the associated emergency eye-wash station suffers frequent breaks. The eye wash station is required to be in service for phosphoric acid deliveries and repair requires working in the tight confines of a pipe chase.

Scope of Work / Project Alternatives Project will be delivered using a design-build project delivery. The scope of improvements will generally include:

1. Replacement of the electrical substation in the 1958 Service Building
2. Connection of replacement electrical substation to Ovation for status monitoring
3. Replacement of electrical panel in 1930 plant and new conduit and cable runs to the associated

CIP Number: **114018**

Project Title **Springwells Water Treatment Plant - Service Building Electrical Substation and Miscellaneous Improvements**

equipment
4. Rehab of masonry on exterior of phosphoric acid fill station
5. Insulation of piping and pipe chase behind phosphoric acid fill station
6. Installiation of tank level gauges and alarms at fill station to prevent overfilling of chemical storage tanks

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	90	1,378	40	0	0	1,508	1508

CIP Number: 115001

Project Title Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Water Works Park

Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☑ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☑ NEWTP Repurposing

☐ **Project New To CIP**

Pumps and Piping

Project Engineer/Manager Timothy Kuhns

Director Grant Gartrell

65.4

Project Score

Problem Statement Most of the existing yard piping is greater than 100 years old and requires replacement with new piping installed in a more efficient configuration.

Scope of Work / Project Alternatives This project is being delivered using a design-bid-build project delivery method. The scope of work generally includes:

1. Designing the project.
2. Removing existing yard piping, valves and buried venturi meters and related vaults.
3. Constructing new yard piping, valves, water production flow meters, buried valve and meter vaults, and related system equipment.
4. Connecting to existing transmission main piping.
5. Testing and commissioning the new main, valves and water production flow metering equipment.
6. Restoring the site.

Other Important Info This project is being coordinated with the new Waterworks Park to Northeast Transmission Main.

Challenges: Complicated sequence of construction, and demands of DWSD must be maintained along with coordination transmission system between Water Works Park and Northeast WTPs. Condition of existing valves required to complete the work is unknown. Complex construction staging is accounted for in the design to avoid loss of service and delays to the construction contract.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,760	251	5,462	13,349	21,478	20,883	8,836	0	72,019	70008
2020	0	0	682	899	17,333	17,333	17,333	0	0	0	0	53,580	51999
2019	0	9	412	968	20,771	34,466	14,397	28		0	0	71,051	70630

CIP Number: **115001**

Project Title **Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018			5,500	27,900	20,500				0	0	0	53,900	53900

CIP Number: 115003
Project Title Water Works Park Water Treatment Plant Comprehensive Condition Assessment

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Water Works Park
Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Waterworks Park WTP

Project Engineer/Manager Michael Dunn
Director Grant Gartrell

35.6
Project Score

Problem Statement A condition assessment of Waterworks Park Water Treatment Plant has not been completed since the 2004 reconstruction. Condition assessment is needed to identify critical assets in need of repair or replacement.

Scope of Work / Project Alternatives A condition assessment of Waterworks Park Water Treatment Plant has not been completed since the 2004 reconstruction. Continued and periodic inspection of the Water Treatment Plant is needed to maintain a reliable production system, especially given the reliance on Waterworks Park to provide finish water to the Northeast Service Area.

Other Important Info Contract No. 147 with Hubbell, Roth & Clark is underway.

Challenges: Coordinating shutdowns required for condition assessment inspections.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	514	68	0	0	0	0	0	0	582	0
2020	0	0	440	262	153	0	0	0	0	0	0	855	153
2019	0		131	262	153					0	0	546	415
2018		200	375						0	0	0	575	375

CIP Number: 115004
Project Title Water Works Park Water Treatment Plant Chlorine System Upgrade

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Water Works Park
Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

The Water Works Park Chlorine System has experienced several leaks and requires complete replacement. The Water Works Park storage room will have an updated scrubber system to neutralize up to 4000 lbs. of chlorine gas

Project Engineer/Manager Michael Dunn

Director Grant Gartrell

Project Score 84

Problem Statement The existing gas chlorine feed system has experienced numerous leaks and has compromised the safety of plant personnel. In addition, the chlorine gas leaks caused significant damage to all equipment inside the chlorine storage room. Secondary damage also occurred to equipment in adjacent rooms.

Scope of Work / Project Alternatives This project is being delivered under a design-bid-build project delivery method. The scope of work generally includes the following:
1. Removal of existing chlorine feed system, including evaporators, feeders and associated electrical, instrumentation and control equipment.
2. Installation of new chlorine evaporators, feeders, and associated electrical, instrumentation and control equipment.
3. Installation of new heating, ventilating and air-conditioning system equipment in the chlorine storage, feeder and adjacent electrical equipment room.
4. Installation of new gas chlorine scrubbing system.
5. Installation of new Ovation monitoring and control system for the entire chlorine disinfection system at WWP.

Other Important Info Project History: The WWP facility began serving customers with finished water in 2003. More recently, the chlorine system has had one major leak and several minor leaks on a recurring and more frequent basis. Since chlorine is a highly toxic material, yet integral for providing finished water in accordance with the Safe Drinking Water Act, a study and design project was initiated under the CIP allowance as project CS-1721. This construction project will be based on the study and design conducted under that work. In

CIP Number: **115004**

Project Title **Water Works Park Water Treatment Plant Chlorine System Upgrade**

addition, the original design was oversized relative to the current operating conditions and resulted in operational problems due to the turndown required.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

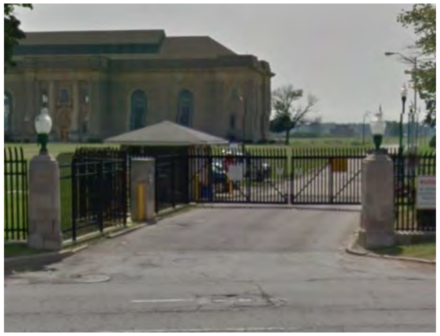
CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	6,686	754	0	0	0	0	0	0	7,440	0
2020	0	0	2,527	4,196	2,047	1	0	0	0	0	0	8,771	2048
2019	0	371	672	3,124	2,878	4				0	0	7,049	6006
2018		290	700	8,700					0	0	0	9,690	9400

CIP Number: 115005
Project Title WWP WTP Building Ventilation Improvements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Water Works Park
Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**



Water Works Park

Project Engineer/Manager Michael Dunn

Director Terry Daniel

76

Project Score

Problem Statement The existing ventilation systems are not adequate for the chemical storage rooms, the ozone generator room, ozone destruct room, laboratory rooms, pilot plant rooms, flocculation and sedimentation rooms, and filter galleries at the Water Works Park Water Treatment Plant. Inadequate ventilation poses safety hazards to employees and visitors alike.

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. The scope of work will generally include the following:
1) Design of the improved, new ventilation systems for the facility.
2) Selective removal of existing ventilation system equipment.
3) Construction of new mechanical ventilation systems.
4) Installation of electrical feeders for new mechanical ventilation equipment.
5) Installation of new instrumentation equipment for monitoring and alarms, including necessary interlocks with the process control network.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	1,614	1,999	3,610	2,539	379	0	0	10,141	8527
2020	0	0		7	507	3,907	650	0	0	0	0	5,071	5064

CIP Number: 115006
Project Title Water Works Park Site/Civil Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Water Works Park
Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Water Works Park

Project Engineer/Manager Michael Dunn
Director Grant Gartrell

39.4
Project Score

Problem Statement Many of the existing roadways and pedestrian side walks have substantial cracking, crumbiling concrete and un-even surfaces whose condition becomes worse every year. The concrete bases for several portions of the site perimeter security fencing are also heavily deteriorated with crumbling concrete. Additionally, there is not sufficient employee and visitor parking space for the facility and new parking areas are needed to meet the needs of employees and visitors alike. Furthermore, there is no truck vehicle weight scale on site to verify the quantities of chemicals delivered to the site from suppliers, as well as to verify quantities of dewatered sludge transported off site for disposal. Currently, vendor-generated quantities are used soley for payment purposes putting GLWA at a disadvantage whenever disputes arise regarding amounts invoiced. Lastly, there are several areas throughout the grounds with concrete in a poor condition that requires rehabilitation to extend its service life.

Scope of Work / Project Alternatives This project will be delivered using a design-build project delivery. The schedule is predicated on using AECOM's design build assistance services under its CIP Program Management Contract CS-272. The scope of work for this project generally includes the following:
1. Construct 30 car parking lot adjacent to plant employee lot.
2. Construct 20 car parking lot across from maintenance garage to serve as GLWA vehicle parking.
3. Construct 10 car parking lot across from engineering building to serve as visitor parking.
4. Construct 20 car parking lot adjacent to current engineering building lot.
5. Install sidewalk from new proposed security entrance to flag pole.
6. Install hardscape, softscape, and signage on engineering building.
7. Install truck weigh scale.
8. Repair perimeter fencing and support structures.
9. Install access hatch for screen house catch basin.
10. Repair misc. concrete defects by shallow spall repair and crack injections.
11. Remove and replace areas of failing roadway.

CIP Number: 115006
Project Title Water Works Park Site/Civil Improvements

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	5,643	5,643	0

CIP Number: 116002

Project Title Pennsylvania and Springwells Raw Water Supply Tunnel Improvements

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Treatment Plants and Facilities
Class Lvl 3	General Purpose
Location	City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Crown cracks are especially concerning in the Springwells Raw Water Tunnel

Project Engineer/Manager Todd King

Director Grant Gartrell

Project Score

Problem Statement Significant structural distress in the form of cracking and ovality have been detected in the Pennsylvannia, Northeast and Springwells raw water tunnels that deliver raw water to the Northeast and Springwells Water Treatment Plants. The extent and magnitude of the distress requires that these segments of tunnel be rehabilitated and restored to provide renewed structural intergrity and consequently reliability.

Scope of Work / Project Alternatives This project is being delivered using a progressive design-build project delivery method. The scope of work generally includes supplemental remove operated vehicle (ROV) and personnel diver underwater, detailed investigations to determine the nature, magnitude and extent of total tunnel rehabilitation required. The detailed investigations are also used to collect sufficient information and data to determine the preferred design and construction approach best suited to the conditions identified during the detailed underwater investigations. The investigation work of DB-150 focused on those sections of tunnel where concerns were observed during the condition assessment work conducted under former DWSD Contract No. CS-1623. Three areas were identified including the Pennsylvania Tunnel at Water Works Park (non structural rehab), Northeast Raw Water Tunnel (structural rehab) located in the Outer Drive greenbelt and the highest concern being a portion of the Springwells Tunnel near the Springwells WTP (structural rehab). Project alternatives evaluated included tunnel dewatering with rehab done in dry conditions along with tunnel bypass pumping; new tunnel construction, and tunnel rehab in the wet using underwater diver teams. The DB-150 project approach will involve the latter alternative to rehab the tunnel sections of concern.

Other Important Info The tunnels are approximately 80 to 100 feet below ground surface. Dewatering the tunnels to repair them will create extensive stresses that must be considered prior to performing the work. Maintaining a supply of raw water to Springwells, Northeast and Water Works Park throughout construction to meet finished water production requirements/demands of the system. Specialized/complicated construction.

CIP Number: 116002

Project Title Pennsylvania and Springwells Raw Water Supply Tunnel Improvements

Project History: Portions of the Raw Water Tunnel system are approaching 100 years of service. The Northeast Tunnel failed catastrophically in the late 80s due to infiltration of sand through cracking. This project is based on the recommendations of CS-1623, currently underway, which is inspecting all GLWA raw water tunnels.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	10,200	653	14,138	21,917	8,810	5,527	0	0	61,245	50392
2020	0	0	2,178	7,513	5,467	5,467	5,467	3,998	0	0	0	30,090	20399
2019	0	10	3,625	9,042	5,468	5,468	5,468	3,998		0	0	33,079	29444
2018		500	2,000	10,000	15,000	4,900			0	0	0	32,400	31900

CIP Number: 122001
Project Title Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road

Project Status Closed
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location Macomb County

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

A large water main

Project Engineer/Manager Khader Hamad

Director Grant Gartrell

Project Score

Problem Statement Paralleling original 36" water main that is critical to the supply of three communities and has had history of breaks

Scope of Work / Project Alternatives This project will provide for the installation of approximately 35,650 feet of parallel 42-inch diameter pre-stressed embedded concrete cylinder pipe (PCCP) and approximately 1,070 linear feet of 36-inch diameter of PCCP in 24 Mile Road from Rochester Station to Romeo Plank Road. The work will also provide for all interconnections and valves.

Other Important Info Challenges: N/A - Pending Closeout

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	33,246	0	0	0	0	0	0	0	33,246	0
2020	0	0	33,566	0	0	0	0	0	0	0	0	33,566	0
2019	0	32,571	2,813							0	0	35,384	0
2018	26926	2,367	715						0	0	0	30,008	715

CIP Number: 122002
Project Title Replacement of Five (5) PRV Pits of Treated Water Transmission System

Project Status Closed
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

An example PRV

Project Engineer/Manager Eric Kramp

Director Grant Gartrell

Project Score

Problem Statement Replacement of the PRVs to enhance operability of the system and improve control of the system to meet customer pressure needs

Scope of Work / Project Alternatives This project has replaced five existing pressure reducing valves (PRVs) that were defective and no longer controlling downstream pressures. During the replacement, the PRV pits were upgraded to improve accessibility, provide new sump pumps as needed, and make other necessary improvements to operations.

Other Important Info Challenges: N/A - Closed

Project History: Change Order Number one has been executed, and contractor final payment issued.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,785	5	0	0	0	0	0	0	2,790	0
2020	0	0	1,844	804	0	0	0	0	0	0	0	2,648	0
2019	0	1,697	670							0	0	2,367	0
2018	1015	1,205							0	0	0	2,220	0

CIP Number: 122003
Project Title Water Works Park to Northeast Transmission Main

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Field Services
Class Lvl 3	Transmission System
Location	City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☑ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☑ NEWTP Repurposing

☐ **Project New To CIP**

Project Engineer/Manager Timothy Kuhns

Director Grant Gartrell

Project Score 62.4

Problem Statement The 2015 GLWA Water Master Plan update indicated that the regional system has significant excess capacity for water treatment compared to projected water demands. The analysis contained in the Water Mater Plan update indicated that for average day demand conditions, the five WTPs typically operate between 23 percent to 35 percent of the rated treatment capacity and for maximum day demand conditions, the five WTPs typically operate between 38 percent to 67 percent of the treatment rated capacity. To address this imbalance, the Water Master Plan update recommended a program to reduce the regional treatment capacity to better align it with future system water demands. In order to align treatment capacity and projected system demands, the 2015 Water Master Plan update recommended that a new water transmission system be constructed from the Water Works Park WTP to the Northeast WTP to provide finished water to the Northeast reservoirs from the Water Works Park WTP. Under this recommendation, low lift and treatment facilities would be decommissioned at the Northeast WTP and the high-lift pumps/reservoirs at the Northeast WTP will be repurposed to function as a booster pump station to re-pump the treated, finished water delivered to the Northeast WTP site from the Water Works Park WTP through the new water transmission main system. the finished water reservoirs and high lift station at Northeast could be left in service such that the site could operate as a booster station moving forward.

Scope of Work / Project Alternatives This project includes three separate construction phases for the completion of the overall water transmission system from Water Works Park to Northeast:
(1) Phase 1 - Construction of 84-inch yard piping and a Flow Control Facility at the Northeast site.
(2) Phase 2 - Construction of 19,000 feet of 81-inch water transmission main (WTM) from the Northeast site to the intersection of Harper/Venice
(3) Phase 3 - Construction of 3,000 feet of 81-inch WTM from intersection of Harper/Venice to the intersection of South Edsel Ford Service Drive/Garland, construction of 6,700 feet of 66-inch WTM from the intersection of the South Edsel Ford Service Drive/Garland to the intersection of Hurlbut/Sylvester.

CIP Number: 122003

Project Title Water Works Park to Northeast Transmission Main

Other Important Info Challenges: Construction of large diameter WTM in the road ROW north of I-94. Identification of as-built host pipe condition for Hurlbut, Bewick, and Garland Mains to maximize I.D. of liner pipe.

This project was recommended as part of the 2015 Water Master Plan Update to align treatment capacity with decreasing water demands.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,611	1,169	11,703	18,407	18,678	18,170	20,839	65,949	157,526	87797
2020	0	0	1,655	1,121	871	15,786	24,115	29,615	29,994	30,115	0	133,272	100381
2019	0	19	1,305	1,372	8,622	17,547	46,022	30,722	25,270	0	0	130,879	104285
2018			1,500	5,000	10,000	74,000	2,000	37,500	0	0	0	130,000	92500

CIP Number: 122004

Project Title **96-inch Water Transmission Main Relocation and Isolation Valve Installations**

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Field Services
Class Lvl 3	Transmission System
Location	Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Map of the 96-inch main relocation away from the landfill

Project Engineer/Manager Grant Gartrell

65.2

Project Score

Director Grant Gartrell

Problem Statement Project critical to providing isolation and redundancy to Lake Huron WTP supply, while protecting the water supply from potential contamination at the G&H Landfill. Project includes relocation around existing superfund landfill addition of isolation valves along the 96-inch water transmission main.

Scope of Work / Project Alternatives Relocate 2.5 miles of 96-inch transmission main currently located in an EPA NPL landfill, a portion of which is submerged in landfill leachate. Relocation includes crossing the Clinton River, coordination with many various authorities having jurisdiction and easement acquisition. Isolation valve installation portion of the project provides the ability to isolate segments of the 96-inch main between Imlay Station and North Service Center for maintenance while maintaining customer expected level of service.

Other Important Info Challenges: Shutdown, continued customer service, isolation valve installations while maintaining the Lake Huron WTP supply to Rochester Station. Property acquisition will be required for the chesterfield temporary booster station and East Pond Creek discharge facility for relocation around the landfill.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,790	2,549	5,267	15,765	19,937	19,797	19,797	59,969	144,871	80563
2020	0	0	1,130	837	5,000	6,000	26,453	35,886	23,453	33,907	0	132,666	96792
2019	0	460	570	1,797	2,644	895	23,087	45,825	57,389	0	0	132,667	74248
2018		500	1,500	6,000	35,900	31,700	31,700	31,700	0	0	0	139,000	106800

CIP Number: 122005
Project Title Schoolcraft Road Water Transmission Main

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**


Water main replacement

Project Engineer/Manager Nick Hoffman

Director Grant Gartrell

42

Project Score

Problem Statement We currently operate an existing 48-inch water trasnmission main on West Bound Schoolcraft Road. This existing PCCP transmission main was manufactured by Interpace Corporation which has a long documented history of PCCP failures due to manufacturing means and methods of the pre-stressed wires. Due to excessive breaks over the years and the downstream effect on customers, we are improving the transmission system reliability and redundancy by installing a new 48-inch water transmission main on Eastbound Schoolcraft Road.

Scope of Work / Project Alternatives Design and Construction of approximately 12,000 linear feet of new PCCP or Carbon Steel 48-inch water transmission main along Eastbound Schoolcraft service drive between Middlebelt and Beech Daly. Including isolation valves, blowoff's, valve vaults, manhole entrances and related appurtenances. Upon completion and tie-in of the new Eastbound Schoolcraft transmission main the existing will be abandoned in place.

Other Important Info Designed under CS-1488 by Somat Engineering

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	141	3,342	13,141	1,482	0	0	0	0	18,106	14623
2020	0	0	4	180	8,100	9,145	633	0	0	0	0	18,062	17878
2019	0		16	50	6,249	6,899	591			0	0	13,805	13789
2018				7,300	7,250				0	0	0	14,550	14550

CIP Number: 122006
Project Title Wick Road Water Transmission Main

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Field Services
Class Lvl 3	Transmission System
Location	Wayne County - Outside Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**


Transmission main

Project Engineer/Manager Nick Hoffman

Director Grant Gartrell

54.2
Project Score

Problem Statement Existing water main from Wick Station to Ypsilanti station has history of excessive breaks. Additionally, the main is the only primary connection between the two facilities with multiple community Master Meters along its alignment. A break in this line is disruptive to several communities dependent upon the failure location. The intent is to improve the transmission system reliability/redundancy by means of constructing a parallel 48-inch water main along Wick Road.

Scope of Work / Project Alternatives Design and Construction of the new 48-inch transmission main along Westbound Wick Road in Romulus, MI including isolation valves and interconnects that will tie-in with the existing main along the alignment. Completion of this project will alleviate pressures and potential transients between the two mains, as well as increase reliability/redundancies in the general area.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	420	6,163	9,975	5,780	0	0	0	0	22,338	15755
2020	0	0	126	1,370	18,028	12,334	60	0	0	0	0	31,918	30422
2019	0	23	16	1,743	12,373	10,154	10			0	0	24,319	24280
2018		10,000	9,350						0	0	0	19,350	9350

CIP Number: 122007
Project Title Merriman Road Water Transmission Main Loop

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☑ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Water main installation

Project Engineer/Manager Jacob Mangum
Director Grant Gartrell

61.6
Project Score

Problem Statement Currently, several member partners (served by master meters WL-08, WL-03, WL-01, WL-12, WY-01, RS-01, GC-03) are fed by a single 36-inch water transmission main along Michigan Avenue. Construction of this proposed Merriman Road transmission main will provide a second feed to these member partners and therefore provide redundancy. Additionally, construction of this proposed Merriman Road transmission main improves and reinforces water service delivery to the point where the Michigan Avenue Booster Pumping Station is not needed anymore. Therefore, as was recommended in the 2015 Water Master Plan Update, this proposed project is also a predecessor project to decommissioning the Michigan Avenue Booster Station.

Scope of Work / Project Alternatives This project involves design and construction services associated with the installation of 2 miles of new 30-inch transmission main along Merriman Road between Glenwood and Marquette Roads. Alternatives evaluated included new main on either:
1. Hannon Road (rejected because of its poor route relative to other options)
2. Newburgh Road (rejected because it is not technically feasible as it will not meet contract pressures.
3. Merriman Road (accepted because it is superior in its transmission capabilities, routing and opportunity to decommission the Michigan Avenue Pump Station).

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	15	390	1,297	19,755	21,457	1702
2020	0	0		0	0	0	0	30	5,209	0	0	5,239	5239
2019	0		6	653	1,611	2,076	901			0	0	5,247	5241
2018			1,800	2,200					0	0	0	4,000	4000

CIP Number: 122009
Project Title Water System Improvements in Joy Road from Southfield Road to Trinity

Project Status	Closed
Class Lvl 1	Water
Class Lvl 2	Field Services
Class Lvl 3	Transmission System
Location	City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing
- ☐ **Project New To CIP**


Water main being laid

Project Engineer/Manager Khader Hamad

Director Grant Gartrell

Project Score

Problem Statement Replacement of original piping with excessive break history with new ductile iron main along Wayne County roadway.

Scope of Work / Project Alternatives The work consists of replacement of existing distribution mains and existing 24-inch transmissions mains, including gate valve, blow offs, air release valves and other appurtenances along Joy Road from Southfield Freeway to Trinity Road in the City of Detroit. A portion of this work is part of the Retail system (not included in this amount) CIP No. 463. Joy Road is also a significant Wayne County roadway within Detroit and a DDOT bus route.

Other Important Info Challenges: N/A - Pending Closeout

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	149	0	0	0	0	0	0	0	149	0
2020	0	0	107								0	107	0
2019	0	107								0	0	107	0
2018	8323	100							0	0	0	8,423	0

CIP Number: 122010

Project Title Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from

Project Status Closed

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing
- ☐ **Project New To CIP**

Water main being replaced

Project Engineer/Manager Eric Kramp

Director Grant Gartrell

Project Score

Problem Statement Original piping has history of excessive breaks; replacing to minimize disruption in high-traffic area

Scope of Work / Project Alternatives Work includes replacement of approx. 18500 ft. of existing water main with 8", 12", and 16" DI pipe along both Joy Rd and Davison. The scope of work also includes approx. 5300 ft. of 24" DI pipe along Joy Rd. A portion of this work is part of the Retail system (amounts not included) CIP No. 463.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0		0	0	0	0	0	0	0	0	0	0
2019	0		16							0	0	16	0
2018		1,370	1,106	652					0	0	0	3,128	1758

CIP Number: 122011
Project Title Park-Merriman Road Water Transmission Main

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Field Services
Class Lvl 3	Transmission System
Location	Wayne County - Outside Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Water main being installed

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

30.2

Project Score

Problem Statement Currently, most of the wholesale master meters serving the cities of Wayne and Westland are fed off a single, "dead-end" transmission main, which provides no redundancy in service aside from customer lateral distribution opportunities. Additionally, Wayne, Westland and Inkster have deduct wholesale meters that are fed off the single, "dead-end" transmission main. Construction of this new 24-inch water main will create a loop for these member partners and thereby eliminate the single, "dead-end" main. Direct meter connections will be made to the new 24-inch transmission main so that all deduct water meters will be eliminated as part of this CIP project.

Scope of Work / Project Alternatives This CIP project is being delivered under a design-bid-build project delivery method and generally includes the following scope of work:
1. Construction of 7,000 linear feet of 24-inch diameter ductile iron water transmission main, which includes 2 directional drills to install this main under the lower Rouge River, and 1 jack-and-bore to install this main under Michigan Avenue.
2. Constructing 2 new wholesale master meters and associated vaults for the city of Wayne.
3. Associated park improvements where the new transmission main is installed through the Wayne County Venoy-Dorsey Park.

Other Important Info Challenges: Shutdowns to connect the two new meters with the City of Wayne. The water pressure during these two shutdowns will be reducers and coordination will need to take place with the City of Wayne, their residents and local businesses.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	988	4,474	2,163	0	0	0	0	0	7,625	2163
2020	0	0	156	1,067	4,737	2,237	6	0	0	0	0	8,203	6980

CIP Number: 122011

Project Title Park-Merriman Road Water Transmission Main

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0		23	955	3,676	1,549	6			0	0	6,209	6186
2018			1,800	2,200					0	0	0	4,000	4000

CIP Number: 122012
Project Title 36-inch Water Main in Telegraph Road

Project Status Pending Closeout
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Water main ready to install

Project Engineer/Manager Khader Hamad

Director Grant Gartrell

45.6

Project Score

Problem Statement Excessive joint leaks warrant replacement; new water line to be placed in greenbelt

Scope of Work / Project Alternatives This project includes installation of approximately 10,530 feet of 36-inch dia. water main in Telegraph Road from Cherry Hill to Warren Ave.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	9,959	0	0	0	0	0	0	0	9,959	0
2020	0	0	9,418	155	0	0	0	0	0	0	0	9,573	0
2019	0	8,125	2,257	3						0	0	10,385	3
2018		2,000	5,061						0	0	0	7,061	5061

CIP Number: 122013
Project Title 14 Mile Transmission Main Loop

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location Oakland County

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Project Engineer/Manager Sara Mille
Director Grant Gartrell

Project Score 58.4

Problem Statement The 14 Mile Transmission Main that currently serves West Bloomfield Township, Farmington Hills, Commerce Township, Novi, Walled Lake, and Wixom is a single feed transmission system. If a disruption to service were to occur on this transmission main, many of the users along this main would experience a complete loss of pressure and flow. This project would provide a transmission main loop to the 14 Mile system to increase redundancy on this branch of the system.

Scope of Work / Project Alternatives Install approximately 6 Miles of 48-inch transmission main from 8 Mile Road to 14 Mile Road. It also includes construction of approximately 1 mile of new 24-inch parallel transmission main along 14 Mile from M-5 to west of Decker Road to reinforce the 14 Mile Transmission System.

The work will also include connections to the yard piping and reservoir fill line at the Haggerty Booster Station as well as a control valve to regulate flows along the transmission main.

Other Important Info GLWA is collaborating with the City of Novi on the potential to provide an additional master meter connection with Novi along Napier Road where the new 48-inch tranmission main will be installed.
Project History: The 2015 Water Master Plan Update included a recommendation to evaluate options along this branch of the system to increase redundancy. Since that recommendation, GLWA Water Supply Operations Engineering performed a hydraulic analysis of redundancy alternatives for the 14 Mile Transmission System. The results of the hydraulic analysis was presented at the May 15, 2017 and September 19, 2017 Analytical Work Group Meetings and based on the discussion at these meetings, the Haggerty Loop Option described in the scope of work appears to be the preferred alternative.

Challenges: Routing and construction staging for the proposed piping in the vicinity of the Haggerty and 8 Mile Intersection appears to be a significant challenge as this intersection is one of the highest traffic volume intersections in Southeast Michigan.

CIP Number: 122013
Project Title 14 Mile Transmission Main Loop

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	638	3,762	1,194	17,085	17,085	17,085	17,085	7	73,941	69534
2020	0	0		0	751	1,315	1,507	13,420	12,000	25,433	0	54,426	28993
2019	0				751	1,315	1,507	13,420	37,433	0	0	54,426	16993
2018		1,300	10,500	12,000	6,000				0	0	0	29,800	28500

CIP Number: 122016
Project Title Downriver Transmission Main Loop

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Field Services
Class Lvl 3	Transmission System
Location	Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

58.4

Project Score

Example transmission main

Project Engineer/Manager Sara Mille

Director Grant Gartrell

Problem Statement The Downriver Transmission Main that currently serves Brownstown, Riverview, Woodhaven, Trenton, Flat Rock, Gibraltar, Rockwood, South Rockwood, Berlin Township, and Grosse Isle is a single feed transmission system. If a disruption to service were to occur on this transmission main, many of the users along this main would experience a complete loss of pressure and flow. The number of users that would experience pressure loss would depend on the location of the break. This project would provide a transmission main loop to the Downriver system to provide redundancy on this branch of the system.

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. The scope of work generally includes: installing approximately 9 miles of 16-inch transmission main and 1 mile of 24-inch transmission main paralleling the existing Allen Road/Dixie Highway transmission main and install 4 miles of 30-inch transmission main along Inkster road between Wick and Pennsylvania road. This will provide redundancy to the Downriver communities of Brownstown, Riverview, Woodhaven, Trenton, Flat Rock, Gibraltar, Rockwood, South Rockwood, Berlin Township, and Grosse Isle. The project's scope will also include the demolition of the Electric Avenue Booster Pumping Station reserviors, as well as replacement of the city of Trenton's billing meters.

Other Important Info Completion of the Downriver Transmission main loop is predicated on acquiring ownership of a portion of 24-inch transmission main owned but not used by the City of Trenton. As of this CIP update, the acquisition of this Trenton main is nearing completion.

Project History: The 2015 Water Master Plan Update included a recommendation to evaluate options along this branch of the system to increase redundancy. Since that recommendation, GLWA Water Supply Operations Engineering performed a hydraulic analysis of redundancy alternatives for the Downriver Transmission System. The results of the hydraulic analysis were presented at the May 15, 2017, September 19, 2017, May 31,2018, and February 26, 2019 Analytical Work Group Meetings and based on the discussion at these meetings the approach described in the scope of work was determined as the

CIP Number: 122016
Project Title Downriver Transmission Main Loop

best alternative.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	24	1,398	1,748	3,793	7,984	8,007	7,984	6,806	37,744	29516
2020	0	0		0	297	964	3,051	10,763	22,122	0	0	37,197	37197
2019	0				297	964	3,051	10,763	22,122	0	0	37,197	15075

CIP Number: 122017
Project Title 7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Project Engineer/Manager Timothy Kuhns
Director Grant Gartrell

84.2
Project Score

Problem Statement The primary driver of this project is to provide back up water service from Springwells WTP to the Water Works and Northeast Service Areas in case of loss of service to the Water Works Park WTP or Northeast WTP.
The secondary driver to this project is to support Northeast WTP repurposing by providing a second finished water supply main to the Northeast site to support maximum day demands for the Northeast service area, which can be as high as 190 MGD. With the upcoming decommissioning of treatment at the Northeast WTP, Water Works Park will provide 150 MGD of finished water to the Northeast high lift pumping system to provide service to the existing Northeast service area, which means that 40 MGD must be delivered from other water treatment plants during the maximum day demand conditions. 7 Mile/Nevada Transmission Main provides transmission between the Springwells and Water Works Park Service areas and will provide needed redundancy once Northeast WTP treatment is decommissioned.

Scope of Work / Project Alternatives Project includes inspection and rehab of the 7 Mile/Nevada Transmission Main and construction of a new flow control station at Carrie/Nevada.

Other Important Info This project highlights the need to reinforce the transmission system in order to reliably provide service during existing conditions and after treatment is decommissioned at the Northeast WTP. This project would be completed regardless of whether the Northeast WTP treatment is decommissioned.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	74	1,794	3,510	9,223	7,620	7,572	30,784	60,577	29719
2020	0	0			1,040	6,050	6,910	3,750	2,750		0	20,500	20500

CIP Number: 122018
Project Title Garland, Hurlbut, Bewick Water Transmission System Rehabilitation

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Field Services
Class Lvl 3 Transmission System
Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [x] NEWTP Repurposing

- [x] **Project New To CIP**

Project Engineer/Manager Timothy Kuhns
Director Grant Gartrell

89
Project Score

Problem Statement A large proportion of the water transmission mains (WTM) within the City of Detroit were constructed between the decades of 1870 and 1930. Mains constructed during this period have exceeded their service life and will require replacement in the near term. Several WTM within this age of construction have strategic importance as they can be used to transmit flows between the Water Works Park WTP and the Northeast WTP.

Scope of Work / Project Alternatives This project involves rehab of WTM along Garland Street, Hurlbut Street, and Bewick Street between Jefferson Avenue and I-94 within the east side of the City of Detroit. This project will include a detailed condition assessment of these WTM to evaluate the appropriate rehabilitation method.

Other Important Info This project will be implemented concurrently with Phase 3 of CIP:122003 WWP to NE Transmision Main Project.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	121	138	143	150	169	169	586	1,476	769

CIP Number: 132001
Project Title Wick Road Booster Pumping Station Rehabilitation

Project Status Closed
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Wick Road Station

Project Engineer/Manager Eric Kramp
Director Grant Gartrell

Project Score

Problem Statement Provides improved control on the far-western portion of the transmission system.

Scope of Work / Project Alternatives Rehab 3 pumps and added VFDs and related controls system upgrades

Other Important Info Project closed FY 2019

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	135	0	0	0	0	0	0	0	135	0
2020	0	0	130	35	0	0	0	0	0	0	0	165	0
2019	0		147							0	0	147	0
2018	13452	250							0	0	0	13,702	0

CIP Number: 132003
Project Title West Service Center Pumping Station, Isolation Gate Valves for Line Pumps

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Oakland County

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Isolation gate valves

Project Engineer/Manager Andrew Juergens

Director Grant Gartrell

70.8

Project Score

Problem Statement There are six line pumping units in the main pump house at the West Service Center Booster Pumping Station. There are butterfly valves located on the suction side all six line pumps, and resilient seated gate valves on the discharge side of three of the six line pumps. Three of the line pumps do not have a valve on their discharge side and therefore no immediate means of isolation. The existing butterfly and resilient seated gate valves are all leaking and not reliable for isolating pumps. Moreover, as mentioned, three of the line pumps do not have an isolation valve of any kind on their discharge. The poor condition and lack of discharge isolation valves on all line pumps makes it extremely challenging to take pumps out for service, repair and maintenance. Extraordinary means are required to remove pumps out for service because the entire high-pressure or intermediate-pressure pumping systems have to be temporarily shutdown.

Scope of Work / Project Alternatives This project is being delivered using a design-bid-build project delivery. The scope of work generally includes removing 6 existing butterfly valves from the pump suction piping and 3 existing gate valves from the high-pressure pumping system discharge piping; and providing 6 new double-disc gate valves on the pump suction piping and 6 new double disc gate valves on the pump discharge piping.

Other Important Info Challenges: Sequence of construction and meeting system demands will need to be coordinated with operations.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	248	1,666	65	0	0	0	0	0	1,979	65
2020	0	0	138	1,186	490	0	0	0	0	0	0	1,814	490
2019	0	66	147	1,229	96					0	0	1,538	1325

CIP Number: **132003**

Project Title **West Service Center Pumping Station, Isolation Gate Valves for Line Pumps**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018			521	1,000					0	0	0	1,521	1521

CIP Number: 132004

Project Title North Service Center Pumping Station - Hydraulic Surge Control

Project Status Closed

Class Lvl 1 Water

Class Lvl 2 Systems Control Center

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Observed pressure data from meter at the border of Warren and Madison Heights.

Project Engineer/Manager Timothy Kuhns

28.2

Project Score

Director Grant Gartrell

Problem Statement Madison Heights, Troy, and Sterling Heights experience pressure spikes from the suction side of the North Service Center when line pumps trip. Hydraulic transient study is needed to identify the most cost effective solution to mitigate the pressure spikes

Scope of Work / Project Alternatives In recent years, the North Service Center has experienced power failures resulting in pump trips at the facility. The pump trips have caused high pressure transients along the transmission mains serving Madison Heights, Sterling Heights, Troy, Warren, Fraser, Clinton Township, and Roseville. The proposed project involves the study of control measures to mitigate the hydraulic transients present within the system.

Other Important Info Challenges: Coordination with operations and customers necessary to complete the work.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	215	0	0	0	0	0	0	0	215	0
2020	0	0	215	0	0	0	0	0	0	0	0	215	0
2019	0	75	157							0	0	232	0
2018		200	500	2,000	100				0	0	0	2,800	2600

CIP Number: 132006
Project Title Ford Road Pumping Station, Pressure and Control Improvements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Ford Road Booster Pumping Station

Project Engineer/Manager Eric Kramp
Director Grant Gartrell

43.4
Project Score

Problem Statement Design of isolation, pressure and flow control equipment for efficient delivery of consistent pressures to wholesale customers at Ford Road water booster pumping station

Scope of Work / Project Alternatives The project generally consists of:
Replacing all pump suction butterfly valves with new triple offset high performance butterfly valves (10)
Replacing all control butterfly valves with new metal seated ball valves (10)
Replacement of th existing 16-inch cone valve-driven reservoir fill line a new 20-incg plunger valve controlled fill line
Nnew 75 KW generator and appurtenances,
and related work.

Other Important Info The project is currently under procurement, and a predecisor to any work along the Newburgh water main and Michigan Avenue Station. The two major observed challenges for the project include isolation of the station during the critical initial shutdown, and the lead time of the first six valves for the line pump isolation valves and the first reservoir isolation valve.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	289	1,036	987	959	8	0	0	0	3,279	1954
2020	0	0	161	235	2,515	18	0	0	0	0	0	2,929	2533
2019	0	8	106	245	1,805	445				0	0	2,609	2495
2018			200	2,800					0	0	0	3,000	3000

CIP Number: 132007

Project Title Energy Management: Freeze Protection Pump Installation at Imlay Pump Station

Project Status	Active
Class Lvl 1	Water
Class Lvl 2	Systems Control Center
Class Lvl 3	Pump Station/Reservoir
Location	Lapeer County

- [x] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Imlay Pump Station

Project Engineer/Manager Vittoria Hogue

Director Grant Gartrell

37.6

Project Score

Problem Statement This CIP project will address two principle needs. The first is the need to replace an existing large pumping units with a smaller pumping unit for the purpose of recirculating finished water inside the station's reservoir. Recirculation of reservoir water is required during the low-demand season to maintain water quality. Recirculation of reservoir water using a smaller suitability sized pumping unit will reduce operating complexity and the possibility for damage to the larger pump units. The second need for the new smaller pumping unit is to meet the lower station demands for customers served west of Imlay Station. The lower station demands are a result of Genesee County communities (outside the city of Flint) that have left GLWA's system.

Scope of Work / Project Alternatives This project is being delivered using a design-build project delivery method. The scope of work generally includes replacing one of Imlay Sation's 75 MGD pump's and 6,000 HP motor's with a smaller 22.5 MGD pump with 1,500 HP motor. The associated VFD, valves, piping and appurtenences will also be removed and replaced to accommodate the new smaller pump.

Other Important Info N/A

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	97	685	4,211	206	0	0	0	0	5,199	4417
2020	0	0	9	14	592	1,315	230	0	0	0	0	2,160	2137
2019	0			38	385	134				0	0	557	557
2018			200	500	300				0	0	0	1,000	1000

CIP Number: 132008
Project Title Various Pumping Stations - Needs Assessment Study

Project Status Pending Closeout
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Example of a large pipe and valve installation

Project Engineer/Manager Erich Klun

Director Grant Gartrell

51.2

Project Score

Problem Statement Existing pumping stations were constructed in the 1960s and 1970s and most of the pumping units were sized to meet maximum hydraulic condition and perceived to be inefficient.

Scope of Work / Project Alternatives This project includes a comprehensive condition and needs assessment study of all water booster stations, exclusive of reservoirs. System wide modelling will confirm station decommissioning as recommended by the 2015 Water Master Plan Update. The condition assessments will include all engineering disciplines, with a focus on variable speed pumping applications to meet changing station demands, DTE rate incentive identification, station metering, valve and yard piping improvements and station bypasses.

Other Important Info Challenges: Shutdown, operation and manpower required to cover the condition assessment inspections to complete the work.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,838	0	0	0	0	0	0	0	1,838	0
2020	0	0	913	764	0	0	0	0	0	0	0	1,677	0
2019	0	33	722	1,178						0	0	1,933	1178
2018		500	1,200						0	0	0	1,700	1200

CIP Number: 132010

Project Title West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Systems Control Center

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Project Engineer/Manager Andrew Juergens

Director Grant Gartrell

54

Project Score

Problem Statement Construction of West Service Center Division Valves is needed to convey flows originating from the Lake Huron Water Treatment Plant through the West Service Center to the Springwells high-pressure service area while the Springwells raw water tunnel is out of service for repairs. The existing reservoirs at the West Service Center are in poor condition and continue to require periodic structural repairs despite numerous past repairs. Additionally, half of the existing reservoir pumps experience suction hydraulic issues when the reservoir level falls below half full.

Scope of Work / Project Alternatives This project is being delivered using a design-build project delivery method. The scope of work generally involves:

1. Rehabilitating Valve Vaults #1, #4, and #7.
2. Demolishing existing Valve Vault #3
3. Constructing a new Valve Vault #3 containing a new 24-inch cone valve.
4. Demolishing two existing 10 MG reservoirs and the associated Reservoir Pump Houses #1 and #2, and the associated yard piping.
5. Constructing two new 5 MG reservoirs.
6. Constructing a new Reservoir Pump House, including three new reservoir pumping units and two new reservoir fill valves.
7. Installing new the local valve control panel and instrumentation.
8. Testing and commissioning the new pumping facilities and finished water reservoirs.
9. Restoring the site.

Other Important Info Challenges: Water storage capacity and reservoir pumping capacity need to be maintained during construction. Sequence of construction and meeting system demands will need to be coordinated with operations. Construction of the new reservoirs is subject to the city of Southfield's zoning ordinances especially related to the height of the reservoirs.

CIP Number: 132010

Project Title West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	296	663	4,323	12,209	11,853	8,361	0	0	37,705	36746
2020	0	0		0	2,620	7,430	15,570	8,910	2,606	0	0	37,136	37136
2019	0				2,620	7,430	15,570	8,910	2,606	0	0	37,136	34530
2018			7,600	4,200					0	0	0	11,800	11800

CIP Number: 132012
Project Title Ypsilanti Booster Pumping Station Improvements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Ypsilanti Pump Station

Project Engineer/Manager Jorge Nicolas
Director Grant Gartrell

61.2
Project Score

Problem Statement The Ypsilanti Booster Pumping Station does not have backup power generation and needs one in the event of a power loss to the site so that system pressure loss is avoided during these conditions. The entire station and its pumping and electrical system equipment are are original to the facility and are past their useful service life. The existing electrical system requires substantial maintenance to keep it in service. The existing pumps and motors are in poor condition and also require cumbersome maintenance to keep in service.

Scope of Work / Project Alternatives This project is being delivered using a design-bid-build project delivery method. The scope of work generally includes building a new booster pumping station that meets current water system demands, current building and electrical codes, and best industry practices for water pumping station design, operation and maintenance needs. The new station will be equipped with all new pumps, motors, drives, electrical switchgear, power distribution system, building mechanical, station passive bypass, and electrical backup power generation.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	21	712	846	846	3,827	9,721	11,936	3,708	31,617	27176
2020	0	0	4	28	585	865	2,855	4,205	1,319	0	0	9,861	9829
2019	0			93	606	820	2,594	4,134	900	0	0	9,147	8247

CIP Number: 132014
Project Title Adams Road Pumping Station Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Oakland County

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Project Engineer/Manager Timothy Kuhns
Director Grant Gartrell

64.6
Project Score

Problem Statement The Adams Road booster pumping station was constructed in 1971 and is nearing the end of its service life. Recent condition assessment of the station indicates that there are several needs at the site that need to be addressed due to aging infrastructure. Improvements required at the site include site drive improvements, site valve replacements, building sump replacement, site drain PS replacement, structural improvements, pumping system improvements, flow metering improvements, bypass upgrades, interior valve replacement, control valve replacement, valve actuator replacement, air-vacuum valve replacement, station piping improvements, service water system improvements, HVAC upgrades, plumbing upgrades, and various electrical system improvements. Cost estimates for these site improvements indicate construction cost to build a new station adjacent to the current site may be cost comparable.

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. The scope of work generally includes reconstructing a new pumping station next to the existing station on the current site. The new station will be designed to bring it up to current building and electrical codes, industry standards, and best practices for operation and maintenance of pumping stations.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	13	205	925	26,393	27,536	1143
2020	0	0		0	0	0	21	1,029	2,312	2,312	0	5,674	3362
2019	0						21	1,030	4,625	0	0	5,676	1051

CIP Number: 132015
Project Title Newburgh Road Booster Pumping Station Improvements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Andrew Juergens
Director Grant Gartrell

56.6
Project Score

Problem Statement Existing pumps, motors and electrical gear are beyond useful service life. The existing pump manufacturer has discontinued maintenance support of the pumps, increasing the difficulty and cost of maintenance. Additionally, a new transmission main will be designed to allow the Newburgh Station to pump flows to the Haggerty Station reservoir. The Haggerty reservoir fill operation may require additional pumps at the Newburgh Station that are rated to higher discharge pressures.

Scope of Work / Project Alternatives Construct a new Newburgh Road Booster Pumping Station, including new pumps, motors, VFDs, electrical gear, building mechanical equipment, and backup power generation. Alternatives include constructing a new Newburgh Road Booster Pumping Station on the existing site, expanding the existing site to accommodate a new station, or construction of the new station on a new site.

Other Important Info Challenges: The existing site may not be large enough to construct the new Newburgh Station. Coordination with the 14-Mile Road Transmission Main Loop Contract will be required.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	3	581	973	1,595	5,216	6,286	9,133	6,890	30,677	23203
2020	0	0		0	16	621	2,396	2,396	2,429	4,311	0	12,169	7858
2019	0				607	2,396	2,396	2,396	4,375	0	0	12,170	7795

CIP Number: 132016
Project Title North Service Center Pumping Station Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Oakland County

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Timothy Kuhns
Director Grant Gartrell

58.2
Project Score

Problem Statement The North Service Center was constructed in 1962 and is nearing the end of its service life.

Recent condition assessment of the station indicates that there are several needs at the site that need to be addressed due to aging infrastructure. Improvements required at the site include site drive improvements, site valve replacements, valve operator replacement, abandonment of pitot tube well, belt drain replacement, septic tank and well field replacement, electric room improvements, station wall upgrades, building structure improvements, line and reservoir pump upgrades, flow meter improvements, bypass upgrades, interior valve upgrades, control valve upgrades, valve actuator upgrades, station piping improvements, service water system upgrades, sump pump upgrades, sampling system upgrades, and various electrical improvements. Cost estimates for these site improvements indicate construction cost to build a new station adjacent to the current site may be cost comparable.

Scope of Work / Project Alternatives This project includes complete reconstruction of the North Service Center Pumping Station.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	21	279	2,385	1,832	40,825	45,342	4517
2020	0	0		0	0	0	0	6	6,325	18,589	0	24,920	6331
2019	0						6	4,520	20,394	0	0	24,920	4526

CIP Number: 132017
Project Title North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping & Valve Replacement

Project Status Reclassified
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Oakland County

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager TBD
Director Grant Gartrell

57.8
Project Score

Problem Statement Yard piping and valves are original to the facility and are beyond useful service life. New valves and yard piping are needed to improve reliable operation; and in order to provide reliable shutoff and water tightness during the subsequent station upgrades to the pumping equipment.

Scope of Work / Project Alternatives Civil Work:
Improvements are ncessary to the drive, drain pump station and related piping, building strucgtures
Mechanical
All pumps should be rehabilitated, with new mechanical seals etc.
All isolation valves should be assessed and/or replaced

The category 5 cost for rehabilitation is in the magnitude of 15 million dollars; to replace with new is 75.
Therefore, rehabilitation is recommended.
All control valves should be assessed and/or replaced
All actuators should be replaced to modern standards.

Electrical:
imrpvovements to transformers, grounding, &VFDs are necessary.

Other Important Info Challenge: Maintenance of facility operations during construction.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	14	136	0	0	0	0	150	150
2020	0	0		0	6	2,300	2,506	264	0	0	0	5,076	5076

CIP Number: **132017**

Project Title **North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping & Valve Replacement**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0				6	2,300	2,506	264		0	0	5,076	5076

CIP Number: 132018
Project Title Schoolcraft Pumping Station Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Project Engineer/Manager Eric Kramp
Director Grant Gartrell

56.6
Project Score

Problem Statement Following the Pump Station Condition Survey and Needs Assesment, significant issues were observed in the Schoolcraft Pumping Station. This needs assesment has found several significant areas of necessary improvement to the station as described in the project scope fo work:

Scope of Work / Project Alternatives This project will be delivered using a design-bid-build project delivery method. The scope of work will generally include replacing existing pumps, motors, drives, electrical switchgear, motor control centers, valves, valve operators, yard piping, and yard valves with new infrastructure. Additionally, the underdrain system that serves the finished water reservoirs will either be rehabilitated in place or replaced with new.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0		0	0	10	1,958	2,048	3,048	3,500	0	10,564	7064
2019	0					10	1,916	2,085	6,553	0	0	10,564	4011

CIP Number: 132019
Project Title Wick Road Pumping Station Improvements

Project Status	Future Planned
Class Lvl 1	Water
Class Lvl 2	Systems Control Center
Class Lvl 3	Pump Station/Reservoir
Location	Wayne County - Outside Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Vittoria Hogue

Director Grant Gartrell

68.4

Project Score

Problem Statement Wick Pump Station is currently oversized based on the demands it experiences, has poor valve isolation capabilities and much of its equipment was installed in 1981 and is passed its useful service life. This project's intent is to right size the station and replace valves and other aging equipment.

Scope of Work / Project Alternatives This project will be delivered under a design-bid-build delivery method. This project's scope of work will be rightsizing the station's pumping capacity, improving valve control and isolation, and replacing and/or upgrading equipment that is at the end of its useful life. The improvements intended to right size the station include replacing reservoir pumping units and installing another small line pump (jockey pump) to accommodate low flow conditions. Valve control and isolation work will involve replacing existing station bypass check valve and isolation valves, replacing interior valves, rehabbing pump control valves, replacing the cone valve on the reservoir fill line and replacing the hydraulic actuator control system with an electrically motor actuated system. The equipment that is at the end of its useful service life and will be replaced are as follows: effluent flow meter, the pressure reducing station for the service water system, the sump pumps, the service entrance transformers, the grounding ring, and the medium and low voltage equipment. Other miscellaneous work that will be conducted under this project will be improving the heating and ventilation, isolating potable water supply from non-potable water supply, installing lighting improvements, upgrading the existing generators, correcting the power factors, improving site driveway to accommodate semi trucks, and reconfiguring the station's discharge piping.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	15	2,925	2,940	15
2020	0	0		0	0	0	6	1,009	4,554	0	0	5,569	5569

CIP Number: 132019

Project Title Wick Road Pumping Station Improvements

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0						6	1,009	4,555	0	0	5,570	1015

CIP Number: 132020
Project Title Franklin Pumping Station Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Oakland County

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Project Engineer/Manager TBD
Director Grant Gartrell

64.6
Project Score

Problem Statement The Franklin Booster Pumping Station was constructed in 1968 and is nearing the end of its service life.

Recent condition assessment of the station indicates that there are several needs at the site that need to be addressed due to aging infrastructure. Improvements required at the site include site drive improvements, sanitary holding tank improvements, site valve replacements, mezzanine valve access improvements, electrical room upgrades, building structure improvements, pumping improvements, flow metering improvements, station bypass upgrades, interior valve upgrades, control valve replacement and rehabilitation, valve actuator system improvements, station piping improvements, service water system upgrades, sampling system upgrades, HVAC upgrades, plumbing upgrades, and various electrical improvements. Cost estimates for these site improvements indicate construction cost to build a new station adjacent to the current site may be cost comparable.

Scope of Work / Project Alternatives This project includes complete reconstruction of the Franklin Booster Station.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	2,442	2,442	0
2020	0	0		0	0	0	0	0	0	10,109	0	10,109	0
2019	0						846	2,009	7,315	0	0	10,170	2855

CIP Number: 132021
Project Title Imlay Pumping Station Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Lapeer County

- [x] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Project Engineer/Manager Eric Kramp
Director Grant Gartrell

58.2
Project Score

Problem Statement Following completion of the 2018 Booster Station Condition Assesment, several significant issues have been documented at the Imlay Booster Station. In addition to the updates to the VFD systems identified in the FY 2020 CIP. Site/civil, mechanical, and electrical improvements have been identified far in excess of the initial 2020 CIP, including the complete replacement of all outdated electrical switchgear.

It was recently documented that approximatley half of the reservoir fill system is working at less than full capacity, and this has revised this BCE accordingly.

Scope of Work / Project Alternatives Significant improvementst to the site/civil, mechanical, and electrical systems at the Imlay Booster Station. Highlights in each discipline are indentified as follows:
Site/Civil -- Replace crumbling retaining walls. Roofing rehabilitation
Pumping -- "Right size" remaining pump and motor units based on 2015 WMPU. Rehabilitate any pumping units that are determined to be correctly sized.
Mechanical -- Improvements to HVAC. Replacement or reinforcement of all station isolation gate and butterfly valves. Rehabilitaiton or replacement of reservoir fill valves.
Electrical -- Additional and replacement of generators. Replacement of double-ended 13.2 KVA switch-gear. Rehabilitation or replacement of VFDs

Other Important Info VFD size is unusual in the marketplace and cooling systems are complex for the VFDs.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	13	13	0
2020	0	0		0	0	0	0	6	2,103	10,000	0	12,109	2109

CIP Number: 132021

Project Title Imlay Pumping Station Improvements

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0							6	12,103	0	0	12,109	6

CIP Number: 132022
Project Title **Joy Road Pumping Station Improvements**

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager Jacob Mangum
Director Grant Gartrell

56.6
Project Score

Problem Statement The station is undersized with limited space for maintenance and personnel access. The main walkway inside the station is built on top of the discharge header and six stairways connected to it are non-code compliant. There is not enough room to install normal stairs. The electrical room addition was partially built on top of the pump station top slab and blocks access to the reservoir fill line valves. The pump station roof hatches leak and drip onto equipment below. The discharge header is heavily corroded and is in need of replacement. Three reservoir pumps, motors and valves are past their useful service life. Two additional VFDs and associated new motors are needed to provide operational flexibility. The station is without a flow meter and a station bypass.

Scope of Work / Project Alternatives Design contract will consider life-cycle costs of rehabilitating the current station versus building a new station on available land located to the south of the current station. A listing of the type of station improvements by discipline is provided below.
Site Drive Improvements - The existing site drive geometry needs to be improved to allow for a mobile crane or semi-trailer truck.
Site Drain Lift Station - Installation of a new site drain pump station next to existing with removal of the existing equipment
Electrical Room - A new electrical room addition is required for the new recommended VFD gear
Building Structures Improvements - The existing building structures require maintenance and repair. Details of the associated interior and exterior repair items are provided within this report
Pump Improvements - Rehabilitate the existing line and reservoir pumps with the addition of 2 new VFD and associated motors
New Effluent Flow Meter - Construction of a new effluent flow magmeter within the existing station
Station Bypass - A station bypass is planned through replacement of existing exterior valves with motorized gate valves
Replace Interior Valves - Replace butterfly valves with metal seated gate valves and replace the Res

CIP Number: 132022

Project Title Joy Road Pumping Station Improvements

No. 1 Fill line cone valve with a new 14” cone valve
Rehabilitate Control Valves - Rehabilitate pump control valves with new stuffing box packing and drain
Valve Actuator System - Replace the existing control valve actuator system with a new electric motor actuator system
Piping Improvements - Replacement of piping as noted and improve suction and discharge headers in compliance with ANSI/HI 9.6.6 standard
Service Water System - Updates to the service water system are required; replacement of galvanized piping, pressure reducing station and backflow preventer
Building Sump Pumps - The building sump pumps are recommended for replacement
Heating and Ventilation - Improvements are required to the existing heating and ventilation
Plumbing and Fixtures - Improvements are needed to separate the potable water supply from the service water piping as well as other misc. improvements
Grounding - Provide new grounding ring along the outside parameter of the building and transformer yard
Variable Frequency Drives - New VFD drives for all three line pumps are recommended
LED Lighting - Replace lighting with LED lighting
Instrumentation - Provide new field instruments for the station, specifically for the pumping systems
Existing Generator - Update the existing generator with new fuel and bulk storage tank as well as other upgrades

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	7	0	0	0	0	0	0	48	55	0
2020	0	0		0	0	0	0	6	6,103	0	0	6,109	6109
2019	0							6	6,103	0	0	6,109	6

CIP Number: 132025

Project Title Northwest Booster Station Yard Piping Improvements

Project Status	Cancelled
Class Lvl 1	Water
Class Lvl 2	Systems Control Center
Class Lvl 3	Pump Station/Reservoir
Location	City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [x] Reliability/Redundancy
- [x] NEWTP Repurposing

- [ ] **Project New To CIP**

Project Engineer/Manager Eric Kramp

Director Grant Gartrell

63.6

Project Score

Problem Statement Historical pumpage data for the Northeast WTP indicates that the maximum day demands for the Northeast service area can be as high as 190 MGD. With the upcoming decommissioning of treatment at the Northeast WTP, Water Works Park will provide 150 MGD of finished water to the Northeast high lift pumping system to provide service to the existing Northeast service area, which means that 40 MGD must be delivered from other water treatment plants during the maximum day demand conditions. Upgrades to the yard piping at the Northwest Booster Station would allow flows to be pumped from the Springwells WTP through the Northwest Booster Station to the Northeast Service Area to provide a portion of the needed 40 MGD. This project will provide the needed transfer of demand loads from Water Works Park to Springwells once Northeast WTP treatment is decommissioned.

Scope of Work / Project Alternatives Project includes construction of a new reservoir fill valve system to fill the existing reservoirs from Springwells. The project also includes replacement of the isolation valves and pumping units.

Other Important Info This project highlights the need to reinforce the transmission system in order to reliably provide service after treatment is decommissioned at the Northeast WTP.

Challenges: The project challenges include working with older piping and transmission valves. Isolation of piping to make connections to the existing piping system may be a challenge. Project History: The 2015 Water Master Plan proposed decommissioning of this booster station. However, the Master Plan assumed that the excess capacity at Water Works Park could fully supply the Northeast Service Area demands, which is not the case. For this reason, it will be necessary to use this station to provide maximum day demands from the Springwells WTP to the Northeast Service Area once decommissioning at the Northeast WTP is complete.

CIP Number: 132025

Project Title Northwest Booster Station Yard Piping Improvements

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1	0	0	0	0	0	0	0	1	0
2020	0	0				50	1,700	3,750			0	5,500	5500

CIP Number: 132026
Project Title Franklin Pumping Station Valve Replacement

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Station/Reservoir
Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Project Engineer/Manager Mini Panicker
Director Biren Saparia

Project Score

Problem Statement The existing gate valves and butterfly (suction) valves that service the four (4) line pumps and two (2) reservoir pumps in the Franklin Pumping Station have exceeded their useful life and are in need of replacement.

Scope of Work / Project Alternatives Scope of work is demolition and replacement of six (6) 24" manually operated gate valves, demolition and replacement of three (3) 24" and three (3) 30" manually operated butterfly (suction) valves, demolition and replacement of two (2) 30" electrically actuated butterfly (suction) valves and rebuild of the existing gate valves.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	449	613	349	0	0	0	0	1,411	962

CIP Number: 170100
Project Title Water Treatment Plant /Pump Station Allowance

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

GLWA Water Service Area

Project Engineer/Manager Grant Gartrell
Director Grant Gartrell

64.4
Project Score

Problem Statement This allowance is reserved for unplanned, emergency and critical project needs that need to be addressed quickly.

Scope of Work / Project Alternatives This project is an allowance for unplanned, critical projects that may occur at the Water Treatment Plants and Booster Pump Stations throughout the system. These projects may include repair, replacement or rehabilitation of key assets as required to allow the Authority to provide sufficient water quality, quantity and pressure to meet customer demands in accordance with federal and state requirements under the Safe Drinking Water Act.

Other Important Info Challenges: Close coordination with operations and ability to jump on needs.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	9,747	1,813	1,499	1,359	1,359	1,363	1,359	51,665	70,164	6939
2020	0	0	6,635	3,176	3,000	3,000	3,000	3,000	3,000	15,000	0	39,811	15000
2019	0	6,777	1,597	4,296	3,058	3,144	3,000	3,000	15,000	0	0	39,872	16498
2018		10,000	10,000	20,000	20,000	19,650	12,645		0	0	0	92,295	82295

CIP Number: 170200

Project Title As-Needed Construction Materials, Environmental Media and Special Testing Services, Construction

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

☐ Innovation

☐ Conc. WW Master Plan

☐ Water MP Right Sizing

☐ Reliability/Redundancy

☐ NEWTP Repurposing

☐ **Project New To CIP**

Example of concrete testing

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

20

Project Score

Problem Statement GLWA engineering and operations need a contract mechanism to obtain professional engineering services in a timely manner to investigate environmental, geotechnical and specialized engineering problems that occur on a regular basis throughout the system.

Scope of Work / Project Alternatives This engineering/technical services contract involves as-needed engineering and technical services related to geotechnical investigations and related geotechnical engineering, construction materials sampling and testing, environmental media sampling and testing, soils sampling and testing, land surveying, corrosion testing and inspection, computer-aided design, and construction inspection.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	64	1,057	685	9	0	0	0	0	1,815	694
2020	0	0	2	472	572	572	0	0	0	0	0	1,618	1144
2019	0		172	472	572	572				0	0	1,788	1616
2018			500	500	500				0	0	0	1,500	1500

CIP Number: 170300
Project Title Water Treatment Plant Automation Program

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Project Engineer/Manager Jeffrey Dorsey

Director Terry Daniel

Project Score

Problem Statement The automation design and construction project comes from recommendations that identified existing station process data conditions, station needs, GLWA mission critical assets, alternative improvement options to address identified needs, recommended improvements to address the needs, prioritized projects based on the GLWA CIP scoring tool, and scheduling for making the improvements along with associated capital improvement budgets associated with each project established under CS-108.

Scope of Work / Project Alternatives The purpose of this project is to implement the recommendations from CS-108 that are prioritized in five (5) year increments with an estimated cost of $1 million dollars per year over a twenty (20) year span.

Other Important Info Challenge: Standardization of multiple different data process equipment already installed throughout the 5 plants could be a problem.

Project History: The GLWA Water Operations division is comprised of five water treatment plants. Each plant has process areas ranging from intake, sedimentation, chlorination, filtration and distribution systems. One of the directives from the organizational objectives is to provide the treatment plants with automation. This automation would be one of the main drivers for increased efficiency in data monitoring and regulatory reporting and reduced workload and maintenance cost. The recommendations from this assessment will be the catalyst for automation projects at the pumping stations over the next 20-year planning period. In addition, the recommendations from this assessment are required to be prioritized in 5-year increments with estimated costs.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,658	3,208	5,440	2,943	1,211	3,117	1,151	0	18,728	13862
2020	0	0	1,377	61	1,561	1,561	1,561	1,514	105	0	0	7,740	6302

CIP Number: **170300**

Project Title **Water Treatment Plant Automation Program**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0	13	1,425	61	1,561	1,561	1,561	1,514	105	0	0	7,801	6258
2018			1,500	1,500	1,500	1,500	1,500		0	0	0	7,500	7500

CIP Number: 170400
Project Title Water Transmission Improvement Program

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Example of a failed water main

Project Engineer/Manager Todd King
Director Todd King

Project Score

Problem Statement Assessing, rehabilitating or replacing aging transmission mains in the water system

Scope of Work / Project Alternatives This project is a yearly funding allocation for the design and/or construction work for the rehabilitation or replacement/construction of aging water transmission lines and all appurtenances, connections and related structures.

Other Important Info O&M manuals, GIS, Section Maps and Gate Books are available for reference.

Project History: There are many critical assets that are required to be operated in the transmission system and this yearly allowance is needed to meet the critical needs of these assets.

Challenges: May require shut down of large pumps, isolation or shutdown of large mains etc.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,643	1,781	1,776	1,776	1,776	1,781	1,046	16,578	28,157	8155
2020	0	0	156	1,000	1,500	2,000	2,000	2,000	2,000	100,000	0	110,656	9500
2019	0	1,075	229	1,000	1,500	2,000	2,000	2,000	2,000	0	0	11,804	8500
2018			10,000	11,000	9,000	11,000	9,000		0	0	0	50,000	50000

CIP Number: 170500

Project Title Transmission System Valve Rehabilitation and Replacement Program

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

A large valve for a transmission pipe

Project Engineer/Manager Todd King

Director Todd King

66.8

Project Score

Problem Statement Replacement/Rehabilitation of GLWA Transmission System Gate Valves will aid in implementing a regular valve exercising program as recommended by AWWA as well as increase the reliability of the transmission system.

Scope of Work / Project Alternatives Evaluate the existing conditions, provide the necessary replacement/ rehabilitation option, design and implement them.

Other Important Info GIS, Section Maps and Gate Books are available for reference.

Project History: There are critical valves that are required to be closed during a main break or an emergency situation. There has not been a regular valve exercising program in past 15 years in the DWSD/GLWA System.

Challenges: May require shutdown of large transmission mains.

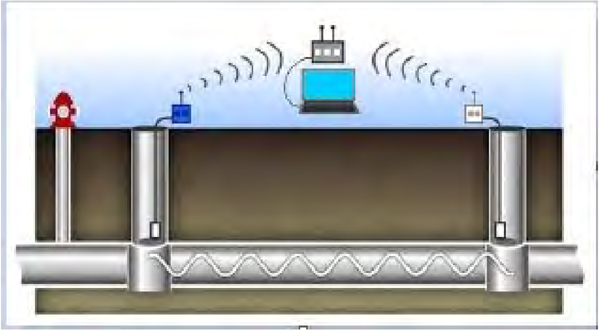
Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	7,159	642	1,177	3,119	3,175	3,210	3,203	4,784	26,469	13884
2020	0	0	3,430	4,000	4,000	3,274	4,000	4,000	4,000	10,000	0	36,704	19274
2019	0		2,000	4,000	4,000	3,274	726	4,000	4,000	0	0	22,000	16000
2018			2,930	3,100	3,100	3,100	3,100		0	0	0	15,330	15330

CIP Number: 170600
Project Title Water Transmission Main Asset Assessment Program

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Example of pressure main assessment technology

Project Engineer/Manager Todd King

Director Todd King

Project Score

Problem Statement Many of the water mains serving the GLWA service area were installed in the early part of the 20th century or the later part of the 19th century, and are now reaching the end of their useful life span. This project will pilot and utilize new technologies to accurately identify the condition of these buried assets by constructing access ways for inspection and the installation of sensors and fiber optic cables for real-time monitoring of condition. It's essential for cost-efficient repair and replacement programs which in turn will increase the reliability and performance of the system.

Scope of Work / Project Alternatives Construct access structures and utilize new technology to evaluate the existing conditions of the transmission system. Construction of in place sensors and cables may be necessary to adequately access condition. Provide the necessary recommendation for replacement and rehabilitation.

Other Important Info *Innovation Note: Consider new techniques for water main assessment.
GIS, Section Maps and Gate Books are available for reference.
Challenges: Gaining access to inspect buried pipes is difficult, disruptive and costly. However, there are ways to monitor and test the condition of the piping and methods of performing condition assessment.
Project History: There are many critical assets that are required to be operated in the transmission main, but the authority doesn't know the existing conditions. For planning purposes, information about the actual condition of pipes is needed and there has not been a regular condition assessment program related to the transmission System (pipes greater than 24").

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	54	54	54	775	2,183	4,183	23,450	30,753	7249
2020	0	0		2,500	3,000	4,000	4,000	5,000	5,000	25,000	0	48,500	21000

CIP Number: 170600

Project Title Water Transmission Main Asset Assessment Program

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0		2,627	2,501	3,001	4,001	4,001	5,001	5,001	0	0	26,133	18505
2018			2,626	2,000	2,000	2,000	2,000		0	0	0	10,626	10626

CIP Number: 170800
Project Title System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Project Engineer/Manager John McCallum

Director Grant Gartrell

Project Score

Problem Statement This project merges all CIPs associated with Reservoir Rehabilitation into a single, compreshensive CIP Project. This new project is being managed against a overall repair schedule to mitigate conflicts in the transmission system so as to minimize the impact for MDEQ Mandated inspections and repairs to GLWA Reservoirs at Booster Stations and Water Treatment Plants. ECK 7/2018

Adjust the cost of this CIP this fiscal year to account for the contract award amount for engineering services related to this CIP, as well as competitive, public bid prices received for rehabilitation work on 10 of the 33 system-wide reservoirs. JPM 8/5/2019

Scope of Work / Project Alternatives The project will provide inspection, rehabilitation, and maintenance for all 33 finished (potable) reservoirs in the GLWA system on a MDEQ mandated 5 year revolving inspection cycle.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	457	2,160	6,087	6,087	6,087	4,100	11,366	22,732	59,076	33727
2020	0	0		482	5,128	5,211	5,182	3,888	5,495	33,778	0	59,164	24904
2019	0		39	472	753	4,510	4,340	4,340	4,645	0	0	19,099	14415
2018		50	3,300	2,550	2,550	2,550			0	0	0	11,000	10950

CIP Number: 170900
Project Title Suburban Water Meter Pit Rehabilitation and Meter Replacement

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Example of a Water Meter

Project Engineer/Manager Chandan Sood
Director Chandan Sood

20
Project Score

Problem Statement Improving meter data reliability, ensuring accurate billing, improving customer service and allow high quality analysis of the system

Scope of Work / Project Alternatives The Proposed improvements should include the following; The replacements of meters that have surpassed their life expectancy, and or the current flow rates exceed the mechanical limits of the meter. Installing entrance hatches that allow safer ingress, and egress, and that can be locked for security. Sand blasting and painting of piping and walls. Waterproofing meter vaults to keep the ground water out. Provide a proper floor slope in meter chambers that allow water to settle in puddles. Repairing damage sump pump discharge lines. Repairing any structural deficiencies in the meter chambers, loose concrete, bricks, and ladder rungs. Installing access tunnels for the meter location that require extensive traffic control, or are very dangerous to enter because of the entrance location. Upgrading and repairing damaged electrical fixtures in the meter vaults. Weather proofing the meter control cabinets, chalking, replacing rubber door seals, replacing missing foam insulation, replacing upgrading cabinet heaters, repairing damaged locking mechanisms. Improving, or paving the access roads, and or parking for meter locations that have limited parking or get overgrown with foliage in the summer time.

Other Important Info Challenges: Requires temporary shutdown of the water supply through the meter.

Project History: Currently GLWA provides water service to 126 communities, and measures flows and volumes by the utilization of 290 wholesale water meters now in service; 17 of these meters are venturi-orifice type meters, 26 of these are dual venturi type meters, 48 of these single venturi type meters, 97 of these are magnetic flow type meters, and 102 of these are turbine or mechanical type meters. Meters were installed between 1945 through 1975 under various projects and tasks.

CIP Number: 170900

Project Title Suburban Water Meter Pit Rehabilitation and Meter Replacement

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,238	2,542	2,535	2,535	1,139	121	120	71	10,301	6450
2020	0	0		3,000	4,000	4,000	3,997	4,100	4,200	20,500	0	43,797	20297
2019	0		410	4,613	3,690	3,690	3,997	4,100		0	0	20,500	20090
2018		500	4,000	4,000	4,000	4,000	4,000		0	0	0	20,500	20000

CIP Number: 171400
Project Title LED Lighting & Lighting Control Improvements at All Water Facilities

Project Status Cancelled
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

☑ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Project Engineer/Manager Eric Griffin
Director John Norton

Project Score

Problem Statement Existing lighting systems at most facilities are energy inefficient. Replacement with new, modern LED lighting type systems will reduce electrical usage and costs. Regulatory changes by ASHRAE are required for lighting control and there are safety concearns with egress lighting at our facilities

Scope of Work / Project Alternatives Replace existing lighting fixtures with new lighting fixtures at the water plants and water booster pumping stations. Update lighting control to new ASHRAE standards and Egress lighting to meet NFPA 101 Life Safety Code

Other Important Info Updates to ASHRAE Lighting Control and NFPA-101 Life safety code make this of greater importance.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0		0	0	0	0	693	693	4,401	0	5,787	1386
2019	0					520	693	693	5,094	0	0	7,000	1906

CIP Number: 171500

Project Title Roof Replacement at WWP, SP, LH, NE, SW, NSC, Orion, Franklin, and Conner Creek Facilities

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Project Engineer/Manager Nick Hoffman

Director Grant Gartrell

Project Score

Problem Statement This design build project will replace roofing systems on GLWA water plants, water booster pumping stations and sewage pumping stations that were determined to need replacement over the next 5 to 7 years based on the CS-1674 Roofing Assesment Contract. Replacement is needed to protect the facilities interigty with regards to interiors, sensitive electrical equipment and process mechanical equipment vital to operations.

Scope of Work / Project Alternatives Tear off of existing roofing systems and replace with new roofing systems as follows:
Water Works Park- High Lift Building, standing metal seam roof, Raw Water Booster Pump Station, built-up roof
Springwells - Turbine House, built-up roof, 1930 Machine Room
Conner Sewage Lift Station, built-up roof
Franklin Water Booster Pump Station, built-up roof
Orion Water Booster Pump Station, standing metal seam roof

Other Important Info The total estimated replacement value (2016 dollars) of the 1,682,727 square feet of roofing at the water treatment plants, sewage pumping stations and water booster pumping stations is $33,142,054.

Project History: A condition assessment was performed and completed under Contract No. CS-1674 in 2016 that included all roofs located at GLWA's 5 water treatment plants, 19 water booster pumping stations and 11 sewage pumping stations. There were 268 separate roof sections totaling 1,682,727 square feet of roof inspected during this condition assessment project.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	71	2,828	173	317	2,907	3,126	2,255	11,996	23,673	8778

CIP Number: **171500**

Project Title **Roof Replacement at WWP, SP, LH, NE, SW, NSC, Orion, Franklin, and Conner Creek Facilities**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2020	0	0	50	0	2,657	0	0	0	2,000	2,000	0	6,707	4657
2019	0			111	986	210	24	1,159	24,756	0	0	27,246	2490

SECTION 2 WASTEWATER

CIP Number: 211001

Project Title WRRF Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Primary Treatment

Location City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Pipe Gallery

Project Engineer/Manager Nicolas Nicolas

Director Philip Kora

Project Score

Problem Statement Rehabilitation for meeting NPDES Permit and NEC requirements

Scope of Work / Project Alternatives The work to be completed under this project will include installing ventilation and atmospheric control for the pipe gallery; providing new lights and emergency lights, etc.. This work also includes rehabilitation of 12 drain lines from rectangular clarifiers 3-12, circular clarifiers 16 and 16, installation of large manhole with sump pumps to collect drainage and discharge to clarifier, and concrete crack repairs, and rehabilitation work in Electrical/Mechanical Building.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	45,069	6,225	3,775	0	0	0	0	0	55,069	3775
2020	0	0	25,098	18,724	7,982	3,054	0	0	0	0	0	54,858	11036
2019	0	10,243	12,983	16,107	8,671	6,033				0	0	54,037	30811
2018		10,848	12,097	20,990	7,968				0	0	0	51,903	41055

CIP Number: 211002
Project Title **WRRF PS No. 2 Pumping Improvements - Phase 1**

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Pump Station 2

Project Engineer/Manager Vinod Sharma

Director Philip Kora

Project Score

Problem Statement Correct drifting issues of pumps and meet long term wet weather capacity needs

Scope of Work / Project Alternatives This project involves evaluating and recommending alternatives for providing more reliable pumping capacity at Pump Station No. 2 for Pumps Nos. 11 and 14.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1,912	1,860	0	0	0	0	0	0	3,772	0
2020	0	0	322	2,268	1,222	0	0	0	0	0	0	3,812	1222
2019	0	109	599	2,454	621					0	0	3,783	3075
2018	456	1,157	1,304	616					0	0	0	3,533	1920

CIP Number: 211004
Project Title WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Primary Treatment

Location City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**


Rack and Grit

Project Engineer/Manager Partho Ghosh

Director Philip Kora

Project Score

Problem Statement Rehabilitate aging rack and grit system for efficient removal of grit to reduce loading on downstream process areas

Scope of Work / Project Alternatives The scope of work includes modifications and improvements of the existing grit and screening handling system at Pump Station 1 and MPI Sampling Station 1.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	26,502	1,771	0	0	0	0	0	0	28,273	0
2020	0	0	24,505	1,824	869	0	0	0	0	0	0	27,198	869
2019	0	20,944	3,648	2,752	303					0	0	27,647	3055
2018	13887	2,303	2,652	2,652					0	0	0	21,494	5304

CIP Number: 211005
Project Title WRRF PS No. 2 Improvements Phase II

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Main Raw Sewage Pumps at Pump Station 2

Project Engineer/Manager Alfredo Lava
Director Dan Alford

72.8
Project Score

Problem Statement This project will improve the pump reliability of PS-2 to meet the NPDES permit flow capacity requirements.

Scope of Work / Project Alternatives The preliminary scope of this project is to provide basis of design (study) report for rehabilitation/rebuilding plan for existing pump and its control and any associated equipment. The study will look into the addition of VFD to the three constant speed pumps. The study will not be limited to increasing the capacity of existing pumps to meet the long-term goal for wet weather capacity. The Scope also include: Provide engineering design for rehabilitation/rebuilding of the pumps, replacement of HVAC System, I&C Improvements (i.e. automation, etc.), structural, architectural and electrical improvement, provide design for any recommendation made by the study report. The services during construction is: provide construction assistance, such as review of shop drawings, response to RFIs, attending progress meetings, verifying and assisting GLWA for any changes requested by the contractor, etc.

Construction will follow after the completion of design.

Other Important Info Challenges: Shutdowns of the pumps to be rehabilitated will require co-ordination with operations and careful planning to meet NPDES permit requirements for the flow capacity during the construction phase.

Project History: Pump Station No. 2 was built in 1994. Seven out of eight pumps were running since 1994. These pumps never attained the design capacity due to an unidentified drifting problem. The eighth pump (Pump No. 10) was installed under PC-740 with a modified suction elbow that provided better pumping capacity. The VFDs for five (5) pumps were also replaced in 2005 under PC-744 contract.
A new impeller was installed on Pump No. 9 and a rebuilt impeller was installed on Pump No. 16 in 2008, which provided sufficient improvements in pumping capacity. To mitigate the declining of pumping

CIP Number: 211005
Project Title WRRF PS No. 2 Improvements Phase II

capacity, DWSD initiated a CS-1444/PC-795 PS-2 Pumping Improvements project to rehabilitate Pump No. 11 and Pump No. 14 to solidify the long-term wet weather capacity of 1700 MGD.
It was recommended to rehabilitate the remaining pumps with energy efficient, and more reliable control systems that require less maintenance.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1	0	0	0	471	2,245	949	30,384	34,050	3665
2020	0	0	0	0	0	684	711	611	8,668	10,925	0	21,599	10674
2019	0		7		515	115	9,294	9,101	3,055	0	0	22,087	19025
2018			600	1,700	4,800	3,700			0	0	0	10,800	10800

CIP Number: 211006
Project Title WRRF PS No. 1 Improvements

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Pump Station 1 Interior

Project Engineer/Manager Jason Williams

Director Dan Alford

75

Project Score

Problem Statement Condition assessment and rehabiliation of all pumps at Pump Station No. 1 to increase efficiency and reliability.

Scope of Work / Project Alternatives The study/design work will identify all major parts including impellers and wear rings to be refurbished for each pump and all related appurtenances. The construction services will provide rehabilitation and/or replacement as determined in the study and design along with the sequencing of pump shutdown throughout the rehabilitation period.
Investigation and evaluation of all the inlet gates, outlet gates and associated actuators, Motor Control Centers (MCCs) and other related equipment, HVAC system, Control System and provide recommendation and design for rehabilitation or replacement are also part of the scope.

Other Important Info Challenges: Maintaining the adequate pumping capacity during construction.

Project History: GLWA operate two raw sewage pumping stations: PS-1 and PS-2, at the Water Resources Recovery Facility. Raw wastewater (influent) from the collection system flows to the Influent Pumping Station through the Detroit River Interceptor (16 feet in diameter), Oakwood Interceptor (12.5 feet in diameter) and North Interceptor East Arm (NIEA). The main Influent Pumping Station No. 1 (PS-1) was constructed in the 1930s. PS-1 has eight constant speed pumps of various capacities (six were installed in the 1940s and two more were added in 1956) and has a Firm Capacity (largest pump out of service) of 1,225 MGD during wet weather event. The Influent Pumping Station No. 2 (PS-2) has eight raw sewage pumps (combination of variable and constant speed pumps) with a Firm Capacity of 805 MGD during wet weather event.
The pumps at PS-1 were rehabilitated in 2004 and 2005 under PC-744 project (DWP 1007).

CIP Number: 211006

Project Title WRRF PS No. 1 Improvements

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	6	929	645	551	8,532	12,772	3,341	0	26,776	25841
2020	0	0		498	1,803	2,325	8,424	8,370	811	84	0	22,315	21733
2019	0			500	1,800	2,462	9,394	9,245	719	0	0	24,120	23401
2018			600	5,350	5,125	2,054			0	0	0	13,129	13129

CIP Number: 211007

Project Title WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Primary Treatment

Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

WRRF Pumping Station 2: Bar Racks and Grit Collection System

Project Engineer/Manager Jason Williams

Project Score 65.2

Director Dan Alford

Problem Statement Replacement of all bar racks and associated equipment and addition of fine screens (1/4 inch) for more reliable and efficient screenings removal. Addition of screenings washing and compaction to reduce truck traffic and cost of disposal. Improvement of grit collection system with more efficient, state-of-the-art, grit collection and pumping system, and grit washing and classification to reduce truck traffic and cost of disposal. Improvements to the grit screenings and grit removal and handling systems will improve the performance of all downstream processes, reduce maintenance costs and increase life of downstream equipment.

Scope of Work / Project Alternatives The work consists of evaluation, design and construction of the replacement of the existing bar racks and ancillary equipment and gates, addition of new fine screens (1/4 inch) downstream of the bar racks, addition of screenings washing and compaction, inclusion of stacked tray grit removal or other technology within the aerated grit tank and grit washing and/or classification. Work also includes the upgrade and expansion as necessary of the existing building that houses the screens and the screenings and grit handling and load out, including all lighting, HVAC, plumbing, electrical, and architectural work. New instrumentation and controls for operations and monitoring will also be provided. System shall be designed to meet long-term wet weather capacity requirements at PS2.

Other Important Info *Innovation note: Include new grit removal equipment rather than replacement in kind (cyclonic).
The CIP Project Proposal – CIP 1314 – "Replacement of Bar Racks at Pump Station No. 2" and CIP Project Proposal – CIP 1223 – "Rehabilitation of Grit and Screening System at PS-2 and Rehabilitation of Sampling Sites at WWTP" are combined into one project under CIP 1314. That combined new budget for CIP 1314 (CIP 1223 and 1314) has a total amount of $11,617,000. The design of "Rehabilitation of Sampling Sites" is completed and will be bid separately for construction. The previous design for Bar Rack System by Sigma under As Needed Engineering Services Contact task order will not proceed for construction as designed. An engineering decision to have a fresh look and start new study, design and construction project

CIP Number: 211007

Project Title WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements

through this CIP project will proceed. The original budget for CIP-1314 is $3.667M. The $6.0M CIP budget transfer was made from CIP-1223. The new revised CIP-1314 budget is $9.667

Challenges: Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

Project History: The Pump Station No. 2 Rack and Grit Collection system have been in service for almost twenty years. The equipment are near the end of its useful life. Improper transport of collected screenings has been ongoing problem and rags and other floatable materials are not screened thoroughly.
The condition and reliability of the Pump Station No. 2 Grit System was inspected and the grit crane was upgraded in 2002 by PC-744/DWP-1006.

- The HVAC system was found in good condition but needs some rehabilitation due to its ending life cycle.
- Modifications are needed to the existing Grit removal system because of the draining issues. Grit Chambers cannot be emptied due to clogged drains.
- Grit carry over cause deterioration of the downstream process and equipment
- Rehabilitation/Replacement of screening belt since the equipment is nearing to its useful life.
- Rehabilitation of Grit Channel Drain Gate stems.

The bar screen foundations, screen frames, and conveyance chutes in PS-2 have been in service for approximately twenty years.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	1	256	3,098	7,546	2,120	20,899	34,034	8,642	76,596	67697
2020	0	0		6	269	1,329	2,039	6,306	7,838	49	0	17,836	17781
2019	0			7	402	1,980	2,404	6,956	8,814	0	0	20,563	11749
2018			650	2,900	3,300	2,817			0	0	0	9,667	9667

CIP Number: 211008

Project Title WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines

Project Status	Active
Class Lvl 1	Wastewater
Class Lvl 2	WRRF
Class Lvl 3	Primary Treatment
Location	City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Ferric Chloride Tanks at Pump Station 1

Project Engineer/Manager Ravi Yelamanchi

Director Dan Alford

74.2

Project Score

Problem Statement The Ferric Chloride Systems at PS-1 is used to reduce phosphorus to the required permit levels. The system, which include chemical storage tanks, secondary containment, valves and piping is in need of rehabilitation. The Complex B sludge lines are clogged due to Struvite and need rehabilitation/replacement.

Scope of Work / Project Alternatives The scope of work will include study design and construction for the ferric chloride feed system at PS-1. Specifically it will include: a study to evaluate alternative locations for application of ferric chloride, a pilot study to test alternative application points, and inspection of the existing chemical feed systems, a study to provide recommendations for system modifications and improvements, design of recommended system improvements, and construction of chemical feed system improvements. Evaluation and recommended design and construction of the sludge lines in Complex B is also included in the scope.

Other Important Info *Innovation note: Align sizing & design with U of M phosphorus & enhanced carbon capture studies, as well as improved mixing of the ferric with primary influent.

Challenges: Maintaining capacity of the existing feed system during construction will be a challenge. Also, determining the simplest system that will meet current and future phosphorous limits for both primary and secondary effluent will be a challenge.

Project History: There are phosphorous effluent permit limits for both primary effluent (during wet weather) and for secondary effluent. Effluent limits for phosphorous were lowered again in 2016 and now stand at 1.5 mg/l for primary effluent and 0.7 mg/l (October – March) and 0.6 mg/l (April – September) for secondary effluent. GLWA has historically been able to meet the phosphorous limits for both primary and secondary effluent by adding ferric chloride to the primary clarifier influent. The physical/chemical removal in the primary clarifiers lowered the phosphorous concentrations to meet the primary effluent

CIP Number: 211008

Project Title WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines

limits. However, GLWA has begun to experience some difficulty with the settling of the secondary biomass in the final clarifiers. Preliminary investigations have indicated that this settling ability issue could be caused by low phosphorous concentrations in the secondary influent wastewater. This is because the biomass in the secondary system requires a certain ratio of carbon (CBOD), nitrogen, and phosphorous to reduce the pollutant concentrations and then settle in the final clarifiers. As such, in addition to rehabilitating the ferric chloride system at PS-1, there also needs to be a study and possibly pilot test conducted to review the best location for ferric chloride addition to the wastewater.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	178	1,239	5,522	3,886	0	0	0	0	10,825	9408
2020	0	0	12	1,021	2,950	4,983	1,600	0	0	0	0	10,566	9533
2019	0			7	115	1,259	2,732	5,537	2,363	0	0	12,013	9650
2018			400	1,400	5,200	2,000	633		0	0	0	9,633	9633

CIP Number: 211009

Project Title **WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System**

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Primary Treatment

Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager TBD

61.2

Project Score

The existing scum system is complicated to operate and difficult to maintain, equipment remains out of service for extended period. The scum beaches need better enclosure and heating system, during extreme cold conditions scum collection system get frozen

Director Dan Alford

Problem Statement The circular clarifiers scum removal system is over 10 years old and need to be rehabilitated. They will help protect the secondary treatment process by preventing scum from entering the aeration tanks.

Scope of Work / Project Alternatives This project will provide for the study, design and construction of new scum equipment in the Scum Buildings for the circular clarifiers . The study will consist of an evaluation of the existing process and simplified alternative systems for scum removal including the scum removal from the buildings. Future alternatives for scum disposal, such as addition to an anaerobic digestion process, will be considered. All alternatives will be evaluated for energy efficiency (reduction of electrical usage). The scum removal system at the rectangular PCs will also be evaluated to determine which aspects can be applied to the circular SBs. Design and construction services will be included for the selected scum removal system.

Other Important Info *Innovation note: See project write-up -- evaluate alternatives for energy efficiency.

Project History: There are 12 rectangular PCs (1-12) and 6 circular PCs (13-18) clarifiers at the WRRF. PCs remove TSS, BOD, and phosphorous through a chemically enhanced settling process. The clarifiers also remove fats, oils, and grease (FOG or scum) by skimming the surface of the clarifiers and transporting the scum to a SB where it can be concentrated and pumped again to be hauled off site. The SBs for the rectangular clarifiers were recently rehabilitated. They have a fairly simple system and appear to be operating well. The SBs for the circular clarifiers utilize a somewhat complex transport and concentration system. New SBs were installed for PCs 17 and 18 when they were constructed. Since their installation, the

CIP Number: 211009

Project Title **WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System**

equipment in the circular clarifier SBs has been complicated to operate and difficult to maintain. Much of the equipment is out of service for extended periods of time.

Challenges: Each of the scum removal facility serves two circular clarifiers, so two circular clarifiers at a given time needs to be out of services during rehabilitation, this will limit the primary capacity to minimum to meet NPDES permit requirements.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	21	313	1,254	802	8,715	2,144	0	13,249	13228
2020	0	0		0	0	778	619	5,237	4,725	35	0	11,394	11359
2019	0				7	859	572	5,796	5,005	0	0	12,239	7234
2018			266	324	1,870	2,671	2,670	2,679	0	0	0	10,480	7801

CIP Number: 211010

Project Title Rehabilitation of Sludge Processing Complexes A and B

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Primary Treatment

Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Project Engineer/Manager Ravi Yelamanchi

Director Dan Alford

65

Project Score

Problem Statement Both Complex A and Complex B have reached the end of there design life. The majority of the equipment for the two processes are located below grade in areas prone to flooding. Tanks are located above grade and have little to no access around the perimeter, this limits and reduces cleaning effectiveness. Both the valves and the pumps used to transfer sludge to the BDF are past there design life. Equipment brakeage affects the plant ability to process sludge.

Scope of Work / Project Alternatives The work consists of evaluation, design and rehabilitation of both Complex A and Complex B. Scope to include tank repair to improving tank access and increase life, building and process repair to including structural, mechanical, process, electrical, and instrumentation replacement. Scope should focused on relocating the sludge pumps from below grade to above grade which could include new above grade structures and cross connecting pumps to allow for additional flexibility in feeding the BDF process.

Other Important Info Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	178	748	13,113	14,039	926

CIP Number: 211011
Project Title WRRF PS1 Screening and Grit Improvements

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [x] **Project New To CIP**

Project Engineer/Manager TBD
Director Dan Alford

64
Project Score

Problem Statement Addition of fine screens (1/4 inch) for more reliable and efficient screenings removal. Addition of screenings washing and compaction to reduce truck traffic and cost of disposal. Improvement of grit collection system with more efficient, state-of-the-art, grit collection and pumping system, and grit washing and classification to reduce truck traffic and cost of disposal. Improvements to the grit screenings and grit removal and handling systems will improve the performance of all downstream processes, reduce maintenance costs and increase life of downstream equipment.

Scope of Work / Project Alternatives The work consists of evaluation, design and construction of the addition of new fine screens (1/4 inch) downstream of the bar racks, addition of screenings washing and compaction, inclusion of stacked tray grit removal within the aerated grit tank and grit washing and/or classification. Work also includes the upgrade and expansion as necessary of the existing building that houses the screens and the screenings and grit handling and load out, including all lighting, HVAC, plumbing, electrical, and architectural work. New instrumentation and controls for operations and monitoring will also be provided. System shall be designed to meet long-term wet weather capacity requirements at PS1.

Other Important Info Maintaining the MDEQ-NPDES required capacity during the construction phase of the project. Coordination with the CIP Number 211006

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	14	100,733	100,747	14

CIP Number: 212003
Project Title WRRF Aeration System Improvements

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Secondary Treatment & Disinfection

Location City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Equipment for aeration system

Project Engineer/Manager Vinod Sharma

Director Philip Kora

Project Score

Problem Statement Improve aeration system and provide necessary inter-connections

Scope of Work / Project Alternatives The scope of work includes study, design, and construction assistance for the oxygen baffle on Bay 10 of A1 & A2 decks, replacement of influent, Return Activated Sludge (RAS) piping, isolation gate and valves for decks Nos. 3 & 4, replace RAS and influent magmeters for Intermediate Lift Pumps (ILP) Nos. 3, 4 & 7. The work also includes replacement of influent gates and operators on Aeration Deck No. 1 & 2.

Other Important Info Challenges: N/A - Under Procurement

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	16,356	136	0	0	0	0	0	0	16,492	0
2020	0	0	11,851	4,831	0	0	0	0	0	0	0	16,682	0
2019	0	3,805	9,273	2,719	2,523					0	0	18,320	5242
2018		2,348	11,197	2,658					0	0	0	16,203	13855

CIP Number: 212004

Project Title WRRF Chlorination and Dechlorination Process Equipment Improvements

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Secondary Treatment & Disinfection

Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Chlorinator/Sulfonator buildings

Project Engineer/Manager Ali Khraizat

Director Dan Alford

81.6

Project Score

Problem Statement The disinfection complex equipment condition has deteriorated because of the corrosive characteristics of the chemicals utilized in the operations of the area. This project is needed to restore equipment performance to OEM levels.

Scope of Work / Project Alternatives Scope of Work is to refurbish evaporators, chlorinators/sulfonators, replace regulating check valves, ejectors, process water valves, gas safety panels, compressors, gas flow meters, and all accessories and appurtenances. This proposed CIP budget is for construction only. The design and construction assistance services are budgeted through "As Needed Engineering Services Contract CS-1481, Task #23".

Other Important Info *Innovation note: Align with considerations of alternative disinfection.
The maintenance of the equipment hasn't been performed at the recommended intervals. Rebuilding the equipment and maintaining them according to OEM specifications would provide reliable performance.

Challenges: Chlorine and sulfur dioxide are both extremely hazardous toxic chemicals that can impact staff and the public if an uncontrolled gas release occurs. Maintaining staff safety, regulatory compliance, and meeting production requirements is a challenge.

Project History: The DMT Disinfection Complex was commissioned in 2003 and was expected to operate until 2023 without any major projects. However budget and staffing reductions caused the scheduled maintenance to be reduced so the equipment condition has deteriorated.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	190	3,726	1,850	0	0	0	0	0	5,766	1850

CIP Number: **212004**

Project Title **WRRF Chlorination and Dechlorination Process Equipment Improvements**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2020	0	0	117	913	2,345	1,670	0	0	0	0	0	5,045	4015
2019	0	86		2,101	2,422	661				0	0	5,270	5184
2018			400	2,800	1,800				0	0	0	5,000	5000

CIP Number: 212006
Project Title WRRF Rouge River Outfall (RRO) Disinfection (Alternative)

Project Status	Active
Class Lvl 1	Wastewater
Class Lvl 2	WRRF
Class Lvl 3	Secondary Treatment & Disinfection
Location	City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Plan view of RRO location

Project Engineer/Manager Darrel Field

Director Philip Kora

Project Score

Problem Statement Provide project oversight and design build services for alternative disinfection services to meet NPDES Permit requirements at existing Rouge River Outfall

Scope of Work / Project Alternatives The consultant shall provide comprehensive professional services for project oversight and Owner's representation for the PC-797 RRO Disinfection Progressive Design-Build Contract. The scope of work consists of completing basis of design, design and construction services to develop and implement a solution that will result in 100% disinfection of wet weather flow discharged from WRRF to Detroit River outfall and Rouge River Outfall in order to meet NPDES Permit requirements.

Other Important Info Challenges: N/A - Under Procurement.

Project History: The DR0-2 Outfall was originally designed in 1998 under CS-1150, and construction began in 1999 under PC-709. Some surface construction work and substantial underground work were performed, including construction of the entrance shaft, two access shafts, six diffuser riser shafts in the Detroit River, and about half of the length of the tunnel. On April 23, 2003, uncontrollable high rates of ground water mixed with Hydrogen Sulfide (H2S) inflow flooded the tunnel, and it has remained so since that time.
After the tunnel flooded, GLWA (then DWSD) terminated the PC-709 contract and looked for other alternative to complete the work. After further study of the tunnel construction a different alternative was considered and thus, scope for the Modified Detroit River Outfall No. 2 (MOD DR0-2) under CS-1448 design was established. This contract called for a design to construct a new rock tunnel at a higher elevation with Slurry Shield Tunnel Boring Machine (TBM). The design of the MOD DR0-2 was completed on December 2007 and the construction of the DR0-2 project under PC-771 was started on November 2008. Due to economic hardship during the fiscal year 2008/2009, DWSD requested MDEQ to terminate this contract. After further discussion an agreement reached with GLWA (then DWSD) and MDEQ to allow termination of this Contract and look for feasible and cost effective solutions to meet the wet-

CIP Number: **212006**
Project Title **WRRF Rouge River Outfall (RRO) Disinfection (Alternative)**

weather discharge to Rouge River Outfall. Therefore, on April 2009, GLWA (then DWSD) terminated the PC-771, MOD DR0-2 Contract.
The Rouge River Outfall No. 2 (RR0-2) proposal was first developed in 2009. The RR0-2 was to be a ground level conduit extending approximately 2,500 feet to the intersection of the Rouge River and the Rouge Shipping canal. The RR0-2 conduit was to be used during the wet-weather events and primary effluent to the river shall be disinfected by mixing of Chlorine and De-chlorination. The Basis of Design (BOD) for the RR0-2 project was issued on November 6, 2009. GLWA (then DWSD) performed a RR0-2 Segment- 1 contract to do the ancillary work such as modification of gates, stop logs and chlorine tank shut off valves at WRRF.
In 2012/2013 the WRRF commissioned a study of the feasibility of alternative disinfection methods for meeting the requirements of the Rouge River Disinfection. The results of this study and a subsequent hydraulic study came to the conclusion that the existing conduits to the Rouge River had sufficient contact time to properly disinfect and dechlorinate the secondary effluent from the WRRF. If a method could be designed to shunt secondary flows to the Rouge
River during wet weather and send primary effluent through the longer DRO, then a substantial savings would result from a new design approach. This approach was further explored and discussed with the MDEQ. The result is a NPDES permit modification allowing for the construction of the proposed Rouge River Outfall Disinfection project, keeping the April 2019 project completion date that had been in the NPDES permit.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	41,692	2,748	0	0	0	0	0	0	44,440	0
2020	0	0	26,441	17,009	4,583	0	0	0	0	0	0	48,033	4583
2019	0	6,873	20,619	15,817	4,157					0	0	47,466	19974
2018	729	6,530	15,800	15,520	9,020				0	0	0	47,599	40340

CIP Number: 212007

Project Title **WRRF Rehabilitation of the Secondary Clarifiers**

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Secondary Treatment & Disinfection

Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Secondary Clarifiers

Project Engineer/Manager Beena Chackunkal

Director Dan Alford

53.2

Project Score

Problem Statement The secondary clarifiers need to be inspected and rehabilitated for certain components such as the rake arms.

Scope of Work / Project Alternatives This project will provide for inspection, study, design, and construction for refurbishing the secondary clarifiers. A key component will be the inspection of the concrete and the rake arms. Once the condition of these components is determined, alternatives will be evaluated and the selected alternative will be designed and constructed. The scope will also include evaluating and designing isolation gates for the individual clarifiers. The B Houses have energy intensive HVAC units. These will be evaluated for potential payback with alternative, energy efficient units.

Other Important Info Challenges: This will be a long term project because only one or two clarifiers can be taken out of service at a time. Also, there may be different levels of rehabilitation for each clarifier depending upon the results of the inspection.

Project History: There are 25 secondary clarifiers at the GLWA WRRF. They have been rehabilitated in the past for other components such as RAS pumps, troughs and weirs, and center drives. It is time to refurbish some of the other key components.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	15	427	879	532	28,288	30,141	1853
2020	0	0		0	0	0	0	71	933	29,114	0	30,118	1004
2019	0				859	1,374	3,680	9,216	19,676	0	0	34,805	15129
2018			301	3,576	5,543	5,540	5,540	10,499	0	0	0	30,999	20500

CIP Number: 212008
Project Title WRRF Aeration Improvements 1 and 2

Project Status	Future Planned
Class Lvl 1	Wastewater
Class Lvl 2	WRRF
Class Lvl 3	Secondary Treatment & Disinfection
Location	City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Intermediate Lift Pump Station N.2

Project Engineer/Manager Beena Chackunkal

Director Dan Alford

Project Score 67.8

Problem Statement The ILPs convey primary effluent to the secondary bioreactors (aeration decks). These pumps have reached their useful life and are in need of replacement. The pump selection is integrally connected to improvements in the aeration decks related to the conversion to biological phosphorus removal, implementation of step feed and overall improved hydraulic control in the aeration decks and flow control through the secondary system. Implementation of biological phosphorus removal will reduce oxygen and chemical use resulting in a more sustainable treatment system, and implementation of step feed will improve high flow management through the secondary system increasing the volume of flow that can be treated through the secondary system thus minimizing the volume of flow discharged without secondary system. Hydraulic improvements ease operations and minimize the operator attention on the numerous surface aerators.

Scope of Work / Project Alternatives The work consists of evaluation, design and construction of the replacement of ILPs 1 & 2, conversion of aeration decks 1 & 2 to incoprorate biological phosphorus removal, including replacement of mixers in Bays 1, 2 and 3, relocation of the oxygen feed, and a new purge blower. Incorporation of step feed includes modification of the influent conditions to allow primary effluent to be directed to Bay 1, as well as two other locations down the length of the tank. Weir length will be increased to reduce the variation in the hydraulic grade line across the tank to maintain adequate submergence of mixer/aerators and reduce the frequency of mixer/aerators tripping out on surge. Replacement of Mixer/aerators in Decks 4 through 10 will be evaluated and could be included as an add-alternate to the contract.

Other Important Info Opportunity for a common header system to allow for any ILP to supply any bioreactor. If feasible provide ILPs that can meet the regulatory and dry weather needs without the need for speed control.

Challenges: Maintaining the required wet weather secondary capacity of 930 MGD while operating efficiently during dry weather flows.

CIP Number: 212008

Project Title WRRF Aeration Improvements 1 and 2

Project History: ILP Station No. 1 houses ILP Nos. 1 and 2. The pumps are vertical turbine type each with a maximum capacity of 365 MGD and a motor size of 2,500 hp. The pumps are equipped with variable frequency drives (VFDs) to vary the pump speed. ILP Nos. 1 and 2 can feed Aeration Deck Nos. 1 and 2.

ILP Station No. 2 houses ILP Nos. 3, 4, and 7. The pumps are vertical turbine pumps with a maximum rated design capacity of 350 MGD each and a motor size of 2,500 hp. The pumps are also equipped with VFDs. ILP Nos. 3 and 4 feed Aeration Deck Nos. 3 and 4, while ILP No. 7 is a swing pump and can be used to transfer wastewater to Aeration Deck Nos. 2, 3, or 4.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	183	4,612	7,977	7,619	40,638	15,336	5,149	81,514	76182
2020	0	0			229	500	656	6,727	5,910	6,811	0	20,833	14022
2019	0				230	1,141	6,569	5,767	6,809	0	0	20,516	13707

CIP Number: 212009

Project Title WRRF Aeration Improvements 3 and 4

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Secondary Treatment & Disinfection

Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [x] **Project New To CIP**

Project Engineer/Manager TBD

Director Dan Alford

67.8

Project Score

Problem Statement The ILPs convey primary effluent to the secondary bioreactors (aeration decks). These pumps have reached their useful life and are in need of replacement. The pump selection is integrally connected to improvements in the aeration decks related to the conversion to biological phosphorus removal, implementation of step feed and overall improved hydraulic control in the aeration decks and flow control through the secondary system. Implementation of biological phosphorus removal will reduce oxygen and chemical use resulting in a more sustainable treatment system, and implementation of step feed will improve high flow management through the secondary system increasing the volume of flow that can be treated through the secondary system thus minimizing the volume of flow discharged without secondary system. Hydraulic improvements will ease operations and minimize the operator attention on the numerous surface aerators.

Scope of Work / Project Alternatives The work consists of evaluation, design and construction of the replacement of ILPs 3, 4 & 7, conversion of aeration decks 3 & 4 to incoprorate biological phosphorus removal, including replacement of mixers in Bays 1 and 2, relocation of the oxygen feed, and a new purge blower. Incorporation of step feed includes modification of the influent conditions to allow primary effluent to be directed to Bay 1, as well as two other locations down the length of the tank. An assessment of reconfiguring decks 3 and 4 to four independent decks will also be assessed. Weir length will be increased to reduce the variation in the hydraulic grade line across the tank to maintain adequate submergence of mixer/aerators and reduce the frequency of mixer/aerators tripping out on surge. Replacement of Mixer/aerators in Decks 3 through 8 will be evaluated and could be included as an add-alternate to the contract or included as a separate contract.

Other Important Info Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

CIP Number: 212009

Project Title WRRF Aeration Improvements 3 and 4

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	14	73,749	73,763	14

CIP Number: 212010

Project Title WRRF Conversion of Disinfection of all Flow to Sodium Hypochlorite and Sodium Bisulfite

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Secondary Treatment & Disinfection

Location City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [x] **Project New To CIP**

Project Engineer/Manager TBD

Director Dan Alford

65

Project Score

Problem Statement With the completion of the RRO Disinfection Project (CIP 212006), storage and feed of sodium hypochlorite to the primary effluent bypass with sodium bisulfite for dechlorination has been enabled. Elimination of the use of gaseous chlorine for disinfection of the secondary effluent and replacement with sodium hypochlorite will increase operator and public safety in and around the plant site.

Scope of Work / Project Alternatives The work consists of evaluation of sodium hypochlorite and sodium bisulfite usage over the first three years of operation of the new system to assess actual dosage required to achieve permit compliance and storage available with the existing system. The assessment will include preliminary design of modifications required to enable sodium hypochlorite feed to the secondary treatment effluent and an assessment of the storage requirements at varying sodium hypochlorite concentrations. The assessment will also include the appetite for a chemical manufacturer to own and operate a sodium hypochlorite generation facility in close proximity to the facility that would allow piping of sodium hypochlorite to the site (in lieu of providing additional storage, if required, on-site).

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	14	5,972	5,986	14

CIP Number: 213002
Project Title WRRF Rehabilitation of Central Offload Facility

Project Status Cancelled

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Residuals Management

Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Powdered lime discharges into the COF causing lime to discharge throughout the building making the scrubber system to fail

Project Engineer/Manager Partho Ghosh

Project Score 76.2

Director Philip Kora

Problem Statement Refurbishment or replacement of COF equipment including sludge storage bins, conveyors, and lime offload system, scrubber system, HVAC etc., will improve reliability and performance. This improvement will enable WRRF to be in compliance with NPDES permit

Scope of Work / Project Alternatives The study, design and construction for the rehabilitation of the central offload facility includes bin activators, rotary feeder valves, knife gate valves, bottom hoppers, conveyors, and other associated items. The work also includes rehabilitation of HVAC system of the entire facility, lime offloading system, drainage system, elevator, and doors.

Other Important Info Challenges: Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

Project History: The Central Offload Facility was built under PC-744 (DWP-1074) as a design build project in 2005. The project completion was delayed due to the lime sludge slide gates on the lime mixers which were continuously leaking whenever sludge head in storage bins was high. This problem was finally resolved after replacing the gates. Due to the nature of lime and sludge and continuous operation of this facility, the equipment started failing causing various operational and maintenance problems. Eventually, the facility needs a major rehabilitation.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	982	4,204	7,696	3,297	0	0	0	0	0	16,179	10993

CIP Number: **213002**

Project Title **WRRF Rehabilitation of Central Offload Facility**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0	202	665	6,447	7,520	4,579				0	0	19,413	18546
2018		800	5,850	6,750	4,350				0	0	0	17,750	16950

CIP Number: 213005
Project Title WRRF Complex I Incinerators Decommissioning and Reusability

Project Status	Cancelled
Class Lvl 1	Wastewater
Class Lvl 2	WRRF
Class Lvl 3	Residuals Management
Location	City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Complex – I Incinerator Building at the WRRF

Project Engineer/Manager Ravi Yelamanchi

Director Dan Alford

38.4

Project Score

Problem Statement This project will decommission the C-I Incinerators building and investigate the re-usability.

Scope of Work / Project Alternatives Provide basis of design report for decommissioning of the Complex-I demolition and relocation drawings for existing pass through utilities. Provide recommendation for future reusability plan for Complex I. The demolition cost and construction assistance, and relocation of utilities is not included in this budgeted CIP. The budgeted CIP includes study, design and minimum rehabilitation to install heating to continue utilizing the building other than incinerations. The cost to demolish equipment and rehabilitate the existing building for reuse is very high and further capital investment is deferred until reuse need of this building is well defined.

Other Important Info *Innovation note: Future uses may include alternative sludge handling; keep aligned with Master Plan and Research & Innovation.
Project History: Complex I was installed and in operation since the 1940’s and has completed its valuable life cycle. The Bio-solids Alternatives Evaluation at the WWTP evaluated several options for long-term dewatering disposal as it relates to overall, and more specifically, the Complex I Incinerator Facility. Most of the options indicated that a long-term phasing out of Complex I especially due to its aged equipment and challenges of meet regularity requirements.
Challenges: Possible challenges with this project will include shutdowns of the secondary water system and abatement of asbestos and lead for this building built 1940’s. Some utility service lines may be shared with adjoining Complex II Incinerator and Complex I Dewatering.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	43	0	0	0	0	0	0	4,409	0	4,452	0

CIP Number: **213005**

Project Title **WRRF Complex I Incinerators Decommissioning and Reusability**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0					161	1,221	2,352	1,171	0	0	4,905	3734
2018			900	200					0	0	0	1,100	1100

CIP Number: 213006
Project Title WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Residuals Management
Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Sludge Feed Pumps

Project Engineer/Manager Ravi Yelamanchi
Director Dan Alford

69.2
Project Score

Problem Statement Improved sludge feed pumping system will provide wide range of operating conditions. Variable Frequency drive and Hydraulic drive units for SFP 1 and 2 are located below grade and the area has flooded. A single recycle valve for SFP 3 and 4 puts the plant at a higher risk for system outages.

Scope of Work / Project Alternatives The scope of work includes study, design, and construction for the replacement of sludge feed pumps SFP 1, 2, 3, 4, 5 and 6 and other modifications to the pumping system at the WRRF.

Other Important Info Challenges: Maintaining Plant Operational Capacity during construction.

Project History: Water Resource Recovery Facility (WRRF) has six (6) Sludge Storage Tanks (SST-1, 2, 3, 4, 5 &6), which feed sludge to the dewatering facilities (i.e. belt filter presses complexes and complex II centrifuges.) Typically, sludge from Storage Tanks 1 & 2 supplies the centrifuges on dewatering complex II upper level; sludge from Storage Tanks 3 & 4 supplies the centrifuges on the lower level of Dewatering Complex II; and sludge from Storage Tanks 5 & 6 supplies the belt filter presses in Dewatering Complex I. However, control valves in the Dewatering Complex II basement allow sludge from any storage tanks to supply any Dewatering area.
Under Contract PC-792, Storage Tanks SST-3 & 4 along with Sludge Feed Pumps SFP-3 & 4 are to be dedicated to BDF Facility.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	5	0	174	385	3,371	716	0	0	4,651	4646
2020	0	0	5	0		0	0	24	1,366	2,331	0	3,726	1390
2019	0	4			57	275	2,391	1,130		0	0	3,857	3853

CIP Number: **213006**

Project Title **WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018		33	402	750					0	0	0	1,185	1152

CIP Number: 213007

Project Title WRRF Modification to Incinerator Sludge Feed Systems at Complex -II

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Residuals Management

Location City of Detroit

Project Engineer/Manager Chris Breinling

Director Philip Kora

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

87.2

Project Score

Picture from left to right Sludge Conveyer G Damaged by Fire and Conveyer B in the Complex – II Dewatering Building and Fire Damaged Conveyer H in Complex-II Incinerators Building

Problem Statement GLWA have an ongoing study and design of sludge cake conveyance system improvements project after the March 4, 2016 fire incident in Complex –II Incinerators building. The construction of this project will provide a cleaner, fire resistant, reliable and safe sludge feed to the incinerators.

Scope of Work / Project Alternatives The restoration of sludge conveying capacity, which was lost due to the fire damage and to provide improved sludge conveyance from each dewatering facility to the incinerators. Replacement of 19 MCCs and Replacement of the Unit Substation EB-26 in Incineration Complex II.

Other Important Info Challenges: Maintaining the sludge conveyance capacity to meet permit requirements during the construction of these improvements, will be the most significant challenge on this project.

Project History: The C-II Incineration complex is over 40 years old. Major rehabilitation had been deferred over the years in anticipation of an alternative Biosolids disposal solution to handle all the solids. The Complex-II have many major pieces of equipment that are nearing the end of their useful life and require replacement or major rehabilitation in order to be used as the primary long-term solids disposal method. GLWA approved a PC-774 and PC-791 contract to rehabilitate some of the aging problem of the incineration and to meet the new air permit requirements. GLWA just completed the construction of a Biosolids Dryer Facility (BDF) with a firm capacity of 316 dry tons per day. The BDF facility is currently in operation under an in-term agreement with NEFCO. The current GLWA plan for Biosolids disposal is to utilize BDF to its capacity first, then send the additional load to Complex-II Incinerators and anything beyond that to the land fill. This Biosolids Disposal Plan requires investment in the Complex-II Incinerators to process the sludge loads on a regular basis for the daily and wet weather events to avoid the highest

CIP Number: 213007

Project Title **WRRF Modification to Incinerator Sludge Feed Systems at Complex -II**

cost of land fill.
The sludge from Dewatering Complex II travels through a series of conveyor belts (i.e., conveyors G, H and J) before it reaches Incineration Complex II. The sludge from Dewatering Complex II Lower Level was transported by Conveyor G to Conveyor H. In Incinerator Complex II, Conveyor H branches to Conveyors K and L then continue to various conveyors to feed incinerators. The sludge from Dewatering C-II Upper Level was transported by Conveyor J which branches to Conveyors M and N in Incineration C-II then continue to various Conveyors to feed incinerators. The conveyor belt structures in Incineration C-II are old, have been modified, rebuilt or repaired several times that might have altered the overall integrity of the structures. The existing “Dusseau” hopper oftentimes plugged resulting to sludge spillage. The existing feed system to the incinerator from the hoppers should be redesigned and replaced. New control systems, safeguards, provision of SFE water, run time meter or tie to ovation system and poor lighting system in the complex needs improvement.
Drainage problems had historically existed within the basement of Complex II Incineration and C-II Dewatering having to do with both building drainage, and filtrate drainage. These problems led to excessive demands on operations and maintenance staff, shutdown of process-related equipment, and safety concerns for WWTP personnel. Improvements to the C-II Incinerators building drainage system were completed in 2003 under contract DWP-1028. However, the drainage problems were not completely eliminated and still continue to exist and further Improvements to the C-II Dewatering are in design for improvements. In order to have an effective sludge conveyer’s wash system, a key requirement for safe operation of sludge conveyance system, the drainage improvements in the Complex-II Dewatering and Incinerators building are essential.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	9,352	8,336	2,258	0	0	0	0	0	19,946	2258
2020	0	0	871	7,159	8,711	3,308	0	0	0	0	0	20,049	12019
2019	0		567	6,787	11,356	3,477				0	0	22,187	21620
2018		1,500	9,600	7,822					0	0	0	18,922	17422

CIP Number: 213008
Project Title WRRF Rehabilitation of the Ash Handling Systems

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Residuals Management

Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Ash crusher system was last rehabilitated 15 years ago and near the end of its useful life, due to Complex I decommissioning dry ash system needs to be reconfigured and rehabilitated

Project Engineer/Manager Alfredo Lava

Director Dan Alford

Project Score 57.8

Problem Statement The ash systems convey and store ash for ultimate disposal. The incinerators cannot be used if both the systems are not working.

Scope of Work / Project Alternatives The scope of work will include study, design, and construction for the rehabilitation of the wet and dry ash systems. The scope will also include the piping, valves, isolation gates, vacuum pumps, air filters, HVAC, boilers, miscellaneous silo repairs (concrete, access, etc.) site work and drainage, and miscellaneous structural repairs (foot bridge, spalling concrete, etc.) at the dry ash handling system. It will also include the pumps, piping, and sluicing system at the wet ash system.

Other Important Info *Innovation note: Due to only 10-15 years remaining useful life on Complex I, reconsider recommissioning wet ash. Recom.

Project History: The C-I and C-II Incinerators have been the primary source for processing Biosolids at the GLWA WRF since the plant was first built. The original ash handling system was a wet ash/sluicing process. The dry ash system was constructed in the 1960s and expanded with the construction of the C-II Incinerators in the 1970s. The wet ash system has not been in use for over five years and there is no backup if the dry ash system goes down. The C-I Incinerators are planned to be decommissioned in the next year or two and there is a potential to link the C-I ash handling system to the C-II system to provide extra storage.

CIP Number: **213008**
Project Title **WRRF Rehabilitation of the Ash Handling Systems**

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	166	1,338	636	11,061	5,342	0	0	18,543	18377
2020	0	0		0	111	1,111	5,525	9,574	2,184	0	0	18,505	18505
2019	0				687	916	3,614	6,069	9,330	0	0	20,616	11286
2018			530	1,045	6,225	5,725	4,791		0	0	0	18,316	18316

CIP Number: 214001

Project Title WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Industrial Waste Control

Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Old IWC and Analytical Lab; new one will be built at the location of the WRRF because of Gordie Howe International Bridge Project

Project Engineer/Manager Beena Chackunkal

Project Score 62.2

Director Dan Alford

Problem Statement Laboratory Optimization, Continued operation of IWC and Lab, lease termination for analytical laboratory, and utilization of available space in WRRF NAB

Scope of Work / Project Alternatives Relocate Industrial Waste Control Division and Analytical Lab to New Administration Building at WRRF. Consolidate the existing Operations Lab with Analytical Lab.

Other Important Info Challenges: Maintaining the laboratory operations during relocation.

Project History: In accordance with the NPDES Permit, GLWA implements and enforces an Industrial Pretreatment Program (IPP), and regulates the discharge of wastewater from commercial and industrial sources throughout the service area. A key component of the IPP includes the performance of analytical testing on wastewater samples collected from industrial and commercial sources, in-system samples from the sewer system and other sources including groundwater and septage.

The Industrial Waste Control Division (IWC) is responsible for implementation of the IPP, and analytical services are obtained from the Analytical Laboratory located at the MCHT facility. IWC activities are housed at the Livernois Center Building (LCB) located at 303 S. Livernois, while the Analytical Laboratory leases space at the MCHT on Second Avenue.

The State of Michigan Department of Transportation and the Govt. of Canada have proposed to construct a new bridge crossing across the Detroit River, with a completion date of 2020. The Livernois Center Building lies within the area designated for the Bridge and support services and need to be relocated. It would be desirable to relocate the laboratory facilities at the same time to optimize the operations and make use of underutilized GLWA facilities rather than lease space from a 3rd party.

CIP Number: 214001

Project Title WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	2,301	10,369	1,331	0	0	0	0	0	14,001	1331
2020	0	0	573	2,828	7,567	0	0	0	0	0	0	10,968	7567
2019	0	182		4,001	7,764	1,000				0	0	12,947	12765
2018			5,000	2,000					0	0	0	7,000	7000

CIP Number: 216004

Project Title Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF

Project Status Active

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 General Purpose

Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

The RAS-3 sampling station in the basement of Intermediate Lift Pump No. 2 (ILP No. 2) Building samples the return activated sludge flows to Aeration Deck No.4

Project Engineer/Manager Beena Chackunkal

Director Dan Alford

Project Score 82.2

Problem Statement Rehabilitation of the sampling facilities will improve system reliability and allow for consistent and accurate sampling. This will help to submit an accurate report to MDEQ. The rehabilitation of Ferric Chloride system will improve the phosphorous removal to comply with the Permit.

Scope of Work / Project Alternatives The scope of work includes:
Replacement of existing sampling equipment, installing new samplers, pumps, piping, housing and support equipment such as I&C, HVAC, etc. at the various sampling sites.
The scope also include:
Replacement of existing two steel Ferric Chloride tanks at PS#2 with four (4) smaller tanks.
Provide new piping layout, gravity feed, and self-cleaning strainer.
Rehabilitate Ferric Chloride Unloading station, associated Valves and Appurtenances.
Provide Flow meters and new control strategies to meet future demands of Ferric Chloride at Pump Station # 2.
The CIP is for construction only.

Other Important Info *Innovation note: Rehab may include alternative online/real-time sampling & analysis, as well as improved mixing of the ferric with primary influent.
The original CIP Project Proposal CIP-1223, “Rehabilitation of Grit and Screening System at PS-2 and Rehabilitation of Sampling Sites at WWTP” included two major scope items; Rehabilitation of Grit & Bar Screening System and Sampling Stations. That construction budget for CIP-1223 amount $11 M was set aside in CIP. The design for Grit & Screening System and Sampling Station were complete under As Needed Engineering Services Contract, CS-1481 Task 18. The construction for “Rehabilitation of Sampling Sites” will move forward and be bid out separately for construction without Grit & Bar Screening System.

CIP Number: 216004

Project Title Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF

The Bar Rack System and Grit System designed under As Needed Engineering Services Contact CS-1481, Task 18 will not proceed for construction as designed. An engineering decision to have a fresh look and start a new study, design and construction project through CIP-1314 will proceed. The proposed CIP budget is for construction cost only. The original budget for CIP-1223 was $11M and has been reduced to $5M. The remaining $6M budget has been transferred to CIP-1314 to complete study, design and construction of Grit and Screening System at PS#2.

Challenges: Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

Project History: The Sampling sites are located at Oakwood, MPI-2, NEIA, PEAS1, 3 & 4, ML1 thru 4, and RAS1 thru 4, C2SE 3& 4. Sampling is performed to monitor permit compliance and process performance. Samples are also collected and analyzed on composite samples. The above sampling stations are required to be rehabilitated or replaced for meeting the permit sampling requirements. These sampling stations regularly fails to collect samples due to the clogging problem in the sample line. Replacement of existing sampling equipment, installing new samplers, pumps, HVAC, etc. were also proposed through Need Assessment 2010 – 2016 for these sampling stations.
The WRRF sampling station rehabilitation design is completed under an As Needed Engineering Services. The WRRF PS# 2 Ferric Chloride rehabilitation design is completed under another As Needed Engineering Services Contact. These two projects are combined together for construction under the revised CIP #1223 in the 2018 CIP.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	815	3,493	1,300	121	0	0	0	0	5,729	1421
2020	0	0	439	609	3,921	607	0	0	0	0	0	5,576	4528
2019	0	312	40	551	3,957	565				0	0	5,425	5073
2018			2,500	2,500					0	0	0	5,000	5000

CIP Number: 216006
Project Title Assessment and Rehabilitation of WRRF yard piping and underground utilities

Project Status	Active
Class Lvl 1	Wastewater
Class Lvl 2	WRRF
Class Lvl 3	General Purpose
Location	City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

GLWA WRRF

Project Engineer/Manager Charles Reinhart

Director Dan Alford

76.4

Project Score

Problem Statement Yard piping and underground utilities are vital to the operations of the WRRF. The integrity of these systems will be maintained with this project. The Secondary Water system needs to be relocated or completely refurbished to provide uninterrupted water for fire protection and process applications such as seal water to the pumps. Some of the yard piping is original to the plant and requires a condition assessment.

Scope of Work / Project Alternatives This project will include the study, design, and construction for the needed improvements to yard piping and underground utilities. This includes right sizing, as-built confirmation and condition assessment of our yard piping and underground utilities. It is possible that the secondary water system may need to be relocated. The distribution models for the water systems will also be updated. A redundant potable water feed to the WRRF will also be evaluated.

Other Important Info Reliable utility is a critical aspect of O&M for the facility and to avoid outages.

Project History: Some of the pipe lines at the WRRF have been inexistence since the plant was built and have been found on record dating back to 1938. As the plant has grown, so have the systems. In general, the majority of the changes to the multiple systems occurred when the specific buildings or components to the plant were built or renovated. Therefore, an evaluation and necessary replacement of these pipelines are needed to make sure the integrity of these pipelines.

Challenges: Maintaining the adequate supply of our water systems required for treatment processes during assessment and rehabilitation of underground utilities will be the most significant challenge on this project. Temporary power, air, water, natural gas system shutdowns may also be required to perform the work.

CIP Number: **216006**

Project Title **Assessment and Rehabilitation of WRRF yard piping and underground utilities**

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	3	270	4,291	4,754	4,754	4,767	5,400	273	24,512	23966
2020	0	0		0	323	5,258	3,849	4,500	3,500	7,423	0	24,853	17430
2019	0				1,718	4,008	7,174	17,530	24,026	0	0	54,456	30430
2018			1,700	2,000	12,000	15,600	16,279	4,141	0	0	0	51,720	47579

CIP Number: 216007
Project Title DTE Primary Electric 3rd Feed Supply to WRRF

Project Status	Active
Class Lvl 1	Wastewater
Class Lvl 2	WRRF
Class Lvl 3	General Purpose
Location	City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

The new 3rd 120/13.8 kV Transformer installed and owned by the Great Lakes Water Authority waiting for the 3rd Primary Electric Feed Line to be installed and energized

Project Engineer/Manager Phillip Kora

Director Philip Kora

Project Score 82.8

Problem Statement GLWA's WWTP will have a redundant primary electrical service to power the WRRF equipment.

Scope of Work / Project Alternatives The scope of this design-build project includes design and construction of 3rd 120 kV primary electric supply transmission line owned by DTE tapping into the 120-kV Waterman-Zug line in the vicinity of Dearborn St. and Copland St right-of-way at Tower 1368. The design-build services also include securing the property right-of-way easements from the property owners, as well as the design and construction of power transmission supply line. This primary transmission power line will energize the already installed new 120-13.8 industrial substation owned by GLWA near EB-1.

Other Important Info Challenges: Negotiation with private property owners and testing of the automatic switch over will require co-ordination with operations.

Project History: The WRRF has been supplied primary electrical power through the DTE Maxwell Switching Station via two power supply lines Maxwell 1 and Maxwell 2. The two main electrical buildings at the WRRF which feed the primary and secondary facilities are Electrical Building 1 and 2 (EB-1 and EB2). EB2 supply electrical power to the pump station #1 and all the primary treatment facilities. EB1 supply power to pump station #2, secondary treatment facilities, dewatering, incineration and all other remaining facilities. The City of Detroit's Public Lighting Department (PLD) provided a redundant 24kV back-up electrical services to EB2 through the City of Detroit 24kV industrial substation. In the event of DTE power supply failure the PLD 24kV power supply line provided redundancy and reliability to EB2. The back-up power supply by PLD at EB-2 required a manual switch over in the event of DTE power failure. The City of Detroit's PLD discontinued its power generation in the late 1980's. PLD also started curtailing electrical power supply distribution to its customers. The study by HRC in 1988 and later by Metcalf & Eddy in the

CIP Number: 216007

Project Title DTE Primary Electric 3rd Feed Supply to WRRF

early 90's during design and construction of Pump Station # 2 project identified the need for a 3rd primary electrical supply line. In order to provide reliable and redundant primary electric power supply to the WRRF after the September 8, 2011 power failure event, GLWA initiated a consulting services contract "CS-1449 Underground Electrical Duct Bank Repair and EB-1, EB-2 and EB-10 Primary Power Services Improvements at the WWTP". This CS-1449 scope required to study and design reliable and redundant primary electrical power system improvements. The study recommended to abandon PLD's 24kV back-up electric power supply to EB-2 and replace with a 3rd power supply feed line from DTE's Waterman substation. In addition to the 3rd power feed line, the study also recommended a new 120-13.8 kV transformer near EB-1 and a new 15kV power supply line to EB-2, to address power redundancy and reliability. Construction of the primary power services improvements design through CS-1449 were procured through contract PC-783. The contract PC-783 in the 1st quarter of 2016 abandoned and removed the 24kV power feed line and industrial substation owned by PLD. On May 29, 2012, GLWA signed a letter of agreement with DTE to provide a 3rd 120kV feed transmission line owned by DTE (paid by GLWA) to a new 120-13.8 kV industrial substation built and owned by GLWA. The DTE agreed to obtain all required property right-of-way and easements for the route with reasonable effort per the agreement with GLWA. The PC-783 contract allocated $1.30 Million budget for DTE to execute these services. GLWA, through construction contract PC-783, has already installed a new 120-13.8 industrial substation near EB-1, a new 15kV power supply line from the new transformer to EB-2, and removed 24kV back-up electrical service line and industrial substation owned by PLD. However, DTE failed to get property right-of-way and easements for the route. DTE's original design route for transmission line was along the railroad tracks but the rail company declined to provide right-of-way for DTE's new transmission line. DTE later planned a longer transmission route to buy property from private owners, but a property owner increased the price sensing urgency for GLWA. The new cost estimate by DTE for this new transmission line is $4.3 Million. GLWA's WRRF requires a reliable and redundant electrical power supply in order to be in compliance with NPDES permit requirements. The disconnection and removal of backup power supply from PLD leaves GLWA vulnerable for power failure and this urgent power supply line needs to be installed at the earliest. In order to speed design and construction GLWA is proposing a design-build project delivery method for the 3rd power supply line project. Presently there is no true redundant primary electrical service feed line to the WRRF, both the primary electric supply lines originate from the DTE Maxwell Switching Station. GLWA's General Counsel is currently working on utilizing the "Condemnation Process" to acquire easement from the private property owners for this route.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	738	3,062	1,296	727	0	0	0	0	5,823	2023
2020	0	0	584	2,108	1,381	3,374	0	0	0	0	0	7,447	4755
2019	0	15		2,002	1,326	3,326				0	0	6,669	6654

CIP Number: **216007**

Project Title **DTE Primary Electric 3rd Feed Supply to WRRF**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018			3,500	3,500					0	0	0	7,000	7000

CIP Number: 216008

Project Title Rehabilitation of Screened Final Effluent (SFE) Pump Station

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 General Purpose

Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [x] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Project Engineer/Manager TBD

Director Dan Alford

55.8

Project Score

Problem Statement The SFE Pump Station provides SFE water to many of the GLWA WRRF treatment processes and needs to be completely rehabilitated to maintain uninterrupted supply of SFE water to these processes.

Scope of Work / Project Alternatives This project will include the study, design, and construction for the needed improvements to the SFE pump station. This includes required capacity, pumps, strainers, piping, controls, building improvements, and electrical supply. This will also include a study to evaluate the potential for replacing the secondary water utilization with SFE utilization where feasible and an alternative analysis to the existing carrier water at chlorination/dechlorination facility, seal water, recovery needs which may include additional SFE treatment such as chemical addition to accommodate process needs.

Other Important Info *Innovation note: optimize of a valuable resource recovered for facility needs. Project History: The SFE pump station has eight pumps with a total capacity of approximately 135 MGD. Pumps 1,2,4, and 6 were installed in 1973, pumps 3 and 5 in 1980, and pumps 7 and 8 in 1998. The older pumps were rebuilt in 1998. Strainers have been reconditioned as necessary over time. Due to the critical nature of the SFE pump station and the elapsed time since a major rehabilitation (over 15 years), a significant upgrade/rehabilitation is required. In addition, the two 5 kV transformers that supply power from EB-3 are approximately 40 years old and are in need of replacement.

Challenges: Maintaining the adequate supply of SFE to the plant treatment processes during construction of the SFE improvements.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	590	1,362	1,507	15,571	5,924	0	0	24,954	24364
2020	0	0		51	1,091	991	9,475	7,805	5,535		0	24,948	24897

CIP Number: 216009
Project Title LM Facilities Assessment and Rehabilitation/Replacement

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 General Purpose
Location City of Detroit

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☑ **Project New To CIP**

Project Engineer/Manager Beena Chackunkal
Director Dan Alford

71.6
Project Score

Problem Statement The warehouse buildings that stores equipment and supplies for GLWA are located at different facilities. The physical condition of the existing buildings, specifically the McKinstry warehouse (SSS), seems to be in poor condition with extensive roof leaking and other issues. There is an assessment of the L&M Facilities going on to determine whether it makes economic sense to continue to operate these facilities at the existing sites or if these facilities can be downsized into one central site.

Scope of Work / Project Alternatives Evaluate the existing conditions of the warehouse facilities throughout GLWA. Provide recommendations to improve the facility environment to store the assets safely and efficiently. The various building systems, including heating, ventilation, electrical, and lighting shall be evaluated to be in compliance with applicable building codes and regulations.
Design and Construction of the suggested modifications, based on the evaluation, shall follow.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	227	253	1,318	970	0	0	0	2,768	2541

CIP Number: 216010
Project Title WRRF Facility Optimization

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 General Purpose
Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Project Engineer/Manager TBD
Director Dan Alford

63.6
Project Score

Problem Statement The existing WRRF is a product of countless construction projects over nearly 90 years and consists of numerous process and non-process buildings with varying levels of use and practicality. As WRRF across the nation come out of the shadows and into the light of the public and elected officials it is critical to convey an image that reflects the pride and importance of the work that is done every day at this facility. As such, this project will work on the softer side of the facility, create a visitor center focusing on public education to entice the next generation of wastewater engineers, scientists and operators, and to beautify the image of the facility creating a more welcoming environment for the public and staff alike.

Scope of Work / Project Alternatives The work consists of extending the evaluation performed as a part of Master Planning to design and construct site modifications including but not limited to a new visitor center, demolition or repurposing of existing structures that are no longer used, consolidation and or reconfiguration of administration, operations and maintenence staff and spaces, vehicle and equipment storage spaces, shops, etc. The project also includes site modifications to include improved site circulation, parking and fencing, green infrastructure, improved landscaping, wallking paths around the site and site features, including but not limited to educational signage and benches.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	14	657	987	7,999	681	0	10,338	10338

CIP Number: 222001
Project Title **Oakwood District Intercommunity Relief Sewer Modification at Oakwood District**

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 Field Services
Class Lvl 3 Interceptor
Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Aerial photo, far left, of Oakwood Sewer District depicting previously designed relief sewers tributary to Oakwood Pump Station and CSO Retention Treatment Basin. Part of the planned relief sewers and associated hydraulic structures were constructed between

Project Engineer/Manager Mini Panicker

Director Biren Saparia

Project Score 53.6

Problem Statement Improvements to the Oakwood District Sanitary Sewer system and implementation of various projects as recommended in report by Applied Sciences, Inc. Dated 2/26/16. Projects to include: 1) Clean & Inspect Trunk Sewers, 2) Analysis and improvement of Oakwood PS/RTB operations, 3) Second influent sewer to Oakwood PS, and 4) NWI Diversion for CSO Control. Projects to be prioritized and validated as part of Wastewater Master Plan Project (GLWA CS-036).

Scope of Work / Project Alternatives The work includes basis of design (study) report on alternative solution to proposed Oakwood District Intercommunity Relief Sewer, diversion of storm water flow, and construction assistance during construction phase of emerging projects. Coordinate with DWSD projects including catch basin restrictions and green spaces.

Other Important Info Refer to linked aerial photo of Oakwood District with overlay of proposed new sewers, as built drawings of recent construction in the District for PCS-79, PCS-80 and PC-755; map of Intercommunity Collection System including portion of Oakwood District shown above—and other select resources linked below.

Challenges: Maintaining the wet weather contract capacities and adequate CSO treatment during extreme storm events and mitigate basement and street flooding in the District and intercommunity regional districts are the most significant challenges for the project to address. Other Important Info: The Oakwood District is located in the southwest portion of the City of Detroit covering an area of 1,520 acres. In general, it's bound within by a continuous stretch of the northerly and westerly bank of the Rouge River, thence stretches of the city limits of River Rouge and Ecorse to the south, thence a stretch of the city limits of Lincoln Park to the far lower west (abutting a stretch of Outer Drive near the adjacent watercourse of Ecorse Creek further west), thence a stretch of the city limits of Melvindale to the north near I-75 (between Outer Drive and Schaefer Hwy), thence a continued stretch of city limits of Melvindale to the upper west abutting Schaefer Hwy (between I-75 and the point of beginning along southerly embankment of the Rouge River adjacent Mellon Ave.

Much of the District was originally platted as Oakwood Village, later annexed to the City of Detroit. Some areas of the District are situated in relatively low-lying, flood prone topographies. Much of the combined sewer drainage system was originally designed and built since the 1930's with laterals and larger trunk and intercepting sewers tributary to the former (and present replacement) Oakwood Pumping Station situated near the intersection of Sanders and Liddesdale Street. In early years, combined sanitary and intercepted storm runoff flow drained to that pump station was coarsely screened, pumped (lifted) and, in turn, conveyed though two discharge conduits tributary to a segment of O'Brien Drain--a natural and man-made (modified) stream confluent to the Rouge River--without further treatment.

Whereas much of the remaining area of the District, predominantly that north of Fort Street and east of Schaefer highway (a/k/a Oakwood Heights), is situated on relatively higher terrain. Originally, good portions of this area4 connected to public sewers drained to other streams or outfalls tributary to the Rouge and otherwise drained to the original municipal wastewater treatment plant in Detroit via other lateral, trunk and intercepting sewers tributary to an original 24" siphon connection constructed beneath the Rouge River just south of the Fort Street bridge to the city's 12'-9" Oakwood Interceptor also constructed in the 1930's extending from the WWTP, largely paralleling the Rouge River to a point ending just north of Fort Street beneath Miller Road.

In the 1940's, a 3'-0" sewer was constructed from the original pump station's discharge channel which proceeded northerly beneath Sanders St and thence easterly beneath Fort St to a drop shaft hydraulic structure at below intersection at Bayside St in turn connected with a 24" siphoned sewer running easterly beneath the Rouge River and connecting with a downstream hydraulic connection to the City's 12'-9" Oakwood Interceptor (later renamed Oakwood Northwest Interceptor, or ONWI) tributary to the WWTP (originally built in the 30's and placed into operation in early 40's) to primarily convey pumped sanitary (dry weather) flow from the southerly portion of the District to the treatment plant. Continued sewer modifications in the District promoted the interception and routing of combined flows in other areas underserved to the pump station via larger intercepting sewers constructed along Pleasant, Sanders and elsewhere connecting with the main Liddesdale Interceptor—the primary influent sewer to pump station.

In the 1950's, to meet increased service needs in the far western sewer districts of the City of Detroit and neighboring communities of Wayne County and otherwise mitigate increased public health risks, the county (with endorsements from a coalition of these municipalities) commissioned construction of the 10'-0" cylinder Northwest Interceptor (NWI). The NWI was constructed in segments, phased over 10 years. Its alignment generally extends 15 miles northwest from its terminus near Fort and Bayside within the Oakwood District --largely following the original watercourse of main trunk of the Rouge thence northerly beneath the Southfield Freeway (M-39) to a connection with the tributary 7'-6" cylindrical Ford Road intercepting sewer—which transports upstream drainage from Detroit's Rouge River District as well as drainage from several hydraulically-connected suburban communities. The NWI's transport capacity, although initially sized to convey wet weather flows resulting up to the typical 10-year uniform rainstorm simulated across the collection system, contributes to ¼ or more of all annual tributary influent flows to the WRRF, on average—depending on prevailing transport capacities along its extensive run as well as limited transport capacities within the downstream ONWI.

It should be recognized that the sole hydraulic-connection from the Oakwood Sewer District for drainage to the NWI is via a drop manhole connection of the aforementioned 36" sanitary discharge main leading from the new (replacement) Oakwood pump station and integral CSO retention treatment basin built in 2011 (PC-755). This connection, which is located beneath Fort St just upstream of the above-mentioned 1950's hydraulic drop shaft structure located at Fort at Bayside with a connected 6'-3" siphon to the ONWI. For more information on Oakwood District refer to Section 2.4 of the linked Description of Sewer Service Districts from the 2003 Wastewater Master Plan, some subject to revisions, since the Oakwood Pump Station and CSO Control Facility was constructed in 2011. Also for further reference, refer to linked Oakwood District Sewer Maps.

Prior Drainage Plans; Continued Interim Plans As part of overall renovation, larger, deeper intercepting sewers and relief sewers were proposed to Oakwood District to alleviate the surcharging and flooding of basement. Contact PCS-79 (2011) implemented sewer modifications designed in the Oakwood Heights area as well as Junction Chamber No. 1 at the headworks (influent channels) to the new Oakwood pump station/CSO RTB just east of Pleasant Ave; PCS-80 (2012) implemented select designed relief and replacement sewers in tributary area to the existing 9'-0"- Liddesdale intercepting sewer. In addition, the proposed system also consisted of a replacement of the existing sewer systems through the district area. The existing sewer system generally consists of sewer line located behind homes, which is connecting sanitary flows from homes and storm flows from the catch basins located in the street.

Previously, GLWA authorized a new task to Applied Science, Inc. (ASI) under CS-1482 to perform the baseline hydraulic and hydrologic analysis for the impacted areas of the Oakwood District based on the recent condition of the site, such as conversion of the green space by the Marathon Oil Company, current hydrologic factors given the current land use, and assessment of other land and abandoned properties.

Moreover, extended efforts have been undertaken by ASI, as engineering representative of Wayne County, and GLWA to address wet weather capacity needs for the intercommunity districts tributary to GLWA's NWI and the county's Rouge Valley Interceptor (1965) illustrated on above map)--which are hydraulically-connected with a passive structure (B-097) built in the 1960's at their crossing (i.e., double 6'-6" siphons of the RVI beneath the NWI's alignment) in proximity of Pleasant Ave and Oakwood Ave intersection.

CIP Number: 222001

Project Title Oakwood District Intercommunity Relief Sewer Modification at Oakwood District

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	975	3,128	3,371	11,234	13,439	21,365	53,512	32147
2020	0	0		0	0	0	3,800	10,077	10,077	14,077	0	38,031	23954
2019	0				10	1,372	5,961	10,292	20,365	0	0	38,000	17635
2018				550	2,750	5,500	2,200		0	0	0	11,000	11000

CIP Number: 222002
Project Title Detroit River Interceptor (DRI) Evaluation and Rehabilitation

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 Field Services
Class Lvl 3 Interceptor
Location City of Detroit

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Visual inspection of a large sewer

Project Engineer/Manager Mini Panicker

Director Biren Saparia

65.4
Project Score

Problem Statement Evaluation of the existing condition of the Detroit River interceptor (DRI), and rehabilitation/replacement of portions based on the evaluation results are essential to optimize the transportation capacity of the GLWA collection system and to increase its service life.

Scope of Work / Project Alternatives Preliminary Scope of Work of the Project is as follows: Review the existing records, investigate the existing conditions , provide the necessary cleaning/rehabilitation/replacement to optimize the design capacity of the collection system and to minimize the inflow and infiltration into the collection system.

Other Important Info Challenges: DRI may have flow control challenges for both inspection and rehabilitation. Recommendations from these inspections may reveal further need for cleaning, rehabilitation or replacement.

Project History: The installation of some of the GLWA interceptors and sewers are dated back to 1912 under various contracts.
Detroit River Interceptor inspection was completed in 5 different phases and there were portions deteriorated with visible surface aggregates, attached encrustation and infiltration. Some trunk sewer inspection revealed sludge deposition with reduced transportation capacity.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	10,592	16,199	23,634	9,786	1,465	10,014	9,986	0	81,676	54885
2020	0	0	2,647	9,424	10,000	10,000	10,000	1,000	1,000	5,000	0	49,071	32000
2019	0	5	2,232	1,084	8,052	10,187	10,187	10,187	2,491	0	0	44,425	39697
2018		321	10,000	5,000	5,000				0	0	0	20,321	20000

CIP Number: 222003

Project Title North Interceptor East Arm (NIEA) Evaluation and Rehabilitation

Project Status Cancelled

Class Lvl 1 Wastewater

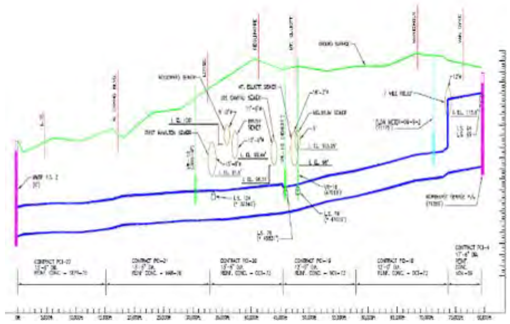
Class Lvl 2 Field Services

Class Lvl 3 Interceptor

Location Multiple Counties

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**



Elevation profile of part of the NIEA

Project Engineer/Manager Todd King

Director Todd King

65.4

Project Score

Problem Statement Evaluation of the existing condition of NIEA, and rehabilitation/replacement of portions with structural deficiencies based on the evaluation results are essential to optimize the transportation capacity of the GLWA collection system and to increase its service life

Scope of Work / Project Alternatives Review the available inspection report (NTH 2015) which recommends additional work along the 33,900 lineal feet reach. The report also recommends 1500 lineal feet of potential slip lining. This SOW includes further evaluation of the existing conditions, develop a data gap analysis and provide the necessary cleaning/rehabilitation to optimize the design capacity of the collection system, minimize the inflow and infiltration into the collection system, and extend the service life, evaluate the existing conditions, and provide the necessary cleaning/rehabilitation/replace to optimize the design capacity of the collection system, minimize the inflow and infiltration into the collection system, and to extend the service life.

Other Important Info *Innovation note: Consider new techniques for assessment.

Project History: The installation of some of the GLWA interceptors and sewers are dated back to 1912 under various contracts.
NIEA inspection by NTH recently revealed structural deficiencies and sludge deposits. Detroit River Interceptor inspection was recently completed and there were portions deteriorated with visible surface aggregates, attached encrustation and infiltration. Some trunk sewer inspection also revealed sludge deposition with reduced transportation capacity. Inspections of sewers to reveal the existing conditions are necessary and shall be done every 5 to 7 years. Recommendations from these inspections may reveal further need for cleaning, rehabilitation or replacement.

Challenges: NIEA may have flow control challenges for both inspection and rehabilitation.

CIP Number: 222003

Project Title North Interceptor East Arm (NIEA) Evaluation and Rehabilitation

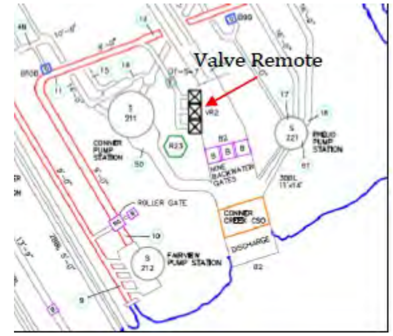
Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0		0							0	0
2020	0	0		500	15,000	14,500	0	0	0	0	0	30,000	29500
2019	0					11,000	12,000	3,000		0	0	26,000	26000
2018			11,000	12,000	3,000				0	0	0	26,000	26000

CIP Number: 222004
Project Title Sewer System Infrastructure and Pumping Stations Improvements

Project Status	Active
Class Lvl 1	Wastewater
Class Lvl 2	Field Services
Class Lvl 3	Interceptor
Location	Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**



Example of a Valve Remote at Conner Pump Station

Project Engineer/Manager Mini Panicker

Director Biren Saparia

68.2
Project Score

Problem Statement VR-Gates, ISDs, and backwater gates are operational elements in the collection system that help in minimizing the untreated overflows and maximizing the flows to the WRRF and CSO control facilities. They have reached their life expectancy and needs rehabilitation.

Scope of Work / Project Alternatives Evaluate the existing conditions of the VR-Gates, ISDs, Backwater Gates and Access Hatches, provide the necessary design and the Construction Assistance for their replacement/rehabilitation.

Other Important Info Google map of VR-3 and VR-9 are included. VR-4, 5, 6, 10, 11 &13 are also part of the project.

Project History: GLWA interceptors and sewers were constructed in the early 1900s. The hatches and access covers secure operations and maintenance access points throughout the system for items such as the backwater gates, ISD, and VR. The backwater gates, ISD, and VR are all critical elements that control and divert flows throughout the system. Most of them have reached their life expectancy and are hard to operate properly. These structures play vital roles in controlling the flow, increasing the storage capacity, and in meeting the NPDES permits.

Challenges: These are operational elements, so flow control may be a challenge.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	4	1,459	2,701	5,433	16,434	9,864	3,279	1,952	41,126	37711
2020	0	0		1,019	3,500	3,514	6,000	5,000	8,000	60,000	0	87,033	26014
2019	0		341	1,019	1,014					0	0	2,374	2033

CIP Number: 222004

Project Title Sewer System Infrastructure and Pumping Stations Improvements

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018			341	1,000	1,422				0	0	0	2,763	2763

CIP Number: 222007

Project Title NIEA Rehabilitation from WRRF to Gratiot Ave. and Sylvester St.

Project Status Cancelled

Class Lvl 1 Wastewater

Class Lvl 2 Field Services

Class Lvl 3 Interceptor

Location City of Detroit

☑ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☑ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**

Example inspection of a large sewer

Project Engineer/Manager Todd King

Director Todd King

72.8

Project Score

Problem Statement Rehabilitation and replacement program of the existing NIEA based upon structural deficiencies identified from the evaluation results. This is essential to optimize the transportation capacity of the GLWA collection system and to increase its life expectancy.

Scope of Work / Project Alternatives Preliminary Scope of Work of the Project is as follows: Review available data, provide the necessary rehabilitation/replacement option, design and implement them to optimize the design capacity of the collection system, minimize the inflow and infiltration into the collection system, and extend the service life.

Other Important Info *Innovation note: Consider new techniques for assessment. Other Important Info: The installation of some of the GLWA interceptors and sewers are dated back to 1912 under various contracts.
NIEA inspection upstream of this segment by NTH recently revealed structural deficiencies and sludge deposits. Recent Detroit River Interceptor and North West Interceptor inspections revealed that there were portions deteriorated with visible surface aggregates, attached encrustation and infiltration. Some trunk sewer inspection also revealed sludge deposition with reduced transportation capacity.
Inspections of sewers to reveal the existing conditions are necessary and shall be done every 5 to 7 years. Recommendations from these inspections may reveal further need for cleaning, rehabilitation or replacement

Challenges: NIEA may have flow control challenges for both inspection and rehabilitation.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0		0							0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0

CIP Number: 222007

Project Title NIEA Rehabilitation from WRRF to Gratiot Ave. and Sylvester St.

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0			4	760	3,295	5,689	5,689	5,566	0	0	21,003	15437
2018			7,000	7,000	7,000				0	0	0	21,000	21000

CIP Number: 232001
Project Title Fairview Pumping Station - Replace Four Sanitary Pumps

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Stations
Location City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing
- ☐ **Project New To CIP**

Sanitary pumps at Fairview Pumping Station

Project Engineer/Manager Mike Graham
Director Grant Gartrell

Project Score

Problem Statement Replacement and upgrade of pumping equipment's to improve transportation of waste water to the treatment plant

Scope of Work / Project Alternatives The scope of work consists of the study, design, and construction for four new pumping systems including inlet and discharge valves and wet well hydraulics. This will also include enlarging doorways, revamping roadways, and upgrading electrical and control systems.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	3,404	27,552	5,336	984	0	0	0	0	37,276	6320
2020	0	0	1,551	6,000	18,000	4,891	0	0	0	0	0	30,442	22891
2019	0	778	508	12,094	14,414	3,974				0	0	31,768	30482
2018	128	472	2,100	14,350	15,350				0	0	0	32,400	31800

CIP Number: 232002
Project Title Freud & Conner Creek Pump Station Improvements

Project Status	Active
Class Lvl 1	Wastewater
Class Lvl 2	Systems Control Center
Class Lvl 3	Pump Stations
Location	City of Detroit

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Freud Pump Station

Project Engineer/Manager Mini Panicker

Director Biren Saparia

79.6

Project Score

Problem Statement The primary objective of this project is to study the overall performance of Connor Creek and Freud sewage pumping stations and develop design, and build an operational strategy to optimize the utilization of interconnected piping and operation between both pumping stations and the Connor Creek Retention and Treatment Basin.

Scope of Work / Project Alternatives Provide basis of design, and final design for an operational strategy to optimize the utilization of interconnected piping and operation between Connor Creek and Freud pumping stations and the Connor Creek Retention and Treatment Basin. Provide construction of the emerging project and construction assistance during construction of the emerging project.

Other Important Info Challenges: Meeting the collection system transport capacity during the construction.

Project History: The Connor Creek Pump Station (CCPS) was originally built in 1928 with four storm water pumps, each with a rated capacity of 500 cubic feet per second (cfs). The CCPS was expanded in 1940 adding four more pumps of the same capacity. The pump station currently has a total capacity of 4,000 cfs and a firm capacity of 3,500 cfs. The pumps are primed using a vacuum system that relies on the flooding of the discharge channel siphon to maintain a water seal, which allows the pumps to be primed. Since the Conner Creek CSO RTB went into operation in November 2005, the discharge channel for the CCPS is drained when the CC RTB is dewatered. Therefore, the vacuum priming system cannot prime the pumps. This results in the CCPS pumps being unable to start until the discharge channel is flooded and the vacuum priming system has a seal on the discharge to prime the pumps.
The Freud Pump Station (FPS) was originally built in 1954 with eight storm water pumps, each with a 450 cfs capacity. Two additional pumps were subsequently installed for dewatering and to act as sanitary pumps during dry weather flows. These two pumps are rated at 35 cfs and 20 cfs and are not operated when the storm water pumps are in service. Under the current operating protocol, the FPS is operated first and results in water flowing to the discharge channel of the CCPS, providing sufficient water to

CIP Number: 232002

Project Title Freud & Conner Creek Pump Station Improvements

ensure submergence of the vacuum siphon block to allow the vacuum system to prime the CCPS pumps. The FPS pumps do not require priming during normal operations. The discharge pipe from each pump is tied to three 14' x 14' box conduits which transport flow to the CC RTB. The crown elevation of these conduits is approximately 95' and the lowest ground elevation along these conduits ranges from 96' to 100'. Surcharging and flooding have been reported when the CC RTB is filled to the overflow elevation of 98' and more than three of the FPS storm water pumps are in operation

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	5,631	7,364	6,445	57	9,898	23,830	30,803	138,071	222,099	71033
2020	0	0	5,110	1,984	17,029	13,014	50,014	50,014	25,007	257	0	162,429	155078
2019	0	2,101	1,384	1,192		223	1,582	11,000	15,000	0	0	32,482	13997
2018		8,040	5,900	5,100	2,460	1,000			0	0	0	22,500	14460

CIP Number: 232003
Project Title Northeast Pumping Station

Project Status Cancelled
Class Lvl 1 Wastewater
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Stations
Location City of Detroit

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Pump at the Northeast Pumping Station

Project Engineer/Manager Mini Panicker

Director Biren Saparia

89

Project Score

Problem Statement This project will include replacement of the inlet gate valves, installation of Pump No. 3 and new chopper pumps, repair of the original service elevator, rebuilding of the spare pumps, repair and upgrade of the wet well, repair and upgrade of the dry well, repair and upgrade of the Gate House air handling systems, emergency bypass of the station, etc.

Scope of Work / Project Alternatives Provide basis of design, and final design for a complete rehabilitation for the station with an emergency bypass option. Provide construction of the emerging project and construction assistance during construction.

Other Important Info *Innovation note: Include energy efficiency.

Project History: The Northeast Sewage Pumping Station was built under contract PC-216. It had only three sanitary pumps and another sewage pump was added under PC-736. Later on OMID added 2 more sewage pumps. Recently under OMID Contract-3,OMID performed the removal of existing discharge piping; installation of a new discharge pipe manifold system; structural alterations to accommodate filling the east and west sides of the existing discharge chamber to support deteriorated external walls, replacement of the NESPS roof structure over the east and west sides; placement of new concrete walls and beams to form a centralized discharge opening to the PCI-4 sewer, construction of precast concrete walls above the central chamber and precast roof slab panels for permanent access; and other associated work to accomplish the repairs etc.
This proposed rehabilitation project is to address the rest of the issues affecting the station which was built in 1969

Challenges: Meeting the collection system transport capacity during the construction.

CIP Number: **232003**

Project Title **Northeast Pumping Station**

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0		0							0	0
2020	0	0		1,000	7,000	10,500	10,500	2,500	0	0	0	31,500	30500
2019	0					2,408	10,920	13,000		0	0	26,328	26328
2018			2,408	10,920	13,000				0	0	0	26,328	26328

CIP Number: 232004
Project Title CONDITION ASSESSMENT AT BLUE HILL PUMP STATION

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 Systems Control Center
Class Lvl 3 Pump Stations
Location City of Detroit

- [ ] Innovation
- [x] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [x] **Project New To CIP**

Project Engineer/Manager Todd King
Director Todd King

Project Score

Problem Statement The condition of the Blue Hill PS has not been accurately established to the metrics being established for other GLWA pumping stations. A new condition assessment is required.

Scope of Work / Project Alternatives Perform station inspection by a multi-discipline team of specialists in pumps, valves, electrical, HVAC, structural, building envelope I&C, security, and building mechanical systems. Perform wire to water efficiency tests

Other Important Info Performance of this pumping station is related with flood control objectives for Conner and Freud Pumping Stations.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	286	0	0	0	0	0	286	286

CIP Number: 233003
Project Title Rouge River In-system Storage Devices

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 Systems Control Center
Class Lvl 3 In System Devices (Dams, ISD's)
Location City of Detroit

- [ ] Innovation
- [x] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [x] **Project New To CIP**

Project Engineer/Manager Mini Panicker
Director Biren Saparia

60.8
Project Score

Problem Statement The Rouge River receives untreated CSO discharges from GLWA CSO outfalls and outfalls from other Member combined sewer systems during wet weather. CSO control strategies that deal with first flush capture from small storms is typically a cost-effective implementation step in a CSO control program. Studies for the Wastewater Master Plan have shown the effectiveness of controlling first flush for small storms with receiving water modeling. 9 locations on DWSD trunk sewers east of the Rouge River are feasible for storing 25 million gallons of CSO during small storms (less than 1-inch of rainfall).

Scope of Work / Project Alternatives Perform sewer inspections, utility survey, and flow metering to establish and prioritize the siting of 9 new In-System Storage Devices (ISD)

Perform preliminary and final design of the ISDs, including upstream and downstream access points, power supply and instrumentation.

Construct 9 new inflatable dam in-system storage devices (ISD). Modify existing manholes or construct new access points upstream and downstream of each ISD. Provide electrical power, above ground structures for pneumatic control systems and instrumentation for remote operation. Provide connection for mobile standby generator.

Other Important Info The new ISD devices would be installed in trunk sewers owned and operated by DWSD. These are not GLWA leased sewers. A legal agreement may need to be prepared for GLWA to construct, operate, and maintain.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	32	86	3,374	1,984	41,321	46,797	5476

CIP Number: 260100

Project Title WRRF, Lift Station and Wastewater Collection System Structures Allowance

Project Status Closed

Class Lvl 1 Wastewater

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

WRRF

Project Engineer/Manager Beena Chackunkal

Director Dan Alford

Project Score

Problem Statement Funding required for unplanned, emergency and critical small capital projects in the entire wastewater system

Scope of Work / Project Alternatives This is an allowance for unplanned critical projects, equipment replacement/rehabilitation, critical asset replacement, energy saving projects, etc.. at the Wastewater Treatment Plant and other Wastewater Operation Facilities. Unplanned critical items include, but not limited to, mechanical, HVAC, electrical, instrumentation and control, demolition, earthwork, concrete, masonry, etc.

Other Important Info Challenges: N/A - Allowance.

Project History: WRRF has audited twice in the past for all equipment and supporting facilities. These audits helped to assess equipment repair and future planning and execution of rehabilitation/replacement projects at WRRF facilities.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	21,938	1,100	1,100	1,100	1,100	1,100	1,100	5,500	0	34,038	5500
2019	0	14,758	2,195	1,100	1,100	2,200	2,200	2,200		0	0	25,753	8800
2018		5,587	12,000	12,000	15,000	15,000	12,000		0	0	0	71,587	66000

CIP Number: 260200
Project Title Sewer and Interceptor Rehabilitation Program

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


An example interceptor

Project Engineer/Manager Mini Panicker

Director Biren Saparia

Project Score

Problem Statement Rehabilitation and replacement program of the existing sewers and interceptors is identified after the conditiio assessment. This replacement, rehabilitation and cleaning program is essential to optimize the transportation capacity of the GLWA collection system and to increase its life expectancy.

Scope of Work / Project Alternatives Provide CCTV and/or sonar inspection of the GLWA Collection System Interceptors and Trunk Sewers to reveal the existing conditions as per the National Association of Sewer Service Companies' (NASSCO) Pipeline Assessment Certification Program (PACP) standards, evaluate the existing conditions, and provide the necessary cleaning/rehabilitation/replace to optimize the design capacity of the collection system and to minimize the inflow and infiltration into the collection system.

Other Important Info Challegers: Large sewers and interceptors may have flow control challenges for both inspection and rehabilitation.

Project History: The installation of some of these interceptors and sewers are dated back to 1912 under various contracts. Detroit River Interceptor inspection was recently completed in 5 different phases and there were portions deteriorated with visible surface aggregates, attached encrustation and infiltration. Some trunk sewer inspection revealed sludge deposition with reduced transportation capacity. Inspections of sewers to reveal the existing conditions are necessary and shall be done every 5 to 7 years. Recommendations from these inspections may reveal further need for cleaning, rehabilitation or replacement.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	18,637	19,029	12,976	36,047	24,872	15,495	14,347	13,240	154,643	103737
2020	0	0	13,555	8,609	15,000	15,000	15,000	15,000	15,000	95,000	0	192,164	75000

CIP Number: **260200**

Project Title **Sewer and Interceptor Rehabilitation Program**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0	3,397	7,751	10,601	10,400	11,400	11,400	11,400	11,400	0	0	77,749	55201
2018		2,612	8,000	8,000	20,000	20,000	20,000		0	0	0	78,612	76000

CIP Number: 260500
Project Title CSO Outfall Rehabilitation

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing

- [ ] **Project New To CIP**

Sewer tap piping in B009 outfall (left) and sludge buildup and poor masonry in B007 outfall (right)

Project Engineer/Manager Mini Panicker

Director Biren Saparia

Project Score 72.8

Problem Statement PROJECTS 222006 AND 233001 HAVE BEEN INCORPORATED INTO THIS PROJECT. Rehabilitation of the CSO outfalls is essential to properly discharge the uncontrollable combined sewer overflows to the receiving waters and to prevent sewer back up into the Conveyance System. Recent inspections of the outfalls revealed structural deficiencies like fractures, missing mortar from bricks etc. There are sediment and debris deposits in many of them.

Scope of Work / Project Alternatives Preliminary Scope of Work of the project is construction. Contract CS-168 will review the existing records, evaluate the existing conditions, and provide the necessary design to rehabilitate the outfalls. Another Engineering Services contract will be initiated after the CS-168 contract.

Other Important Info PROJECTS 222006 AND 233001 HAVE BEEN INCORPORATED INTO THIS PROJECT.

Project History: The construction of these outfalls are dated back to the early 1900s under various contracts.

Challenges: Some outfalls are below the river elevation; rehabilitation may be challenging.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	3,331	4,802	11,706	9,156	11,995	10,976	8,243	4,197	64,406	52076
2020	0	0	9	4,000	15,102	17,947	10,926	15,102	15,102	11,000	0	89,188	74179
2019	0			507	3,826	10,001	10,001	10,001	10,001	0	0	44,337	34336

CIP Number: **260500**

Project Title **CSO Outfall Rehabilitation**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018			6,000	6,000	6,000	6,000	6,000	6,000	0	0	0	36,000	30000

CIP Number: 260600
Project Title CSO FACILITIES IMPROVEMENT PROGRAM

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Retrofitted chemical feed pump replacement at Puritan-Fenkell RTB and makeshift wooden stairs to enter Basin Valve Gallery

Project Engineer/Manager Chris Nastally

Project Score 90.6

Director Chris Nastally

Problem Statement This program is being established to facilitate the study, design, construction administration, and construction of improvements necessary to maintain the facilities which contribute to the CSO Control Program and compliance herewith.

Scope of Work / Project Alternatives This program is intended to include studies, design, construction administration, and construction projects which serve to improve process areas or functions of the CSO Facilities. The overall scope of this program is to complete the following: The CS-299 (Facilities Assessment Project) will have projects that need to be programmed into the CIP over time, Replacement of CSO Facilities Fire Alarm Systems; Structural Condition Assessment Design/Build project; and flushing improvements to Baby Creek CSO Facility. A direct product of the Needs/Condition Assessment and SRP is identification of facility needs with projects identified, prioritized, and conceptual cost estimates. From this output, RFP's will be developed to address these needs. For this purpose, Design and Construction dollars have been identified in the later years of this Program to facilitate design and construction of those identified needs. It is anticipated that the primary drivers of these improvements will be obsolescence/end of service life, excessive O&M problems, reliability, efficiency and system standardization which arise from feedback from operation & maintenance, the scheduled replacement plan, and the needs/condition assessment. Following completion of the Wastewater Master Plan, new projects may be otherwise defined which will be incorporated into the CIP. These projects will likely be entered into the CIP as stand-alone projects rather than falling under this program. Furthermore, upon completion of the NPDES permit, new regulatory requirements may arise which require capital improvements. Depending on the nature of those improvements, they may be stand-alone projects or fall within the elements of this Program.

CIP Number: **260600**
Project Title **CSO FACILITIES IMPROVEMENT PROGRAM**

Additionaly, the latest NPDES permit as well as previous ones, given recognition to the Long Term CSO Control Plan and the requirements that outfalls which are high priority non core be addressed by 2037. Part and parcel to this is the development of a refreshed Long Term CSO Control plan to be submitted to the DEQ by 11/15/2022. The new Long Term CSO Control Plan will begin forging a path of Long Term CSO Control and will identify how GLWA will work towards addressing the requirements of the NPDES permit. The intent with the LT Plan is to construct high impact low-cost (relatively speaking) projects in years 5 through 10 of the LT Plan. Then in years 10 through 20 the more expensive improvements are expected to be made. Previous versions of the Long Term CSO Control Plan carried estimated costs of $1,000,000,000 to $2,000,000,000. While these costs are very high, and today not well defined beyond previousl LT plans, it is recognized that significant investment in CSO Control is required to be in compliance with the NPDES permit and therefore GLWA is attempting to begin accounting for and planning for this work in our long term financial planning for the CIP. As the Wastewater Masterplan and Long Term CSO Control Plans and CS-299 projects complete, the view of what needs to be done for existing and future CSO Facilities will become more vivid.

Other Important Info (Replaces CIP1313).

Project History: The GLWA CSO Control Program consists of the operations of 6 CSO RTB's, and 3 Screening & Disinfection Facilities (SDF). The fundamental difference between the SDF's and the RTB's is the presence of a bonafied basin versus a large diameter, long effluent pipe/ outfall. The long outfall (SDF) functionally serves a purpose similar to the basin (RTB) in terms of storage of combined sewer overflow during a rain event. As a result, the SDF's are fundamentally more difficult to keep clean than the RTB's because flushing systems must transport settled solids (after a storm) long distances to leave the effluent pipe. The CSO Facilities average age is around 15 years with the oldest facilities being constructed in 1994 and the most recent facility being constructed in 2011. A scheduled replacement plan was completed in 2013, which is now out of date, and a high level Needs Assessment conducted in 2016, which didn't identify large scale projects or priorities based on condition other than those of emergency nature. Projects resulting from the 2016 NA were largely emergency projects in nature. A Goal of this program includes standardization of the systems utilized at each facility, as well as improving operational & maintenance conditions at each facility. Given the eras in which the facilities were constructed, and being part of demonstration projects, they have differing technology which makes maintenance and operations duties more difficult. Another goal of this program is to improve the operating conditions of facility assets to increase reliability, efficiency, and compliance with all GLWA regulatory and other levels of service.

Challenges: As this program starts off, there is a lot of design RFPs in the beginning which will lead to la refined projects aimed at improving operations, which lead to RFPs for design and large scale construction projects in the later years (3-5). A significant challenge to be faced will be maintaining the CSO facilities in current operations without the benefit of large-scale improvements of the CSO Systems.

CIP Number: **260600**
Project Title **CSO FACILITIES IMPROVEMENT PROGRAM**

Another significant challenge of this program will be unforeseen conditions that may be encountered as facility inspections & condition assessments begin. For example, finding significant structural distress of a basin could lead to increase of budget or extension of timeline of improvements. Considering much of the equipment/systems identified for inclusion in this program are at or near obsolescence or are actively causing O&M issues, delays in improvements could possibly cause operational or compliance issues.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

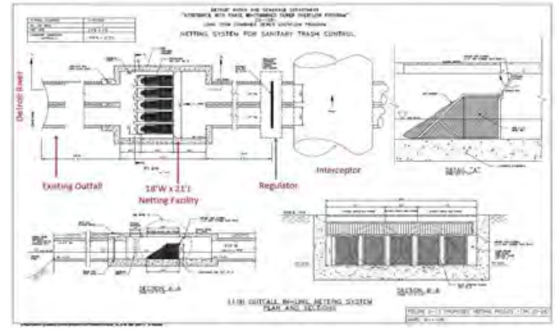
CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	6,742	7,555	7,492	10,289	10,576	4,759	20,280	85,250	152,943	53396
2020	0	0	481	8,442	5,604	4,553	5,825	10,325	13,361	15,000	0	63,591	39668
2019	0	764	1,658	9,277	6,218	2,351	4,351	9,351	11,251	0	0	45,221	31548
2018		3,428	2,247	6,400	9,000	7,200	3,610		0	0	0	31,885	28457

CIP Number: 270001
Project Title Pilot CSO Netting Facility

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 CSO Facilities
Class Lvl 3 Multiple CSO Facilities
Location City of Detroit

- ☐ Innovation
- ☑ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**



Project Engineer/Manager Chris Nastally
Director Chris Nastally

65
Project Score

Problem Statement The First Street CSO Outfall has been identified in the NPDES Permit for the Priority Non-Core Compliance schedule. It is also the nearest and most frequently discharging outfall upstream of the proposed Ralph C Wilson waterfront park on the Detroit River. A pilot facility to demonstrate the application of CSO outfall nets is proposed at this location to keep the sanitary trash from discharging close to this beach, and also to help minimize impacts from fecal coliform bacteria contained in CSO discharge.

Scope of Work / Project Alternatives Inspect the two 10-ft by 10-foot box culverts that comprise this outfall and establish a location for installing the CSO nets, considering outfall structural condition, ease of access for net removal and replacement, and maintenance vehicle parking. Construct in-line netting facility under Convention Center Drive to the west of Cobo Convention Center.
Construct access point for future Total Chlorine Residual monitoring to be installed in a second phase of this project.

Other Important Info GLWA staff conducted a field inspection in 2019 of CSO outfall netting facilities constructed in Cleveland in 2004. There are different types of CSO net installations, and GLWA believes that in-line nets provide for the most efficient operation and maintenance.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	20	86	1,604	318	4,507	1,234	7,769	6535

CIP Number: 270002
Project Title Meldrum Sewer Diversion and VR-15 Improvements

Project Status	Future Planned
Class Lvl 1	Wastewater
Class Lvl 2	CSO Facilities
Class Lvl 3	Multiple CSO Facilities
Location	City of Detroit

- ☐ Innovation
- ☑ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☑ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Project Engineer/Manager Mini Panicker

Director Biren Saparia

62.4

Project Score

Problem Statement The Meldrum Sewer is an uncontrolled CSO that discharges through outfall B-07. Currently, this is an untreated CSO discharge. Untreated CSO discahrges let debris from the sewer and bacteria make their way into fresh water bodies and are not good for public health or the environment. The NPDES permit requires control of this outfall to Michigan water quality standards. The Leib Screening and Disinfection Facility was designed with capacity to screen and disinfect the Meldrum Sewer CSO flow, but presently there is no way to get the flow from the Meldrum sewer to the Conant-Mt. Elliot sewer (and to Leib). This project is a high-level recommendation from the wastewater masterplan. An rfp will need to be developed that further develops the project scope necessary to achieve the desired outcome of connecting the Meldrum sewer to the Contant-Mt. Elliot sewer.

Scope of Work / Project Alternatives The scope of work involves connecting the Meldrum sewer to the Conant-Mt. Elliot Sewer with a diversion pipe that is 5 feet in diameter. New gates would be installed in the Meldrum sewer which direct flow through this diversion and into the Conant-Mt. Elliot sewer, which would then be processed through the Leib Screening and Disinfection Facility. These gates would allow dry weather flow to take it's normal route through the Meldrum sewer to the DRI, and would divert wet-weather to Leib SDF. This would reduce untreated CSO discharge, a requirement of the NPDES Permit.

Other Important Info Recommended in DWSD LTCSO Plan of 2008.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

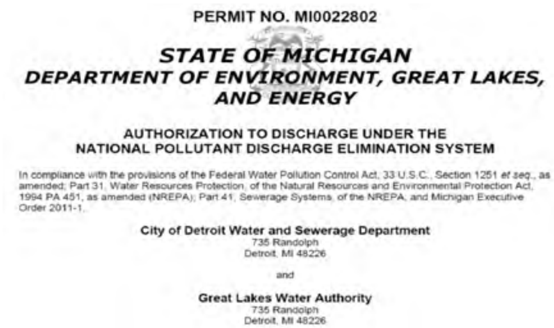
CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	13	86	586	162	5,232	6,079	847

CIP Number: 270003
Project Title Long Term CSO Control Plan

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 CSO Facilities
Class Lvl 3 Multiple CSO Facilities
Location Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**


PERMIT NO. MI0022802

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

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, 33 U.S.C., Section 1251 *et seq.*, as amended; Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); Part 41, Sewerage Systems, of the NREPA; and Michigan Executive Order 2011-1,

City of Detroit Water and Sewerage Department
735 Randolph
Detroit, MI 48226

and

Great Lakes Water Authority
735 Randolph
Detroit, MI 48226

Project Engineer/Manager Chris Nastally
Director Chris Nastally

59.6
Project Score

Problem Statement The NPDES permit which governs CSO Discharges for GLWA requires GLWA to provide for prohibition, elimination, or adequate treatment of combined sewer discharges containing raw sewage. The current plans of 2008 and 2010 were approved by the EGLE (formerly MDEQ) and are the current plans of record. The new NPDES permit issued in July of 2019 opened the door for GLWA to refresh the Long Term Plan and submit to EGLE for review and approval by 11/15/2022. There are 56 total untreated outfalls operated by GLWA that require control in accordance with the NPDES permit language. The language allows for flexibility in terms of which outfalls GLWA shall address first, second & last, but nonetheless requires all of them to be addressed.

Scope of Work / Project Alternatives This project will be a predecessor project to executing a long term CSO control plan, as required by the NPDES permit. This project will include evaluation of the requirements and work done under the 2008 and 2010 current plans of record, evaluation of elements within the Wastewater Masterplan aimed at CSO Control, evaluation of affordability, evaluation and siting of specific projects to be executed, and evaluation and programming of recommended projects to address affordability. The RFP for this project is presently being drafted.

Other Important Info The wastewater masterplan, currently in draft format, has identified in it elements that are a part of the Long Term Plan, including a new storage conduit on the west-side for first flush capture, in-system storage dams, system diversions, and some netting facilities locations strategically selected. These will need to be evaluated and further fleshed out under this project and also evaluated against current system requirements, and former Long Term requirements and plans set forth in 2008 and 2010.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	68	2,796	2,220	710	0	0	0	5,794	5726

CIP Number: 277001
Project Title Baby Creek Outfall Improvements Project

Project Status	Future Planned
Class Lvl 1	Wastewater
Class Lvl 2	CSO Facilities
Class Lvl 3	Baby Creek
Location	Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Project Engineer/Manager Chris Nastally

Director Chris Nastally

72.8

Project Score

Problem Statement The triple barrel Baby Creek Outfall consists of (3) 14'-6" wide by 17'-6" tall concrete box culverts which extend from the Baby Creek Screening & Disinfection Facility to the Baby Creek Outfall on the Rouge River (approximately 5,500 feet). During the original construction of the facility a project was conducted to remove sludge from the pipe. That is because there was, and is no way to flush the outfall, and no easy way to clean the debris from the outfall. Having debris in the outfall will cause operational issues in terms of loss in capacity to transport flow, potential re-growth of bacteria during events making disinfection more difficult or require more chemical disinfection, and limiting GLWA's ability to perform inspections and adequately assess the condition of the entire pipe.

Scope of Work / Project Alternatives This project consists of a study and design. Construction is anticipated from the design, but since the flushing system solution cannot be known at this time this phase is not included in the project due to the variability in alternatives and their associated costs. The study and design will assess the proper ways to clean the pipes, facilitate future maintenace, flushing of the pipes after rain events, and perform assessments of the backwater gates and ensure proper instrumentation is installed in the outfall to facilitate better operations and monitoring. In addition to this, the current pipes as they pass through the Woodmere Cemetery have a very minimal easement making future maintenance and access very difficult. This project will endeavor to identify the limits of a proper easement which facilitates access necessary for GLWA to properly maintain the outfall, and the Consultant will assist GLWA in acquiring these easements. This easement will likely be through Woodmere Cemetery and the Patton Park between Vernor & the Baby Creek SDF. GLWA also anticipates the Consultant providing Construction Assistance once this project goes into Construction.

Other Important Info The current outfall is not capable of being flushed and the solids level will build up after each rain event. Furthermore, the rising river level continues to impact this facility and the outfalls capacity. Having a build up of sludge does not favor Baby Creek in passing the necessary flows because the headloss through the pipes is small and the capacity of the pipes are reduced to to the reduction in cross-

CIP Number: 277001

Project Title Baby Creek Outfall Improvements Project

sectional area.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	79	1,251	907	0	0	0	0	2,237	2158

SECTION 3 CENTRALIZED SERVICES

CIP Number: 331001

Project Title Roofing Systems Replacement at Water Plants and Booster Pump Stations

Project Status Cancelled

Class Lvl 1 Centralized Services

Class Lvl 2 Facilities

Class Lvl 3 General Purpose

Location Multiple Counties

☑ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing

☐ **Project New To CIP**


Roof in need of repair

Project Engineer/Manager Paula Anderson

Director Paula Anderson

61

Project Score

Problem Statement This CIP provides funds to replace roofing systems that are past their useful service life and thus too costly to repair. Sound roofing systems are important to protect the process infrastructure inside GLWA's buildings.

Scope of Work / Project Alternatives This project encompasses the evaluation of all Water Treatment Plant and Booster Pump Station roofs to determine their current condition and to prioritize their repair or replacement. The project will evaluate the type of roof, built-up roofing material, flashing, roof drains/conductors and sealing materials that comprise the building envelope. The findings of the roof survey and evaluation will be used to prioritize roof repair and replacement projects for design and construction.

Other Important Info *Innovation note: use cool roofs.

Project History: Majority of GLWA Water Plant facilities have Built-Up-Roof (BUR) membranes systems commonly referred as "tar and gravel" roofs. Majority of the more than 70 roofs, are over 15 years old and few are even older up to 30 years old. In many instances, inadequate roof system maintenance has been provided.

Challenges: Weather dependent and seasonal work. May require management of several construction projects simultaneously to complete the work. The project should include but, not be limited to the following, material testing for hazardous materials, thermal scans and condition analysis.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0		0	0	225	375	1,625	1,825	1,375	0	5,425	4050

CIP Number: **331001**

Project Title **Roofing Systems Replacement at Water Plants and Booster Pump Stations**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0				128	169	809	1,243	4,844	0	0	7,193	2349
2018		3,000	3,000	3,000	2,500				0	0	0	11,500	8500

CIP Number: 331002

Project Title Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening

Project Status Active

Class Lvl 1 Centralized Services

Class Lvl 2 Facilities

Class Lvl 3 General Purpose

Location Multiple Counties

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Photo of Complex – I Dewatering Roof at the WRRF.

Project Engineer/Manager Beena Chackunkal

Director Dan Alford

43.8

Project Score

Problem Statement Some of the roofs at GLWA WRRF facilities are near its end of useful life. The roofs help to protect the expensive equipment by preventing rain water entering through roofs into the facilities.

Scope of Work / Project Alternatives Inspect the roofing system conditions and assess drainage conditions on all the GLWA wastewater related facility buildings. Document the roofing systems inspections by taking and submitting high-quality photographs, scaled drawings, sketches, and inspection notes to adequately describe the conditions and deficiencies of the roofing systems and their drainage facilities. Recommend the extent of the roofing repairs and replacements required. Document the roof for each building inspected on the project. Classify the roofs into three (3) main categories, such as, 1) Roofs that require complete replacement, 2) Roofs that only require repair, and 3) Roofs that require no action within the next 10 years. Develop a recommended implementation/planning schedule with budgetary costs tied to the schedule for roofing system repairs and replacements that GLWA should plan for over the next 10 years. Provide preventative care suggestions for the GLWA's roofing systems evaluated under this contract. Provide any OSHA compliance suggestions that may be applicable for the GLWA's roofing systems evaluated under this contract.

Other Important Info *Innovation note: Use cool roofs.
Complex – II Incinerator ($1.8M) and Complex – II Dewatering ($1.0 M) replacement are under consideration to be part of fire remediation project.

Challenges: Roof material testing for asbestos before demolition and flashing will be challenge to manage as low levels of asbestos are very common in the GLWA's old roof type systems.

Project History: Majority of GLWA WRRF facilities have Built-Up-Roof (BUR) membranes systems commonly referred as "tar and gravel" roofs. The old Administration buildings and the Newer Administration buildings

CIP Number: 331002

Project Title Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening

have tar and gravel type of roof systems. The CSO RTB's and SDF's have metal and shingle type of roof systems. Majority of the roofs are over 15 years old and few are even older up to 30 years. These roof systems has been maintained through regular maintenance and repair or patch work performed to fix the leaking roof spots.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	802	321	91	1,745	1,724	1,708	1,702	1,652	9,745	6970
2020	0	0		278	1,092	4,142	4,114	41	42	0	0	9,709	9431
2019	0			286	709	5,575	5,114			0	0	11,684	11684
2018			2,200	2,060	1,060	1,050	540	2,140	0	0	0	9,050	6910

CIP Number: 341001
Project Title Security Infrastructure Improvements on Water Facilities

Project Status Active
Class Lvl 1 Centralized Services
Class Lvl 2 Security
Class Lvl 3 General Purpose
Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [x] **Project New To CIP**

Project Engineer/Manager Michael Lewis
Director W. Barnett Jones

Project Score

Problem Statement GLWA facilities have been designated as "Critical Infrastructure" by the United States Department of Homeland Security (OHS). Critical Infrastructure is under constant threat by malicious people intent on disruption and destruction. GLWA staff is engag.ed in a continual process of threat and vulnerability assessment to our facilities, operations, and staff. Using several assessment tools including, OHS Site Assessments, incorporating
AWWA security recommendations, and utilizing GLWA's historical assessment data, we have the basis for initiating a strategic plan for security infrastructure improvements. The resulting data from these assessments formulate recommendations for mitigating vulnerabilities. The implementation of these recommendations requires an efficient and effective design, procurement, and construction process.

Scope of Work / Project Alternatives Water Works Park: Additional coverage where boats dock and by the screening house. Video assessment wherever there are alarm points. Primary Building needs to be secured. Need video coverage. Switchgear room needs to be secured. Exterior video coverage of oxygen tanks and entrance lo chlorine room. Secure transformer enclosures -Raw water Booster Station. Interior intrusion detection devices need to be installed at high lift building- glass break, motion sensors, etc. Install Card readers to interior of the new plant where critical assets are located. Enhanced perimeter fencing and gates. Enhanced perimeter detection system Replacement of analog cameras

Northeast Water Plant: Chemical building needs access control intrusion devices. Video assessment wherever there are alarm points. Flocculate building needs intrusion devices. Interior intrusion devices for uncovered areas. Enhanced perimeter fencing and gates Replacement of analog cameras. Enhanced perimeter detection system.

Springwells Water Plant: Enhanced access control system Chemical Building, basins and tunnel not secured. Video assessment wherever there are alarm points Enhanced perimeter detection system.

CIP Number: 341001
Project Title Security Infrastructure Improvements on Water Facilities

Enhanced perimeter fencing and gates Replacement of analog cameras

Lake Huron Water Treatment Plant: Cameras at the Clear Well, Main Transformer Station and the Emergency Generators. Enhanced perimeter fencing and gates. Replacement of analog cameras. Enhanced perimeter detection system.

Southwest Water Plant: Video assessment wherever there are alarm points. Replace door closures to chlorine room so the doors swing shut and lock automatically. Install card readers to chlorine room and chlorine evaporation room. Enhanced perimeter fencing and gates. Replacement of analog cameras. Enhanced perimeter detection system.

Southwest Water Treatment Intake: Provide security for the intake platform. Enhanced perimeter fencing and gates. Replacement of analog cameras

Belle Isle Intake: Enhanced Access Control. Perimeter fencing and gates. Intrusion detection. Video assessment and surveillance.

Chlorine Storage Areas at all Plants: Enhanced Access Control. Intrusion detection. Video assessment and surveillance.

Other Important Info GLWA has a responsibility in the layered approach to critical infrastructure security; partnering with Federal, State, and Local law enforcement entities to minimize and respond to threats. This partnership required GLWA to maintain a minimum security posture equating to the Critical Infrastructure designation. Implementation of the security protocols were none existent, and improving the GLWA security foot print can reduce our vulnerabilities and enhance our response to known threats.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	4,029	4,018	2,603	0	0	0	0	10,650	6621

CIP Number: 341002
Project Title Security Infrastructure Improvements for Wastewater Facilities

Project Status	Active
Class Lvl 1	Centralized Services
Class Lvl 2	Security
Class Lvl 3	General Purpose
Location	Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☑ **Project New To CIP**

Project Engineer/Manager Michael Lewis

Director W. Barnett Jones

Project Score

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AWWA security recommendations, and utilizing GLWA's historical assessment data, we have the basis for initiating a strategic plan for security infrastructure improvements. The resulting data from these assessments formulate recommendations for mitigating vulnerabilities. The implementation of these recommendations requires an efficient and effective design, procurement, and construction process.

Scope of Work / Project Alternatives Water Works Park: Additional coverage where boats dock and by the screening house. Video assessment wherever there are alarm points. Primary Building needs to be secured. Need video coverage. Switchgear room needs to be secured. Exterior video coverage of oxygen tanks and entrance lo chlorine room. Secure transformer enclosures -Raw water Booster Station. Interior intrusion detection devices need to be installed at high lift building- glass break, motion sensors, etc. Install Card readers to interior of the new plant where critical assets are located. Enhanced perimeter fencing and gates. Enhanced perimeter detection system Replacement of analog cameras

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Springwells Water Plant: Enhanced access control system Chemical Building, basins and tunnel not secured. Video assessment wherever there are alarm points Enhanced perimeter detection system.

CIP Number: 341002

Project Title Security Infrastructure Improvements for Wastewater Facilities

Enhanced perimeter fencing and gates Replacement of analog cameras

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Other Important Info GLWA has a responsibility in the layered approach to critical infrastructure security; partnering with Federal, State, and Local law enforcement entities to minimize and respond to threats. This partnership required GLWA to maintain a minimum security posture equating to the Critical Infrastructure designation. Implementation of the security protocols were none existent, and improving the GLWA security foot print can reduce our vulnerabilities and enhance our response to known threats.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	1,579	1,051	0	0	0	0	0	2,630	1051

CIP Number: 351001
Project Title LED Lighting and Lighting Control Improvements

Project Status Active
Class Lvl 1 Centralized Services
Class Lvl 2 Energy Management
Class Lvl 3 General Purpose
Location Multiple Counties

- [x] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**


Example LED light fixture

Project Engineer/Manager Eric Griffin
Director John Norton

60.8
Project Score

Problem Statement Energy savings, demand reduction improved visibility, safety, operational efficiency and worker productivity. Budget was cut to $500,000.00 we plan on reducing scope to 4 Booster stations only under this CIP.MFG 7/25/2019

Scope of Work / Project Alternatives Remove identified old fixtures and replace with new LED lamps and advanced control systems.

Other Important Info Challenges: Some outfalls are below the river elevation; installation may be challenging.

Project History: An audit was completed in 2010/2011 but little action was taken. Advancement in lighting technology since this audit has rendered it obsolete as to recent innovations, technology and cost. Across the system, equipment is in poor condition and exceeds its end of life. Some existing fixtures are antiques and compared to today's lighting, cannot meet minimum lighting standards.

A well detailed audit is to be carried out to determine the best suitable replacement lamps based on a set performance criteria, lighting controls to be incorporated and in cases where delamping might be an option, equivalent/appropriate lighting output and level is to be maintained per task/space requirements

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	6	0	50	248	252	0	0	0	556	550
2020	0	0		250	250	0	0	0	0	0	0	500	250
2019	0		2	1,172	1,600					0	0	2,774	2772

CIP Number: **351001**

Project Title **LED Lighting and Lighting Control Improvements**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018			933	933	933				0	0	0	2,799	2799

CIP Number: 380400

Project Title As-needed CIP Implementation Assistance and Related Services

Project Status Closed

Class Lvl 1 Centralized Services

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Make a Plan

Project Engineer/Manager Gaylor Johnson / Dan Edwards

Director Dan Alford

Project Score

Problem Statement The purpose of this proposed contract is to provide implementation assistance and related services on a task order basis to support the GLWA.

Scope of Work / Project Alternatives This project provides for multi-discipline Engineering services on an "as-needed basis" to support GLWA's Water & Sewer Systems. The purpose of this proposed contract is to provide implementation assistance and related services on a task order basis to support the GLWA. The services provided under this contract include assistance in capital projects definition and planning, design and construction phase procurement assistance and monitoring; third party contract administration/oversight assistance/scheduling services; claims/changes analysis and resolution; technical training; value engineering (VE) services on selected design projects; develop engineering study reports; identify minimum requirements, scope of work, basis of process design, performance criteria, minimum standards of quality, and preliminary design and oversight services for design/build contracts; proposal analysis assistance; engineering forensic analysis, and additional program support services.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0		0							0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	210	500	1,606	1,606	1,606				0	0	5,528	4818
2018	4770	1,400	100						0	0	0	6,270	100

CIP Number: 380500
Project Title Wastewater General Engineering Services on an As-needed Basis

Project Status Closed
Class Lvl 1 Centralized Services
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Example of pipe being laid

Project Engineer/Manager Beena Chackunkal
Director Dan Alford

Project Score

Problem Statement Various engineering as needed services for design and replacement of aging water and sewer lines.

Scope of Work / Project Alternatives This project involves designing water main and lateral sewer replacement projects for aging and dysfunctional water mains and sewers throughout the system and several projects at the WRRF under different tasks on an as-needed basis. The work also includes civil, structural, architectural, hydraulics, mechanical, electrical, surveying, instrumentation and piping design services.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	282	114	114	91					0	0	601	205
2018	10064	228	228						0	0	0	10,520	228

CIP Number: 380600

Project Title As-Needed General Engineering Services

Project Status Active

Class Lvl 1 Centralized Services

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- ☐ Innovation
- ☐ Conc. WW Master Plan
- ☐ Water MP Right Sizing
- ☐ Reliability/Redundancy
- ☐ NEWTP Repurposing

☐ **Project New To CIP**

Project Engineer/Manager Grant Gartrell

Director Grant Gartrell

Project Score

Problem Statement Allowance for the study and design of critical projects throughout the system prior to bidding and construction.

Scope of Work / Project Alternatives As-needed engineering services for water and wastewater engineering.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	5	0	0	0	0	0	0	0	5	0
2020	0	0	2	94	0	0	0	0	0	0	0	96	0
2019	0	316	406	327	50					0	0	1,099	377
2018	14012	446	436	386					0	0	0	15,280	822

CIP Number: 380700

Project Title As-Needed Geotechnical and Related Engineering Services

Project Status Active

Class Lvl 1 Centralized Services

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [ ] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Example of testing being performed

Project Engineer/Manager Peter Fromm

Director Grant Gartrell

Project Score

Problem Statement GLWA engineering and operations need a contract mechanism to obtain professional engineering services in a timely manner to investigate environmental, geotechnical and specialized engineering problems that occur on a regular basis throughout the system.

Scope of Work / Project Alternatives This engineering/technical services contract involves as-needed engineering and technical services related to geotechnical investigations and related geotechnical engineering, construction materials sampling and testing, environmental media sampling and testing, soils sampling and testing, land surveying, corrosion testing and inspection, computer-aided design, and construction inspection. This contract includes design, construction services, and resident project representation for the follow transmission main projects:

1. 1802775 Park-Merriman 24-inch Water Main
2. 1803621 Wick Road 48-inch Transmission Main
3. 1804129 Schoolcraft Road 48-inch Transmission Main

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	1,415	715	0	0	0	0	0	2,130	715
2020	0	0	0	620	0	0	0	0	0	0	0	620	0
2019	0	230	238	477	477	477	238			0	0	2,137	1669
2018		650	907	333	333	333			0	0	0	2,556	1906

CIP Number: 380800
Project Title Geotechnical and Related Services on an As-Needed Basis

Project Status Closed
Class Lvl 1 Centralized Services
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**

Project Engineer/Manager Grant Gartrell
Director Grant Gartrell

Project Score

Problem Statement As Needed geotechnical consulting services.

Scope of Work / Project Alternatives The work includes consultant services for geotechnical work on as-needed basis. The work also provides for additional engineering/ technical services as requested.

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2019	0	164								0	0	164	0
2018	2441	132							0	0	0	2,573	0
2021	0	0	0		0							0	0
2020	0	0	0	0							0	0	0

CIP Number: 380900
Project Title General Engineering Services

Project Status Closed
Class Lvl 1 Centralized Services
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

☐ Innovation
☐ Conc. WW Master Plan
☐ Water MP Right Sizing
☐ Reliability/Redundancy
☐ NEWTP Repurposing
☐ **Project New To CIP**


Analytical Lab

Project Engineer/Manager Beena Chackunkal

Director Dan Alford

Project Score

Problem Statement As needed multi-discipline engineering services for various small scale projects at WTP and WRRF.

Scope of Work / Project Alternatives This project provides for rapid design turn-around for a variety of projects on an as-needed basis providing multi-disciplinary professional services including meter pit improvement services.

Other Important Info Challenges: N/A - Active

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0		0							0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	138	572	916	425					0	0	2,051	1341
2018	28	1,250	1,154						0	0	0	2,432	1154

CIP Number: 381000
Project Title Power Quality: Electric Metering Improvement Program

Project Status Future Planned
Class Lvl 1 Centralized Services
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- [ ] Innovation
- [ ] Conc. WW Master Plan
- [ ] Water MP Right Sizing
- [x] Reliability/Redundancy
- [ ] NEWTP Repurposing
- [ ] **Project New To CIP**

Example of an electric meter

Project Engineer/Manager Eric Griffin

Director John Norton

Project Score

Problem Statement Advanced meters for measuring power usage in real-time to reduce the electrical demands and further optimize load management practices,
GLWA is experiencing a lot of power outages at our facilities. The installation of the New Power Monitors will give us real wave form data to determine why we are having outages and the time period of sagging or swelling voltage which effects the integrity of our equipment. MFG 7/25/2019

Scope of Work / Project Alternatives This program will increase the number of electric meters at pumping stations and treatment facilities to allow for active demand management to reduce electricity rates. The meters can be tied to the existing data management system for data archiving and use.
The installation of the New Power Monitors will give us real wave form data to determine why we are having outages and the time period of sagging or swelling voltage which effects the integrity of our equipment.MFG 07/25/2019

Other Important Info Project History: Project is in the works targeting high demand (kW) sites - all the water treatment plants (Phase 1)
We would like to change the project to design build and move up on the CIP. The outages we are having are affecting our preassuers that are causing water main breaks and boil water advisories, We need this to better communicate DTE problems that we are faced with and come up with solutions to improve the process or equipment.MFG 7/25/2019

Project Expenses Compared to Previous CIP Versions (All figures are in $1,000's)

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2021	0	0	0	0	86	446	1,540	1,337	112	445	2,904	6,870	3880
2020	0	0		0	0	0	0	0	0	5,000	0	5,000	0
2019	0				120	120	510	878	4,372	0	0	6,000	1628

CIP Number: **381000**

Project Title **Power Quality: Electric Metering Improvement Program**

CIP Alias	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total	5-Yr Total
2018		1,000	1,000	1,000	1,000	1,000	1,000		0	0	0	6,000	5000

IX. Glossary

BCE............................Business Case Evaluations
BDF ....Biosolids Dryer Facility
BFP............................Belt Filter Press
BGD...........................Billion Gallons per Day
BPS............................Booster Pumping Station
CB ....Construction Bond
CCR............................Consumer Confidence Rule
CCTV.........................Closed-Circuit Television
cfs ....cubic feet per second
CIP.............................Capital Improvement Plan
CMG ....GLWA Capital Management Group
COF ....Central Offload Facility
CSF ....Central Services Facility
CSO............................Combined Sewer Overflow
CTA ....Common To All
CWA..........................Clean Water Act
DDOT........................Detroit Department of Transportation
DE ....Debt Eligible
DI ....Ductile Iron
DRI ....Detroit River Interceptor
DRO...........................Detroit River Outfall
dtpd ....dry tons per day
DWRF.......................Drinking Water Revolving Fund
DWSD.......................Detroit Water and Sewerage Department
DWSD-R..................Specifying the new, Detroiter-focused Detroit Water and Sewerage Department
EPA ....United States Environmental Protection Agency
GIS.............................Geographic Information System
GLWA........................Great Lakes Water Authority
GPS............................Global Positioning System
HVAC........................Heating, Ventilation, and Air Conditioning
I&C ....Instrumentation & Controls
I&E ....Improvement & Extension
IDF.............................Intermediate Distribution Facilities
IGA ....Investment Grade Audit
ILP ....Intermediate Lift Pumps
ISD.............................In System Storage Device
IT................................Information Technology
ITS ....Information Technology and Services
IWC ....Industrial Waste Control
LCR............................Lead and Copper Rule
LED ....Light-Emitting Diode
LEL............................Lower Explosive Limit
LIMS/PIMS ....Laboratory Information Management System/Project Information Management System
LH WTP...................Lake Huron Water Treatment Plant
MACP.......................Manhole Assessment Certification Program
MBO..........................Master Bond Ordinance
MCC..........................Motor Control Centers
MDEQ.......................Michigan Department of Environmental Quality
MDF ....Main Distribution Facilities
MG ....Million Gallons
MGD..........................Million Gallons per Day
NAB...........................New Administration Building at the WRRF
NASSCO ....National Association of Sewer Service Companies
NE WTP...................Northeast Water Treatment Plant
NEC ....National Electric Code
NESDS......................Northeast Sewerage Disposal System
NIEA ....North Interceptor East Arm
NPDES......................US EPA National Pollutant Discharge Elimination System
NPL ....US EPA National Priorities List
O&M..........................Operations & Maintenance
OEM ....Original Equipment Manufacturer

O-NWI.......................Oakwood-Northwest Interceptor
OSHA.........................Occupational Safety and Health Administration
OWI...........................Oakwood Interceptor
PAC ....Powdered Activated Carbon
PACP.........................Pipeline Assessment Certification Program
PCCP.........................Pre-Stressed Concrete Cylinder Pipe
PEAS.........................Primary Effluent to Activated Sludge
PLC............................Programmable Logic Controller
PLD ....Programmable Logic Device
PRV ....Pressure Reducing Valve
PS...............................Pump Station
RAS............................Return Activated Sludge
RRO...........................Rouge River Outfall
RRO-2........................Rouge River Outfall No. 2
RTB ....Retention Treatment Basins
RVSDS......................Rouge Valley Sewerage Disposal System
RWCS ....Regional Water Transmission System
SAMO ....GLWA System Analytics and Meter Operations
SCADA......................Supervisory Control And Data Acquisition (GLWA uses Ovation brand)
SCC............................Systems Control Center
SCP ....Small Capital Projects
SCUBA actuators ..Self-Contained Universal Bi-directional Actuator
SDF............................Screening and Disinfection Facility
SDWA........................Safe Drinking Water Act
SFE ....Secondary Final Effluent
SFP ....Sludge Feed Pump
SOW..........................Scope of Work
SPW WTP ....Springwells Water Treatment Plant
SRP............................Scheduled Replacement Program
SW WTP ....Southwest Water Treatment Plant
T&O...........................Taste and Odor
TAC ....Technical Advisory Committee
TCR ....Total Coliform Rule
TPC............................Tournament Players Championship Golf Course in Dearborn
VFD ....Variable Frequency Drive
VR-Gates ....Valve Remote Gates
WAM.........................Work and Asset Management
WMP.........................Water Master Plan
WMPU......................Water Master Plan Update
WRRF.......................Water Resource Recovery Facility
WSC ....West Service Center
WTP..........................Water Treatment Plant
WWP WTP ....Water Works Park Water Treatment Plant
WWTP ....Wastewater Treatment Plant (old terminology)

X. APPENDICES