GLWA's 2022 – 2026 Capital Improvement Plan

GLWA Board Meeting

January 27, 2021, 2:00 p.m.

GLWA
Great Lakes Water Authority

OVERVIEW: Capital Improvement Plan?

- Five-year planning document with a 10-year outlook
- Requires alignment with our overall Financial Plan
- Stakeholder Input – Opportunities for Board, Member Partners & vendor community to provide input during development
- Compilation of projects from all areas of the organization
- Increased redundancy, reliability & resiliency of assets

The goal of the plan is to provide regional collaboration & planning to minimize capital expenditures while providing **the best water & sewer services to our member partners.**

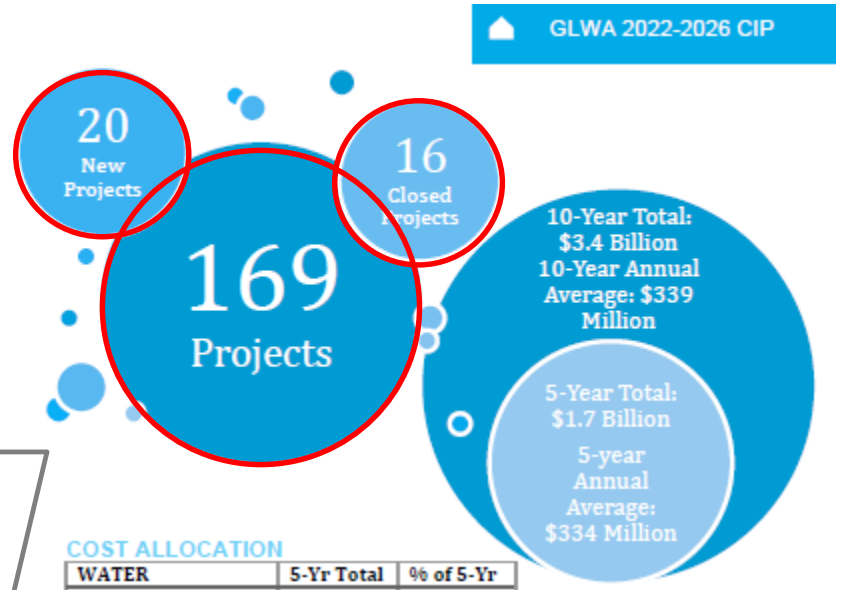
Summary

- CIP Discussion Draft No.1 submitted to GLWA, Board, and Member Outreach 10/25/20
- 2 Specific Questions & Comments received and addressed
- Draft No. 2 Released on 12/11/2020
- Feedback has been positive; the CIP has been well received
- No change in 5-year CIP planned spend
- Executive summary added to the beginning of the document

CIP At A Glance

CIP AT A GLANCE

GLWA's Capital Improvement Plan (CIP) supports the continuation of major capital asset investments 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.



WATER

CIP Document	FY2021	FY2022	FY2023	FY2024	FY 2025	FY 2026	5-Year Total
Approved Water CIP FY 2021-2025	147,567	179,920	201,894	212,849	193,187	167,750	935,417
Draft Water CIP FY 2022-2026		179,210	200,713	199,165	170,936	182,430	932,455
Difference ($)		(709)	(1,181)	(13,684)	(22,251)	14,679	(2,962)
Difference (%)		(0%)	(1%)	(6%)	(12%)	9%	-0.3%

(Figures are shown in $1,000's.)

-0.3%

WASTEWATER

CIP Document	FY2021	FY2022	FY2023	FY2024	FY 2025	FY 2026	5-Year Total
Approved Wastewater CIP FY 2021-2025	110,640	112,758	140,841	203,259	171,938	149,267	739,436
Draft Wastewater CIP FY 2022-2026		106,050	123,190	160,940	173,024	175,200	738,403
Difference ($)		(6,708)	(17,652)	(42,319)	1,085	25,932	(1,034)
Difference (%)		(6%)	(13%)	(21%)	1%	17%	(0.1%)

(Figures are shown in $1,000's.)

-0.1%

COST ALLOCATION

WATER	5-Yr Total	% of 5-Yr
CTA	911,407	97.7%
Suburban Only	21,048	2.3%
Sub-total	932,455	100.0%

WASTEWATER	5-Yr Total	% of 5-Yr
CTA	645,650	87.4%
83/17	62,778	8.5%
TBD	29,975	4.1%
Sub-total	738,403	100.0%

PLAN SPENDING SUMMARY

5-Year Total:	$1.7 Billion	10-Year Total:	$3.4 Billion
5-Year Annual Average:	$334 Million	10-Year Annual Average:	$339 Million

GLWA Great Lakes Water Authority

CIP Features

New Format Business Case Evaluation (BCE) for all projects

- Status
- Project score
- Problem Statement
- Description
- Schedule
- Projected expenditures

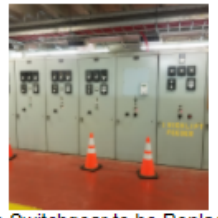
GLWA

CIP Number: 111001

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

Project Status: Project Execution - Design
Class Lvl 1: Water
Class Lvl 2: Treatment Plants and Facilities
Class Lvl 3: Lake Huron
Lookup Location: Lake Huron WTP
☐ **Project New to CIP:**

☑ **Innovation**
☐ **WW Master Plan**
☑ **Water Master Plan Right Sizing**
☑ **Redundancy**
☐ **NE WTP Repurposing**
☐ **Linear Assets Outside of Facilities**
☐ **Predecessor Project(s)**



Representative Switchgear to be Replaced under CIP 111001

Project Engineer/Manager: Eric Kramp

Director: Grant Gartrell

Project Score
71.6

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

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

Scope of Work/Project Alternatives:
This CIP will be delivered using a design-bid-build project delivery method. The project's scope of improvements will generally include rehabilitation or replacement of the following systems and equipment:
1. High and medium voltage electrical system at the facility
2. Low-lift pumps, right-sized to current and projected demands.
3. High-lift pumping units, right-sized to current and projected demands.
4. Filter wash water pumps and related equipment.
5. Phosphoric acid storage tanks and f...

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

Current Expenses (All figures are in $1,000's)

Activity Name	Total Costs	Actual Costs	Prior FYs	FY21	FY22	FY23	FY24	FY25	FY26	5 Year Total	FY27+
GLWA Salaries	$268	$48	$48	$57	$27	$26	$21	$22	$22	$117	$45
Design & Construction Assistance # 1	$10,466	$164	$164	$1,935	$1,935	$1,656	$793	$791	$791	$5,966	$2,400
Construction (Build) # 1	$46,444	$0	$0	$0	$0	$2,899	$8,052	$10,025	$10,025	$31,001	$15,443

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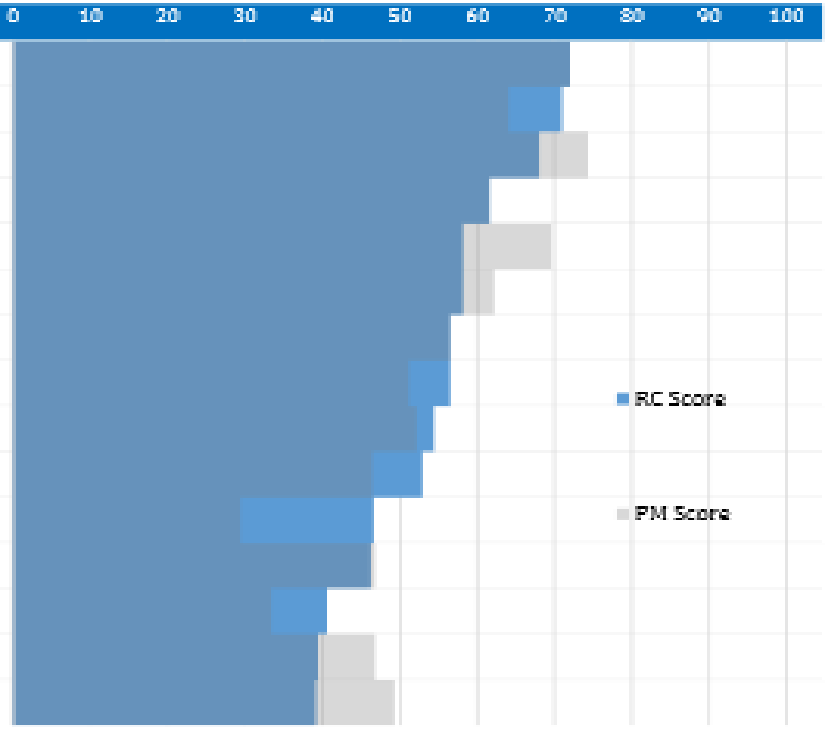
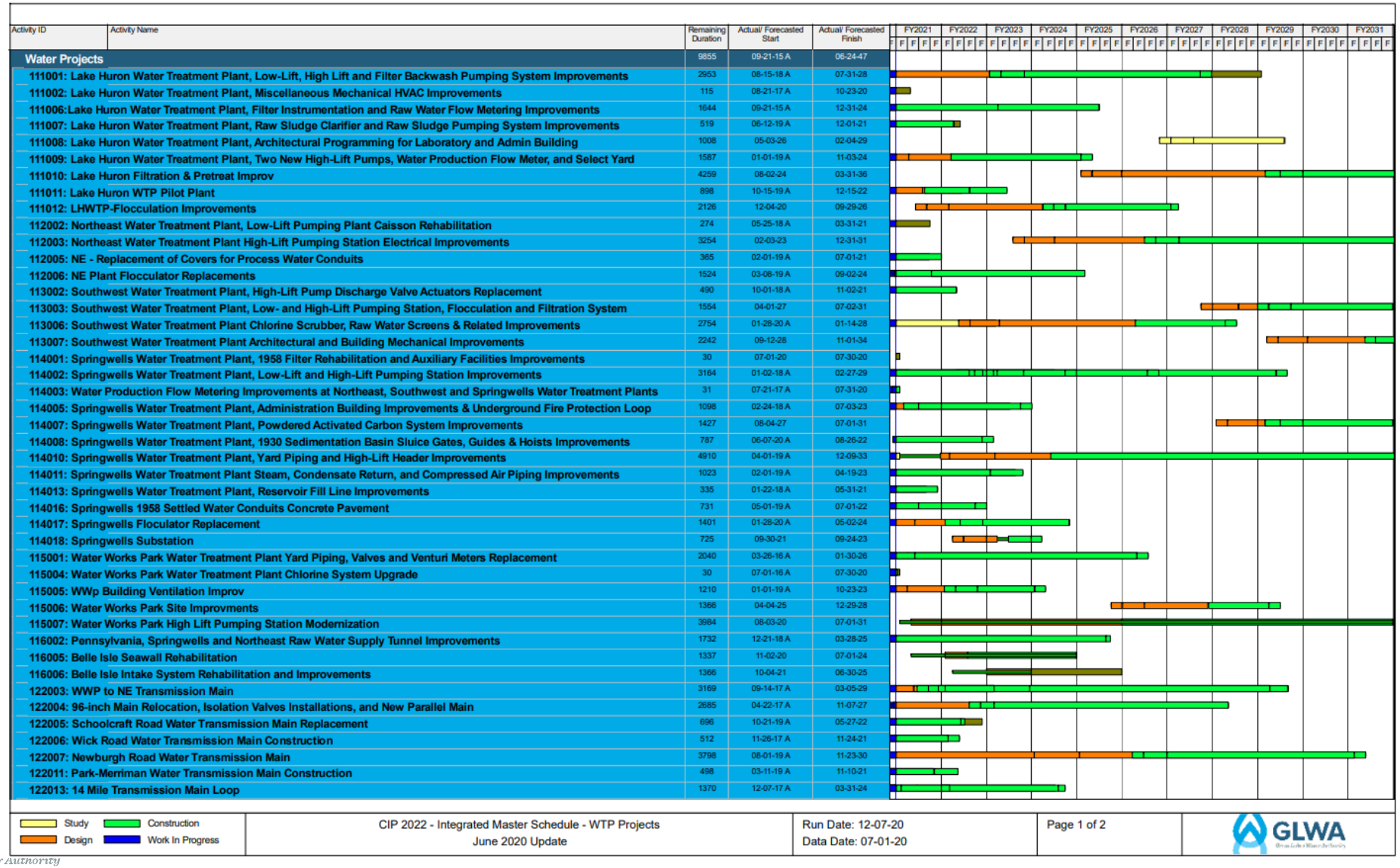
Chapter 3 – Overall project prioritization/consequence & probability of failure

Table 2. Project Manager Criteria Scores: Water

RANK	CIP NO.	TITLE	
1	111012	LHWTP-Flocculation Improvements	111012
2	111010	Filtration Improvements	111010
3	112003	NEWTP High-Lift Pumping Station Improvements	112003
4	122007	Merriman Road Water Transmission Main Loop	122007
5	132016	North Service Center Pumping Station Improvements	132016
6	132021	Imlay Pumping Station Improvements	132021
7	132022	Joy Road Pumping Station Improvements	132022
8	132018	Schoolcraft Pumping Station Improvements	132018
9	115007	Water Works Park High Lift Pumping Station Modernization	115007
10	114018	SPWTP - Service Bldg Electrical Substation and Misc. Improvements	114018
11	114007	SPWTP Powdered Activated Carbon System Improvements	114007
12	116006	Belle Isle Intake System Rehabilitation and Improvements	116006
13	111008	LHWTP, Arch. Programming for Lab and Admin Bldg Improvements	111008
14	115006	Water Works Park Site/Civil Improvements	115006
15	116005	Belle Isle Seawall Rehabilitation	116005



Integrated Master Schedule (IMS) Water



Activity ID	Activity Name	Remaining Duration	Actual/ Forecasted Start	Actual/ Forecasted Finish
Water Projects		9855	09-21-15 A	06-24-47
111001:	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements	2953	08-15-18 A	07-31-28
111002:	Lake Huron Water Treatment Plant, Miscellaneous Mechanical HVAC Improvements	115	08-21-17 A	10-23-20
111006:	Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements	1644	09-21-15 A	12-31-24
111007:	Lake Huron Water Treatment Plant, Raw Sludge Clarifier and Raw Sludge Pumping System Improvements	519	06-12-19 A	12-01-21
111008:	Lake Huron Water Treatment Plant, Architectural Programming for Laboratory and Admin Building	1008	05-03-26	02-04-29
111009:	Lake Huron Water Treatment Plant, Two New High-Lift Pumps, Water Production Flow Meter, and Select Yard	1587	01-01-19 A	11-03-24
111010:	Lake Huron Filtration & Pretreat Improv	4259	08-02-24	03-31-36
111011:	Lake Huron WTP Pilot Plant	898	10-15-19 A	12-15-22
111012:	LHWTP-Flocculation Improvements	2126	12-04-20	09-29-26
112002:	Northeast Water Treatment Plant, Low-Lift Pumping Plant Caisson Rehabilitation	274	05-25-18 A	03-31-21
112003:	Northeast Water Treatment Plant High-Lift Pumping Station Electrical Improvements	3254	02-03-23	12-31-31
112005:	NE - Replacement of Covers for Process Water Conduits	365	02-01-19 A	07-01-21
112006:	NE Plant Flocculator Replacements	1524	03-08-19 A	09-02-24
113002:	Southwest Water Treatment Plant, High-Lift Pump Discharge Valve Actuators Replacement	490	10-01-18 A	11-02-21
113003:	Southwest Water Treatment Plant, Low- and High-Lift Pumping Station, Flocculation and Filtration System	1554	04-01-27	07-02-31
113006:	Southwest Water Treatment Plant Chlorine Scrubber, Raw Water Screens & Related Improvements	2754	01-28-20 A	01-14-28
113007:	Southwest Water Treatment Plant Architectural and Building Mechanical Improvements	2242	09-12-28	11-01-34
114001:	Springwells Water Treatment Plant, 1958 Filter Rehabilitation and Auxiliary Facilities Improvements	30	07-01-20	07-30-20
114002:	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	3164	01-02-18 A	02-27-29
114003:	Water Production Flow Metering Improvements at Northeast, Southwest and Springwells Water Treatment Plants	31	07-21-17 A	07-31-20
114005:	Springwells Water Treatment Plant, Administration Building Improvements & Underground Fire Protection Loop	1098	02-24-18 A	07-03-23
114007:	Springwells Water Treatment Plant, Powdered Activated Carbon System Improvements	1427	08-04-27	07-01-31
114008:	Springwells Water Treatment Plant, 1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements	787	06-07-20 A	08-26-22
114010:	Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements	4910	04-01-19 A	12-09-33
114011:	Springwells Water Treatment Plant Steam, Condensate Return, and Compressed Air Piping Improvements	1023	02-01-19 A	04-19-23
114013:	Springwells Water Treatment Plant, Reservoir Fill Line Improvements	335	01-22-18 A	05-31-21
114016:	Springwells 1958 Settled Water Conduits Concrete Pavement	731	05-01-19 A	07-01-22
114017:	Springwells Floculator Replacement	1401	01-28-20 A	05-02-24
114018:	Springwells Substation	725	09-30-21	09-24-23
115001:	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	2040	03-26-16 A	01-30-26
115004:	Water Works Park Water Treatment Plant Chlorine System Upgrade	30	07-01-16 A	07-30-20
115005:	WWp Building Ventilation Improv	1210	01-01-19 A	10-23-23
115006:	Water Works Park Site Improvments	1366	04-04-25	12-29-28
115007:	Water Works Park High Lift Pumping Station Modernization	3984	08-03-20	07-01-31
116002:	Pennsylvania, Springwells and Northeast Raw Water Supply Tunnel Improvements	1732	12-21-18 A	03-28-25
116005:	Belle Isle Seawall Rehabilitation	1337	11-02-20	07-01-24
116006:	Belle Isle Intake System Rehabilitation and Improvements	1366	10-04-21	06-30-25
122003:	WWP to NE Transmission Main	3169	09-14-17 A	03-05-29
122004:	96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main	2685	04-22-17 A	11-07-27
122005:	Schoolcraft Road Water Transmission Main Replacement	696	10-21-19 A	05-27-22
122006:	Wick Road Water Transmission Main Construction	512	11-26-17 A	11-24-21
122007:	Newburgh Road Water Transmission Main	3798	08-01-19 A	11-23-30
122011:	Park-Merriman Water Transmission Main Construction	498	03-11-19 A	11-10-21
122013:	14 Mile Transmission Main Loop	1370	12-07-17 A	03-31-24

FY2021 FY2022 FY2023 FY2024 FY2025 FY2026 FY2027 FY2028 FY2029 FY2030 FY2031

Study Construction
Design Work In Progress

CIP 2022 - Integrated Master Schedule - WTP Projects
June 2020 Update

Run Date: 12-07-20
Data Date: 07-01-20

Page 1 of 2

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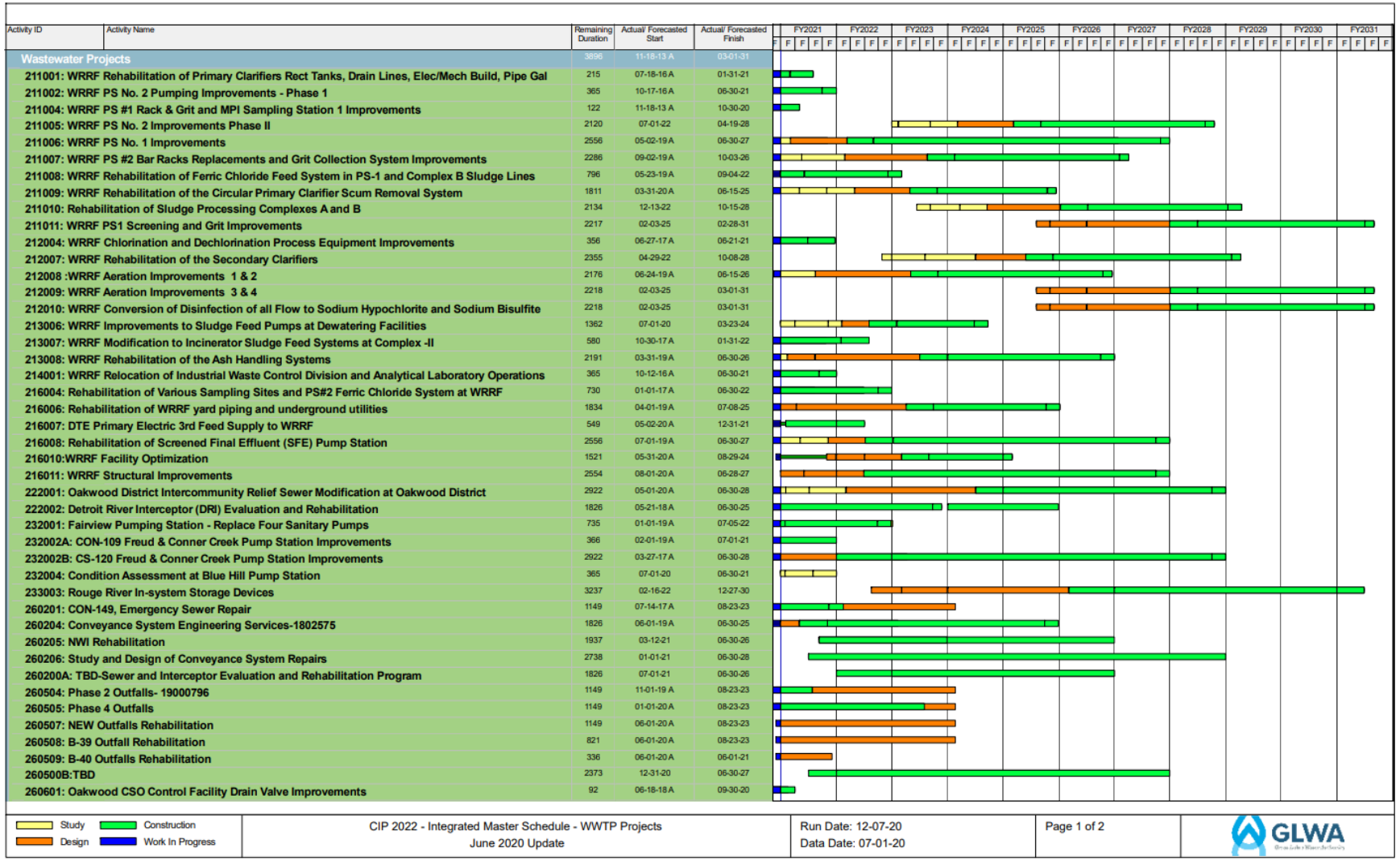
Integrated Master Schedule (IMS) Wastewater



Activity ID	Activity Name	Remaining Duration	Actual/ Forecasted Start	Actual/ Forecasted Finish
Wastewater Projects		3896	11-18-13 A	03-01-31
211001: WRRF Rehabilitation of Primary Clarifiers Rect Tanks, Drain Lines, Elec/Mech Build, Pipe Gal		215	07-18-16 A	01-31-21
211002: WRRF PS No. 2 Pumping Improvements - Phase 1		365	10-17-16 A	06-30-21
211004: WRRF PS #1 Rack & Grit and MPI Sampling Station 1 Improvements		122	11-18-13 A	10-30-20
211005: WRRF PS No. 2 Improvements Phase II		2120	07-01-22	04-19-28
211006: WRRF PS No. 1 Improvements		2556	05-02-19 A	06-30-27
211007: WRRF PS #2 Bar Racks Replacements and Grit Collection System Improvements		2286	09-02-19 A	10-03-26
211008: WRRF Rehabilitation of Ferric Chloride Feed System in PS-1 and Complex B Sludge Lines		796	05-23-19 A	09-04-22
211009: WRRF Rehabilitation of the Circular Primary Clarifier Scum Removal System		1811	03-31-20 A	06-15-25
211010: Rehabilitation of Sludge Processing Complexes A and B		2134	12-13-22	10-15-28
211011: WRRF PS1 Screening and Grit Improvements		2217	02-03-25	02-28-31
212004: WRRF Chlorination and Dechlorination Process Equipment Improvements		356	06-27-17 A	06-21-21
212007: WRRF Rehabilitation of the Secondary Clarifiers		2355	04-29-22	10-08-28
212008 :WRRF Aeration Improvements 1 & 2		2176	06-24-19 A	06-15-26
212009: WRRF Aeration Improvements 3 & 4		2218	02-03-25	03-01-31
212010: WRRF Conversion of Disinfection of all Flow to Sodium Hypochlorite and Sodium Bisulfite		2218	02-03-25	03-01-31
213006: WRRF Improvements to Sludge Feed Pumps at Dewatering Facilities		1362	07-01-20	03-23-24
213007: WRRF Modification to Incinerator Sludge Feed Systems at Complex -II		580	10-30-17 A	01-31-22
213008: WRRF Rehabilitation of the Ash Handling Systems		2191	03-31-19 A	06-30-26
214001: WRRF Relocation of Industrial Waste Control Division and Analytical Laboratory Operations		365	10-12-16 A	06-30-21
216004: Rehabilitation of Various Sampling Sites and PS#2 Ferric Chloride System at WRRF		730	01-01-17 A	06-30-22
216006: Rehabilitation of WRRF yard piping and underground utilities		1834	04-01-19 A	07-08-25
216007: DTE Primary Electric 3rd Feed Supply to WRRF		549	05-02-20 A	12-31-21
216008: Rehabilitation of Screened Final Effluent (SFE) Pump Station		2556	07-01-19 A	06-30-27
216010:WRRF Facility Optimization		1521	05-31-20 A	08-29-24
216011: WRRF Structural Improvements		2554	08-01-20 A	06-28-27
222001: Oakwood District Intercommunity Relief Sewer Modification at Oakwood District		2922	05-01-20 A	06-30-28
222002: Detroit River Interceptor (DRI) Evaluation and Rehabilitation		1826	05-21-18 A	06-30-25
232001: Fairview Pumping Station - Replace Four Sanitary Pumps		735	01-01-19 A	07-05-22
232002A: CON-109 Freud & Conner Creek Pump Station Improvements		366	02-01-19 A	07-01-21
232002B: CS-120 Freud & Conner Creek Pump Station Improvements		2922	03-27-17 A	06-30-28
232004: Condition Assessment at Blue Hill Pump Station		365	07-01-20	06-30-21
233003: Rouge River In-system Storage Devices		3237	02-16-22	12-27-30
260201: CON-149, Emergency Sewer Repair		1149	07-14-17 A	08-23-23
260204: Conveyance System Engineering Services-1802575		1826	06-01-19 A	06-30-25
260205: NWI Rehabilitation		1937	03-12-21	06-30-26
260206: Study and Design of Conveyance System Repairs		2738	01-01-21	06-30-28
260200A: TBD-Sewer and Interceptor Evaluation and Rehabilitation Program		1826	07-01-21	06-30-26
260504: Phase 2 Outfalls- 19000796		1149	11-01-19 A	08-23-23
260505: Phase 4 Outfalls		1149	01-01-20 A	08-23-23
260507: NEW Outfalls Rehabilitation		1149	06-01-20 A	08-23-23
260508: B-39 Outfall Rehabilitation		821	06-01-20 A	08-23-23
260509: B-40 Outfalls Rehabilitation		336	06-01-20 A	06-01-21
260500B:TBD		2373	12-31-20	06-30-27
260601: Oakwood CSO Control Facility Drain Valve Improvements		92	06-18-18 A	09-30-20

FY2021 FY2022 FY2023 FY2024 FY2025 FY2026 FY2027 FY2028 FY2029 FY2030 FY2031

Study Construction
Design Work In Progress

CIP 2022 - Integrated Master Schedule - WWTP Projects
June 2020 Update

Run Date: 12-07-20
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Page 1 of 2

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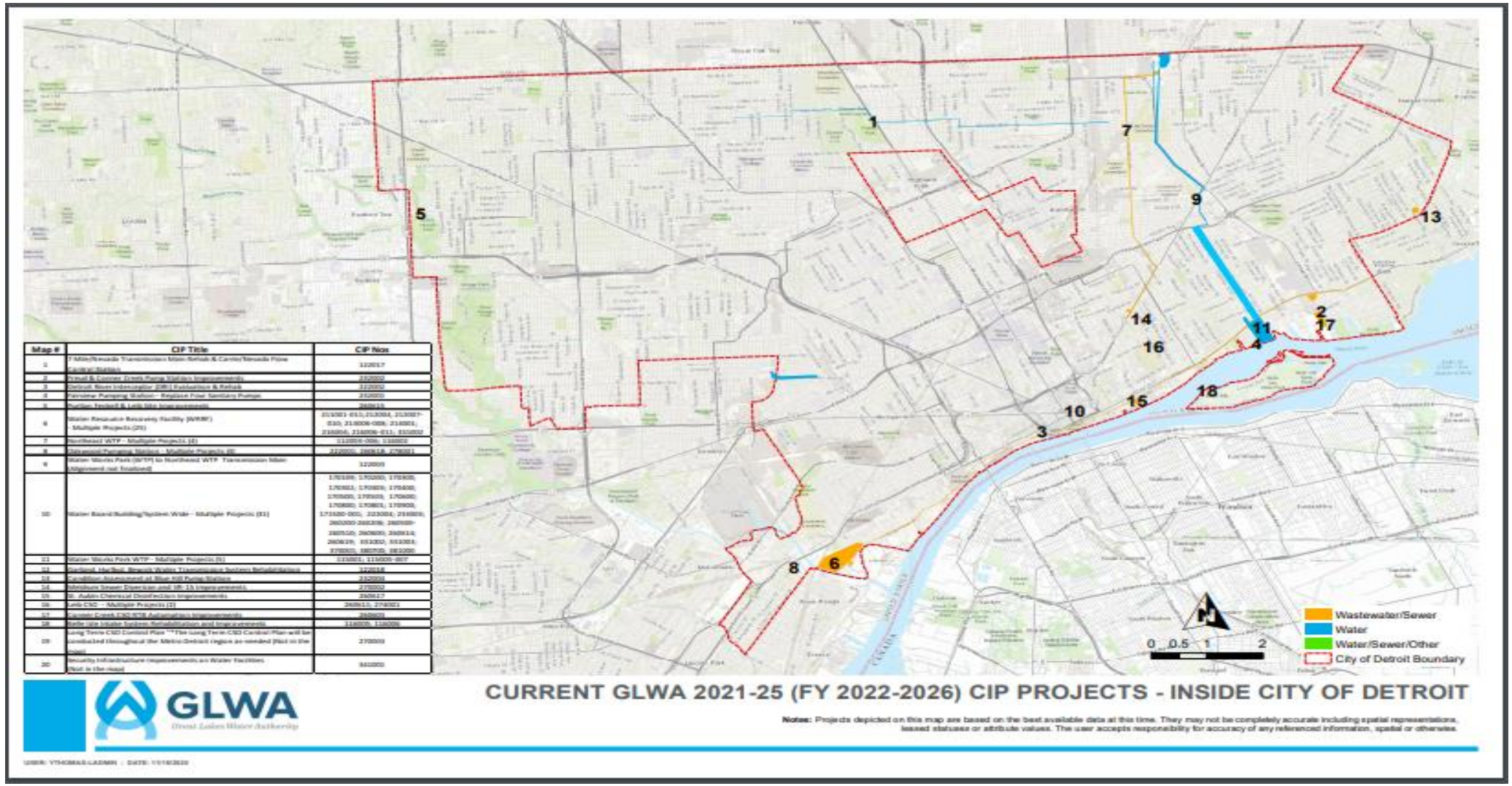
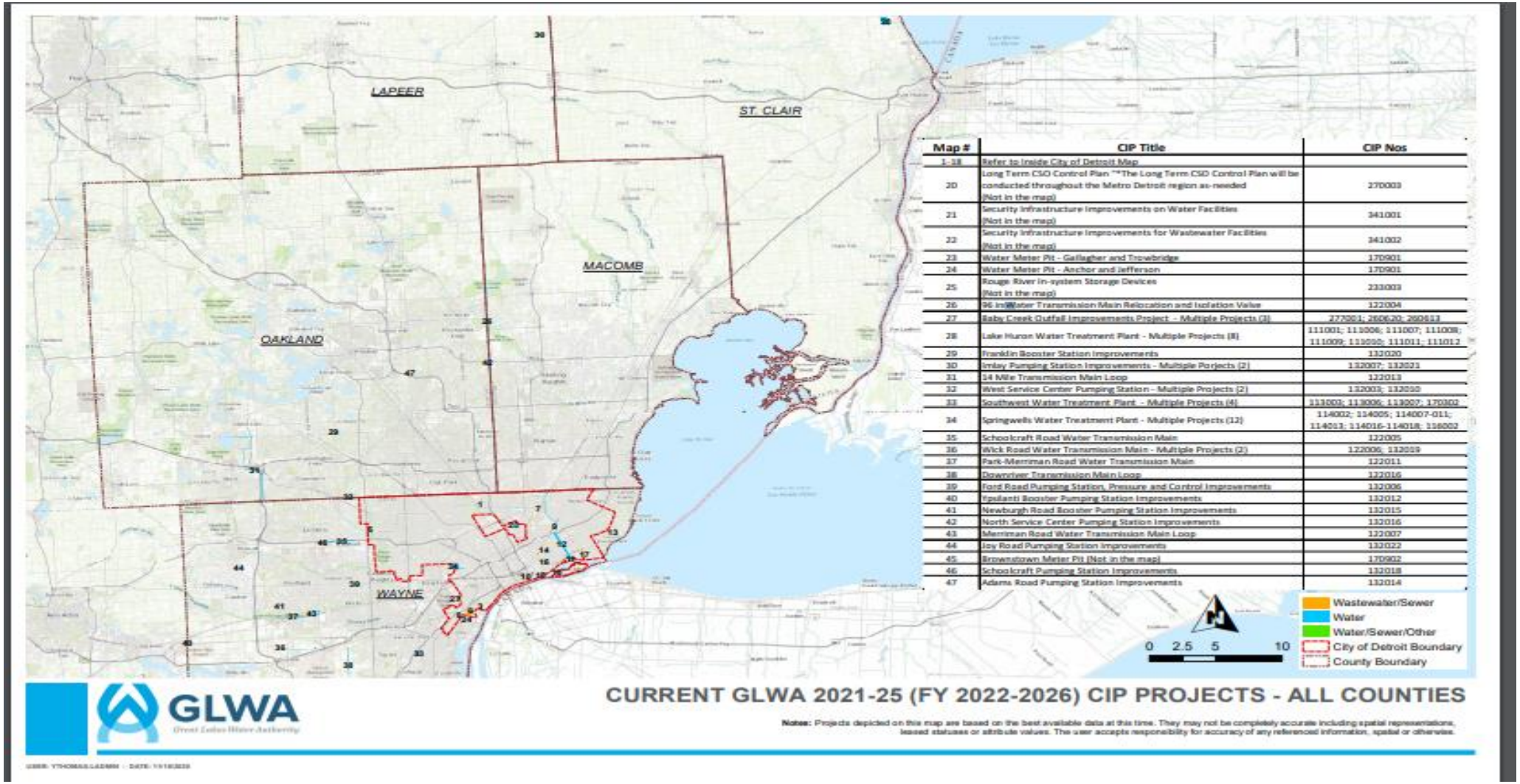
GIS Map- City of Detroit (COD)



Map #	CIP Title	CIP Nos
1	7 Mile/Newaukee Transmission Main Rehab & Carrier/Newaukee Flow Control Station	122017
2	Orwell & Conner Creek Pump Station Improvements	212002
3	Detroit River Interceptor (DRI) Relocations & Rehab	222002
4	Fairview Pumping Station - Replace Four Sanitary Pumps	232001
5	Dublin, Fenkell & Lieb Site Improvements	260615
6	Water Resource Recovery Facility (WRRF) - Multiple Projects (25)	013081-010,213004, 213007-010, 213009-009, 214001, 216006, 216009-011, 232002
7	Northeast WTP - Multiple Projects (2)	112004-006, 116002
8	Oakwood Pumping Station - Multiple Projects (2)	212000, 260618, 276001
9	Water Works Park (WTP) to Northeast WTP Transmission Main Alignment (not finalized)	122003
10	Water Board Building/System Wide - Multiple Projects (31)	170109, 170203, 170305, 170503, 170503, 170509, 170400, 170500, 170503, 170600, 170800, 170801, 170900, 171500-001, 223004, 216003, 260000-260309, 260500-260520, 260600, 260610, 260619, 013003, 013004, 170501, 082705, 081200
11	Water Works Park WTP - Multiple Projects (5)	113001, 113005-007
12	Sectional Hatfield, Branch Water Transmission System Rehabilitations	122018
13	Condition Assessment at Blue Hill Pump Station	232009
14	Jefferson Sewer Diversion and lift 13 Improvements	275002
15	W. Jubin Chemical Disinfection Improvements	260617
16	Lieb CSO - Multiple Projects (2)	260610, 276001
17	Conner Creek CSO RTB Automation Improvements	260609
18	Belle Isle Water System Rehabilitation and Improvements	116005, 116006
19	Long Term CSO Control Plan **The Long Term CSO Control Plan will be conducted throughout the Metro Detroit region as needed (Not in the map)	270003
20	Security Infrastructure Improvements at Water Facilities (Not in the map)	661003

GIS Map- All Counties



Map #	CIP Title	CIP Nos
1-18	Refer to Inside City of Detroit Map	
20	Long Term CSO Control Plan **The Long Term CSO Control Plan will be conducted throughout the Metro Detroit region as-needed (Not in the map)	270003
21	Security Infrastructure Improvements on Water Facilities (Not in the map)	341001
22	Security Infrastructure Improvements for Wastewater Facilities (Not in the map)	341002
23	Water Meter Pit - Gallagher and Trowbridge	170901
24	Water Meter Pit - Anchor and Jefferson	170901
25	Rouge River In-system Storage Devices (Not in the map)	233003
26	96 in Water Transmission Main Relocation and Isolation Valve	122004
27	Baby Creek Outfall Improvements Project - Multiple Projects (3)	277001; 260620; 260613
28	Lake Huron Water Treatment Plant - Multiple Projects (8)	111001; 113006; 111007; 111008; 111009; 113010; 111011; 111012
29	Franklin Booster Station Improvements	132020
30	Imlay Pumping Station Improvements - Multiple Porjects (2)	132007; 132021
31	14 Mile Transmission Main Loop	122013
32	West Service Center Pumping Station - Multiple Projects (2)	132003; 132010
33	Southwest Water Treatment Plant - Multiple Projects (4)	113003; 113006; 113007; 170302
34	Springwells Water Treatment Plant - Multiple Projects (12)	114002; 114005; 114007-011; 114013; 114016-114018; 116002
35	Schoolcraft Road Water Transmission Main	122005
36	Wick Road Water Transmission Main - Multiple Projects (2)	122006; 132019
37	Park-Merriman Road Water Transmission Main	122011
38	Downriver Transmission Main Loop	122016
39	Ford Road Pumping Station, Pressure and Control Improvements	132006
40	Ypsilanti Booster Pumping Station Improvements	132012
41	Newburgh Road Booster Pumping Station Improvements	132015
42	North Service Center Pumping Station Improvements	132016
43	Merriman Road Water Transmission Main Loop	122007
44	Joy Road Pumping Station Improvements	132022
45	Brownstown Meter Pit (Not in the map)	170902
46	Schoolcraft Pumping Station Improvements	132018
47	Adams Road Pumping Station Improvements	132014

New CIP Features

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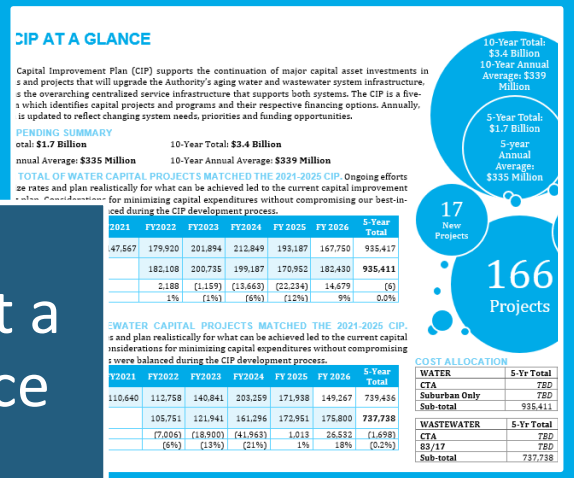
Appendix D: Systems

How To Navigate CIP

CIP At a Glance



Appendix D: Systems

1.1. GLWA WATER SYSTEM

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 816 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.

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 1.

Table 1. Treatment plant history and rated capacity

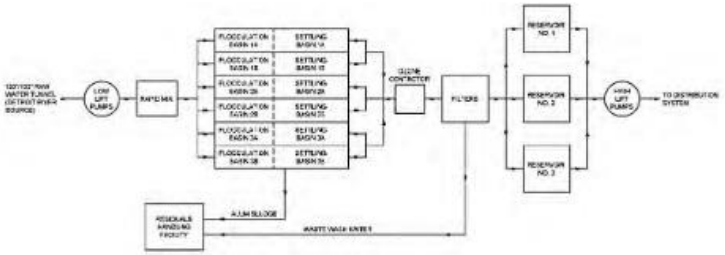
PLANT	PLACED IN OPERATION	MAXIMUM RATED CAPACITY (MGD)
Lake Huron	1974	400
Southwest	1964	240
Northeast	1956	300
Springwells	1931/1958	540

1.1.5. Water Works Park Water Treatment Plant

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

Figure 10. Water Works Park WTP

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



1.2. GLWA WASTEWATER SYSTEM

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 [illegible] Secondary treatm[illegible] clarification for re[illegible] cleaner effluent) w[illegible] to be the recipient [illegible] of staying abreast [illegible]

Currently, the WR[illegible] population contai[illegible] service area of mo[illegible] section of the Ame[illegible] of the top 10 engi[illegible]

The WRRF treats, [illegible] capacity is 1,700 M[illegible] secondary treatm[illegible] which time it rem[illegible] loads. It was upgra[illegible] the upgrade to sec[illegible] percent of the poll[illegible]

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 39.

Conner Creek CSO RTB

Figure 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 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.

How To Navigate CIP

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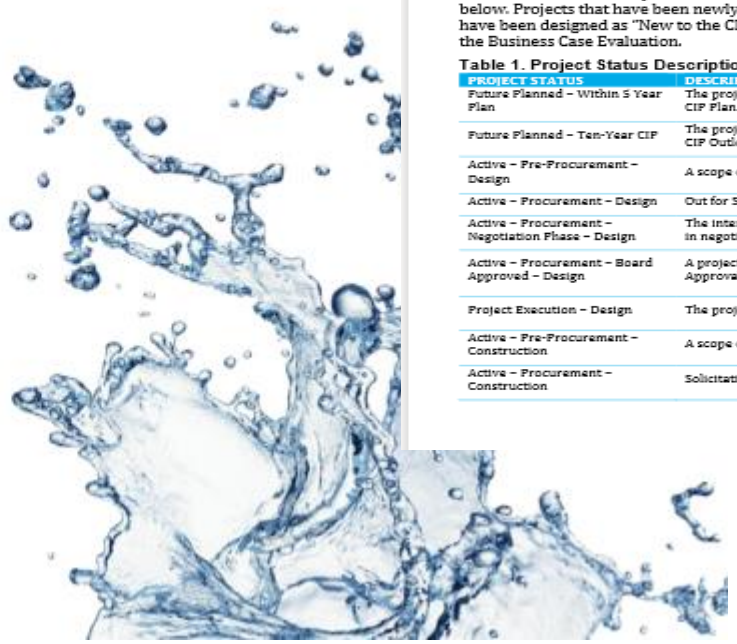

1.1. KEY FEATURES

PROJECT STATUS DESCRIPTION

To determine a particular project's 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 1 below. 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.

Table 1. Project Status Descriptions

PROJECT STATUS	DESCRIPTION
Future Planned – Within 5 Year Plan	The project is planned to begin within the 5 Year CIP Plan.
Future Planned – Ten-Year CIP	The project is planned to begin within the 10 Year CIP Outlook.
Active – Pre-Procurement – Design	A scope of work or RFP is being developed.
Active – Procurement – Design	Out for Soli
Active – Procurement – Negotiation Phase – Design	The intend in negotiati
Active – Procurement – Board Approved – Design	A project o Approval to
Project Execution – Design	The project
Active – Pre-Procurement – Construction	A scope of
Active – Procurement – Construction	Solicitation
Active – Procurement – Negotiation Phase – Construction	The intended low bid Contractor has been selected and is in negotiations.
Active – Procurement – Board Approved – Construction	A project over $1,000,000 requires Board Approval to execute the contract.
Project Execution – Construction	The project's contract has been executed.
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.

PHASE CATEGORIES

Projects are broken up into several phases related to how the project

CIP AND BUSINESS UNIT OVERVIEW

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.

PROJECT RISK MATRIX

Project risks are identified specifically related to their Probability of Failure (PoF) and Consequence of Failure (CoF) and portrayed on an overall Risk Matrix. The overall criteria remain unchanged, however, to show each project on the risk matrix, the eight criteria used in the project prioritization framework are designated as either a PoF or CoF primary risk driver. The designation of PoF and CoF to each criterion as primary risk driver is shown in Table 4.

After each criterion is scored for each project, the weighted PoF and CoF factors have been calculated. This provides a 1 to 5 vertical axis value for probability of failure and a 1 to 5 horizontal axis value for the consequence of failure. This point is plotted with the other projects to show its relative position compared to others within the matrix. A sample of the matrix is shown in Figure 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 4. 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

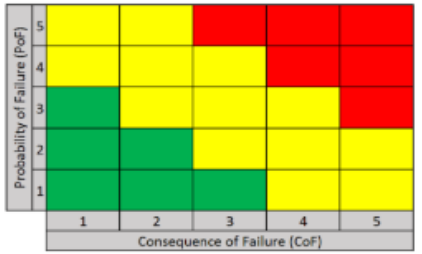

Figure 1. Risk Matrix.

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Have a Great Day!