

CIP

Capital Improvement Plan
2020 - 2024



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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 Michigan Department of Environmental Quality (MDEQ), 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:

- *Freman Hendrix, GLWA Board Chairman; Representative for the City of Detroit*
- *Brian Baker, GLWA Board Vice Chairman; Representative for Macomb County*
- *Abe Munfakh, GLWA Board Secretary; Representative for Wayne County*
- *Gary A. Brown, Representative for the City of Detroit*
- *Robert J. Daddow, CPA, Representative for Oakland County*
- *Craig Hupy, Representative for the State of Michigan*

The GLWA Capital Improvement Planning committee provides significant input, direction and evaluation of the 2020-2024 CIP. Current members of the CIP committee include:

- *Abe Munfakh, P.E.*
- *Robert J. Daddow, CPA*
- *Craig Hupy, 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*
- *W. Barnett Jones, Chief Security and Integrity Officer*
- *Michelle A. Zdrodowski, Chief Public Affairs Officer*
- *Jeffrey E. Small, Chief Information 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 981 square miles located in eight Michigan counties and an estimated population of nearly four million or nearly 40% of Michigan's population. Suburban member partners comprise approximately 82% of the population served by the Authority, and the Retail Water Customers (as defined herein) comprise the remainder served by the Authority.

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. 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 each 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/our-system/facilities/>.

2.1. Funded Portion of the Programs

This plan spans a 5-year period from fiscal year 2020 through fiscal year 2024. 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 FY2020-2024 CIP are listed below. These projects are budgeted for greater than \$30 Million over the FY2020-2024 time period. There are seven (7) projects in the Water category and five (5) projects in the Wastewater category.

3.1. Water

Table I-1. Water Projects with 2020-2024 CIP Total Greater than \$30M

CIP #	Project Title	Lifetime Actual Thru FY18	FY19	Projected Expenditures							
				FY20	FY21	FY22	FY23	FY24	FY25+	2020-24 CIP Total	Project Total
122003	WWP to NE Transmission Main	1,655	1,121	871	15,786	24,115	29,615	29,994	30,115	100,381	133,272
122004	96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main	1,130	837	5,000	6,000	26,453	35,886	23,453	33,907	96,792	132,666
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	498	2,607	5,985	9,302	13,724	13,724	26,145	42,831	68,880	114,816
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	682	899	17,333	17,333	17,333	-	-	-	51,999	53,580
122016	Downriver Transmission Main Loop	-	-	297	964	3,051	10,763	22,122	-	37,197	37,197
132010	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades	-	-	2,620	7,430	15,570	8,910	2,606	-	37,136	37,136
122006	Wick Road Water Transmission Main Construction	126	1,370	18,028	12,334	60	-	-	-	30,422	31,918

3.2. Wastewater

Table I-2. Wastewater Projects with 2020-2024 CIP Total Greater than \$30M

CIP #	Project Title	Lifetime Actual Thru FY18	FY19	Projected Expenditures							
				FY20	FY21	FY22	FY23	FY24	FY25+	2020-24 CIP Total	Project Total
232002	Freud & Conner Creek Pump Station Improvements	5,110	1,984	17,029	13,014	50,014	50,014	25,007	257	155,078	162,429
260200	Sewer and Interceptor Rehabilitation Program	13,555	8,609	15,000	15,000	15,000	15,000	15,000	95,000	75,000	192,164
260500	CSO Outfall Rehabilitation	9	4,000	15,102	17,947	10,926	15,102	15,102	11,000	74,179	89,188
260600	CSO FACILITIES IMPROVEMENT PROGRAM	481	8,442	5,604	4,553	5,825	10,325	13,361	15,000	39,668	63,591
222002	Detroit River Interceptor (DRI) Evaluation & Rehabilitation	2,647	9,424	10,000	10,000	10,000	1,000	1,000	5,000	32,000	49,071
232003	Northeast Pumping Station	-	1,000	7,000	10,500	10,500	2,500	-	-	30,500	31,500
222001	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	-	-	-	-	3,800	10,077	10,077	14,077	23,954	38,031

SECTION 4 LARGEST 2020 PROJECTED SPEND (GREATER THAN \$5M)

The water and wastewater projects with the largest projected spend for 2020 are listed below. These projects are budgeted for greater than \$5 Million in FY 2020. There are eight (8) projects in the Water category and ten (10) projects in the Wastewater category.

4.1. Water

Table I-3. Water Projects with 2020 Projected Spend Greater than \$5M. (Thousands of dollars)

CIP #	Project Title	Lifetime Actual Thru FY18	FY19	Projected Expenditures							2020-24 CIP Total	Project Total
				FY20	FY21	FY22	FY23	FY24	FY25+			
122006	Wick Road Water Transmission Main Construction	126	1,370	18,028	12,334	60	-	-	-	30,422	31,918	
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	682	899	17,333	17,333	17,333	-	-	-	51,999	53,580	
111009	Lake Huron Water Treatment Plant, Two New High-Lift Pumps, Water Production Flow Meter, and Select Yard Piping Improvements	-	16	9,030	10,030	7,030	-	-	-	26,090	26,106	
122005	Schoolcraft Road Water Transmission Main Replacement	4	180	8,100	9,145	633	-	-	-	17,878	18,062	
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	498	2,607	5,985	9,302	13,724	13,724	26,145	42,831	68,880	114,816	
116002	Pennsylvania, Springwells and Northeast Raw Water Supply Tunnel Improvements	2,178	7,513	5,467	5,467	5,467	3,998	-	-	20,399	30,090	
114011	Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements	473	3,109	5,392	7,754	8,261	-	-	-	21,407	24,989	
170800	System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation	-	482	5,128	5,211	5,182	3,888	5,495	33,778	24,904	59,164	

4.2. Wastewater

Table I-4. Wastewater Projects with 2020 Projected Spend Greater than \$5M

CIP #	Project Title	Lifetime Actual Thru FY18	FY19	Projected Expenditures							
				FY20	FY21	FY22	FY23	FY24	FY25+	2020-24 CIP Total	Project Total
232001	Fairview Pumping Station - Replace Four Sanitary Pumps	1,551	6,000	18,000	4,891	-	-	-	-	22,891	30,442
232002	Freud & Conner Creek Pump Station Improvements	5,110	1,984	17,029	13,014	50,014	50,014	25,007	257	155,078	162,429
260500	CSO Outfall Rehabilitation	9	4,000	15,102	17,947	10,926	15,102	15,102	11,000	74,179	89,188
260200	Sewer and Interceptor Rehabilitation Program	13,555	8,609	15,000	15,000	15,000	15,000	15,000	95,000	75,000	192,164
222003	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	-	500	15,000	14,500	-	-	-	-	29,500	30,000
222002	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	2647	9,424	10,000	10,000	10,000	1,000	1,000	5,000	32,000	49,071
213007	WRRF Modification to Incinerator Sludge Feed Systems at Complex -II	871	7,159	8,711	3,308	-	-	-	-	12,019	20,049
211001	WRRF Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery	25098	18,724	7,982	3,054	-	-	-	-	11,036	54,858
213002	WRRF Rehabilitation of Central Offload Facility	982	4,204	7,696	3,297	-	-	-	-	10,993	16,179
214001	WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations	573	2,828	7,567	-	-	-	-	-	7,567	10,968
232003	Northeast Pumping Station	-	1,000	7,000	10,500	10,500	2,500	-	-	30,500	31,500
260600	CSO FACILITIES IMPROVEMENT PROGRAM	481	8,442	5,604	4,553	5,825	10,325	13,361	15,000	39,668	63,591

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 prioritize newly submitted CIP projects for the upcoming fiscal year. For this CIP, the projects, programs and allowances that are currently active have not been prioritized by these committees as they are currently underway.

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 Asset Management & 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 2020-2024 CIP.

Date	Description
August 20, 2018	Distribute & Train Team Members on Business Case Evaluation Database
September 26, 2018	Team Members BCE's are Due
October 1 & 3, 2018	Water and Wastewater Review Committee Meetings
October 18, 2018	Executive Leadership Team Reviews BCE's & Modifications to CIP
October 25, 2018	First Member Partner Review of CIP – Version 1 at Charges Rollout Meeting #1
October 29, 2018	First GLWA CIP Committee Review of CIP – Version 1
November 19, 2018	Member Partner & Board Comments Due
November 30, 2018	GLWA CIP Committee Meeting
December 18, 2018	Second Member Partner Review of CIP – Version 2 at AM/CIP Member Partner Outreach Work Group
December 18, 2018	Second GLWA CIP Committee Member Partner Review of CIP – Version 2
1st Quarter 2019	Align the Board approval of CIP and budget.
July 1, 2019	Effective Date of 2020- 2024 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 2020-2024 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
Karen Mondora	Member Partner Rep. – City of Farmington Hills
Jody Caldwell	GLWA Systems Planning
Bill Fritz	GLWA Systems Planning
Ali Khraizat	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 Financial Services
Andrew Soznoski	GLWA Financial Services
Desiree Barrett	GLWA Financial Services
Chandan Sood	GLWA Systems Analytics & Meter Ops

Table II-2. Wastewater Review Committee Members

Name	Group
Sam Smalley	Member Partner Representative, DWSD
Jody Caldwell	GLWA Systems Planning
Bill Fritz	GLWA Systems Planning
Suzanne Coffey	GLWA Wastewater Operations
Ali Khraizat	GLWA Wastewater Engineering
Philip Kora	GLWA Wastewater Engineering
Beena Chackunkal	GLWA Wastewater Engineering
Navid Mehram	GLWA Wastewater Operations
Sajit George	GLWA Wastewater Operations
Biren Saparia	GLWA Systems Control
Anjanette Custard	GLWA Financial Services
Andrew Sosnoski	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 criteria 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 three primary CIP types: Project, Program, and Allowance. A typical project that has a specific scope and timeframe is considered a Project. Whereas Programs and Allowances do not have specifically developed scopes and typically extend over many years. Allowances are necessary for utility operations due to the unanticipated nature of pipeline and equipment failures that require immediate repair and rehabilitation to continuously meet level of service requirements. Table II-4 defines each CIP Type.

SECTION 5 REPORT FORMAT

The 2020-2024 CIP format is similar to the 2019-2023 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 2020-2024 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	
	25X - General Purpose	251 - 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
	26X - Programs	2601 - Programs	
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. In the front of each Appendix will be a list of projects that are contained within the Appendix. By selecting a project within this list, the reader will be directed to the BCE related to that project.

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 2019-2023 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 optimized to allow for access control and improved operability.

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 remains 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 criteria as primary risk driver is shown in Table II-6.

After each criteria 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

RISK MATRIX

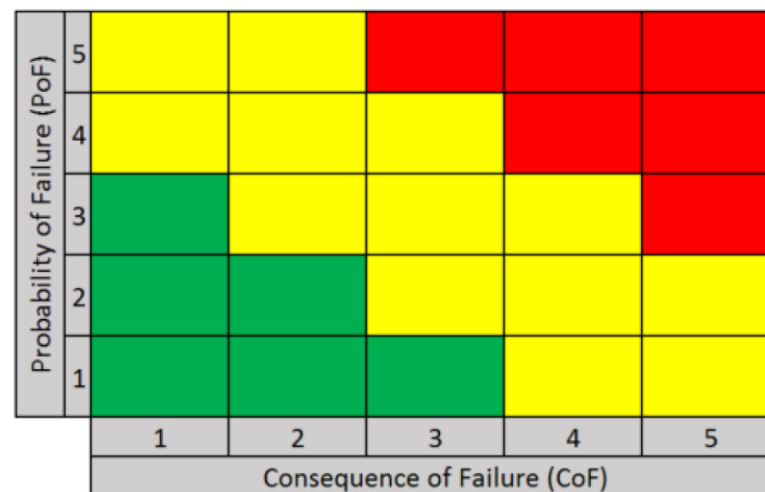


Figure II-1. Risk Matrix.

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.

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.

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%

5.11. Program & Allowance Project "Carve Outs"

In the past, projects that were performed under an allowance or a program typically were not specifically identified within the CIP unless the project had significant expenses and schedule to warrant its addition to the CIP the following year. In the 2018

fiscal year, Financial Services Areas began issuing a CIP number and tracking these projects within the BS&A financial software. These projects have been coined, “carve outs”, as they are carved out of the parent allowance or program CIP. The CIP number associated with these carve outs is numerically relevant to the parent CIP number. To better portray this relationship in the CIP, the project carve outs are rolled up as phases under the parent CIP program or allowance.

5.12. Project Year-to-Year Comparison

In order to compare a projects 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	Design and Build			
Budget	Water	Task Name	Start Date	Duration	End Date
Phase Status	Future Planned Start	Scope Development	1/22/2018	100	5/2/2018
Contract No	NA	Procurement	7/1/2018	220	2/6/2019
Cost Est Class		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 2020-2024 CIP. The 2020 CIP continues to improve and evolve to provide the various stakeholders accurate and timely information at their fingertips.

Modifications to the 2020 CIP include the expansion of the Cost Estimation Classification system to provide a general understanding of the level of accuracy related to the cost estimate. Additional tables and summaries have been developed to display this data. In addition, the 2020 CIP now includes a 10-year Water and Wastewater Outlook for projected expenditures.

Major changes will be identified and many more changes, improvements and modification are in conceptual form now and will likely be available for the 2021 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 1 INTRODUCTION

The intersection of the CIP and the GLWA's overall financial plan balances several objectives to support the Authority's mission. Those objectives include the following:

- ✓ Transparency in the development of the financial plan
- ✓ Collaboration internally and externally
- ✓ Ensure sustainability
- ✓ Reduce the debt burden
- ✓ Smoothing of annual adjustments to service charges
- ✓ Improve the Authority's financial position

The Authority draws upon five sources of funding for its CIP:

1. **Bond Proceeds:** The Authority uses an incremental method of funding long-lived capital projects through a bond financing program. The Authority issues revenue bonds pursuant to Michigan Public Act 94 of 1933 (the Revenue Bond Act). The Act provides a pledge of "net revenues" for the payment of the bond principal and interest. "Net revenues" is the revenues of the system remaining after deducting the reasonable expenses of administration, operation, and maintenance of the system.
2. **Revenue Financed Capital (Improvement & Extension Fund):** Based upon ongoing expense, capital, and revenue optimization efforts, the Authority is able to build reserves to use pay-as-you go funding for shorter-lived and lower-dollar capital expenditures as well as to reduce the level of borrowing for longer-lived assets. These funds are not budgeted for use until received and recorded in the Improvement & Extension Fund for the water or the sewer system.
3. **Federal Loan Programs:** The Authority's sources of funding include lower cost financing programs including

the State Revolving Fund (SRF) Loan Program and the Drinking Water Revolving Fund (DWRf) Loan Program.

4. **Grants:** The Authority utilizes public grants programs such as the State of Michigan's Stormwater, Asset Management, and Wastewater Program (provides both grants and loans) and is pursuing federal and private grants for energy optimization.
5. **Contribution in Aid of Construction:** Periodically, the Authority has the opportunity to partner with other entities for the design and construction or improvement of an asset. Depending on the nature of the shared financing strategy, the Authority may offset the cost of System expansion or improvements with direct or indirect capital from that partner.

To ensure proper accountability of funding sources and uses, the Authority utilizes two funds for its capital program for each system: the Construction Bond Fund and the Improvement & Extension (I&E) Fund.

- ✓ **Construction Bond Fund:** This fund represents the proceeds of bond issuances and related interest earnings for the purposes of financing capital improvements. New with this CIP, GLWA has made a concentrated effort to implement a CIP financial plan strategy where long-lived assets, defined as constructed infrastructure and plant facilities with an estimated useful life greater than 20 years, are eligible for bond funding.
- ✓ **Improvement & Extension (I&E) Fund:** The I&E Fund is defined by the Authority's Master Bond Ordinance (MBO) as the "fund used for improvements, enlargements, extensions or betterment" of the System. Cash receipts of the Authority are transferred into the I&E Fund pursuant to a flow of funds after commitments are met for a monthly allocation of operations and maintenance

expense, debt service, pension, WRAP, budget stabilization fund, and extraordinary repair and replacement fund as administered by a trustee. Capital outlay items are funded with I&E Funds. Capital outlay are items that are generally purchased (rather than constructed) and with an estimated useful life of less than 20 years.

The basis of accounting for the capital spending is the accrual basis. Under this basis of accounting, revenues are recognized when earned and measurable regardless of when collected; and expenses are recorded, or accrued, on a matching basis when incurred. Accrued expenses are expected to be paid in a subsequent accounting period. For purposes of this CIP, the terms expenses and expenditures are used interchangeably.

SECTION 2 SUMMARY CIP FINANCIAL PLAN REVIEW AND ANALYSIS

The GLWA CIP financial plan document is based on a foundational database of capital projects and programs to support improved analysis and decision-making, provide transparency, balance risk and opportunity, and demonstrate greater clarity in the long-term GLWA financial strategy. With the ultimate performance measure of lowering the cost of capital, a better-executed financial plan optimizes the use of bonds, revenue financial capital, revolving fund loans, and grants. It also contemplates execution risk (actual rate of capital project delivery) versus inherent risk in project cost estimating. Lastly, a sustainable financial plan encompasses flexibility to allow for strategic timing of new debt, pace of cash flow needs, and adequate reserves for system needs.

While the GLWA Board of Directors approves the plan, the authority to spend does not occur until additional project review processes are completed prior to the procurement process. Depending on the scope and dollar amount of the project, final approval to proceed may include customer engagement, Chief

Executive Officer review, and GLWA Board CIP Committee review and/or GLWA Board action.

Recognizing the different scope between the CIP which has a broader strategic view of system needs versus the tactical financial plan which models use of cash reserves and future borrowing, the GLWA is implementing a new “capital spend rate assumption policy” for the FY 2020 – 2024 CIP. This policy, provided below, was adopted by the GLWA Board of Directors on November 28, 2018.

Capital Program Spend Rate Assumption Policy

Purpose: The Spend Rate Assumption (SRA) policy provides an analytical approach to bridge the total dollar amount of projects in the Capital Improvement Plan (CIP) with what can realistically be spent due to limitations beyond GLWA’s control and/or delayed for non-budgetary reasons. Those limitations, whether financial or non-financial, necessitate the SRA for budgetary purposes, despite the prioritization established in the CIP. The outcome is a reasoned balance between a desired level of capital investment with financial strategies to manage debt levels and control adjustments to customer charges.

Policy: Annually, a projected spend rate assumption for the financial plan related to the proposed capital improvement plan will be established based upon pertinent factors and data available at that time. Such pertinent factors and data will include the mix of projects and phases in the proposed CIP, interdependency risk, criticality, and other measures provided by the GLWA team members that develop and manage the CIP projects. That spend rate assumption will be presented to the Audit Committee no later than December 31st each year after the GLWA Board, Capital Improvement Planning Committee, and member partners have had the opportunity to review the draft capital improvement plan.

The remainder of this chapter provides an analysis of information in the CIP database that will inform the spend rate assumption for future financial plans.

2.1. Cost Pool Responsibility

Revenue requirements are the basis for establishing customer charges. Included in that calculation are operations and maintenance expense, debt service, Master Bond Ordinance (MBO) reserve requirements, system lease requirements, revenue financed capital targets, water residential assistance program commitments, and legacy obligations. The cost of capital improvements is allocated to customers among four general cost pools as described following:

1. **Common-to-All (CTA)** represents costs that are allocable to all customers.

2. **Oakland-Macomb Interceptor Drainage District (OMID)** represents costs that are allocable to a portion of the sewer system that receives flows from OMID's system.
3. **Suburban Only** represents costs that are allocable to wholesale customers outside the City of Detroit.
4. **CSO 83/17** represents capital costs that are allocated based upon terms of a 1999 rate settlement agreement sanctioned by a federal court. The outcome was an allocation of 83% of "combined sewer overflow control facilities" (CSO) costs to City of Detroit customers and 17% to other customers.

As shown in Table III-1 and Table III-2 below, the majority of the proposed capital improvements are allocated to the common-to-all cost pool.

Table III-1. Cost Allocation: Water
 Financial figures are in thousands of dollars (\$1,000's).

Cost Allocation	Projected Capital Expenditures					Total FYs 2020-2024	Percent of Five Year Total
	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
Water							
Common-to-all	\$ 139,247	\$ 162,599	\$ 178,598	\$ 164,906	\$ 186,666	\$ 832,016	98%
Suburban Only	4,000	4,000	3,997	4,100	4,200	20,297	2%
Grand Total	\$ 143,247	\$ 166,599	\$182,595	\$ 169,006	\$ 190,866	\$ 852,313	100%

Table III-2. Cost Allocation: Wastewater
 Financial figures are in thousands of dollars (\$1,000's).

Cost Allocation	Projected Capital Expenditures					Total FYs 2020-2024	Percent of Five Year Total
	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
Wastewater							
Common-to-all	\$ 133,876	\$ 102,877	\$ 133,852	\$ 146,559	\$ 116,798	\$ 633,962	86%
OMID	22,000	25,000	10,500	2,500	-	60,000	8%
CSO 83/17	5,604	4,553	5,825	10,325	13,361	39,668	5%
Grand Total	\$ 161,480	\$ 132,430	\$150,177	\$ 159,384	\$ 130,159	\$ 733,630	100%

2.2. CIP Funding Based on Estimated Useful Life

The long-term financial plan differentiates between appropriate uses of long-term debt versus revenue financed capital in the Improvement & Extension (I&E) Fund as defined in the MBO. As a general rule, assets with a life of less than 20 years are funded with I&E Funds. Assets with a life greater than 20 years are funded with a blend of debt and I&E Funds. Building I&E Funds over time allows GLWA to position itself to further reduce reliance on debt. Exceptions to that plan may be to take advantage of lower cost borrowings from the revolving fund loan programs or a revision of the plan to optimize refunding savings. For this reason, the five-

year financial plan is regularly reviewed during the fiscal year. Updates may also occur due to grant awards, collaboration opportunities, and changes in budgetary conditions. The financial plan reflects grants and federal and state loans only after approval is received by the grantor or authorizing party.

As shown in Table III-3 and Table III-4, most of the CIP projects are longer-lived assets, defined as greater than a 20-year estimated useful life. Shorter-lived assets scheduled for acquisition or replacement are identified in the five-year capital outlay plan provided in the GLWA Biennial Budget and Five-Year Plan document.

Table III-3. Asset Life and Eligibility for Funding with Long-Term Debt: Water

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

Asset Life Range	Projected Capital Expenditures						Total FYs 2020-2024	Percent of Five Year Total
	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024			
Water								
<20 Years	\$ 15,144	\$ 18,685	\$ 14,622	\$ 12,666	\$ 13,247	\$ 74,364	9%	
>20 Years	128,103	147,914	167,973	156,340	177,619	777,949	91%	
Grand Total	\$ 143,247	\$ 166,599	\$ 182,595	\$ 169,006	\$ 190,866	\$ 852,313	100%	

Table III-4. Asset Life and Eligibility for Funding with Long-Term Debt: Wastewater

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

Asset Life Range	Projected Capital Expenditures						Total FYs 2020-2024	Percent of Five Year Total
	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024			
Wastewater								
<20 Years	\$ 14,910	\$ 17,709	\$ 16,725	\$ 11,626	\$ 11,772	\$ 72,742	10%	
>20 Years	146,570	114,721	133,452	147,758	118,387	660,888	90%	
Grand Total	\$ 161,480	\$ 132,430	\$ 150,177	\$ 159,384	\$ 130,159	\$ 733,630	100%	

2.3. Project Status Analysis

As shown in Table III-5 and Table III-6 below, 78% of the water system projects and 83% of the wastewater system projects are classified as “Future Planned Start”. As defined in Chapter II, those projects with a Project Status of “Future Planned Start” are projects where that was included in the previous CIP and does not have an assigned BS&A Project Number

Table III-5. Project Status Analysis: Water
 Financial figures are in thousands of dollars (\$1,000’s).

Projected Capital Expenditures							Total FYs 2020-2024	Percent of Total
Phase Status	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024			
Water								
Active	\$ 63,984	\$ 53,846	\$ 28,753	\$ 11,666	\$ 11,427	\$ 169,676	20%	
Future Planned Start	70,575	107,254	153,342	156,840	178,439	666,450	78%	
Under Procurement	8,688	5,499	500	500	1,000	16,187	2%	
Grand Total	\$143,247	\$166,599	\$182,595	\$169,006	\$190,866	\$ 852,313	100%	

Table III-6. Project Status Analysis: Wastewater
 Financial figures are in thousands of dollars (\$1,000’s).

Projected Capital Expenditures							Total FYs 2020-2024	Percent of Total
Phase Status	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024			
Wastewater								
Active	\$ 65,724	\$ 34,879	\$ 12,705	\$ 2,541	\$ 2,070	\$ 117,919	16%	
Future Planned Start	90,864	93,716	137,472	156,843	128,089	606,984	83%	
Pending Close-out	500	-	-	-	-	500	0%	
Under Procurement	4,392	3,835	-	-	-	8,227	1%	
Grand Total	\$161,480	\$132,430	\$150,177	\$159,384	\$130,159	\$ 733,630	100%	

2.4. Project Category Analysis

As noted in Chapter II, project phase categories relate to how a project will be delivered and managed. Categories may be grouped to align with how the work is to be performed and often with one vendor contract. The current project categories are identified below.

- S.....Study
- D.....Design
- CConstruction
- CAConstruction Assistance
- DB.....Design and Build

- DBA.....Design Build Assistance
- CM.....Construction Management
- PMProject Management
- TBDTo Be Determined

As shown in Table III-7 and Table III-8 below, the majority of the dollars are allocated to construction and design build. From a financial standpoint, this increases the validity of the projected CIP spend once a contract is awarded as there are significantly less dollars assigned to pre-construction activities.

Table III-7. Project Category Analysis: Water
 Financial figures are in thousands of dollars (\$1,000's).

Phase Status	Projected Capital Expenditures					Total FYs 2020-2024	Category as a Percent of Total FYs 2020-2024
	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
Water							
C	\$ 95,976	\$ 88,296	\$ 91,685	\$ 96,242	\$ 104,106	\$ 476,305	56%
CA	325	325	50	-	-	700	0%
D	150	200	200	200	200	950	0%
D/CA	7,043	8,926	7,211	4,267	6,566	34,013	4%
DB	28,835	62,631	76,120	62,031	72,894	302,511	35%
GLWA-PM	1,875	1,851	1,556	1,548	2,179	9,009	1%
S	903	450	500	-	-	1,853	0%
S/D/CA	5,440	3,594	2,273	1,718	1,921	14,946	2%
TBD	2,700	326	3,000	3,000	3,000	12,026	1%
Grand Total	\$ 143,247	\$166,599	\$ 182,595	\$ 169,006	\$ 190,866	\$ 852,313	100%

Table III-8. Project Category Analysis: Wastewater
 Financial figures are in thousands of dollars (\$1,000's).

Phase Status	Projected Capital Expenditures					Total FYs 2020-2024	Category as a Percent of Total FYs 2020-2024
	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
Wastewater							
C	\$ 109,673	\$ 78,201	\$ 111,198	\$ 126,911	\$ 98,102	\$ 524,085	71%
CA	264	99				363	0%
CM	155	-	-	-	-	155	0%
D	1,500	1,000	-	-	-	2,500	0%
D/CA	1,644	1,630	420	350	90	4,134	1%
DB	15,087	16,909	19,000	14,500	16,500	81,996	11%
GLWA-PM	2,387	1,809	1,625	1,526	1,672	9,019	1%
S	2,850	2,250	-	-	-	5,100	1%
S/D/CA	5,920	5,532	7,434	12,597	12,795	44,278	6%
TBD	22,000	25,000	10,500	3,500	1,000	62,000	8%
Grand Total	\$ 161,480	\$132,430	\$ 150,177	\$ 159,384	\$ 130,159	\$ 733,630	100%

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	2020 Status
111009	Lake Huron Water Treatment Plant, Two New High-Lift Pumps, Water Production Flow Meter, and Select Yard Piping Improvements	Active
112005	Northeast Water Treatment Plant - Replacement of Covers for Process Water Conduits	Future Planned
112006	Northeast Water Treatment Plant Flocculator Replacements	Active
114016	Springwells Water Treatment Plant 1958 Settled Water Conduits Concrete Pavement Replacement	Future Planned
114017	Springwells Water Treatment Plant Flocculator Drive Replacement	Future Planned
115005	WWP WTP Building Ventilation Improvements	Active
122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station	Future Planned
132025	Northwest Booster Station Yard Piping Improvements	Future Planned
216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station	Active

Table IV-2. Projects Progressed to Active Status

CIP #	Title	2019 Status	2020 Status
111004	LH WTP Electrical Tunnel Rehabilitation	Future Planned	Active
114005	SPW WTP Administration Building Improvements & Underground Fire Protection Loop	Future Planned	Active
114008	SPW WTP 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements	Future Planned	Active
122005	Schoolcraft Road Water Transmission Main Replacement	Future Planned	Active

CIP #	Title	2019 Status	2020 Status
122006	Wick Road Water Transmission Main Construction	Future Planned	Active
122011	Park-Merriman Water Transmission Main Construction	Future Planned	Active
132007	Imlay Pumping Station - Energy Management: Freeze Protection Pump Installation	Future Planned	Active
170600	Water Transmission Main Asset Assessment Program	Future Planned	Active
170900	Suburban Water Meter Pit Rehabilitation and Meter Replacement	Future Planned	Active
171500	Roof Replacement - Various Water Facilities	New	Active
211008	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines	Future Planned	Active
212004	WRRF Chlorination and Dechlorination Process Equipment Improvements	Future Planned	Active
214001	WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations	Future Planned	Active
216004	Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF	Future Planned	Active
216007	DTE Primary Electric 3rd Feed Supply to WRRF	Future Planned	Active
222004	Collection System Infrastructure Improvements	Future Planned	Active
260500	CSO Outfall Rehabilitation	Future Planned	Active

Table IV-3. Projects Progressed to Pending Closeout Status

CIP #	Title	2019 Status	2020 Status
122010	Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from Lindwood to Livernois	Active	Pending Closeout
132004	North Service Center Pumping Station - Hydraulic Surge Control	Active	Pending Closeout

CIP #	Title	2019 Status	2020 Status
380500	Wastewater General Engineering Services on an As-needed Basis	Active	Pending Closeout
380900	General Engineering Services	Active	Pending Closeout
122010	Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from Lindwood to Livernois	Active	Pending Closeout

Table IV-4. Projects Progressing to Closed Status

CIP #	Title	2019 Status	2020 Status
116003	Genesee and Lapeer County Transmission System Improvements	Active	Closed
122014	Romulus 48-inch Water Main Installation	Pending Closeout	Closed
122015	30" Water main Replacement - Water main Replacement Under Jefferson & Rouge River	Pending Closeout	Closed
161001	Water Master Plan Update	Pending Closeout	Closed
170700	Reservoirs Inspection, Repair and Rehabilitation Program	Pending Closeout	Closed
212001	WRRF Returned Activated Sludge (RAS) Pumps, Influent Mixed Liquor System and Motor Control Centers (MCC) Improvements for Secondary Clarifiers	Pending Closeout	Closed
212002	WRRF Study, Design, & Construction Management Services for Modified Detroit River Outfall No. 2	Pending Closeout	Closed
212005	WRRF Rouge River Outfall No. 2 (RRO-2) Segment 1	Pending Closeout	Closed
213001	WRRF Replacement of Belt Filter Presses for Complex I and Upper Level Complex II	Pending Closeout	Closed
213003	WRRF Sewage Sludge Incinerator Air Quality Improvements	Pending Closeout	Closed
213004	WRRF Biosolids Dryer Facility	Pending Closeout	Closed
216001	Underground Electrical Duct Bank Repair and EB-1, EB-2 and EB-10 Primary Power Service Improvements	Pending Closeout	Closed

CIP #	Title	2019 Status	2020 Status
216002	Plant-wide Fire Alarm Systems Upgrade/Integration and Fire Protection Improvements	Pending Closeout	Closed
361001	Consolidated Process Control System Upgrades	Pending Closeout	Closed
361002	Data Center Reliability/Availability Improvements	Pending Closeout	Closed
361003	SCADA Radio Network Upgrade	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-5. Innovation Projects

CIP	Title
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements
132007	Imlay Pumping Station - Energy Management: Freeze Protection Pump Installation
132022	Joy Road Booster Pumping Station, Reservoir Pumping System Improvements
170600	Water Transmission Main Asset Assessment Program
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

CIP	Title
212004	WRRF Chlorination and Dechlorination Process Equipment Improvements
212008	WRRF Rehabilitation of Intermediate Lift Pumps (ILPs)
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
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)

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-6 . Master Plan Right-Sizing Projects

CIP	Title
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements
113002	Southwest Water Treatment Plant, High-Lift Pump Discharge Valve Actuators Replacement
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

CIP	Title
114013	Springwells Water Treatment Plant, Reservoir Fill Line Improvements
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement
122003	WWP to NE Transmission Main
122007	Newburgh Road Water Transmission Main
122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station
132007	Imlay Pumping Station - Energy Management: Freeze Protection Pump Installation
132025	Northwest Booster Station Yard Piping Improvements
216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station

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-7 . Redundancy & Reliability Projects

CIP	Title
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements
111009	Lake Huron Water Treatment Plant, Two New High-Lift Pumps, Water Production Flow Meter, and Select Yard Piping 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
122001	Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road
122003	WWP to NE Transmission Main
122004	96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main
122005	Schoolcraft Road Water Transmission Main Replacement
122006	Wick Road Water Transmission Main Construction

CIP	Title
122007	Newburgh Road Water Transmission Main
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 Water Transmission Main Construction
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
132003	West Service Center Pumping Station, Isolation Gate Valves for Line Pumps
132007	Imlay Pumping Station - Energy Management: Freeze Protection Pump Installation
132016	North Service Center Pumping Station Improvements
132017	North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping & Valve Replacement
132018	Schoolcraft Booster Pumping Station Improvements
132019	Wick Road Booster Pumping Station - Switchgear, Control Valves and Hydropneumatic Tank Replacement
132022	Joy Road Booster Pumping Station, Reservoir Pumping System 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
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

CIP	Title
211009	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System
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 Rehabilitation of Intermediate Lift Pumps (ILPs)
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
232001	Fairview Pumping Station - Replace Four Sanitary Pumps
232002	Freud & Conner Creek Pump Station Improvements
232003	Northeast Pumping Station
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
331002	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)
381000	Energy Management: 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-8 . Northeast Water Treatment Plant Repurposing Related Projects

CIP	Title
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, Springwells and Northeast Raw Water Supply Tunnel Improvements
122003	WWP to NE Transmission Main
132010	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades
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-9. Projects by Physical Jurisdiction

Jurisdiction		CIP Projects			
City of Detroit					
112002	115005	211001	212003	213007	232001
112003	116002	211002	212004	213008	232002
112005	122003	211004	212006	214001	232003
112006	122009	211005	212007	216004	
115001	122010	211006	212008	216006	
115002	122017	211007	213002	216007	
115003	132009	211008	213005	216008	
115004	132025	211009	213006	222002	
Lapeer County					
132007	132021				
Macomb County					
122001					
Oakland County					
122013	132004	132014	132017		
132003	132010	132016	132020		
Saint Clair County					
111001	111004	111006	111008		
111002	111005	111007	111009		
Wayne County - Outside Detroit					
113001	114001	114008	114015	122011	132012
113002	114002	114009	114016	122012	132015
113003	114004	114010	114017	122016	132018
113004	114005	114011	122005	132001	132019
113006	114006	114012	122006	132002	132022
113007	114007	114013	122007	132006	
Multiple Counties					
114003	170300	171400	260200	380400	381000
122002	170400	171500	260500	380500	
122004	170500	222001	260600	380600	
132008	170600	222003	331001	380700	
170100	170800	222004	331002	380800	
170200	170900	260100	351001	380900	

SECTION 3 5-YEAR CIP SUMMARY TABLES

The Great Lakes Water Authority 2020-2024 Capital Improvement Plan overall summary tables can be seen below. Please note that projected expenses and project categories shown in Table IV-7. Centralized Services are also included in Table IV-5. Water CIP Categories and Table IV-6. Wastewater CIP Categories.

Table IV-10. Water CIP Categories

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

Category	Category Number	Lifetime Actual Thru FY 2018 (Unaudited)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total	Project Total
Water											
Treatment Plants & Facilities											
Lake Huron	111	\$ 3,102	\$ 5,071	\$ 23,602	\$ 19,641	\$ 13,532	\$ 4,450	\$ 10,000	\$ 33,057	\$ 71,225	\$112,455
Northeast	112	473	892	1,725	2,003	3	-	-	62,234	3,731	67,330
Southwest	113	447	1,476	3,256	1,145	6	-	-	192,654	4,407	198,984
Springwells	114	98,407	24,979	17,841	26,819	31,512	17,645	26,221	157,347	120,038	400,771
Water Works Park	115	3,649	5,364	20,040	21,241	17,983	-	-	-	59,264	68,277
General Purpose	116	2,178	7,513	5,467	5,467	5,467	3,998	-	-	20,399	30,090
Treatment Plants & Facilities Total		108,256	45,295	71,931	76,316	68,503	26,093	36,221	445,292	279,064	877,907
Field Services											
General Purpose	121	-	-	-	-	-	-	-	-	-	-
Transmission System	122	48,006	5,534	38,824	53,831	62,735	93,464	95,528	89,455	344,382	487,377
Field Services Total		48,006	5,534	38,824	53,831	62,735	93,464	95,528	89,455	344,382	487,377
SCC											
General Purpose	131	-	-	-	-	-	-	-	-	-	-
Pump Station/Reservoir	132	1,570	2,262	6,824	12,609	27,242	23,629	30,799	48,821	101,103	153,756
SCC Total		1,570	2,262	6,824	12,609	27,242	23,629	30,799	48,821	101,103	153,756
Water Quality											
General Purpose	141	-	-	-	-	-	-	-	-	-	-
Water Quality Total		-	-	-	-	-	-	-	-	-	-
Metering											
General Purpose	151	-	-	-	-	-	-	-	-	-	-
Metering Total		-	-	-	-	-	-	-	-	-	-
General Purpose											
General Purpose	161	-	-	-	-	-	-	-	-	-	-
General Purpose Total		-	-	-	-	-	-	-	-	-	-

Category	Category Number	Lifetime Actual Thru FY 2018 (Unaudited)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total	Project Total
Programs											
Programs	170	\$11,650	\$14,691	\$ 25,418	\$ 23,618	\$ 23,740	\$ 24,195	\$ 26,493	\$210,679	\$123,464	\$ 360,484
Programs Total		11,650	14,691	25,418	23,618	23,740	24,195	26,493	210,679	123,464	360,484
Water Total		169,482	67,782	142,997	166,374	182,220	167,381	189,041	794,247	848,013	1,879,524
Water Central Services											
Information Technology	31X	-	-	-	-	-	-	-	-	-	-
Fleet	32X	-	-	-	-	-	-	-	-	-	-
Facilities	33X	-	-	-	225	375	1,625	1,825	1,375	4,050	5,425
Security	34X	-	-	-	-	-	-	-	-	-	-
Energy Management	35X	-	250	250	-	-	-	-	-	250	500
Engineering	36X	-	-	-	-	-	-	-	-	-	-
General Purpose	371	-	-	-	-	-	-	-	-	-	-
Programs	38XX	1	714	-	-	-	-	-	2,500	-	3,215
Water Central Services Total		1	964	250	225	375	1,625	1,825	3,875	4,300	9,140
Grand Total		169,483	68,746	143,247	166,599	182,595	169,006	190,866	798,122	852,313	1,888,664

Table IV-11. Wastewater CIP Categories.

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

Category	Category Number	Lifetime Actual Thru FY 2018 (Unaudited)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total	Project Total
Wastewater											
WRRF											
Primary Treatment	211	\$ 49,937	\$ 24,341	\$ 15,095	\$ 13,153	\$ 13,393	\$ 20,524	\$ 22,042	\$ 11,093	\$ 84,207	\$ 169,578
Secondary Treatment & Disinfection	212	38,409	22,804	8,248	3,161	10,131	14,603	12,378	35,925	48,521	145,659
Residuals Management	213	1,901	11,363	16,518	7,716	5,525	9,598	3,550	6,740	42,907	62,911
IWC	214	573	2,828	7,567	-	-	-	-	-	7,567	10,968
CSO RTB & SDF	215	-	-	-	-	-	-	-	-	-	-
General Purpose	216	1,023	2,717	5,625	9,239	3,849	4,500	3,500	7,423	26,713	37,876
WRRF Total		91,843	64,053	53,053	33,269	32,898	49,225	41,470	61,181	209,915	426,992
Field Services											
General Purpose	221	-	-	-	-	-	-	-	-	-	-

Category	Category Number	Lifetime Actual Thru FY 2018 (Unaudited)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total	Project Total
Interceptors	222	2,647	10,943	28,500	28,014	19,800	16,077	19,077	79,077	111,468	204,135
Field Services Total		2,647	10,943	28,500	28,014	19,800	16,077	19,077	79,077	111,468	204,135
SCC											
General Purpose	231	-	-	-	-	-	-	-	-	-	-
Pumping Stations	232	6,661	8,984	42,029	28,405	60,514	52,514	25,007	257	208,469	224,371
In System Devices	233	-	-	-	-	-	-	-	-	-	-
SCC Total		6,661	8,984	42,029	28,405	60,514	52,514	25,007	257	208,469	224,371
Metering											
General Purpose	241	-	-	-	-	-	-	-	-	-	-
Metering Total		-	-	-	-	-	-	-	-	-	-
General Purpose											
General Purpose	251	-	-	-	-	-	-	-	-	-	-
General Purpose Total		-	-	-	-	-	-	-	-	-	-
Programs											
Programs	260	35,983	22,151	36,806	38,600	32,851	41,527	44,563	126,500	194,347	378,981
Programs Total		35,983	22,151	36,806	38,600	32,851	41,527	44,563	126,500	194,347	378,981
Wastewater Total		137,134	106,131	160,388	128,288	146,063	159,343	130,117	267,015	724,199	1,234,479
Wastewater Central Services											
Information Technology	31X	-	-	-	-	-	-	-	-	-	-
Fleet	32X	-	-	-	-	-	-	-	-	-	-
Facilities	33X	-	278	1,092	4,142	4,114	41	42	-	9,431	9,709
Security	34X	-	-	-	-	-	-	-	-	-	-
Energy Management	35X	-	-	-	-	-	-	-	-	-	-
Engineering	36X	-	-	-	-	-	-	-	-	-	-
General Purpose	37X	-	-	-	-	-	-	-	-	-	-
Programs	38XX	1	-	-	-	-	-	-	2,500	-	2,501
Central Services Total		1	278	1,092	4,142	4,114	41	42	2,500	9,431	12,210
Grand Total		137,135	106,409	161,480	132,430	150,177	159,384	130,159	269,515	733,630	1,246,689

Table IV-12. Centralized Services Categories

Please note that these project categories and projected expenses also appear in Water and Wastewater tables, Table IV-5 and IV-6, respectively. Financial figures are in thousands of dollars (\$1,000's).

Category	Category Number	Lifetime Actual Thru FY 2018 (Unaudited)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total	Project Total
Information Technology	31X										
Water		\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Wastewater		-	-	-	-	-	-	-	-	-	-
Information Technology Total		-	-	-	-	-	-	-	-	-	-
Fleet	32X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Fleet Total		-	-	-	-	-	-	-	-	-	-
Facilities	33X										
Water		-	-	-	225	375	1,625	1,825	1,375	4,050	5,425
Wastewater		-	278	1,092	4,142	4,114	41	42	-	9,431	9,709
Facilities Total		-	278	1,092	4,367	4,489	1,666	1,867	1,375	13,481	15,134
Security	34X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Security Total		-	-	-	-	-	-	-	-	-	-
Energy Management	35X										
Water		-	250	250	-	-	-	-	-	250	500
Wastewater		-	-	-	-	-	-	-	-	-	-
Energy Management Total		-	250	250	-	-	-	-	-	250	500
Engineering	36X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Engineering Total		-	-	-	-	-	-	-	-	-	-
General Purpose	37X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
General Purpose Total		-	-	-	-	-	-	-	-	-	-
Programs	38XX										

Category	Category Number	Lifetime Actual Thru FY 2018 (Unaudited)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total	Project Total
Water		1	714	-	-	-	-	-	2,500	-	3,215
Wastewater		1	-	-	-	-	-	-	2,500	-	2,501
General Purpose Total		2	714	-	-	-	-	-	5,000	-	5,716
Grand Total		2	1,242	1,342	4,367	4,489	1,666	1,867	6,375	13,731	21,350

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

Water Risk Matrix of Future Planned Projects

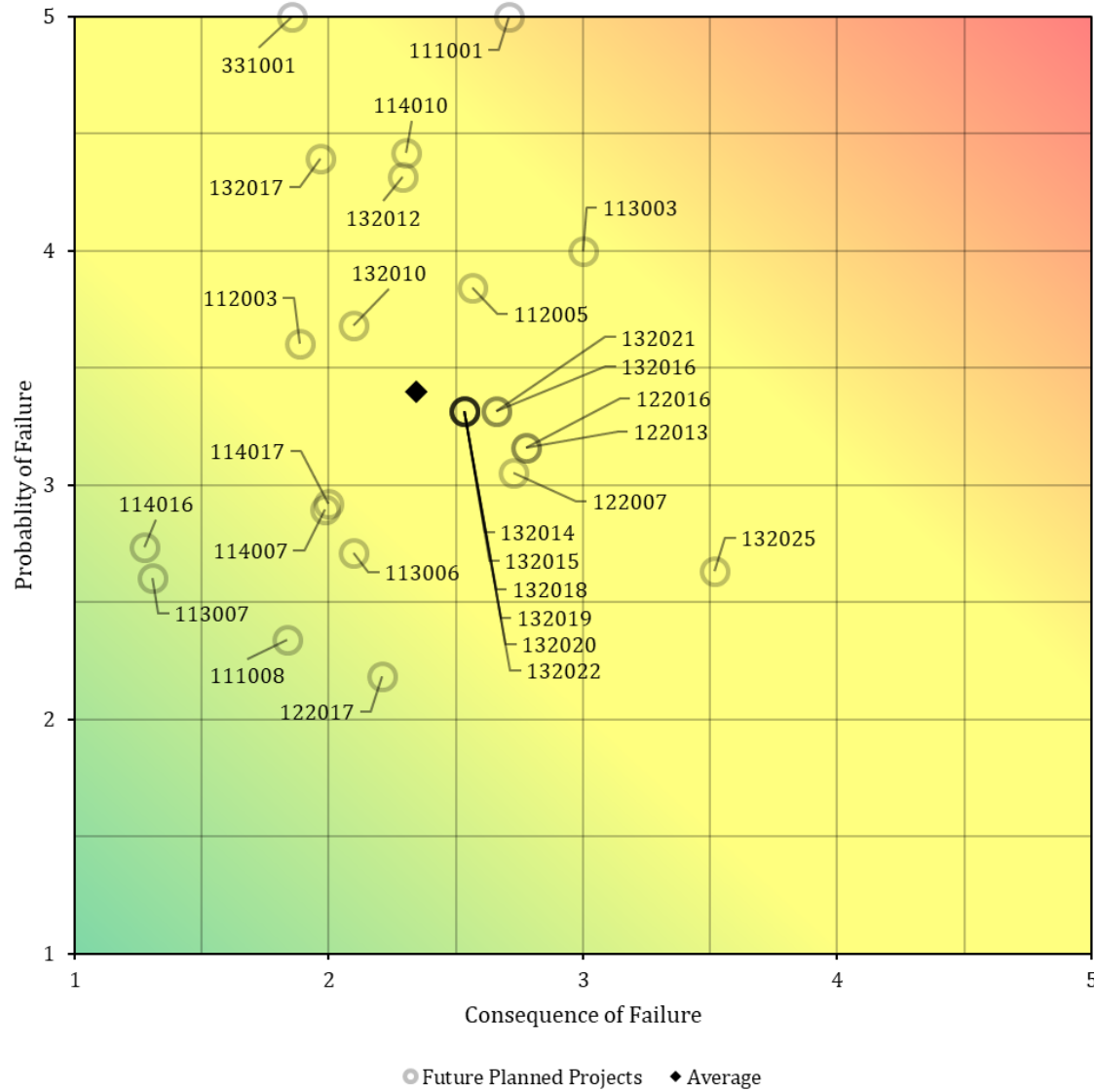


Figure I-1. Water Project Risk Matrix

Wastewater Risk of Future Planned Projects

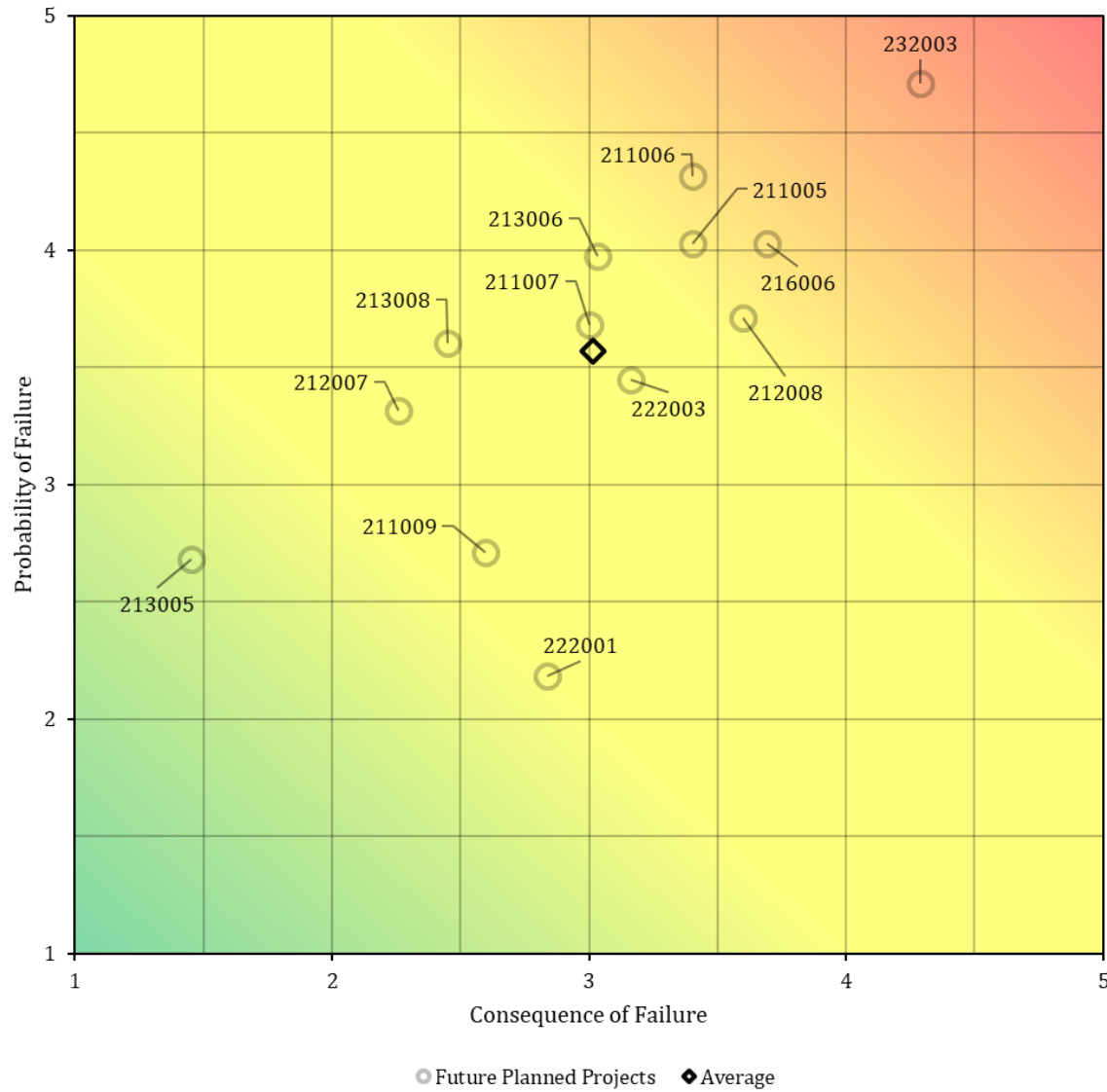


Figure I-2. Wastewater Project Risk Matrix

SECTION 2 PROJECT MANAGER CRITERIA SCORES: WATER

Rank	CIP No.	Title		0	20	40	60	80	100		
1	111001	LH WTP, Low-Lift, High Lift & Filter Backwash Pumping System Imp...	111001								
2	113003	SW WTP, Low- & High-Lift PS, Flocculation and Filtration System...	113003								
3	132025	NW BPS Yard Piping Improvements	132025								
4	114010	SP WTP, Yard Piping and High-Lift Header Improvements	114010								
5	132012	Ypsilanti Booster Pumping Station Improvements	132012								
6	112005	Northeast WTP - Replacement of Covers for Process Water Conduits	112005								
7	331001	Roofing Systems Replacement at Water Plants and BPS	331001								
8	122013	14 Mile Transmission Main Loop	122013								
9	122016	Downriver Transmission Main Loop	122016								
10	132016	North Service Center Pumping Station Improvements	132016								
11	132021	Imlay BPS - Replace Pumps, Motors, VFDs, and HVAC System	132021								
12	132017	NSC BPS - On-Site & Off-Site Yard Piping & Valve Replacement	132017								
13	122007	Newburgh Road Water Transmission Main	122007								
14	132014	Adams Road Booster Pumping Station Improvements	132014								
15	132015	Newburgh Road Booster Pumping Station Improvements	132015								
16	132020	Franklin BPS - Isolation Gate Valves & Electrical Actuator Improve...	132020								
17	132019	Wick Road BPS - Switchgear, Control Valves and Hydropneumatic...	132019								
18	132022	Joy Road BPS, Reservoir Pumping System Improvements	132022								
19	132018	Schoolcraft Booster Pumping Station Improvements	132018								
20	132010	WSC PS - Reservoir, Reservoir Pumping, and Division Valve Upgrades	132010								
21	112003	Northeast WTP High-Lift Pumping Station Electrical Improvements	112003								
22	114017	Springwells WTP Flocculator Drive Replacement	114017								
23	113006	Southwest WTP Chlorine Scrubber, Raw Water Screens & Related...	113006								
24	114007	Springwells WTP, Powdered Activated Carbon System Improvements	114007								
25	122017	7 Mile/Nevada TM Rehab and Carrie/Nevada Flow Control Station	122017								
26	111008	LH WTP, Architectural Programming for Lab & Admin Bldg Improve...	111008								
27	114016	SP WTP 1958 Settled Water Conduits Concrete Pavement Rplcmt.	114016								
28	113007	Southwest WTP Architectural and Building Mechanical Improvements	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	111001	LH WTP, Low-Lift, High Lift & Filter Backwash Pumping System Imp...	5	5	3	3	1	1	4	4	64.6	5	5	1	5	2	5	4	4	8
2	113003	SW WTP, Low- & High-Lift PS, Flocculation and Filtration System...	4	5	3	4	4	2	1	2	66.6	4	4	3	4	4	2	3	2	8.8
3	132025	NW BPS Yard Piping Improvements	4	4	1	2	1	4	4	4	54.6	4	2	2	2	5	5	3	3	4.4
4	114010	SP WTP, Yard Piping and High-Lift Header Improvements	5	2	4	1	2	3	2	2	53.8	5	5	2	3	2	2	3	3	12
5	132012	Ypsilanti Booster Pumping Station Improvements	5	5	3	4	2	2	5	3	72	5	4	1	4	3	2	3	3	12
6	112005	Northeast WTP - Replacement of Covers for Process Water Conduits	5	5	2	2	5	2	3	4	72	5	5	3	1	4	1	2	1	12
7	331001	Roofing Systems Replacement at Water Plants and BPS	5	3	4	5	3	2	4	2	71.4	5	5	3	5	2	1	1	1	3.2
8	122013	14 Mile Transmission Main Loop	1	5	2	4	4	5	1	2	60.6	1	5	2	3	4	5	1	2	3.6
9	122016	Downriver Transmission Main Loop	1	5	2	4	4	3	1	2	57.4	1	5	2	3	4	5	1	2	2
10	132016	North Service Center Pumping Station Improvements	4	3	1	4	2	2	3	4	54.2	4	3	2	3	3	4	1	4	9
11	132021	Imlay BPS - Replace Pumps, Motors, VFDs, and HVAC System	3	4	1	3	1	1	1	3	41.8	4	3	2	3	3	4	1	4	7.2
12	132017	NSC BPS - On-Site & Off-Site Yard Piping & Valve Replacement	5	5	1	5	1	2	2	2	55.8	4	5	1	4	3	3	2	1	12
13	122007	Newburgh Road Water Transmission Main	1	5	1	4	2	3	5	4	58.6	1	4	1	4	3	3	4	4	7.2
14	132014	Adams Road Booster Pumping Station Improvements	4	4	2	4	2	4	3	4	64	4	3	2	3	3	3	1	4	7.2
15	132015	Newburgh Road Booster Pumping Station Improvements	4	4	1	4	2	2	3	4	57.2	4	3	2	3	3	3	1	4	2
16	132020	Franklin BPS - Isolation Gate Valves & Electrical Actuator Improve...	4	4	1	4	2	3	3	3	57	4	3	2	3	3	3	1	4	10.2
17	132019	Wick Road BPS - Switchgear, Control Valves and Hydropneumatic...	4	4	1	4	2	3	2	3	55	4	3	2	3	3	3	1	4	4
18	132022	Joy Road BPS, Reservoir Pumping System Improvements	5	4	1	4	1	2	3	3	54.4	4	3	2	3	3	3	1	4	2
19	132018	Schoolcraft Booster Pumping Station Improvements	4	4	1	5	1	1	2	4	52.4	4	3	2	3	3	3	1	4	9
20	132010	WSC PS - Reservoir, Reservoir Pumping, and Division Valve Upgrades	3	4	1	4	3	2	2	2	52.6	3	4	1	4	1	5	1	5	3.6
21	112003	Northeast WTP High-Lift Pumping Station Electrical Improvements	4	4	1	4	2	2	2	3	53.4	4	3	1	4	1	2	3	4	7.2
22	114017	Springwells WTP Flocculator Drive Replacement	3	3	2	2	1	2	2	3	43.8	4	2	2	3	2	2	2	2	3.4
23	113006	Southwest WTP Chlorine Scrubber, Raw Water Screens & Related...	3	3	1	2	5	1	1	1	46.6	3	3	1	2	5	1	1	1	17
24	114007	Springwells WTP, Powdered Activated Carbon System Improvements	3	2	3	4	2	2	1	1	46.6	3	2	3	4	2	2	1	1	7.2
25	122017	7 Mile/Nevada TM Rehab and Carrie/Nevada Flow Control Station	1	5	1	2	4	4	2	2	53	1	4	1	1	4	4	1	1	13.6
26	111008	LH WTP, Architectural Programming for Lab & Admin Bldg Improve...	4	3	2	1	2	2	1	4	47.2	4	2	2	1	2	2	1	2	9
27	114016	SP WTP 1958 Settled Water Conduits Concrete Pavement Rplcmt.	4	3	1	2	2	1	1	2	40.6	4	3	1	1	2	1	1	1	4.4
28	113007	Southwest WTP Architectural and Building Mechanical Improvements	4	3	1	3	2	1	2	3	46.6	3	2	1	3	1	1	2	2	5.4

SECTION 4 PROJECT MANAGER CRITERIA SCORES: WASTEWATER

Rank	CIP No.	Title		0	20	40	60	80	100	
1	232003	Northeast Pumping Station	232003							
2	216006	Assessment & Rehab of WRRF yard piping and underground utilities	216006							
3	211006	WRRF PS No. 1 Improvements	211006							
4	212008	WRRF Rehabilitation of Intermediate Lift Pumps (ILPs)	212008							
5	211005	WRRF PS No. 2 Improvements Phase II	211005							
6	213006	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	213006							
7	222003	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	222003							
8	211007	WRRF PS #2 Bar Racks Replacements & Grit Collection System Impr...	211007							
9	213008	WRRF Rehabilitation of the Ash Handling Systems	213008							
10	212007	WRRF Rehabilitation of the Secondary Clarifiers	212007							
11	211009	WRRF Rehab of the Circular Primary Clarifier Scum Removal System	211009							
12	222001	Oakwood Dist. Intercom. Relief Sewer Modification at Oakwood Dist.	222001							
13	213005	WRRF Complex I Incinerators Decommissioning and Reusability	213005							

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	232003	Northeast Pumping Station	5	3	4	4	3	5	5	4	79.6	5	5	4	4	4	5	5	4	8.8
2	216006	Assessment & Rehab of WRRF yard piping and underground utilities	5	4	4	4	4	3	4	4	80.8	5	4	4	3	4	4	3	3	12
3	211006	WRRF PS No. 1 Improvements	5	4	4	4	4	3	4	4	80.8	5	4	4	4	4	3	2	3	4.8
4	212008	WRRF Rehabilitation of Intermediate Lift Pumps (ILPs)	4	4	5	3	3	3	4	3	74.6	4	4	5	3	3	3	4	2	10.2
5	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	14.4
6	213006	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	3	4	4	3	3	3	2	4	66.4	3	4	4	5	2	2	3	4	12
7	222003	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	5	4	4	3	3	4	4	2	73.2	5	4	3	1	3	4	5	1	12
8	211007	WRRF PS #2 Bar Racks Replacements & Grit Collection System Impr...	4	4	4	4	3	2	4	4	73.4	3	4	4	4	3	3	3	1	8.8
9	213008	WRRF Rehabilitation of the Ash Handling Systems	4	4	3	4	3	2	3	3	66	4	3	3	4	3	1	3	1	8.8
10	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	9
11	211009	WRRF Rehab of the Circular Primary Clarifier Scum Removal System	3	3	3	2	2	2	3	3	52.8	3	3	3	2	2	2	3	3	9
12	222001	Oakwood Dist. Intercom. Relief Sewer Modification at Oakwood Dist.	1	4	2	1	3	4	3	3	51.8	1	4	2	1	3	4	3	3	10.2
13	213005	WRRF Complex I Incinerators Decommissioning and Reusability	2	3	1	3	1	1	2	3	38.4	2	3	1	3	1	1	2	3	3.6

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.

Table VI-1. Water CIP Projects: Active, Ranked by 2020-2024 CIP Total

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								2020-2024 CIP Total	Project Total	Percent of W/S CIP
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond				
122003	WWP to NE Transmission Main	A	2014	1,655	1,121	871	15,786	24,115	29,615	29,994	30,115	100,381	133,272	11.8%	
122004	96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main	A	2016	1,130	837	5,000	6,000	26,453	35,886	23,453	33,907	96,792	132,666	11.4%	
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	A	2004	498	2,607	5,985	9,302	13,724	13,724	26,145	42,831	68,880	114,816	8.1%	
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	A	2007	682	899	17,333	17,333	17,333	-	-	-	51,999	53,580	6.1%	
122006	Wick Road Water Transmission Main Construction	A	2016	126	1,370	18,028	12,334	60	-	-	-	30,422	31,918	3.6%	
111009	Lake Huron Water Treatment Plant, Two New High-Lift Pumps, Water Production Flow Meter, and Select Yard Piping Improvements	A	2018	-	16	9,030	10,030	7,030	-	-	-	26,090	26,106	3.1%	
170800	System-Wide Finished Water Reservoir Inspection, Design and Rehabilitation	A	2016	-	482	5,128	5,211	5,182	3,888	5,495	33,778	24,904	59,164	2.9%	
114011	Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements	A	2012	473	3,109	5,392	7,754	8,261	-	-	-	21,407	24,989	2.5%	
170600	Water Transmission Main Asset Assessment Program	A	2017	-	2,500	3,000	4,000	4,000	5,000	5,000	25,000	21,000	48,500	2.5%	
116002	Pennsylvania, Springwells and Northeast Raw Water Supply Tunnel Improvements	A	2016	2,178	7,513	5,467	5,467	5,467	3,998	-	-	20,399	30,090	2.4%	
170900	Suburban Water Meter Pit Rehabilitation and Meter Replacement	A	2014	-	3,000	4,000	4,000	3,997	4,100	4,200	20,500	20,297	43,797	2.4%	
170500	Transmission System Valve Rehabilitation and Replacement Program	A	2017	3,430	4,000	4,000	3,274	4,000	4,000	4,000	10,000	19,274	36,704	2.3%	
122005	Schoolcraft Road Water Transmission Main Replacement	A	2016	4	180	8,100	9,145	633	-	-	-	17,878	18,062	2.1%	
114008	Springwells Water Treatment Plant, 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements	A	2014	-	442	4,153	6,830	5,697	3	-	-	16,683	17,125	2.0%	
170100	Water Treatment Plant /Pump Station Allowance	A	2012	6,635	3,176	3,000	3,000	3,000	3,000	3,000	15,000	15,000	39,811	1.8%	

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								Project Total	Percent of W/S CIP
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total		
111006	Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements	A	2014	735	55	3,333	3,333	3,333	-	-	-	9,999	10,789	1.2%
170400	Water Transmission Improvement Program	A	2010	156	1,000	1,500	2,000	2,000	2,000	2,000	100,000	9,500	110,656	1.1%
111007	Lake Huron Water Treatment Plant, Raw Sludge Clarifier and Raw Sludge Pumping System Improvements	A	2016	284	194	4,660	4,661	-	-	-	-	9,321	9,799	1.1%
114005	Springwells Water Treatment Plant, Administration Building Improvements & Underground Fire Protection Loop	A	2014	-	30	413	2,258	3,820	1,604	-	-	8,095	8,125	0.9%
122011	Park-Merriman Water Transmission Main Construction	A	2015	156	1,067	4,737	2,237	6	-	-	-	6,980	8,203	0.8%
170300	Water Treatment Plant Automation Program	A	2017	1,377	61	1,561	1,561	1,561	1,514	105	0	6,302	7,740	0.7%
115005	WWP WTP Building Ventilation Improvements	A	2018	-	7	507	3,907	650	-	-	-	5,064	5,071	0.6%
171500	Roof Replacement - Various Water Facilities	A	2018	50	-	2,657	-	-	-	2,000	2,000	4,657	6,707	0.5%
111004	Lake Huron Water Treatment Plant, Electrical Tunnel Rehabilitation	A	2014	63	384	4,296	6	-	-	-	-	4,302	4,749	0.5%
113002	Southwest Water Treatment Plant, High-Lift Pump Discharge Valve Actuators Replacement	A	2014	249	1,157	2,876	1,144	6	-	-	-	4,026	5,432	0.5%
112006	Northeast Water Treatment Plant Flocculator Replacements	A	2018	-	3	1,356	1,356	3	-	-	-	2,715	2,718	0.3%
132006	Ford Road Pumping Station, Pressure and Control Improvements	A	2014	161	235	2,515	18	-	-	-	-	2,533	2,929	0.3%
132007	Imlay Pumping Station - Energy Management: Freeze Protection Pump Installation	A	2014	9	14	592	1,315	230	-	-	-	2,137	2,160	0.3%
115004	Water Works Park Water Treatment Plant Chlorine System Upgrade	A	2017	2,527	4,196	2,047	1	-	-	-	-	2,048	8,771	0.2%
111002	Lake Huron Water Treatment Plant, Miscellaneous Mechanical HVAC Improvements	A	2014	2,020	4,422	1,882	-	-	-	-	-	1,882	8,324	0.2%
114013	Springwells Water Treatment Plant, Reservoir Fill Line Improvements	A	2016	332	2,849	1,551	-	-	-	-	-	1,551	4,732	0.2%
170200	As Needed Construction Materials, Environmental Media and Special Testing Services, Construction Inspection, and Other Technical Services	A	2014	2	472	572	572	-	-	-	-	1,144	1,618	0.1%
132003	West Service Center Pumping Station, Isolation Gate Valves for Line Pumps	A	2014	138	1,186	490	-	-	-	-	-	490	1,814	0.1%
113004	Southwest Water Treatment Plant, Raw Water Sampling Modifications	A	2014	198	319	380	1	-	-	-	-	381	898	0.0%
351001	Water Facility Lighting Renovations	A	2017	-	250	250	-	-	-	-	-	250	500	0.0%
112002	Northeast Water Treatment Plant, Low-Lift Pumping Plant Caisson Rehabilitation	A	2014	473	889	203	-	-	-	-	-	203	1,565	0.0%
115003	Water Works Park Water Treatment Plant Comprehensive Condition Assessment	A	2014	440	262	153	-	-	-	-	-	153	855	0.0%

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								Project Total	Percent of W/S CIP	
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total			
114003	Water Production Flow Metering Improvements at Northeast, Southwest and Springwells Water Treatment Plants	A	2014	3,445	3,561	80	19	-	-	-	-	-	99	7,105	0.0%
114006	Springwells Water Treatment Plant Replacement of 1958 Rapid Mixing Units	A	2014	177	886	61	-	-	-	-	-	-	61	1,124	0.0%
114001	Springwells Water Treatment Plant, 1958 Filter Rehabilitation and Auxiliary Facilities Improvements	A	2002	89,310	7,978	-	-	-	-	-	-	-	0	97,288	0.0%
114012	SPW WTP Water Treatment Plant 1930 Filter Building-Roof Replacement	A	2016	1,124	2,788	-	-	-	-	-	-	-	0	3,912	0.0%
114015	Springwells Water Treatment Plant Emergency Grating Replacement	A	2017	2,737	729	-	-	-	-	-	-	-	0	3,466	0.0%
132008	Various Pumping Stations - Needs Assessment Study	A	2014	913	764	-	-	-	-	-	-	-	0	1,677	0.0%
380700	As-Needed Geotechnical and Related Engineering Services	A	2006	-	620	-	-	-	-	-	-	-	0	620	0.0%
380600	As-Needed General Engineering Services	A	2004	1	94	-	-	-	-	-	-	-	0	95	0.0%
380400	As-needed CIP Implementation Assistance and Related Services	A	2002	-	-	-	-	-	-	-	-	-	0	0	0.0%
Active Water Projects Total				123,888	67,724	137,159	143,855	140,561	108,332	105,392	313,131	635,299	1,140,042	75%	

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

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								Project Total	Percent of W/S CIP	
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total			
122001	Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road	PC	2005	33,566	-	-	-	-	-	-	-	-	0	33,566	0.0%
122012	36-inch Water Main in Telegraph Road	PC	2012	9,418	155	-	-	-	-	-	-	-	0	9,573	0.0%
122002	Replacement of Five (5) PRV Pits of Treated Water Transmission System	PC	2010	1,844	804	-	-	-	-	-	-	-	0	2,648	0.0%
114009	SPW WTP Service Area Redundancy Study	PC	2014	311	-	-	-	-	-	-	-	-	0	311	0.0%
132004	North Service Center Pumping Station - Hydraulic Surge Control	PC	2014	215	-	-	-	-	-	-	-	-	0	215	0.0%
132001	Wick Road Booster Pumping Station Rehabilitation	PC	2004	130	35	-	-	-	-	-	-	-	0	165	0.0%
122009	Water System Improvements in Joy Road from Southfield Road to Trinity	PC	2014	107	-	-	-	-	-	-	-	-	0	107	0.0%
116003	Genesee and Lapeer County Transmission System Improvements	PC	2016	-	-	-	-	-	-	-	-	-	0	0	0.0%
122010	Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from Lindwood to Livernois	PC	2014	-	-	-	-	-	-	-	-	-	0	0	0.0%
380500	Wastewater General Engineering Services on an As-needed Basis	PC	2004	-	-	-	-	-	-	-	-	-	0	0	0.0%
380800	Geotechnical and Related Services on an As-Needed Basis	PC	2007	-	-	-	-	-	-	-	-	-	0	0	0.0%
Pending Closeout Water Projects Total				45,591	994	0	0	0	0	0	0	0	0	46,585	0.0%

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

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								2020-2024 CIP Total	Project Total	Percent of W/S CIP	Prioritization Score (RC)
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond					
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements	FP	2010	-	-	401	1,611	3,169	4,450	10,000	32,757	19,631	52,388	2.3%	71.6	
113003	Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocculation and Filtration System Improvements	FP	2014	-	-	-	-	-	-	-	148,286	0	148,286	0.0%	67.6	
132025	Northwest Booster Station Yard Piping Improvements	FP	2020	-	-	-	50	1,700	3,750	-	-	5,500	5,500	0.6%	63.6	
114010	Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements	FP	2012	-	-	-	-	-	-	72	110,578	72	110,650	0.0%	62.2	
132012	Ypsilanti Booster Pumping Station Improvements	FP	2017	4	28	585	865	2,855	4,205	1,319	-	9,829	9,861	1.2%	61.2	
112005	Northeast Water Treatment Plant - Replacement of Covers for Process Water Conduits	FP	2018	-	-	166	647	-	-	-	-	813	813	0.1%	61.0	
331001	Roofing Systems Replacement at Water Plants and Booster Pump Stations	FP	2014	-	-	-	225	375	1,625	1,825	1,375	4,050	5,425	0.5%	61.0	
122016	Downriver Transmission Main Loop	FP	2017	-	-	297	964	3,051	10,763	22,122	-	37,197	37,197	4.4%	58.4	
122013	14 Mile Transmission Main Loop	FP	2017	-	-	751	1,315	1,507	13,420	12,000	25,433	28,993	54,426	3.4%	58.4	
132016	North Service Center Pumping Station Improvements	FP	2017	-	-	-	-	-	6	6,325	18,589	6,331	24,920	0.7%	58.2	
132021	Imlay Booster Pumping Station - Replace Pumps, Motors, VFDs, and HVAC System	FP	2018	-	-	-	-	-	6	2,103	10,000	2,109	12,109	0.2%	58.2	
132017	North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping & Valve Replacement	FP	2018	-	-	6	2,300	2,506	264	-	-	5,076	5,076	0.6%	57.8	
122007	Newburgh Road Water Transmission Main	FP	2016	-	-	-	-	-	30	5,209	-	5,239	5,239	0.6%	57.0	
132015	Newburgh Road Booster Pumping Station Improvements	FP	0	-	-	16	621	2,396	2,396	2,429	4,311	7,858	12,169	0.9%	56.6	
132018	Schoolcraft Booster Pumping Station Improvements	FP	2018	-	-	-	10	1,958	2,048	3,048	3,500	7,064	10,564	0.8%	56.6	
132014	Adams Road Booster Pumping Station Improvements	FP	2017	-	-	-	-	21	1,029	2,312	2,312	3,362	5,674	0.4%	56.6	
132019	Wick Road Booster Pumping Station - Switchgear, Control Valves and Hydropneumatic Tank Replacement	FP	2018	-	-	-	-	6	1,009	4,554	-	5,569	5,569	0.7%	56.6	
132020	Franklin Booster Pumping Station - Isolation Gate Valves & Electrical Actuator Improvements	FP	2018	-	-	-	-	-	-	-	10,109	0	10,109	0.0%	56.6	
132022	Joy Road Booster Pumping Station, Reservoir Pumping System Improvements	FP	2018	-	-	-	-	-	6	6,103	-	6,109	6,109	0.7%	56.6	
132010	West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades	FP	2017	-	-	2,620	7,430	15,570	8,910	2,606	-	37,136	37,136	4.4%	54.0	
112003	Northeast Water Treatment Plant High-Lift Pumping Station Electrical Improvements	FP	2017	-	-	-	-	-	-	-	62,234	0	62,234	0.0%	50.8	
114017	Springwells Water Treatment Plant Flocculator Drive Replacement	FP	2018	-	-	-	-	10	2,314	4	-	2,328	2,328	0.3%	47.0	
113006	Southwest Water Treatment Plant Chlorine Scrubber, Raw Water Screens & Related Improvements	FP	2017	-	-	-	-	-	-	-	7,032	0	7,032	0.0%	46.6	

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures							FY 2025 & Beyond	2020-2024 CIP Total	Project Total	Percent of W/S CIP	Prioritization Score (RC)
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024						
114007	Springwells Water Treatment Plant, Powdered Activated Carbon System Improvements	FP	2014	-	-	-	-	-	-	-	-	3,938	0	3,938	0.0%	46.6
122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station	FP	2020	-	-	1,040	6,050	6,910	3,750	2,750	-	20,500	20,500	2.4%	44.0	
111008	Lake Huron Water Treatment Plant, Architectural Programming for Laboratory and Admin Building Improvements	FP	2017	-	-	-	-	-	-	-	300	0	300	0.0%	40.6	
114016	Springwells Water Treatment Plant 1958 Settled Water Conduits Concrete Pavement Replacement	FP	2018	-	-	206	656	-	-	-	-	862	862	0.1%	36.6	
113007	Southwest Water Treatment Plant Architectural and Building Mechanical Improvements	FP	2017	-	-	-	-	-	-	-	37,336	0	37,336	0.0%	36.0	
171400	Energy Management Program at All Water Facilities	FP	-	-	-	-	-	-	693	693	4,401	1,386	5,787	0.2%	N/A	
381000	Energy Management: Electric Metering Improvement Program	FP	2016	-	-	-	-	-	-	-	2,500	0	2,500	0.0%	N/A	
	Future Planned Water Projects Total			4	28	6,088	22,744	42,034	60,674	85,474	484,991	217,014	702,037	25.5%		

Table VI-4. Water CIP Projects: Totals

Totals	Lifetime Actual Thru FY 2018 (unaudited)	FY 2019	FY 2020	Projected Expenditures					FY 2025 & Beyond	2020-2024 CIP Total	Project Total	Percent of W/S CIP
				FY 2021	FY 2022	FY 2023	FY 2024					
Active Water Projects Total	123,888	67,724	137,159	143,855	140,561	108,332	105,392	313,131	635,299	1,140,042	74.5%	
Pending Closeout Water Projects Total	45,591	994	0	0	0	0	0	0	0	46,585	0.0%	
Future Planned Water Projects Total	4	28	6,088	22,744	42,034	60,674	85,474	484,991	217,014	702,037	25.5%	
Water Projects Total	169,483	68,746	143,247	166,599	182,595	169,006	190,866	798,122	852,313	1,888,664	100.0%	

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-5 on the following page.

Table VI-5. 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 2020-2024 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

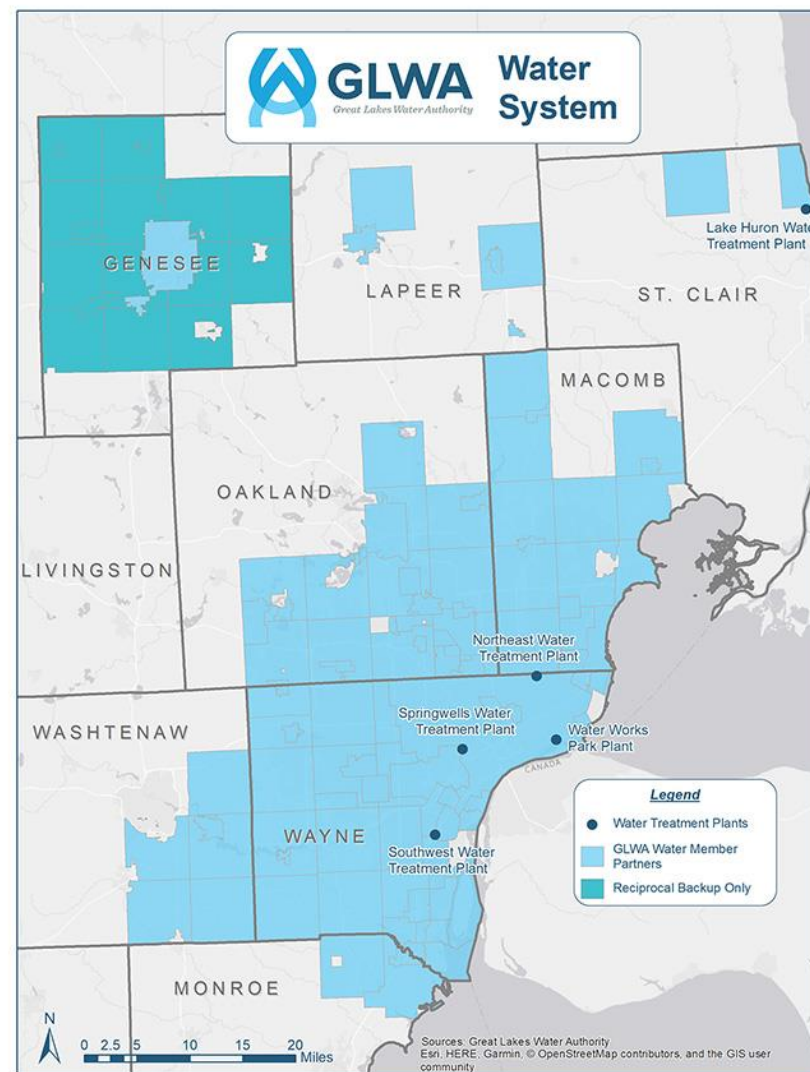
The Authority currently provides wholesale water services in a service area encompassing 981 square miles and serves all or a portion of eight Michigan counties in southeast Michigan, including Oakland, Macomb, Wayne, Lapeer, Genesee, Washtenaw, St. Clair and Monroe Counties. Figure VI-1 displays GLWA's 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-6 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-6. 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	<i>*IPD = Intermediate Pressure District, HPD = High Pressure District</i>

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

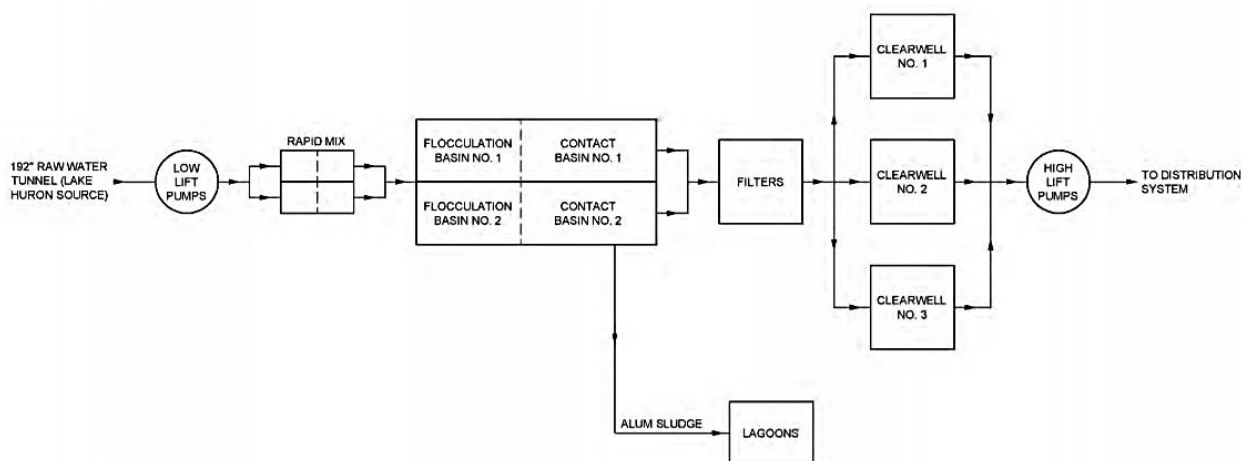
communities it serves to the north of Detroit. In 2004, after completion of a pilot study along with various upgrades to the process trains, the MDEQ rated the maximum capacity of Lake Huron at 400 MGD. Lake Huron is the only GLWA facility that is operated in “modified” direct filtration mode. The sedimentation

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

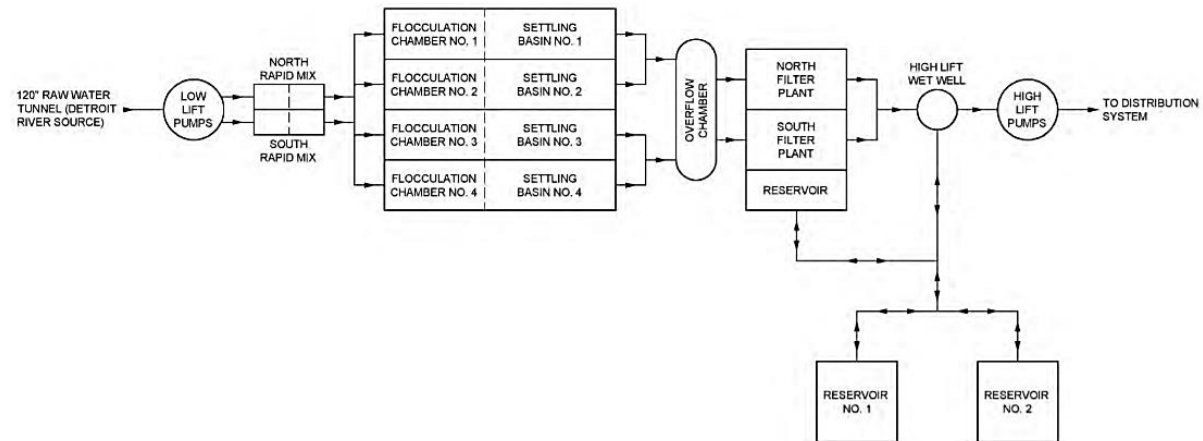


Figure VI-5. Northeast WTP process diagram

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

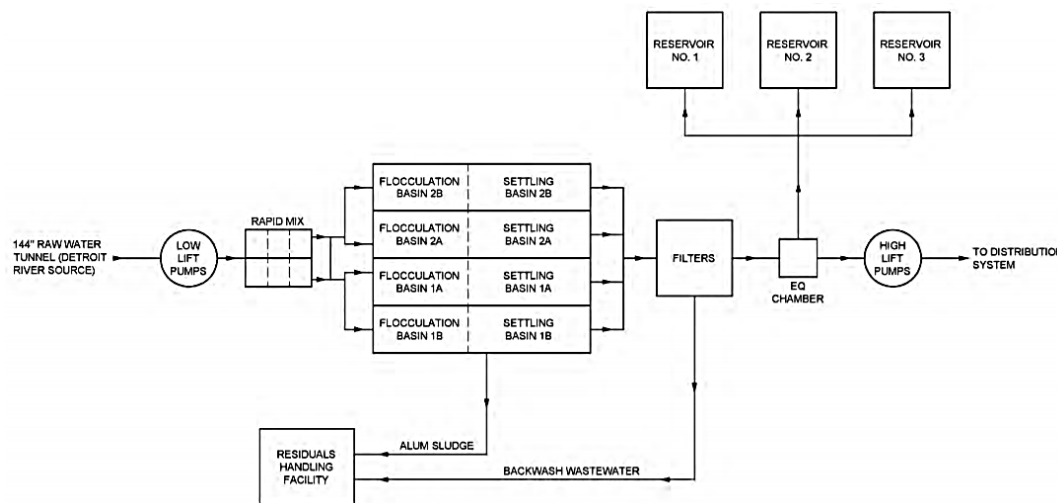


Figure VI-7. Southwest WTP process diagram

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 2019. 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

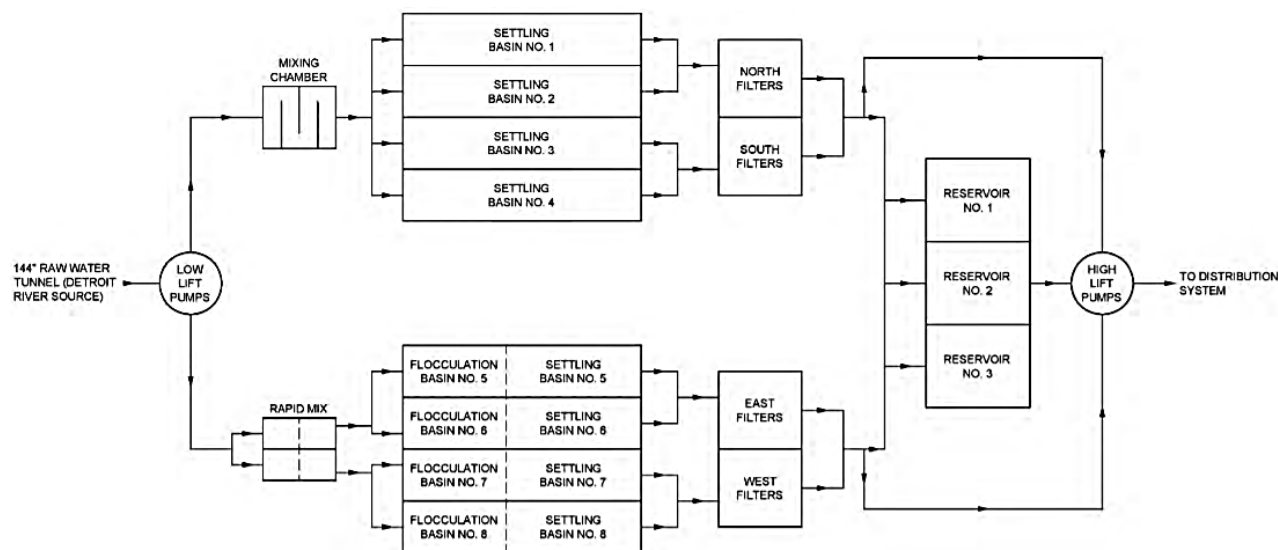


Figure VI-9. Springwells WTP process diagram

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.

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-10. Water Works Park WTP

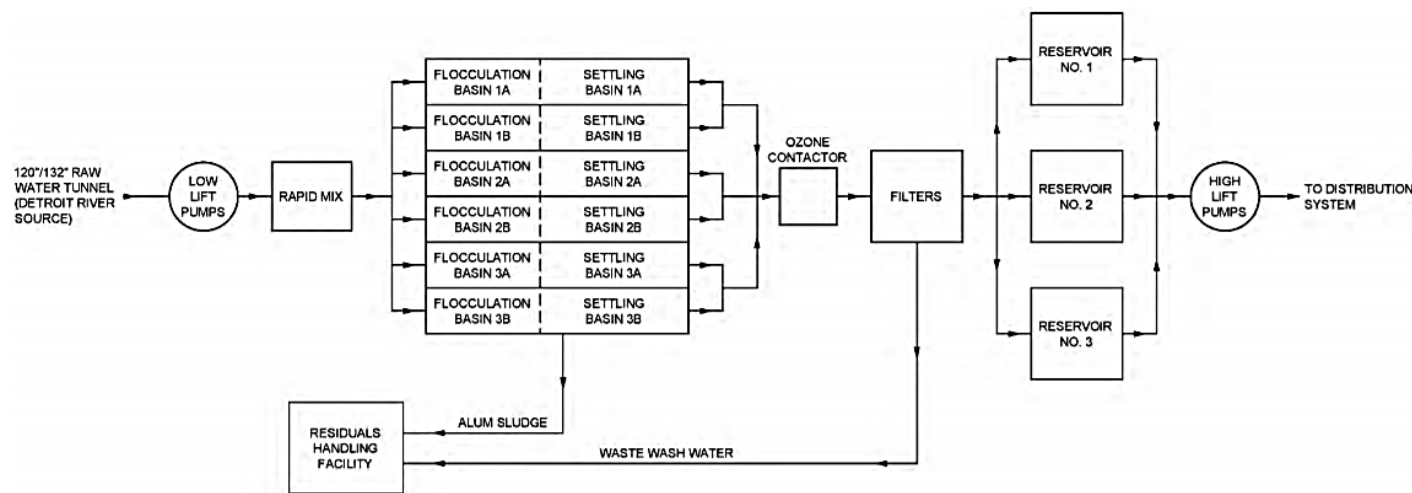


Figure VI-11. Water Works Park process diagram

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%).

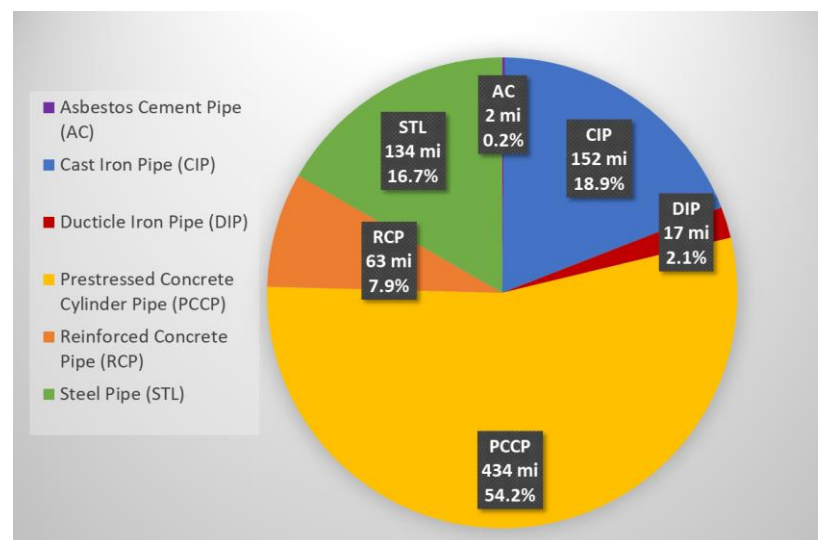


Figure VI-12. Transmission system inventory by material

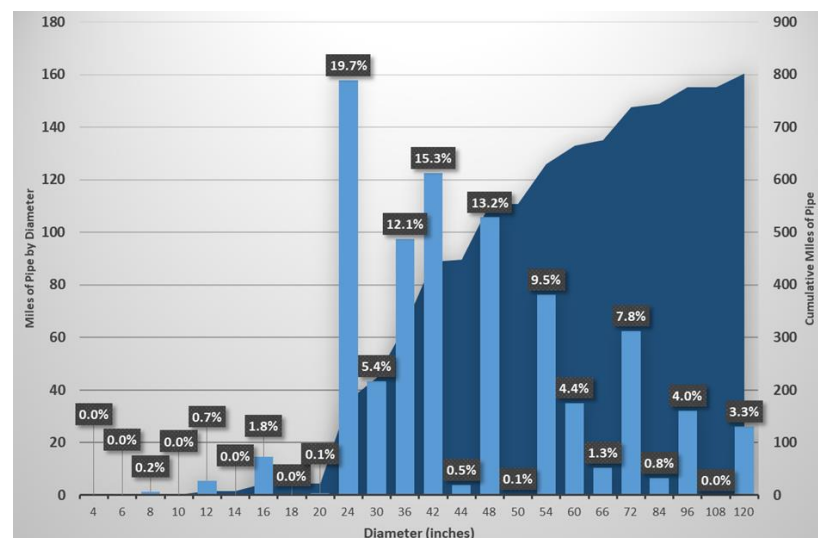


Figure VI-13. Transmission system inventory by diameter

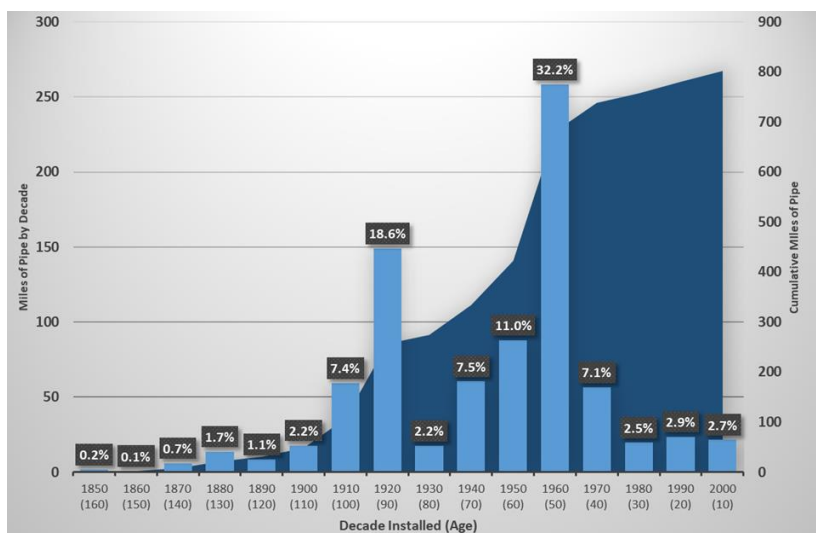


Figure VI-14. Transmission system inventory by decade installed / age

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.

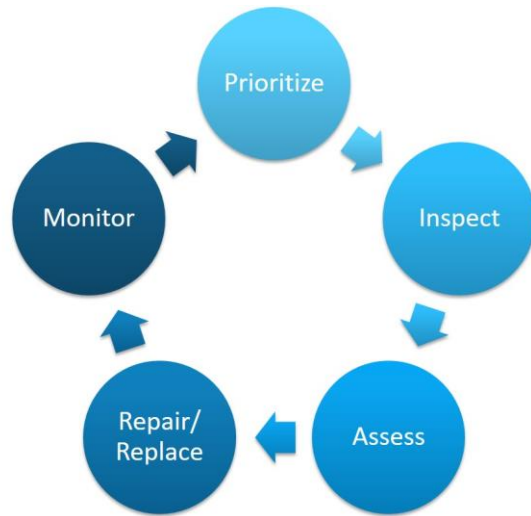


Figure VI-15. Proposed transmission system program cycle

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.

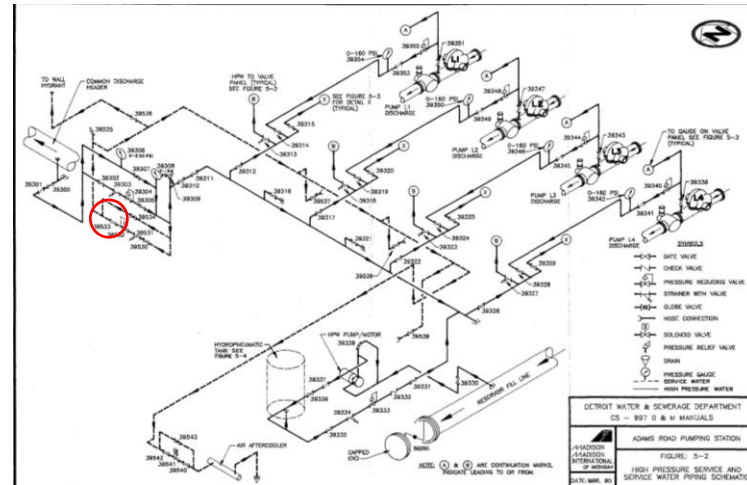


Figure VI-16. Adams Road Pumping Station: PRVs can be seen throughout drawing. The one circled for example reduces pressure before feeding to service water line.

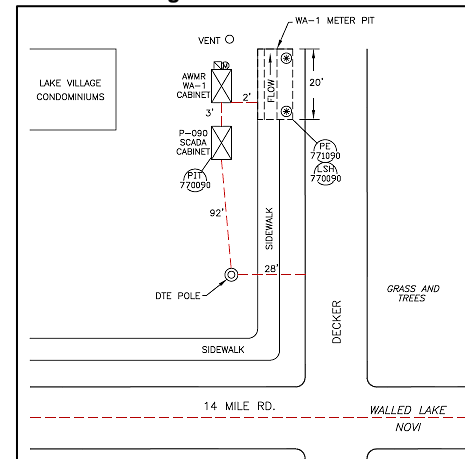
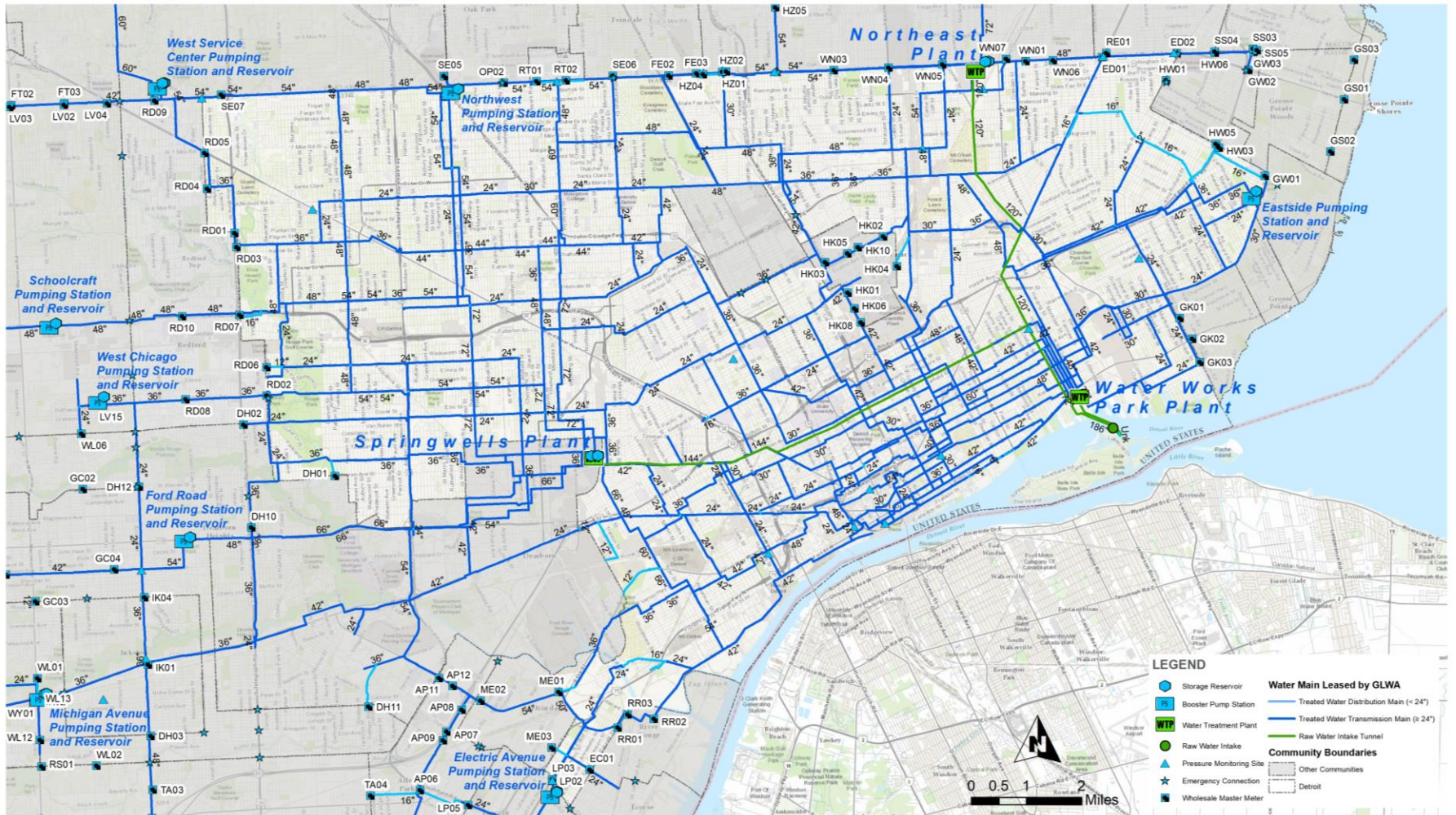


Figure VI-17. Pressure Monitoring Site at 14 Mile and Decker.



**GLWA LEASED WATER ASSETS - INSIDE CITY OF DETROIT
REGIONAL WATER TRANSMISSION SYSTEM**

Notes: Assets depicted on this map are based on the best available data at this time. They may not be completely accurate including spatial representations, leased statuses or attribute values. The user accepts responsibility for accuracy of any referenced information, spatial or otherwise.

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

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, 18.2 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. The station has two reservoirs in which it stores water to supplement the normal water supply during peak demand periods. During low demand periods, the station is used only to circulate the reservoir water once or twice per week. 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	2 X 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 area 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	3

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 through 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 through the 30-inch water main running along 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.

Table VI-7. Wastewater/Sewer Projects: Active, Ranked by 2020-2024 CIP Total

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								2020-2024 CIP Total	Project Total	Percent of W/S CIP
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond				
232002	Freud & Conner Creek Pump Station Improvements	A	2016	5,110	1,984	17,029	13,014	50,014	50,014	25,007	257	155,078	162,429	21.1%	
260200	Sewer and Interceptor Rehabilitation Program	A	2013	13,555	8,609	15,000	15,000	15,000	15,000	15,000	95,000	75,000	192,164	10.2%	
260500	CSO Outfall Rehabilitation	A	2017	9	4,000	15,102	17,947	10,926	15,102	15,102	11,000	74,179	89,188	10.1%	
260600	CSO FACILITIES IMPROVEMENT PROGRAM	A	2017	481	8,442	5,604	4,553	5,825	10,325	13,361	15,000	39,668	63,591	5.4%	
222002	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	A	2016	2,647	9,424	10,000	10,000	10,000	1,000	1,000	5,000	32,000	49,071	4.4%	
222004	Collection System Infrastructure Improvements	A	2017	-	1,019	3,500	3,514	6,000	5,000	8,000	60,000	26,014	87,033	3.5%	
216008	Rehabilitation of Screened Final Effluent (SFE) Pump Station	A	2018	-	51	1,091	991	9,475	7,805	5,535	-	24,897	24,948	3.4%	
232001	Fairview Pumping Station - Replace Four Sanitary Pumps	A	2011	1,551	6,000	18,000	4,891	-	-	-	-	22,891	30,442	3.1%	
213007	WRRF Modification to Incinerator Sludge Feed Systems at Complex -II	A	2016	871	7,159	8,711	3,308	-	-	-	-	12,019	20,049	1.6%	
211001	WRRF Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery	A	1999	25,098	18,724	7,982	3,054	-	-	-	-	11,036	54,858	1.5%	
213002	WRRF Rehabilitation of Central Offload Facility	A	2010	982	4,204	7,696	3,297	-	-	-	-	10,993	16,179	1.5%	
211008	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines	A	2017	12	1,021	2,950	4,983	1,600	-	-	-	9,533	10,566	1.3%	
331002	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)	A	2017	-	278	1,092	4,142	4,114	41	42	-	9,431	9,709	1.3%	
214001	WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations	A	2014	573	2,828	7,567	-	-	-	-	-	7,567	10,968	1.0%	

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								2020-2024 CIP Total	Project Total	Percent of W/S CIP
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond				
260100	WRRF, Lift Station and Wastewater Collection System Structures Allowance	A	2012	21,938	1,100	1,100	1,100	1,100	1,100	1,100	5,500	5,500	34,038	0.7%	
216007	DTE Primary Electric 3rd Feed Supply to WRRF	A	2017	584	2,108	1,381	3,374	-	-	-	-	4,755	7,447	0.6%	
212006	WRRF Rouge River Outfall (RRO) Disinfection (Alternative)	A	2014	26,441	17,009	4,583	-	-	-	-	-	4,583	48,033	0.6%	
216004	Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF	A	2010	439	609	3,921	607	-	-	-	-	4,528	5,576	0.6%	
212004	WRRF Chlorination and Dechlorination Process Equipment Improvements	A	2010	117	913	2,345	1,670	-	-	-	-	4,015	5,045	0.5%	
211002	WRRF PS No. 2 Pumping Improvements - Phase 1	A	2003	322	2,268	1,222	-	-	-	-	-	1,222	3,812	0.2%	
211004	WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements	A	2008	24,505	1,824	869	-	-	-	-	-	869	27,198	0.1%	
212003	WRRF Aeration System Improvements	A	2008	11,851	4,831	-	-	-	-	-	-	0	16,682	0.0%	
380600	As-Needed General Engineering Services	A	2004	1	-	-	-	-	-	-	-	0	1	0.0%	
380400	As-needed CIP Implementation Assistance and Related Services	A	2002	-	-	-	-	-	-	-	-	0	0	0.0%	
Active Wastewater Projects Total				137,087	104,405	136,745	95,445	114,054	105,387	84,147	191,757	535,778	969,027	73.0%	

Table VI-8. Wastewater/Sewer CIP Projects: Pending Closeout, Ranked by Total Cost

CIP #	Title	Project Status	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	Projected Expenditures								2020-2024 CIP Total	Project Total	Percent of W/S CIP
					FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond				
380900	General Engineering Services	PC	2007	-	-	-	-	-	-	-	-	-	0	0	0.0%
380500	Wastewater General Engineering Services on an As-needed Basis	PC	2004	-	-	-	-	-	-	-	-	-	0	0	0.0%
380800	Geotechnical and Related Services on an As-Needed Basis	PC	2007	-	-	-	-	-	-	-	-	-	0	0	0.0%
Pending Closeout Wastewater Projects Total				0	0	0	0	0	0	0	0	0	0	0	0.0%

Table VI-9. Wastewater/Sewer Projects: Future Planned, Ranked by Prioritization Score

CIP #	Title	Project	Year Added	Lifetime Actual Thru FY 2018 (unaudited)	FY 2019	Projected Expenditures								Project Total	Percent of W/S CIP	Prioritization (RC) Score
						FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total				
232003	Northeast Pumping Station	FP	2016	-	1,000	7,000	10,500	10,500	2,500	-	-	30,500	31,500	4.2%	89.0	
216006	Assessment and Rehabilitation of WRRF yard piping and underground utilities	FP	2017	-	-	323	5,258	3,849	4,500	3,500	7,423	17,430	24,853	2.4%	76.4	
211006	WRRF PS No. 1 Improvements	FP	2016	-	498	1,803	2,325	8,424	8,370	811	84	21,733	22,315	3.0%	75.0	
211005	WRRF PS No. 2 Improvements Phase II	FP	2014	-	-	-	684	711	611	8,668	10,925	10,674	21,599	1.5%	72.8	
212008	WRRF Rehabilitation of Intermediate Lift Pumps (ILPs)	FP	2017	-	-	229	500	656	6,727	5,910	6,811	14,022	20,833	1.9%	72.8	
213006	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	FP	2016	5	-	-	-	-	24	1,366	2,331	1,390	3,726	0.2%	67.8	
222003	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	FP	2016	-	500	15,000	14,500	-	-	-	-	29,500	30,000	4.0%	65.4	
211007	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements	FP	2016	-	6	269	1,329	2,039	6,306	7,838	49	17,781	17,836	2.4%	65.2	
213008	WRRF Rehabilitation of the Ash Handling Systems	FP	2017	-	-	111	1,111	5,525	9,574	2,184	-	18,505	18,505	2.5%	57.8	
212007	WRRF Rehabilitation of the Secondary Clarifiers	FP	2017	-	-	-	-	-	71	933	29,114	1,004	30,118	0.1%	53.2	
211009	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System	FP	2017	-	-	-	778	619	5,237	4,725	35	11,359	11,394	1.5%	52.8	
222001	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	FP	2014	-	-	-	-	3,800	10,077	10,077	14,077	23,954	38,031	3.3%	51.8	
213005	WRRF Complex I Incinerators Decommissioning and Reusability	FP	2014	43	-	-	-	-	-	-	4,409	0	4,452	0.0%	38.4	
381000	Energy Management: Electric Metering Improvement Program	FP	2016	0	0	0	0	0	0	0	2,500	0	2,500	0.0%	N/A	
Future Planned Wastewater Projects Total				48	2,004	24,735	36,985	36,123	53,997	46,012	77,758	197,852	277,662	27.0%		

Table VI-10. Wastewater/Sewer CIP Projects: Subtotals

Subtotals	Lifetime Actual Thru FY 2018 (unaudited)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond	2020-2024 CIP Total	Project Total	Percent of W/S CIP
Active Wastewater Projects Total	137,087	104,405	136,745	95,445	114,054	105,387	84,147	191,757	535,778	969,027	73.0%
Pending Closeout Wastewater Projects Total	0	0	0	0	0	0	0	0	0	0	0.0%
Future Planned Wastewater Projects Total	48	2,004	24,735	36,985	36,123	53,997	46,012	77,758	197,852	277,662	27.0%
Total Wastewater Projects	137,135	106,409	161,480	132,430	150,177	159,384	130,159	269,515	733,630	1,246,689	100.0%

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

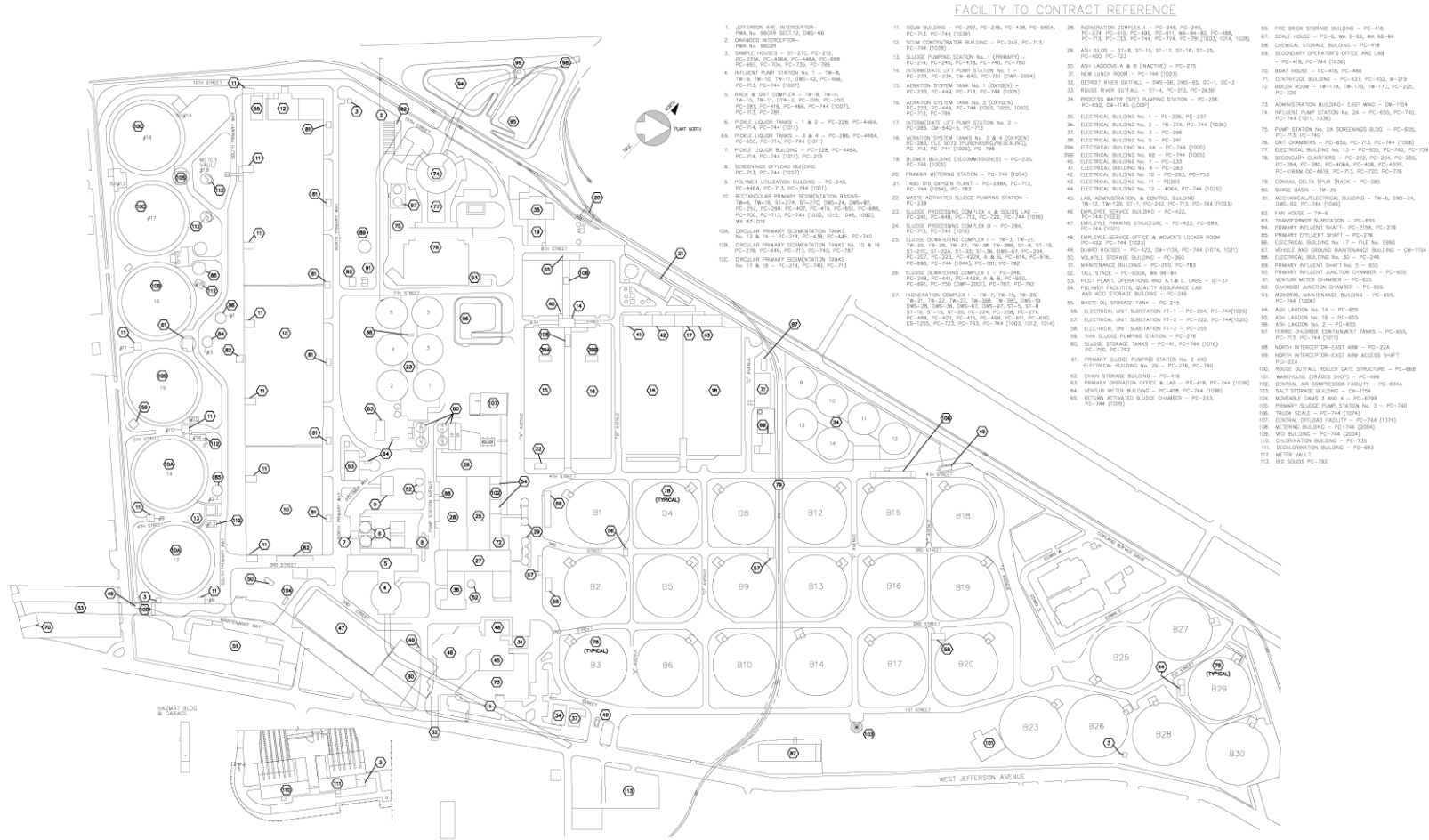


Figure VI-39. Water Resource Recovery Facility Layout

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 partners 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-11 on the following pages.

Table VI-11. 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

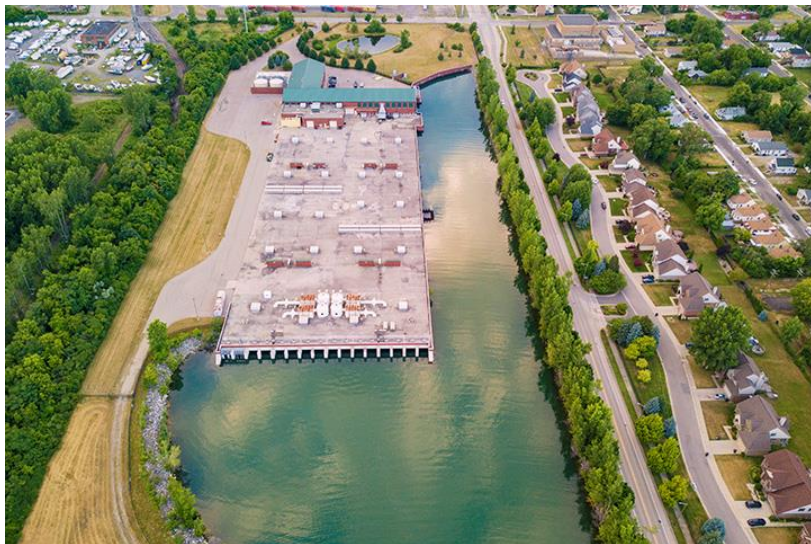


Figure VI-40. Conner Creek CSO RTB

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-12 below.

Table VI-12. 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.

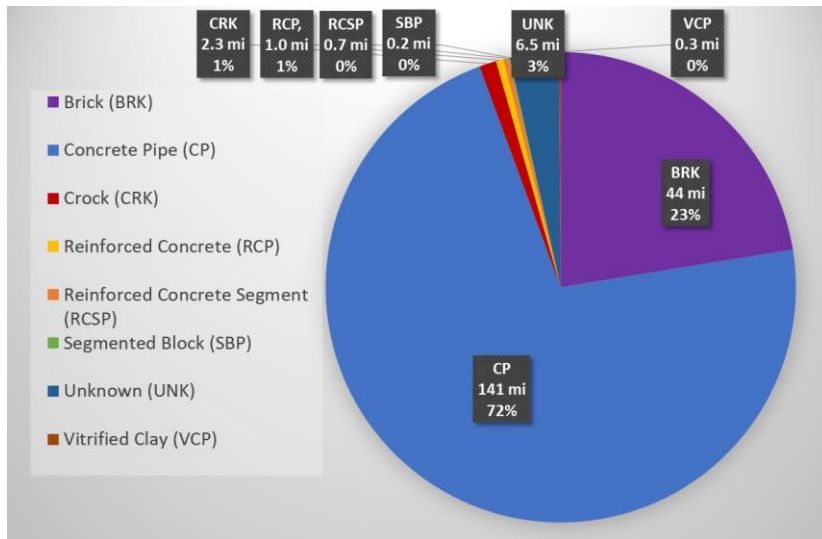
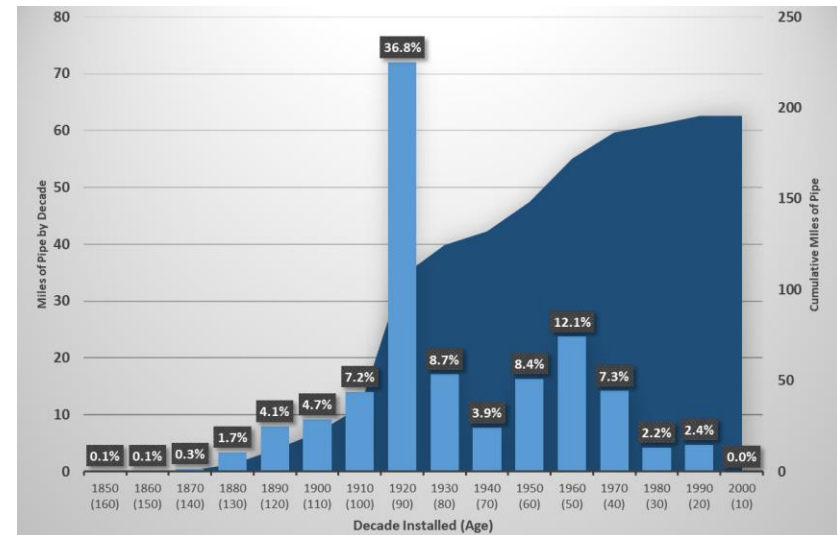
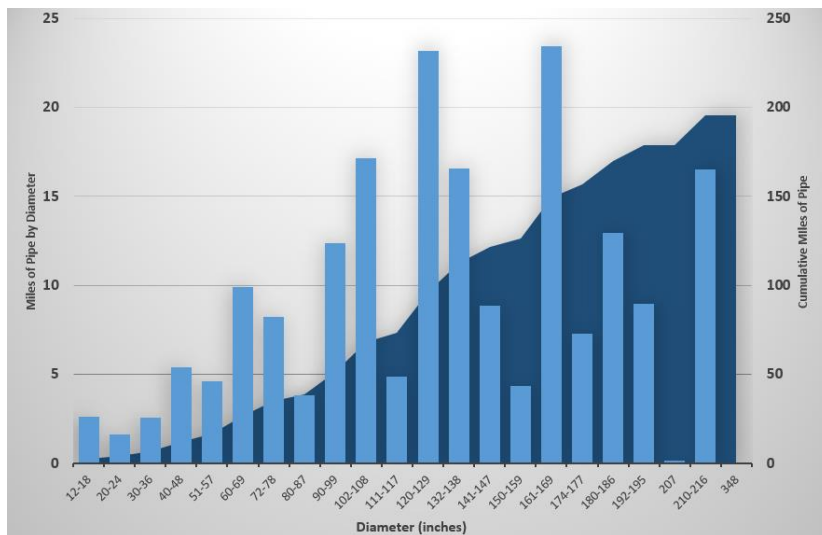

Figure VI-48. Collection system inventory by material

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

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

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.

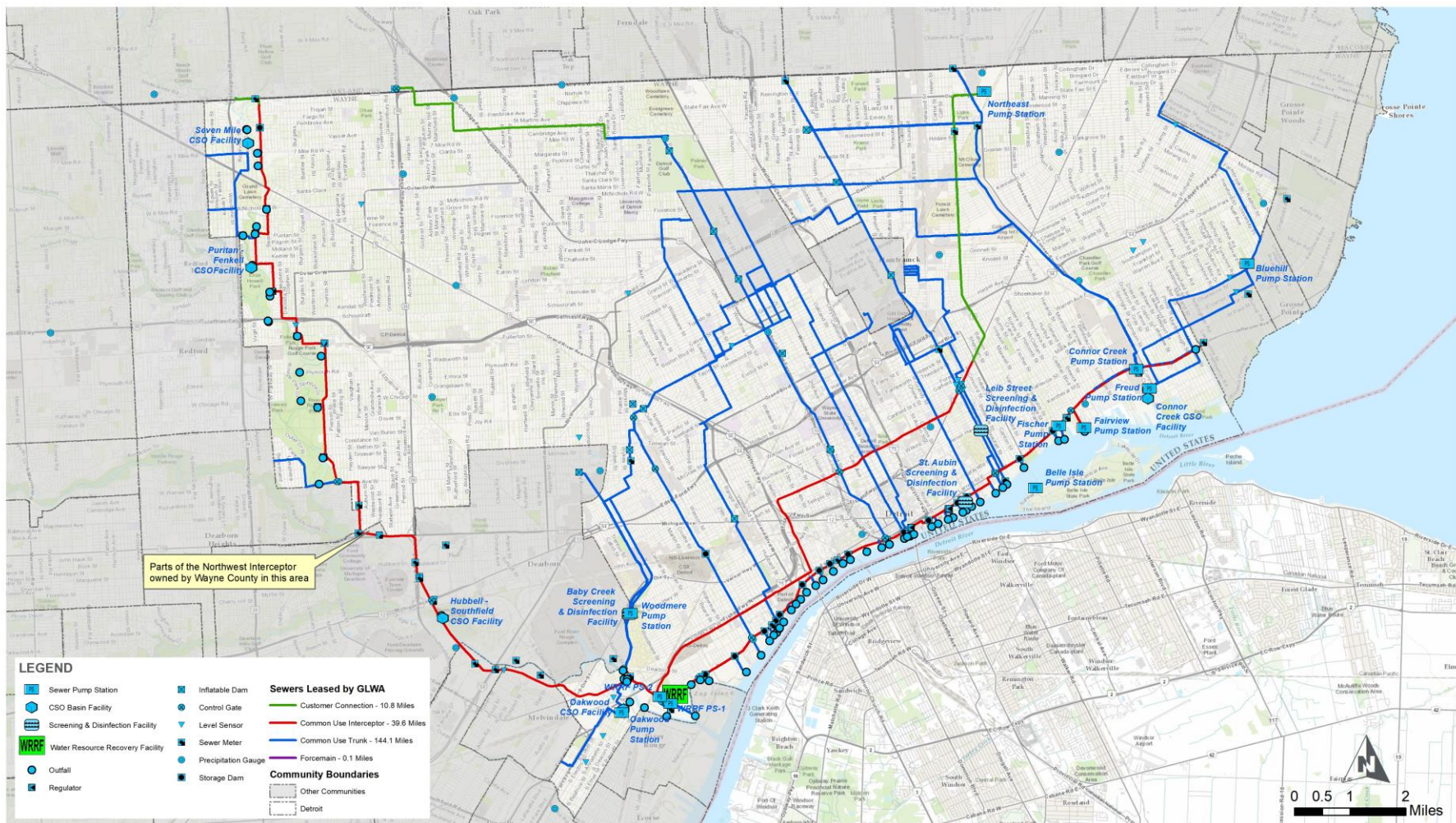


Figure VI-51. Sewer interceptors and trunk sewers operated/maintained by GLWA

Table VI-13. 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	97	91	94	9/2017 to 1/2018
6 Mile Sewer East	Trunk	0.4	10.5'	Concrete	DRI	1921	-	97	-	97	9/17
6 Mile Sewer West	Trunk	0.5	6.25'-7.25'	Concrete	O-NWI	1930	-	88	-	88	12/2017
7 Mile Sewer	Trunk	4.2	5.5'-11.5'	Concrete	DRI & NIEA	1921	1924	97	94	96	8/2017 to 11/2017
7 Mile Sewer West	Trunk	0.8	9.25'	Brick	O-NWI	1931	-	87	-	87	10/2017
7 Mile Sewer West Relief	Trunk	0.7	10'	Concrete	DRI & NIEA	1965	1967	53	51	52	8/2017 to 10/2017
7 Mile Sewer East Relief	Trunk	3.2	9'-13.75'	Concrete	DRI	1960	1962	58	56	57	10/2017
"8 Mile-Centerline Sewer / Connors Ave. Arm"	Trunk	0.7	1.5'-8.5'	Concrete / Brick / Unknown	DRI	1928	1930	90	88	89	4/2018 to 8/2018
Ashland Relief Sewer	Trunk	1.7	11.5'-16'	Concrete	DRI	1961	-	57	-	57	11/2016 to 12/2016
Baby Creek (Dry Weather Line)	Trunk	4.3	3'	Concrete	O-NWI	1938	-	80	-	80	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	-	56	-	56	12/2017 to 1/2018
Bates St. Sewer	Trunk	5.4	1' - 13.5' 3'x4.5' (Box)	Concrete / Brick / Clay / Unknown	DRI	1922	-	96	-	96	9/2017 to 10/2017
Berg Sewer	Customer Connection	0.1	1.75'	Concrete / Brick	O-NWI	1929	-	89	-	89	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	106	95	101	8/2017 to 10/2017
Conant-Mt. Elliot Relief Sewer	Trunk	8.2	10.5'-16.25'	Concrete	DRI & NIEA	1954	1957	64	61	63	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	96	90	93	9/2016 to 12/2017
Dequindre Interceptor	Trunk	0.9	9'	Concrete	DRI & NIEA	1970	-	48	-	48	-

Sewer Name	Type	Length (miles)	Size	Material	Drains to Interceptor	Years Constructed (year - year)		Age Range (years - years)		Average Age	Inspection Month / Year
Detroit River Outfalls	Outfalls	10.7	1'-15.5' (Varying Shapes)	Concrete / Brick / Clay / Unknown	Detroit River	1885	1967	133	51	92	10/2016
Detroit River Interceptor (DRI)	Interceptor	12.7	6'-16'	Concrete / Brick	WRRF	1913	1939	105	79	92	07/2012 to 10/2016
East Jefferson Relief Sewer	Trunk	1.1	14'	Concrete	DRI	1927	-	91	-	91	12/2016
Elmer-Ternes Sewer (West End Relief)	Trunk	2.6	14.5' 14.5x14.5' (Box)	Concrete	O-NWI	1962	1965	56	53	55	8/2017 to 10/2017
Evergreen-Farmington Connection	Customer Connection	4.8	8'	Concrete	DRI & NIEA	1991	-	27	-	27	-
First-Hamilton Relief Sewer	Trunk	8.8	7'-15.5' 2.7'x4' - 10'x10.5' (Box)	Concrete	DRI & NIEA	1956	1970	62	48	55	8/2017 to 10/2017
Fisher Ave. Storm Sewer	Trunk	0.5	10.5'x13.75'	Concrete	DRI / Detroit River	1928	1965	90	53	72	-
Fort Street Sewer	Trunk	2.7	2'-10'	Concrete / Crock / Brick / Segmented Block	O-NWI	1924	1939	94	79	87	9/2017 to 3/2018
Fox Creek Relief Sewer, Cadieux Road Sewer	Trunk	4.0	9.25'-16'	Concrete	DRI	1923	1953	95	65	80	11/2016 to 12/2016
Jos. Campau Sewer	Trunk	5.0	3.5'-11.5'	Concrete / Brick	DRI	1921	1957	97	61	79	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	96	43	70	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	99	97	98	9/2017 to 2/2018
Livernois Relief Sewer	Trunk	5.0	3'-10.5' 10'x10' (Box)	Concrete	DRI & NIEA	1949	1972	69	46	58	9/2017 to 10/2017
Lonyo Sewer	Trunk	3.4	13.6' 14.5'x14' (Box)	Concrete / Brick	O-NWI	1922	-	96	-	96	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	98	43	71	7/2017
Mack Avenue Relief Sewer	Trunk	2.2	9.25'-14'	Concrete	DRI	1967	-	51	-	51	11/2016

Sewer Name	Type	Length (miles)	Size	Material	Drains to Interceptor	Years Constructed (year - year)		Age Range (years - years)		Average Age	Inspection Month / Year
Mt. Elliot Ave. Sewer, Miller Road Sewer, Carrie Ave. Relief, and Laterals	Trunk	6.4	1.25'-9'	Crock / Brick	DRI	1913	1930	105	88	97	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	47	44	46	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

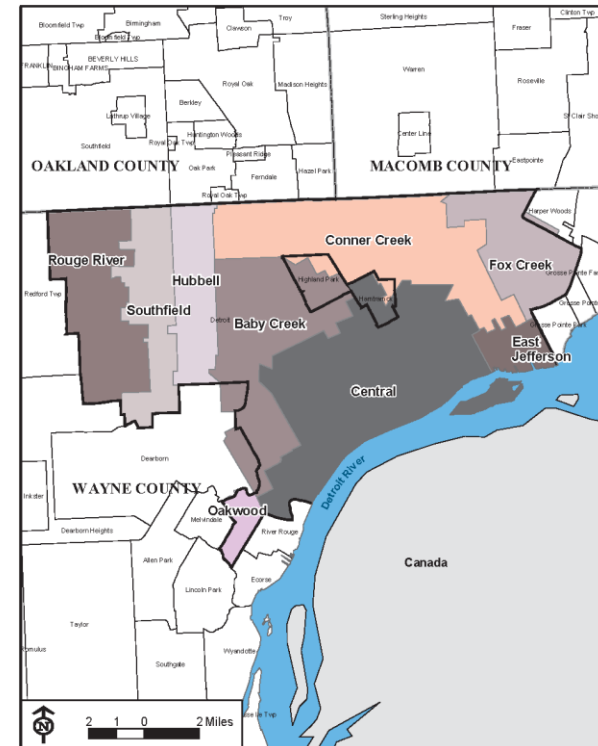


Figure VI-52. Sewer districts within Detroit

GLWA Regional Sewer Districts

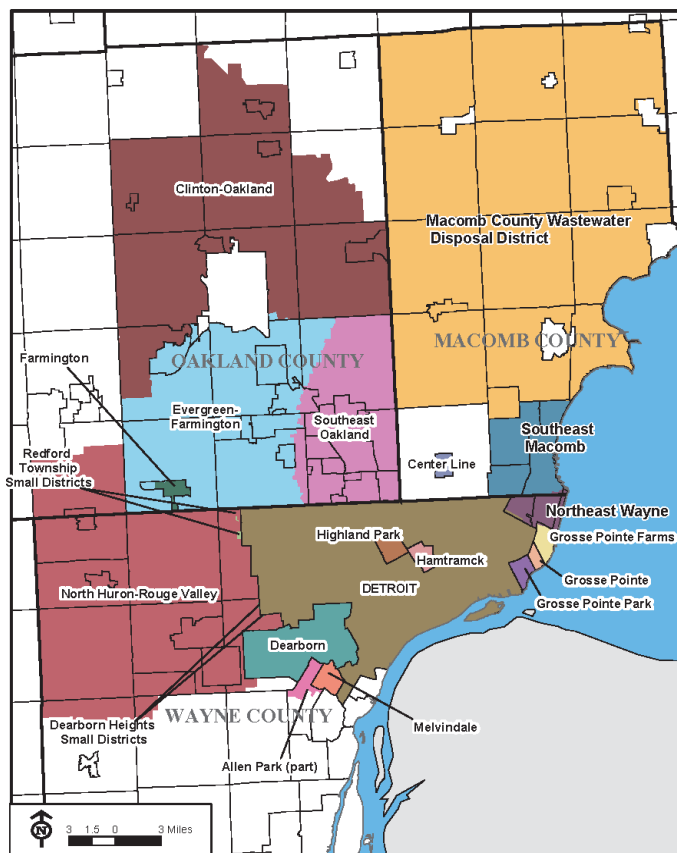


Figure VI-53. Sewer districts served by GLWA

Total GLWA Sewer Districts

Communities served by the varying sewer districts are provided below.

Table VI-14. 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

County/ City	District	Communities
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.

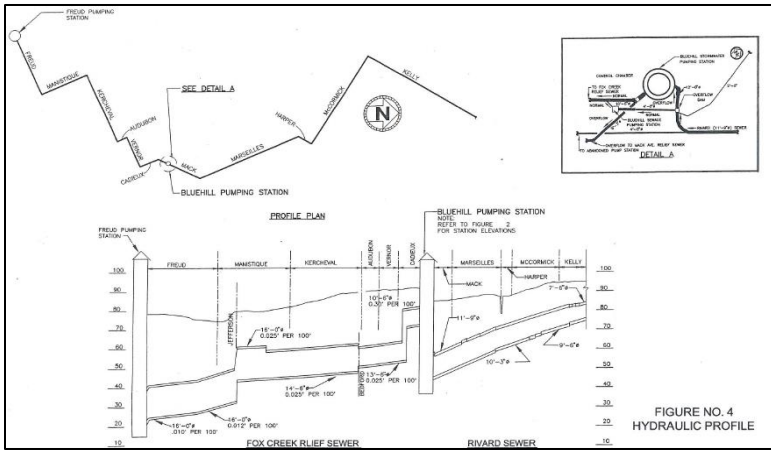


Figure VI-54. Hydraulic Profile at Bluehill Station

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

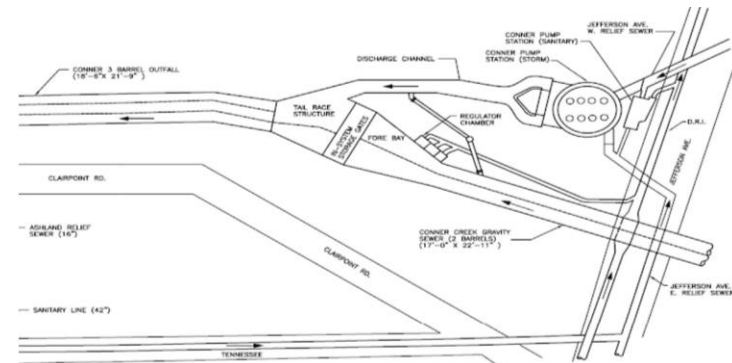


Figure VI-56. Schematic of Conner Creek Pump Station

Table VI-15. 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	<p>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.</p> <p>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.</p> <p>Rehabilitation of the site shall include replacement of all roadways, curbs, sidewalks, site lighting, and demolition of the oil pump house.</p>	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

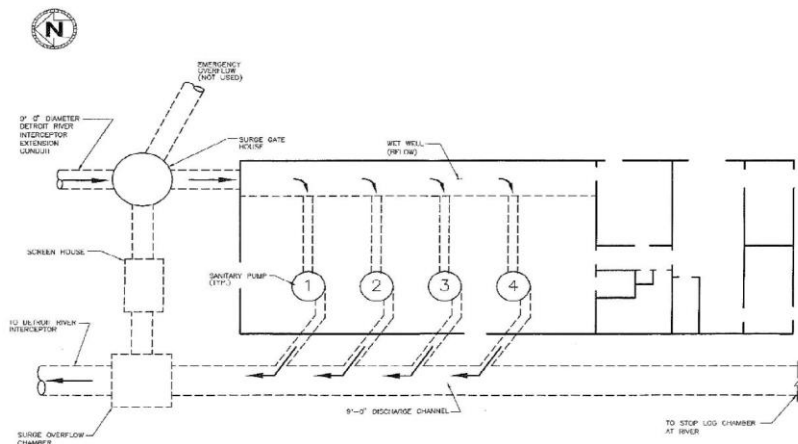


Figure VI-58. Fairview Pump Station Schematic

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-16. 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.

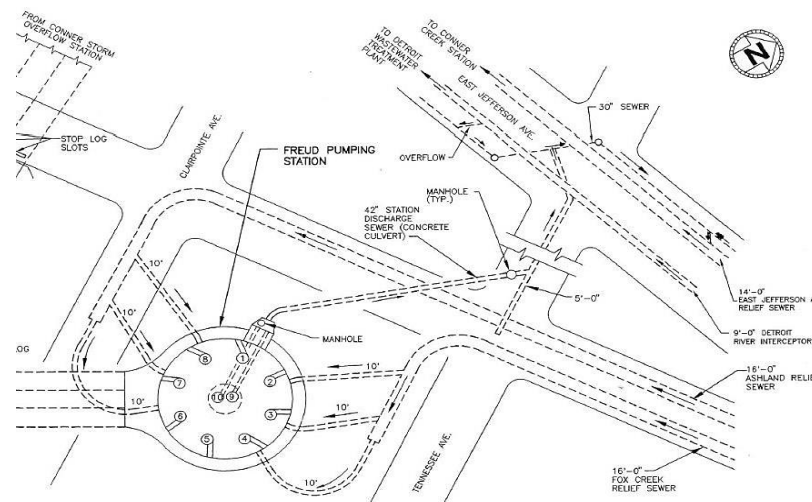


Figure VI-60. Freud Pump Station Schematic

Table VI-17 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-18. 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

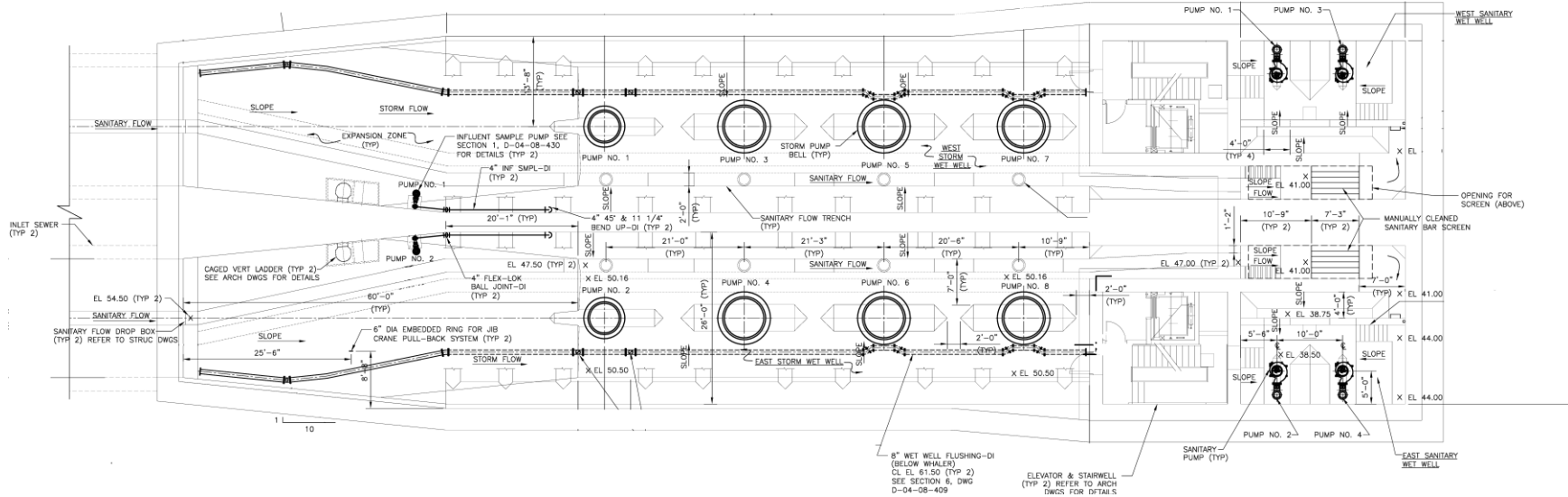
Oakwood Pump Station



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-19. 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.

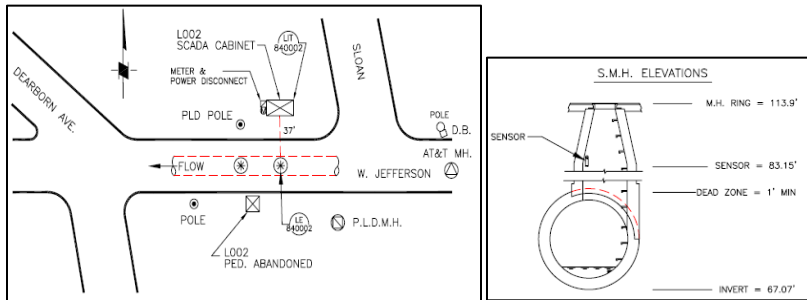


Figure VI-64. Example of a level sensor at West Jefferson and Sloan

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.

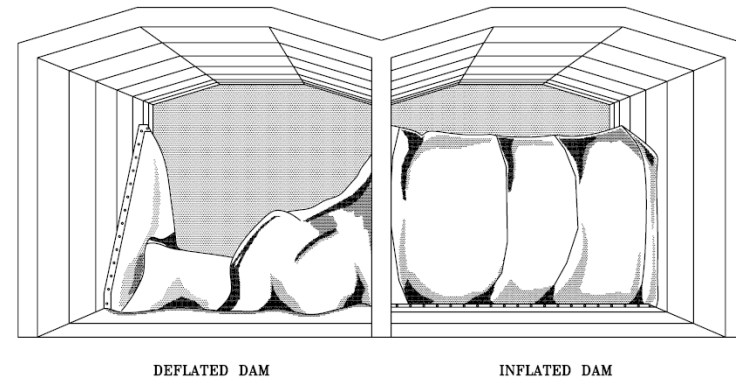


Figure VI-65. Inflatable dam illustration

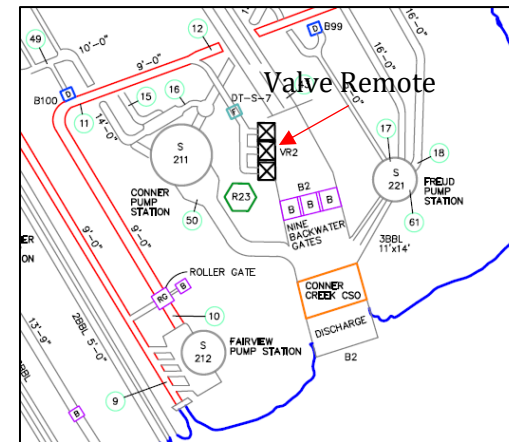


Figure VI-66. Example of VR located at Conner Pump Station

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.

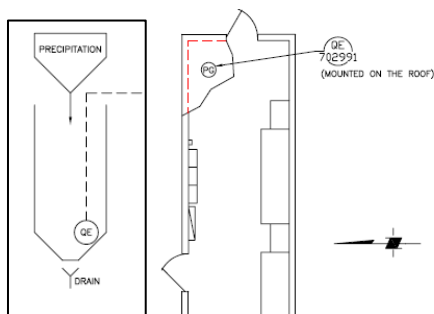


Figure VI-67. Example of Precipitation Gauge mounted on roof at Schoolcraft Pump Station

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-20. Centralized Services Projects

CIP #	Title	Budget	Project Status	Year Added	Lifetime Actual Thru	FY 2019	Projected Expenditures							2020-2024 CIP Total	Project Total	Percent of W/S CIP
							FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 & Beyond				
380400	As-needed CIP Implementation Assistance and Related Services	W	A	2002	0	0	0	0	0	0	0	0	0	0	0	0.0%
380400	As-needed CIP Implementation Assistance and Related Services	S	A	2002	0	0	0	0	0	0	0	0	0	0	0	0.0%
380600	As-Needed General Engineering Services	W	A	2004	1	94	0	0	0	0	0	0	0	0	95	0.0%
380600	As-Needed General Engineering Services	S	A	2004	1	0	0	0	0	0	0	0	0	0	1	0.0%
380500	Wastewater General Engineering Services on an As-needed Basis	W	PC	2004	0	0	0	0	0	0	0	0	0	0	0	0.0%
380500	Wastewater General Engineering Services on an As-needed Basis	S	PC	2004	0	0	0	0	0	0	0	0	0	0	0	0.0%
380800	Geotechnical and Related Services on an As-Needed Basis	W	PC	2007	0	0	0	0	0	0	0	0	0	0	0	0.0%
380800	Geotechnical and Related Services on an As-Needed Basis	S	PC	2007	0	0	0	0	0	0	0	0	0	0	0	0.0%
381000	Energy Management: Electric Metering Improvement Program	W	FP	2016	0	0	0	0	0	0	0	0	2,500	0	2,500	0.0%
381000	Energy Management: Electric Metering Improvement Program	S	FP	2016	0	0	0	0	0	0	0	0	2,500	0	2,500	0.0%
Water Centralized Services					1	94	0	0	0	0	0	0	2,500	0	2,595	
Wastewater Centralized Services					1	0	0	0	0	0	0	0	2,500	0	2,501	
Total Centralized Services					2	94	0	0	0	0	0	0	5,000	0	5,096	

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 addition 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 cross-

referencing 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 2020-2024 CIP are longer-term 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 FY2020 through FY2029. Projects within the 2020-2024 CIP that carry over into the FY2025+ 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 FY2027-FY2029, 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 #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
111001	W	LH WTP Low and High Lift Pumping, and Filter Backwash Pumps Improvements	0	401	1,611	3,169	4,450	10,000	12,713	12,641	7,403	0	0	0	19,631	32,757	52,388
111002	W	LH WTP Miscellaneous Mechanical HVAC Improvements	4,422	1,882	0	0	0	0	0	0	0	0	0	0	1,882	0	1,882
111004	W	LH WTP Electrical Tunnel Rehabilitation	384	4,296	6	0	0	0	0	0	0	0	0	0	4,302	0	4,302
111006	W	LH WTP Replacement of Filter Instrumentation and Raw Water Flow Metering Improvements	55	3,333	3,333	3,333	0	0	0	0	0	0	0	0	9,999	0	9,999
111007	W	LH WTP Raw Sludge Clarifier and Raw Sludge Pumping System Improvements	194	4,660	4,661	0	0	0	0	0	0	0	0	0	9,321	0	9,321
111008	W	LH WTP Architectural Programming - Laboratory and Admin Building Architectural Improvements Study	0	0	0	0	0	0	300	0	0	0	0	0	0	300	300
111009	W	LH-WTP Two 35-MGD High Lift Pumps, Water Production Flow Meters and Yard Piping Improvements	16	9,030	10,030	7,030	0	0	0	0	0	0	0	0	26,090	0	26,090



CIP #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
112002	W	NE WTP Low Lift Pumping Plant Caisson Rehabilitation	889	203	0	0	0	0	0	0	0	0	0	0	203	0	203
112003	W	NE WTP High-Lift Pumping Station Electrical Improvements	0	0	0	0	0	0	1,490	2,109	7,289	18,023	20,000	13,323	0	48,911	48,911
112005	W	NE Steel Cover Replacement	0	166	647	0	0	0	0	0	0	0	0	0	813	0	813
112006	W	NE WTP Flocculator Replacement	3	1,356	1,356	3	0	0	0	0	0	0	0	0	2,715	0	2,715
113002	W	SW WTP High Lift Pump Discharge Valve Actuators Replacement	1,157	2,876	1,144	6	0	0	0	0	0	0	0	0	4,026	0	4,026
113003	W	SW WTP Low and High Lift Pumping & Rapid Mix Chamber BFVs, Sluice Gates, Flocculation & Filtration System Improvements	0	0	0	0	0	0	1,569	2,880	4,553	7,368	10,000	121,916	0	26,370	26,370
113004	W	SW WTP Raw Water Sampling Modifications	319	380	1	0	0	0	0	0	0	0	0	0	381	0	381
113006	W	SW WTP Chlorine Scrubber, Raw Water Screens & Related Improvements	0	0	0	0	0	0	7,032	0	0	0	0	0	0	7,032	7,032
113007	W	SW WTP Architectural and Building Mechanical Improvements	0	0	0	0	0	0	0	9,334	9,334	9,334	9,334	0	0	37,336	37,336
114001	W	SPW WTP 1958 Filter Rehabilitation and Auxiliary Facilities	7,978	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114002	W	SPW WTP Low Lift and High Lift Pump Station	2,607	5,985	9,302	13,724	13,724	26,145	19,656	19,656	3,519	0	0	0	68,880	42,831	111,711
114003	W	WTP Water Production Flow Metering Improvements at NE, SW, and SPW WTP	3,561	80	19	0	0	0	0	0	0	0	0	0	99	0	99
114005	W	SPW WTP Administration Building Improvements & Underground Fire Protection Loop	30	413	2,258	3,820	1,604	0	0	0	0	0	0	0	8,095	0	8,095
114006	W	SPW WTP Replacement of Rapid Mix Units 1958 Process Train	886	61	0	0	0	0	0	0	0	0	0	0	61	0	61
114007	W	SPW WTP Powdered Activated Carbon System Improvements	0	0	0	0	0	0	1,164	2,771	3	0	0	0	0	3,938	3,938
114008	W	SPW WTP 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements	442	4,153	6,830	5,697	3	0	0	0	0	0	0	0	16,683	0	16,683
114010	W	SPW WTP Yard Piping and High Lift Header Improvements	0	0	0	0	0	72	451	15,723	15,723	15,723	15,723	47,235	72	63,343	63,415
114011	W	SPW WTP Steam, Condensate Return, and Compressed Air Piping Improvements	3,109	5,392	7,754	8,261	0	0	0	0	0	0	0	0	21,407	0	21,407
114012	W	SPW WTP Water Treatment Plant 1930 Filter Building-Roof Replacement	2,788	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114013	W	SPW WTP Reservoir Fill Line Improvements	2,849	1,551	0	0	0	0	0	0	0	0	0	0	1,551	0	1,551



CIP #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
114015	W	SPW WTP Emergency Grating Replacement	729	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114016	W	SPW 1958 Settled Water Conduit Concrete Replacement	0	206	656	0	0	0	0	0	0	0	0	0	862	0	862
114017	W	SPW WTP Flocculator Drive Replacement	0	0	0	10	2,314	4	0	0	0	0	0	0	2,328	0	2,328
115001	W	WWP WTP Yard Piping, Valves and Venturi Meters Replacement	899	17,333	17,333	17,333	0	0	0	0	0	0	0	0	51,999	0	51,999
115003	W	WWP WTP Comprehensive Condition Assessment	262	153	0	0	0	0	0	0	0	0	0	0	153	0	153
115004	W	WWP WTP Chlorine System Upgrade	4,196	2,047	1	0	0	0	0	0	0	0	0	0	2,048	0	2,048
115005	W	Emergency WWP WTP Building Ventilation Improvements	7	507	3,907	650	0	0	0	0	0	0	0	0	5,064	0	5,064
116002	W	Pennsylvania, Springwells and Northeast Raw Water Supply Tunnel Improvements	7,513	5,467	5,467	5,467	3,998	0	0	0	0	0	0	0	20,399	0	20,399
122001	W	Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122002	W	Replacement of Five (5) PRV Pits of Treated Water Transmission System	804	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122003	W	WWP to NE Transmission Main	1,121	871	15,786	24,115	29,615	29,994	30,115	0	0	0	0	0	100,381	30,115	130,496
122004	W	96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main	837	5,000	6,000	26,453	35,886	23,453	16,056	16,969	882	0	0	0	96,792	33,907	130,699
122005	W	Transmission System Water Main Work - Replacement of Schoolcraft Water Main	180	8,100	9,145	633	0	0	0	0	0	0	0	0	17,878	0	17,878
122006	W	Transmission System Water Main Work-Wick Road Parallel Water Main	1,370	18,028	12,334	60	0	0	0	0	0	0	0	0	30,422	0	30,422
122007	W	Newburgh Road Transmission Main	0	0	0	0	30	5,209	0	0	0	0	0	0	5,239	0	5,239
122009	W	Water System Improvements in Joy Road from Southfield Road to Trinity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122010	W	Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from Lindwood to Livernois	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122011	W	Park-Merriman Water Main-Final Phase	1,067	4,737	2,237	6	0	0	0	0	0	0	0	0	6,980	0	6,980
122012	W	36-inch Water Main in Telegraph Road	155	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122013	W	14 Mile Transmission Main Loop	0	751	1,315	1,507	13,420	12,000	13,769	11,608	56	0	0	0	28,993	25,433	54,426
122016	W	Downriver Transmission Main Loop	0	297	964	3,051	10,763	22,122	0	0	0	0	0	0	37,197	0	37,197
122017	W	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station	0	1,040	6,050	6,910	3,750	2,750	0	0	0	0	0	0	20,500	0	20,500



CIP #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
132001	W	Wick PS - Rehabilitation	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132003	W	West Service Center PS - Isolation Gate Valves for Line Pumps	1,186	490	0	0	0	0	0	0	0	0	0	0	490	0	490
132004	W	North Service Center PS - Hydraulic Surge Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132006	W	Ford Road PS - Pressure and Control Improvements	235	2,515	18	0	0	0	0	0	0	0	0	0	2,533	0	2,533
132007	W	Imlay PS - Energy Management: Freeze Protection Pump Installation	14	592	1,315	230	0	0	0	0	0	0	0	0	2,137	0	2,137
132008	W	Various PS's - Needs Assessment Study	764	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132010	W	West Service Center PS - Reservoir, Reservoir Pumping, and Division Valve Upgrades	0	2,620	7,430	15,570	8,910	2,606	0	0	0	0	0	0	37,136	0	37,136
132012	W	Ypsilanti PS Improvements	28	585	865	2,855	4,205	1,319	0	0	0	0	0	0	9,829	0	9,829
132014	W	Adams Road Pumping Booster Pumping & Switch Gear Improvements	0	0	0	21	1,029	2,312	1,073	1,074	165	0	0	0	3,362	2,312	5,674
132015	W	Newburgh BPS - Pumping System & Building Upgrades	0	16	621	2,396	2,396	2,429	2,323	1,966	22	0	0	0	7,858	4,311	12,169
132016	W	North Service Center BPS Improvements	0	0	0	0	6	6,325	8,034	4,919	4,919	717	0	0	6,331	18,589	24,920
132017	W	North Service Center BPS - On-Site & Off-Site Yard Piping & Valve Replacement	0	6	2,300	2,506	264	0	0	0	0	0	0	0	5,076	0	5,076
132018	W	Schoolcraft BPS - Pumps, Yard Piping, Valves & Reservoir Pumps & Underdrain System	0	0	10	1,958	2,048	3,048	1,078	2,065	357	0	0	0	7,064	3,500	10,564
132019	W	Wick Road BPS - Switchgear, Control Valves & Hydropneumatic Tank Replacement	0	0	0	6	1,009	4,554	0	0	0	0	0	0	5,569	0	5,569
132020	W	Franklin BPS - Isolation Gate Valves & Electrical Actuator Improvements	0	0	0	0	0	0	2,000	6,793	1,316	0	0	0	0	10,109	10,109
132021	W	Imlay BPS - Replace VFDs, Pumps, Motors and HVAC	0	0	0	0	6	2,103	3,988	5,542	470	0	0	0	2,109	10,000	12,109
132022	W	Joy Road BPS - Replace Reservoir Pumps, Motors and Isolation Valves	0	0	0	0	6	6,103	0	0	0	0	0	0	6,109	0	6,109
132025	W	Northwest Booster Station Yard Piping Improvements	0	0	50	1,700	3,750	0	0	0	0	0	0	0	5,500	0	5,500
170100	W	Water Treatment Plant / Pump Station Allowance	3,176	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	15,000	15,000	15,000	30,000
170200	W	As Needed Construction Materials, Environmental Media and Special Testing Services, Construction Inspection, and Other Technical Services	472	572	572	0	0	0	0	0	0	0	0	0	1,144	0	1,144



CIP #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
170300	W	Water Treatment Plant Automation Program	61	1,561	1,561	1,561	1,514	105	0	0	0	0	0	0	6,302	0	6,302
170400	W	Water Transmission Improvement Program	1,000	1,500	2,000	2,000	2,000	2,000	20,000	20,000	20,000	20,000	20,000	10,000	9,500	100,000	109,500
170500	W	Transmission System Valve Rehabilitation and Replacement Program	4,000	4,000	3,274	4,000	4,000	4,000	2,000	2,000	2,000	2,000	2,000	10,000	19,274	10,000	29,274
170600	W	Water Transmission Main Asset Assessment Program	2,500	3,000	4,000	4,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	25,000	21,000	25,000	46,000
170800	W	Reservoir Inspection, Design & Rehabilitation	482	5,128	5,211	5,182	3,888	5,495	6,756	6,756	6,756	6,756	6,756	33,778	24,904	33,778	58,682
170900	W	Suburban Water Meter Pit Rehabilitation and Meter Replacement	3,000	4,000	4,000	3,997	4,100	4,200	4,100	4,100	4,100	4,100	4,100	20,500	20,297	20,500	40,797
171400	W	Energy Management Program @ All Water Facilities	0	0	0	0	693	693	1,019	1,019	1,019	1,019	325	0	1,386	4,401	5,787
171500	W	Roof Replacement - Various Water Facilities	0	2,657	0	0	0	2,000	500	500	500	500	0	0	4,657	2,000	6,657
331001	W	Roofing Systems Replacement at Water Plants and Booster Pump Stations	0	0	225	375	1,625	1,825	344	344	344	344	0	0	4,050	1,375	5,425
351001	W	Water Facility Lighting Renovations	250	250	0	0	0	0	0	0	0	0	0	0	250	0	250
380400	W	As-needed CIP Implementation Assistance and Related Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0
380600	W	As-Needed General Engineering Services	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0
380700	W	As-Needed Geotechnical and Related Engineering Services	620	0	0	0	0	0	0	0	0	0	0	0	0	0	0
380800	W	Geotechnical and Related Services on an As-Needed Basis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
381000	W	Energy Management: Electric Metering Improvement Program	0	0	0	0	0	0	500	500	500	500	500	2,500	0	2,500	2,500
NA	W	LH WTP Improvements to Pre-Treatment and Filtration	0	0	0	0	0	0	17,095	17,095	17,095	17,095	17,095	0	0	85,477	85,477
Totals			68,746	143,247	166,599	182,595	169,006	190,866	183,125	176,364	116,325	111,478	113,833	299,252	852,313	701,125	1,553,438

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

10-Year Water CIP Outlook												
Note: Figures below are in thousands of dollars												
2019 Outlook	FY2019	FY2020	FY2021	FY2022	FY2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total 2019-2028
Projects	46,785	116,870	130,656	157,209	148,672	152,017	126,675	112,980	60,711	58,426	NA	1,111,001
Programs	19,253	20,713	25,078	21,091	26,502	50,733	46,309	49,539	49,033	48,675	NA	356,925
Not Yet Specified Projects								15,000	70,000	75,000	NA	160,000
Subtotal 2019 Water CIP	66,038	137,583	155,734	178,300	175,174	202,750	172,984	177,519	179,744	182,101	NA	1,627,926
Proposed 2020 Outlook	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total 2020-2029
Projects	53,341	117,829	142,981	158,855	144,811	164,373	140,250	133,489	73,450	68,604	72,152	1,216,795
Programs	15,405	25,418	23,618	23,740	24,195	26,493	42,875	42,875	42,875	42,875	41,681	336,643
Not Yet Specified Projects									60,000	70,000	70,000	200,000
Subtotal 2020 Water CIP	68,746	143,247	166,599	182,595	169,006	190,866	183,125	176,364	176,325	181,478	183,833	1,753,438

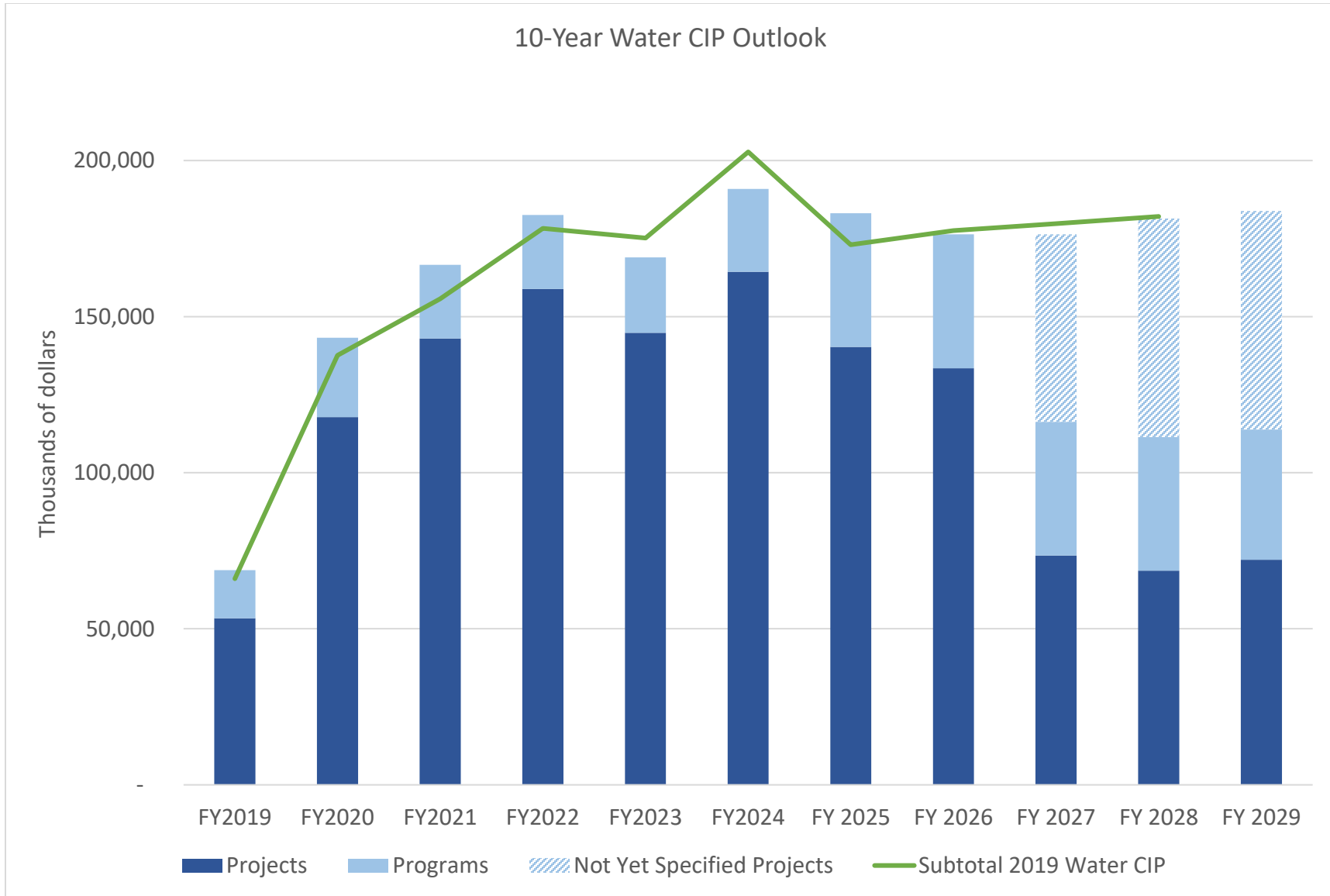


Figure VII-1. 10-Year Water CIP Outlook Chart

SECTION 2 SECTION 1.2 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 FY2027-FY2029, 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 #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
211001	S	WRRF Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery	18,724	7,982	3,054	0	0	0	0	0	0	0	0	0	11,036	0	11,036
211002	S	WRRF PS No. 2 Pumping Improvements - Phase 1	2,268	1,222	0	0	0	0	0	0	0	0	0	0	1,222	0	1,222
211004	S	WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements	1,824	869	0	0	0	0	0	0	0	0	0	0	869	0	869
211005	S	WRRF PS No. 2 Improvements Phase II	0	0	684	711	611	8,668	5,463	5,463	0	0	0	0	10,674	10,925	21,599
211006	S	WRRF PS No. 1 Improvements	498	1,803	2,325	8,424	8,370	811	84	0	0	0	0	0	21,733	84	21,817
211007	S	WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements	6	269	1,329	2,039	6,306	7,838	49	0	0	0	0	0	17,781	49	17,830
211008	S	WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines	1,021	2,950	4,983	1,600	0	0	0	0	0	0	0	0	9,533	0	9,533
211009	S	WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System	0	0	778	619	5,237	4,725	35	0	0	0	0	0	11,359	35	11,394
212003	S	WRRF Aeration System Improvements	4,831	0	0	0	0	0	0	0	0	0	0	0	0	0	0
212004	S	WRRF Chlorination and Dechlorination Process Equipment Improvements	913	2,345	1,670	0	0	0	0	0	0	0	0	0	4,015	0	4,015
212006	S	WRRF Rouge River Outfall (RRO) Disinfection (Alternative)	17,009	4,583	0	0	0	0	0	0	0	0	0	0	4,583	0	4,583
212007	S	WRRF Rehabilitation of the Secondary Clarifiers	0	0	0	0	71	933	6,000	7,676	7,000	7,000	1,438	0	1,004	29,114	30,118

CIP #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
212008	S	WRRF Rehabilitation of Intermediate Lift Pumps (ILPs)	0	229	500	656	6,727	5,910	6,811	0	0	0	0	0	14,022	6,811	20,833
213002	S	WRRF Rehabilitation of Central Offload Facility	4,204	7,696	3,297	0	0	0	0	0	0	0	0	0	10,993	0	10,993
213005	S	WRRF Complex I Incinerators Decommissioning and Reusability	0	0	0	0	0	0	409	4,000	0	0	0	0	0	4,409	4,409
213006	S	WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities	0	0	0	0	24	1,366	2,000	331	0	0	0	0	1,390	2,331	3,721
213007	S	WRRF Modification to Incinerator Sludge Feed Systems at Complex -II	7,159	8,711	3,308	0	0	0	0	0	0	0	0	0	12,019	0	12,019
213008	S	WRRF Rehabilitation of the Ash Handling Systems	0	111	1,111	5,525	9,574	2,184	0	0	0	0	0	0	18,505	0	18,505
214001	S	WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations	2,828	7,567	0	0	0	0	0	0	0	0	0	0	7,567	0	7,567
216004	S	Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF	609	3,921	607	0	0	0	0	0	0	0	0	0	4,528	0	4,528
216006	S	Assessment and Rehabilitation of WRRF yard piping and underground utilities	0	323	5,258	3,849	4,500	3,500	4,000	3,423	0	0	0	0	17,430	7,423	24,853
216007	S	DTE Primary Electric 3rd Feed Supply to WRRF	2,108	1,381	3,374	0	0	0	0	0	0	0	0	0	4,755	0	4,755
216008	S	Rehabilitation of Screened Final Effluent (SFE) Pump Station	51	1,091	991	9,475	7,805	5,535	0	0	0	0	0	0	24,897	0	24,897
222001	S	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	0	0	0	3,800	10,077	10,077	10,077	4,000	0	0	0	0	23,954	14,077	38,031
222002	S	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	9,424	10,000	10,000	10,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	32,000	5,000	37,000
222003	S	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	500	15,000	14,500	0	0	0	0	0	0	0	0	0	29,500	0	29,500
222004	S	Collection System Infrastructure Improvements	1,019	3,500	3,514	6,000	5,000	8,000	10,000	11,000	12,000	13,000	14,000	60,000	26,014	60,000	86,014
232001	S	Fairview Pumping Station - Replace Four Sanitary Pumps	6,000	18,000	4,891	0	0	0	0	0	0	0	0	0	22,891	0	22,891
232002	S	Freud & Conner Creek Pump Station Improvements	1,984	17,029	13,014	50,014	50,014	25,007	257	0	0	0	0	0	155,078	257	155,335
232003	S	Northeast Pumping Station	1,000	7,000	10,500	10,500	2,500	0	0	0	0	0	0	0	30,500	0	30,500
260100	S	WRRF, Lift Station and Wastewater Collection System Structures Allowance	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	5,500	5,500	11,000
260200	S	Sewer and Interceptor Rehabilitation Program	8,609	15,000	15,000	15,000	15,000	15,000	15,000	15,000	20,000	20,000	25,000	95,000	75,000	95,000	170,000
260500	S	CSO Outfall Rehabilitation	4,000	15,102	17,947	10,926	15,102	15,102	3,000	2,000	2,000	2,000	2,000	11,000	74,179	11,000	85,179



CIP #	Budget	Title	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030 +	2020-2024 Total	2025 - 2029 Total	TOTAL 2020-2029
260600	S	CSO FACILITIES IMPROVEMENT PROGRAM	8,442	5,604	4,553	5,825	10,325	13,361	15,000	15,000	15,000	15,000	15,000	15,000	39,668	75,000	114,668
331002	S	Roofing Systems Replacement at GLWA WRRF, CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)	278	1,092	4,142	4,114	41	42	0	0	0	0	0	0	9,431	0	9,431
380400	S	As-needed CIP Implementation Assistance and Related Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
380600	S	As-Needed General Engineering Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
381000	S	Energy Management: Electric Metering Improvement Program	0	0	0	0	0	0	500	500	500	500	500	2,500	0	2,500	2,500
NA	S	Rehabilitation of Sludge Processing Complexes A and B	0	0	0	0	0	0	1,700	7,650	7,650	0	0	0	0	17,000	17,000
NA	S	Rehabilitation of Support Facilities at WRRF	0	0	0	0	0	0	1,300	5,743	5,743	0	0	0	0	12,786	12,786
Totals			106,409	161,480	132,430	150,177	159,384	130,159	83,784	83,886	71,993	59,600	60,038	185,600	733,630	359,301	1,092,931

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

10 -Year Wastewater CIP Outlook

Note: Figures below are in thousands of dollars

	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total 2019-2028
FY2019 Outlook												
Projects	80,114	86,482	81,237	105,004	131,867	89,123	43,800	29,867	15,100	15,100	NA	732,944
Programs	25,069	24,673	30,715	31,407	36,591	31,683	35,568	34,708	34,852	35,001	NA	335,649
Not Yet Specified Masterplan												
Projects						30,000	70,000	90,000	105,000	110,000	NA	405,000
Subtotal 2019 Wastewater CIP	105,183	111,155	111,952	136,411	168,458	150,806	149,368	154,575	154,952	160,101	NA	1,473,593
Proposed FY2020 Outlook												
Projects	84,258	124,674	93,830	117,326	117,857	85,596	49,184	50,286	33,393	21,000	16,438	709,584
Programs	22,151	36,806	38,600	32,851	41,527	44,563	34,600	33,600	38,600	38,600	43,600	383,347
Not Yet Specified Masterplan												
Projects							65,000	70,000	85,000	100,000	110,000	430,000
Subtotal 2020 Wastewater CIP	106,409	161,480	132,430	150,177	159,384	130,159	148,784	153,886	156,993	159,600	170,038	1,522,931

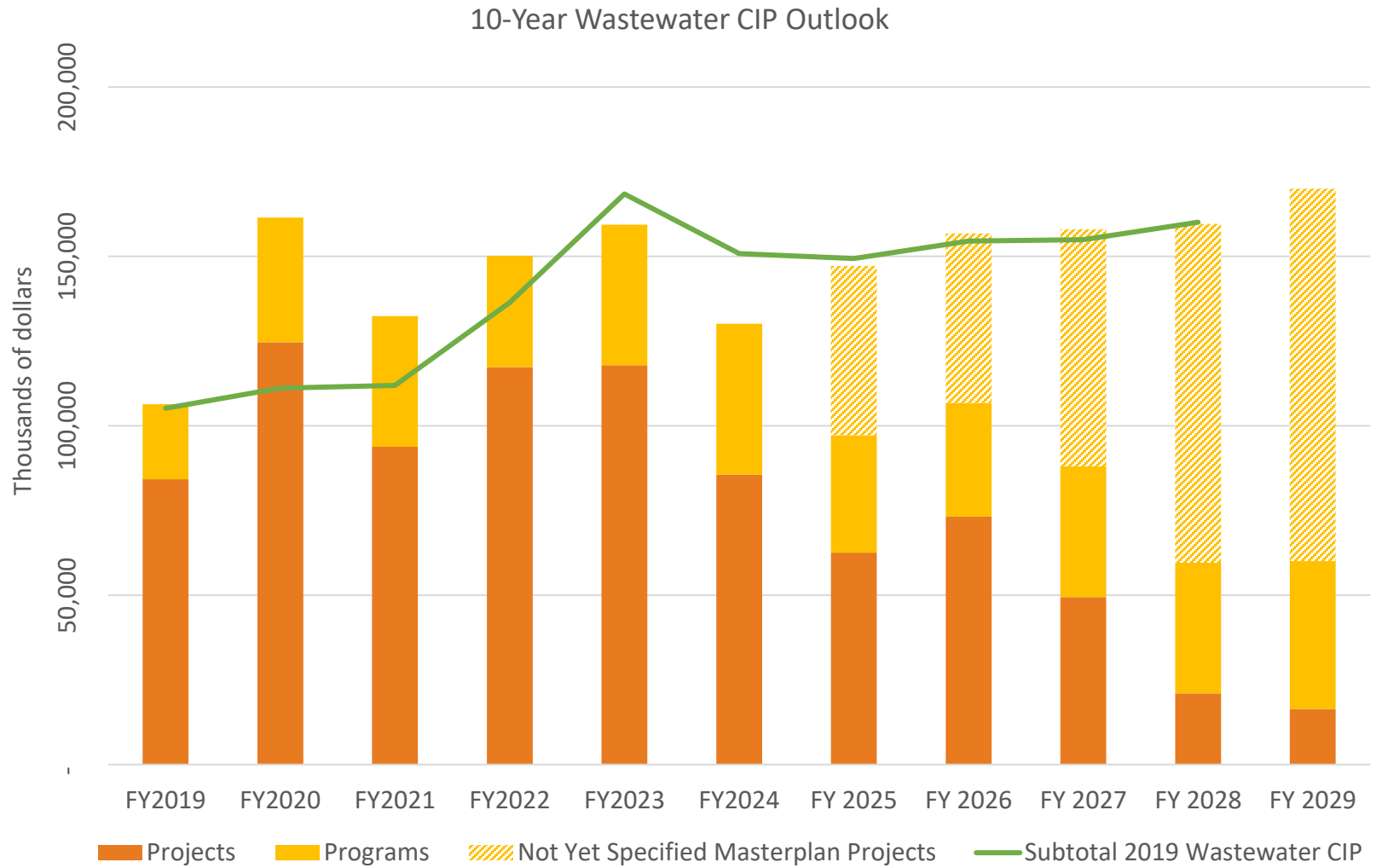


Figure VII-2. 10-Year Wastewater CIP Outlook Chart.

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 Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Lake Huron

Location Saint Clair County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 71.6



Lake Huron WTP

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell

Project Significance 111003 RECLASSIFIED INTO THIS PROJECT. Improvements needed to align the existing low lift pumping rate with the Lake Huron WTP production rate per the 2015 WMPU. Currently constant speed pumping forces the WTP to operate in a batch mode. 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. Replacement of phosphoric acid chemical storage tanks and fill piping. Flocculation moved to new project proposed CIP Project for filter rehabilitation and flocculators.

Scope of Work Currently constant speed pumping forces the Lake Huron WTP to operate in a batch mode as the low lift pump capacities exceed the high lift pump capacities. Improvements needed to align the existing low lift pumping rate with the Lake Huron WTP production rate per the 2015 WMPU. Replace with new:

1. High-voltage electrical system
2. Replace LL Pumps 3 and 4 with new pumps to meet 2015 WMPU
3. Improve HL Pump resilience & flexibility
4. Improve WW Pump capability and update as necessary
4. Phosphoric acid system upgrades

Challenges 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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		200	2,500	3,000					0	0	5,700
2019	0				401	1,611	3,169	4,450	42,757	0	52,388
2020	0	0		0	401	1,611	3,169	4,450	10,000	32,757	52,388

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 77



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

Project Engineer/Manager Todd King

Manager Grant Gartrell

Project Significance Existing heating, ventilating and air-conditioning systems Lake Huron are 40 years old and are either not operable or energy-inefficient. Thus, replacement with new, energy efficient mechanical HVAC systems is needed.

Scope of Work The work includes replacement of the existing Natural Gas-Fired hot water boilers, back flow preventers, and dehumidification units with related accessories.

Challenges Heating system modifications will be seasonally dependent.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		270	1,030	3,130	3,050	422			0	0	7,902
2019	0	309	781	3,666	3,873	13				0	8,642
2020	0	0	2,020	4,422	1,882	0	0	0	0	0	8,324

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**

Project Score 38.6

Project Engineer/Manager Jorge Nicolas
Manager Grant Gartrell



Lake Huron WTP Electrical Tunnel

Project Significance 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.

Scope of Work Repairing electrical tunnel to prevent intrusion of water and further structural damage to concrete cables, duct banks and cable trays.

Challenges None.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			1,000	3,000	1,600				0	0	5,600
2019	0		116	414	4,296	6				0	4,832
2020	0	0	63	384	4,296	6	0	0	0	0	4,749

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 62.2



Raw Water Flow Meter

Project Engineer/Manager Todd King

Manager Grant Gartrell

Project Significance The filter instrumentation and raw water metering at the Lake Huron WTP is non-functioning and is in need of replacement. Replacement of this equipment is needed for reliable plant operations.

Scope of Work Replacement of the filter instrumentation and raw water metering equipment.

Challenges The existing raw water venturi meters do not have standard dimensions and determining accuracy may be difficult.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		100	600	12,150	11,780				0	0	24,630
2019	0	253	643	43	8,647	9,816	6,909	4		0	26,315
2020	0	0	735	55	3,333	3,333	3,333	0	0	0	10,789

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**

Project Score **53.2**



Raw sludge clarifier at Lake Huron WTP

Project Engineer/Manager Todd King

Manager Grant Gartrell

Project Significance This project will provide a study and design on the structural integrity, capacity and performance requirements for pumps and piping to meet maximum design flows. The construction services will re-construct the raw sludge clarifiers and sludge pumping and conveyance system to meet the plant demands for pumping and conveying raw sludge to the existing lagoons.

Scope of Work The sludge clarifier is integral to the backwash water treatment system and the walls of the clarifiers are severely bowed and in the process of failing. If the clarifier and backwash tank fail, the ability to backwash the Lake Huron WTP filters will be lost and result in the loss of the Lake Huron WTP to the system until a temporary bypass can be arranged.

Challenges Improvements will require coordination with plant operations (filter backwashing).

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			50	920	6,163				0	0	7,133
2019	0	9	422	212	1,612	3,608	1,221			0	7,084
2020	0	0	284	194	4,660	4,661	0	0	0	0	9,799

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score **40.6**



Lake Huron Water Treatment Plant

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance Existing laboratory and admin. Building interior is original to the plant and is in need of modernization.

Scope of Work Modernize lab and admin building offices, common areas, conference room, lunch room, lobby, entry-way, locker rooms, showers, and bathrooms.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0								300	0	300
2020	0	0		0	0	0	0	0	0	300	300

CIP Number: 111009

Project Title Lake Huron Water Treatment Plant, Two New High-Lift Pumps, Water Production Flow Meter, and Select Yard

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing



Project New To CIP

Project Score **62.2**

Project Engineer/Manager Brian VanHall
Manager Grant Gartrell

Project Significance Two new, smaller capacity, high-lift pumping units are needed to provide lower finished water flows out of Lake Huron WTP to accommodate the relocation of the 96-inch transmission main south of Imlay Pumping Station and to accommodate the installation of a new water production flow meter at the Lake Huron WTP. The two new 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 two new smaller high-lift pumping units are installed.

Scope of Work Design and install a new flow meter and isolation valve to the north high lift header, a new bypass line from the south high lift header, two new 35 MGD high lift pumps.

Challenges Adding the high lift header bypass and new isolation valve requires the existing valve to adequately seat.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0		16	9,030	10,030	7,030				26,106

CIP Number: 112001

Project Title Phase 1 WWP to NE Transmission - Flow Control Station at NE WTP

Project Status Reclassified

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Northeast

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **62.2**

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance Flow control valves are needed at the terminus of the proposed 81-inch Waterworks Park to Northeast finish water transmission system. This project is needed to control flow rates from Waterworks Park to the re-purposed Northeast system.

Scope of Work The work includes providing and installing new flow control station at the NE WTP site.

Challenges Sequencing of construction with the phase-over of Northeast WTP becoming a booster station. Connecting to existing piping and/or reservoirs will require reservoir shut and isolation, requiring close coordination with operations.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			800						0	0	800
2019	0					700	1,988	112		0	2,800
2020	0	0		0	0	0	0	0	0	0	0

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**

Project Score 51.6

Project Engineer/Manager Govind Patel

Manager Grant Gartrell



Low Lift Pumping Plant at Northeast WTP

Project Significance Preventing further degradation of steel and concrete structure of the Low Lift Pumps Caisson at the Northeast WTP

Scope of Work The work includes design and repair of concrete cracks and concrete restoration to stop leakage on the concrete covers of the encased steel beams and along the inner surfaces of the caisson wall.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		150	1,183						0	0	1,333
2019	0	163	70	831	619	30	4			0	1,717
2020	0	0	473	889	203	0	0	0	0	0	1,565

CIP Number: 112003

Project Title Northeast Water Treatment Plant High-Lift Pumping Station Electrical 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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP

Project Score 50.8



Northeast Water Treatment Plant

Project Engineer/Manager Jorge Nicolas

Manager Grant Gartrell

Project Significance Upgrade the existing medium voltage and low voltage electrical systems for the high-lift pumping station only.

Scope of Work Electrical system improvements for high-lift pumping equipment only.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0								62,265	0	62,265
2020	0	0		0	0	0	0	0	0	62,234	62,234

CIP Number: 112004

Project Title NE - WTP Relocation of 12" service line at front of plant

Project Status Cancelled

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Northeast

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **22**

Project Engineer/Manager Govind Patel

Manager Grant Gartrell

Project Significance Plant service water is currently fed off of a DWSD owned 12" water main along 8 Mile Road in front of the plant. GLWA is charged by DWSD for use of this water which represents a substantial long term cost. Project involves disconnecting from the DWSD 12" main and connecting to a GLWA main exiting the plant for its service water supply.

Scope of Work Disconnect service water feed for plant from the existing 12" water main owned by DWSD and connect it via new service water piping to an existing GLWA transmission main existing the plant grounds. Work involves site civil and buried piping work.

Challenges Coordinating with DWSD on the disconnection from its 12" water main.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0				1,023	1,437				0	2,460
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 112005

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

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 Northeast

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 61



Project Engineer/Manager Peter Fromm

Manager Grant Gartrell

Project Significance The existing steel covers that cover equipment and entry openings into settled water and 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 Replace steel covers, frames and associated structural support beams over the settled water and filtered water conduits.

Challenges Temporary support of sluice gate operators and partial shutdown of certain portions of the plant to facilitate replacement of embedded frames and structural supports that are located immediately above settled water and filtered water flows.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0			166	647					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

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 67.4

Project Engineer/Manager Peter Fromm
Manager Grant Gartrell



Project Significance 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.

Scope of Work Replace 1/2 of the existing flocculators, including drives, motors, shafts, and paddles with new.

Challenges Water production during construction

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Row 1: 2020, 0, 0, 3, 1,356, 1,356, 3, 2,718

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 53.2

Project Engineer/Manager Shakil Ahmed

Manager Terry Daniel



Oil hydraulic valve actuators leaking oil

Project Significance 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 This project involves replacement of the valve actuators at the high lift pump system as the existing oil hydraulic actuators are leaking and at the end of their service life.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		160	160	900	900				0	0	2,120
2019	0	115	186	1,157	2,876	1,144	6			0	5,484
2020	0	0	249	1,157	2,876	1,144	6	0	0	0	5,432

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 67.6



Example of a butterfly valve

Project Engineer/Manager Shakil Ahmed
Manager Grant Gartrell

Project Significance Replacing improperly functioning as well as cracked valves and gates, causing operational and maintenance concerns. Low and High Lift Pumping Improvements: Existing pumping station equipment including pumps, motors, switchgear, controls, gates, valves, etc. are all original to the plant and are over-sized for the current and projected system water demands for at least the next 20 years. The station's electrical system and controls are difficult and costly to maintain and have reduced reliability due to age and lack of available parts on the market. Large size and age of pumps and motors are inefficient. Flocculation & Filtration System Improvements: Existing filter media, auxiliary scour, backwash, and related appurtenances are all original to the plant construction (circa 1962) and need to be replaced for reliability and efficiency improvements. Flocculator equipment upgrades were identified in the 2015 WMPU project.

Scope of Work The work includes study, design, and construction services for the replacement of 2 - 72" diameter butterfly valves, 4 motorized sluice gates, 7 potable sluice gates, and 1 - 36" flag valve. Replacement of high and low lift pumps, motors, motor controls, medium-voltage switchgear, and MCCs. Replace and improve filtration system equipment and components as well as flocculator equipment upgrades.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018								2,940	0	0	2,940
2019	0								148,286	0	148,286
2020	0	0		0	0	0	0	0	0	148,286	148,286

CIP Number: 113004

Project Title Southwest Water Treatment Plant, Raw Water Sampling Modifications

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

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 44.8



Access manhole

Project Engineer/Manager Shakil Ahmed
Manager Grant Gartrell

Project Significance 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 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.

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)

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for years 2018, 2019, and 2020.

CIP Number: 113005

Project Title Southwest Water Treatment Plant Residuals Management

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

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 58

Project Engineer/Manager Shakil Ahmed

Manager Grant Gartrell



Southwest Water Treatment Plant

Project Significance The current system is too limited with regard to the plant's ability to quickly discharge and otherwise dispose of water plant residuals from the sedimentation basins, flocculator chambers, associated channels, and the residuals handling facility raw solids storage tanks, thickeners, and associated channels to the local sewer system in instances where the plant needs to free the water treatment process from excess solids that inhibit effective water treatment.

Scope of Work Study the existing design and construction of the plant facilities, determine hydraulic and treatment bottlenecks, develop alternative solutions, and identify the best alternative to quickly discharge water plant residuals from plant processes, tanks, channels, etc. to the local sewer system so that water treatment and quality problems are avoided.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for 2019 and 2020.

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
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 46.6



Southwest Water Treatment Plant

Project Engineer/Manager Shakil Ahmed
Manager Grant Gartrell

Project Significance Existing chlorine gas scrubber needs to be replaced for reliability and safety reasons. Related improvements include ventilation, alarms, instruments, and controls. The existing raw water screens are original to the plant, do not operate and are needed to protect the low lift pumps.

Scope of Work Replace the existing gas chlorine scrubber with new unit plus related ventilation, alarms, instruments, and controls; as well as replacement of the existing raw water screens.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for 2019 and 2020 showing expense distribution over time.

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 36



Southwest Water Treatment Plant

Project Engineer/Manager Shakil Ahmed

Manager Grant Gartrell

Project Significance The existing building mechanical equipment (HVAC, dehumidification, plumbing) and architectural features (doors, windows, flooring, furnishings, etc.) throughout the facility are over 50 years old. They are beyond their useful service life and need to be replaced with more reliable, energy efficient systems. The architectural improvements will be limited to the administration and high/low lift buildings on this project. Existing filter media, auxiliary scour, backwash, and related appurtenances are all original to the plant construction (circa 1962) and need to be replaced for reliability and efficiency improvements. Flocculator equipment upgrades were identified in the 2015 WMPU project.

Scope of Work Replace the dehumidification, HVAC and selected plumbing system equipment with new as well as replacing exterior and interior doors and windows with new. Renovate the existing laboratory. FROM FORMER 113008: Replace and improve filtration system equipment and components as well as flocculator equipment upgrades.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0								37,336	0	37,336
2020	0	0		0	0	0	0	0	0	37,336	37,336

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
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing
Project New To CIP

Project Score 62.2



Springwells filter building

Project Engineer/Manager Khader Hamad
Manager Grant Gartrell

Project Significance Reconstruction of the 40 filters and 19 filters at the Springwells 1958 and 1930 filter plants, respectively has provided 295 MGD of reliable filtration capacity at the Springwells Water Treatment Plant. The existing mechanical HVAC, dehumidification, electrical, instrumentation, and controls systems serving the 1958 filters have also been upgraded to make them more reliable and efficient. Likewise, the existing mechanical HVAC and dehumidification system serving the 1930 filter building was replaced with new again to provide reliability and efficiency. The existing elevators at the facility have been replaced with new and upgraded to bring them into compliance with current building codes and safety standards. The administration building offices and laboratory have been improved architecturally, including new HVAC and lighting systems.

Scope of Work 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 replacement of Phosphoric Acid Feed System, rehabilitation of the 1958 Filters, rehabilitation of failed 1930s Filters, Update of Operation and Maintenance Manuals, and addition of polymer systems and controls. 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; install a local instrumentation and controls system.

Challenges Completion of the

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for 2018 and 2019.

CIP Number: 114001

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0	89,310	7,978	0	0	0	0	0	0	97,288

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 69.2

Project Engineer/Manager Erich Klun

Manager Grant Gartrell



High Lift Station viewed from Low Lift Station operating floor showing high lift pump pits and windows to be replaced.

Project Significance 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 The electrical gear at the Springwells WTP high and low lift stations is old and parts are no longer available. The outdated equipment also poses safety issues. Furthermore, the pumps may be right-sized to provide more efficient pumping systems.

Challenges Complicated sequence of construction required to replace electrical gear while maintaining system demands throughout construction. During construction, new costly equipment will be operating next to existing equipment/facilities to be demolished

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			1,500	2,000	12,500	22,000	21,500	26,500	0	0	86,000
2019	0	22	463	1,433	2,481	1,453	11,228	8,675	59,748	0	85,503
2020	0	0	498	2,607	5,985	9,302	13,724	13,724	26,145	42,831	114,816

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 50.6



Water production flow metering device

Project Engineer/Manager Jorge Nicolas

Manager Grant Gartrell

Project Significance Existing water production flow meters need to be rehabilitated to place back into reliable and accurate service. Once completed, accurate flow measurement from these plants will answer non-revenue water questions.

Scope of Work Water production metering is needed at the Water Treatment Plants to manage non-revenue and provide estimates of usage for non-wholesale customers.

Challenges Removing and replacing existing meters in original piping requires isolation using existing yard piping and valving. Condition of existing pipe and valves needs to be adequately addressed in the final design documents and coordinated with operations.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		1,000	8,800	2,100	1,000				0	0	12,900
2019	0	186	704	2,506	2,506	1,257				0	7,159
2020	0	0	3,445	3,561	80	19	0	0	0	0	7,105

CIP Number: 114005

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

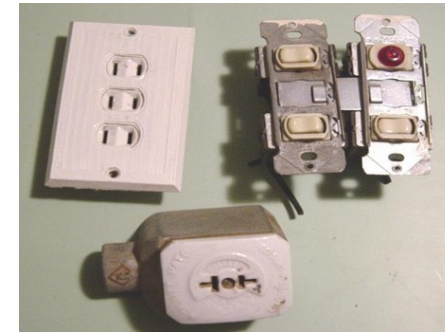
Project Status Active
Class Lvl 1 Water
Class Lvl 2 Treatment Plants and Facilities
Class Lvl 3 Springwells
Location Wayne County - Outside Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**

Project Score **67.4**

Project Engineer/Manager Peter Fromm

Manager Grant Gartrell



Outdated electrical outlets

Project Significance Existing administration building is over 80 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 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 work also includes relocating the electrical gear from basement to first floor locker room. 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.

Challenges Major component of this project includes the relocation/replacement of existing electrical gear located in the basement, and switchover to the new gear and location will need to be seamless. All plumbing needs to be replaced, the majority of which is conc. 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. 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.

CIP Number: 114005

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

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018				300	1,700				0	0	2,000
2019	0			30	413	2,258	3,820	1,604		0	8,125
2020	0	0		30	413	2,258	3,820	1,604	0	0	8,125

CIP Number: 114006

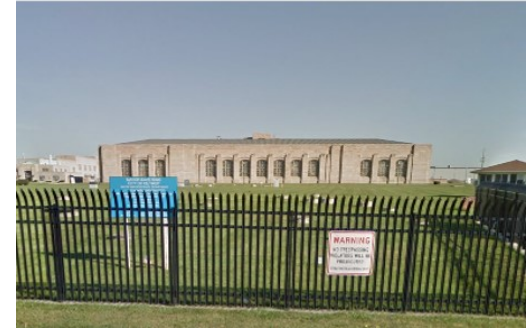
Project Title Springwells Water Treatment Plant Replacement of 1958 Rapid Mixing Units

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 69.4



Springwells WTP

Project Engineer/Manager Peter Fromm

Manager Grant Gartrell

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

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

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		100	875	275					0	0	1,250
2019	0	104	123	1,284	211					0	1,722
2020	0	0	177	886	61	0	0	0	0	0	1,124

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 46.6



Springwells WTP

Project Engineer/Manager TBD
Manager Grant Gartrell

Project Significance Although the existing powdered activated carbon (PAC) system is operable, it is difficult to operate and maintain when needed for taste and odor control. The PAC system needs to be replaced with a new system using a different design that provides for improved operation and maintainability. The plant is able to feed powdered activated carbon (PAC) when needed but only through extraordinary measures because the existing PAC feed systems does not operate as intended. The extraordinary measures cause additional operation and maintenance expense and inefficiencies that should be corrected in the long term. Due to the infrequent need to feed PAC, there is not an immediate need to replace the entire existing PAC system at Springwells. If raw water quality deteriorates unexpectedly and taste and odor causing compound concentrations steadily increase, then replacement of the PAC system at an earlier date would be warranted.

Scope of Work Replace the existing PAC system with a new system of a different design that provides improved operations and maintainability when PAC dosing is needed to control taste and odor in the raw water supply.

Challenges Layout of piping to correct existing problems and drainage difficult. Diffuser replacement/relocation/installation will require plant shutdowns to complete, so it will be seasonal demand dependent.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018					900	2,000			0	0	2,900
2019	0								3,939	0	3,939
2020	0	0		0	0	0	0	0	0	3,938	3,938

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

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 52.8



NONE

Project Engineer/Manager Peter Fromm
Manager Grant Gartrell

Project Significance Existing sedimentation basin gates, guides and hoists are early 1930s and are in need of upgrade. Further, upgrades must result in a safer mode of gate operation.

Scope of Work This project will evaluate and rehabilitate or replace the sluice gates, guides and hoists at the 1930s Filter Building at the Springwells Water Treatment Plant. These gates and appurtenances have surpassed their expected service life and require rehabilitation and/or replacement for the isolation and operation of the 1930s filters and overall maintenance of various systems at the Springwells WTP. Options for maintenance of flows are limited with current condition of these gates.

Challenges Work will either require sedimentation basins to be shut down and dewatered or the work performed by divers. In either case, portions of the 1930 plant will need to be shut down to complete the work.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 114009

Project Title SPW WTP Service Area Redundancy Study

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 78



NONE

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance 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 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		450							0	0	450
2019	0	193	145							0	338
2020	0	0	311	0	0	0	0	0	0	0	311

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 62.2



Springwells WTP

Project Engineer/Manager Erich Klun

Manager Grant Gartrell

Project Significance 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. Other yard piping, including gravity sewers and process piping, need to be assessed and replaced and or rehabilitated.

Scope of Work Existing yard piping is original riveted steel from the early 1930s and has experienced leaks. These leaks have potential to disrupt service to Springwells Service area customers. Scope will also include performing a condition assessment, cleaning and replacement/rehabilitation of all gravity sewers (including manholes) and other pressure pipe. Other site improvements will include replacement of access drives, new guard shack, construction trailer utility hook-up station, and other site miscellaneous site improvements. Formerly CIP 1248.

Challenges Complex construction sequencing, and reliability of existing gate valves for isolation will be critical. Design will need to address the isolation valve issue, as well as the condition of the existing yard piping being connected to.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018				2,000	7,000	8,000	8,000		0	0	25,000
2019	0								110,129	0	110,129
2020	0	0		0	0	0	0	0	72	110,578	110,650

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 62.4

Project Engineer/Manager Brian VanHall

Manager Grant Gartrell



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

Project Significance These existing mechanical systems are largely broken and leaking, creating an inefficient use of energy.

Scope of Work 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 (SP-TBD) to replace the leaking steam piping, condensate return piping and compressed air piping throughout the Springwells WTP. The scope of work includes replacing inefficient unit 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.

Challenges 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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		300	3,450	2,500					0	0	6,250
2019	0	280	450	1,406	4,824	4,654	7			0	11,621
2020	0	0	473	3,109	5,392	7,754	8,261	0	0	0	24,989

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
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing
Project New To CIP

Project Score 61



Filter Building roof

Project Engineer/Manager Paula Anderson

Manager Paula Anderson

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

Scope of Work 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.

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)

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for years 2018, 2019, and 2020.

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 77.2

Project Engineer/Manager Erich Klun
Manager Grant Gartrell



Springwells WTP

Project Significance Reservoir fill line to Springwells is needed to provide finished water to the Springwells high service area from Southwest and Waterworks Park while the Springwells raw water tunnel is out of service for repairs and during times when the Springwells Low Lift Station is taken offline for inspections, repairs or maintenance.

Scope of Work Reservoir fill line to Springwells is needed to provide finished water to the Springwells high service area from Southwest and Waterworks Park while the Springwells raw water tunnel is out of service for repairs.

Challenges Very complicated sequence of construction, and coordination with wholesale customers is required.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		200	3,300	4,000					0	0	7,500
2019	0	120	181	2,469	3,656	61	21			0	6,508
2020	0	0	332	2,849	1,551	0	0	0	0	0	4,732

CIP Number: 114015

Project Title Springwells Water Treatment Plant Emergency Grating 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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 100

Project Engineer/Manager Erich Klun

Manager Grant Gartrell



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 Significance 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 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).

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

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

CIP Number: 114016

Project Title Springwells Water Treatment Plant 1958 Settled Water Conduits Concrete Pavement Replacement

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
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 36.6



Project Engineer/Manager Peter Fromm
Manager Grant Gartrell

Project Significance The existing concrete pavement that covers the 1958 settled water conduits is failing and requires replacement. The existing pavement is severely deteriorated and is crumbling in several areas. This pavement is 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 feeds process water to the 1958 filters.

Scope of Work Remove existing concrete pavement and replace with new concrete pavement around the entire 1958 filter building at the Springwells Water Treatment Plant.

Challenges Equipment limits 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)

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Row 1: 2020, 0, 0, 206, 656, 862.

CIP Number: 114017

Project Title Springwells Water Treatment Plant Flocculator Drive Replacement

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 47



Project Engineer/Manager Peter Fromm
Manager Grant Gartrell

Project Significance The existing flocculator drives (20 total) are beyond useful service life and required replacement to maintain reliable flocculation.

Scope of Work Replace flocculator drive units, realign drive shafts, and replace mechanical seals at shaft wall penetrations.

Challenges Maintenance of plant operations during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0					10	2,314	4		2,328

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 65.4



Pumps and Piping

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance 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 Much of the yard piping and valve system at Waterworks Park is old and at the end of its service life. Furthermore, the Water Treatment Plant does not have functioning production flow metering as the existing equipment is oversized and non-functioning. Replacement of the yard piping, valve, and metering system is needed at the site.

Challenges Complicated sequence of construction, and demands of DWSD-R must be maintained along with coordination with 84" between Water Works Park and Northeast WTPs. Condition of existing valves required to complete the work is unknown.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			5,500	27,900	20,500				0	0	53,900
2019	0	9	412	968	20,771	34,466	14,397	28		0	71,051
2020	0	0	682	899	17,333	17,333	17,333	0	0	0	53,580

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 35.6



Waterworks Park WTP

Project Engineer/Manager Grant Gartrell

Manager Grant Gartrell

Project Significance 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 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.

Challenges Coordinating shutdowns required for condition assessment inspections.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		200	375						0	0	575
2019	0		131	262	153					0	546
2020	0	0	440	262	153	0	0	0	0	0	855

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

Project Engineer/Manager Todd King

Manager Grant Gartrell

Project Significance WWP Chlorine System has experienced numerous leaks and has compromised the safety of plant

Scope of Work Demolition and replacement of all mechanical systems, equipment and piping related to chlorine transport, vaporization and application. New chlorine system will be able to meet current dose rates and be able to meet future loadings estimated for WWP after the Northeast WTP treatment system is taken off line.

Challenges It will be critical for the contractor to phase the work to provide ongoing chlorine application during the retrofit.

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**

Project Score 84



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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		290	700	8,700					0	0	9,690
2019	0	371	672	3,124	2,878	4				0	7,049
2020	0	0	2,527	4,196	2,047	1	0	0	0	0	8,771

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **76**

Project Engineer/Manager Mike Dunn

Manager Terry Daniel

Project Significance Design and construction of ventilation system improvements for certain chemical storage rooms and the ozone generator and destruct rooms at the Water Works Park Water Treatment Plant to improve employee and visitor safety.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0		7	507	3,907	650	0	0	0	5,071

CIP Number: 116002

Project Title Pennsylvania, Springwells and Northeast 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

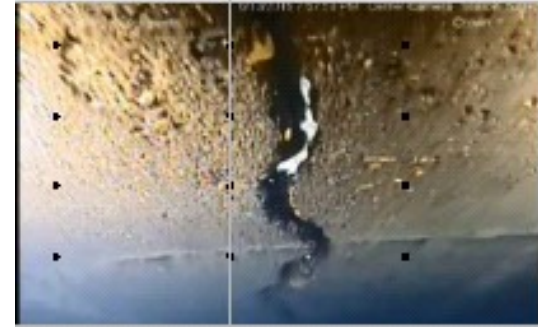
Project Engineer/Manager Todd King

Manager Grant Gartrell

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 0



Crown cracks are especially concerning in the Springwells Raw Water Tunnel

Project Significance Project critical to production at Springwells WTP during repurposing of Northeast WTP as recommended by the 2015 WMPU. Contract CS-1623 identified problem areas on the raw water supply system that compromised the system's ability to meet demands during the repurposing of Northeast WTP.

Scope of Work The scope of work is to conduct supplemental investigations to design the repairs for the sections of tunnel identified in CS-1623 as having structural concerns. Three areas were identified with the highest concern being a portion of the Springwells Tunnel near the Springwells WTP.

Challenges The tunnels are approximately 80 feet below the surface of the Detroit River. This poses challenges for assessing the extent of damage to the structures, as well as repair. 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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		500	2,000	10,000	15,000	4,900			0	0	32,400
2019	0	10	3,625	9,042	5,468	5,468	5,468	3,998		0	33,079
2020	0	0	2,178	7,513	5,467	5,467	5,467	3,998	0	0	30,090

CIP Number: 116003

Project Title Genesee and Lapeer County Transmission System Improvements

Project Status Closed

Class Lvl 1 Water

Class Lvl 2 Treatment Plants and Facilities

Class Lvl 3 General Purpose

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 54.6



Transmission main

Project Engineer/Manager Todd King

Manager Grant Gartrell

Project Significance Project critical to maintaining chlorine residual to customers connected to the 72" main feeding Flint and Genesee County and abandonment of the 72" main once Flint and Genesee County are off the system. Projects need to be substantially complete by July

Scope of Work With the departure of Flint and Genesee County from the GLWA system, the water age in the 72-inch transmission main increases to levels where minimum chlorine residuals cannot be maintains. Chlorine booster stations are needed along the 72-inch transmission main to maintain acceptable chlorine residuals.

Challenges Live tapping and line stops on 72" PCCP required for both projects and is specialized construction. Work requires close coordination with operations to meet pressure requirements required to tap the pipe.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			400	3,200	3,200				0	0	6,800
2019	0			0						0	0
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 122001

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

Project Status Pending Closeout

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location Macomb County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Khader Hamad

Manager Grant Gartrell



A large water main

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

Scope of Work 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.

Challenges N/A - Pending Closeout

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

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

CIP Number: 122002

Project Title Replacement of Five (5) PRV Pits of Treated Water Transmission System

Project Status Pending Closeout

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**

Project Score

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell



An example PRV

Project Significance Replacement of the PRVs to enhance operability of the system and improve control of the system to meet customer pressure needs

Scope of Work This project will replace five existing pressure reducing valves (PRVs) that are defective and no longer controlling downstream pressures. During the replacement, the PRV pits will be upgraded to improve accessibility, provide new sump pumps as needed, and make other necessary improvements.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	1015	1,205							0	0	2,220
2019	0	1,697	670							0	2,367
2020	0	0	1,844	804	0	0	0	0	0	0	2,648

CIP Number: 122003

Project Title WWP to NE Transmission Main

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **62.4**



NONE

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance 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, an 81-inch transmission main is proposed between Water Works Park and Northeast to convey 150 MGD of finished water to the Northeast high lift pumping system to provide service to the existing Northeast service area to meet a large portion of the Northeast service area maximum day demands.

Scope of Work This project includes construction of 35,000 feet of 81-inch diameter piping between Water Works Park and Northeast. The project includes a flow control station at the Northeast site to control flows between Water Works Park and the Northeast High Lift Station

Challenges Route determination, utility conflicts and connections to yard piping at Northeast and Water Works Park WTPs. The large new main will cross I-94 and run through 7 miles of residential/commercial streets.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			1,500	5,000	10,000	74,000	2,000	37,500	0	0	130,000
2019	0	19	1,305	1,372	8,622	17,547	46,022	30,722	25,270	0	130,879
2020	0	0	1,655	1,121	871	15,786	24,115	29,615	29,994	30,115	133,272

CIP Number: 122004

Project Title 96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 65.2

Project Engineer/Manager Grant Gartrell

Manager Grant Gartrell



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

Project Significance Project critical to providing redundancy to Lake Huron WTP supply and protection of water supply from potential contamination. Project includes relocation around existing landfill and addition of a parallel main with interconnection to meters between Romeo and 24 Mile Road.

Scope of Work 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.

Challenges Shutdown, isolation and live tapping of the 96" main while maintaining the Lake Huron WTP supply and operations of Rochester Station. Routing and possible property acquisition for both the parallel main and relocation around the landfill.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		500	1,500	6,000	35,900	31,700	31,700	31,700	0	0	139,000
2019	0	460	570	1,797	2,644	895	23,087	45,825	57,389	0	132,667
2020	0	0	1,130	837	5,000	6,000	26,453	35,886	23,453	33,907	132,666

CIP Number: 122005

Project Title Schoolcraft Road Water Transmission Main Replacement

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

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 42

Project Engineer/Manager Peter Fromm
Manager Grant Gartrell



Water main replacement

Project Significance Improving transmission system reliability and redundancy

Scope of Work Design work of 10,800 of new 48-inch transmission main along I-96 under the freeway service drive between Middlebelt and Beech Daly. Due to excessive breaks the Schoolcraft water main in Redford/Livonia will be replaced. The purpose is to improve the transmission system reliability/redundancy.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for years 2018, 2019, and 2020.

CIP Number: 122006

Project Title Wick Road Water Transmission Main Construction

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

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 54.2



Transmission main

Project Engineer/Manager Peter Fromm

Manager Grant Gartrell

Project Significance Placement of parallel water main to minimize service disruptions to customer communities

Scope of Work Construction of the new 48-inch transmission main along a principal roadway in Romulus. Original water main from Wick station to Ypsilanti station has history of excessive breaks. Additionally, the main is the only principal connection between the two facilities with multiple community Master Meters along its length. A break in this line is disruptive to several communities dependent upon this supply line. The purpose is to improve the transmission system reliability/redundancy.

Challenges May require shut down of large transmission mains.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 122007

Project Title **Newburgh Road Water Transmission Main**

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location Wayne County - Outside Detroit

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **57**



Water main installation

Project Significance Project identified in the 2015 Water Master Plan Update; improves system reliability, redundancy, and provides operational savings. It was also identified in the 2015 WMPU that this project is a predecessor project to decommissioning the Michigan Avenue Booster Station.

Scope of Work This project involves design and construction services associated with the installation of 3 miles of new 24-inch transmission main along Hannon Road.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			1,800	2,200					0	0	4,000
2019	0		6	653	1,611	2,076	901			0	5,247
2020	0	0		0	0	0	0	30	5,209	0	5,239

CIP Number: 122009

Project Title Water System Improvements in Joy Road from Southfield Road to Trinity

Project Status Pending Closeout

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Khader Hamad

Manager Grant Gartrell



Water main being laid

Project Significance Replacement of original piping with excessive break history with new ductile iron main along Wayne County roadway.

Scope of Work 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.

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	8323	100							0	0	8,423
2019	0	107								0	107
2020	0	0	107								107

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 Pending Closeout

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell



Water main being replaced

Project Significance Original piping has history of excessive breaks; replacing to minimize disruption in high-traffic area

Scope of Work 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.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		1,370	1,106	652					0	0	3,128
2019	0		16							0	16
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 122011

Project Title Park-Merriman Water Transmission Main Construction

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

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 30.2

Project Engineer/Manager Peter Fromm

Manager Grant Gartrell

Project Significance Replacement of new water main to convert deduct water meters to direct connection meters

Scope of Work This third and final leg of the 24" water main project will convert a handful of GLWA Master Meters from a deduct to direct connection service and retire Master Meter WY-01 in favor of two new Master Meter vaults.

Challenges n/a



Water main being installed

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for years 2018, 2019, and 2020.

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

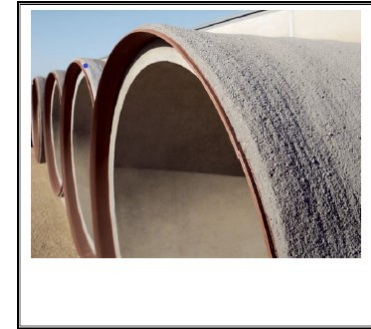
Project Engineer/Manager Khader Hamad

Manager Grant Gartrell

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **45.6**



Water main ready to install

Project Significance Excessive joint leaks warrant replacement; new water line to be placed in greenbelt

Scope of Work This project includes installation of approximately 10,530 feet of 36-inch dia. water main in Telegraph Road from Cherry Hill to Warren Ave.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		2,000	5,061						0	0	7,061
2019	0	8,125	2,257	3						0	10,385
2020	0	0	9,418	155	0	0	0	0	0	0	9,573

CIP Number: 122013

Project Title 14 Mile Transmission Main Loop

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **58.4**

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance 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 Install approximately 6 Miles of 48-inch transmission main from 8 Mile Road to 14 Mile Road along Haggerty Road. 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.

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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		1,300	10,500	12,000	6,000				0	0	29,800
2019	0				751	1,315	1,507	13,420	37,433	0	54,426
2020	0	0		0	751	1,315	1,507	13,420	12,000	25,433	54,426

CIP Number: 122014

Project Title Romulus 48-inch Water Main Installation

Project Status Closed

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location Wayne County - Outside Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Khader Hamad

Manager Grant Gartrell



Pipe ready to install

Project Significance Placement of a parallel water main to minimize service disruptions to customer communities

Scope of Work The City of Romulus notified DWSD of a significant retail development opening in Autumn 2016 at the southeast corner of Vining and Wick Roads. Romulus was also aware that DWSD has a project pending to place a 48" water main along Wick Road. Placement of the new 48" water main would be disruptive to the retail development traffic entrances/exits facing Wick road. Thus, Romulus asked if the 48" water main project could be expedited so it could be in place at the time of the retail development construction in Spring/Summer 2016. The 48" water main will be placed by Romulus as a part of the pavement upgrade work being pursued by Romulus early in 2016.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	1021	3,514							0	0	4,535
2019	0	3,840	403							0	4,243
2020	0	0	4,011	0	0	0	0	0	0	0	4,011

CIP Number: 122015

Project Title 30" Water main Replacement - Water main Replacement Under Jefferson & Rouge River

Project Status Closed

Class Lvl 1 Water

Class Lvl 2 Field Services

Class Lvl 3 Transmission System

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Khader Hamad

Manager Grant Gartrell



Water main

Project Significance This project was completed to replace a critical water main that suffered a break and that serves the GLWA WRRF.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		2,327							0	0	2,327
2019	0	2,345	398							0	2,743
2020	0	0	2,461	0	0	0	0	0	0	0	2,461

CIP Number: 122016

Project Title Downriver 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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **58.4**



Example transmission main

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance The Downriver Transmission Main that currently serves Brownstown, Riverview, Woodhaven, Trenton, Flat Rock, Gibraltar, Rockwood, South Rockwood, and Berlin Township 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 Downriver system to increase redundancy on this branch of the system.

Scope of Work Install approximately 6 Miles of 16-inch transmission main and 3 Miles of 24-inch transmission main from along the Electric Avenue corridor to parallel the existing transmission system in this branch of the system.

Challenges Assuming ownership of the 24-inch transmission main through the City of Trenton may require condition assessment of this portion of pipeline.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0				297	964	3,051	10,763	22,122	0	37,197
2020	0	0		0	297	964	3,051	10,763	22,122	0	37,197

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **44**

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance 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. 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. A new flow control station is needed at the intersection of Carrie and Nevada 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.

Scope of Work Project includes inspection and rehab of the 7 Mile/Nevada Transmission Main and construction of a new flow control station at Carrie/Nevada.

Challenges Work will be required within crowded right-of-way within the Nevada/Carrie Intersection

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0			1,040	6,050	6,910	3,750	2,750		20,500

CIP Number: 132001

Project Title Wick Road Booster Pumping Station Rehabilitation

Project Status Pending Closeout

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Wayne County - Outside Detroit

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 0



Wick Road Station

Project Significance Provides improved control on the far-western portion of the transmission system.

Scope of Work Rehab 3 pumps and added VFDs and related controls system upgrades

Challenges Complicated control programming of VFDs and HVAC system.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	13452	250							0	0	13,702
2019	0		147							0	147
2020	0	0	130	35	0	0	0	0	0	0	165

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 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **70.8**



Isolation gate valves

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance Project needed to provide isolation of the existing pumping units from the distribution and transmission system during pumping unit and discharge flow control valve maintenance. Existing conditions require three pumping units to be taken out of service to

Scope of Work Currently there is no means to isolate individual pumping units at the West Service Center. Maintenance on individual units require taking out entire high or intermediate pumping systems without isolation valves.

Challenges Sequence of construction and meeting system demands will need to be coordinated with operations and on-going work to repurpose the Northeast WTP.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			521	1,000					0	0	1,521
2019	0	66	147	1,229	96					0	1,538
2020	0	0	138	1,186	490	0	0	0	0	0	1,814

CIP Number: 132004

Project Title North Service Center Pumping Station - Hydraulic Surge Control

Project Status Pending Closeout

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**

Project Score 28.2

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance 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 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.

Challenges Coordination with operations and customers necessary to complete the work.



Observed pressure data from meter at the border of Warren and Madison Heights.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		200	500	2,000	100				0	0	2,800
2019	0	75	157							0	232
2020	0	0	215	0	0	0	0	0	0	0	215

CIP Number: 132006

Project Title Ford Road Pumping Station, Pressure and Control Improvements

Project Status Active
Class Lvl 1 Water
Class Lvl 2 SCC
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 43.4

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell



Ford Road Booster Pumping Station

Project Significance Design of pressure and flow control equipment for efficient delivery of consistent pressures to wholesale customers at Ford Road water booster pumping station

Scope of Work The work involves designing variable speed pumping equipment and controls on line and reservoir pumping units to better match water demands to efficiently provide consistent pressures and flows to wholesale customers in the service area.

Challenges N/A - Under Procurement

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 132007

Project Title Imlay Pumping Station - Energy Management: Freeze Protection Pump Installation

Project Status Active
Class Lvl 1 Water
Class Lvl 2 SCC
Class Lvl 3 Pump Station/Reservoir
Location Lapeer County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 37.6



Imlay Pump Station

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell

Project Significance Project driven by eliminating the application of using existing large pumping units to recirculate and maintain water quality in the existing reservoir during low demand season. Project reduces operating costs, maintains water quality and reduces operating costs, maintains water quality and reduce operating complexity.

Scope of Work The purpose of this project is to minimize the electrical peak demand power charges associated with cycling water in the reservoir during low-demand periods. Rather than running a 6,000 HP motor-driven pump for a few minutes daily, a 150 HP motor-driven pump can run for a few hours to do the same work much less expensively.

Challenges None.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			200	500	300				0	0	1,000
2019	0			38	385	134				0	557
2020	0	0	9	14	592	1,315	230	0	0	0	2,160

CIP Number: 132008

Project Title Various Pumping Stations - Needs Assessment Study

Project Status Active
Class Lvl 1 Water
Class Lvl 2 SCC
Class Lvl 3 Pump Station/Reservoir
Location Multiple Counties

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing
Project New To CIP

Project Score 51.2

Project Engineer/Manager Erich Klun
Manager Grant Gartrell



Example of a large pipe and valve installation

Project Significance The work includes a comprehensive needs assessment and hydraulic modeling to determine future station capacities for the nineteen (19) water booster pumping station facilities. Study will include assessment of existing condition and providing list of improvements, upgrading the following items: Facility HVAC and Lighting, Pumping System, Electrical Switch Gear, Instrumentation, Control and Ovation, Fire Protection and Alarms, etc.

Scope of Work 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.

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)

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for CIP years 2018, 2019, and 2020.

CIP Number: 132010

Project Title West Service Center Pumping Station - Reservoir, Reservoir Pumping, and Division Valve Upgrades

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **54**

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance 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 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.

Challenges 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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			7,600	4,200					0	0	11,800
2019	0				2,620	7,430	15,570	8,910	2,606	0	37,136
2020	0	0		0	2,620	7,430	15,570	8,910	2,606	0	37,136

CIP Number: 132012

Project Title Ypsilanti Booster Pumping Station Improvements

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 SCC
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 61.2



Ypsilanti Pump Station

Project Engineer/Manager Jorge Nicolas
Manager Grant Gartrell

Project Significance Ypsilanti does not have a generator and needs one in the event of a power outage in order to help maintain pressures. The pumps, motors and electrical system are original to the facility and are past their useful service life. The electrical system requires substantial maintenance to keep it in service. Replacement of the motors and electrical system will improve the reliability of the station. In addition, the station does not have a sewer discharge, which is required in order to enable any underground construction due to dewatering discharges.

Scope of Work Replace pumps, motors, drive, switchgear with new. Install a new discharge sewer, backup generator and bypass for the station.

Challenges Contaminated groundwater at the site. No existing sanitary, storm or combined sewer at the site. A NPDES permit will be required to discharge treated groundwater to a surface water of the state for all construction dewatering operations.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0			93	606	820	2,594	4,134	900	0	9,147
2020	0	0	4	28	585	865	2,855	4,205	1,319	0	9,861

CIP Number: 132013

Project Title Adams Road Pumping Booster VFD & Gate Valves to Optimize Service Delivery

Project Status Cancelled

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP

Project Score

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance Provide new VFDs to meet variable system demands with respect to pressure (improve customer service) and replace gate valves with new more reliable valves.

Scope of Work Install new VFDs and replace existing gate valves.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0				148	531	531	348		0	1,558
2020	0	0								0	0

CIP Number: 132014

Project Title Adams Road Booster Pumping Station Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **56.6**

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance Existing pumps, motors and electrical gear for station power are beyond their useful service life and require replacement to maintain station reliability.

Scope of Work Provide new pumps, high-efficiency electric motors and electrical gear for entire station.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0						21	1,030	4,625	0	5,676
2020	0	0		0	0	0	21	1,029	2,312	2,312	5,674

CIP Number: 132015

Project Title Newburgh Road Booster Pumping Station Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Wayne County - Outside Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 56.6

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance Existing pumps, motors and electrical gear are beyond useful service life. Replacement will provide new equipment that is more reliable, energy efficient and optimally sized for system demands. Other improvements involve building mechanical equipment replacement again because of surpassing useful life.

Scope of Work Replace all existing pumps, motors, VFDs, electrical gear and building mechanical equipment with new.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0				607	2,396	2,396	2,396	4,375	0	12,170
2020	0	0		0	16	621	2,396	2,396	2,429	4,311	12,169

CIP Number: 132016

Project Title North Service Center Pumping Station Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **58.2**

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance Recondition line pumps L-2 through L-6, add VFD, replace existing valves and electrical gear with new due to equipment being past useful service life in order to provide more reliable equipment.

Scope of Work Rehabilitate line pumps L-2 through L-6, replace motors and electrical gear with new. Work involves process mechanical and electrical upgrades.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0						6	4,520	20,394	0	24,920
2020	0	0		0	0	0	0	6	6,325	18,589	24,920

CIP Number: 132017

Project Title North Service Center Booster Pump Station - On-Site & Off-Site Yard Piping & Valve Replacement

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 57.8

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance 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 Replace existing yard valves and yard piping with new.

Challenges Maintenance of facility operations during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0				6	2,300	2,506	264		0	5,076
2020	0	0		0	6	2,300	2,506	264	0	0	5,076

CIP Number: 132018

Project Title Schoolcraft Booster Pumping Station Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Wayne County - Outside Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 56.6

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance The existing pumps, yard piping and station valves are past their useful service life and require replacement to maintain reliable station operations. Existing belt drain underdrain system protects reservoir from floating when empty so underdrain system must perform to prevent catastrophic damage to reservoirs.

Scope of Work Replace existing station pumps, yard valves, select yard piping, and rehabilitate reservoir underdrain system.

Challenges Maintenance of facility operations during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0					10	1,916	2,085	6,553	0	10,564
2020	0	0		0	0	10	1,958	2,048	3,048	3,500	10,564

CIP Number: 132019

Project Title Wick Road Booster Pumping Station - Switchgear, Control Valves and Hydropneumatic Tank Replacement

Project Status Future Planned
Class Lvl 1 Water
Class Lvl 2 SCC
Class Lvl 3 Pump Station/Reservoir
Location Wayne County - Outside Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 56.6

Project Engineer/Manager TBD
Manager Grant Gartrell

Project Significance Existing switchgear, control valves and hydropneumatic tank at station is beyond useful service life and requires replacement to maintain station reliability
Scope of Work Replace station electrical switchgear, L-1 control valve and related controls, hydropneumatic tank and related controls for operation of all station control valves
Challenges Maintenance of station operations during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0						6	1,009	4,555	0	5,570
2020	0	0		0	0	0	6	1,009	4,554	0	5,569

CIP Number: 132020

Project Title Franklin Booster Pumping Station - Isolation Gate Valves & Electrical Actuator Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Oakland County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 56.6

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance Existing gate valves, pumps, motors, and valve operators are beyond useful service life and require replacement to maintain reliable station.

Scope of Work Replace existing station pumps, motors, valves, valve operators, and electrical

Challenges Maintenance of station operation during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0						846	2,009	7,315	0	10,170
2020	0	0		0	0	0	0	0	0	10,109	10,109

CIP Number: 132021

Project Title Imlay Booster Pumping Station - Replace Pumps, Motors, VFDs, and HVAC System

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Lapeer County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **58.2**

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance Existing pumps, motors, VFDs and HVAC system need replacement in order to maintain reliability in the station's operation.

Scope of Work Replace existing VFDs with new, chiller system VFD cooling, and replace existing station HVAC system.

Challenges 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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0							6	12,103	0	12,109
2020	0	0		0	0	0	0	6	2,103	10,000	12,109

CIP Number: 132022

Project Title Joy Road Booster Pumping Station, Reservoir Pumping System Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location Wayne County - Outside Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 56.6

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell

Project Significance Existing reservoir pumps, motors and associated valves are past their useful service life and require replacement to maintain station reliability. In addition, the existing header is heavily corroded and as a result also needs replacement.

Scope of Work Replace the station's reservoirs pumps, motors, valves, valve operators, and header with new.

Challenges Maintaining station operations during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0							6	6,103	0	6,109
2020	0	0		0	0	0	0	6	6,103	0	6,109

CIP Number: 132023

Project Title Reservoir Inspection, Design & Rehabilitation @ WWP and NEWTP; and Wick, Schoolcraft, Northwest, North

Project Status Reclassified
Class Lvl 1 Water
Class Lvl 2 SCC
Class Lvl 3 Pump Station/Reservoir
Location Multiple Counties

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**

Project Score 47

Project Engineer/Manager TBD
Manager Grant Gartrell

Project Significance This project is combined into a new overall Reservoir Rehabilitation Project.

Scope of Work Conduct inspections and execute any necessary rehabilitation of the reservoirs that results from the inspection work as directed and approved by GLWA.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0						449	554	18,106	0	19,109
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 132024

Project Title Reservoir Inspection, Design and Rehabilitation @ Adams, East-side, Farmington, Ford Road, Franklin, Haggerty

Project Status Reclassified
Class Lvl 1 Water
Class Lvl 2 SCC
Class Lvl 3 Pump Station/Reservoir
Location Multiple Counties

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**

Project Score 47

Project Engineer/Manager TBD
Manager Grant Gartrell

Project Significance Existing reservoirs need to be inspected and any necessary rehabilitation conducted every 5 years according to MDEQ guidelines; and in order to assure that reservoirs are protective of drinking water quality.

Scope of Work Conduct inspections and execute any necessary rehabilitation of the reservoirs that results from the inspection work as directed and approved by GLWA.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0						449	554	18,106	0	19,109
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 132025

Project Title Northwest Booster Station Yard Piping Improvements

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 SCC

Class Lvl 3 Pump Station/Reservoir

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **63.6**

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell

Project Significance 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 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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0				50	1,700	3,750			5,500

CIP Number: 161001

Project Title Water Master Plan Update

Project Status Closed

Class Lvl 1 Water

Class Lvl 2 General Purpose

Class Lvl 3 General Purpose

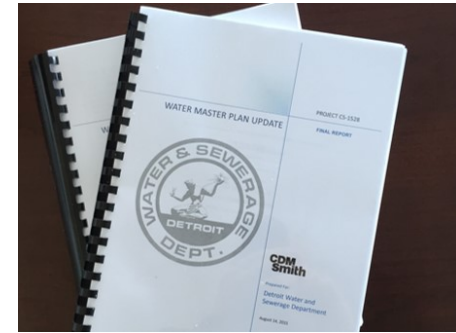
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score

Project Engineer/Manager Grant Gartrell

Manager Grant Gartrell



Previous Water Master Plan

Project Significance Road map to maintain and improve the overall system performance on a cost-efficient basis

Scope of Work This project consists of the update of the 2004 Water Master Plan including a review of current and ongoing studies, regulatory mandates under the Clean Water Act and State of Michigan, contractual obligations to the customers and Department policies.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		290							0	0	290
2019	0	330							0	0	330
2020	0	0	0	0	0	0	0	0	0	0	0

CIP Number: 170100

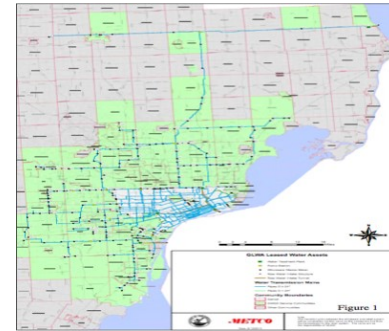
Project Title Water Treatment Plant /Pump Station Allowance

Project Status Active
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 64.4



GLWA Water Service Area

Project Engineer/Manager Grant Gartrell

Manager Grant Gartrell

Project Significance This allowance is reserved for unplanned, emergency and critical project needs that need to be addressed quickly.

Scope of Work 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		10,000	10,000	20,000	20,000	19,650	12,645		0	0	92,295
2019	0	6,777	1,597	4,296	3,058	3,144	3,000	3,000	15,000	0	39,872
2020	0	0	6,635	3,176	3,000	3,000	3,000	3,000	3,000	15,000	39,811

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 20



Example of concrete testing

Project Engineer/Manager Peter Fromm

Manager Grant Gartrell

Project Significance Provides readily accessible, qualified testing and inspection services for unforeseen and minor projects

Scope of Work 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.

Challenges N/A - Under Procurement

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			500	500	500				0	0	1,500
2019	0		172	472	572	572				0	1,788
2020	0	0	2	472	572	572	0	0	0	0	1,618

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score



Project Engineer/Manager Jeffrey Dorsey
Manager Terry Daniel

Project Significance 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 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.

Challenges Standardization of multiple different data process equipment already installed throughout the 5 plants could be a problem.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			1,500	1,500	1,500	1,500	1,500		0	0	7,500
2019	0	13	1,425	61	1,561	1,561	1,561	1,514	105	0	7,801
2020	0	0	1,377	61	1,561	1,561	1,561	1,514	105	0	7,740

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
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP

Project Score 0

Project Engineer/Manager Todd King
Manager Todd King



Example of a failed water main

Project Significance Assessing, rehabilitating or replacing aging transmission mains in the water system

Scope of Work 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			10,000	11,000	9,000	11,000	9,000		0	0	50,000
2019	0	1,075	229	1,000	1,500	2,000	2,000	2,000	2,000	0	11,804
2020	0	0	156	1,000	1,500	2,000	2,000	2,000	2,000	100,000	110,656

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
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**

Project Score 66.8



A large valve for a transmission pipe

Project Engineer/Manager Todd King

Manager Todd King

Project Significance 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 Evaluate the existing conditions, provide the necessary replacement/ rehabilitation option, design and implement them.

Challenges May require shutdown of large transmission mains.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			2,930	3,100	3,100	3,100	3,100		0	0	15,330
2019	0		2,000	4,000	4,000	3,274	726	4,000	4,000	0	22,000
2020	0	0	3,430	4,000	4,000	3,274	4,000	4,000	4,000	10,000	36,704

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**

Project Score

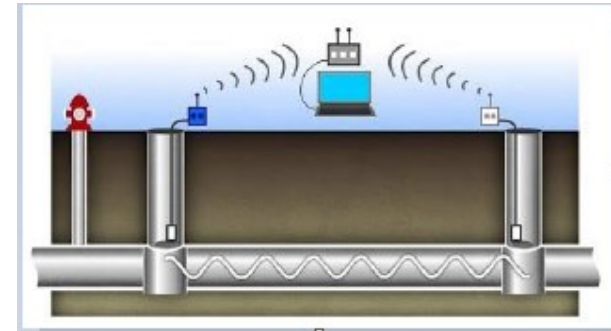
Project Engineer/Manager Todd King

Manager Todd King

Project Significance 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 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.

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



Example of pressure main assessment technology

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			2,626	2,000	2,000	2,000	2,000		0	0	10,626
2019	0		2,627	2,501	3,001	4,001	4,001	5,001	5,001	0	26,133
2020	0	0		2,500	3,000	4,000	4,000	5,000	5,000	25,000	48,500

CIP Number: 170700

Project Title Reservoirs Inspection, Repair and Rehabilitation Program

Project Status Closed
Class Lvl 1 Water
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP



A GLWA reservoir

Project Score

Project Engineer/Manager Timothy Kuhns

Manager Grant Gartrell

Project Significance Identifying issues that may have a direct impact on water quality due to interior/exterior structural failure

Scope of Work The work provides for all Pumping Stations, study, design, and construction contract documents for rehabilitation and upgrades, and management services related to construction including award of contract, inspection during construction, and furnishing all construction work through provisional allowance for sub agreements.

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	9571	2,316	88						0	0	11,975
2019	0	12,914	1,417							0	14,331
2020	0	0	12,977	0	0	0	0	0	0	0	12,977

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Eric Kramp

Manager Grant Gartrell

Project Significance This project merges all CIPs associated with Reservoir Rehabilitation except 170800 into a single, Omnibus 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.

Scope of Work The contract will provide inspection and maintenance of the existing 23 of 33 potable water storage tanks in the system.

Challenges Considerable plant, transmission system, and Jurisdiction Haven Authority buy-in is required to perform this contract. Isolation of the Reservoir has been a challenge for GLWA and its predecessor agency.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		50	3,300	2,550	2,550	2,550			0	0	11,000
2019	0		39	472	753	4,510	4,340	4,340	4,645	0	19,099
2020	0	0		482	5,128	5,211	5,182	3,888	5,495	33,778	59,164

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
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing
Project New To CIP

Project Score 20

Project Engineer/Manager Chandan Sood
Manager Chandan Sood



Example of a Water Meter

Project Significance Improving meter data reliability, ensuring accurate billing, improving customer service and allow high quality analysis of the system

Scope of Work 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.

Challenges Requires temporary shutdown of the water supply through the meter

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 171000

Project Title LH - WTP Sanitary Survey Improvements

Project Status Reclassified

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Saint Clair County

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Grant Gartrell

Manager Grant Gartrell

Project Significance Address the sanitary survey needs that are identified by the MDEQ as part of its 3-year rotation of plant sanitary surveys where regulatory needs are identified.

Scope of Work Design and construct improvements or modifications to plant process facilities that may be identified by the MDEQ during its 3-year cycle of sanitary surveys.

Challenges Possible negotiations with MDEQ on items they identify in sanitary surveys that GLWA may take exception.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0			45	49	49	49	49	247	0	488
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 171100

Project Title NE - WTP Sanitary Survey Improvements

Project Status Reclassified

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **0**

Project Engineer/Manager Govind Patel

Manager Grant Gartrell

Project Significance Address the sanitary survey needs that are identified by the MDEQ as part of its 3-year rotation of plant sanitary surveys where regulatory needs are identified.

Scope of Work Design and construct improvements or modifications to plant process facilities that may be identified by the MDEQ during its 3-year cycle of sanitary surveys.

Challenges Possible negotiations with MDEQ on items they identify in sanitary surveys that GLWA may take exception.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0		6	75	79	79	79	79	399	0	796
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 171200

Project Title SW-WTP Sanitary Survey Improvements

Project Status Reclassified

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Wayne County - Outside Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **0**

Project Engineer/Manager Shakil Ahmed
Manager Grant Gartrell

Project Significance Address the sanitary survey needs that are identified by the MDEQ as part of its 3-year rotation of plant sanitary surveys where regulatory needs are identified.

Scope of Work Design and construct improvements or modifications to plant process facilities that may be identified by the MDEQ during its 3-year cycle of sanitary surveys.

Challenges Possible negotiations with MDEQ on items they identify in sanitary surveys that GLWA may take exception.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0			6	75	79	79	79	399	0	717
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 171300

Project Title WWP - WTP Sanitary Survey Improvements

Project Status Reclassified

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager TBD

Manager Terry Daniel

Project Significance Address the sanitary survey needs that are identified by the MDEQ as part of its 3-year rotation of plant sanitary surveys where regulatory needs are identified.

Scope of Work Design and construct improvements or modifications to plant process facilities that may be identified by the MDEQ during its 3-year cycle of sanitary surveys.

Challenges Possible negotiations with MDEQ on items they identify in sanitary surveys that GLWA may take exception.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0			45	49	49	49	49	247	0	488
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 171400

Project Title Energy Management Program @ All Water Facilities

Project Status Future Planned

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance Existing lighting systems at most facilities are energy inefficient. Replacement with new, modern LED lighting type systems will reduce electrical usage and costs.

Scope of Work Replace existing lighting fixtures with new lighting fixtures at the water plants and water booster pumping stations.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0					520	693	693	5,094	0	7,000
2020	0	0		0	0	0	0	693	693	4,401	5,787

CIP Number: 171500

Project Title Roof Replacement - Various Water Facilities

Project Status Active

Class Lvl 1 Water

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance This CIP 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 due to their poor condition. Replacement is needed to protect building interiors and sensitive electrical equipment.

Scope of Work Replace existing roofs with new built-up roofing systems.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0			111	986	210	24	1,159	24,756	0	27,246
2020	0	0	50	0	2,657	0	0	0	2,000	2,000	6,707

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Nicolas Nicolas

Manager Philip Kora



Pipe Gallery

Project Significance Rehabilitation for meeting NPDES Permit and NEC requirements

Scope of Work 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.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		10,848	12,097	20,990	7,968				0	0	51,903
2019	0	10,243	12,983	16,107	8,671	6,033				0	54,037
2020	0	0	25,098	18,724	7,982	3,054	0	0	0	0	54,858

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
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**



Pump Station 2

Project Score

Project Engineer/Manager Vinod Sharma

Manager Philip Kora

Project Significance Correct drifting issues of pumps and meet long term wet weather capacity needs

Scope of Work This project involves evaluating and recommending alternatives for providing more reliable pumping capacity at Pump Station No. 2 for Pumps Nos. 11 and 14.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	456	1,157	1,304	616					0	0	3,533
2019	0	109	599	2,454	621					0	3,783
2020	0	0	322	2,268	1,222	0	0	0	0	0	3,812

CIP Number: 211003

Project Title WRRF Rehabilitation of Primary Clarifiers

Project Status Reclassified
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**



Primary Clarifiers

Project Engineer/Manager Nicolas Nicolas

Manager Philip Kora

Project Significance Rehabilitation to maintain NPDES permit capacity and addressing excessive, maintenance induced downtime

Scope of Work This project includes rehabilitation of sludge and scum collectors, replacement of sludge conveyance equipment, and sludge cross scum and collectors for the rectangular clarifiers. The scope of work also includes concrete crack repair on floor, wall, and ceiling.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	1	220	240	120					0	0	581
2019	0	1,702	272	201	56					0	2,231
2020	0	0		0	0	0	0	0	0	0	0

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
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**



Rack and Grit

Project Engineer/Manager Partho Ghosh

Manager Philip Kora

Project Significance Rehabilitate aging rack and grit system for efficient removal of grit to reduce loading on downstream process areas

Scope of Work 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.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	13887	2,303	2,652	2,652					0	0	21,494
2019	0	20,944	3,648	2,752	303					0	27,647
2020	0	0	24,505	1,824	869	0	0	0	0	0	27,198

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 72.8

Project Engineer/Manager Alfredo Lava

Manager Ali Khraizat



Main Raw Sewage Pumps at Pump Station 2

Project Significance This project will improve the pump reliability of PS-2 to meet the NPDES permit flow capacity requirements.

Scope of Work 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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			600	1,700	4,800	3,700			0	0	10,800
2019	0		7		515	115	9,294	9,101	3,055	0	22,087
2020	0	0	0	0	0	684	711	611	8,668	10,925	21,599

CIP Number: 211006

Project Title WRRF PS No. 1 Improvements

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 75



Pump Station 1 Interior

Project Engineer/Manager Alfredo Lava

Manager Ali Khraizat

Project Significance Condition assessment and rehabilitation of all pumps at Pump Station No. 1 to increase efficiency and reliability.

Scope of Work 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.

Challenges Maintaining the adequate pumping capacity during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			600	5,350	5,125	2,054			0	0	13,129
2019	0			500	1,800	2,462	9,394	9,245	719	0	24,120
2020	0	0		498	1,803	2,325	8,424	8,370	811	84	22,315

CIP Number: 211007

Project Title WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 65.2

Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat



WRRF Pumping Station 2: Bar Racks and Grit Collection System

Project Significance Replacement of all bar racks and associated equipment for more reliable and efficient operations. Improvements to the grit collection system will prevent the grit affecting the downstream equipment. These improvements will enable WRRF to be in compliance with NPDES permit.

Scope of Work The work consists of evaluation, design and construction for the replacement of Bar Racks and Grit Collection System including their associated motors and electrical panels as necessary to meet the long-term wet weather capacity requirements at the PS-2.

Challenges 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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			650	2,900	3,300	2,817			0	0	9,667
2019	0			7	402	1,980	2,404	6,956	8,814	0	20,563
2020	0	0		6	269	1,329	2,039	6,306	7,838	49	17,836

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

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**

Project Score 74.2



Ferric Chloride Tanks at Pump Station 1

Project Engineer/Manager Ravi Yelamanchi

Manager Ali Khraizat

Project Significance 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 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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			400	1,400	5,200	2,000	633		0	0	9,633
2019	0			7	115	1,259	2,732	5,537	2,363	0	12,013
2020	0	0	12	1,021	2,950	4,983	1,600	0	0	0	10,566

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 52.8

Project Engineer/Manager Ali Khraizat

Manager Ali Khraizat



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

Project Significance 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 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			266	324	1,870	2,671	2,670	2,679	0	0	10,480
2019	0				7	859	572	5,796	5,005	0	12,239
2020	0	0		0	0	778	619	5,237	4,725	35	11,394

CIP Number: 212001

Project Title WRRF Returned Activated Sludge (RAS) Pumps, Influent Mixed Liquor System and Motor Control Centers (MCC)

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Secondary Treatment & Disinfection
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Nicolas Nicolas

Manager Philip Kora



Return activated sludge pump and Motor Control Center building

Project Significance Replace aging pump units, control and instrumentation and building enclosures

Scope of Work This project provides new power supply cable to/from secondary clarifiers and substation MCC, provides new MCCs at each secondary clarifier, provides short-circuit analysis and fault rating , replace 25 RAS pumps at the secondary clarifiers and complete all miscellaneous electrical work such as replacement of cables, conduit, pull boxes, panels and junctions boxes, etc.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	24060	115							0	0	24,175
2019	0	34,090								0	34,090
2020	0	0	34,090								34,090

CIP Number: 212002

Project Title WRRF Study, Design, & Construction Management Services for Modified Detroit River Outfall No. 2

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Secondary Treatment & Disinfection
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Alfredo Lava

Manager Ali Khraizat



DRO2 plan at WRRF

Project Significance Provide remediation and decommissioning of non-utilized portions of as-built PC-709 construction, which resulted in a flooded tunnel

Scope of Work The scope of work includes limited study, detailed design, preparation of construction plans, and construction management services necessary to implement the modified Detroit River Outfall No. 2 in accordance with NPDES Permit requirements.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	8449	33							0	0	8,482
2019	0	10,819								0	10,819
2020	0	0	10,819								10,819

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Kashmira Patel

Manager Philip Kora

Project Significance Improve aeration system and provide necessary inter-connections

Scope of Work 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.

Challenges N/A - Under Procurement



Equipment for aeration system

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		2,348	11,197	2,658					0	0	16,203
2019	0	3,805	9,273	2,719	2,523					0	18,320
2020	0	0	11,851	4,831	0	0	0	0	0	0	16,682

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

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 81.6



Chlorinator/Sulfonator buildings

Project Engineer/Manager Ali Khraizat

Manager Ali Khraizat

Project Significance 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 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".

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 212005

Project Title WRRF Rouge River Outfall No. 2 (RRO-2) Segment 1

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Secondary Treatment & Disinfection
Location City of Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**



Piece of movable dam at DRO-2

Project Engineer/Manager Partho Ghosh

Manager Philip Kora

Project Score

Project Significance Cap abandoned entrance shaft of failed DRO-2 tunnel and rehabilitate movable dams and stop logs to control wet weather flow discharge

Scope of Work The scope of work includes installation of new Stop Log-8 Gates, modification of Movable Dam MD-1, and installation of new power pack building. This project will also provide for a hydraulic actuation system for gates MD-3 A/B and SG 41-44, modification of stop logs SL-1 A/B, and replace chlorination/dechlorination tank car emergency shutoff valves. The project will further include modification of PLC based control system, capping abandoned PC-709 precast tunnel lining segments.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	12125	62							0	0	12,187
2019	0	252								0	252
2020	0	0	252								252

CIP Number: 212006

Project Title WRRF Rouge River Outfall (RRO) Disinfection (Alternative)

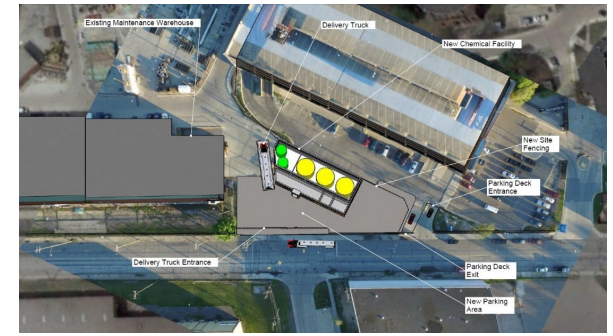
Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Secondary Treatment & Disinfection
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Darrel Field
Manager Philip Kora



Plan view of RRO location

Project Significance Provide project oversight and design build services for alternative disinfection services to meet NPDES Permit requirements at existing Rouge River Outfall

Scope of Work 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.

Challenges N/A - Under Procurement

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	729	6,530	15,800	15,520	9,020				0	0	47,599
2019	0	6,873	20,619	15,817	4,157					0	47,466
2020	0	0	26,441	17,009	4,583	0	0	0	0	0	48,033

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **53.2**

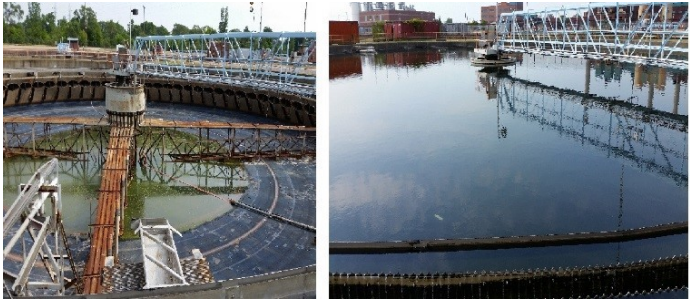
Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat

Project Significance The secondary clarifiers need to be inspected and rehabilitated for certain components such as the rake arms.

Scope of Work 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.

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.



Only one or maximum two out of total 25 secondary clarifiers can be taken out of service at a time for repairs. Secondary system has a lot of moving parts and equipment. A long term (8 years) rehabilitation program for the secondary clarifiers needs to be

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			301	3,576	5,543	5,540	5,540	10,499	0	0	30,999
2019	0				859	1,374	3,680	9,216	19,676	0	34,805
2020	0	0		0	0	0	0	71	933	29,114	30,118

CIP Number: 212008

Project Title WRRF Rehabilitation of Intermediate Lift Pumps (ILPs)

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Secondary Treatment & Disinfection
Location City of Detroit

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 72.8

Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat



Intermediate Lift Pump Station N.2

Project Significance The ILPs are old and reached the end of life cycle. The ILPs convey primary effluent to the secondary bioreactors. Therefore a replacement or rehabilitation will help to comply with the permit capacity requirement for the Secondary Process Area.

Scope of Work Feasibility study, design and construction of the existing process flow to maximize conveyance redundancy/distribution, pump sizing to accommodate dry and wet weather operations for the five intermediate lift pumps that lift primary effluent to the aeration basins for secondary treatment.

Challenges Maintaining the required wet weather secondary capacity of 930 MGD while operating efficiently during dry weather flows.

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

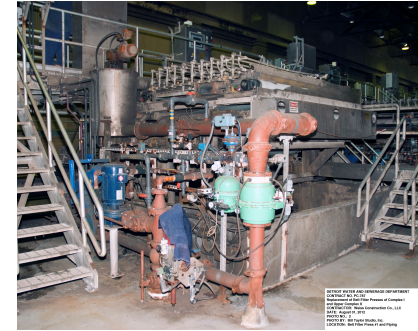
Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for 2019 and 2020.

CIP Number: 213001

Project Title WRRF Replacement of Belt Filter Presses for Complex I and Upper Level Complex II

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Residuals Management
Location City of Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**



PC 787 Belt filter presses replacement

Project Engineer/Manager Vinod Sharma / Nicolas Nicolas

Manager Ali Khraizat

Project Significance Study, design and construction assistance of equipment experiencing numerous breakdowns and for meeting permit capacities

Scope of Work The work will consist of replacements of 10 Belt Filter Presses for Complex 1 and 12 Belt Filter Presses for Complex II Dewatering, Screened Final Effluent booster pumps, sludge belt conveyors, sludge grinders, and all related supportive equipment including control panels and associated wiring.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	29	1,872							0	0	1,901
2019	0	36,669								0	36,669
2020	0	0	0								0

CIP Number: 213002

Project Title WRRF Rehabilitation of Central Offload Facility

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Residuals Management
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 76.2

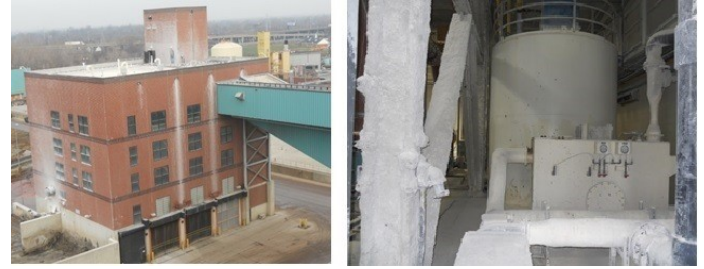
Project Engineer/Manager Partho Ghosh

Manager Philip Kora

Project Significance 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 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.

Challenges Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.



Powdered lime discharges into the COF causing lime to discharge throughout the building making the scrubber system to fail

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		800	5,850	6,750	4,350				0	0	17,750
2019	0	202	665	6,447	7,520	4,579				0	19,413
2020	0	0	982	4,204	7,696	3,297	0	0	0	0	16,179

CIP Number: 213003

Project Title WRRF Sewage Sludge Incinerator Air Quality Improvements

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Residuals Management
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

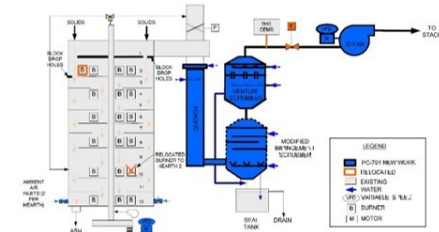
Project Engineer/Manager Kashmira Patel

Manager Philip Kora

Project Significance Provide sludge incinerations air quality improvements at Incinerator Complex II to meet NPDES Permit requirements

Scope of Work This project involves the design and construction for sludge incinerator air quality improvements at Complex II Incinerator Facility at WRRF. The scope of work includes installation of new scrubber, induced draft fan, noise reduction modification, and air quality and monitoring equipment.

Challenges N/A - Active



Schematic of incinerator air quality improvement equipment

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	33043	3,000							0	0	36,043
2019	0	50,635	459							0	51,094
2020	0	0	36,676	0	0	0	0	0	0	0	36,676

CIP Number: 213004

Project Title WRRF Biosolids Dryer Facility

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Residuals Management
Location City of Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP



New GLWA Biosolids Dryer Facility

Project Score

Project Engineer/Manager Darrel Field

Manager Philip Kora

Project Significance Allows retirement of Complex I Incinerators. Will provide significant cost savings and is the largest Biosolids dryer facility in North America

Scope of Work This project provides for study, design and construction of a thermal dryer facility with a firm capacity of 330 dry tons per day (dtpd). The scope of work also includes a conveyance system from Complex I to Complex II.

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	134190	1,691	60	26					0	0	135,967
2019	0	2,024	193	23						0	2,240
2020	0	0	2,408	22	0	0	0	0	0	0	2,430

CIP Number: 213005

Project Title WRRF Complex I Incinerators Decommissioning and Reusability

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Residuals Management

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **38.4**

Project Engineer/Manager Ravi Yelamanchi

Manager Ali Khraizat



Complex – I Incinerator Building at the WRRF

Project Significance This project will decommission the C-I Incinerators building and investigate the re-usability.

Scope of Work 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.

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 Dewa

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			900	200					0	0	1,100
2019	0					161	1,221	2,352	1,171	0	4,905
2020	0	0	43	0	0	0	0	0	0	4,409	4,452

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 67.8



Sludge Feed Pumps

Project Engineer/Manager Ravi Yelamanchi

Manager Ali Khraizat

Project Significance Improved sludge feed pumping system will provide wide range of operating conditions.

Scope of Work The scope of work includes study, design, and construction for the replacement of sludge feed pumps SFP 1, 2, 5 and 6 and other modifications to the pumping system at the WRRF.

Challenges Maintaining Plant Operational Capacity during construction.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		33	402	750					0	0	1,185
2019	0	4			57	275	2,391	1,130		0	3,857
2020	0	0	5	0		0	0	24	1,366	2,331	3,726

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **87.2**

Project Engineer/Manager Chris Breinling

Manager Philip Kora

Project Significance 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 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.

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.



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

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		1,500	9,600	7,822					0	0	18,922
2019	0		567	6,787	11,356	3,477				0	22,187
2020	0	0	871	7,159	8,711	3,308	0	0	0	0	20,049

CIP Number: 213008

Project Title WRRF Rehabilitation of the Ash Handling Systems

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 WRRF

Class Lvl 3 Residuals Management

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **57.8**

Project Engineer/Manager Alfredo Lava

Manager Ali Khraizat



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 Significance 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 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.

Challenges Maintaining the dry ash system at capacity while the wet ash system is being built will be a challenge.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			530	1,045	6,225	5,725	4,791		0	0	18,316
2019	0				687	916	3,614	6,069	9,330	0	20,616
2020	0	0		0	111	1,111	5,525	9,574	2,184	0	18,505

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 IWC
Location City of Detroit

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 62.2

Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat

Project Significance Laboratory Optimization, Continued operation of IWC and Lab, lease termination for analytical laboratory, and utilization of available space in WRRF NAB

Scope of Work Relocate Industrial Waste Control Division and Analytical Lab to New Administration Building at WRRF. Consolidate the existing Operations Lab with Analytical Lab.

Challenges Maintaining the laboratory operations during relocation.



Old IWC and Analytical Lab; new one will be built at the location of the WRRF because of Gordie Howe International Bridge Project

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 216001

Project Title Underground Electrical Duct Bank Repair and EB-1, EB-2 and EB-10 Primary Power Service Improvements

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 General Purpose
Location City of Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**



Electrical Duct Bank

Project Engineer/Manager Vinod Sharma

Manager Philip Kora

Project Significance Procure and install electrical power system to meet safety standards and provide third redundant electric feeder per NPDES permit

Scope of Work This project involves the study, design, and construction assistance work for repairing the 15KV Primary Switch Gears A & B, unit substation EB-1, EB-2, and EB-10, unit 5KV substation and switch gear DE-1, and two outdoor 3-phase primary transformers; and repair of building structure and associated components. The work will also include coordination of system shut-down, and coordination of system reconnection with new cables.

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	23037	2,575	1,532						0	0	27,144
2019	0	31,636	1,033							0	32,669
2020	0	0	32,686	0	0	0	0	0	0	0	32,686

CIP Number: 216002

Project Title Plant-wide Fire Alarm Systems Upgrade/ Integration and Fire Protection Improvements

Project Status Closed
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 General Purpose
Location City of Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**



Fire alarm system

Project Score

Project Engineer/Manager Vinod Sharma

Manager Ali Khraizat

Project Significance Install an integrated Fire Alarm system to facilitate centralized monitoring

Scope of Work This project involves the installation of an Integrated Plant-wide Fire Alarm System in approximately 100 buildings (of which 50+ have a stand-alone fire alarm system) at the WRRF in order to facilitate centralized monitoring and assure faster corrective action. The new system will be interfaced with the existing WRRF Control System.

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	5390	624							0	0	6,014
2019	0	850								0	850
2020	0	0	855								855

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

- Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project New To CIP

Project Score 82.2

Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat



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 Significance 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 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.

Challenges 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)

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for years 2018, 2019, and 2020.

CIP Number: 216006

Project Title Assessment and Rehabilitation of WRRF yard piping and underground utilities

Project Status Future Planned
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 General Purpose
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 76.4



GLWA WRRF

Project Engineer/Manager Ali Khraizat

Manager Ali Khraizat

Project Significance 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 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.

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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			1,700	2,000	12,000	15,600	16,279	4,141	0	0	51,720
2019	0				1,718	4,008	7,174	17,530	24,026	0	54,456
2020	0	0		0	323	5,258	3,849	4,500	3,500	7,423	24,853

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
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP

Project Score **82.8**

Project Engineer/Manager Phillip Kora

Manager Philip Kora

Project Significance GLWA's WWTP will have a redundant primary electrical service to power the WRRF equipment.

Scope of Work 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.

Challenges Negotiation with private property owners and testing of the automatic switch over will require co-ordination with operations.



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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			3,500	3,500					0	0	7,000
2019	0	15		2,002	1,326	3,326				0	6,669
2020	0	0	584	2,108	1,381	3,374	0	0	0	0	7,447

CIP Number: 216008

Project Title Rehabilitation of Screened Final Effluent (SFE) Pump Station

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Secondary Treatment & Disinfection
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 55.8



Project Engineer/Manager Ali Khraizat
Manager Ali Khraizat

Project Significance 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 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2020	0	0		51	1,091	991	9,475	7,805	5,535		24,948

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 Interceptors

Location Multiple Counties

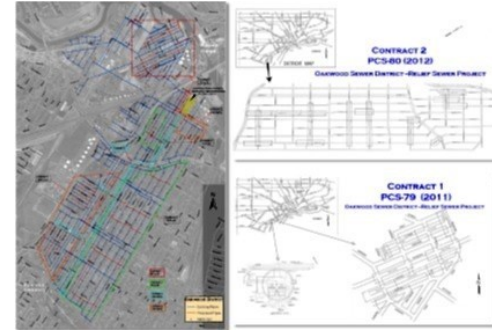
- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 51.8

Project Engineer/Manager Todd King

Manager Todd King



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 Significance 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 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.

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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018				550	2,750	5,500	2,200		0	0	11,000
2019	0				10	1,372	5,961	10,292	20,365	0	38,000
2020	0	0		0	0	0	3,800	10,077	10,077	14,077	38,031

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 Interceptors
Location City of Detroit

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 65.4

Project Engineer/Manager Mini Panicker
Manager Biren Saparia



Visual inspection of a large sewer

Project Significance 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 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.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 222003

Project Title North Interceptor East Arm (NIEA) Evaluation and Rehabilitation

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 Field Services

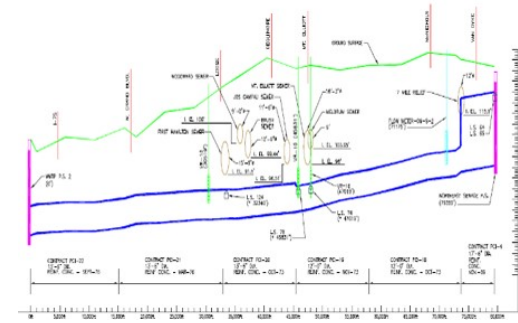
Class Lvl 3 Interceptors

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **65.4**



Elevation profile of part of the NIEA

Project Engineer/Manager Todd King

Manager Todd King

Project Significance 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 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.

Challenges NIEA may have flow control challenges for both inspection and rehabilitation.

Project Expenses Compared to Previous CIP Versions (All figures are in \$,1000's)

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			11,000	12,000	3,000				0	0	26,000
2019	0					11,000	12,000	3,000		0	26,000
2020	0	0		500	15,000	14,500	0	0	0	0	30,000

CIP Number: 222004

Project Title Collection System Infrastructure Improvements

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 Field Services
Class Lvl 3 Interceptors
Location Multiple Counties

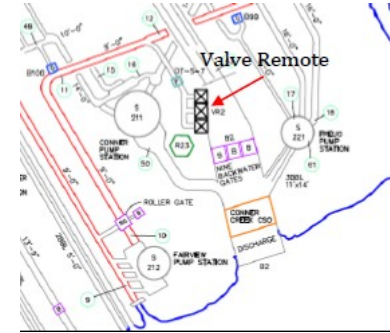
- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 68.2

Project Engineer/Manager Mini Panicker

Manager Biren Saparia



Example of a Valve Remote at Conner Pump Station

Project Significance 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 wastewater treatment plant and CSO control facilities.

Scope of Work 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			341	1,000	1,422				0	0	2,763
2019	0		341	1,019	1,014					0	2,374
2020	0	0		1,019	3,500	3,514	6,000	5,000	8,000	60,000	87,033

CIP Number: 222005

Project Title Collection System Access Hatch Improvements

Project Status Reclassified
Class Lvl 1 Wastewater
Class Lvl 2 Field Services
Class Lvl 3 Interceptors
Location Multiple Counties

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**

Project Score 56.4

Project Engineer/Manager Mini Panicker
Manager Biren Saparia

Project Significance Access Hatches are structures in the collection system to provide reliable access to buried equipment and pipe lines. Many are deteriorated and dangerous to operate.

Scope of Work Locate the deteriorating access hatches, evaluate the existing conditions, provide the necessary replacement/ rehabilitation to minimize the inflow into the collection system and underground structures. Access hatches in the collection system are installed under various projects for providing access to underground vaults and equipment.

Challenges NA

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			3,196	2,000	2,001				0	0	7,197
2019	0		341	1,000	1,422					0	2,763
2020	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.

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 Field Services

Class Lvl 3 Interceptors

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **72.8**



Example inspection of a large sewer

Project Engineer/Manager Todd King

Manager Todd King

Project Significance 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 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			7,000	7,000	7,000				0	0	21,000
2019	0			4	760	3,295	5,689	5,689	5,566	0	21,003
2020	0	0	0	0	0	0	0	0	0	0	0

CIP Number: 232001

Project Title Fairview Pumping Station - Replace Four Sanitary Pumps

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 SCC
Class Lvl 3 Pumping Stations
Location City of Detroit

- Innovation
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP**

Project Score 0



Sanitary pumps at Fairview Pumping Station

Project Engineer/Manager Jorge Nicolas

Manager Grant Gartrell

Project Significance Replacement and upgrade of pumping equipment's to improve transportation of waste water to the treatment plant

Scope of Work 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.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	128	472	2,100	14,350	15,350				0	0	32,400
2019	0	778	508	12,094	14,414	3,974				0	31,768
2020	0	0	1,551	6,000	18,000	4,891	0	0	0	0	30,442

CIP Number: 232002

Project Title Freud & Conner Creek Pump Station Improvements

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 SCC
Class Lvl 3 Pumping Stations
Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 79.6

Project Engineer/Manager Mini Panicker

Manager Biren Saparia



Freud Pump Station

Project Significance 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 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.

Challenges Meeting the collection system transport capacity during the construction

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		8,040	5,900	5,100	2,460	1,000			0	0	22,500
2019	0	2,101	1,384	1,192		223	1,582	11,000	15,000	0	32,482
2020	0	0	5,110	1,984	17,029	13,014	50,014	50,014	25,007	257	162,429

CIP Number: 232003

Project Title Northeast Pumping Station

Project Status Future Planned

Class Lvl 1 Wastewater

Class Lvl 2 SCC

Class Lvl 3 Pumping Stations

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **89**



Pump at the Northeast Pumping Station

Project Engineer/Manager Mini Panicker

Manager Biren Saparia

Project Significance 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 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.

Challenges Meeting the collection system transport capacity during the construction

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			2,408	10,920	13,000				0	0	26,328
2019	0					2,408	10,920	13,000		0	26,328
2020	0	0		1,000	7,000	10,500	10,500	2,500	0	0	31,500

CIP Number: 233002

Project Title Collection System In System Storage Devices (ISDs) Improvement

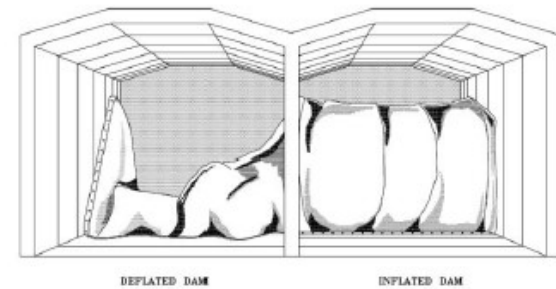
Project Status Reclassified
Class Lvl 1 Wastewater
Class Lvl 2 SCC
Class Lvl 3 In System Devices
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 50

Project Engineer/Manager Mini Panicker
Manager Biren Saparia



Inflatable dam illustration

Project Significance ISDs are operational elements in the collection system that help in storing combined sewage during wet weather events to minimize the frequency and volume of the untreated overflows and to maximize the flows to the wastewater treatment plant and CSO control facilities.

Scope of Work Assess the existing conditions of the ISD elements and their structures and rehabilitate/ replace.

Challenges These are operational elements, so flow control may be a challenge especially during wet weather periods.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			86	464	2,000	1,000			0	0	3,550
2019	0		86	82	382	2,000	1,000			0	3,550
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 251002

Project Title Wastewater System-Wide Instrumentation & Control Software and Hardware Upgrade

Project Status Reclassified
Class Lvl 1 Wastewater
Class Lvl 2 General Purpose
Class Lvl 3 General Purpose
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 70.2



Ovation hardware and screens

Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat

Project Significance This Instrumentation & Controls (I&C) system upgrade is for the operating system and miscellaneous ovation hardware upgrades. It is necessary when the old OS is no longer supported by Microsoft. Ovation needs to be upgraded too.

Scope of Work Upgrade Ovation software and miscellaneous hardware. An evaluation for the upgrade will be conducted. During the evaluation of the upgrade, the study will also consider an evaluation of Ovation's ultimate ability to meet GLWA's future needs.
 Replace Obsolete/End of Life Allen Bradley PLC5 control systems at 3 CSO Facilities (Leib, St. Aubin, 7-Mile) and upgrade critical Instrumentation. New Controllers, HMI, network components and controls system integration.
 Upgrade Ovation at 4 CSO Site(Connor, Oakwood, Baby Creek and Belle Isle) and Upgrade critical Instrumentation. Implement high performance graphics and advance alarm management and advanced process control.
 Upgrade control rooms at WRRF and CSO Sites. New consoles, HVAC, Flooring, security enhancements and lighting.

Challenges Co-ordinate with Plant and CSO operation for shutdown requests during the software and hardware upgrade.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018						3,299	2,563		0	0	5,862
2019	0			877	2,653	7,012	3,506			0	14,048
2020	0	0		0	0	0	0	0	0	0	0

CIP Number: 260100

Project Title WRRF, Lift Station and Wastewater Collection System Structures Allowance

Project Status Active
Class Lvl 1 Wastewater
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 0



WRRF

Project Engineer/Manager Beena Chackunkal
Manager Ali Khraizat

Project Significance Funding required for unplanned, emergency and critical small capital projects in the entire wastewater system

Scope of Work 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.

Challenges N/A - Allowance

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

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

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 0



An example interceptor

Project Engineer/Manager Mini Panicker

Manager Biren Saparia

Project Significance Rehabilitation and replacement program of the existing sewers and interceptors based upon structural deficiencies identified from the evaluation results. 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 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.

Challenges Large sewers and interceptors may have flow control challenges for both inspection and rehabilitation.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows for years 2018, 2019, and 2020.

CIP Number: 260300

Project Title Scheduled Replacement Program of Critical Assets

Project Status Reclassified
Class Lvl 1 Wastewater
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Score 0



Aerial view of the WRRF

Project Engineer/Manager Beena Chackunkal
Manager Ali Khraizat

Project Significance This program is to perform the scheduled replacement for critical assets and planned small capital projects (SCP) at WRRF and WW operations

Scope of Work SRP implementation procedures includes replacement for key Equipment and facilities, prepare long-range replacement schedules, yearly budget Estimates, O & M annual costs, Equipment Replacement Criteria and conclusions and recommendations.

Challenges Depending on type of project, long term or short term projects equipment or part of process areas need to shut down.

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for CIP years 2018, 2019, and 2020.

CIP Number: 260400

Project Title Sewage Meter Design, Installation, Replacement and Rehabilitation Program

Project Status Reclassified
Class Lvl 1 Wastewater
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 0

Project Engineer/Manager Chandan Sood
Manager Chandan Sood



Example of a flow meter

Project Significance Improving meter data reliability, ensuring accurate billing, improving customer service and allow high quality analysis of the system

Scope of Work Replace the existing antiquated metering equipment with new metering equipment.

Challenges Requires temporary shutdown of large sewers

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		500	500	500	500	500	500		0	0	3,000
2019	0		500	1,700	1,700	1,700	1,000	1,000	1,000	0	8,600
2020	0	0		0	0	0	0	0	0	0	0

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **72.8**

Project Engineer/Manager Mini Panicker

Manager Biren Saparia



Sewer tap piping in B009 outfall (left) and sludge buildup and poor masonry in B007 outfall (right)

Project Significance 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 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			6,000	6,000	6,000	6,000	6,000	6,000	0	0	36,000
2019	0			507	3,826	10,001	10,001	10,001	10,001	0	44,337
2020	0	0	9	4,000	15,102	17,947	10,926	15,102	15,102	11,000	89,188

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
 - Water MP Right Sizing
 - Reliability/Redundancy
 - NEWTP Repurposing
- Project New To CIP

Project Score 90.6



Retrofitted chemical feed pump replacement at Puritan-Fenkell RTB and makeshift wooden stairs to enter Basin Valve Gallery

Project Engineer/Manager Chris Nastally

Manager Chris Nastally

Project Significance 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 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: Needs Assessment, Condition Assessment, and update to the 2013 Scheduled Replacement Plan (SRP); 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.

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

CIP Number: 260600

Project Title CSO FACILITIES IMPROVEMENT PROGRAM

in current operations without the benefit of large-scale improvements of the CSO Systems. 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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		3,428	2,247	6,400	9,000	7,200	3,610		0	0	31,885
2019	0	764	1,658	9,277	6,218	2,351	4,351	9,351	11,251	0	45,221
2020	0	0	481	8,442	5,604	4,553	5,825	10,325	13,361	15,000	63,591

SECTION 3 **CENTRALIZED SERVICES**

CIP Number: 331001

Project Title Roofing Systems Replacement at Water Plants and Booster Pump Stations

Project Status Future Planned

Class Lvl 1 Centralized Services

Class Lvl 2 Facilities

Class Lvl 3 General Purpose

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score **61**



Roof in need of repair

Project Engineer/Manager Paula Anderson

Manager Paula Anderson

Project Significance 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 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.

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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		3,000	3,000	3,000	2,500				0	0	11,500
2019	0				128	169	809	1,243	4,844	0	7,193
2020	0	0		0	0	225	375	1,625	1,825	1,375	5,425

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

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

Project Score 43.8

Project Engineer/Manager Ali Khraizat

Manager Ali Khraizat



Photo of Complex – I Dewatering Roof at the WRRF.

Project Significance 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 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.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			2,200	2,060	1,060	1,050	540	2,140	0	0	9,050
2019	0			286	709	5,575	5,114			0	11,684
2020	0	0		278	1,092	4,142	4,114	41	42	0	9,709

CIP Number: 351001

Project Title Water Facility Lighting Renovations

Project Status Active
Class Lvl 1 Centralized Services
Class Lvl 2 Energy Management
Class Lvl 3 General Purpose
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 60.8



Example LED light fixture

Project Engineer/Manager TBD
Manager Grant Gartrell

Project Significance Energy savings, demand reduction improved visibility, safety, operational efficiency and worker productivity

Scope of Work Remove identified old fixtures and replace with new LED lamps and advanced control systems.

Challenges Some outfalls are below the river elevation; installation may be challenging.

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018			933	933	933				0	0	2,799
2019	0		2	1,172	1,600					0	2,774
2020	0	0		250	250	0	0	0	0	0	500

CIP Number: 361001

Project Title Consolidated Process Control System Upgrades

Project Status Closed

Class Lvl 1 Centralized Services

Class Lvl 2 Engineering

Class Lvl 3 General Purpose

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP



A system control room

Project Engineer/Manager Biren Saparia

Manager Biren Saparia

Project Significance Provide reliability, redundancy and improved functionality to department-wide Process Control System.

Scope of Work This project involves integrating the control and monitoring network throughout all of the facilities with the new SCADA system installed under PC-713. The work includes control system hardware, software, and firmware upgrade or replacement, troubleshooting, installation, start-up, testing, and repair services.

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	3928	640							0	0	4,568
2019	0	321								0	321
2020	0	0	629	0	0	0	0	0	0	0	629

CIP Number: 361002

Project Title Data Center Reliability/Availability Improvements

Project Status Closed

Class Lvl 1 Centralized Services

Class Lvl 2 Engineering

Class Lvl 3 General Purpose

Location City of Detroit

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score

Project Engineer/Manager Biren Saparia

Manager Biren Saparia

Project Significance N/A - Pending Closeout

Scope of Work N/A - Pending Closeout

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	6004	10							0	0	6,014
2019	0	33								0	33
2020	0	0	33	0	0	0	0	0	0	0	33

CIP Number: 361003

Project Title SCADA Radio Network Upgrade

Project Status Closed
Class Lvl 1 Centralized Services
Class Lvl 2 Engineering
Class Lvl 3 General Purpose
Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP**

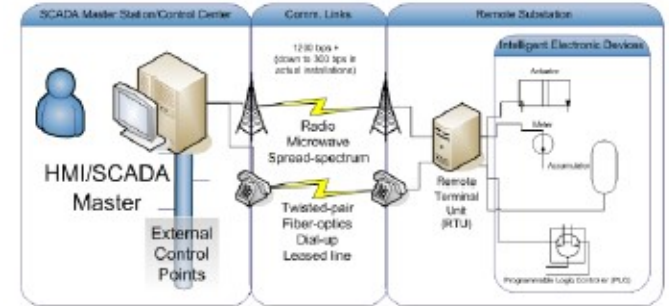
Project Score

Project Engineer/Manager Biren Saparia
Manager Biren Saparia

Project Significance N/A - Pending Closeout

Scope of Work N/A - Pending Closeout

Challenges N/A - Pending Closeout



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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	6221	218							0	0	6,439
2019	0	1,319	60							0	1,379
2020	0	0	1,320	0	0	0	0	0	0	0	1,320

CIP Number: 380400

Project Title As-needed CIP Implementation Assistance and Related Services

Project Status Active
Class Lvl 1 Centralized Services
Class Lvl 2 Programs
Class Lvl 3 Programs
Location Multiple Counties

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing



Project Score

Project Engineer/Manager Gaylor Johnson / Dan Edwards
Manager Ali Khraizat

Project Significance 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.

Scope of Work 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.

Challenges N/A - Active

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Row 1: 2018, 4770, 1,400, 100, 0, 0, 6,270

CIP Number: 380400

Project Title As-needed CIP Implementation Assistance and Related Services

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2019	0	210	500	1,606	1,606	1,606				0	5,528
2020	0	0	0	0	0	0	0	0	0	0	0

CIP Number: 380500

Project Title Wastewater General Engineering Services on an As-needed Basis

Project Status Pending Closeout

Class Lvl 1 Centralized Services

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 0

Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat



Example of pipe being laid

Project Significance Various engineering as needed services for design and replacement of aging water and sewer lines.

Scope of Work 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	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	10064	228	228						0	0	10,520
2019	0	282	114	114	91					0	601
2020	0	0	0	0	0	0	0	0	0	0	0

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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP

Project Score 0



Project Engineer/Manager Grant Gartrell
Manager Grant Gartrell

Project Significance Allowance for the study and design of critical projects throughout the system prior to bidding and construction.

Scope of Work As-needed engineering services for water and wastewater engineering.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	14012	446	436	386					0	0	15,280
2019	0	316	406	327	50					0	1,099
2020	0	0	2	94	0	0	0	0	0	0	96

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

- Project New To CIP
Innovation
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing



Example of testing being performed

Project Engineer/Manager Peter Fromm

Manager Grant Gartrell

Project Significance Design of Telegraph Rd, Wick Rd, Park-Merriman, & Schoolcraft water main projects.

Scope of Work Project utilized as the design mechanism for the Telegraph Road, Wick Road, Park-Merriman, and Schoolcraft water main projects. Also, contract has provisions for the as-needed services associated with pipeline construction projects such as testing, staking, and inspection.

Challenges N/A - Active

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

Table with 12 columns: CIP, FY16, FY17, FY18, FY19, FY20, FY21, FY22, FY23, FY24, FY25, Total. Rows show expense data for years 2018, 2019, and 2020.

CIP Number: 380800

Project Title Geotechnical and Related Services on an As-Needed Basis

Project Status Pending Closeout

Class Lvl 1 Centralized Services

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

- Project New To CIP**



Example of a pipe being laid

Project Score

Project Engineer/Manager Grant Gartrell

Manager Grant Gartrell

Project Significance As Needed geotechnical consulting services.

Scope of Work The work includes consultant services for geotechnical work on as-needed basis. The work also provides for additional engineering/ technical services as requested.

Challenges N/A - Pending Closeout

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	2441	132							0	0	2,573
2019	0	164								0	164
2020	0	0	0	0							0

CIP Number: 380900

Project Title General Engineering Services

Project Status Pending Closeout

Class Lvl 1 Centralized Services

Class Lvl 2 Programs

Class Lvl 3 Programs

Location Multiple Counties

- Innovation
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing
- Project New To CIP

Project Score 0



Analytical Lab

Project Engineer/Manager Beena Chackunkal

Manager Ali Khraizat

Project Significance As needed multi-discipline engineering services for various small scale projects at WTP and WRRF.

Scope of Work 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.

Challenges N/A - Active

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018	28	1,250	1,154						0	0	2,432
2019	0	138	572	916	425					0	2,051
2020	0	0	0	0	0	0	0	0	0	0	0

CIP Number: 381000

Project Title Energy Management: 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
- Water MP Right Sizing
- Reliability/Redundancy
- NEWTP Repurposing

Project New To CIP

Project Score 0

Project Engineer/Manager TBD

Manager Grant Gartrell

Project Significance Advanced meters for measuring power usage in real-time to reduce the electrical demands and further optimize load management practices

Scope of Work 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.



Example of an electric meter

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

CIP	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
2018		1,000	1,000	1,000	1,000	1,000	1,000		0	0	6,000
2019	0				120	120	510	878	4,372	0	6,000
2020	0	0		0	0	0	0	0	0	5,000	5,000

IX. GLOSSARY

BCE.....	Business Case Evaluations	IDF.....	Intermediate Distribution Facilities
BDF.....	Biosolids Dryer Facility	IGA.....	Investment Grade Audit
BFP.....	Belt Filter Press	ILP.....	Intermediate Lift Pumps
BGD.....	Billion Gallons per Day	ISD.....	In System Storage Device
BPS.....	Booster Pumping Station	IT.....	Information Technology
CB.....	Construction Bond	ITS.....	Information Technology and Services
CCR.....	Consumer Confidence Rule	IWC.....	Industrial Waste Control
CCTV.....	Closed-Circuit Television	LCR.....	Lead and Copper Rule
cfs.....	cubic feet per second	LED.....	Light-Emitting Diode
CIP.....	Capital Improvement Plan	LEL.....	Lower Explosive Limit
CMG.....	GLWA Capital Management Group	LIMS/PIMS.....	Laboratory Information Management System/Project Information Management System
COF.....	Central Offload Facility	LH WTP.....	Lake Huron Water Treatment Plant
CSF.....	Central Services Facility	MACP.....	Manhole Assessment Certification Program
CSO.....	Combined Sewer Overflow	MBO.....	Master Bond Ordinance
CTA.....	Common To All	MCC.....	Motor Control Centers
CWA.....	Clean Water Act	MDEQ.....	Michigan Department of Environmental Quality
DDOT.....	Detroit Department of Transportation	MDF.....	Main Distribution Facilities
DE.....	Debt Eligible	MG.....	Million Gallons
DI.....	Ductile Iron	MGD.....	Million Gallons per Day
DRI.....	Detroit River Interceptor	NAB.....	New Administration Building at the WRRF
DRO.....	Detroit River Outfall	NASSCO.....	National Association of Sewer Service Companies
dtpd.....	dry tons per day	NE WTP.....	Northeast Water Treatment Plant
DWRF.....	Drinking Water Revolving Fund	NEC.....	National Electric Code
DWSD.....	Detroit Water and Sewerage Department	NESDS.....	Northeast Sewerage Disposal System
DWSD-R.....	Specifying the new, Detroit-focused Detroit Water and Sewerage Department	NIEA.....	North Interceptor East Arm
EPA.....	United States Environmental Protection Agency	NPDES.....	US EPA National Pollutant Discharge Elimination System
GIS.....	Geographic Information System	NPL.....	US EPA National Priorities List
GLWA.....	Great Lakes Water Authority	O&M.....	Operations & Maintenance
GPS.....	Global Positioning System	OEM.....	Original Equipment Manufacturer
HVAC.....	Heating, Ventilation, and Air Conditioning		
I&C.....	Instrumentation & Controls		
I&E.....	Improvement & Extension		

O-NWI.....	Oakwood-Northwest Interceptor	SDF.....	Screening and Disinfection Facility
OSHA.....	Occupational Safety and Health Administration	SDWA.....	Safe Drinking Water Act
OWI.....	Oakwood Interceptor	SFE.....	Secondary Final Effluent
PAC.....	Powdered Activated Carbon	SFP.....	Sludge Feed Pump
PACP.....	Pipeline Assessment Certification Program	SOW.....	Scope of Work
PCCP.....	Pre-Stressed Concrete Cylinder Pipe	SPW WTP.....	Springwells Water Treatment Plant
PEAS.....	Primary Effluent to Activated Sludge	SRP.....	Scheduled Replacement Program
PLC.....	Programmable Logic Controller	SW WTP.....	Southwest Water Treatment Plant
PLD.....	Programmable Logic Device	T&O.....	Taste and Odor
PRV.....	Pressure Reducing Valve	TAC.....	Technical Advisory Committee
PS.....	Pump Station	TCR.....	Total Coliform Rule
RAS.....	Return Activated Sludge	TPC.....	Tournament Players Championship Golf Course in Dearborn
RRO.....	Rouge River Outfall	VFD.....	Variable Frequency Drive
RRO-2.....	Rouge River Outfall No. 2	VR-Gates.....	Valve Remote Gates
RTB.....	Retention Treatment Basins	WAM.....	Work and Asset Management
RVSDS.....	Rouge Valley Sewerage Disposal System	WMP.....	Water Master Plan
RWCS.....	Regional Water Transmission System	WMPU.....	Water Master Plan Update
SAMO.....	GLWA System Analytics and Meter Operations	WRRF.....	Water Resource Recovery Facility
SCADA.....	Supervisory Control And Data Acquisition (GLWA uses Ovation brand)	WSC.....	West Service Center
SCC.....	Systems Control Center	WTP.....	Water Treatment Plant
SCP.....	Small Capital Projects	WWP WTP.....	Water Works Park Water Treatment Plant
SCUBA actuators ..	Self-Contained Universal Bi-directional Actuator	WWTP.....	Wastewater Treatment Plant (old terminology)

X. APPENDICES

- Appendix A Water Business Case Evaluations
- Appendix B Sewer Business Case Evaluations
- Appendix C..... Centralized Services Business Case Evaluations