

20 CAPITAL 23 IMPROVEMENTS PLAN

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2023 Capital Improvements Plan

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2023 Capital Improvements Plan

INTRODUCTION AND OVERVIEW

INTRODUCTION

The District's Capital Improvements Plan (CIP) is updated each year prior to the development of the annual budget. The CIP contributes to District planning and budgeting in the following ways:

- Identifies capital projects that are needed to keep the District's assets in good working order and meet capacity needs.
- Analyzes and describes projects in detail in individual business cases, including needs, alternatives, costs and timeframes for planning, design and construction.
- Identifies potential large spending requirements for future years and incorporates them into financial planning as needed.
- Estimates costs for six years using the best information available.

- Arranges project timelines to balance urgency, resources and coordination requirements.
- Prepares a financing plan to balance the use of debt, financial resiliency and impacts on service charges.
- Proposes an annual capital budget for the succeeding year.

For projects toward the end of the six-year time frame, costs and schedules are generally less developed. Details of projects in the first one to three years are more precisely known. Many of the early period projects are underway, and their costs have been committed to by contract.

Annual CIP updates allow the District to have more precise spending and work plans in the short term and prepare for potential large work and financial issues over the longer term.

Information on specific projects in the CIP can be found in the project summaries in **Appendix A**. These project summaries describe the scope, need, cost and schedule for each project. More detailed descriptions of each project are included in business cases.

A brief discussion of recently completed projects can be found in **Appendix B**, along with the status of maintenance retainers for recently completed or soon-to-be-completed projects. **Appendix C** includes a discussion about risk management for some of the projects in the District's conveyance system. This appendix is intended to provide additional information regarding the relative priority of the various projects in the conveyance system.



An aerial view of the Nine Springs Wastewater Treatment Plant showcases the scale of our on-campus operations, with Lake Monona and the downtown Madison skyline visible in the distance.

PROJECT COST ESTIMATES

Local, state, national and global economies have seen a rapid rise in the cost of various goods and services in the past year. The effects of inflation have hit the construction industry especially hard, and the costs to construct capital improvements are very uncertain at present. An additional difficulty is that supply chains for raw materials and equipment used on these projects have been severely disrupted and are leading to long lead times and project delays.

The District's traditional approach in project cost estimating for the CIP is to inflate costs at the rate of 3% annually. This has generally yielded good results. Due to the current economic climate, the 2023 CIP uses the following annual rates:

- 6% for 2023
- 5% for 2024
- 5% for 2025
- 4% for 2026
- 3% in 2027 and 2028

As an additional measure, another contingency factor has been applied to project costs for those projects that are scheduled for construction in 2022 and/or 2023. This contingency factor, referred to as an economic climate contingency (ECC) by District staff, is independent of inflation and other contingencies that are routinely used for capital planning and estimating. The ECCs applied to District projects in 2022 and 2023 vary, but in general, they are a minimum of 10% for collection system projects and 20% for projects at the treatment plant. The higher ECC for treatment plant projects reflects the fact that these projects typically have more complex electrical and control equipment, the costs of which have been found to be especially vulnerable to inflation. All cost estimates and contingency factors will be reevaluated before the adoption of the final 2023 CIP and 2023 Capital Projects Budget in October 2022.

SUMMARY OF 2023 EXPENDITURES

Capital expenditures for 2023 focus on the rehabilitation and replacement of existing assets at the treatment plant and provide system capacity in the conveyance system. Some of the major construction activities and equipment purchases in 2023 include the following:

- Rehabilitating HVAC systems in four process buildings at the treatment plant.
- Raising and reinforcing the berms in the District lagoons east of South Towne Drive.
- Continuing work on the replacement of the District's maintenance, financial and human resources systems.
- Rehabilitating the flow splitter structure downstream of the Headworks Facility.
- Providing additional capacity for the West Intercepting System between Shorewood Boulevard and Marshall Court in the Village of Shorewood and from University Bay Drive to Walnut Street in the City of Madison.
- Installing Phase 5 of the Lower Badger Mill Creek Interceptor between County Highway PD and Shady Oak Lane in the City of Verona.
- Providing additional capacity for the Waunakee Extension to the Northeast Interceptor west of State Highway 113 in the Town of Westport and the Village of Waunakee.
- Rehabilitating Pumping Station 4 in the City of Madison.



The District owns and operates 142 miles of pipe and 18 pumping stations across the 26 owner communities covering 186 square miles in the Madison area. Raw wastewater force mains make up about 32 miles of the collection system.

- Increasing the firm capacity of Pumping Station 17 in the City of Verona.
- Installing a relief force main for Pumping Station 17 in the City of Verona and Town of Verona.

Smaller construction projects in 2023 include the following:

- Expansion of the solar power system at the Maintenance Facility.
- Pavement rehabilitation at the treatment plant and other miscellaneous projects at the treatment plant and the collection system as identified in the business case documents for these projects.

Besides construction, several large projects will be in the design phase in 2023. Construction of the first phase of the Liquid Processing Improvements was completed in early 2022. Design of the second phase of projects will begin in late 2022 and continue throughout 2023. These projects include replacement of the air piping in the East Primary Influent Channel, replacement of piping and equipment in the aeration tanks and modifications to allow for treatment at lower levels of dissolved oxygen, and replacement of blower and switchgear equipment.

Another large project getting underway in 2023 will be the replacement of the equipment for the incoming electrical

service to the treatment plant from the local power utility. This equipment is responsible for transforming the incoming voltage for use by downstream plant equipment at lower voltages and for isolating and protecting that equipment.

In the collection system, design work in 2023 is expected to continue for the last phase of the Lower Badger Mill Creek Interceptor. Phase 5 will be under construction in 2023 up to Shady Oak Lane in the Town of Verona. Phase 6 construction in 2024 will complete the interceptor up to Midtown Road. Other design work in the collection system in 2023 is expected to include a project to install a connector line between Pumping Station 6 and Pumping Station 10. The feasibility of this project is being explored in detail in 2022 and the design will carry forward into 2023 if the results are favorable.

Finally, design work will begin in 2023 on a multi-year plan to provide emergency power generation at all District pumping stations. The District currently has facilities or plans in place for portable generation at 5 of its 18 pumping stations. Under this plan, the remaining stations will be equipped with portable generators in a series of annual installations between 2025 and 2030.

Significant planning work will also occur in 2023, with completion of the Collection System Facilities Plan expected before the end of that year. This document will be used to identify, justify and prioritize collection system projects for inclusion in future CIPs. It is also anticipated that a space needs study will be completed in 2023 for various District properties. This study, to be completed by a consultant, will perform an inventory of all properties owned by the District, identify those assets with the greatest needs, and deliver a plan that allows the District to optimize the best use of those assets. Examples of initiatives or areas to be studied include siting of a future biosolids processing facility, location for a new septage receiving facility, location for possible tertiary treatment for chlorides, location of a new resource recovery facility, site improvements and renovations to the Shop One Building, and site security issues. Planning work will also continue in 2023 on efforts to comply with the new phosphorus water quality standards for the discharge of treated effluent to Badger Mill Creek. The new standards, which lower the allowable phosphorus concentration in the waterway, were included in the District's discharge permit which was reissued in May 2020 and require compliance by September 2028. Currently, the three most viable options to achieve compliance are diverting all



Electrician Roy Wells works to repair an electrical unit in our Maintenance Facility. Our electrical team works on thousands of components across the collection system and plant each year.

effluent to Badfish Creek, water quality trading, watershed adaptive management, or some combination of the alternatives. Planning work in 2023 will involve a study to determine the feasibility of these alternatives.

CONFORMANCE WITH ADOPTED PLANS AND PROGRAMS

The 2023 CIP assumes that capital projects will be in conformance with the recommendations of the District’s 2009 50-year Master Plan regarding centralized treatment. The plan recommends that the District continue to treat all wastewater from its service area at the Nine Springs Wastewater Treatment Plant and return a portion of the effluent to Badger Mill Creek. As such, none of the projects in the CIP assume that a satellite treatment facility will be located anywhere in the District’s service area in the foreseeable future. This is a key assumption to note as the projects to add capacity in the Pumping Station 17 basin move into detailed design and construction in the next two to three years.

While the 50-year Master Plan provides long-term guidance, shorter-term planning is required to assess the condition and capacity of the District’s systems and assets. The District relies upon facility planning efforts, its asset management program, and other planning efforts to help direct annual updates to its CIP. The following planning efforts provide the most significant guidance to the District’s annual capital improvements planning.

COLLECTION SYSTEM FACILITIES PLAN

Last updated in 2011, the Collection System Facilities Plan provides a list of recommended capital improvements to the District’s collection system. The Capital Area Regional Planning Commission updated its 2009 evaluation of the District’s collection system capacity in 2017 and 2018. This update will in turn allow the District to update its Collection System Facilities Plan, currently scheduled for completion in 2023.

SOLIDS HANDLING FACILITIES PLAN

This Solids Handling Facilities Plan formed the basis for work constructed during the Eleventh Addition to the plant. This addition, completed in 2014, provided a comprehensive update to the treatment plant’s solids handling processes. This work should allow the plant to meet solids loadings for the next 20 years. As such, solids handling is not a primary focus of the 2023 CIP.

LIQUID PROCESSING FACILITIES PLAN

While the Solids Handling Facilities Plan investigated the plant’s solids streams and processes, the Liquid Processing Facilities Plan reviewed the plant’s liquid streams and processes. This facilities plan was substantially completed in 2017 and included multiple projects that will address the plant’s liquid processing needs. The 17 projects identified in the facilities plan will be combined into separate bid packages that will be constructed in multiple phases over the next 10 to 15 years. The first phase of the project was bid in 2019 and was completed in the second half of 2021. Projects to be included in the second and third phases of the Liquid Processing Improvements are included in the 2023 CIP, with the timing and phasing of these projects determined based on project need, staff workload and the District’s financial situation.



Contractors replace the Final Clarifier 6 launder system, including troughs, weirs and scum baffles. The new fiberglass components are an upgrade to the older galvanized material that was showing significant wear and rust.



Solar panels on the roof of the Maintenance Facility provide about 10% to 15% of the building's energy. The panels can generate 20 kilowatts of power, or approximately \$2,600 annual savings on utility costs.

ENERGY MANAGEMENT MASTER PLAN

Brown and Caldwell and Strand Associates performed an energy study in 2014. This plan built on that study by taking a comprehensive look at how the District is currently using energy and creating a roadmap for how to manage energy in the future. The study, conducted by Carollo Engineers, emphasized how to select projects and optimize energy use as critical pieces of equipment are replaced in the coming years, such as the gas-driven electrical generators and the associated hot water system. The study was completed in the fall of 2021 and recommends further study and/or facilities planning for heat and power improvements, biosolids processing and miscellaneous energy enhancements at the treatment plant in the coming years.

ASSET MANAGEMENT PROGRAM

The CIP is informed by the District's asset management program. Asset management contributes to capital planning by evaluating the condition and criticality of District assets, implementing proper maintenance processes to extend asset life and providing data on asset repair and replacement needs. The District's program began in 2011, received an updated framework in 2016, and received an updated plant asset management plan in 2019. The next steps in the program include further improving maintenance practices, improving asset data and implementing a new computerized maintenance management system to provide better information for planning.

2023 Capital Improvements Plan

2023 CAPITAL PROJECTS BUDGET OVERVIEW & SUMMARY

This section discusses the District's 2023 capital budget. The capital budget sets spending limits on a per-project basis and total annual spending basis. Spending on individual projects is limited to the authorized total project cost. Individual project spending can and does vary by year if the total cost is not exceeded over the life of the project. Spending on all capital projects combined in the budget year is limited to the total amount authorized. The annual total budget limit is set for the current year only. Future year spending totals in the CIP are estimates.

The tables in this section list proposed total project cost authorizations, annual expenditures by project and loan proceeds. Financial matters, including fund balances and the use of debt, are discussed in the section on capital finance.

TOTAL PROJECT COSTS SUMMARY

Table CIP-1A lists total project costs. In accordance with Commission Policy ATT-2 on the development of the capital budget, each year the Chief Engineer and Director is required to submit to the Commission a list of total project costs for all previously approved projects and all projects new to the proposed budget. This table also includes total costs for those projects that are included in the six-year Capital Improvements Plan. For each project, the total project cost of the current budget year is compared to that of the preceding year. A similar table will be provided as part of the annual capital budget.

Table CIP-1B provides a breakdown of total project costs for projects that were authorized in previous CIPs but were subsequently combined, or bundled, into a single consolidated project for bidding and construction purposes. This table is provided for informational purposes per Commission policy, although only the total cost of the consolidated project is used for cost control purposes.

ANNUAL BUDGETS AND EXPENDITURES SUMMARY

Table CIP-2 lists annual expenditures by project. Table CIP-3 shows total annual budgets for 2021-2023, with actual and estimated spending for 2021 and 2022, respectively. For 2021, actual expenditures were \$23.0 million, which was well below the budgeted amount of \$39.9 million. The underspending of approximately \$17 million in 2021 was due primarily to the following projects:

1. Deferred start to replacement of District's computerized maintenance management system (\$1.3 million below budget).
2. Less spending on Liquid Processing Improvements – Phase 1 in 2021 due to a higher rate of construction in 2020 than was anticipated in the 2021 budget. This has the effect of actual expenditures being above the budget estimate in 2020 and below the estimate in 2021 (\$4.2 million below budget).



Collection systems engineer Jen Hurlebaus monitors operations at one of our 18 pumping stations. Rehabilitated pumping stations increase capacity, improve efficiency and ensure reliability for communities.

3. Less spending on NSVI replacement sewer in 2021 due to a higher rate of construction in 2020 than was anticipated in the 2021 budget. This has the effect of actual expenditures being above the budget estimate in 2020 and below the estimate in 2021 (\$1.7 million below budget).
4. Favorable bid for Phase 1 of West Interceptor – Shorewood Relief project (\$4.0 million below budget).
5. Slower pace of construction for Pumping Stations 13 and 14 Rehabilitation project than was anticipated in the 2021 budget (\$3.0 million below budget).

These five projects alone account for roughly 85% of the 2021 underspending amount.

Expenditures for 2022 are estimated to be \$16.6 million. This is below the budgeted value of \$21.8 million by \$5.2 million. The underspending for 2022 is due to the postponement of the rehabilitation of the Northeast Interceptor (Truax Extension) near the Dane County Regional Airport. Approximately \$6.0 million was included in the 2022 Capital Projects Budget to install a liner in this interceptor in 2022. The District has elected to postpone this project until 2025 so that higher priority projects can be implemented.

LOAN REVENUES SUMMARY

Table CIP-4 provides a summary of loan revenues by the project(s). Preceding year values are actual disbursements received from the State of Wisconsin’s Clean Water Fund for projects under construction or recently completed. Current year and subsequent year values are estimates based on the District’s financing needs.

As shown in the table, the District received \$13.1 million in loan proceeds from the Clean Water Fund in 2021. It should be noted that \$6.2 million in loan revenue was received in January of 2022 for the West Interceptor – Shorewood Relief and Nine Springs Valley Interceptor projects, although all the associated expenditures were incurred well before this date. The District had anticipated receiving this loan revenue in the fall of 2021, but processing of the loan application and closing of the loan with the Department of Natural Resources took longer than normal. Thus, the \$6.2 million in loan revenue for these projects is shown in **Table CIP-4** in 2022 instead of 2021.

Delays to loan revenue such as this may occur more frequently in the coming years with the increased funding

to the Clean Water Fund program and the associated lending requirements that have resulted from the federal Bipartisan Infrastructure Law and the Build America, Buy America Act. Additional discussion of debt is included in the capital finance section.

2023 PROJECT FUNDING

As discussed in the finance section, capital projects are funded from the District's capital projects fund. This fund receives revenue from the following sources: as loan proceeds from the Clean Water Fund; from connection charges collected from new users of the conveyance system and treatment plant; as cash transfers from the operating fund; and from interest investments. In recent years the District has financed approximately 90% of its capital expenditures with loans from the Clean Water Fund. Financing decisions are made on a per-project basis, considering loan eligibility and project size, in addition to overall financing strategy. In 2023, cash revenues net of loan proceeds will be used for \$8.8 million, or 28%, of total expenditures. The following notable construction projects will be paid from revenue sources other than loan proceeds in 2023:

- Maintenance, Financial and HR Systems (\$689,000)
- West Interceptor – Shorewood Relief – Phase 3 (\$5,346,000)
- Lower Badger Mill Creek Interceptor – Phase 5 (\$1,283,000)
- Various Capital Budget Expenses (\$405,000)

Cash in the capital projects fund will also be used to pay for planning and design work for the following projects:

- Liquid Processing Improvements – Phase 2 (\$2,491,000)
- Nine Springs Wastewater Treatment Plant Electric Service Equipment Replacement (\$175,000)
- Lagoon Dikes Improvements (\$565,000)
- Flow Splitter Improvements (\$551,000)
- Pumping Station 6 to Pumping Station 10 Connector (\$440,000)

These planning and design costs will initially be paid from cash in the fund and all or a portion of them may later be reimbursed through loans from the Clean Water Fund in subsequent years if/when construction commences.

TABLE CIP-1A | Total Project Cost Authorizations

Subprojects shown in separate table as noted		Has Subprojects	Authorization in 2022 Plan	Proposed Authorization in 2023 Plan	Change in Authorization	
TREATMENT PLANT			138,610,000	172,594,000	33,984,000	25%
A01	Liquid Processing Improvements- Phase 2			-		n/a
A01.1	East Primary Influent Channel Air Piping Replacement		793,000	1,390,000	597,000	75%
A01.2	Low Dissolved Oxygen (Partial Plant)		3,171,000	3,850,000	679,000	21%
A01.3	Low Dissolved Oxygen (Full Plant)		18,015,000	21,563,000	3,548,000	20%
A01.4	West Blowers and Switchgear Replacement		12,540,000	10,100,000	(2,440,000)	-19%
A01.5	East Blowers and Switchgear Replacement			11,230,000		n/a
A02	2021 Treatment Plant HVAC Improvement Project		1,523,000	1,960,000	437,000	29%
A03	NSWWTP Electrical Service Equipment Replacement		3,098,000	4,739,000	1,641,000	53%
A04	Treatment Plant Energy Projects					n/a
A04.1	Heat and Power Improvements		40,405,000	50,914,000	10,509,000	26%
A04.2	Miscellaneous Energy Projects		7,154,000	10,422,000	3,268,000	46%
A05	Lagoon Dikes Improvements		2,046,000	4,148,000	2,102,000	103%
A06	Maintenance, Financial and HR Systems		5,660,000	6,007,000	347,000	6%
A07	Metrogro Applicators & Equipment		4,405,000	4,494,000	89,000	2%
A08	Flow Splitter Improvements		2,252,000	2,500,000	248,000	11%
A09	Treatment Plant HVAC Improvements- Group 1 Projects		2,844,000	3,310,000	466,000	16%
A10	Liquid Processing Improvements- Phase 3					n/a
A10.1	Headworks Screening		4,246,000	5,012,000	766,000	18%
A10.2	Grit Processing Improvements		2,393,000	2,585,000	192,000	8%
A11	Septage Receiving Modifications		3,832,000	4,005,000	173,000	5%
A12	Miscellaneous Treatment Plant Projects		124,000	119,000	(5,000)	-4%
A13	Minor Capital Improvements		115,000	122,000	7,000	6%
A14	Annual Pavement Improvements		65,000	70,000	5,000	8%
N/A	Energy Management Master Plan		624,000	624,000	-	0%
	Engine Generator and Blower Control Panel Replacements		677,000	677,000	-	0%
	Final Clarifier 4, 5 and 6 Effluent Launder Trough Replacement		370,000	370,000	-	0%
	Headworks Flow Metering		2,291,000	2,291,000	-	0%
	Liquid Processing Improvements- Phase 1	*	16,818,000	16,818,000	-	0%
	Operations Building First Floor Remodel		2,050,000	2,175,000	125,000	6%
	Resource Recovery Facility		899,000	899,000	-	0%
	Shop One Site Improvements		200,000	200,000	-	0%
INTERCEPTORS			75,692,000	83,770,000	8,078,000	11%
B01	West Interceptor- Shorewood Relief Projects			-		n/a
B01.1	West Interceptor- Shorewood Relief (Phase 2)		1,754,000	1,754,000	-	0%
B01.2	West Interceptor- Shorewood Relief (Phase 3)		4,676,000	5,481,000	805,000	17%
B02	Lower Badger Mill Creek Interceptor					n/a
B02.1	Lower Badger Mill Creek Interceptor- Phase 5		1,196,000	1,382,000	186,000	16%
B02.2	Lower Badger Mill Creek Interceptor- Phase 6		3,082,000	3,566,000	484,000	16%
B03	Pump Station 6 to Pump Station 10 Connector		7,100,000	9,882,000	2,782,000	39%
B04	NEI- Waunakee Extension Capacity Improvements (Phase 1)		7,948,000	9,548,000	1,600,000	20%
B05	NEI- Truax Extension Rehab		6,025,000	7,769,000	1,744,000	29%
B06	NEI- FEI to SEI Rehab		2,129,000	2,277,000	148,000	7%
B07	SEI Rehab- Pumping Station 9 to SEI-Dutch Mill Extension		1,796,000	2,718,000	922,000	51%
B08	NSVI Capacity Improvements- Phase 1		13,251,000	12,500,000	(751,000)	-6%
B09	West Interceptor Rehab- Babcock Hall to Dayton Street		1,249,000	1,350,000	101,000	8%
B10	District Flow Monitoring Stations		1,182,000	1,239,000	57,000	5%
N/A	NEI- Truax Extension Relief		9,646,000	9,646,000	-	0%
	Northeast Interceptor Joint Grouting MH10-101 to MH10-106		307,000	307,000	-	0%
	Northeast Interceptor Joint Grouting MH10-112 to MH10-106		304,000	304,000	-	0%
	NSVI Improvements-McKee Road to Dunn's Marsh		4,754,000	4,754,000	-	0%
	NSVI-Morse Pond Extension		2,300,000	2,300,000	-	0%
	West Interceptor- Shorewood Relief (Phase 1)		4,915,000	4,915,000	-	0%
	Interceptor Rehabilitation- 2020	*	2,078,000	2,078,000	-	0%

Subprojects shown in separate table as noted

TABLE CIP-1A | Total Project Cost Authorizations (cont.)

	Has Subprojects	Authorization in 2022 Plan	Proposed Authorization in 2023 Plan	Change in Authorization	
PUMPING STATIONS AND FORCE MAINS		45,289,000	61,773,000	16,484,000	36%
C01 Grass Lake Dike Stabilization		905,000	905,000	-	0%
C02 Pumping Station 4 Rehabilitation		5,481,000	7,069,000	1,588,000	29%
C03 Pumping Station 17 Firm Capacity Improvements		5,224,000	6,790,000	1,566,000	30%
C04 Pumping Station 17 Force Main Relief- Phase 2		4,961,000	10,500,000	5,539,000	112%
C05 Emergency Power Generation at District Pumping Stations		8,429,000	9,271,000	842,000	10%
C06 Miscellaneous Collection System Improvements		90,000	103,000	13,000	14%
C07 Force Main Condition Assessment		3,534,000	3,684,000	150,000	4%
C08 Pumping Station 16 Projects					n/a
C08.1 Pumping Station 16 Rehabilitation			6,370,000		n/a
C08.2 Pumping Station 16 Force Main Rehabilitation		1,652,000	2,068,000	416,000	25%
N/A Automated Power Transfer at Pump Stations 10 and 11		268,000	268,000	-	0%
Pumping Station 13 & Pumping Station 14 Rehabilitation	*	10,755,000	10,755,000	-	0%
Pumping Station 17 Force Main Relief- Phase 1		3,490,000	3,490,000	-	0%
Pumping Station 7 Force Main Emergency Repair		500,000	500,000	-	0%
CAPITAL BUDGET EXPENSES		20,310,000	14,026,000	(6,284,000)	-31%
D01 Capital Budget Expenses		52,000	53,000	1,000	2%
D02 Collection System Facilities Plan Update		230,000	290,000	60,000	26%
D03 Badger Mill Creek Phosphorus Compliance		19,345,000	13,000,000	(6,345,000)	-33%
D04 Plan for District Properties		360,000	360,000	-	0%
N/A Plant Asset Management Plan Implementation		323,000	323,000	-	0%
Grand Total		279,901,000	332,163,000	52,262,000	19%

TABLE CIP-1B | ESTIMATED TOTAL SUBPROJECT COSTS FOR BUNDLED PROJECTS

Spending limits are at the bundled project level. Subproject amounts are estimates for information only.

	2022	Estimated 2023	Change	
Interceptor Rehabilitation - 2020	\$2,078,000	\$2,078,000	\$ -	0%
NEI Relief Sewer and E. Johnson Street Relief Sewer Rehab	470,000	470,000	-	0%
West Interceptor- Spring Street Relief (lining project)	1,608,000	1,608,000	-	0%
Liquid Processing Improvements - Phase 1	\$16,818,000	\$16,818,000	-	0%
54 Inch Primary Influent Rehabilitation	662,000	662,000	-	0%
East Blower Controls	727,000	727,000	-	0%
East-West Plant Flow Metering	1,848,000	1,848,000	-	0%
Plant Peak Capacity Improvements	4,695,000	4,695,000	-	0%
Plant Unit Substation Improvements	3,940,000	3,940,000	-	0%
Primary Tanks 1 and 2 Rehabilitation	1,055,000	1,055,000	-	0%
Process Control System Upgrade- Phase Two	1,112,000	1,112,000	-	0%
UV Disinfection System Replacement	2,779,000	2,779,000	-	0%
Pumping Station 13 & Pumping Station 14 Rehabilitation	\$10,755,000	\$10,755,000	-	0%
Pumping Station 13 Rehabilitation	5,480,000	5,480,000	-	0%
Pumping Station 14 Rehabilitation	5,275,000	5,275,000	-	0%

TABLE CIP-2 | 2021-2023 EXPENDITURES BY PROJECT

District policy limits 2023 spending to the all-projects grand total shown
Individual project spending is not limited by year, but is limited by total project cost authorization

	2021 Actual	2022 Estimated	2023 Anticipated
TREATMENT PLANT	\$7,478,000	\$3,803,000	\$6,131,000
A01 Liquid Processing Improvements- Phase 2	-	-	-
A01.1 East Primary Influent Channel Air Piping Replacement	-	5,000	142,000
A01.2 Low Dissolved Oxygen (Partial Plant)	-	5,000	207,000
A01.3 Low Dissolved Oxygen (Full Plant)	-	-	498,000
A01.4 West Blowers and Switchgear Replacement	-	5,000	822,000
A01.5 East Blowers and Switchgear Replacement	-	5,000	822,000
A02 2021 Treatment Plant HVAC Improvement Project	38,000	884,000	1,011,000
A03 NSWWTP Electrical Service Equipment Replacement	-	160,000	175,000
A04 Treatment Plant Energy Projects	-	-	-
A04.1 Heat and Power Improvements	-	--	-
A04.2 Miscellaneous Energy Projects	-	-	233,000
A05 Lagoon Dikes Improvements	190,000	295,000	565,000
A06 Maintenance, Financial and HR Systems	1,000	659,000	689,000
A07 Metrogro Applicators & Equipment	818,000	700,000	106,000
A08 Flow Splitter Improvements	-	45,000	551,000
A10 Liquid Processing Improvements- Phase 3	-	-	-
A10.1 Headworks Screening	-	-	-
A11 Septage Receiving Modifications	-	-	-
A12 Miscellaneous Treatment Plant Projects	8,000	120,000	119,000
A13 Minor Capital Improvements	88,000	115,000	122,000
A14 Annual Pavement Improvements	-	-	70,000
N/A Energy Management Master Plan	151,000	15,000	-
Engine Generator and Blower Control Panel Replacements	145,000	485,000	-
Final Clarifier 4, 5 and 6 Effluent Launder Trough Replacement	235,000	115,000	-
Headworks Flow Metering	638,000	-	-
Liquid Processing Improvements- Phase 1	3,471,000	30,000	-
Operations Building First Floor Remodel	1,435,000	160,000	-
Resource Recovery Facility	261,000	-	-
INTERCEPTORS	\$5,843,000	\$4,748,000	\$10,015,000
B01 West Interceptor- Shorewood Relief Projects	-	-	-
B01.1 West Interceptor- Shorewood Relief (Phase 2)	75,000	1,630,000	-
B01.2 West Interceptor- Shorewood Relief (Phase 3)	-	99,000	5,346,000
B02 Lower Badger Mill Creek Interceptor	-	-	-
B02.1 Lower Badger Mill Creek Interceptor- Phase 5	-	99,000	1,283,000
B02.2 Lower Badger Mill Creek Interceptor- Phase 6	-	110,000	127,000
B03 Pumping Station 6 to Pumping Station 10 Connector	-	190,000	440,000
B04 NEI- Waunakee Extension Capacity Improvements (Phase 1)	-	993,000	2,819,000
B05 NEI- Truax Extension Rehab	3,000	-	-
B06 NEI- FEI to SEI Rehab	-	-	-
B07 SEI Rehab- Pumping Station 9 to SEI-Dutch Mill Extension	-	-	-
N/A Interceptor Rehabilitation- 2020	3,000	-	-
NEI- Truax Extension Relief	4,000	-	-
Northeast Interceptor Joint Grouting MH10-101 to MH10-106	29,000	242,000	-
Northeast Interceptor Joint Grouting MH10-112 to MH10-106	9,000	-	-
NSVI Improvements-McKee Road to Dunn's Marsh	2,686,000	250,000	-
NSVI-Morse Pond Extension	-	35,000	-
West Interceptor- Shorewood Relief (Phase 1)	3,034,000	1,100,000	-

TABLE CIP-2 | 2021-2023 EXPENDITURES BY PROJECT (CONT.)

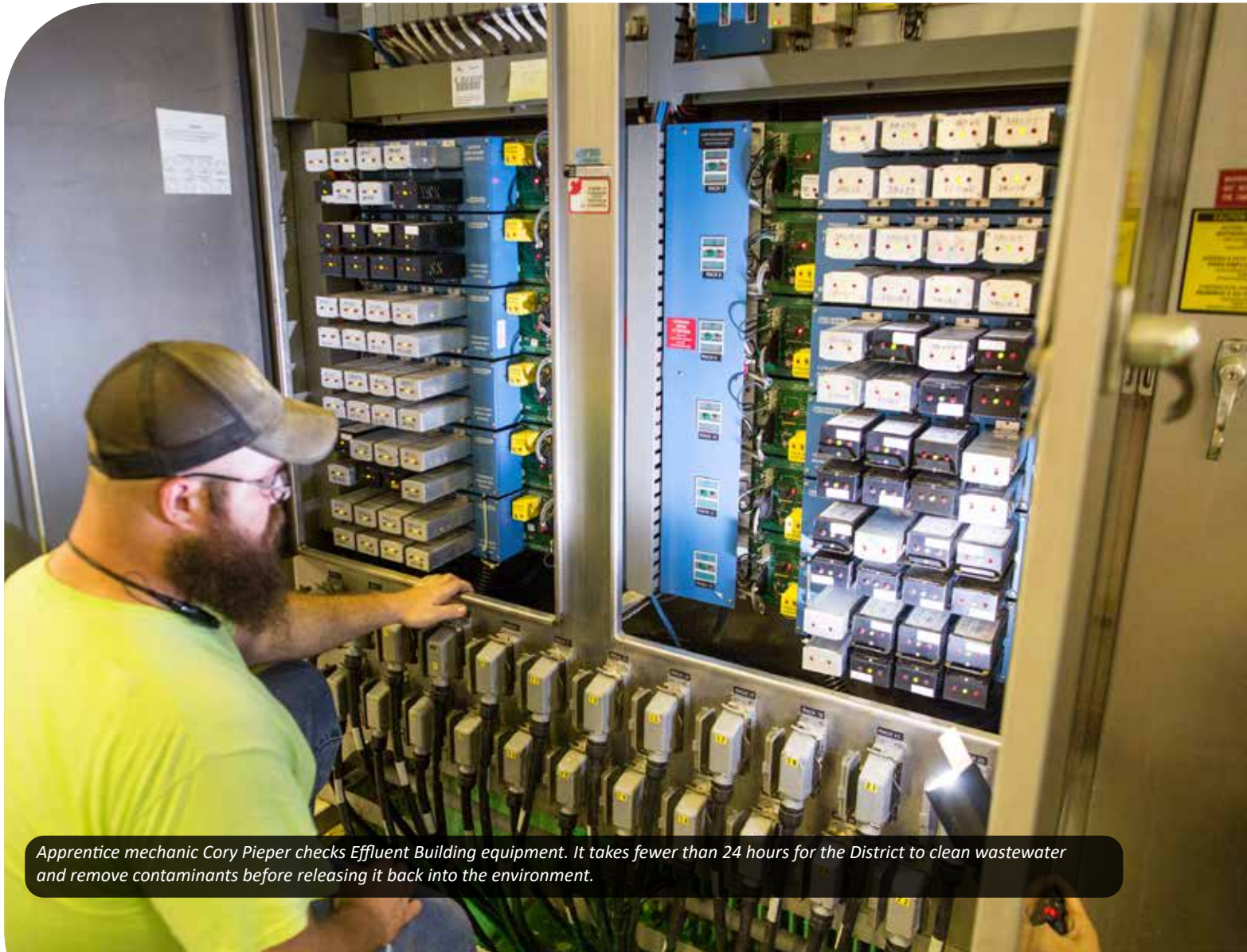
		2021 Actual	2022 Estimated	2023 Anticipated
PUMPING STATIONS AND FORCE MAINS		\$9,520,000	\$7,692,000	\$14,536,000
C01	Grass Lake Dike Stabilization	17,000	625,000	
C02	Pumping Station 4 Rehabilitation	217,000	888,000	3,237,000
C03	Pumping Station 17 Firm Capacity Improvements	41,000	641,000	2,372,000
C04	Pumping Station 17 Force Main Relief- Phase 2	18,000	1,538,000	8,818,000
C05	Emergency Power Generation at District Pumping Stations	-	5,000	5,000
C06	Miscellaneous Collection System Improvements	22,000	90,000	103,000
C08	Pumping Station 16 Projects	-	-	-
C08.2	Pumping Station 16 Force Main Rehabilitation	1,000	-	-
N/A	Automated Power Transfer at Pumping Stations 10 and 11	8,000	-	-
	Pumping Station 13 & Pumping Station 14 Rehabilitation	6,319,000	3,600,000	-
	Pumping Station 17 Force Main Relief- Phase 1	2,599,000	305,000	-
	Pumping Station 7 Force Main Emergency Repair	279,000	-	-
CAPITAL BUDGET EXPENSES		\$161,000	\$359,000	\$405,000
D01	Capital Budget Expenses		50,000	53,000
D02	Collection System Facilities Plan Update	36,000	82,000	64,000
D03	Badger Mill Creek Phosphorus Compliance	13,000	-	106,000
D04	Plan for District Properties	-	172,000	182,000
N/A	Plant Asset Management Plan Implementation	112,000	55,000	-
Grand Total		\$23,003,000	\$16,602,000	\$31,086,000

TABLE CIP-3 | ANNUAL BUDGET AND EXPENDITURES

	Adopted Capital Budget		2023 Proposed CIP	
	2021	2022	2023	2022-2023 CHANGE
Budgets	\$39,869,000	\$21,783,000	\$31,086,000	43%
Expenditures (Actual 2021; Estimated 2022)	\$23,003,000	\$16,602,000		
<i>Underspending</i>	<i>\$16,866,000</i>	<i>\$5,181,000</i>		

TABLE CIP-4 | CLEAN WATER FUND LOAN PROCEEDS

	2021 Actual	2022 Estimated	2023 Anticipated
LPI- Phase 1/Pumping Station 7 Improvements/Headworks Flow Metering	\$7,488,000	\$748,000	-
NEI- Waunakee Extension Relief	-	-	3,774,000
NEI-Truax Ext Relief/SWI-Haywood Ext Replacement	205,000	-	-
Pumping Station 4 Rehabilitation	-	-	4,257,000
Pumping Station 17 Force Main- Phase 2	-	-	10,270,000
2021 Treatment Plant HVAC Improvement Project	-	929,000	991,000
Pumping Station 13&14 Rehab/Ops Bldg Remodel/2019 Plant Piping/Int Rehab	5,360,000	8,795,000	-
WI-Shorewood Relief (Phase 1)/NSVI-McKee Rd to Dunn's Marsh	-	8,600,000	-
Pump Station 17 Firm Capacity Improvements	-	-	2,993,000
Grand Total	\$13,053,000	\$19,072,000	\$22,285,000



Apprentice mechanic Cory Pieper checks Effluent Building equipment. It takes fewer than 24 hours for the District to clean wastewater and remove contaminants before releasing it back into the environment.

2023 Capital Improvements Plan

SIX-YEAR CAPITAL PROJECTS SUMMARY

This section discusses planned projects for the six years of the CIP. Financing issues for the six-year period are discussed in the capital finance section.

The District's CIP includes projections for projects that are either underway and will continue into 2023, or for those new projects that will begin within the six-year planning horizon. These projects have been identified by District staff to address a variety of needs such as hydraulic capacity, condition or new regulatory requirements. Costs and schedules for these projects are continually updated as the scopes become better defined and as priorities and funding strategies change over time.

Table CIP-5 is included to show the anticipated annual inflation-adjusted costs that are expected for each project. These tables show approximately \$233 million worth of expenditures over the six years from 2023 to 2028.

Table CIP-6 presents the anticipated schedule for each project by phase within the six-year planning window. For each project, the predominant phase of the project is shown for a given year. Where two phases of a project are likely to occur in the same year, both phases are indicated.

PROJECT SUMMARIES AND BUSINESS CASES

Summary descriptions for each of the proposed projects are included in **Appendix A**. Projects are categorized as Nine Springs Wastewater Treatment Plant projects, interceptor projects, or pumping station and force main projects. Projects are identified using an alphanumeric identifier:

- A- Nine Springs Wastewater Treatment Plant
- B - Interceptor Projects
- C- Pumping Stations and Force Main Projects
- D- Capital Budget Expenses

It should also be noted that some projects contain a numerical suffix to indicate that it is related to, or dependent upon, some other project and may be part of a larger constructed project in the future (i.e., Project ID A01.1).

Additional project information for most projects is contained in comprehensive business cases. Since some projects are closely connected or contingent upon other projects, more than one project may be included in a single business case. Note that some business cases, and hence associated costs, are more developed than others. Where costs have not been fully developed, amounts have been included as placeholders or allowances to identify the need. As with all projects, these costs will be modified as project scopes are refined, and better estimates become available. It should be noted that projects that have entered the construction phase are not included in the project summaries in **Appendix A** and do not have an updated business case.

The remainder of this section provides a summary of the most notable projects that are included in each category in the 2023 CIP.



Modern engineering practices and updated infrastructure like that at Pumping Station 15 in Middleton supports continuous operations for the approximately 41 millions of gallons of wastewater the District cleans.

TREATMENT PLANT

With the completion of the Liquid Processing Improvements – Phase 1 project in the second half of 2021, the focus will now shift to the remaining projects that were developed in the 2016 Liquid Processing Facilities Plan. Replacement of the west blowers and switchgear equipment will begin in 2022. Unlike the 2022 CIP which proposed replacing the three west blowers in a phased approach over many years, the 2023 CIP calls for replacing all three blowers between 2024 and 2026 due to the deteriorating condition and critical nature of this equipment. A project to replace the east blowers and related switchgear equipment is planned upon completion of the west blowers project. This project was not in the 2022 CIP, and while the equipment continues to perform reasonably well, it is operating beyond its useful life.

Another project from the 2016 Liquid Processing Facilities Plan that will begin in the second half of 2022 is the introduction of a low-dissolved oxygen process to secondary treatment. The facilities plan recommended a process called nitrite shunt that would use less energy and lower nutrients. While bench-scale testing of the nitrite shunt process did not yield satisfactory results, it did suggest that using low-dissolved oxygen for secondary treatment could have significant energy savings. The low-dissolved oxygen process will be implemented at full scale in one of the four treatment plants in 2024 and operated to assess its effectiveness through 2026. If successful, the process will be expanded to all plants in 2028.

Another notable project that will begin in 2023 is a project to replace the switchgear equipment at the treatment plant that receives electrical power from the local utility. This equipment steps down the incoming voltage from the utility so that it can be used by downstream equipment. This switchgear is inspected regularly, and it is in decent working condition. However, it is nearing the end of its useful life by industry standards, and replacement parts are difficult to obtain. Since this equipment is vital to supplying the electrical needs of all plant equipment, District staff are recommending that it be replaced at this time.

Finally, of particular note is a change to the project schedule for two major projects that were recommended in the 2020 Energy Management Master Plan and 2020 Biosolids Management Study. The 2022 CIP proposed that the District begin a facility planning process in 2022-2023 to further study how the District should use its biogas going forward and how best to address its aging assets that treat the biogas. Construction was tentatively

scheduled to begin in 2026. Due to staff availability and other priority projects, the Heat and Power Improvements project is being pushed back three years, with facility planning and construction postponed until 2025-2026 and 2029, respectively. The 2023 CIP also continues to support the District's commitment to the land application of biosolids. While the 2020 Biosolids Management Study recommended that the District investigate a possible future transition from a liquid product that is land applied to a dried cake product, that transition will take many years to execute, if pursued, and it is beyond the six-year planning horizon of this document. In the interim, the District will continue to make improvements to its current land application program through the purchase of two new applicators in 2024 and 2025. Other operational continuity improvements are likely to be included in the 2024 CIP.

INTERCEPTORS

The 2023 CIP provides a major investment in increasing the capacity of the collection system in response to growth in the District's service area and increasing rates of inflow and infiltration. Dane County remains one of the fastest-growing counties in Wisconsin. As a result, the following capacity improvements are planned:

- **West Interceptor – Shorewood Relief:** New relief and replacement sewers will be constructed in the City of Madison and the Village of Shorewood along University Avenue between Whitney Way and Walnut Street in three separate phases. The additional capacity is required to serve projected development in the City of Middleton and the Town of Westport. Phase 1 construction was completed in early 2022. Phases 2 and 3 are scheduled for construction in 2022 and 2023, respectively.
- **Northeast Interceptor – Waunakee Extension (Phase 1):** Approximately 9,000 feet of new relief or replacement sewer will be installed in 2023 and 2024 to serve future development in the villages of Waunakee and Dane and the Town of Westport.
- **Lower Badger Mill Creek Interceptor (Phases 5 & 6):** These are the final phases of the interceptor, to be installed in 2023 and 2024. Upon completion, all or a portion of wastewater flows north of Midtown Road will be diverted to Pumping Station 17 in the City of Verona.

- **Nine Springs Valley Interceptor Capacity Improvements (Phase 1):** This is the first phase of major capacity improvements that are needed for this intercepting system between Pumping Station 11 and Pumping Station 12. It is expected that construction will be divided into at least four phases over a 15-year to 20-year period, with the first phase scheduled for construction in 2027 and 2028.

The 2023 CIP also contains several rehabilitation projects for District interceptors. Several of these projects have been delayed one or more years from previous plans, and several of them are now proposed in 2025. These rehabilitation projects will become the focus of the interceptor category once the majority of the previously mentioned capacity improvement projects are completed.

PUMPING STATIONS AND FORCE MAINS

The District has been systematically rehabilitating its pumping stations over the last 20 years as part of its capital improvements program. These rehabilitations have generally included full replacement of the major mechanical, electrical, control and HVAC systems. Pumping

Stations 13 and 14 are currently being rehabilitated and are scheduled to be completed in the second half of 2022. A full rehabilitation project is also planned for Pumping Station 4 in 2023 and 2024.

The scope of improvements to Pumping Station 17 is also being evaluated and analyzed in 2022. The station's most immediate needs relate to firm capacity due to high rates of growth in the Lower Badger Mill Creek basin, especially north of Midtown Road in the City of Madison. Most of the station equipment is in reasonably good working condition at this time and can be expected to provide reliable service for 10 to 15 more years. The station is not easily expandable, however, and floodplain issues suggest that a new pumping station may be needed in the longer term for this basin. The 2023 CIP includes costs to provide short-term capacity improvements and to replace some critical electrical and HVAC systems such that the station can operate reliably for the next 10 to 15 years. As such, the 2023 CIP does not reflect any costs for a new pumping station.

This category also includes the completion of a relief force main for Pumping Station 17 in 2023. The Phase 1 work was coordinated with a City of Verona public works project completed in the summer of 2021. When complete, the force main will have the capacity needed to serve flows in the upper portions of the Lower Badger Mill Creek basin, which are scheduled to be diverted to Pumping Station 17 in 2024.

New projects in this category have been included to address the continuity of pumping station operations and force main conditions. Only two District pumping stations currently have standby generators that can ensure that the stations continue to operate during a loss of electrical power. Generators have been installed at Pumping Stations 13 and 14 as part of the construction that is in progress. The 2023 CIP outlines a plan to install standby generators at most of the remaining District stations between 2025 and 2030. The plan also includes an annual allowance, starting in 2024, to perform annual inspections of the District's higher-risk force mains.

CAPITAL PROJECTS BUDGET EXPENSES

The final category of expenditures in **Table CIP-4** is capital budget expenses (letter D). These expenses typically include expenses related to planning and studies assessed against the capital fund that would be difficult to capitalize on a specific asset.



Collection system supervisor Ray Schneider temporarily addresses infiltration leaks from Goose Lake near Badger Mill Creek during a low water period. More significant system updates are needed to minimize further water intake.

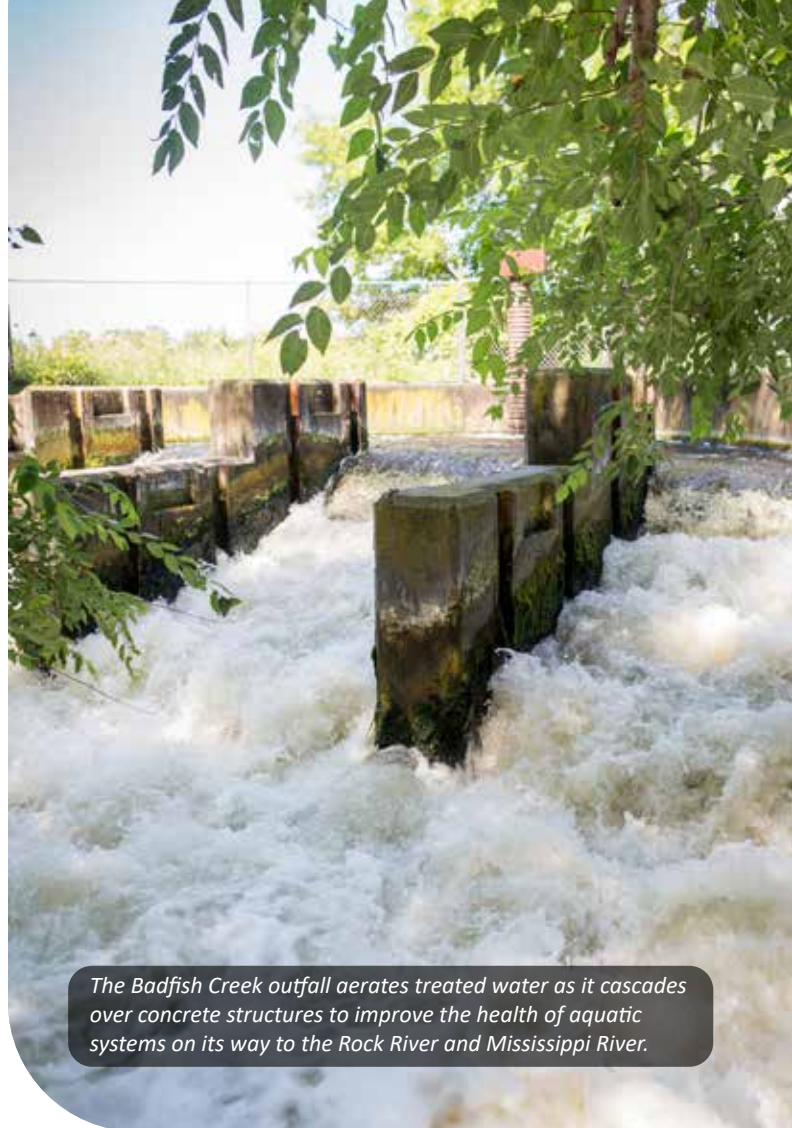
The largest anticipated expenses in this category over the next six years pertain to the work necessary to comply with the new phosphorus requirements for District effluent that is discharged to Badger Mill Creek.

These new requirements were included in the District's discharge permit that was reissued in May 2020 and called for full compliance in 2028. The District originally developed six alternatives to achieve compliance, but it has narrowed the list to four options at this time:

1. Divert all treated effluent to Badfish Creek and discontinue discharge to Badger Mill Creek;
2. Water quality trading;
3. Watershed adaptive management; and
4. Treatment.

The District's discharge permit requires that a final compliance alternatives plan be submitted to WDNR in 2023, and costs are included in the 2023 CIP for that purpose. The 2023 CIP also includes an allowance of \$12.5 million for this project in 2027 if tertiary treatment facilities need to be constructed at the treatment plant. The use of capital funds is being included in the CIP as a conservative assumption for financial planning until a final decision for compliance is reached.

Other items in this category include an annual allowance for general planning expenses for use in developing the Capital Improvements Plan, completion of the Collection System Facilities Plan Update in 2023, and a space needs study for all District-owned properties.



The Badfish Creek outfall aerates treated water as it cascades over concrete structures to improve the health of aquatic systems on its way to the Rock River and Mississippi River.

TABLE CIP-5 | SIX-YEAR SPENDING FORECAST

Project Number	Project Title	2023	2024	2025	2026	2027	2028
Treatment Plant		\$6,131,000	\$15,709,000	\$13,049,000	\$11,039,000	\$20,632,000	\$19,277,000
A01	Liquid Processing Improvements- Phase 2	-	-	-	-	-	-
A01.1	East Primary Influent Channel Air Piping Replacement	142,000	1,242,000	-	-	-	-
A01.2	Low Dissolved Oxygen (Partial Plant)	207,000	3,038,000	216,000	359,000	-	-
A01.3	Low Dissolved Oxygen (Full Plant)	498,000	-	-	766,000	10,165,000	9,967,000
A01.4	West Blowers and Switchgear Replacement	822,000	2,143,000	4,786,000	2,340,000	-	-
A01.5	East Blowers and Switchgear Replacement	822,000	-	-	936,000	5,502,000	3,965,000
A02	2021 Treatment Plant HVAC Improvement Project	1,011,000	-	-	-	-	-
A03	NSWWTP Electrical Service Equipment Replacement	175,000	184,000	2,069,000	2,151,000	-	-
A04	Treatment Plant Energy Projects	-	-	-	-	-	-
A04.1	Heat and Power Improvements	-	-	888,000	924,000	2,091,000	2,153,000
A04.2	Miscellaneous Energy Projects	233,000	378,000	-	-	-	284,000
A05	Lagoon Dikes Improvements	565,000	3,075,000	-	-	-	-
A06	Maintenance, Financial and HR Systems	689,000	1,672,000	1,182,000	1,377,000	426,000	-
A07	Metrogro Applicators & Equipment	106,000	835,000	993,000	122,000	-	-
A08	Flow Splitter Improvements	551,000	1,842,000	-	-	-	-
A09	Treatment Plant HVAC Improvements- Group 1 Projects	-	1,051,000	2,259,000	-	-	-
A10	Liquid Processing Improvements- Phase 3	-	-	-	-	-	-
A10.1	Headworks Screening	-	-	-	-	238,000	2,463,000
A10.2	Grit Processing Improvements	-	-	-	-	-	168,000
A11	Septage Receiving Modifications	-	11,000	327,000	1,805,000	1,859,000	-
A12	Miscellaneous Treatment Plant Projects	119,000	111,000	117,000	122,000	125,000	129,000
A13	Minor Capital Improvements	122,000	128,000	134,000	140,000	144,000	148,000
A14	Annual Pavement Improvements	70,000	-	77,000	-	83,000	-
N/A	Plant Improvements 2028	-	-	-	-	-	-
	Resource Recovery Facility	-	-	-	-	-	-
Interceptors		\$10,015,000	\$15,358,000	\$17,582,000	\$9,991,000	\$12,456,000	\$12,830,000
B01	West Interceptor- Shorewood Relief Projects	-	-	-	-	-	-
B01.2	West Interceptor- Shorewood Relief (Phase 3)	5,346,000	-	-	-	-	-
B02	Lower Badger Mill Creek Interceptor	-	-	-	-	-	-
B02.1	Lower Badger Mill Creek Interceptor- Phase 5	1,283,000	-	-	-	-	-
B02.2	Lower Badger Mill Creek Interceptor- Phase 6	127,000	3,328,000	-	-	-	-
B03	Pumping Station 6 to Pumping Station 10 Connector	440,000	4,513,000	4,739,000	-	-	-
B04	NEI- Waunakee Extension Capacity Improvements (Phase 1)	2,819,000	5,736,000	-	-	-	-
B05	NEI- Truax Extension Rehab	-	1,525,000	6,241,000	-	-	-
B06	NEI- FEI to SEI Rehab	-	50,000	2,226,000	-	-	-
B07	SEI Rehab- Pumping Station 9 to SEI-Dutch Mill Extension	-	106,000	2,612,000	-	-	-
B08	NSVI Capacity Improvements- Phase 1	-	95,000	386,000	401,000	5,696,000	5,867,000
B09	West Interceptor Rehab- Babcock Hall to Dayton Street	-	6,000	1,344,000	-	-	-
B10	District Flow Monitoring Stations	-	-	35,000	1,203,000	-	-
N/A	Collection System Projects 2025	-	-	-	-	-	-
	Collection System Projects 2026	-	-	-	6,077,000	-	-
	Collection System Projects 2027	-	-	-	-	4,382,000	-
	Collection System Projects 2028	-	-	-	-	-	4,513,000
	Lining Projects 2025	-	-	-	-	-	-
	Lining Projects 2026	-	-	-	2,309,000	-	-
	Lining Projects 2027	-	-	-	-	2,379,000	-
	Lining Projects 2028	-	-	-	-	-	2,450,000

TABLE CIP-5 | SIX-YEAR SPENDING FORECAST (CONT.)

Project Number	Project Title	2023	2024	2025	2026	2027	2028
Pumping Stations and Force Mains		\$14,536,000	\$7,269,000	\$6,539,000	\$11,584,000	\$8,257,000	\$7,062,000
C02	Pumping Station 4 Rehabilitation	3,237,000	2,725,000	-	-	-	-
C03	Pumping Station 17 Firm Capacity Improvements	2,372,000	3,735,000	-	-	-	-
C04	Pumping Station 17 Force Main Relief- Phase 2	8,818,000	-	-	-	-	-
C05	Emergency Power Generation at District Pumping Stations	5,000	128,000	1,876,000	2,054,000	1,634,000	1,135,000
C06	Miscellaneous Collection System Improvements	103,000	108,000	113,000	118,000	121,000	125,000
C07	Force Main Condition Assessment	-	557,000	584,000	608,000	626,000	645,000
C08	Pumping Station 16 Projects	-	-	-	-	-	-
C08.1	Pumping Station 16 Rehabilitation	-	-	590,000	3,421,000	2,353,000	-
C08.2	Pumping Station 16 Force Main Rehabilitation	-	17,000	88,000	1,963,000	-	-
N/A	Pumping Station Projects 2025	-	-	3,288,000	-	-	-
	Pumping Station Projects 2026	-	-	-	3,420,000	-	-
	Pumping Station Projects 2027	-	-	-	-	3,522,000	-
	Pumping Station Projects 2028	-	-	-	-	-	5,158,000
Capital Budget Expenses		\$405,000	\$56,000	\$292,000	\$61,000	\$12,581,000	\$64,000
D01	Capital Budget Expenses	53,000	56,000	58,000	61,000	63,000	64,000
D02	Collection System Facilities Plan Update	64,000	-	-	-	-	-
D03	Badger Mill Creek Phosphorus Compliance	106,000	-	234,000	-	12,519,000	-
D04	Plan for District Properties	182,000	-	-	-	-	-
Grand Total		\$31,086,000	\$38,392,000	\$37,463,000	\$32,674,000	\$53,926,000	\$39,233,000

TABLE CIP-6 | SIX YEAR CAPITAL PROJECTS PHASES

A = Annual C = Construction C/O = Construction and Operation D = Design D/C = Design and Construction E = Equipment Purchase
 O = Operation P = Planning P/D = Planning and Design S = Study S/T = Study and Testing T = Testing

Project Number	Project Title	2023	2024	2025	2026	2027	2028
Treatment Plant							
A01	Liquid Processing Improvements- Phase 2						
A01.1	East Primary Influent Channel Air Piping Replacement	D	C				
A01.2	Low Dissolved Oxygen (Partial Plant)	D	C/O	O	O		
A01.3	Low Dissolved Oxygen (Full Plant)	D			D	D/C	C
A01.4	West Blowers and Switchgear Replacement	D	C	C	C		
A01.5	East Blowers and Switchgear Replacement	D			C	C	C
A02	2021 Treatment Plant HVAC Improvement Project	C					
A03	NSWWTP Electrical Service Equipment Replacement	P/D	D	C	C		
A04	Treatment Plant Energy Projects						
A04.1	Heat and Power Improvements			P	P	D	D
A04.2	Miscellaneous Energy Projects	C	D/C				P
A05	Lagoon Dikes Improvements	D/C	C				
A06	Maintenance, Financial and HR Systems	P/D	C	C	C	C	
A07	Metrogro Applicators & Equipment	E	E	E	E		
A08	Flow Splitter Improvements	D/C	C				
A09	Treatment Plant HVAC Improvements- Group 1 Projects		D/C	C			
A10	Liquid Processing Improvements- Phase 3						
A10.1	Headworks Screening					P	D
A10.2	Grit Processing Improvements						P/D
A11	Septage Receiving Modifications		P	P/D	C	C	
A12	Miscellaneous Treatment Plant Projects	A	A	A	A	A	A
A13	Minor Capital Improvements	A	A	A	A	A	A
A14	Annual Pavement Improvements	C		C		C	
N/A	Plant Improvements 2028						
	Resource Recovery Facility						

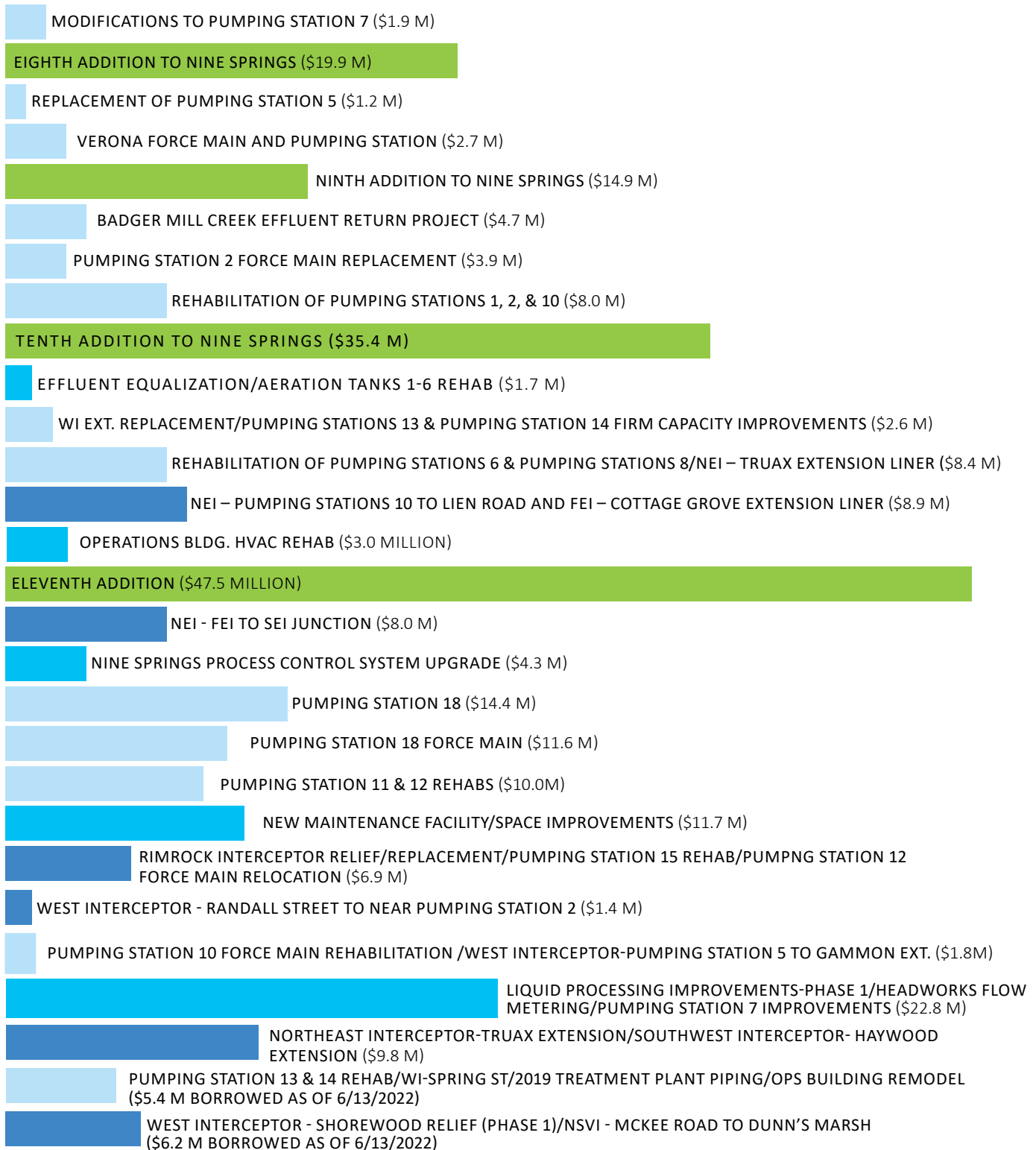
TABLE CIP-6 | SIX YEAR CAPITAL PROJECTS PHASES (CONT.)

A = Annual C = Construction C/O = Construction and Operation D = Design D/C = Design and Construction E = Equipment Purchase
 O = Operation P = Planning P/D = Planning and Design S = Study S/T = Study and Testing T = Testing

Project Number	Project Title	2023	2024	2025	2026	2027	2028
Interceptors							
B01	West Interceptor- Shorewood Relief Projects						
B01.2	West Interceptor- Shorewood Relief (Phase 3)	C					
B02	Lower Badger Mill Creek Interceptor						
B02.1	Lower Badger Mill Creek Interceptor- Phase 5	C					
B02.2	Lower Badger Mill Creek Interceptor- Phase 6	D	C				
B03	Pump Station 6 to Pump Station 10 Connector	D	C	C			
B04	NEI- Waunakee Extension Capacity Improvements (Phase 1)	D/C	C				
B05	NEI- Truax Extension Rehab		D/C	C			
B06	NEI- FEI to SEI Rehab		D	C			
B07	SEI Rehab- Pumping Station 9 to SEI-Dutch Mill Extension		D	C			
B08	NSVI Capacity Improvements- Phase 1		P	D	D	C	C
B09	West Interceptor Rehab- Babcock Hall to Dayton Street		P	D/C			
B10	District Flow Monitoring Stations			D	C		
N/A	Collection System Projects 2025						
	Collection System Projects 2026				C		
	Collection System Projects 2027					C	
	Collection System Projects 2028						C
	Lining Projects 2025						
	Lining Projects 2026				C		
	Lining Projects 2027					C	
	Lining Projects 2028						C
Pumping Stations and Force Mains							
C02	Pumping Station 4 Rehabilitation	C	C				
C03	Pumping Station 17 Firm Capacity Improvements	C	C				
C04	Pumping Station 17 Force Main Relief- Phase 2	C					
C05	Emergency Power Generation at District Pumping Stations	P/D	D	D/C	D/C	C	C
C06	Miscellaneous Collection System Improvements	A	A	A	A	A	A
C07	Force Main Condition Assessment		A	A	A	A	A
C08	Pumping Station 16 Projects						
C08.1	Pumping Station 16 Rehabilitation			D	C	C	
C08.2	Pumping Station 16 Force Main Rehabilitation		P	D	C		
N/A	Pumping Station Projects 2025			C			
	Pumping Station Projects 2026				C		
	Pumping Station Projects 2027					C	
	Pumping Station Projects 2028						C
Capital Budget Expenses							
D01	Capital Budget Expenses	A	A	A	A	A	A
D02	Collection System Facilities Plan Update	P					
D03	Badger Mill Creek Phosphorus Compliance	P		D		C	
D04	Plan for District Properties	P					

Wisconsin Clean Water Fund Loan Program

Although the District can, and may, fund future projects with general obligation bonds, continued use of the Wisconsin Clean Water Fund loan program is anticipated for most of the larger projects in the plan. As of June 13, 2022, the District has borrowed \$279 million from this program for the following projects:

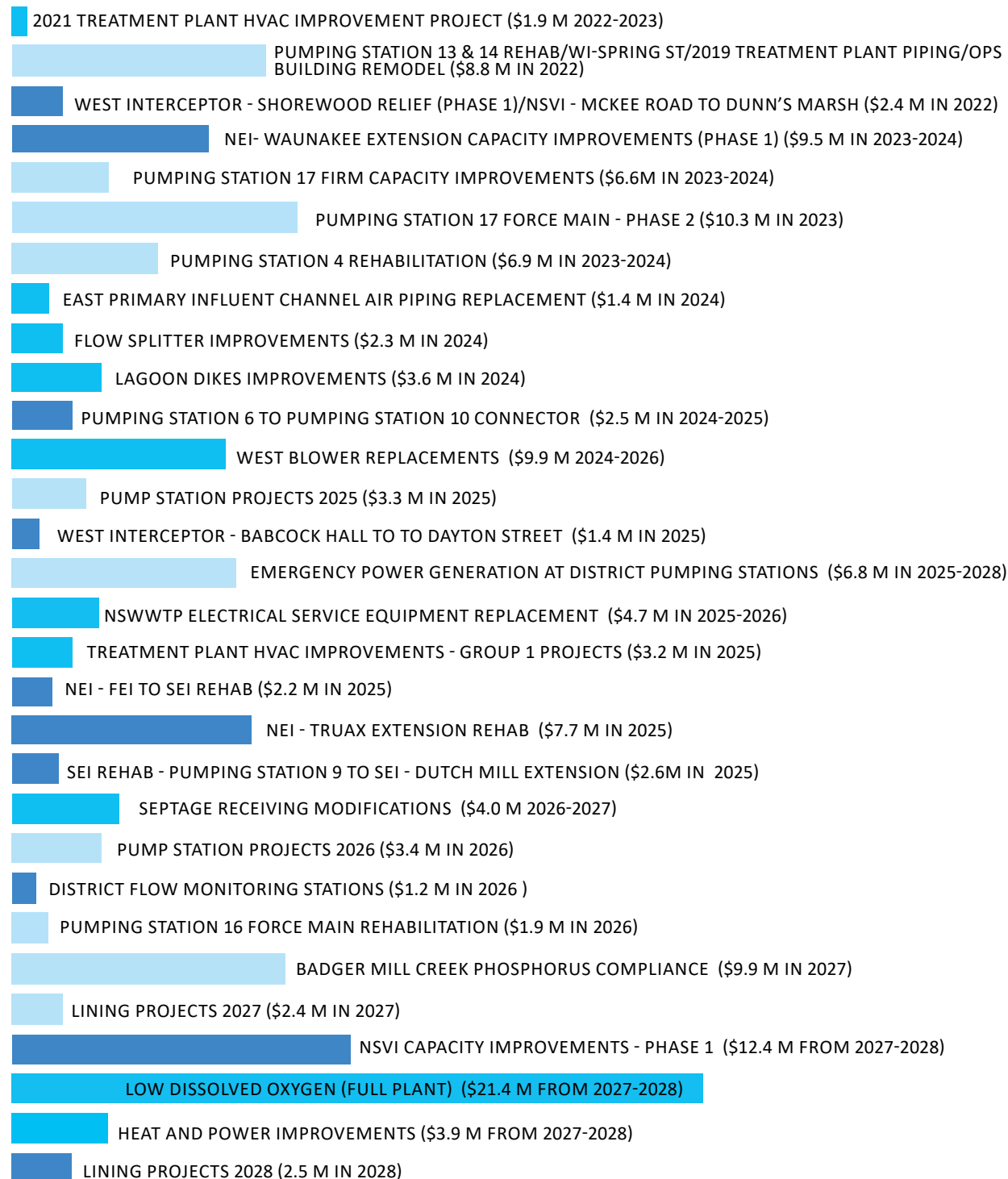


LEGEND



Wisconsin Clean Water Fund Loan Program - Anticipated Debt

The District also anticipates that it will require funding for many future projects, with funding for many of them coming from Clean Water Fund loans. The projects listed below are expected to qualify for a reduced interest rate from the Clean Water Fund over the 20-year life of the loan. This reduced interest rate has averaged less than 2% in the past year. Use of the loan program helps to ensure that adequate capital reserves are on hand to address any unforeseen capital costs.



LEGEND



2023 Capital Improvements Plan

CAPITAL FINANCE

INTRODUCTION

The previous sections described the annual capital budget and the six-year project plan, including project costs and schedules. This section addresses how this work is to be financed.

The District finances its capital improvements program through a combination of cash and borrowing. Borrowing is done through the state's Clean Water Fund loan program, which provides subsidized, below-market interest rates in support of the state's wastewater infrastructure.

The financing plan seeks to maintain financial reserves, limit use of debt, and maintain steady annual increases in service charges. These goals are in tension and must be balanced under overall Commission direction.

Financing under this Capital Improvements Plan differs from the 2022 plan in two respects. First, the 2022 plan included significant projected costs related to implementation of the Energy Management Master Plan, which calls for numerous heat and power updates throughout the Nine Springs Wastewater Treatment Plant. Under this updated 2023 plan, much of those costs are deferred beyond the six-year capital improvements plan period, as planning work for the called-for heat and power upgrades continues. Second, the District has increased projected costs to account for higher rates of inflation and contingencies related to current economic conditions.

This plan continues three overall trends from 2022. The amount of service charges revenues used directly for capital expenses gradually rises to reduce reliance on debt below what would otherwise occur. Nonetheless, total use of debt also rises due to overall increased capital needs. Lastly, year-over-year increases in service charges are projected to remain between 8% and 9% per year. (Note that the increase in service charges for 2023 is tentative, pending final authorization of the 2023 operating budget.)

POLICY CONTROLS

District capital financing is controlled by several Commission policies (available at www.madsewer.org/commission and select Commission Policy Book). These include:

- Outcomes Policy O – 2C “Charges for service are justified, adequate, equitable and predictable;”
- Executive limitations Policy EL – 2C, regarding financial planning/budgeting;
- EL – 2D (5) regarding adequacy of available funds;
- EL – 2G regarding adequacy of rates to fund capital improvements; and

Commission policy book attached policy ATT-2, specifically the sections on:

- Capital projects budget and debt service budget;
- Debt financing;
- Fund reserves;
- Fund structure; and
- Strategic financial planning.

This CIP is consistent with the above policies.



The Commission and staff members work together to develop guidance during strategic planning discussions.

FINANCING TOOLS

The District's capital program is financed with three tools:

1. Disbursements from the state's Clean Water Fund loan program.
2. Revenue from District connection charges (charged for extension of service to new areas).
3. Revenue from District service charges (paid quarterly by municipalities).

Clean Water Fund loan interest rates are lower than commercial loans because of a state interest rate subsidy. Rates in the past two years have been at or under 2%, though rates are projected to increase, mirroring market rate increases. Clean Water Fund loans have a 20-year term.

Clean Water Fund loan proceeds are deposited in the capital projects fund. Loan proceeds are often received a year or more after spending begins on a project. This is because initial planning and design expenses are not eligible for reimbursement until a construction contract for the project has been bid and awarded. These delays are one reason to maintain an adequate reserves in the capital projects fund.

Principal and interest payments are made from a separate debt service fund. Money for these payments comes from District service charges, transferred from the operating fund to the debt service fund. Clean Water Fund program terms require the District to maintain specified reserves in the debt service fund.

Connection charge revenue is paid by municipalities (or directly by developers) on a one-time basis when service is made available to new areas. Connection charges are based on the cost of the conveyance facilities serving a given area and a proportion of the costs of assets at the Nine Springs Wastewater Treatment Plant. Connection charges are meant to recover the infrastructure costs of expanding the system and providing capacity. Ongoing repair and replacement of the system are supported by service charges. Connection charges are deposited directly in the capital projects fund.

Connection charge revenue varies significantly by year depending on the pace and location of development in the region. In preparing the capital financing plan, staff estimate future connection charges based on historical patterns, known rate changes and best judgement about economic conditions. The unpredictability of connection charge revenue is a second reason to

maintain adequate reserves in the capital projects fund. (Estimated connection charges in this CIP reflect the phase in of higher treatment plant connection charge rates, authorized by the Commission in 2017.)

Connection charge revenues contribute roughly 40% of the cash financing for the capital program over the six-year planning horizon, with the remaining 60% from service charges. (Service charges also cover all debt service payments.) Service charge revenues are initially deposited in the operating fund and then transferred to the capital projects fund as part of the District's annual budget.

Use of Clean Water Fund loans remains the largest financing tool for the capital program, financing approximately 80% of capital expenditures in 2023, declining to approximately 60% in 2028, the last year of this Capital Improvements Plan. This reduction in the debt financing ratio is intended to increase the financial resiliency of the District over time, while also reducing interest payments over time. The remainder of expenditures are financed with cash, including from connection charges and service charges.

CAPITAL FINANCING PLAN

The financing plan covers the CIP planning period, 2023–2028. In addition to borrowing levels, the plan proposes annual transfers from the operating fund to the capital projects fund and to the debt service fund. These amounts are anticipated. However, the transfer amounts for the first year of the plan will be fixed in the District's annual budget in the fall. Borrowing amounts will vary from anticipated, reflecting changes in project costs, loan eligibility and staff decisions to not borrow for smaller projects when feasible.

CAPITAL PROJECTS FUND BALANCE

The capital projects fund balance is an important factor in the capital financing plan. The balance provides resiliency against fluctuations in connection charge revenues and against delays in loan proceeds. It also covers the costs of the planning and design phases of loan-funded projects until loan proceeds are received. Furthermore, the balance allows the District to take on unplanned capital expenditures, like emergency repairs. To provide this resiliency, the balance must grow with the size of the capital program. The District seeks to maintain a capital projects fund reserve at least as large as annual cash spending, averaged over several years.

To achieve needed balances, the plan increases the amount transferred from the operating fund to the capital projects fund, over the course of the six-year plan. As shown in **Table CIP-7**, the reserve target increases from \$10 million to just under \$17 million over the period, reflecting increased expenditures. To meet this target, the plan increases transfers from \$3.5 million in 2022 to just under \$11 million by the end of the period.

DEBT SERVICE FUND BALANCE

Payments for principal and interest obligations come from the debt service fund. As with the capital projects fund, the balance provides resiliency against financial fluctuations.

However, where the capital projects fund's balance is useful mainly for year-to-year variations, the debt service fund's balance is for longer-term variations. In particular, the fund balance provides resiliency against potential large capital costs three or more years in the future. "Large" means costs on the order of \$25 million or more, like those for major new regulatory requirements. The debt service fund balance allows the District to take on new debt for such requirements without having to immediately make large increases in service charge revenue. The District tries to increase the balance when such a potential requirement begins to seem likely.

In addition, the Clean Water Fund loan program requires the District to have sufficient funds on hand to pay debt service requirements for the following calendar year. This minimum requirement assures ability to pay but provides no resiliency against potential future projects.

The current financing plan accounts for currently known potential large costs, notably the Energy Management Master Plan, phosphorous requirements for the Lower Badger Mill Creek and potential changes to the District's biosolids program. Although the greatest energy and biosolids costs appear at the end of the planning period, the CIP accounts for them in reserves planning. As shown in Table CIP-8, the Clean Water Fund reserve requirement increases from \$16 million to \$24 million over the period. Transfers from the operating fund to the debt service fund increase from \$16 million to \$23 million. The balance net of the reserve requirement declines from \$13 million in 2023 to \$3 million in 2028. This reflects the growth in the District's reserve requirement, which is in turn driven by an increase in the District's debt funded portion of the capital project portfolio over the planning period.

(Note: The debt service fund balances are adequate to pay the required principal and interest payments on existing and anticipated Clean Water Fund loans. The planned balance at the end of 2023 meets the District's policy requirement to maintain a balance sufficient to avoid levying a property tax to satisfy its debt service obligations.)

TABLE CIP-7 | CAPITAL PROJECTS FUND CASH FLOW SUMMARY

<i>Millions of Dollars</i>	2022	2023	2024	2025	2026	2027	2028
Opening Balance	\$6,718,000	\$16,695,000	\$17,532,000	\$15,716,000	\$23,103,000	\$21,372,000	\$20,409,000
<i>Revenues</i>							
Clean Water Fund Loans	19,072,000	22,285,000	23,567,000	30,833,000	15,243,000	36,263,000	20,818,000
Connection Charges	4,000,000	4,550,000	5,100,000	5,625,000	6,175,000	6,375,000	6,550,000
Interest Revenues	6,000	83,000	88,000	79,000	116,000	214,000	204,000
Transfers From Operating Fund	3,501,000	5,006,000	7,821,000	8,312,000	9,410,000	10,111,000	10,936,000
<i>Total Revenues</i>	<i>\$26,579,000</i>	<i>\$31,924,000</i>	<i>\$36,576,000</i>	<i>\$44,849,000</i>	<i>\$30,944,000</i>	<i>\$52,963,000</i>	<i>\$38,508,000</i>
<i>Expenditures</i>							
Treatment Plant	3,803,000	6,131,000	15,709,000	13,049,000	11,039,000	20,632,000	19,277,000
Interceptors	4,748,000	10,015,000	15,358,000	17,582,000	9,991,000	12,456,000	12,830,000
Pumping Stations and Force Mains	7,692,000	14,536,000	7,269,000	6,539,000	11,584,000	8,257,000	7,062,000
Capital Budget Expenses	359,000	405,000	56,000	292,000	61,000	12,581,000	64,000
<i>Total Expenditures</i>	<i>\$16,602,000</i>	<i>\$31,087,000</i>	<i>\$38,392,000</i>	<i>\$37,462,000</i>	<i>\$32,675,000</i>	<i>\$53,926,000</i>	<i>\$39,233,000</i>
Closing Balance	\$16,695,000	\$17,532,000	\$15,716,000	\$23,103,000	\$21,372,000	\$20,409,000	\$19,684,000
<i>Reserve Target</i>	<i>11,407,000</i>	<i>10,085,000</i>	<i>11,922,000</i>	<i>14,137,000</i>	<i>15,035,000</i>	<i>17,618,000</i>	<i>16,874,000</i>
<i>Closing Balance Net of Reserve</i>	<i>\$5,288,000</i>	<i>\$7,447,000</i>	<i>\$3,794,000</i>	<i>\$8,966,000</i>	<i>\$6,337,000</i>	<i>\$2,791,000</i>	<i>\$2,810,000</i>

TABLE CIP-8 | DEBT SERVICE FUND CASH FLOW SUMMARY

	2022	2023	2024	2025	2026	2027	2028
Opening Balance <i>Millions of Dollars</i>	\$29,924,000	\$30,073,000	\$28,631,000	\$27,931,000	\$27,103,000	\$26,700,000	\$26,321,000
<i>Revenues</i>							
Transfer from Operating Fund	16,297,000	16,026,000	15,239,000	17,089,000	18,477,000	20,506,000	22,576,000
Interest Earnings	49,000	150,000	143,000	140,000	136,000	267,000	263,000
<i>Total Revenues</i>	<i>\$16,346,000</i>	<i>\$16,176,000</i>	<i>\$15,382,000</i>	<i>\$17,229,000</i>	<i>\$18,613,000</i>	<i>\$20,773,000</i>	<i>\$22,839,000</i>
Debt Service Payments	16,197,000	17,618,000	16,082,000	18,057,000	19,016,000	21,152,000	22,266,000
Closing Balance	\$30,073,000	\$28,631,000	\$27,931,000	\$27,103,000	\$26,700,000	\$26,321,000	\$26,894,000
<i>Reserve Requirement</i>	<i>17,618,000</i>	<i>16,082,000</i>	<i>18,057,000</i>	<i>19,016,000</i>	<i>21,152,000</i>	<i>22,266,000</i>	<i>23,451,000</i>
<i>Closing Balance Net of Reserve</i>	<i>\$12,455,000</i>	<i>\$12,549,000</i>	<i>\$9,874,000</i>	<i>\$8,087,000</i>	<i>\$5,548,000</i>	<i>\$4,055,000</i>	<i>\$3,443,000</i>

BORROWING

Borrowing allows the District to smooth its revenue needs over time. Rather than significantly increase service charges to accommodate large new capital projects, borrowing spreads the costs over the term of the loan. The price of this smoothing is the interest payments required.

As shown in **Table CIP-9**, total outstanding principal would rise from \$150 million to \$204 million over the planning period. The District does not have a self-imposed debt limit. Debt levels are instead planned in conjunction with

the other goals of managing service charge increases and maintaining financial resiliency. Furthermore, the District's ability to obtain future Clean Water Fund program loans is not limited by current debt levels.

The District does have one external limit on debt. State statute limits District debt to 5% of the equalized property valuation of the District. Currently, that valuation is approximately \$52 billion. The District's debt limit is 5% of that, or approximately \$2.6 billion. Forecast debt level in 2028 is \$204 million, or 8% of the statutory limit.

A reason to limit debt is to limit annual interest payments. Under the plan, payments would rise from \$3.7 million to \$5 million. If, hypothetically, the District had no debt, service charge revenue would be lowered by the amount of interest payments. On a percentage basis, interest payments are 7.3% of all service charge revenue in 2023 and would decline to 6.5% in 2028. The slight decrease in interest payments as a percent of service charge revenue over the planning period reflects the decrease in capital expenditures financed with debt.

The percentage of capital expenditures financed with debt will be 80% in 2023, declining to 56% in 2028. (Percentages are three-year moving averages, to smooth annual variation that results from loan and spending timing differences.) This reduction in the debt financing ratio is intended to increase the financial resiliency of the District over time, while also reducing interest payments over time. It should be noted that the District cannot borrow 100% of its capital expenses, because of Clean Water Fund program eligibility limits. For example, projects to expand the collection system are generally not eligible for a program loan.



Accounting supervisor Sipiwe Nkosi works to maintain financial resiliency and limit debt as the District balances multiple projects as part of annual budgeting.

SERVICE CHARGES

Supporting the financing plan will require additional transfers from the operating fund and thus increases in service charge revenues. Table CIP-10 shows the amount transferred from the operating fund to each of the other funds per year. The total amount transferred rises from \$21 million to \$34 million over the period. The rate of increase is stable, being between \$1.2 million and \$2.9 million per year. While most funds transferred are in support of the debt service fund, increasing transfers to the capital projects fund over the planning period support the reduction in the percentage of capital expenditures financed with debt noted above.

Table CIP-10 also shows a forecast of service charge needs for the operating budget, the non-capital side of District spending. Although the operating budget is not planned on a multi-year basis, the overall trend in growth is relatively stable. It is driven by inflationary factors and anticipated increases in staffing levels. The amounts shown reflect an assumed steady growth rate that is slightly higher than recent years to err on the side of caution in forecasting. As noted, the estimate for the 2023 operating budget is uncertain at this time.

Adding planned capital program transfers to that trend, forecasted year-over-year increases in total District service charges remain at or just under 9% per year over the period. This steady rate of increase reflects projected growth in capital expenditures over the planning period, as described in the Six-Year Capital Projects Summary portion of this document.

TABLE CIP-9 | USE OF DEBT IN CAPITAL PROGRAM

<i>Millions of Dollars</i>	2023	2024	2025	2026	2027	2028
Percent of Capital Expenditures Financed with Debt (3 year moving average)	81%	83%	72%	63%	65%	56%
End of Year Outstanding Principal Obligations	\$150,324,000	\$161,763,000	\$178,973,000	\$179,687,000	\$199,712,000	\$203,238,000
Interest Paid	\$3,669,000	\$3,954,000	\$4,434,000	\$4,487,000	\$4,914,000	\$4,974,000

TABLE CIP-10 | SERVICE CHARGES SUPPORT FOR THE CAPITAL PROGRAM

	2023	2024	2025	2026	2027	2028
Transfer to Capital Projects Fund	\$5,006,000	\$7,821,000	\$8,312,000	\$9,410,000	\$10,111,000	\$10,936,000
Transfer to Debt Service Fund	16,026,000	15,239,000	17,089,000	18,477,000	20,506,000	22,576,000
<i>Total Support for Capital Program</i>	<i>21,032,000</i>	<i>23,060,000</i>	<i>25,401,000</i>	<i>27,887,000</i>	<i>30,617,000</i>	<i>33,512,000</i>
<i>Increase from Prior Year</i>	<i>1,234,000</i>	<i>2,028,000</i>	<i>2,341,000</i>	<i>2,486,000</i>	<i>2,730,000</i>	<i>2,895,000</i>
Operating Budget Service Charge Needs (trend)	29,132,000	31,300,000	33,620,000	36,102,000	38,758,000	41,600,000
<i>Total Service Charge Increase from Prior Year</i>	<i>\$3,791,000</i>	<i>\$4,196,000</i>	<i>\$4,661,000</i>	<i>\$4,968,000</i>	<i>\$5,386,000</i>	<i>\$5,737,000</i>
<i>Total Percentage Increase from Prior Year</i>	<i>8.2%</i>	<i>8.4%</i>	<i>8.6%</i>	<i>8.4%</i>	<i>8.4%</i>	<i>8.3%</i>

2023 Capital Improvements Plan

APPENDIX A: PROJECT SUMMARIES

ID	Project Title	Pg	ID	Project Title	Pg
A01.1	East Primary Influent Channel Air Piping Replacement	29	B02.1 & B02.2	Lower Badger Mill Creek Interceptor- Phase 5 & 6	49
A01.2	Low Dissolved Oxygen (Partial Plant)	30	B03	Pumping Station 6 to Pumping Station 10 Connector	50
A01.3	Low Dissolved Oxygen (Full Plant)	31	B04	NEI- Waunakee Extension Capacity Improvements (Phase 1)	51
A01.4	West Blowers and Switchgear Replacement	32	B05	NEI- Truax Extension Rehab	52
A01.5	East Blowers and Switchgear Replacement	33	B06	NEI- FEI to SEI Rehab	53
A02	2021 Treatment Plant HVAC Improvement Project	34	B07	SEI Rehab- PS 9 to SEI-Dutch Mill Extension	54
A03	NSWWTP Electrical Service Equipment Replacement	35	B08	NSVI Capacity Improvements- Phase 1	55
A04.1	Heat and Power Improvements	36	B09	West Interceptor Rehab- Babcock Hall to Dayton Street	56
A04.2	Miscellaneous Energy Projects	37	B10	District Flow Monitoring Stations	57
A05	Lagoon Dikes Improvements	38	C01	Grass Lake Dike Stabilization	58
A06	Maintenance, Financial and HR Systems	39	C02	Pumping Station 4 Rehabilitation	59
A07	Metrogro Applicators & Equipment	40	C03	Pumping Station 17 Firm Capacity Improvements	60
A08	Flow Splitter Improvements	41	C04	Pumping Station 17 Force Main Relief- Phase 2	61
A09	Treatment Plant HVAC Improvements - Group 1 Projects	42	C05	Emergency Power Generation at District Pumping Stations	62
A10.1	Headworks Screening	43	C06	Miscellaneous Collection System Improvements	63
A10.2	Grit Processing Improvements	44	C07	Force Main Condition Assessment	64
A11	Septage Receiving Modifications	45	C08.1	Pumping Station 16 Rehabilitation	65
A12	Miscellaneous Treatment Plant Projects	46	C08.2	Pumping Station 16 Force Main Rehabilitation	66
A13 & A14	Miscellaneous Capital Improvements	47	D01	Capital Budget Expenses	67
B01.1 & B01.2	West Interceptor- Shorewood Relief (Phase 2 & 3)	48	D02	Collection System Facilities Plan Update	68
			D03	Badger Mill Creek Phosphorus Compliance	69
			D04	Plan for District Properties	70



CIP ID#
A01.1

East Primary Influent Channel Air Piping Replacement

Start Date

2022

Completion Date

2024

Project Type

Plant Improvements – Primary Treatment

Location

Nine Springs Wastewater Treatment Plant

Description

This project will replace the air piping in the influent channels to the primary tanks on the east side of the treatment plant. Several air leaks were discovered in the air piping in April 2021, and it has been determined that the system can no longer be repaired cost effectively. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

The air piping in the influent channels to the primary tanks supplies pressurized air to the wastewater so that the solids remain suspended until they reach the primary settling basins. Without the proper amount of air in these channels, the solids will settle over time, reducing the channel capacity and increasing maintenance costs to clear the settled material. The air piping in the primary influent channels on the west side of the plant was replaced as part of the Liquid Processing Improvements (Phase 1) in 2020. The piping for the east plant is older than that on the west side prior to its replacement. It requires replacement to ensure that the primary treatment process continues to operate effectively.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$142,000

TOTAL PROJECT COST

\$1,390,000

CIP ID#

A01.2

Low Dissolved Oxygen (Partial Plant)

Start Date

2022

Completion Date

2026

Project Type

Plant Improvements – Aeration System

Location

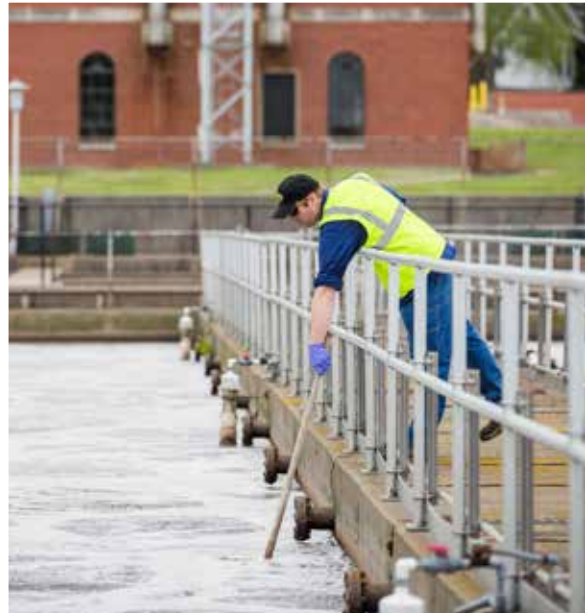
Nine Springs Wastewater Treatment Plant

Description

The purposes of this project are to replace aging assets associated with the secondary treatment system and to test the use of low dissolved oxygen (DO) at full scale on a portion of the biological nutrient removal process. The test results will be used to determine if the low DO process changes can be implemented in the entire secondary treatment process. It is anticipated that costs associated with implementing and testing the low DO process changes will be funded through cash in the capital projects fund.

Background

The existing activated sludge facilities operate an enhanced biological phosphorus removal process. Many of the aeration supply and control equipment assets need replacement due to age, condition or obsolescence. As part of the 2016 Liquid Processing Facilities Plan, changes to the existing processes were evaluated as part of asset replacement, including a process called nitrite shunt, that could result in more effective nutrient removal while using less energy and potentially positioning the District for future total nitrogen regulations. While bench-scale testing of the nitrite shunt process did not yield satisfactory results, it did identify low DO as a promising alternative that could remove the necessary nutrients with less energy.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$207,000

TOTAL PROJECT COST

\$3,850,000



CIP ID#

A01.3

Low Dissolved Oxygen (Full Plant)

Start Date

2023

Completion Date

2029

Project Type

Plant Improvements – Aeration System

Location

Nine Springs Wastewater Treatment Plant

Description

This project involves the implementation of a low-dissolved oxygen (DO) biological nutrient removal process on a plant-wide basis. This project assumes successful bench scale and pilot testing of the process in prior years (see related project ID# A01.2). It is anticipated that costs associated with the project will be funded through the Clean Water Fund.

Background

The existing activated sludge facilities operate an enhanced biological phosphorus removal process. Many of the aeration supply and control equipment assets need replacement due to age, condition or obsolescence. As part of the 2016 Liquid Processing Facilities Plan, changes to the existing processes were evaluated as part of asset replacement, including a process called nitrite shunt that could result in more effective nutrient removal while using less energy and potentially positioning the District for future total nitrogen regulations. While bench-scale testing of the nitrite shunt process did not yield satisfactory results, it did identify low DO as a promising alternative that could remove the necessary nutrients with less energy. The low DO improvements will be implemented in all plants of the biological nutrient removal process if the initial testing, currently scheduled for 2024-2026, is successful.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$498,000

TOTAL PROJECT COST

\$21,563,000

CIP ID#

A01.4

West Blowers and Switchgear Replacement

Start Date

2022

Completion Date

2026

Project Type

Plant Improvements – Aeration System

Location

Nine Springs Wastewater Treatment Plant

Description

This project will replace the west blowers and associated medium-voltage switchgear. These facilities have been in operation for more than 35 years, and they are currently operating beyond their expected lifespan. This project was included in the 2016 Liquid Processing Facilities Plan. It is anticipated that the costs of the project will be funded through the Clean Water Fund.

Background

The 2016 Liquid Processing Facilities Plan recommended replacement of the west blowers using a phased approach. The plan called for two blowers to be replaced between 2020 and 2025, and the remaining blower and blower switchgear to be replaced shortly after 2024. Since the plan was developed, the condition of the blowers has deteriorated significantly, and one of the units is inoperable and requires costly repairs. Given the condition and criticality of this equipment, District operations staff is recommending that all three blowers and associated switchgear be replaced as soon as possible to ensure that this critical process continues to operate satisfactorily.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$822,000

TOTAL PROJECT COST

\$10,100,000



CIP ID#

A01.5

East Blowers and Switchgear Replacement

Start Date

2023

Completion Date

2026

Project Type

Plant Improvements – Aeration System

Location

Nine Springs Wastewater Treatment Plant

Description

This project will replace the east blowers and associated medium-voltage switchgear. This equipment is of varying ages, with some of it more than 50 years old. This infrastructure is a crucial component of the activated sludge process and needs to be replaced to ensure compliance with the District's discharge permit. It is anticipated that the costs of this project will be funded through the Clean Water Fund program.

Background

The east blower system is older than the west blower system, with some of the facilities dating back to the 1960s. The system includes four electric blowers and one engine-driven blower that operates on biogas to reduce electricity demands in the east plants. The 2016 Liquid Processing Facilities Plan recommended the replacement of the east blower switchgear, but not the blowers themselves. New east blowers were not deemed necessary since the plan recommended that the aeration systems of the west and east plants be connected in such a way that the new west blowers could provide excess capacity to the east plant. District staff have elected not to connect the west and east sides of the plant, thereby necessitating the replacement of the east blowers and switchgear.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$822,000

TOTAL PROJECT COST

\$11,230,000

CIP ID# **A02** **2021 Treatment Plant HVAC Improvement Project**

Start Date

2020

Completion Date

2023

Project Type

Plant Improvement- HVAC

Location

Nine Springs Wastewater Treatment Plant

Description

The purpose of this project is to upgrade and replace aging HVAC systems in various buildings at the treatment plant. HVAC systems need to be in good working order so that they meet applicable building codes, provide a safe environment for staff, and protect equipment from damage caused by changing environmental conditions. Due to the harsh environments that these systems treat, many systems have deteriorated beyond reasonable repair and need to be replaced. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

This project will address HVAC deficiencies throughout the treatment plant. Many systems installed prior to the Eleventh Addition to the treatment plant are not working as designed or are not functioning at all. These systems do not meet applicable code requirements and pose a health risk to workers. A consultant performed a comprehensive study of existing systems in 2020 and compiled a prioritized list of the most deficient systems. This project will include improvements in the Gravity Belt Thickener Building, Dissolved Air Floatation Thickener Building, Metrogro Pumping Station, and Headworks Building Control Room. Other plant areas will be addressed in subsequent phases of this initiative.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$1,011,000

TOTAL PROJECT COST

\$1,960,000



CIP ID#

A03

NSWWTP Electrical Service Equipment Replacement

Start Date

2022

Completion Date

2026

Project Type

Plant Improvement - Electrical Distribution

Location

Nine Springs Wastewater Treatment Plant

Description

This project proposes to replace the outdoor service switchgear, transformers, busway system and indoor distribution switchgear for the incoming electrical service to the treatment plant. This system is responsible for transforming the incoming voltage so that it can be utilized by plant equipment and for isolating and protecting that equipment. It is anticipated that future equipment replacement will be funded through a loan from the Clean Water Fund.

Background

Electrical power from the utility is routed to the treatment plant through two sets of switchgear. The first set, known as switchgear H1, is located outside of the Effluent Building. This system operates at 13.8 kV and steps down the voltage to 4.16 kV for use in downstream plant processes. The second system, known as switchgear S1, is located inside the Effluent Building. All equipment was installed in 1984-1985 and is approaching the end of its useful life (40-50 years). An inspection of the H1 equipment was conducted by an electrical engineering company in the fall of 2020. While the equipment was determined to be in good operating condition overall, it is beginning to show signs of deterioration. The condition of the S1 switchgear will also be evaluated as part of this project and may be replaced if warranted.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$175,000

TOTAL PROJECT COST

\$4,739,000

CIP ID#

A04.1 Heat and Power Improvements

Start Date

2025

Completion Date

2031

Project Type

Energy-Related Projects – Use Reduction/Generation

Location

Nine Springs Wastewater Treatment Plant

Description

The purpose of this project is to identify and replace aging assets associated with the District's energy-producing infrastructure and to optimize the use of energy going forward. These improvements will position the District to use its biogas to generate electricity on site at greater efficiency or to produce a biogas of pipeline quality that can be sold to others. This project was evaluated as part of the 2020 Energy Management Master Plan. Additional facility planning and design phases are expected to precede construction. It is anticipated that all project costs will be financed through a loan from the Clean Water Fund.

Background

An energy study was conducted in 2014 by Strand and Brown and Caldwell to provide a roadmap for how the District might achieve energy independence. Areas of focus included ways to reduce energy usage, improve utilization of digester gas and produce more energy. The 2020 master planning study expanded on all these areas and examined the most energy-efficient way to handle and dispose of biosolids. It is anticipated that the master plan will lead to three major projects going forward: (1) Heat and Power Improvements; (2) Biosolids Processing; and (3) Miscellaneous Energy Projects.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$50,914,000



CIP ID#

A04.2 Miscellaneous Energy Projects

Start Date

2023

Completion Date

2034

Project Type

Energy-Related Projects – Use Reduction/Generation

Location

Nine Springs Wastewater Treatment Plant

Description

These are projects that are recommended by the 2020 Energy Management Master Plan to reduce or optimize energy use. Due to their smaller scope and cost as compared to the cogeneration and biosolids projects in the master plan, many of these projects can be implemented in the near term and will be done so on an annual or intermittent basis over the next 10 years. These projects will likely be funded through a mixture of cash and loans, dependent on the cost in a given year.

Background

An energy study was conducted in 2014 by Strand and Brown and Caldwell to provide a roadmap for how the District might achieve energy independence. Areas of focus included ways to reduce energy usage, improve utilization of digester gas and produce more energy. The 2020 master planning study expanded on all these areas and examined the most energy-efficient way to handle and dispose of biosolids. It is anticipated that the master plan will lead to three major projects going forward: (1) Heat and Power Improvements; (2) Biosolids Processing; and (3) Miscellaneous Energy Projects.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$233,000

TOTAL PROJECT COST

\$10,422,000

CIP ID#

A05 Lagoon Dikes Improvements

Start Date

2020

Completion Date

2024

Project Type

Plant Improvements – Lagoon Management

Location

Nine Springs Wastewater Treatment Plant

Description

The purpose of this project is to conduct a geotechnical study of the dikes in the District lagoons and implement measures to stabilize them, especially in periods of high-water levels. The project is being conducted in several phases between 2020 and 2024, and any recommended repairs will be prioritized and implemented as needed. It is anticipated that the geotechnical study will be funded through cash in the capital projects fund, while any necessary improvements will be funded through a loan from the Clean Water Fund.

Background

The District's lagoons, located east of Moorland Road, were used to store biosolids until the early 1980s, at which time application on agricultural lands commenced. Some of the biosolids in the lagoons were found to have levels of polychlorinated biphenyls, or PCBs. The District worked with the EPA to clean up the lagoons in the late 1990s through addition of soil, a fabric cover and a new dike. The lagoons now provide wildlife habitat and recreational opportunities for the public and also act as storage reservoirs for excess plant inflow. During the extreme rainfall event in August of 2018, the water level in Nine Springs Creek reached historic levels, causing a leak which allowed water from the creek to move into the lagoon area. To protect the integrity of the dikes and prevent any migration of contaminated biosolids to the environment, it is desired to fully evaluate the dikes and repair any defective sections.



Financial Analysis

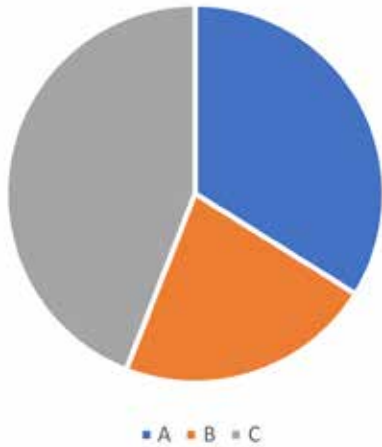
2023 EXPENDITURE (\$2023)

\$565,000

TOTAL PROJECT COST

\$4,148,000

Failure Share by Asset Class



CIP ID#
A06

Maintenance, Financial and HR Systems

Start Date

2020

Completion Date

2027

Project Type

Plant Improvements – Computerized Maintenance Management System (CMMS)

Location

Nine Springs Wastewater Treatment Plant

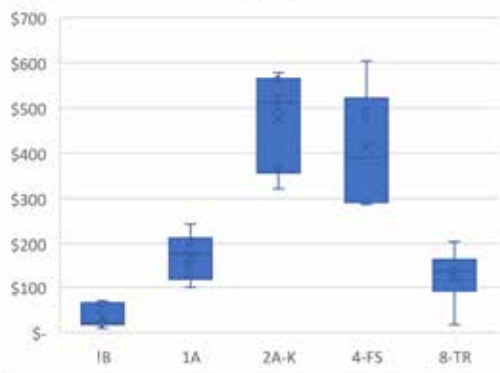
Description

The purpose of this project is to replace the District's existing CMMS and to address needs in the related financial and human resources systems. Each system will operate independently, but their functions and design must be closely integrated. The cost of this project will be funded through cash in the capital projects fund.

Background

The District installed its initial CMMS in 1997 for a cost of approximately \$1.0 million (roughly \$2.2 million in 2022 dollars). The company that developed the system eventually was purchased by Oracle. While the system has generally served the District well since 1997, Oracle is now planning to upgrade its system to a new version that is more complex and targets large users with different needs than the District. As such, the District has a need to obtain a new CMMS and financial system that better supports the District's approach to asset management and reliability-centered maintenance. The project will also identify processes within the Human Resources department that need to be incorporated in the new financial system or in a new dedicated system.

Failure Cost by Type



Financial Analysis

2023 EXPENDITURE (\$2023)

\$689,000

TOTAL PROJECT COST

\$6,007,000

CIP ID#
A07

Metrogro Applicators & Equipment

Start Date

2015

Completion Date

2026

Project Type

Metrogro Applicators and Equipment

Location

Metrogro Program

Description

This line item is included in the Capital Improvements Plan to fund the periodic replacement of the District's biosolids applicators, tankers, and low-disturbance toolbars. It is anticipated that these replacements will be funded through cash in the capital projects fund.

Background

While the District's recently completed Biosolids Management Plan recommended a possible transition from a liquid biosolid to a cake product, that transition will take years to complete. It is probable that a cake product will not be produced on a consistent basis until 2035 at the earliest. The District's Metrogro Program will remain the backbone of the Biosolids Reuse Program for the foreseeable future. The District's standard is to replace an applicator when it reaches 10,000 hours of service. Using that standard, new applicators were purchased in 2019, 2021, and 2022. Two more applicators are scheduled to be purchased in 2024 and 2025. Acquisition of new equipment will also allow for enhanced GPS capability and low-disturbance soil injection. These features are lacking in the older equipment.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$106,000

TOTAL PROJECT COST

\$4,494,000



CIP ID#

A08 Flow Splitter Improvements

Start Date

2022

Completion Date

2024

Project Type

Plant Improvements – Headworks

Location

Nine Springs Wastewater Treatment Plant

Description

This project will rehabilitate, modify or possibly replace the existing flow splitter structure which is located immediately downstream of the grit removal tanks at the Headworks Facility. The structure's concrete and metal components have deteriorated significantly since the structure was put into operation as part of the Tenth Addition, likely due to the high levels of hydrogen sulfide and turbulent flow in this structure. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

The flow splitter structure was built in 2005 as part of the Tenth Addition and allows for the controlled distribution of flow to the west and east plants. Flow from the grit removal basins enters the splitter structure from the west. The flow rises within the structure and spills over weirs that empty into five channels that connect to discharge pipes to the west and east sides of the plant. Flow to each side of the plant can be controlled by the placement of stop logs in the effluent channels. Corrosion of the structure has made it difficult to remove the stop logs in recent years. A thorough video inspection of the structure in February of 2021 revealed that the concrete walls supporting the effluent channels are also in very poor condition. It is desired to rehabilitate or rebuild the damaged sections of concrete before the steel reinforcing is further compromised and leads to failure of the structure.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$551,000

TOTAL PROJECT COST

\$2,500,000

CIP ID#
A09

Treatment Plant HVAC Improvements – Group 1 Projects

Start Date

2024

Completion Date

2025

Project Type

Plant Improvements – HVAC

Location

Nine Springs Wastewater Treatment Plant

Description

The purpose of this project is to upgrade and replace aging HVAC systems in various buildings at the treatment plant. HVAC systems need to be in good working order so that they meet applicable building codes, provide a safe environment for staff and protect equipment from damage caused by changing environmental conditions. Due to the harsh environments that these systems treat, they have deteriorated beyond reasonable repair and need to be replaced. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

A consultant performed a comprehensive condition assessment of existing HVAC systems in 2020-2021 and compiled a prioritized list of improvements for the most deficient systems. The improvement projects were broken down into three priority areas, or groups, with the first group containing items that need to be addressed in the near term to satisfy code requirements, worker safety and/or equipment condition. The most critical projects in Group 1 are included in a separate project which is scheduled for construction in 2022-2023 (see related Project ID# A02). This project will address other projects which were identified in the Group 1 category.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$3,310,000



CIP ID#

A10.1 Headworks Screening

Start Date

2027

Completion Date

2029

Project Type

Plant Improvements – Screening at Headworks Facility

Location

Nine Springs Wastewater Treatment Plant

Description

This project includes the replacement or modification of the fine-screening equipment and related screening handling system at the Headworks Facility. One possible solution is to replace the existing band screens with new step screens and wash presses to dewater the captured material. This project was included in the 2016 Liquid Processing Facilities Plan. It is anticipated that the project will be funded through the Clean Water Fund.

Background

Three fine-screening units were installed at the Headworks Facility as part of the Tenth Addition to the treatment plant. The screens have openings of one-quarter inch and are designed to remove rags and other large material from the raw wastewater to keep it out of the biosolids and to protect downstream process equipment. Several problems have been experienced with the existing screening system, particularly with the processing of the material that is captured on the screens. The existing screening handling system requires frequent operator attention to keep it running. Further, the equipment for the screening handling system is prone to plugging and wear and tear, and it is difficult to obtain replacement parts in a cost-effective and timely manner.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$5,012,000

CIP ID#

A10.2 Grit Processing Improvements

Start Date

2028

Completion Date

2029

Project Type

Plant Improvements – Grit Handling

Location

Nine Springs Wastewater Treatment Plant

Description

This project will improve the performance of the grit handling equipment in the Headworks Facility. It is expected that several pieces of equipment will be replaced due to age and wear, including grit pumps, concentrators, classifiers and appurtenances. It is anticipated that project costs will be funded through the Clean Water Fund.

Background

The existing grit system was installed as part of the Tenth Addition to the Nine Springs Treatment Plant in 2005. The system consists of three vortex grit basins, six recessed impeller grit pumps and three grit concentrators/classifiers located on the mezzanine level of the Headworks Facility. This system was evaluated as part of the 2016 Liquid Processing Facilities Plan. While the equipment works reasonably well and requires little operator attention, it is now reaching the end of its useful life and will require replacement in the next five to 10 years, especially the grit concentrators.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$2,585,000



CIP ID#

A11 Septage Receiving Modifications

Start Date

2024

Completion Date

2027

Project Type

Plant Improvements – Septage Receiving

Location

Nine Springs Wastewater Treatment Plant

Description

This project will correct problems encountered with operation of the existing septage receiving facility. Work will include reconfiguration of the existing facility to allow improved traffic flow, better screening equipment upstream of the Headworks Facility and implementation of more security and tracking measures to reduce the potential for unauthorized discharges. This project was included in the 2016 Liquid Processing Facilities Plan. It is anticipated that project costs will be funded through the Clean Water Fund.

Background

The septage receiving facility was constructed as part of the Tenth Addition to the treatment plant and has experienced a number of operational difficulties since it was placed into operation. Trucks discharging at the facility have to back up to empty their contents, resulting in congestion during periods of heavy traffic and icy and unsafe conditions in winter. Further, sand and grit accumulate in the discharge trough, which requires manual cleaning by District staff on a frequent basis. Improvements will allow for one-way traffic for haulers and an improved screening system to keep unwanted material out of the screening channel. A space needs study for the treatment plant is planned for 2022-2023, which will help inform the preferred location of the future facility.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$4,005,000

CIP ID#
A12

Miscellaneous Treatment Plant Improvements

Start Date

ONGOING

Completion Date

ONGOING

Project Type

Variable

Location

Nine Springs Wastewater Treatment Plant

Description

The purpose of these projects is to make modifications or minor improvements to capital assets at the treatment plant on an annual basis to ensure that they remain in good working condition and to ensure the safety of the District's workers. These projects will be funded from revenue sources other than loans in the capital projects fund.

Background

As the District's assets at the treatment plant continue to age and process complexity increases, operations staff have noted a need to make a number of minor improvements to assets to ensure they remain in good working order. In many cases, the projects are relatively small in scope, yet they are too large and time-consuming to be addressed by the District's maintenance staff. The intent of this item in the capital projects budget is to provide an annual allowance for the identification and completion of these smaller improvement projects at the treatment plant. The projects will be administered through the Operations department or Engineering department and completed by a contractor in accordance with the District's procurement code.



Financial Analysis

2023 EXPENDITURE (\$2023)
\$119,000

TOTAL PROJECT COST
ONGOING



CIP ID#

A13 Miscellaneous Capital & A14 Improvements

Start Date

ONGOING

Completion Date

ONGOING

Project Type

Plant Improvements – Miscellaneous Capital Improvements

Location

Nine Springs Wastewater Treatment Plant

Description

This summary covers two areas:

1. Minor Capital Improvements (Project ID# A13)
2. Annual Pavement Improvements (Project ID# A14)

Background

The District annually includes funds in its capital projects budget for resurfacing of roads and for other unanticipated, minor expenses. These funds are used to periodically restore paved areas of the plant and to address minor defects with District assets that arise during the budget year.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$192,000

TOTAL PROJECT COST

ONGOING

CIP ID#

**B01.1 &
B01.2**

West Interceptor – Shorewood Relief (Phases 2 & 3)

Start Date

2018

Completion Date

2023

Project Type

Capacity Improvement – Conveyance System

Location

West Interceptor Relief Sewer

University Avenue, Walnut Street to Shorewood Boulevard, City of Madison and Village of Shorewood

Description

This project will provide additional capacity to the West Interceptor System in order to convey projected flows from the west side of the District's service area. The improvements consist of the installation of 11,500 feet of replacement and relief sewer that will be installed roughly parallel to the District's existing sewer that runs along the University Avenue corridor between Walnut Street and Whitney Way. Due to the size and complexity of this project, the construction will occur in three phases, with Phase 1 construction occurring in 2021-2022. Phases 2 and 3 are scheduled for 2022 and 2023, respectively. Phase 1 of the project is being financed through the Clean Water Fund while the other phases will be paid for from revenue sources other than loan proceeds in the capital projects fund.

Background

Expected growth in the District's Pumping Station 15 service area, including the Bishops Bay development in the City of Middleton and the Town of Westport, has created a need for the District to add additional capacity to its West Intercepting System. The District's 2011 Collection System Facilities Plan Update included a detailed analysis of the system between Walnut Street and Whitney Way and determined that additional capacity should be provided in or around the year 2020.

Financial Analysis

2023 EXPENDITURE (\$2023)

Phase 2 - \$0

Phase 3 - \$5,346,000

TOTAL PROJECT COST

Phase 2 - \$1,754,000

Phase 3 - \$5,481,000





CIP ID#

B02.1 & B02.2 Lower Badger Mill Creek Interceptor – Phases 5 and 6

Start Date

2022

Completion Date

2024

Project Type

New Capacity – Conveyance System

Location

Lower Badger Mill Creek Interceptor

CTH PD to Midtown Road, City of Verona, Town of Verona & City of Madison

Description

This project will extend the District's Lower Badger Mill Creek Interceptor from Highway PD to Midtown Road to provide service for new development. Construction will occur in two phases in order to accommodate proposed development in the basin. This project will be funded through revenue sources other than loan proceeds in the capital projects fund. Project costs will be recovered from connection charges from new users upon connection to the interceptor improvements.

Background

District policy allows for the construction of District interceptors only when that interceptor shall serve at least two municipalities. Sanitary sewer service options for the Lower Badger Mill Creek drainage basin were studied by District staff in 2005. At that time, it was decided that a regional interceptor sewer would be constructed in several phases as development needs dictated to serve the cities of Verona and Madison and the towns of Verona and Middleton.

Phases 1-4 of the interceptor project were constructed between 2006 and 2018. Phase 5 will extend the sewer approximately 3,000 feet to the north to Shady Oak Lane in 2023. The sewer is scheduled to be completed in 2024 when it is extended 5,500 feet to Midtown Road.

Financial Analysis

2023 EXPENDITURE (\$2023)

Phase 5 - \$1,283,000

Phase 6 - \$127,000

TOTAL PROJECT COST

Phase 5 - \$1,382,000

Phase 6 - \$3,566,000

CIP ID#

B03

Pumping Station 6 to Pumping Station 10 Connector

Start Date

2022

Completion Date

2025

Project Type

System Redundancy – Conveyance System

Location

Pumping Station 6

402 Walter Street, City of Madison

Pumping Station 10

110 Regas Road, City of Madison

Description

This project proposes to connect the East Interceptor at Pumping Station 6 (PS 6) to the Northeast Interceptor at Pumping Station 10 (PS 10) with a new pipeline. The new sewer will flow by gravity or under pressure between the two stations, or a combination of the two. The primary purpose of this interconnection is to provide system redundancy and reliability. It is expected that this project will be funded through a loan from the Clean Water Fund.

Background

The District's collection system consists of 18 pumping stations and 32 miles of raw wastewater force mains. A loss of electrical power at any of these pumping stations or a pipe failure in any of the force mains threatens the ability of the collection system to safely and efficiently convey raw wastewater to the treatment plant. Diversion sewers such as the one proposed for this project allow for the emergency transfer of flow between pump stations and they have been used very effectively in other areas of the collection system. The Pumping Station 6 to Pumping Station 10 connector was studied and recommended in both the 2002 Collection System Facilities Plan and the 2009 Collection System Facilities Plan Update.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$440,000

TOTAL PROJECT COST

\$9,882,000





CIP ID# **NEI – Waunakee Extension**
B04 Capacity Improvements (Phase 1)

Start Date

2021

Completion Date

2024

Project Type

Capacity Relief – Conveyance System

Location

Northeast Interceptor – Waunakee Extension

Yahara River to Village of Waunakee, Town of Westport and Village of Waunakee

Description

This project will provide additional capacity to the Northeast Interceptor system in order to convey projected flows from the villages of Dane and Waunakee and the Town of Westport. The improvements consist of the installation of approximately 18,600 feet of new relief or replacement sewer that will be installed parallel to the District's existing sewer that extends from the Yahara River to the Village of Waunakee. At this time, it is proposed that construction will occur in three phases, with construction of the first phase scheduled for 2023-2024. It is anticipated that this project will be financed through the Clean Water Fund.

Background

Continued high growth rates in this part of the collection system have created a need for the District to add capacity to the Waunakee Extension of the Northeast Interceptor. The Capital Area Regional Planning Commission (CARPC) is projecting that capacity will be reached in several segments of the Waunakee Extension by or about 2022, based on population forecasts. Periodic flow monitoring performed by District staff as part of the billing program validates these projections.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$2,819,000

TOTAL PROJECT COST

\$9,548,000

CIP ID#

B05 NEI – Truax Extension Rehab

Start Date

2021

Completion Date

2025

Project Type

System Rehabilitation – Conveyance System

Location

Northeast Interceptor – Truax Extension

USH 51 Corridor, Rieder Road to Lien Road, City of Madison

Description

This project will correct condition defects in the Northeast Interceptor between Lien Road and the end of the Pumping Station 13 force main at Rieder Road. Approximately 11,000 feet of existing 48-inch concrete pipe will be rehabilitated through the installation of a new cured-in-place liner within the existing pipe. Bypassing of flows during lining will be through the NEI-Truax Extension Relief Sewer, which was completed in the fall of 2020. It is anticipated that this project will be financed through a Clean Water Fund loan.

Background

This section of the Northeast Interceptor was installed in 1969 and suffers from internal corrosion due to the presence of elevated levels of hydrogen sulfide in the wastewater. Approximately one-half of the Northeast Interceptor System between Pumping Station 18 and Pumping Station 14 has either been rehabilitated or replaced due to corrosion. Corrosion of the pipe reduces the capacity by increasing surface roughness and may eventually cause the pipe to fail. Installation of a cured-in-place liner can extend the service life of the interceptor if installed before the corrosion progresses too far.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$7,769,000



CIP ID#

B06 NEI – FEI to SEI Rehab

Start Date

2024

Completion Date

2025

Project Type

System Rehabilitation – Conveyance System

Location

Northeast Interceptor (NEI)

Femrite Drive/Copps Avenue to Progress Road, City of Monona and City of Madison

Description

This project will correct condition defects in the Northeast Interceptor between its junction with the Far East Interceptor (FEI) and its junction with the Southeast Interceptor (SEI). Approximately 3,300 feet of existing 48-inch concrete pipe will be rehabilitated through the installation of a new cured-in-place liner within the existing pipe. It is anticipated that financing of the project will be through a loan from the Clean Water Fund.

Background

This section of the Northeast Interceptor was installed in 1964 and suffers from internal corrosion due to the presence of elevated levels of hydrogen sulfide in the wastewater. Approximately 2,250 feet of the Northeast Interceptor between the Far East Interceptor and the Southeast Interceptor was abandoned in 2013 and replaced with a new sewer due to the condition of the pipe. This project will rehabilitate and extend the service lives of the remaining sewer segments that were not replaced in the 2013 project.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$2,277,000

CIP ID#
B07

SEI Rehab – Pumping Station 9 to SEI-Dutch Mill Extension

Start Date

2024

Completion Date

2025

Project Type

System Rehabilitation – Conveyance System

Location

Southeast Interceptor

Along U.S. Highway 51 from Pumping Station 9 to U.S. Highway 12/18, Village of McFarland

Description

This project will correct condition defects in the Southeast Interceptor between the District's Pumping Station 9 in the Village of McFarland and U.S. Highway 12/18. Numerous cracks and missing pipe material in the asbestos cement sewer will be rehabilitated through the insertion of a cured-in-place lining. New force main valves and a flow meter will also be installed at Pumping Station 9 as part of the work. It is anticipated that this project will be financed through the Clean Water Fund.

Background

This section of the Southeast Interceptor was constructed in 1961 and consists of approximately 8,300 lineal feet of 12-inch and 15-inch asbestos cement pipe. A routine inspection by closed-circuit television in 2014 revealed numerous defects, including surface corrosion, cracks and missing pipe material. The Wisconsin Department of Transportation (WDOT) is planning to make improvements to U.S. Highway 51 from I-39/90 to U.S. Highway 12/18 in or about 2023. As the Southeast Interceptor runs parallel to U.S. Highway 51 but not underneath the traveled lanes of the highway, the rehabilitation project does not need to precede the road reconstruction project.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$2,718,000



CIP ID#
B08

NSVI Capacity Improvements – Phase 1

Start Date

2024

Completion Date

2028

Project Type

Additional Capacity – Conveyance System

Location

Nine Springs Valley Interceptor (NSVI)

Lewis Springs E-Way from Pumping Station 11 to Syene Road, City of Fitchburg

Description

This project will provide additional capacity to the Nine Springs Valley Intercepting System between the District's Pumping Station 11 and Syene Road. It is expected that approximately 8,700 feet of relief or replacement sewer will be installed along the Lewis Springs E-Way in order to serve new development in the southwest and western portions of the District's service area. This project will be funded through a loan from the Clean Water Fund.

Background

The Nine Springs Valley Intercepting System between Pumping Station 11 and Pumping Station 12 was constructed in 1965 and includes 33,000 feet of sewer, ranging in diameter from 30 inches to 54 inches. The Interceptor's service area includes some of the fastest-growing lands in Dane County and Wisconsin. Population and wastewater forecasts performed by the Capital Area Regional Planning Commission (CARPC) indicate that most of the NSVI system and approximately 3,600 feet of sewer upstream of Pumping Station 12 will require additional capacity between 2025 and 2040. This project is the first phase of a multi-phase project that will address capacity needs in the remainder of the NSVI system.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$12,500,000.

CIP ID#

B09

West Interceptor Rehab – Babcock Hall to Dayton Street

Start Date

2024

Completion Date

2025

Project Type

System Rehabilitation – Conveyance System

Location

West Interceptor

Along Babcock Drive, University Avenue and North Randall Avenue,
City of Madison

Description

The purpose of this project is to rehabilitate a portion of the West Interceptor, which is located on the University of Wisconsin campus. The sections to be rehabilitated have been in service for over 100 years and are suffering from internal corrosion. Inserting a cured-in-place liner in the existing sewer will extend its service life 50 years or more. It is anticipated that this project will be financed through the Clean Water Fund.

Background

These sections of the West Interceptor are the oldest assets in the District's collection system. The 24-inch cast iron sewer was originally constructed by the City of Madison in 1916 and then transferred to the District in 1933. Like other sewers of similar age and construction materials, this sewer suffers from tuberculation, or the buildup of deposits on the inside walls of the pipe. These deposits reduce the capacity of the sewer over time and may compromise the structural integrity of the pipe if left unchecked. Rehabilitating the pipe with a new liner is a cost-effective way to address these problems.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$1,350,000



CIP ID#

B10 District Flow Monitoring Stations

Start Date

2025

Completion Date

2026

Project Type

Inflow & Infiltration – Conveyance System

Location

Various

Description

This project supports the District's inflow and infiltration monitoring program through the installation of flow monitoring stations. These monitoring stations will be installed at strategic locations in the collection system to provide accurate flow measurements from District customers. It is anticipated that this project will be funded through the Clean Water Fund.

Background

Owner community meetings held in 2019 identified inflow and infiltration (I/I) reduction as a top priority for the District. With that in mind, the District hired a consultant in 2020 to develop an I/I reduction plan. One of the recommendations from that plan is to use the District's hydraulic model of its collection system to identify areas of excessive I/I. The construction of long-term monitoring sites in the collection system is needed to properly calibrate the model and validate its results. The installation of monitoring sites that are well constructed, provide accurate data and are safe for District staff will ensure the integrity of the flow data and the I/I Reduction Program.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$1,239,000

CIP ID#

C01 Grass Lake Dike Stabilization

Start Date

2018

Completion Date

2022

Project Type

System Rehabilitation – Effluent Conveyance System

Location

Badfish Creek and Grass Lake

Badfish Creek, Schneider Drive to Rutland Dunn Town Line Road, Town of Dunn

Description

The purpose of this project is to evaluate and implement corrective measures to stabilize the Grass Lake dike to prevent sloughing of the shoreline soil. It is anticipated that these measures will include a combination of repair methods, including rebuilding sections of the dike, redirecting the channel, and enhancing habitat by inserting vegetation into the channel at strategic locations. Funding of the improvements will be from revenue sources other than loan proceeds in the capital projects fund.

Background

The Grass Lake dike roads were built to provide a barrier between the District's effluent in Badfish Creek and Grass Lake. Repairs have been made in the past to prevent subsurface flow from the effluent channel from passing into Grass Lake and also to prevent animals from tunneling through the dike. Despite the repairs made by the District's Facilities Maintenance department over the years, these problems are recurring, and a more permanent solution is needed. Cardo Inc. was retained in September 2018 to provide an assessment of the problem, recommend solutions and prepare a design for improvements. The preliminary assessment and final design have been completed. Construction is scheduled for the second half of 2022, pending the acquisition of the necessary permits.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$905,000



CIP ID#
C02

Pumping Station 4 Rehabilitation

Start Date

2020

Completion Date

2024

Project Type

System Rehabilitation – Conveyance System

Location

Pumping Station 4

620 John Nolen Drive, City of Madison

Description

This project provides for a major rehabilitation of Pumping Station 4. Improvements to the station will include the following: replacement of all three pumps due to age and lack of adequate capacity; provision of variable frequency drives to improve operational performance; improvements to the power system to achieve greater redundancy, including provision of an on-site generator; replacement of aging electrical and control equipment; and a new HVAC system. It is anticipated that this program will be funded through a Clean Water Fund loan.

Background

Pumping Station 4 was placed into service in 1967 and pumps flow directly to the Nine Springs Wastewater Treatment Plant through a parallel force main system with Pumping Stations 2 and 3. Most of the equipment in the station has not been replaced or upgraded since the station was started up in 1967. As a result, it is recommended that the major electrical equipment and associated controls be replaced to ensure that the station operates reliably. In addition, it is recommended that the pumping units be replaced and optimized so that the station works in concert with the pumps from Pumping Stations 2 and 3.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$3,237,000

TOTAL PROJECT COST

\$7,069,000

CIP ID#
C03

Pumping Station 17 Firm Capacity Improvements

Start Date

2021

Completion Date

2024

Project Type

System Capacity – Conveyance System

Location

Pumping Station 17

407 Bruce Street, City of Verona

Description

This project will provide additional capacity to Pumping Station 17 in advance of an increase in flows to the station, which is expected to occur in 2024. Some ancillary equipment will also be rehabilitated as part of this project. The work is expected to include the following elements: new pumping units and variable frequency drives; a new standby generator; replacement of HVAC equipment; and new station flow meter in exterior meter vault. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

Pumping Station 17 currently serves only areas within the City of Verona. Additional flow from the City of Madison, and possibly the Town of Verona, will drain to Pumping Station 17 in or about 2024 when the final phase of the District's Lower Badger Mill Creek Interceptor is constructed up to Midtown Road. A capacity upgrade will be needed for Pumping Station 17 when this occurs. These firm capacity improvements are expected to serve the station for approximately 15 years. Due to size and hydraulic limitations of the existing station and floodplain concerns, it is expected that a new pumping station will need to be constructed at that time to serve the basin in the long term.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$2,372,000

TOTAL PROJECT COST

\$6,790,000



CIP ID#
C04

Pumping Station 17 Force Main Relief – Phase 2

Start Date

2021

Completion Date

2023

Project Type

Capacity Improvement – Conveyance System

Location

Pumping Station 17 Force Main

Badger Mill Creek, Arbor Vitae Place to Goose Lake, City of Verona and Town of Verona

Description

This project will add a 24-inch diameter relief force main to the existing 16-inch diameter force main and will provide additional capacity for wastewater that is pumped from Pumping Station 17 in the City of Verona. Approximately 8,350 feet of force main and 3,000 feet of 36-inch diameter gravity interceptor sewer will be installed in the second phase of this project. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

Additional flow will drain to Pumping Station 17 in or about 2024 when the final phase of the District's Lower Badger Mill Creek Interceptor is constructed up to Midtown Road. Capacity relief will be needed for the force main system when this occurs. Relief for the force main system has been separated into two construction phases. The District completed the first phase of the project in conjunction with a City of Verona utility project in 2020 and 2021 to reduce costs and inconvenience to the general public. Phase 2 of the project will occur in 2023, just prior to completion of the final phase of the Lower Badger Mill Creek Interceptor Project.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$8,818,000

TOTAL PROJECT COST

\$10,500,000

CIP ID# **C05** Emergency Power Generation at District Pumping Stations

Start Date

2022

Completion Date

2030

Project Type

System Reliability – Conveyance System

Location

Various Pumping Stations

Description

This project will improve the District’s ability to sustain its collection system operations in the event of a local or regional power outage. Improvements will include the addition of on-site diesel generators for emergency use and associated switching equipment that will be installed at District pumping stations which currently lack such standby facilities. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

District Administrative Guideline #11 provides guidance on how to sustain operations during a loss of power from the electrical grid. More specifically, the guideline specifies a desired level of service such that wastewater collection and treatment can continue to operate at peak design capacity for at least 72 hours after a loss of power. Applying this standard to District pumping stations, one method of achieving this level of service is by providing standby generators at each station. District staff have prioritized each pumping station’s needs for standby generation and have developed an implementation schedule that begins in 2025 and runs through 2030.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$5,000

TOTAL PROJECT COST

\$9,271,000



CIP ID#
C06

Miscellaneous Collection System Improvements

Start Date

Ongoing

Completion Date

Ongoing

Project Type

Variable

Location

Conveyance System

Description

The purpose of these projects is to make modifications or minor improvements to capital assets in the collection system on an annual basis to ensure that they remain in good working condition and enhance the safety of the District's workers. These projects will be funded through cash in the capital projects fund.

Background

As the District's assets in the collection system age, operations staff members have noted a need to make a number of minor improvements to ensure that they remain in good working order. In many cases, the projects are relatively small in scope, yet they are too large and time consuming to be addressed by the District's maintenance staff. The intent of this item in the capital projects budget is to provide an annual allowance for the identification and completion of these smaller improvement projects. The projects will be administered through the Operations department or Engineering department and completed by a contractor in accordance with the District's procurement code.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$103,000

TOTAL PROJECT COST

ONGOING

CIP ID#

C07 Force Main Condition Assessment

Start Date

2024

Completion Date

2029

Project Type

Conveyance System- Force Main Condition Assessments

Location

Various

Description

The purpose of this project is to provide support for annual inspection of the District's force mains. These assets are extremely difficult to inspect by traditional methods as they are difficult to access, they are under pressure, and they cannot be taken out of service for long periods of time. Technology has been developed that can address these challenges, but the inspections require careful planning and can be costly to perform. It is expected that these annual or semi-annual inspections will be paid for from revenue sources other than loan proceeds in the capital projects fund.

Background

Black & Veatch developed a Force Main Condition Assessment Plan for the District in 2017. The primary goals of this work were to develop a plan for the District to use to evaluate the condition of its force mains and to recommend when and how the condition assessments should be performed. The Collection System Facilities Plan Update will make further recommendations on the timing and location of projects when it is completed in 2023. In the interim, an annual placeholder is being included in the six-year Capital Improvements Plan beginning in 2024.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$3,684,000



CIP ID#
C08.1

Pumping Station 16 Rehabilitation

Start Date

2025

Completion Date

2027

Project Type

System Rehabilitation – Conveyance System

Location

Pumping Station 16

1303 Gammon Road, City of Middleton

Description

The purpose of this project is to rehabilitate mechanical and electrical equipment at Pumping Station 16. The rehabilitation is expected to include the following elements: replacement of Pumping Unit C; replacement of cast iron fittings and valves in the dry well piping; new electrical generator, switchgear, and motor control centers; variable frequency drives; HVAC system replacement; and modifications to the odor control system. It is anticipated that this program will be funded through a Clean Water Fund loan.

Background

Pumping Station 16 was placed into service in 1981. No major rehabilitation projects have been completed in the 41 years since the station was installed. Pumping Units A and B were replaced in 2014 and are in good condition, but much of the remaining equipment has reached the end of its useful life. Of special note, the cast iron fittings in the dry well need to be replaced. In 2017 a cast iron tee developed a crack and subsequent leak, which required immediate replacement. Due to odor concerns both at the station and the downstream force main, a comprehensive odor control evaluation will be conducted as part of this project and the related force main rehabilitation project (Project ID# C08.2).

Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$6,370,000

CIP ID#

C08.2 Pumping Station 16 Force Main Rehabilitation

Start Date

2021

Completion Date

2026

Project Type

System Rehabilitation – Conveyance System

Location

Pumping Station 16

North Gammon Road (Colony Drive to Mineral Point Road), City of Madison

Description

The purpose of this project is to correct condition defects in the Pumping Station 16 Force Main on North Gammon Road between Colony Drive and Mineral Point Road. Approximately 400 feet of interceptor sewer downstream of the interceptor will also be rehabilitated as part of this project. It is anticipated that this project will be funded through a loan from the Clean Water Fund.

Background

The Pumping Station 16 force main was installed in 1979-1980 on Gammon Road from Pumping Station 16 in the City of Middleton to just north of Mineral Point Road in the City of Madison. The system consists of approximately 6,900 feet of 36-inch diameter ductile iron pressure sewer and 2,900 feet of 30-inch diameter ductile iron sewer that is not pressurized. The majority of the pressurized sewer is fully submerged at all times and is believed to be in good condition. Approximately 1,600 feet of the non-pressurized sewer is not fully submerged with wastewater and thus is showing evidence of corrosion via inspection by closed circuit television. The project proposes to either rehabilitate the corroded force main sections with a cured-in-place liner or to replace those sections with new pipe. This work will be coordinated with the proposed rehabilitation of Pumping Station 16 (Project ID# C08.1).



Financial Analysis

2023 EXPENDITURE (\$2023)

\$0

TOTAL PROJECT COST

\$2,068,000



CIP ID#

D01 Capital Budget Expenses

Start Date

ONGOING

Completion Date

ONGOING

Project Type

Capital Budget Expenses

Location

District-wide

Description

These are general capital budget expenses. More specifically, they are annual funds used for smaller planning, study and related expenses that are required to update and implement the Capital Improvements Plan (CIP).

Background

Development of the District's Capital Improvements Plan and capital budget requires almost continual study and planning. Often, internal resources are not available to conduct studies or planning in desirable time frames, and external resources are necessary. This budget item provides funds to cover expenditures for smaller studies or planning efforts.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$53,000

TOTAL PROJECT COST

ONGOING

CIP ID#

D02

Collection System Facilities Plan Update

Start Date

2018

Completion Date

2023

Project Type

Capital Budget Expenses

Location

Collection Systems

Description

The District's Collection System Facilities Plan is a key planning document that is periodically updated based on projections from the Capital Area Regional Planning Commission. Funding for this study will be through cash in the capital projects fund.

Background

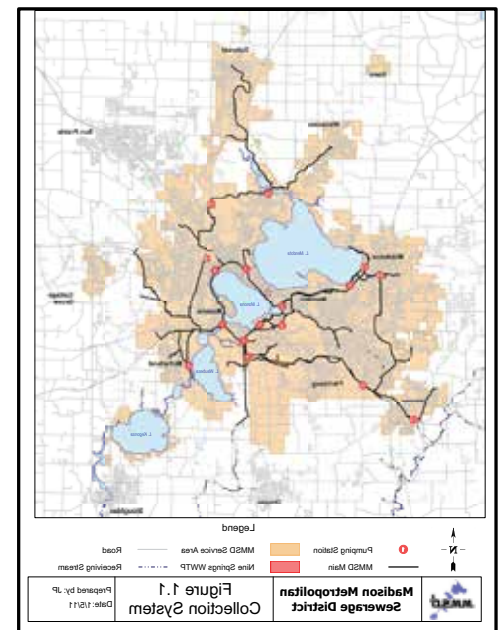
The purpose of the collection system facilities plan is to update and revise the previous plan conducted in 2011. As with the original 2002 plan, the 2011 update reviewed and assessed the adequacy and condition of the District's collection system to identify and recommend future collection system projects. Since plan adoption, the District has completed many of the recommended projects.

Following the Capital Area Regional Planning Commission's update of the District's collection system evaluation in 2018, it is time to review those projects remaining on the list and identify additional future projects that may be required to sustain and/or enhance the integrity of the District's collection system. In the past, the facility plans have been completed solely with District staff at considerable levels of time and effort. An engineering consultant will be retained to complete a portion of this update, with particular attention given to work on control of inflow and infiltration on private property.



Madison Metropolitan Sewerage District Collection System Facilities Plan Update

Prepared by the Staff of the
Madison Metropolitan Sewerage District
December 2011



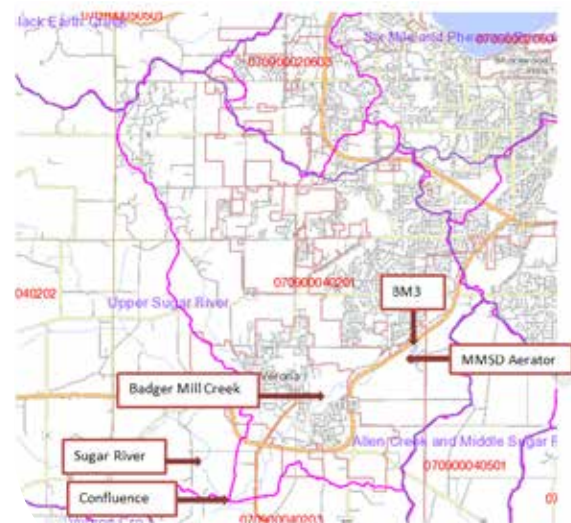
Financial Analysis

2023 EXPENDITURE (\$2023)

\$64,000

TOTAL PROJECT COST

\$290,000



CIP ID# **D03** Badger Mill Creek Phosphorus Compliance

Start Date

2019

Completion Date

TBD

Project Type

Effluent

Location

Badger Mill Creek

Town of Verona and City of Verona

Description

The purpose of this project is to allow for evaluation, plan development and implementation of a solution to address new phosphorus water quality criterion for Badger Mill Creek. New water quality standards for this waterway are part of the District's Wisconsin Pollution Discharge Elimination System (WPDES) permit that was issued in May 2020. The District began preliminary planning for the new standards in 2019, assuming a nine-year compliance schedule. It is anticipated that early planning work related to this effort will be funded through cash in the capital projects fund.

Background

The District currently pumps up to 3.6 MGD of effluent to Badger Mill Creek. The majority of the District's effluent (up to 75.5 MGD) is pumped to Badfish Creek. Historically, all the District's effluent was returned to Badfish Creek, but in 1998 after the City of Verona discontinued operation of their wastewater treatment plant and joined the District, the District began returning up to 3.6 MGD flow to Badger Mill to maintain historic flows.

The District's new WPDES permit requires a phosphorus water quality criterion for Badger Mill Creek, which is significantly less than the existing standard. The list of viable alternatives has been narrowed down to the following four primary options: diversion of effluent flow to Badfish Creek; water quality trading; watershed adaptive management; and treatment.

Financial Analysis

2023 EXPENDITURE (\$2023)

\$106,000

TOTAL PROJECT COST

\$13,000,000

CIP ID#

D04 Plan for District Properties

Start Date

2022

Completion Date

2023

Project Type

Plant Improvements – Space Needs

Location

Nine Springs Wastewater Treatment Plant

Description

The primary purposes of this project are to perform an inventory of all available land and buildings owned by the District, identify those lands and buildings with the greatest needs, propose reconfiguration options and prepare an annual plan for recommended changes. Plant security will be an integral part of the evaluation to ensure that the campus is secure and safe for all staff and visitors. It is likely that this project will include the implementation of some security enhancements in the near term. It is anticipated that this project will be funded through revenue sources other than loan proceeds in the capital projects fund.

Background

Traditionally, the District has planned for future space needs in conjunction with major plant additions that were driven by permit compliance and/or capacity needs. The District has many large projects in its six-year Capital Improvements Plan that will require additional space and coordination. These projects include the following: liquids processing improvement projects, Energy Management Master Plan, Biosolids Master Plan, Shop One site improvements and renovations, a new septage receiving facility and a potential resource recovery facility. All these projects should be evaluated together to effectively plan the future layout of the plant grounds.



Financial Analysis

2023 EXPENDITURE (\$2023)

\$182,000

TOTAL PROJECT COST

\$360,000

2023 Capital Improvements Plan

APPENDIX B: COMPLETED PROJECTS AND RETAINERS

2021 PROJECT COMPLETIONS

PUMPING STATION 7 IMPROVEMENTS

Pumping Station 7 (PS 7) was constructed in 1948. Before the construction of Pumping Station 18 (PS 18) in 2015, PS 7 conveyed approximately 40% of the daily flow to the District's treatment plant. While PS 18 lessened the criticality of PS 7 to a degree, improvements were still needed at PS 7 to replace aging equipment and optimize how the stations interact with each other. Improvements constructed as part of this project included the replacement of existing controllers and the control system, replacement of electrical switchgear and HVAC system, separation of the control room space from the garage and screen room, installation of an odor control system and pump and valve replacements. C.D. Smith began work on the project in August of 2019 and reached final completion in January of 2021. The total project cost of \$4.1 million is being funded through a loan from the Clean Water Fund.

INTERCEPTOR REHABILITATION – 2020

This project involved the rehabilitation of existing sewers on two District interceptor systems in 2020. Approximately 4,500 feet of the Spring Street Relief Sewer on the West Interceptor was rehabilitated with a cured-in-place liner as part of the project, starting at the intersection of Spring Street and North Randall Avenue and terminating at West Washington Avenue near Brittingham Park. This 24-inch diameter cast iron sewer was installed in 1940 and had heavy mineral deposits, or tuberculation, along its entire length. These deposits decrease capacity and weaken the structural integrity of the pipe if not addressed. In addition, approximately 300 feet of the Northeast Interceptor Relief Sewer and East Johnson Street Relief Sewer were rehabilitated as part of this project. These sewers are located at the intersection of North First Street and East Johnson Street in the City of Madison. Work on this project was completed in the fall of 2020, with the final project closeout occurring in February of 2021. The total project cost of \$1.0 million is being funded with a loan from the Clean Water Fund.

NORTHEAST INTERCEPTOR JOINT GROUTING MH10-112 TO MH10-106

Evidence of excessive inflow and infiltration (I/I) had been observed in the original Northeast Interceptor sewer immediately upstream of Pumping Station 10 for approximately 5,100 feet. The 48-inch diameter concrete sewer was installed in 1964 in an area with a high groundwater table. It is estimated that I/I rates were as high as five gallons per minute in some areas. In this project, each joint along the sewer was air tested and injected with grout for 2,600 feet to reduce the I/I to an acceptable rate. The remaining 2,500 feet of 48-inch sewer was rehabilitated similarly in 2021 and 2022. Work on this project was performed in the second half of 2020, with the final closeout of the project occurring in June of 2021. The total project cost of \$193,000 was paid for from cash in the capital projects fund.



During power outages, pumping stations shut down and no longer move wastewater, which increases the risk of backups and overflows. While Pumping Station 7 does not have a standby generator for use in power interruptions, it can divert flow by gravity to nearby Pumping Station 18 in an emergency situation.

NORTHEAST INTERCEPTOR – TRUAX EXTENSION RELIEF

The Truax Extension to the Northeast Interceptor was constructed in 1969. The existing sewer within the project limits consists of approximately 11,000 feet of 48-inch diameter reinforced concrete pipe. Like many other sections of the Northeast Interceptor, this section of sewer is badly corroded due to hydrogen sulfide attack. In addition, population and flow forecasts by the Capital Area Regional Planning Commission indicate that additional capacity is needed in this section of the Northeast Interceptor before the year 2030 to serve rapidly growing areas in the villages of Waunakee and DeForest. This project increased system capacity via a relief sewer which will serve as a future bypass line when the existing sewer is rehabilitated in 2025. Speedway Sand & Gravel began work on the project in July of 2019 and the work was accepted by the District's Commission in July of 2021. The total project cost of \$8.0 million is being funded with a loan from the Clean Water Fund.

PUMP STATION 7 FORCE MAIN EMERGENCY REPAIR

The Pumping Station 7 force main system consists of two parallel force mains that convey approximately five to six million gallons of raw wastewater to the treatment

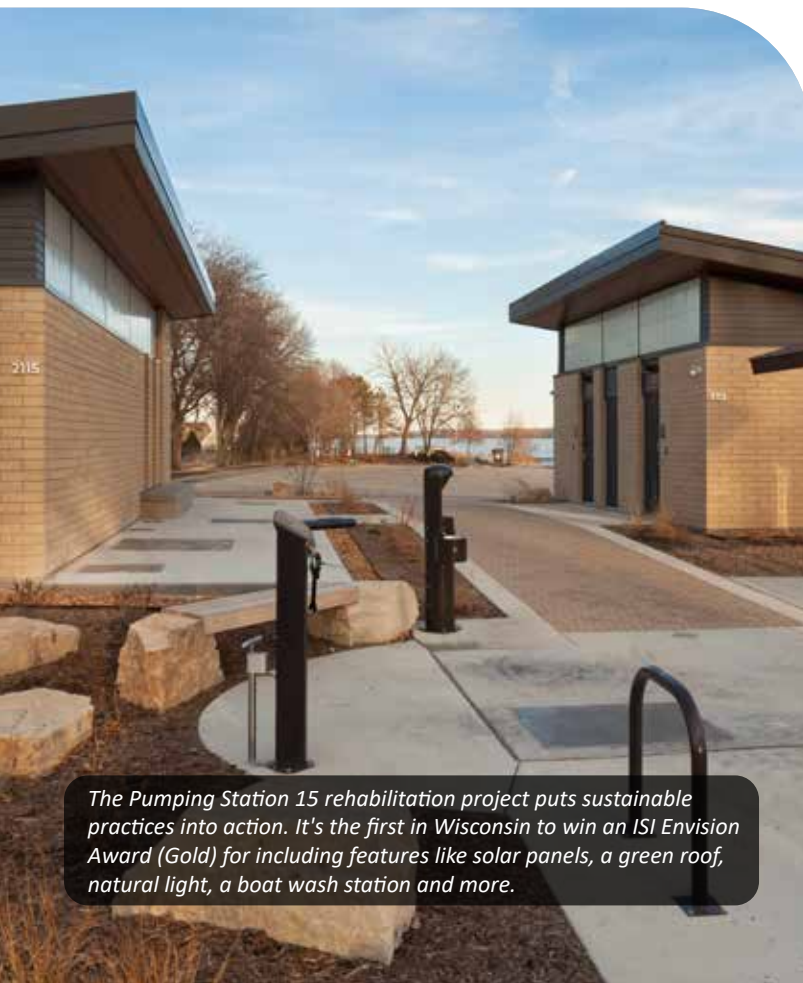
plant each day. Each force main is made of concrete and is 36 inches in diameter, although they were installed in different years (1948 and 1963). Normally, only one of the pipelines is needed to provide service. In April of 2021, a leak was discovered on one of the force mains underneath the Beltline Highway, east of West Broadway in the City of Monona. Subsequent excavation revealed a small crack in the 1948 force main. Repair materials were ordered in May, and the crack was repaired by Capitol Underground and Visu-Sewer by lining approximately 330 feet of the pipe under the Beltline Highway in July. No disruption of service occurred during the investigation or repair of the leak. The total project cost of \$280,000 was paid for from cash in the capital projects fund.

2022 PROJECT COMPLETIONS

Final Completion or Substantial Completion in 2022:

LIQUID PROCESSING IMPROVEMENTS – PHASE 1

With the start-up of new Pumping Station 18 in 2015 and capacity upgrades to Pumping Station 11 occurring shortly thereafter, there was the potential for the hydraulic capacity of the Nine Springs Treatment Plant to be exceeded in high flow events. Facility planning began in 2016 for hydraulic upgrades to the treatment plant and to identify any related improvements to the liquid processes. A facilities plan was completed in August of 2017 that recommended a series of improvements to be implemented in three phases over roughly 10 years. The first phase of these improvements consisted of enhancements to peak-flow management at the plant, replacement of the ultraviolet light disinfection system, replacement of an electrical substation building and upgrades to the process control system. C.D. Smith began work on the improvements in the spring of 2020, and the project was accepted by the District's Commission in January of 2022. The total project cost of \$16.6 million is being funded with a loan from the Clean Water Fund.



The Pumping Station 15 rehabilitation project puts sustainable practices into action. It's the first in Wisconsin to win an ISI Envision Award (Gold) for including features like solar panels, a green roof, natural light, a boat wash station and more.

HEADWORKS FLOW METERING

The District's flow metering facilities were installed in 2005 as part of the Tenth Addition improvements. These facilities consisted of a venturi meter on each of the five influent force mains that convey flow to the treatment plant. Accurate readings of these meters are essential for service charge billing and proper operation of plant processes. Shortly after these facilities were started up, it was discovered that the flow meters were installed at an elevation that was too high relative to the water surface at the downstream fine screening units. To ensure that the flow meters read accurately, it was necessary to artificially raise the water surface upstream of the screens. This has caused the screens to run excessively and bypass rags and other solids. The purpose of this project was to lower each of the five venturi meters so that the fine screening units could be operated as originally intended with a lower upstream water elevation. Staab Construction began work on the project in June of 2020, and the project was accepted by the District's Commission in January of 2022. The total project cost of \$2.2 million is being funded with a loan from the Clean Water Fund.

ENERGY MANAGEMENT MASTER PLAN

This master planning effort involved a comprehensive study of how the District is currently using energy, and it creates a roadmap for how to manage energy in the future. The study emphasized how to optimize energy use as critical pieces of equipment are replaced in the coming years, such as the gasdriven electrical generators and the associated hot water system. Projects related to heat and power improvements, biosolids processing and miscellaneous energy enhancements will be incorporated into the District's Capital Improvements Plan for implementation and/or additional planning in the years to come. Carollo Engineers, Inc. began work on the master plan in February of 2020, and the plan was accepted by the District's Commission in February of 2022. The approximate total project cost of \$585,000 was paid for from cash in the capital projects fund.

2022 ANTICIPATED PROJECT COMPLETIONS

FINAL CLARIFIERS 4, 5 AND 6 EFFLUENT LAUNDER TROUGH REPLACEMENT

In the fall of 2017 District staff discovered numerous holes in the effluent launder troughs of final clarifier 6. It is believed that these holes are due to corrosion of the steel. Similar holes were found in the launder trough of final clarifier 5 in the spring of 2018. If the corrosion progresses too far, it could result in mixed liquor combining with the effluent and lead to decreased treatment performance. The corrosion could also compromise the safety of District personnel who need to stand on the troughs to maintain the clarifiers. This project will replace the effluent launder troughs on final clarifiers 4, 5 and 6. Sabel Mechanical, LLC began work on the new launder troughs in 2021, and it is expected that the work will be completed in the second half of 2022. The anticipated total project cost of \$355,000 will be paid for from cash in the capital projects fund.

OPERATIONS BUILDING FIRST FLOOR REMODEL

A space needs study performed by Bray Architects in 2013 identified a need for improvements to the operators' control room in the Operations Building. In particular, a need for personal storage and a more efficient working space were identified. Further study and improvements were not conducted at that time, however. Since 2013, several members of the Ecosystems Services department had moved into offices in the laboratory, and the operations supervisor and lead operators shared a small office. These changes led to concerns over worker safety, the safety of the public during facility tours and overall unsanitary conditions in these work areas. This project included remodeling a portion of the laboratory and the operators' control room to provide a safer and more efficient use of space for staff who work in this area. Kenneth F. Sullivan Co. began work on the project in September of 2020, and it is anticipated that the project will be closed out in the second half of 2022. The anticipated total project cost of \$2.2 million is being paid for through a loan from the Clean Water Fund.

OPERATIONS BUILDING 800 MECHANICAL ROOM (MINOR CAPITAL IMPROVEMENTS 2020)

The District's mechanical room contains an electric chiller that uses a refrigerant to cool interior spaces within the Operations Building. An inspection of this room by the Department of Safety and Professional Services in April of 2020 noted that several aspects of the chiller operation needed to be brought up to the proper standards. Required improvements included the installation of a leak detection and alarm system for the refrigerant, ventilation modifications and provision of warning signs to alert personnel of the associated dangers with the system. The District retained Design Services to prepare plans and specifications for the necessary improvements in August of 2020, and the work was awarded to Kenneth F. Sullivan Co. in November of 2020. Completion of the project occurred in June of 2022. The total project cost of \$105,000 was paid for from cash in the capital projects fund as part of the minor capital improvements line item in the 2020 capital budget.

ENGINE GENERATOR CONTROL PANEL REPLACEMENTS

The gas-driven engines and generators were installed in 1991 as part of the sludge gas utilization facilities for the Sixth Addition. The control panels for the generators use relays for control of the engines and have not been

significantly modified since they were first installed. The panels also have high-voltage cabling in them that requires special safety equipment and expertise for staff to work in them. The purpose of this project was to replace the relay-based panels with modern programmable logic controllers (PLC) and to reconfigure the panels to eliminate the electric hazard for routine maintenance. Pieper Electric began work on the project in June of 2021, and it is expected that it will be completed in the second half of 2022. The estimated total project cost of \$677,000 will be paid for from cash in the capital projects fund.

NINE SPRINGS VALLEY INTERCEPTOR – MCKEE ROAD TO DUNN'S MARSH

This portion of the Nine Springs Valley Interceptor was installed in 1965 and consisted of reinforced concrete pipe ranging in diameter from 30 inches to 42 inches, except for a 1,170-foot stretch that was replaced in 2000. Due to its proximity to the end of the Pumping Station 12 force main, significant corrosion occurred in portions of this section. In addition, upstream flows have increased at a rapid pace due to development, and updated population forecasts suggest that capacity in much of this section will be reached in the next 10 years. For these reasons, a new replacement sewer was installed along the recreational trail between McKee Road and Dunn's Marsh. R.G. Huston, Inc. began work on the project in December of 2020, and the work was substantially completed in October of 2021. The estimated total project cost of \$4.3 million is being funded through a loan from the Clean Water Fund.

PUMPING STATION 17 FORCE MAIN RELIEF – PHASE 1

Pumping Station 17 currently serves only lands within the City of Verona, and it and its force main are nearing capacity. In addition, the completion of the Lower Badger Mill Creek Interceptor between County Highway PD and Midtown Road is scheduled for 2023-2024. When this occurs, flow from the City of Madison's Midtown Pumping Station will be redirected to Pumping Station 17. In advance of this diversion, a relief force main for Pumping Station 17 is needed to provide the required future capacity. The relief force main project was broken into two phases so that construction of the first phase would be coincident with a City of Verona project in the same corridor. Minger Construction Co., Inc. began installation of the force main in November of 2020, and it was completed in the first half of 2022. The estimated total project cost of \$3.5 million will be paid for from cash in the capital projects fund.



Civil project engineer Rachel Feil talks with contractors at the Nine Springs Valley Interceptor construction site. The project expands conveyance capacity to accommodate upstream development and population expansion.

NSVI-MORSE POND EXTENSION

This project included the construction of approximately 3,200 feet of new sanitary sewer from the existing Nine Springs Valley Interceptor (Midtown Extension) to the southwest corner of Highway PD and Highway M. The new sewer is located along Raymond Road and will provide service for lands in the City of Madison and lands south of Highway PD in the City of Verona. The sewer construction was coordinated with the reconstruction of Highway M from Cross Country Road in the City of Verona to Flagstone Drive in the City of Madison. Construction began in October 2017 and was substantially completed in September 2018. It is expected that the final payment of the District's share of the project will be made in 2022. The total project cost of \$2.2 million was financed through cash in the capital projects fund.

NORTHEAST INTERCEPTOR JOINT GROUTING MH10-101 TO MH10-106

This is the second of two planned projects to reduce inflow and infiltration in the original Northeast Interceptor sewer upstream of Pumping Station 10. The work consists of testing each joint of the 48-inch diameter sewer for water tightness and injecting grout as needed to seal any leaks. The first phase of the project involved approximately 2,600 feet of sewer, and the work was performed in 2020-2021. The second phase of the project addressed the remaining 2,500 feet of sewer in the section to be rehabilitated. Visu-Sewer began work on the project in November of 2021, and it is expected that all work will be completed and that the project will be closed out before the end of 2022. The anticipated total project cost of \$270,000 will be paid for from cash in the capital projects fund.

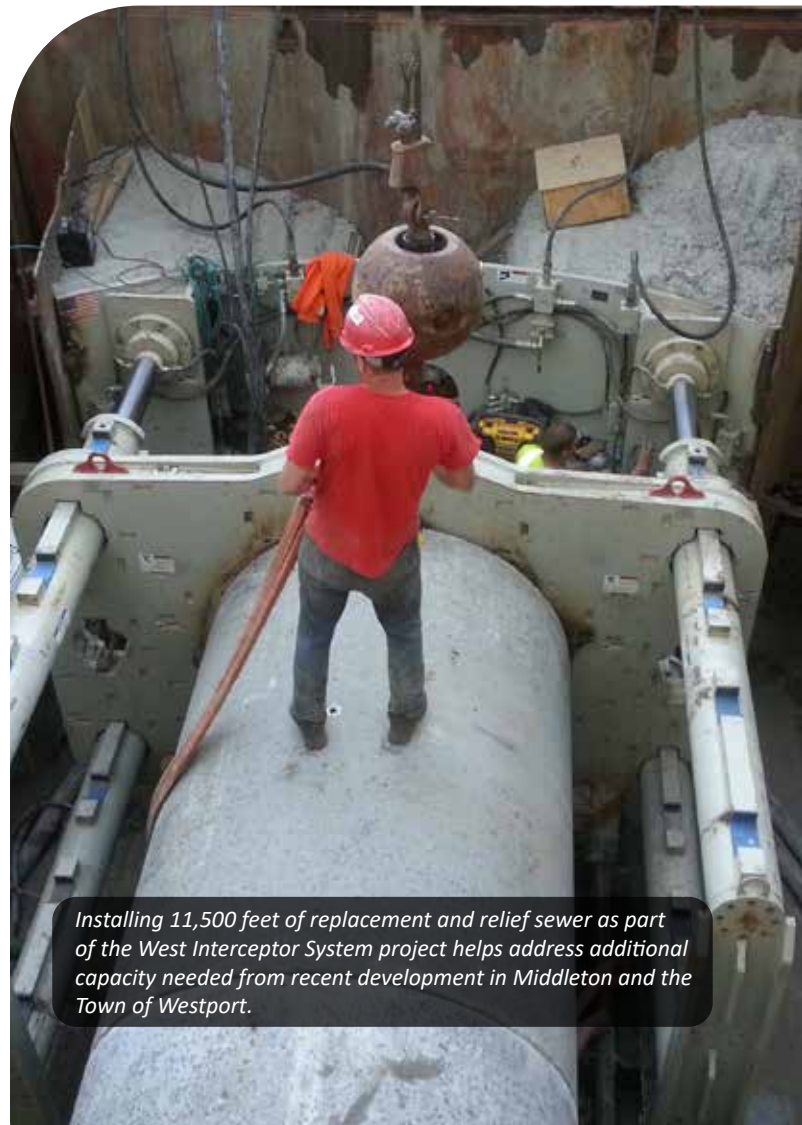
WEST INTERCEPTOR – SHOREWOOD RELIEF (PHASE 1)

This is the first phase of a three-phased project to provide additional capacity to the West Intercepting System between Whitney Way and Walnut Street in the City of Madison and the Village of Shorewood. The additional capacity is needed to serve flows from future development in the Pumping Station 15 service area. Approximately 5,600 feet of 30-inch and 36-inch diameter replacement sewer was installed during the first phase of this project between Whitney Way and Shorewood Boulevard. Phases 2 and 3 of this project are scheduled for construction in 2022 and 2023, respectively. Advance Construction, Inc. of Green Bay, WI began work on the Phase 1 project

in February of 2021, and the work was substantially completed in the first half of 2022. The anticipated total project cost of \$4.7 million is being financed with a loan from the Clean Water Fund.

GRASS LAKE DIKE STABILIZATION

The District constructed facilities to discharge treated effluent to the Badfish Creek waterway in 1958. These improvements included an earthen dike along the western edge of Grass Lake to create a barrier between the lake and the effluent discharge waterway. Over the years, the bank slopes have eroded significantly in some locations, and animals have burrowed into the dike so that seepage through the barrier is a concern if not addressed. This project will repair the dike using a combination of methods, including rebuilding the bank slopes, redirecting the channel, and enhancing habitat by inserting vegetation into the channel at strategic locations. It is anticipated that the construction of these improvements will take place in the fall of 2022, and they will be completed before the end of the calendar year. Funding for the improvements will be via cash in the capital projects fund.



Installing 11,500 feet of replacement and relief sewer as part of the West Interceptor System project helps address additional capacity needed from recent development in Middleton and the Town of Westport.

PLANT ASSET MANAGEMENT PLAN IMPLEMENTATION

This project generally refers to a series of initiatives to develop the District's Asset Management Plan. As part of this effort, the District retained a vendor in November of 2020 to implement a program for Reliability Centered Maintenance (RCM). RCM is a strategy to optimize a maintenance program by considering the various assets of a facility and maintaining them in such a way that system reliability is emphasized. Work on this program is expected to be completed before the end of 2022 at a total estimated cost of \$240,000. These costs will be paid from cash in the capital projects fund.

RETAINERS

The District often includes maintenance or performance retainers within its contracts. The retainers are typically released to the contractor at the end of one year (in some cases, contracts include longer performance periods) following completion of the contract and assuming satisfactory performance. The following are retainers that the District has released within the past year or those that are presently being withheld.

PUMPING STATION 15 REHABILITATION

The District withheld a \$27,500 three-year special maintenance retainer upon project acceptance in March of 2018 as follows: (1) \$10,000 to be paid to the contractor and pump/motor supplier after three years of satisfactory performance; (2) \$10,000 to be paid to contractor and supplier of variable frequency drives after three years of satisfactory performance; and (3) \$7,500 to be paid to the contractor after three years for landscape maintenance warranty, with payments to the contractor of \$2,500 per year for each year's successful warranty work for the landscaping. The total retained amount of \$7,500 for the landscaping work will not be paid due to unsatisfactory performance. The remaining \$20,000 retained amount will also not be released due to the failure of the contractor to submit final lien waivers from the project subcontractors.

NSVI-MORSE POND EXTENSION

The District's interceptor was constructed under a contract that is being administered by the Wisconsin Department of Transportation. The District will withhold a maintenance retainer upon final project closeout under the Wisconsin Department of Transportation's contracting provisions.

SOUTHWEST INTERCEPTOR – HAYWOOD DRIVE REPLACEMENT

The District withheld a \$20,000 retainer upon acceptance of the project in November of 2019, as follows: (1) a \$10,000 maintenance retainer to correct any defective work for one year after project acceptance and (2) an additional \$10,000 retainer to grout two sanitary structures to address infiltration and inflow issues. The full retainer amount will not be released to the contractor due to warranty issues with inflow and infiltration.

PUMPING STATION 7 IMPROVEMENTS

The District withheld maintenance retainers upon acceptance of the project on January 4, 2021, as follows: (1) a \$10,000 retainer to correct any work which is found to be defective for the one-year period following project acceptance and (2) a \$5,000 retainer to be withheld for three years after project acceptance to be split equally between the pump/motor assembly and the variable frequency drives. The \$10,000 retainer was released to C.D. Smith in February of 2022.

NORTHEAST INTERCEPTOR – TRUAX EXTENSION RELIEF

The District withheld a \$25,000 one-year maintenance retainer upon acceptance of the project in July of 2021. The retainer will be released to Speedway Sand & Gravel, Inc. one year after project closeout, pending satisfactory performance.

LIQUID PROCESSING IMPROVEMENTS – PHASE 1

The District withheld a \$15,000 one-year maintenance retainer upon final completion and acceptance of the work in January of 2022. The retainer will be released to C.D. Smith, Inc. one year after project closeout, pending satisfactory performance.

2020 INTERCEPTOR REHABILITATION

The District withheld a \$10,000 one-year maintenance retainer upon closeout of the project on February 11, 2021. The retainer was released to Visu-Sewer, Inc. in May of 2022.

NORTHEAST INTERCEPTOR JOINT GROUTING MH10-112 TO MH10-106

The District withheld a \$5,000 one-year maintenance retainer upon final completion and acceptance of the work on June 10, 2021. The District also withheld an additional \$5,000 one-year maintenance retainer as a guarantee that the contractor shall provide post-grouting digital video of pipe sections that were tested, sealed and verified. The District released the \$5,000 one-year maintenance retainer in June of 2022.

OPERATIONS BUILDING FIRST FLOOR REMODEL

The District will withhold a \$10,000 one-year maintenance retainer upon final completion and acceptance of the work. The retainer will be released to Kenneth F. Sullivan Co. one year after project acceptance, pending satisfactory performance.

HEADWORKS FLOW METERING

The District withheld a \$10,000 one-year maintenance retainer upon final completion and acceptance of the work in January of 2022. The retainer will be released to Staab Construction Corporation one year after project closeout, pending satisfactory performance.

NSVI – MCKEE ROAD TO DUNN’S MARSH

The District will withhold a \$25,000 one-year maintenance retainer upon final completion and acceptance of the work. The retainer will be released to R.G. Huston Co., Inc. one year after project closeout, pending satisfactory performance.

NORTHEAST INTERCEPTOR JOINT GROUTING MH10-101 TO MH10-106

The District will withhold a \$5,000 one-year maintenance retainer upon final completion and acceptance of the work. The District will also withhold an additional \$5,000 one-year maintenance retainer as a guarantee that the contractor shall provide post-grouting digital video of pipe sections that were tested, sealed and verified. The retained amounts shall be released to Visu-Sewer, Inc. one year after project acceptance, pending satisfactory performance.

ENGINE GENERATOR CONTROL PANEL REPLACEMENTS

The District will withhold a \$7,000 three-year maintenance retainer upon final completion and acceptance of the work. The retainer will be released to Pieper Electric, Inc. three years after project acceptance, pending satisfactory performance.

WEST INTERCEPTOR – SHOREWOOD RELIEF (PHASE 1)

The District will withhold a \$20,000 one-year maintenance retainer upon final completion and acceptance of the work. The retainer will be released to Advance Construction, Inc. one year after project closeout, pending satisfactory performance.



Fine screening equipment at the Headworks Facility helps remove rags and other large material from biosolids to protect downstream process equipment from failure.

2023 Capital Improvements Plan

APPENDIX C: RISK MANAGEMENT AND PROJECT SELECTION

One of the purposes of the District's asset management program is to assess the risk related to specific critical assets. This process is ongoing, and the tools to assess risk will become more sophisticated as the asset management program matures. An interim process to rate the level of risk is included in this section. The interim process, while less systematic than the final resulting system, provides similar results and presents relative levels of risk for the projects selected.

INTERCEPTORS AND FORCE MAINS:

Risk is a combination of the consequences of asset failure and the probability that the asset will fail. It is typically scored as the product of the two scores:

Risk = (Consequence of Failure) x (Probability of Failure)

Another factor that enters into the analysis is mitigation. Mitigation methods may reduce the level of risk. One such

method of reducing failure for interceptors is to install a lining within them. Redundant facilities and/or flow diversion options provide additional means of mitigating risk.

Table C-1 contains a list of the interceptor and force main projects included in this Capital Improvements Plan and the relative risk among the projects. These projects are shown graphically on **Chart C-1** with their condition and consequence of failure ratings. Projects that are proposing new assets are not scored since they do not have existing condition scores.

As can be seen from the chart, projects in the reddish upper-right area are of higher risk than those in the green lower-left area. Please note that relative risk is only one factor in determining when a project is scheduled. Other factors include, but are not limited to, cost, other resource availability, coordination with other construction and asset history.

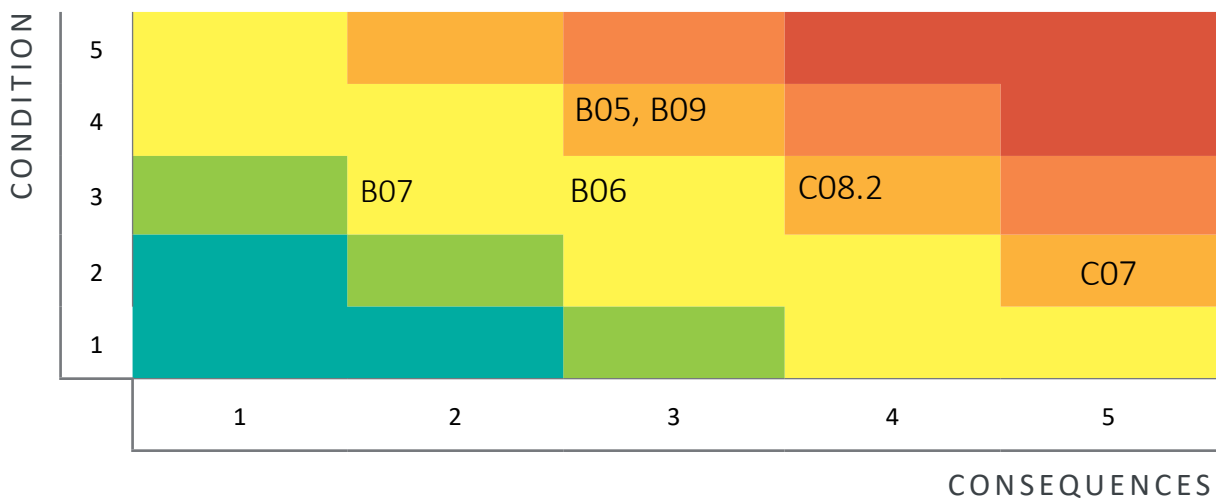


As owner communities expand and develop new neighborhoods, our District engineers strategize, plan and coordinate sewer extensions to our collection system.

TABLE C-1 | Interceptor & Force Main Projects and Associated Relative Risk

PROJECT	PRIMARY DRIVER	YEAR	CONSEQUENCE	CONDITION	RISK SCORE
B01.2 West Interceptor – Shorewood Relief (Phase 3)	Capacity	2023	-	-	-
B02 Lower Badger Mill Creek Interceptor – Phases 5 and 6	Growth/New	2023-2024	-	-	-
B03 Pumping Station 6 to Pumping Station 10 Connector	Redundancy	2024-2025	-	-	-
B04 NEI – Waunakee Extension Capacity Improvements (Phase 1)	Capacity	2023-2024	-	-	-
B05 NEI – Truax Extension Rehab	Condition	2024-2025	3	4	12
B06 NEI – FEI to SEI Rehab	Condition	2025	3	3	9
B07 SEI Rehab – PS 9 to SEI – Dutch Mill Extension	Condition	2025	2	3	6
B08 NSVI Capacity Improvements – Phase 1	Capacity	2027-2028	-	-	-
B09 West Interceptor – Babcock Hall to Dayton Street	Condition	2025	3	4	12
B10 District Flow Monitoring Stations	I/I Reduction	2026	-	-	-
C04 Pumping Station 17 Force Main Relief – Phase 2	Growth/New	2023-2024	-	-	-
C05 Emergency Power Generation at District Pumping Stations	Reliability	2025-2030	-	-	-
C07 Force Main Condition Assessment	Condition	2024-2029	5	2	10
C08.2 Pumping Station 16 Force Main Rehabilitation	Condition	2026	4	3	12

CHART C-1 | Interceptor & Force Main Projects and Associated Relative Risk



PUMPING STATIONS:

The first edition of the District's Collection System Facilities Plan was completed in 2002. This plan used a rating process to identify the most critical pumping stations for refurbishment purposes. The rating sheet from this process has been used since to schedule pumping station rehabilitation projects and to help develop the scope of services for those projects.

The rating sheet was updated as part of the 2011 Collection System Facilities Plan update and was updated again in May 2020 to reflect recently completed projects such as the Pumping Station 7 Improvements Project and updated flow projections by the Capital Area Regional Planning Commission. The rating sheet, referenced as Table 5.1 from the 2011 Collections System Facilities Plan update, was recently updated in June of 2022 and it is included at the end of this section.

The rating system uses five rating criteria and a criticality rating factor to develop an overall score for each pumping station. The five factors include:

1. Maximum capacity
2. Firm capacity
3. Power system redundancy
4. Mechanical systems
5. Electrical systems

Structural integrity, which is a general category that includes several factors related to the pumping facility, structural condition being one of them.

Each category is scored on a scale ranging from 1 (excellent condition) to 5 (very poor condition). The weighting factor is a scale from 1 to 2 and assesses the level of "criticality" of the pumping station in the District's system. It is the average of scores provided by several of the District's staff members. The score is based upon factors such as flow to the pumping station, location within the system, potential redundancy measures and how quickly the site might overflow or backup in the collection system.

As noted in the table, the higher the score, the higher the priority. It should be noted that **Table 5.1** reflects the outcome of rehabilitation projects that were recently completed at Pumping Stations 7, 11, 12 and 15. As a result, these four stations have low overall scores since their needs were just addressed. The five highest-ranking pumping stations currently include Pumping Station 13 (20.80), Pumping Station 14 (17.25), Pumping Stations 4 and 17 (15.53) and Pumping Station 16 (13.20).

The District is addressing the highest-rated stations in the 2023 Capital Improvements Plan as follows:

1. Pumping Station 13 and Pumping Station 14 are being rehabilitated in 2020-2022.
2. Pumping Station 4 is scheduled to be rehabilitated in 2023-2024.
3. Flow capacity improvements and other minor system improvements will be implemented at Pumping Station 17 in 2023-2024 in response to growth needs in the Lower Badger Mill Creek service area.
4. Electrical condition and other needs will be addressed at Pumping Station 16 in 2026-2027.



American white pelicans stop at the District Wildlife Observation Area during the spring migration.

TABLE 5.1 | Pumping Station Rating Sheet
Assessment of Adequacy and Criticality

FACILITY	ADEQUACY/CONDITION OF MISSION CRITICAL CATEGORY LIKERT SCALE (1-5) - CATEGORY DEPENDENT (SEE TEXT FOR EXPLANATION)						TOTAL	WEIGHTING FACTOR (SLIDING SCALE OF 1 TO 2)	RATING	RANKING (1 - 17)
	PEAK FLOW CAPACITY QP (5 POINTS)	FIRM FLOW CAPACITY QF (5 POINTS)	POWER SYSTEM REDUNDANCY (5 POINTS)	MECHANICAL CONDITION/ (5 POINTS)	STRUCTURAL INTEGRITY (5 POINTS)	ELECTRICAL CONDITION (5 POINTS)				
PS NO. 1	1	1	1.5	1	1	1	6.5	1.75	11.38	T-10
PS NO. 2	1	1	1.5	1	1	1	6.5	1.95	12.68	6
PS NO. 3	1.5	1	3	1.5	4	1	12.0	1.00	12.00	8
PS NO. 4	2	1.5	3	1.5	2	3.5	13.5	1.15	15.53	T-3
PS NO. 5	1	1	1.5	1	1	1	6.5	1.20	7.80	16
PS NO. 6	1	1	1.5	1	1	1	6.5	1.30	8.45	15
PS NO. 7	1	1	1	1.5	1	1	6.5	1.75	11.38	T-10
PS NO. 8	1	1	1.5	1	1	1	6.5	1.85	12.03	7
PS NO. 9	1	1	1	1	2	1	7.0	1.10	7.70	17
PS NO. 10	1	1	1.5	1.5	1	1	7.0	1.70	11.90	9
PS NO. 11	1	1	1.5	1	1	1	6.5	1.70	11.05	12
PS NO. 12	1	1	1.5	1	1	1	6.5	1.50	9.75	14
PS NO. 13	2.5	2	4	1	3	3.5	16.0	1.30	20.80	1
PS NO. 14	2	1.5	4	1	3	3.5	15.0	1.15	17.25	2
PS NO. 15	1	1	1	1	1	1	6.0	1.25	7.50	18
PS NO. 16	1	1	2	2.5	2	3.5	12.0	1.10	13.20	5
PS NO. 17	3.5	3	1	4	1	1	13.5	1.15	15.53	T-3
PS NO. 18	1	1	1	1	1	1	6.0	1.75	10.50	13

Assumptions/Notes:

- 1). Pumping station (PS) projects that are under construction or will soon be constructed include updated capacity and equipment condition assessments (e.g. PS 11 & PS 12 Rehabilitation (2015-2016), PS 15 Rehabilitation (2016) & PS 7 Improvements (2020).
- 2). All flow in the Lower Badger Mill Creek valley is assumed to be flowing to PS 17 in Year 2030. For Year 2015 all flows in the LBMC valley south of Valley View Road are assumed to flow to PS 17. Station upgrades at PS 17 are not anticipated until the LBMC Interceptor is fully constructed (~2024).
- 3). No satellite treatment facilities are considered (e.g., Sugar River Treatment Plant). Firm capacity and peak capacity are determined through comparison to actual 2015 flow measurements and projected 2030 flows. Flow projections are from Capital Area Regional Planning Commission's MMSD Collection System Evaluation (2018).
- 4). Firm capacity and peak capacity are determined through comparison to actual 2015 flow measurements and projected 2030 flows. Flow projections are from Capital Area Regional Planning Commission's MMSD Collection System Evaluation (2018).
- 5). For PS 7, changed power system redundancy from 2 to 1, electrical condition from 3 to 1 and mechanical condition from 2.5 to 1.5 to reflect PS 7 Improvements project (5/21/20).
- 6). Electrical condition for PS 16 updated on 6/12/22.

2023 Capital Improvements Plan

APPENDIX D: GLOSSARY

COMMON ACRONYMS

CARPC - Capital Area Regional Planning Commission

CIP - Capital Improvements Plan

CMMS - Computerized Maintenance Management System

CWF - Clean Water Fund (loan program for wastewater facilities)

DNR - Department of Natural Resources

FEI - Far East Interceptor

FOG - Fats, Oils and Grease

MH - Manhole

MMSD - Madison Metropolitan Sewerage District

NACWA - National Association of Clean Water Agencies

NEI - Northeast Interceptor

NSWWTP - Nine Springs Wastewater Treatment Plant

NSVI - Nine Springs Valley Interceptor

O&M - Operations and Maintenance

PCS - Process Control System

PS - Pumping Station

SEI - Southeast Interceptor

WAM - Work and Asset Management (MMSD's CMMS software)

WPDES - Wisconsin Pollutant Discharge Elimination System (District permit)

WRS - Wisconsin Retirement System

DISTRICT DEFINITIONS

ADAPTIVE MANAGEMENT - Watershed approach developed to comply with stringent phosphorus limits.

ADDITIONS - Major construction related additions, alterations, conversions, reconstruction, renovations, rehabilitations and replacements at the Nine Springs Wastewater Treatment Plant.

ANAEROBIC DIGESTION - Under this process, the organic sludge is treated in the absence of oxygen to reduce both the quantity and odor of sludges by breaking down the organic matter and producing methane and carbon dioxide.

ACID DIGESTION - One of the primary steps of the anaerobic digestion process in which soluble products are fermented to acids and alcohols of lower molecular weight.

ANNEXATION - The process whereby a city, village, town or other unit of government (e.g., District) expands its boundaries to include a specific geographic area.

ASSET MANAGEMENT - Comprehensive management of parts and physical infrastructure to provide needed levels of service with tolerable risk at an acceptable lifecycle cost.

BILLING PARAMETERS - District billing parameters include: carbonaceous biochemical oxygen demand (CBOD), total suspended solids (TSS), total phosphorus (TP), total Kjeldahl nitrogen (TKN), volume, equivalent meters and actual customers.

BIOSOLIDS - The soil-like residue of materials removed from sewage during the treatment process.

CAPITAL PROJECTS FUND - Fund that accounts for financial resources used for the acquisition, construction or rehabilitation of major capital facilities. The budget for this fund is often referred to as the capital projects budget or capital budget.

CLASS “A” PRODUCTS (BIOSOLIDS) - Refers to sludge that contains minute levels of pathogens (disease causing organisms). To achieve Class A certification, biosolids must undergo heating, composting, digestion or increased pH that reduces pathogens to below detectable levels. Once these goals are achieved, Class A biosolids can be land-applied without any pathogen-related restrictions at the site.

CLASS “B” PRODUCTS (BIOSOLIDS) - Refers to sludge that has undergone treatment that has reduced but not eliminated pathogens. Class B biosolids have less stringent standards for treatment and contain small but compliant amounts of pathogens. Class B requirements ensure that pathogens in biosolids have been reduced to levels that protect public health and the environment and include certain restrictions for crop harvesting, grazing animals and public contact. As is true of their Class A counterpart, Class B biosolids are treated in a wastewater treatment facility and undergo heating, composting, digestion or increased pH processes before leaving the plant.

CMOM/SSO REGULATIONS - Refers to a capacity, management, operation, and maintenance program (CMOM) that focuses on sewer collection systems with a goal of eliminating sanitary sewer overflows (SSO).

COLLECTION SYSTEM - A system of pipes and pumping facilities carrying sewage for disposal.

COLLECTION SYSTEM FACILITIES PLAN (CSFP) - An overall assessment of the condition and capacity of the key components that comprise the District’s wastewater collection system. The plan identifies the scope and timing of required projects over the next 20 years so that the infrastructure continues to provide a high level of service to the District’s customers while also addressing environmental concerns and regulatory requirements.

COMMISSION - A group appointed pursuant to law to conduct certain government business; the District has nine appointed Commissioners.

CONNECTION CHARGES - Charges related to connecting with District sewers.

CONVEYANCE SYSTEM - Synonymous with collection system.

DEBT SERVICE FUND - A fund established by a government agency or business for the purpose of reducing debt by repaying or purchasing outstanding loans and securities held against the entity. The District transfers a portion of its collected service charges to this fund to pay for its debt service.

EFFLUENT - Wastewater, treated or untreated, that flows out of a treatment plant or sewer outfall. The Nine Springs Wastewater Treatment Plant returns treated effluent to the environment.

EXECUTIVE TEAM - Refers to the Executive Team at the District.

FORCE MAIN - The discharge pipeline of a pumping station.

CONVEYANCE FACILITY CONNECTION CHARGE (CFCC) - CFCC represents the user’s “fair share” of collection system investments the District has made to install interceptor sewers and pumping stations.

INFLUENT - Water or wastewater entering a physical structure or process such as a treatment plant, pumping station or tank.

INTERCEPTOR - Large sewer lines that convey the flow of sewage to a pumping station or treatment plant by gravity.

LINING - A rehabilitation process in which a coating material is introduced to extend the life of the existing sewer.

MASTER PLAN - The District’s 50-year blueprint for the future.

METROGRO - A program that recycles liquid biosolids to agricultural land as fertilizer and soil conditioner.

METROMIX - A “soil like” material created by the District that combines biosolids with amendments such as sand, sawdust and/or bulking agents. Metromix is intended for use in landscaping, turf production, general gardening and other similar applications.

NINE SPRINGS WASTEWATER TREATMENT PLANT (NSWWTP)

- Wastewater treatment plant originally constructed in the late 1920s in Madison, WI. Since then, the plant has experienced numerous changes and additions. The plant presently serves 26 communities in the Madison area.

NUTRIENT REMOVAL - The removal of phosphorus and nitrogen from wastewater. The District uses a process called biological nutrient removal (BNR) that removes nitrogen and phosphorus from wastewater by using specific groups of micro-organisms and providing suitable conditions for their growth.

ONBASE - OnBase is a software application that electronically captures, stores and manages documents generated or received by a company.

OPERATING FUND - In government accounting, fund used to account for all assets and liabilities of a nonprofit entity except those particularly assigned for other purposes in another more specialized fund. The cost of normal operations is expended from this fund.

OSTARA - A process to recover phosphorus-containing fertilizer (struvite) as a natural byproduct of wastewater treatment.

PLAN REVIEW FEE - Owner communities pay sewer plan review fees for the District's plan review of modifications or additions to their sewer systems.

PRETREATMENT - Processes used by industrial or commercial customers to reduce or eliminate the contaminants in non-domestic wastewater to alter its nature, before discharging it into the collection system.

PUMPING STATIONS - Also called lift stations, pumping stations are normally designed to handle raw sewage that is fed from underground gravity pipelines (pipes that are laid at an angle so that a liquid can flow in one direction by gravity). Sewage is fed into and stored in an underground pit, commonly known as a wet well. The well is equipped with instruments to detect the level of sewage present. When the sewage level rises to a predetermined point, a pump will start and lift the sewage upward through a pressurized pipe system called a sewer force main. The sewage discharges into another gravity sewer or its final destination a treatment plant.

RELIEF SEWER - A sewer built to carry the flows in excess of the capacity of an existing sewer; generally in parallel with the existing sewer.

SEPTAGE - The waste content found in a septic tank.

SERVICE CHARGES - Annual amounts collected through customer rates that are used to fund the District's ongoing operations and debt service.

SEWER EXTENSION PERMIT - Refers to a required permit for an extension, addition or modification to the sanitary sewer collection system.

STRVITE - A phosphate mineral (magnesium ammonium phosphate).

TELEVISIONING - A method using video camera(s) to assess the condition of a sewer line in real time. It can reveal blockages from debris, roots or grease; show cracks, breaks or deterioration of a pipe. It allows detailed diagnosis without the need for excavation, saving time and money.

THERMAL REQUIREMENTS - Potential regulatory requirements to meet particular thermal temperatures in effluent receiving streams.

TREATMENT PLANT CONNECTION CHARGE (TPCC) - Represents a new users' fair share of the total cost of the wastewater treatment plant.

USER CHARGE - Service charge based on wastewater flow and loadings data for a specific customer. The wastewater flow and loadings are used to develop customer bills (see also billing parameters).



The Maintenance Facility has a platinum-level LEED certification and is the first LEED-certified building on campus for its green features and sustainable design. It is also the first building in Wisconsin to use cleaned wastewater as a heating and cooling source.

MADISON METROPOLITAN SEWERAGE DISTRICT

Your partner in protecting public health and the environment.

We are a passionate and experienced resource recovery team that aims to protect public health and the environment by providing safe, reliable and efficient wastewater treatment to our communities. We're known for our innovative engineering, conservation leadership, recovery expertise and we're cost-conscious ratepayers, just like you. It's who we are.

At the District, our vision is to enrich life through clean water and resource recovery. Every time our essential workers clean and return wastewater back to nature or apply Metrogro to help farmers grow more food, we're taking steps to create a cleaner and better world. We do this by not only providing critical infrastructure and public services to the communities we serve, but by providing education and doing public outreach so others can take steps to conserve our resources.

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Madison Metropolitan Sewerage District

