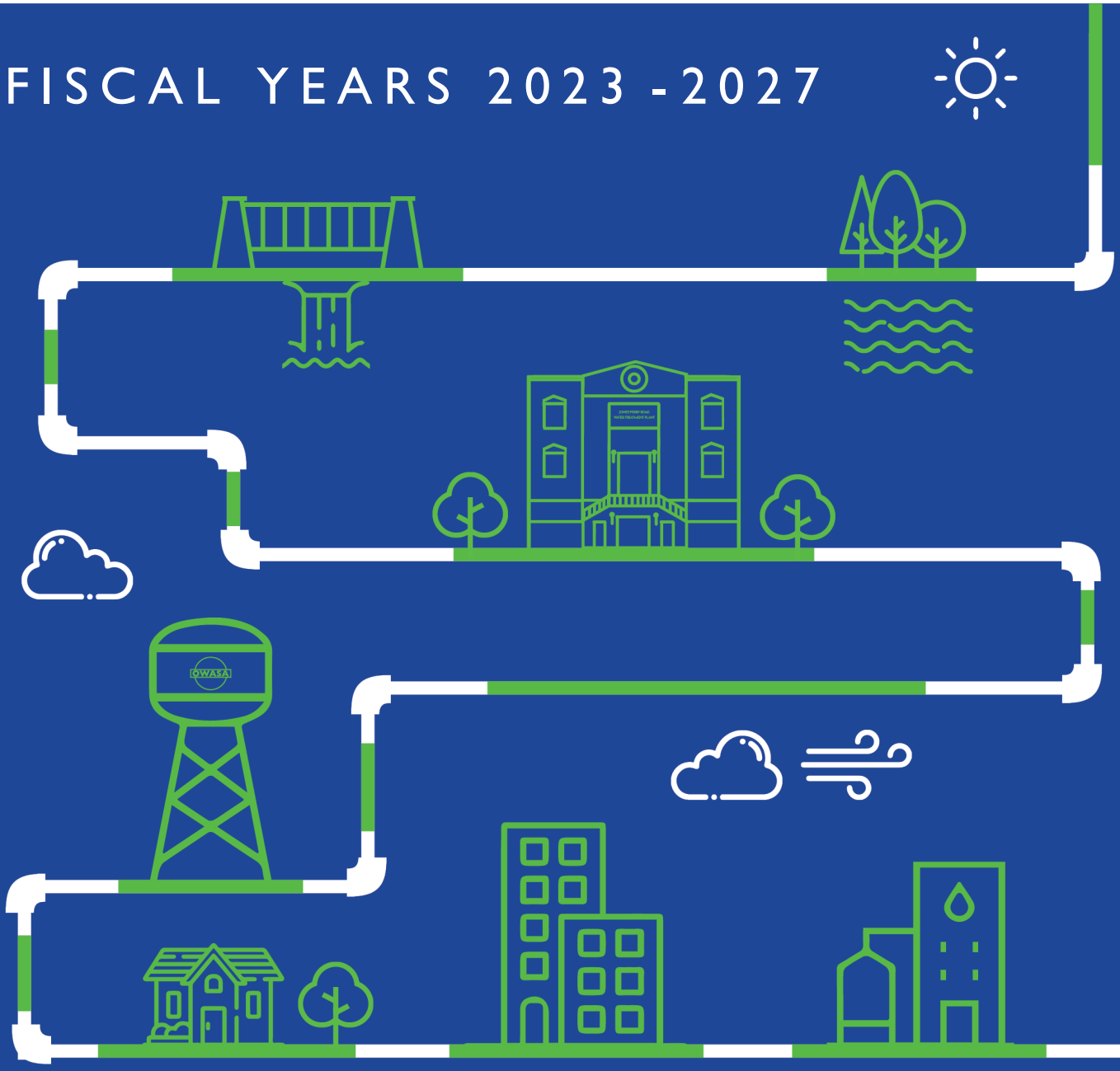
Capital Improvements Program

FISCAL YEARS 2023 - 2027



ORANGE WATER AND SEWER AUTHORITY

OWASA is Carrboro-Chapel Hill's not-for-profit public service agency delivering high quality water, reclaimed water, and wastewater services.

Orange Water and Sewer Authority

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delivering high quality water, wastewater, and reclaimed water services.

Subject: Capital Improvements Program for Fiscal Years 2023-2027

I am pleased to present the Capital Improvements Program (CIP) for Fiscal Years 2023-2027.

The CIP is the culmination of an annual process of capital needs assessment and prioritization completed as part of OWASA's Asset Management Program. This five-year CIP outlines an $111 million plan for the community's investment in its water, wastewater, and reclaimed water infrastructure and represents OWASA's commitment to providing high quality and reliable service into the future.

The CIP includes over $35 million for replacement of approximately 11 miles of aging water mains and other improvements for the water distribution system, $17 million for the evaluation, rehabilitation, and upsizing of approximately 7.5 miles of wastewater collection (sewer) mains and pump stations, $24 million for rehabilitation work at our water treatment plant (WTP), $25 million for our wastewater treatment plant (WWTP) and wastewater pumping facilities, and $10 million for our water supply reservoirs (including OWASA's participation in the Western Intake Partnership Projects), along with rehabilitation or replacement of other assets throughout the system which are nearing the end of their useful life. As in prior CIPs, the vast majority of the FY 2023-2027 CIP is dedicated to the rehabilitation of existing infrastructure (roughly 73% for the five-year period), as opposed to system growth (3%), or system enhancements (24%).

As implied by the subtotals above, renewal of the water distribution system continues to be a major focus of the CIP, and the upcoming years will see major water main replacement projects in construction along Legion Road, Rosemary Street, Manning Drive, South Road and in various neighborhoods throughout the service area. Other notable projects in this CIP include major risk and resiliency improvements to the electrical distribution system at the WTP, supervisory control and data acquisition (SCADA) system improvements at the WTP and WWTP, and major process improvements at the WWTP.

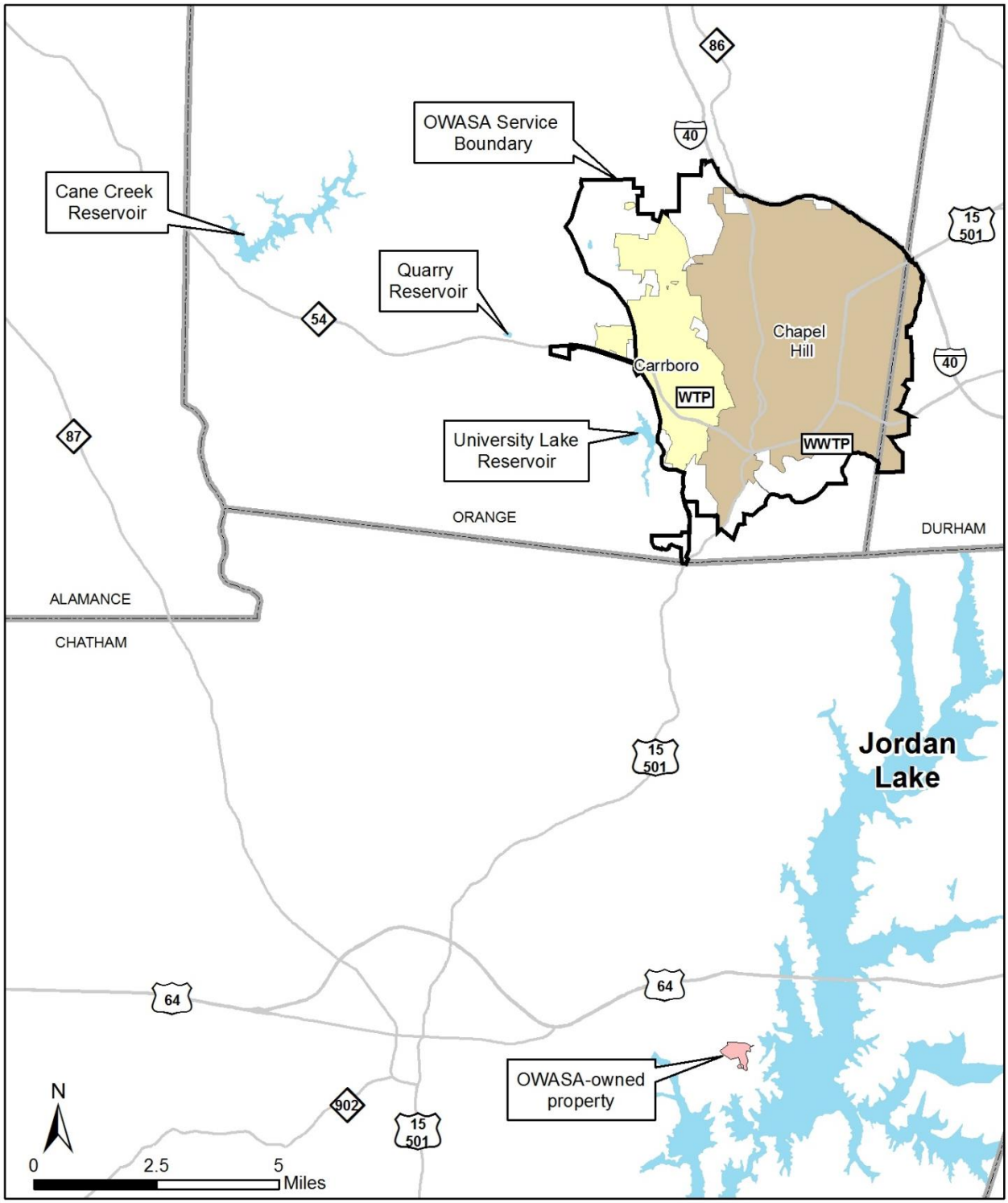
The CIP also includes funding for various needs assessments and planning efforts used to evaluate asset risks and to determine future capital investments required for the water distribution system, the wastewater collection system, water treatment plant, and the wastewater treatment plant.

We believe that the level of investment presented in this CIP leaves OWASA well-positioned to remain the sustainable, responsible, and environmentally-focused organization that our community deserves and has come to expect.

Allison Marie Spinelli

Allison Marie Spinelli, P.E.
Engineering Manager – Capital Projects

Orange Water and Sewer Authority
Service Area and Raw Water Supplies



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Fiscal Years 2023 - 2027
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Objective

This document summarizes OWASA's long-range Capital Improvements Program (CIP) and Budget for the 5-year period including Fiscal Years (FY) 2023 through 2027. Its objective is to help guide OWASA's efforts to meet the community's evolving needs for sustainable, reliable, and high-quality water, wastewater (sewer), and reclaimed water services.

Background

OWASA is a public, non-profit water, wastewater, and reclaimed water agency established in 1977 to serve the Carrboro-Chapel Hill community. OWASA's service area is defined as the Urban Services Area delineated by the Water Sewer Master Planning Boundary Agreement Boundary adopted by Orange County and the Towns of Carrboro and Chapel Hill. OWASA provides service to approximately 86,300 residents through about 22,000 customer accounts. OWASA owns and maintains 3 raw water reservoirs, over 14 miles of raw water lines, the Jones Ferry Road Water Treatment Plant (WTP), 384 miles of drinking water lines, 6 drinking water storage tanks, 4 water booster pumping stations, 336 miles of wastewater collection lines (14 miles of this total are pressurized force mains), 21 wastewater pumping stations, the Mason Farm Wastewater Treatment Plant (WWTP), 5 miles of reclaimed water (RCW) lines, over 2,300 fire hydrants, over 13,300 valves, and over 11,000 manholes.

OWASA's current service area population has grown steadily from approximately 15,000 in 1960 to approximately 86,300 today. Utility service needs have increased accordingly and will continue to grow in the future.

Meeting the community's needs requires ongoing rehabilitation and periodic expansion of the water, wastewater, and reclaimed water systems. Carrying out these long-range improvements while maintaining the high level of service expected by OWASA's customers requires a substantial and sustained financial commitment. In addition to the funding requirements for the capital projects outlined in this document, adequate support is needed for annual operating expenses, such as treatment plant chemicals, maintenance, electricity and natural gas, general supplies, and personnel costs. Federal and state standards for drinking water, wastewater, and reclaimed water will likely continue to become even more stringent in the future, resulting in additional capital and operating costs.

Large amounts of energy are required to pump, treat, and deliver drinking water and reclaimed water to OWASA's customers, as well as to collect and treat the community's wastewater. OWASA recognizes the important link between water and energy and is committed to reducing energy use and greenhouse gas emissions associated with its operations. Critical to that effort is prioritizing energy efficiency and sustainability in the CIP. Installation of more efficient pumps and motors, heating and air conditioning systems, and controls are planned for several areas of our operations and incorporated into a number of capital projects. To the extent practical, capital projects are designed to reduce future energy requirements and costs as well as OWASA's carbon footprint. In 2021, OWASA updated its Energy Management Plan which outlines the use of energy in OWASA facilities and a plan for meeting specific objectives for using energy more efficiently, using renewable energy sources, and reducing our greenhouse gas (GHG) emissions. By reducing overall energy use and increasing the use of renewable energy sources, the plan

will help reduce the demand for water resources, improve environmental impact of OWASA's operations, reduce costs, and improve reliability.

Purpose of Capital Improvements Planning and Budgeting

Capital outlays differ from annual operating expenses. They are typically large in size and irregular in frequency and involve the construction of assets that last for decades. The effects of major capital decisions tend to be longer lasting than annual operating and maintenance decisions and require somewhat different planning and budgeting methods.

OWASA has prepared this CIP in response to those needs. This document includes water, wastewater, and reclaimed water projects anticipated to be needed during the next five years.

The CIP incorporates information and analyses from our Asset Management Program and other planning efforts. Projects are developed using the Asset Management Program's Rehabilitation and Replacement Forecast Model, hydraulic models and risk prioritization models for both the collection system and distribution system, the Long Range Water Supply Plan, the WWTP hydraulic and treatment capacity study, the WTP and WWTP Reliability and Risk Assessment Evaluation and numerous other planning tools. These projects are then prioritized using a CIP Prioritization Model.

The Capital Improvements Budget (CIB) is the financing component for the program and is a major factor in OWASA's financial management decisions. To a significant extent, the CIB drives OWASA's periodic adjustment of rates and fees and affects the timing and extent of revenue bond initiatives, which enable OWASA to borrow money. Before issuing revenue bonds, OWASA must complete a financial feasibility evaluation, including a five-year projection of revenues, operating and maintenance expenses, debt service payments, and capital expenditures. The CIB is an important element of that analysis.

The preparation and annual update of the CIP/CIB accomplishes several important objectives:

1. It helps plan for the orderly repair and replacement of existing facilities; provides the ability to deal with a broad range of needs as a whole; and develops a balanced long-range program for meeting OWASA's objectives.

2. It helps provide adequate lead time for project coordination and planning, regulatory permitting, project design, land acquisition, construction, etc. in order to ensure that the necessary facilities are in place when they are needed.

3. It provides a framework for analyzing a wider range of acceptable (and less costly) alternatives than might otherwise be considered under a narrower and more time-limited evaluation.

4. It provides a long-term perspective for assessing the adequacy of rates and fees and the timing and amount of debt-financing (revenue bond issues, State Revolving Fund loans, etc.).

5. It provides a framework for identifying, ranking, and executing projects for which the needs are most urgent, thereby minimizing customer inconvenience, project delays, and unnecessary carrying costs, and enabling the targeting of limited funds to the highest priority projects.

Framework

The CIP book is organized into sections that provide descriptive information on OWASA's proposed capital improvements for FY 2023 through 2027. Projects have been grouped along functional lines into the following 11 major categories (numbered 270 through 280) which generally correspond to the overall movement of water through the OWASA system:

270 – Raw Water Supply Sources

271 – Raw Water Transmission

272 – Water Treatment Facilities

273 – Drinking Water Pumping

274 – Drinking Water Storage

275 – Drinking Water Transmission and Distribution

276 – Wastewater Collection Lines

277 – Wastewater Pump Stations and Force Mains

278 – Wastewater Treatment and Recycling

279 – Reclaimed Water

280 – Central Office and Operations

Information within each project category generally is provided as follows: a general description of existing facilities; the need for additional or modified facilities; a summary table showing estimated costs of the suggested improvements; and specific information for each proposed project.

Assumptions

Major facility needs are based on demand forecasts developed for OWASA's update of its Long-Range Water Supply Plan. The basic assumptions that underlie these demand forecasts through 2070 include the following:

1. OWASA's service area, which is defined in the Water and Sewer Management, Planning and Boundary Agreement, will remain unchanged.
2. Future demand projections will continue to be based on retail water sales within the Carrboro-Chapel Hill Urban Services Area, as delineated by the Towns of Carrboro and Chapel Hill. Future demands do not anticipate any retail or wholesale delivery outside of this service area.
3. Future demand projections are based on the growth projections developed for the regional Metropolitan Transportation Plan using the CommunityViz model. As part of this process, the Triangle J Council of Governments used the CommunityViz tool to estimate where population and employment growth would occur. Those growth projections included data for 2045 and for build-out conditions, which staff assumed would occur in 2070.
4. The regulatory environment for water and wastewater treatment will remain substantially as it is today. Regulations will allow us to continue with our reclaimed water program and our water treatment plant process water recycling system.

Capital cost projections assume the continuation of existing OWASA policies; e.g., that OWASA funds will not be used for water/wastewater/reclaimed water extensions into new developments.

Future cost projections are escalated at an annual rate of 5%.

Many long-range project needs and cost estimates are based on preliminary analyses that will be further refined in subsequent CIP/CIBs as projects enter the design/construction phase and the scope and cost estimates are refined.

Projected Expenditures

Summary Table 1 presents an overview of the entire five-year planning period and lists the total estimated costs of the capital projects proposed in each of the 11 major categories. Total projected expenditures are approximately $111 million for the five-year period.

Financing

Guidance for funding the improvements outlined in this document is provided in OWASA's Financial Management Policy. OWASA's capital improvement costs are funded mostly through revenue received from customers, however opportunities for federal or state grants are becoming more widely available. Where possible, OWASA pursues grant funding and/or low- or no-interest loans through state and federal revolving loan and grant programs.

Summary

The development, review, and continuous refinement of the CIP/CIB, as part of the overall planning and budgeting process, contributes significantly to OWASA's ability to take the proactive measures necessary to meet the needs and expectations of its customers today and in the future. Allocating the appropriate amount of investment in our infrastructure to ensure reliability and resiliency without over-burdening the community with costs will remain an ongoing challenge which will require diligent management and planning.

Orange Water and Sewer Authority

Capital Improvements Program 2023-2027

Summary Table 1

By Category:

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
270	Raw Water Supply Sources	$ 3,946,000	$ 1,536,000	$ 1,145,000	$ 2,886,000	$ 845,000	**$10,358,000**
271	Raw Water Transmission	$0	$75,000	$0	$0	$0	**$75,000**
272	Water Treatment Facilities	$2,895,000	$6,688,000	$9,311,000	$2,555,000	$2,555,000	**$24,004,000**
273	Drinking Water Pumping	$0	$0	$0	$0	$0	**$0**
274	Drinking Water Storage	$100,000	$0	$0	$0	$100,000	**$200,000**
275	Drinking Water Transmission and Distribution	$ 6,545,000	$ 4,440,000	$ 12,394,000	$ 7,759,000	$ 4,113,000	**$35,251,000**
276	Wastewater Collection	$ 4,544,000	$ 4,250,000	$ 2,770,000	$ 3,570,000	$ 1,470,000	**$16,604,000**
277	Wastewater Pump Stations and Force Mains	$ 900,000	$ 150,000	$ 190,000	$ 560,000	$ 425,000	**$2,225,000**
278	Wastewater Treatment and Recycling	$ 2,510,000	$ 5,000,000	$ 6,565,000	$ 4,252,000	$ 3,495,000	**$21,822,000**
279	Reclaimed Water	$490,000	$75,000	$0	$80,000	$80,000	**$725,000**
280	Central Office and Operations	$0	$0	$0	$0	$0	**$0**
	TOTALS	**$21,930,000**	**$22,214,000**	**$32,375,000**	**$21,662,000**	**$13,083,000**	**$111,264,000**

By Funding Source:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
Cash	$5,239,000	$8,538,000	$9,590,000	$13,707,000	$11,427,000	**$48,501,000**
Potential Bonds/Loans	$16,691,000	$13,676,000	$22,785,000	$7,955,000	$1,656,000	**$62,763,000**
Grants	$0	$0	$0	$0	$0	**$0**
TOTALS	**$21,930,000**	**$22,214,000**	**$32,375,000**	**$21,662,000**	**$13,083,000**	**$111,264,000**

Category 270: Raw Water Supply Sources

Background

Ninety percent of OWASA's water supply originates as rainfall and surface runoff from within Orange County. The remaining ten percent comes from nearby portions of our watersheds in Alamance and Chatham Counties. Because natural streamflow is not sufficient to meet customer demands at all times, OWASA relies on three storage reservoirs to capture and store excess water during periods of higher flow.

Existing Facilities

OWASA's existing raw water supplies are University Lake, Cane Creek Reservoir, and the Quarry Reservoir. OWASA also holds a storage allocation at the B. Everett Jordan Reservoir (Jordan Lake) in Chatham County. OWASA's oldest supply source is University Lake, which was impounded on Morgan Creek in 1932. It is located near Jones Ferry Road adjacent to the western corporate limits of Carrboro. This 212-acre reservoir drains a 30-square mile watershed and has a usable storage capacity of about 450 million gallons (MG). The lake and about 500 acres of adjacent lands are owned by the University of North Carolina (UNC). OWASA is entitled to use University Lake as a water supply source and controls all land within 100 feet of the shoreline through a contractual agreement with UNC.

The 540-acre Cane Creek Reservoir, completed in 1989, is located near NC Highway 54 about 11 miles west of Carrboro and can store approximately 3 billion gallons (BG) of water derived from its 32-square mile drainage area. More than 2,000 acres of surrounding watershed land is either owned by OWASA or protected through conservation easements.

OWASA's third existing water supply source is the Quarry Reservoir, located on NC 54 about 5 miles west of Carrboro in the University Lake watershed. It was acquired in 1979 to supplement raw water supplies during severe droughts or other emergencies. It can be filled with excess water from the Cane Creek Reservoir and currently has a usable storage volume of about 200 MG. OWASA purchased additional land around the quarry in 2000, which it leases to American Stone Company. Approvals were obtained in 2001 to expand the American Stone Company's quarrying operations in the direction of OWASA's Quarry Reservoir. Mining operations will cease by 2030 and the large remaining quarry pit will be available for use as raw water storage, providing a total storage volume of about 2 BG. Improvements completed in 2007 increased the pumping capacity from the Quarry Reservoir and provide additional operational flexibility for the overall water supply system.

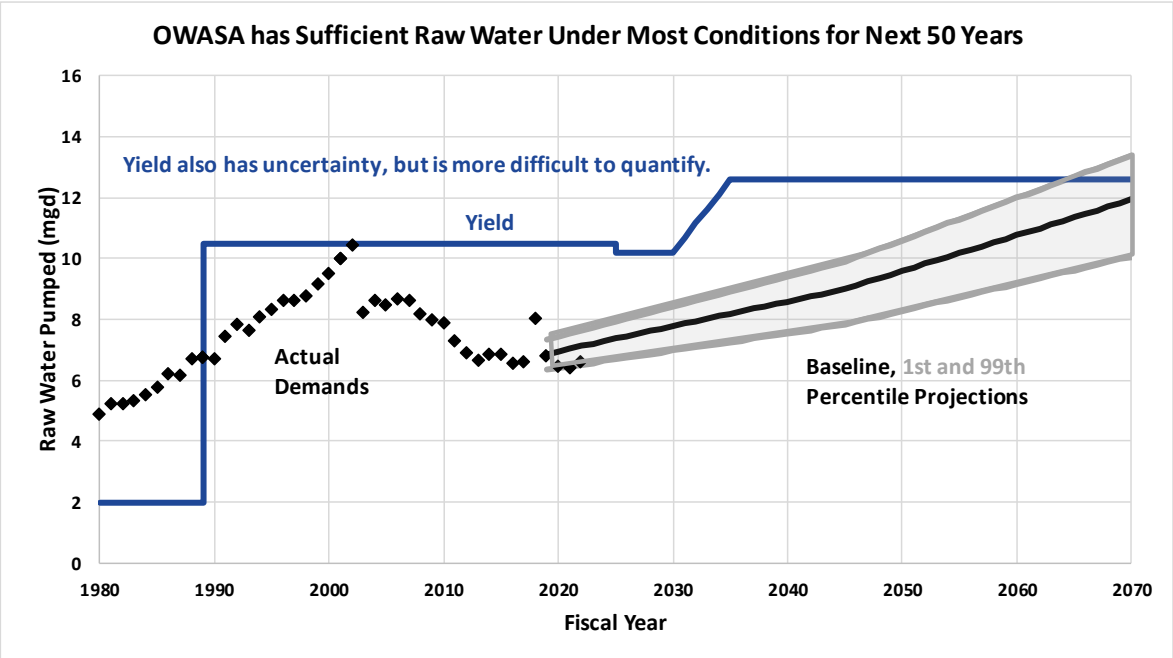
Cane Creek Reservoir, University Lake, and the existing Quarry Reservoir receive sufficient streamflow and have enough storage and transmission capacity to support an average yield of approximately 10.5 million gallons per day (MGD) while still retaining an emergency storage reserve of 700 MG (~20% of capacity) under the worst drought of record conditions for OWASA (2001-2002). Expansion of the Quarry

Reservoir will eventually provide a total system yield of approximately 12.6 MGD based on a contractual rock extraction agreement with American Stone. When OWASA has access to its Jordan Lake allocation, our estimated yield will be higher.

Existing interconnections provide the capacity to receive approximately 7 MGD of treated drinking water from the City of Durham and 3 MGD from the Town of Hillsborough, but due to capacity constraints at Hillsborough's WTP, the transfer ability may be limited to 1 or 1.5 MGD. OWASA also has an interconnection with Chatham County. OWASA can receive approximately 1 mgd through this connection. The combined capacity of our interconnections is about 9.5 mgd, which is about 144 percent of our Fiscal Year 2022 average-day drinking water demands.

OWASA updated its Long-Range Water Supply Plan (LRWSP) to ensure we have water to meet our needs through 2070. Key findings of that Plan included the following: (1) OWASA's locally protected water supplies (with the expanded Quarry Reservoir) can meet most expected needs through 2070 ,but we are vulnerable during droughts and will need supplemental supplies later in the planning period; (2) we are moving forward with expanding the Quarry Reservoir (3) accessing our Jordan Lake allocation by partnering with the City of Durham, Town of Pittsboro, and Chatham County on a new intake and transmission infrastructure on the west side of Jordan Lake is the best method to address our drought vulnerability and to meet our long-term water supply needs.

As part of this update of the LRWSP, the OWASA Board of Directors authorized the use of raw water demand projections, which include a range to capture uncertainty in demand projects, as the basis to evaluate water supply and demand management options to meet the community's water needs in March 2019. Projections of future demand developed as part of the LRWSP comprise a range of population growth, density, development, and water consumption scenarios that may occur through 2070. The figure below shows the updated raw water demand projections developed as part of that project.



The diamond-shaped data points in the figure above represent actual raw water demand since 1980. Because of the significant uncertainty in projecting growth and water demands out 50 years, a range of

projections was developed (grey lines). Further information on the methodology is included in this report. The dark blue line indicates the operational yield of OWASA's existing reservoir/quarry system, including the additional yield that will result from a 1.3 BG expansion of Quarry Reservoir storage. This amount is based on the least volume that would be available after 2030 per American Stone Company's minimum production commitment and would be accessible with OWASA's existing pumping facilities; i.e., with little need for major capital improvements, but there will be permitting required to bring the facility online. Yield calculations assume that 20% of usable reservoir storage is held in reserve for extreme (emergency) drought conditions.

OWASA currently holds an allocation of 5% of Jordan Lake's water supply storage capacity, which can provide a yield of about 5 MGD. OWASA's allocation was converted from Level II (long-term future use) to Level I (nearer term use in the event of severe drought or water supply emergency) in March 2013. Although OWASA's goal is to maximize use of the Cane Creek Reservoir/University Lake/expanded Quarry Reservoir system, Jordan Lake represents an important supplemental source for meeting water demands under certain conditions of supply and demand.

OWASA and our utility neighbors must address the resiliency of water supply and storage, especially for periods of severe and extended droughts as well as the capacity of our reclaimed water system, which may face higher peak demands as temperatures increase with climate change. OWASA worked with our utility neighbors through the Jordan Lake Partnership (JLP) to develop the Triangle Regional Water Supply Plan to ensure all Partners have sufficient and reliable water supply through 2070. The JLP also contracted a regional interconnection study to evaluate the interconnection capacity of our drinking water systems and to identify needed infrastructure improvements to meet future needs. In 2018, the JLP was replaced with the Triangle Water Supply Partnership (TWP). The TWP is building on the work of the JLP and is currently updating the interconnection model and using it to run planning scenarios to identify strategies to improve the region's resiliency to planned and unplanned water supply challenges.

OWASA is also working with the City of Durham, Town of Pittsboro, and Chatham County (Western Intake Partners) to plan, design, and permit a new water supply intake, treatment, and transmission facilities on the western side of Jordan Lake. OWASA does not yet need access to its Jordan Lake allocation on a regular basis so is participating in a limited capacity to have ownership in parts of the infrastructure that are difficult or costly to expand later such as the intake and transmission infrastructure. OWASA will postpone ownership in the proposed water treatment facility until a later phase.

Planned Improvements

The CIP includes $7.1 million to fund several projects to improve and ensure the long-term viability of the raw water supply system. At University Lake, notable near-term projects will add a chemical facility to address taste and odor concerns (270-28) and improve the recreational facilities (270-29). At Cane Creek Reservoir, the CIP provides funds for improvements at the pump station (270-16) and dam (270-30). The CIP also includes OWASA's participation in the Western Intake Partnership Projects (270-34).

Planned improvements are listed in the table on the following page.

Category 270: Raw Water Supply Sources

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
270-04	Jordan Lake Raw Water Supply Allocation	$10,000	$10,000	$10,000	$10,000	$10,000	**$50,000**
270-09	Quarry Reservoir Development	$15,000	$15,000	$65,000	$15,000	$15,000	**$125,000**
270-16	Cane Creek Pump Station Improvements	$0	$25,000	$250,000	$2,041,000	$0	**$2,316,000**
270-28	University Lake Permanganate Facility	$3,000,000	$800,000	$0	$0	$0	**$3,800,000**
270-29	University Lake Fishing Pier and Boat Launch	$0	$80,000	$0	$0	$0	**$80,000**
270-30	Cane Creek Dam Rehabilitation	$200,000	$0	$0	$0	$0	**$200,000**
270-31	Cane Creek Resurfacing	$70,000	$0	$0	$0	$0	**$70,000**
270-34	Western Intake Partnership Projects	$651,000	$606,000	$820,000	$820,000	$820,000	**$3,717,000**
270	**Category Total**	**$3,946,000**	**$1,536,000**	**$1,145,000**	**$2,886,000**	**$845,000**	**$10,358,000**

270-04 Jordan Lake Raw Water Supply Allocation

Description/Background:

OWASA currently holds an allocation of 5% of Jordan Lake's water supply storage capacity, which can provide a yield of about 5 MGD. OWASA's allocation was converted from Level II (long-term future use) to Level I (nearer term use in the event of severe drought or water supply emergency) in March 2013. Funding is provided for the annual operation and maintenance (O&M) costs associated with this allocation of water supply storage in Jordan Lake. Although OWASA's goal is to maximize use of the Cane Creek Reservoir/University Lake/expanded Quarry Reservoir system, Jordan Lake represents an important supplemental source for meeting water demands under certain conditions of supply and demand.

Benefits: increases reliability and reduces operational risk due to water shortages

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$0	$0
TOTAL	**$10,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**	**$50,000**

Current Status: Planning

270-09 Quarry Reservoir Development

Description/Background:

In 2000, OWASA acquired the property north of NC Highway 54 and west of (Old) Bethel-Hickory Grove Church Road on which the American Stone Company's active quarry operations are currently located. The final land acquisition payment was made in FY 2006. Ongoing annual payments of $15,000 are made to Orange County's "No-fault Well Repair Fund" in compliance with the Special Use Permit conditions under which OWASA will expand the Quarry Reservoir. The payments will end in FY 2030, which is when quarrying operations will cease. Additional funding is included in FY 2025 to conduct a planning study for the Quarry Reservoir expansion to better understand future permitting and construction needs.

Benefits: required by permit for future quarry expansion

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$15,000	$15,000	$65,000	$15,000	$15,000	$125,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$0	$0
TOTAL	**$15,000**	**$15,000**	**$65,000**	**$15,000**	**$15,000**	**$125,000**

Current Status: Planning

270-16 Cane Creek Pump Station Improvements

Description/Background:

Funds are included in FY 2024 through FY 2026 for adding automatic generator transfer switchgear, building a permanent enclosure for the generator, and installing variable frequency drives (VFD). Planning and design are funded for FY 2024 and FY 2025, and construction is expected to occur in FY 2026. This work was identified by OWASA maintenance staff.

Benefits: replaces aging assets; reduces operational risk through safer and faster transfer to backup power; potentially reduces energy use

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$20,000	$0	$0	$0	$20,000
Design/Land	$0	$0	$200,000	$0	$0	$200,000
Construction	$0	$0	$0	$1,650,000	$0	$1,650,000
Inspection	$0	$0	$0	$93,000	$0	$93,000
Construction Admin	$0	$0	$0	$93,000	$0	$93,000
Contingency	$0	$5,000	$25,000	$205,000	$0	$235,000
TOTAL	**$0**	**$25,000**	**$250,000**	**$2,041,000**	**$0**	**$2,291,000**

Current Status: Not yet started

270-28 University Lake Permanganate Facility

Description/Background:

An FY 2013 study of the existing dry potassium permanganate feed system recommended relocation of the permanent feed system from the WTP to the two raw water reservoirs, Cane Creek Reservoir and University Lake, in order to increase contact times. Furthermore, the study concluded that liquid sodium permanganate feed systems would be more economical and safer than equivalent dry potassium permanganate feed systems. The Cane Creek Reservoir permanganate facility was completed in FY 2018.

Design and permitting of a new permanganate facility at University Lake began in FY 2019 was complete in FY 2021, with construction funded for FY 2023 and FY 2024. The new facility will include a chemical storage tank and containment area, a chemical storage and feed building, metering pumps, auxiliary building systems, and associated site, electrical, and piping improvements.

This project has been approved for a low interest loan under the Drinking Water State Revolving Fund program.

Benefits: reduces safety risk; increases reliability and reduces operational risk; increases performance

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$2,800,000	$650,000	$0	$0	$0	$3,450,000
Inspection	$80,000	$30,000	$0	$0	$0	$110,000
Construction Admin	$80,000	$30,000	$0	$0	$0	$110,000
Contingency	$100,000	$30,000	$0	$0	$0	$130,000
TOTAL	**$3,060,000**	**$740,000**	**$0**	**$0**	**$0**	**$3,800,000**

Current Status: Under Construction

270-29 University Lake Fishing Pier and Boat Launch

Description/Background:

Funding is provided in FY 2024 for the replacement of the existing fishing pier and boat launch dock. Work will be completed by the North Carolina Wildlife Resources Commission (NCWRC), Division of Engineering and Land Management. The new pier and boat launch will allow for greater loading capacity and will improve the safety and access to these facilities for visitors to University Lake. A similar project was completed by the NCWRC at Cane Creek Reservoir in FY 2015.

Benefits: reduces safety risk; enhances customer experience

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$74,000	$0	$0	$0	$74,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$6,000	$0	$0	$0	$6,000
TOTAL	**$0**	**$80,000**	**$0**	**$0**	**$0**	**$80,000**

Current Status: Not yet started

270-30 Cane Creek Dam Rehabilitation

Description/Background:

This project provides funds for the replacement of joint sealant on the concrete spillway at the Cane Creek Dam as identified by a recent inspection of the dam and adjacent facilities. The need for this project was recommended in the engineer's final dam inspection report.

Benefits: reduces operational risk, replaces aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$180,000	$0	$0	$0	$0	$180,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$20,000	$0	$0	$0	$0	$20,000
TOTAL	**$200,000**	**$0**	**$0**	**$0**	**$0**	**$200,000**

Current Status: Bidding

270-31 Cane Creek Resurfacing

Description/Background:

This project provides funds for the resurfacing of the dam crest as identified by a recent inspection of the dam. The need for this project was recommended in the engineer's final dam inspection report.

Benefits: reduces operational risk, replaces aging assets, reduces safety risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$65,000	$0	$0	$0	$0	$65,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$5,000	$0	$0	$0	$0	$5,000
TOTAL	**$70,000**	**$0**	**$0**	**$0**	**$0**	**$70,000**

Current Status: Expedited and previously completed in FY 2022

270-34 Western Intake Partnership Projects

Description/Background:

This project provides funds for OWASA's participation in the Western Intake Partnership. The allocated funds are for investment in the projects related to the planning, permitting and design of the intake and transmission infrastructure on the western side of Jordan Lake as supported in the Long-Range Water Supply Plan.

Benefits: reduces operational risk,

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$621,000	$600,000	$100,000	$0	$0	$1,312,000
Design/Land	$0	$0	$700,000	$800,000	$800,000	$2,300,000
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$30,000	$6,000	$20,000	$20,000	$20,000	$96,000
TOTAL	**$651,000**	**$606,000**	**$820,000**	**$820,000**	**$820,000**	**$3,717,000**

Current Status: Planning. permitting and design is underway through the Western Intake Partnership Program

Category 271: Raw Water Transmission

Background

Water from OWASA's raw water supply storage reservoirs is pumped through transmission mains to the Water Treatment Plant (WTP). These mains, in combination, are sized to carry the maximum daily flow demands in the service area. Where economically feasible, transmission mains are also sized to maximize the available yield from the system and to provide redundant capacity.

Existing Facilities

Raw water is pumped from University Lake to the WTP in Carrboro by three electrically-driven pumps, each with variable frequency drives, and one diesel engine-driven pump, with a combined maximum effective operating capacity of 20 million gallons per day (MGD). Water is conveyed through two separate transmission mains: a 6,000 foot, 20-inch concrete main constructed in 1963 and a 7,000 foot, 42-inch ductile iron pipe (DIP) main built in 2003.

Water is pumped from the Cane Creek Reservoir by two 2-speed pumps, each originally capable of delivering 12 MGD at high speed, and 6 or 8 MGD at low speed. The pumps are not configured to operate simultaneously. Water is pumped through 33,300 feet of 24-inch DIP located along NC 54, where it can be diverted to either the Quarry Reservoir or University Lake via Phil's Creek. An additional 24,500 feet of 30-inch raw water transmission piping, completed in 1991, allows delivery of Cane Creek water directly to the WTP. The actual transmission capacity of the Cane Creek raw water line is 10.7 MGD.

The current Quarry Reservoir configuration provides 200 million gallons of additional storage capacity. The pump station, completed in 2007, has a capacity of 4 to 6 MGD, depending on the water level in the quarry. The quarry water is delivered to the WTP through a connection to the Cane Creek raw water transmission main.

Planned Improvements

The CIP includes funding for condition assessments of raw water transmission mains from Cane Creek Reservoir (271-05).

Category 271: Raw Water Transmission

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
271-05	Cane Creek Raw Water Transmission Main Study	$0	$75,000	$0	$0	$0	**$75,000**
271	**Category Total**	**$0**	**$75,000**	**$0**	**$0**	**$0**	**$75,000**

271-05 Cane Creek Raw Water Transmission Main Study

Description/Background:

Funding is provided in FY 2024 to test the friction coefficient in the existing 24-inch diameter raw water main from the Cane Creek Reservoir to the Quarry Reservoir in order to determine if the main needs to be cleaned to restore its carrying capacity. This study will be completed prior to the design on the pump station improvements (270-16).

Benefits: determines asset risk; potentially reduces energy use

Funding:

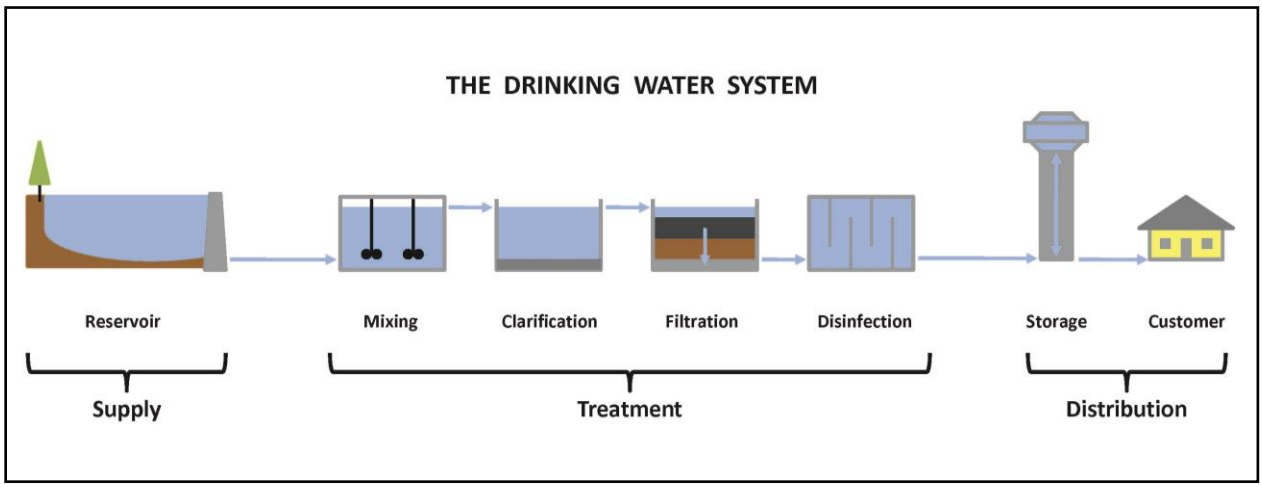
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$70,000	$0	$0	$0	$70,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$5,000	$0	$0	$0	$5,000
TOTAL	**$0**	**$75,000**	**$0**	**$0**	**$0**	**$75,000**

Current Status: Not yet started

Category 272: Water Treatment Facilities

Background

Raw water withdrawn from OWASA's water supply reservoirs is treated by chemical and physical processes at the Water Treatment Plant (WTP). Unlike our reservoirs, which are sized to meet average daily demand calculated over a year, the WTP must be able to meet the maximum or peak demand on any given day.



Existing Facilities

Water from University Lake, Cane Creek Reservoir, and the Quarry Reservoir is treated at the WTP, which is located on a 17-acre site on Jones Ferry Road in Carrboro. The WTP is configured with a chemical flash mixer followed by two parallel (independent) treatment trains:

1. Conventional coagulation/flocculation chamber followed by five gravity settling basins which can be operated at variable rates with a combined capacity of 10 million gallons per day (MGD).

2. Two upflow clarifiers with a combined capacity of an additional 10 MGD.

The two clarification processes are operated together to meet system demands. Clarified water is further treated through ten dual-media filters with a total surface area of 3,880 square feet. When operated at the permitted filtration rate of 4.0 gallons per square foot per minute the filters have a combined capacity of 22.3 MGD.

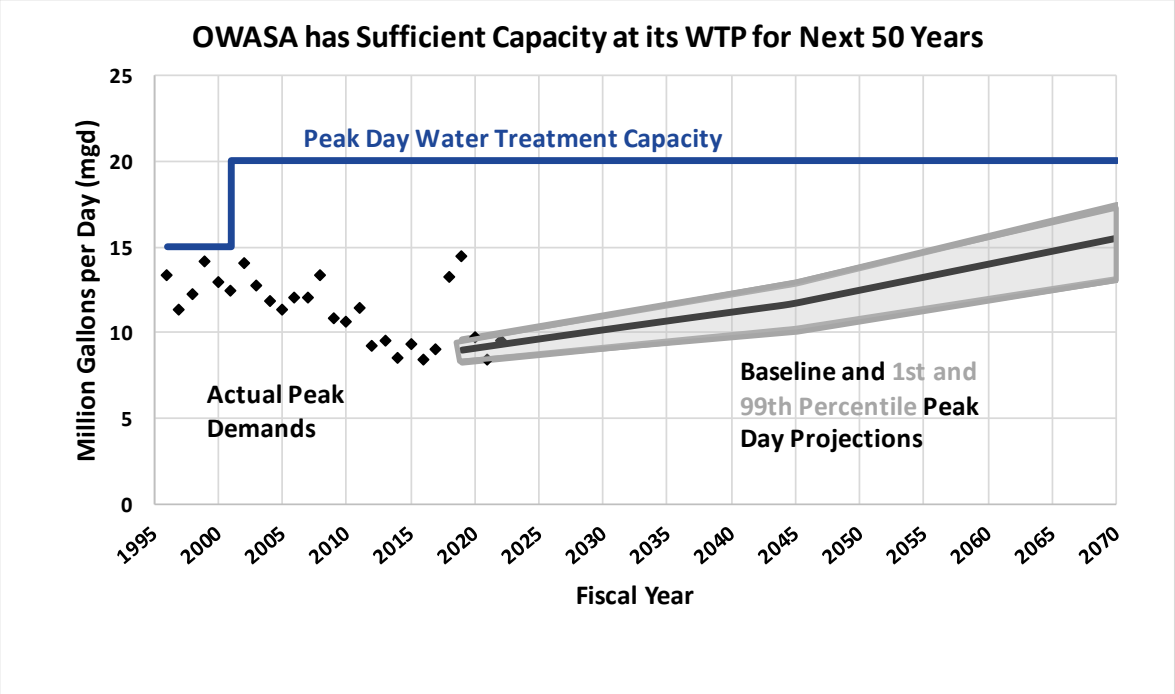
Chemicals used in the treatment process include ferric sulfate for coagulation, liquid caustic (sodium hydroxide) for pH control, sodium permanganate and powdered activated carbon for taste and odor control, a blend of orthophosphates and polyphosphates for corrosion control, sodium hypochlorite and ammonia (ammonium sulfate) for chloramine disinfection, and hydrofluorosilicic acid for community-wide dental health. The 1.5 million-gallon clearwell (underground water reservoir) stores drinking water at the WTP before it is pumped into the distribution system.

The WTP was originally built in 1948 with a capacity of 3 MGD and was expanded to 5 MGD and 10 MGD in 1963 and 1974, respectively. Upflow clarifiers added in 1990 increased the capacity to 12.5 MGD, and the addition of new filters, solids handling, and chemical feed facilities increased the capacity to 15 MGD in 1995. Curtain baffles were installed in the clearwell in 1999 to improve disinfectant contact time.

Additional solids handling facility improvements were completed in 2001 and increased the ability to support sedimentation solids and filter backwash requirements. Additional backwash storage and treatment facilities, along with the addition of a gravity thickener and a belt filter press provided the capacity to handle solids produced by a 20 MGD plant. This project was followed by a phased series of WTP improvements.

- Phase I improved the filter efficiency and provided new underdrains for the eight existing filters, as well as blowers for air scouring the filters.
- Phase II, completed in 2002, increased the drinking water pumping capacity from 15 to 18 MGD. This project also included installation of an ammonia feed system for chloramine disinfection, a process which decreases the concentration of disinfection byproducts (DBPs), provides more reliable compliance with state and federal DBP limits, and improves drinking water taste.
- Phase III was completed in 2002 and provided two new filters, which increased the total capacity of all 10 filters from 17.3 MGD to 22.3 MGD, thereby increasing the WTP overall "firm" capacity from 18 MGD to its current capacity of 20 MGD.
- Phase IV was completed in 2006 and included the installation of a permanent process water recycling system to enable the reuse of process water from the solids handling system and backwash clarifiers. This state-approved recycling system reduced raw water withdrawals from the reservoirs – and the associated use of electrical energy for raw water pumping – by 6 to 7 percent. Other Phase IV improvements included clearwell and bypass pumping modifications.

Following a fire at the WTP in August 2007, the 2,300-volt Drinking Water Pumps Nos. 1, 2, and 3 were replaced with a single 480-volt, 300 horsepower horizontal split-case pump (Pump No. 7) with a variable frequency drive (VFD). A new 1,000-kilowatt generator was installed in June 2013. Rehabilitation and upgrades were completed in 2014 to the two upflow clarifiers (pulsators) originally installed in 1990.



In the graph above, the peak-day drinking water demands are shown (black demands for historical demands, black and gray lines for future demands). Since FY 1999, the year with the highest peak day demand under normal operations, peak day drinking water demands have declined by 33 percent despite a 33 percent increase in customer accounts over that same period. The decline in peak demands from FY 1999 is around 30 percent when other recent years are included in the evaluation). Water conservation efforts by OWASA's customers, together with the University's use of reclaimed water commencing in 2009, have freed up water supply and treatment capacity to meet future needs, thereby enabling OWASA to substantially defer the need for additional water treatment capacity. (The significant increases in peak day drinking water demands in FY 2018 and FY 2019 are anomalies resulting from: in FY 2018, the provision of water to the City of Durham for an extended period of time; and in FY 2019, the large water main break in front of the WTP on November 5, 2018. Peak-day demands for those two years would be in line with historical amounts if not for those two events.)

Planned Improvements

Planned improvements for this category are shown in the table on the following page and include a total of $24 million within the five-year period. Notable projects include the upgrades to the WTP electrical distribution system (272-52), clearwell rehabilitation (272-55), and flash mix basin improvements (272-35).

Category 272: Water Treatment Facilities

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2026	Five-Year Total
272-10	Water Facility Asset Rehabilitation	$0	$0	$0	$2,341,000	$1,819,000	**$4,160,000**
272-37	WTP Belt Filter Press Replacement	$2,000,000	$2,100,000	$0	$0	$0	**$4,100,000**
272-49	WTP SCADA Master Plan Recommendations	$520,000	$1,000,000	$1,000,000	$0	$0	**$2,520,000**
272-52	WTP Electrical Distribution Improvements	$20,000	$3,200,000	$8,020,000	$0	$0	**$11,240,000**
272-55	WTP Clearwell Rehab and Flash Mix Rehab	$180,000	$0	$0	$214,000	$736,000	**$1,130,000**
272-58	WTP Pulsator and Operator Building and Cane Creek Pump Station Roof Replacements	$100,000	$0	$221,000	$0	$0	**$321,000**
272-59	Finished Water Pump #4 Motor and Pump Replacement	$75,000	$325,000	$0	$0	$0	**$400,000**
272-60	Filter 1, 3, 4, 5 Influent Valve Shaft and Actuator Replacements	$0	$63,000	$0	$0	$0	**$63,000**
272-61	WTP Concrete, Joint Sealing and Tile Repairs	$0	$0	$70,000	$0	$0	**$70,000**
272	**Category Total**	**$2,895,000**	**$6,688,000**	**$9,311,000**	**$2,555,000**	**$2,555,000**	**$24,004,000**

272-10 Water Facility Asset Rehabilitation

Description/Background:

CIP 272-10 provides funding for replacement and rehabilitation of the aging components of water supply, treatment, and storage facilities such as the reservoir facilities, WTP, booster pump stations, and storage tanks in order to maintain reliable, efficient performance. Placeholder funding in the fourth and fifth fiscal years of any given five-year CIP assures that capital investment decisions account for asset replacement in future years where specific projects are not yet identified. This is the primary mechanism used to estimate infrastructure replacement needs not only over the five-year CIP, but over a fifteen-year financial planning horizon. Funding is based on estimates of remaining life and replacement costs for over 2,100 individual assets (pumps, motors, etc.) within this asset class.

Benefits: replaces or extends useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$2,341,000	$1,819,000	$4,160,000
TOTAL	**$0**	**$0**	**$0**	**$2,341,000**	**$1,819,000**	**$4,160,000**

Current Status: Long-term funding to be allocated to future identified projects

272-37 WTP Belt Filter Press Replacement

Description/Background:

Belt filter presses (BFP) are used to dewater solids from the treatment process prior to transport to a composting facility for beneficial reuse as a soil amendment. The WTP has two BFP's: BFP No.1 is no longer operational or serviceable and needs to be replaced to ensure reliability and redundancy of this essential treatment plant process. BFP No.2 was rehabilitated in FY 2020.

A FY 2019 planning study evaluated several project options, including alternative dewatering technologies. Recommended improvements include the replacement of BFP No.1, replacement of the solids conveyor system, and installation of new control system improvements. Funds are included in FY 2022 for the completion of design and permitting and the start of construction. Construction is planned to occur in FY 2023 and FY 2024.

This project has been approved for a low interest loan under the Drinking Water State Revolving Fund program, which will result in lower borrowing costs than conventional loans.

Benefits: replaces or extends useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$1,700,000	$1,800,000	$0	$0	$0	$3,500,000
Inspection	$100,000	$100,000	$0	$0	$0	$200,000
Construction Admin	$100,000	$100,000	$0	$0	$0	$200,000
Contingency	$100,000	$100,000	$0	$0	$0	$200,000
TOTAL	**$2,000,000**	**$2,100,000**	**$0**	**$0**	**$0**	**$4,100,000**

Current Status: Under Construction

272-49 WTP SCADA Master Plan Recommendations

Description/Background:

This project will implement the recommendations for the SCADA (Supervisory Control and Data Acquisition) system at the WTP as a result of the master planning study that was completed in FY 2021.

FY 2023 through FY 2025 funds are included to design and implement the near term recommendations of the master plan including replacing obsolete equipment, updating control philosophies and system architecture, and overall system improvements and upgrades. .

Benefits: reduces operational risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$220,000	$300,000	$0	$0	$0	$520,000
Construction	$220,000	$580,000	$800,000	$0	$0	$1,600,000
Inspection	$20,000	$80,000	$100,000	$0	$0	$200,000
Construction Admin	$20,000	$20,000	$70,000	$0	$0	$110,000
Contingency	$20,000	$20,000	$30,000	$0	$0	$70,000
TOTAL	**$500,000**	**$1,000,000**	**$1,000,000**	**$0**	**$0**	**$2,500,000**

Current Status: Scoping services with consultant and integrator through IT procurement process

272-52 WTP Electrical Distribution Improvements

Description/Background:

The 2018 Risk and Reliability Study identified a high priority need to convert the remainder of plant electrical distribution system to an updated voltage standard (a majority of the system already uses the updated standard), construction of a new 650 SF electrical building, relocation of the existing 1500 kW generator, ability to provide closed transition transfer capabilities for both generators, and miscellaneous other electrical improvements throughout the electrical distribution system at the WTP.

Design commenced in FY 2020 and was completed in FY 2022. Construction is currently funded for FY 2024 and FY 2025.

Benefits: reduces operational risk; reduces safety risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$15,000	$0	$0	$0	$0	$15,000
Construction	$0	$2,900,000	$6,500,000	$0	$0	$9,400,000
Inspection	$0	$80,000	$400,000	$0	$0	$480,000
Construction Admin	$0	$80,000	$400,000	$0	$0	$480,000
Contingency	$5,000	$140,000	$720,000	$0	$0	$865,000
TOTAL	**$20,000**	**$3,200,000**	**$8,020,000**	**$0**	**$0**	**$11,240,000**

Current Status: Fully designed

272-55 Clearwell Rehabilitation and Flash Mix Rehabilitation

Description/Background:

An inspection completed in FY 2020 determined that the concrete walls of the clearwell structure were in overall good condition and identified some areas of spalling and cracking within the concrete roof requiring repair. Design and construction to repair a recently identified active clearwell leak is funded for FY 2023 with design and construction to repair the spalling and cracking in the clearwell roof occurring in FY 2026 and FY 2027.

The WTP's two flash mix basins, one for each of the two treatment trains, are where coagulation chemicals are added to the raw water entering the WTP. The basins are designed with the ability to be isolated from each other in order to allow for different chemical dosages, if needed, for each treatment train. The existing valves will need to be replaced because they are malfunctioning such that the flash mix basins cannot be isolated from each other. A planning study completed in FY 2018 recommended timing for the replacement along with additional structural, mechanical, electrical, and instrumentation improvements to this process unit. Funds are included in FY 2023 to start design of the recommended improvements with construction occurring in FY 2026 and FY 2027.

Benefits: extends service life of aging assets, improves operational efficiency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$100,000	$0	$0	$76,000	$0	$176,000
Construction	$50,000	$0	$0	$68,000	$546,000	$664,000
Inspection	$5,000	$0	$0	$30,000	$75,000	$110,000
Construction Admin	$5,000	$0	$0	$30,000	$75,000	$110,000
Contingency	$20,000	$0	$0	$10,000	$40,000	$70,000
TOTAL	**$180,000**	**$0**	**$0**	**$214,000**	**$736,000**	**$1,130,000**

Current Status: In design

272-58 WTP Pulsator and Operator Buiding and Cane Creek Pump Station Roof Replacements

Description/Background:

In December 2016 a roof inspection and evaluation was completed for the Pulsator Building roof and Operations Building pipe gallery and operators control room roofs and indicated that the condition of the roofs was poor. A more recent evaluation of the Cane Creek Pump Station Roof was also completed and noted the roof to be in similar poor condition. All of these roofs also have experienced reoccurring lekas which pose operational and safety concerns at their respective facilities. As such, this project includes funding for the design and construction of new roofs at all three locations between FY 2023 and FY 2025.

Benefits: replaces or extends useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$10,000	$0	$30,000	$0	$0	$40,000
Construction	$70,000	$0	$141,000	$0	$0	$211,000
Inspection	$5,000	$0	$15,000	$0	$0	$20,000
Construction Admin	$5,000	$0	$15,000	$0	$0	$20,000
Contingency	$10,000	$0	$20,000	$0	$0	$30,000
TOTAL	**$100,000**	**$0**	**$221,000**	**$0**	**$0**	**$321,000**

Current Status: Cane Creek Pump Station is under contract, remaining roofs are in design

272-59 Finished Water Pump No. 4 Motor and Pump Replacement

Description/Background:

The WTP uses four pumps (Finished Water Pumps Nos. 4 through 7) to send drinking water from the plant into the distribution system. Finished water pumping is the largest consumer of electrical energy at the WTP. Recent projects were completed to add and/or replace VFDs on Pump No. 5 and No. 6. Little work has been completed to date on Pump No.4 and it is beginning to reach the end of its useful life.

This project includes funds to complete a condition assessment on Pump No.4 in FY 2023 with funds to complete any necessary replacements, rehabilitations and improvements to Pump No.4 in FY 2024.

Benefits: replaces or extends useful life of aging assets, potentially reduces energy use

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$70,000	$0	$0	$0	$0	$70,000
Design/Land	$0	$65,000	$0	$0	$0	$65,000
Construction	$0	$200,000	$0	$0	$0	$200,000
Inspection	$0	$20,000	$0	$0	$0	$20,000
Construction Admin	$0	$20,000	$0	$0	$0	$20,000
Contingency	$5,000	$20,000	$0	$0	$0	$25,000
TOTAL	**$75,000**	**$325,000**	**$0**	**$0**	**$0**	**$400,000**

Current Status: Not yet started, RFQ to be released in FY23

272-60 Filter 1, 3, 4 and 5 Influent Valve Shaft and Actuator Replacements

Description/Background:

The influent valve shafts and actuators in the filter building at the WTP are approaching their end of their useful life. Filter 2 influent valve shaft and actuator were replaced in 2021 due to visible corrosion but the remaining first four filters are also in need of replacement due to expected similar conditions and age.

WTP Operations staff is expected to complete a filter assessment in winter 2022 to best inform replacement and rehabilitation decisions. Following that assessment funding is included in FY 2024 to complete the influent valve shaft and actuator replacements.

Benefits: replaces or extends useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$60,000	$0	$0	$0	$60,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$3,000	$0	$0	$0	$3,000
TOTAL	**$0**	**$63,000**	**$0**	**$0**	**$0**	**$63,000**

Current Status: Not yet started

272-61 WTP Concrete, Joint Sealing and Tile Repair

Description/Background:

The WTP was originally built in 1948 and has experienced several upgrades to date, however many of the concrete structures at the WTP are beginning to exhibit spalling, seepage and crumbling. Additionally, tile and joints within the oldest part of the plant (Filter 1-5 gallery) are needing assessment for future repairs.

This project includes funding for a structural engineering investigation/assessment and coatings analysis in FY 2025 to assess the next steps and locations for more detailed design for rehabilitation and replacement.

Benefits: replaces or extends useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$65,000	$0	$0	$65,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$5,000	$0	$0	$5,000
TOTAL	**$0**	**$0**	**$70,000**	**$0**	**$0**	**$70,000**

Current Status: Not yet started

Category 273: Drinking Water Pumping

Background

I-40 Booster Pump Station

Following treatment at the Water Treatment Plant (WTP), drinking water must be pumped into OWASA's distribution system for delivery to and use by our customers. The WTP is located at an elevation of 470 feet above mean sea level (MSL); however, many parts of our service area are located at higher elevations. To maintain adequate water pressure throughout the service area, drinking water must be pumped up into elevated storage tanks, where it then flows by gravity to our customers. The topography of our service area varies widely; therefore, we have divided our distribution system into areas of similar elevation and therefore pressures. These areas are called "pressure zones." Most of the distribution system is in the 642-foot pressure zone (the maximum water storage level in elevated tanks is set at 642 feet MSL). The north-central and northwestern portions of OWASA's distribution system are in the 740-foot pressure zone (the maximum storage level in elevated tanks is set at 740 feet MSL).

The pumping capacity needed for water distribution is based on peak daily and hourly demands, plus requirements for fire protection. In order to provide uninterrupted service during equipment outages, pumps are sized and configured to satisfy maximum demands with the largest pump at each particular location out of service.

To ensure the reliability of drinking water service to the community, OWASA maintains water system interconnections with the City of Durham, the Town of Hillsborough, and the Chatham County water systems. We have booster pump stations at several of our interconnections to ensure adequate flow and pressure during periods of water transfers.

(Please note that this section of the CIP does not address the drinking water pumps located at the WTP, which are discussed in Category 272.)

Existing Facilities

OWASA's pump station at the base of the 740-foot zone elevated tank on Nunn Mountain contains two pumps rated at 3 million gallons per day (MGD) to transfer water from the 642-foot pressure zone ground level storage tank on Nunn Mountain up to the adjacent 740-foot pressure zone elevated tank.

A drinking water booster pump station was added in 1987 to the 16-inch water main along Old NC 86 at the intersection of Old Fayetteville Road and Hillsborough Road south of Calvander.

In FY 2003, OWASA completed a hydraulic study that evaluated the existing and potential capability to transfer drinking water from the City of Durham to OWASA through the two existing interconnections with the Durham system. Transfers of drinking water may occur either under planned or emergency conditions, when OWASA supply, treatment, and/or distribution facilities cannot meet drinking water demands within

the service area.

In accordance with the study recommendations, OWASA replaced the existing booster pump station at Old Chapel Hill Road and I-40; removed the Cooper Street and Ephesus Church Road pump stations in FY 2008; and installed a new 16-inch diameter water transmission line along Old Durham Road. Together, these improvements have resulted in an increased transfer capacity from approximately 3.5 MGD to approximately 6 MGD. In May 2021, OWASA participated with Durham in a coordinated full-scale field test to confirm the two-way water transfer capacities of the existing I-40 OWASA-Durham interconnection.

The second pump station is located along NC Highway 54 at Finley Golf Course Road (see Planned Improvements below).

Detailed hydraulic studies of the 740-foot and 642-foot pressure zones were completed in FY 2006 and FY 2011. FY 2006 study results were incorporated into the FY 2011 study, which provided a calibrated system-wide hydraulic model. The FY 2011 study confirmed that upgrades would be needed at the Calvander Pump Station by FY 2021 to meet projected future water demands in the 740-foot pressure zone.

A subsequent study and modeling effort identified system improvements needed to enable us to temporarily take the Nunn Mountain ground and elevated storage tanks off-line for maintenance. In accordance with the study recommendations, improvements to the Calvander Pump Station were completed in FY 2014. That project satisfied the Nunn Mountain tank's maintenance needs and the hydraulic needs identified in the FY 2011 study. No other capital improvements to the drinking water pumping system were identified by the study.

Planned Improvements

A 2002 interconnection capacity study recommended the installation of a new booster pump station at Barbee Chapel Road to replace the station at NC Highway 54 and Finley Golf Course Road, as well as accompanying transmission line improvements along Stancell Drive. Those improvements are expected to increase the total drinking water transfer capacity from Durham to OWASA to approximately 8.5 MGD, but they are not currently planned within the 5-year CIP. A current project is underway to update OWASA's hydraulic model to further inform the timing and capacity needs of a new NC Highway 54 pump station.

No funding is provided within Category 273, as the need, timing, and scope of the above project will be evaluated as part of the update to the distribution system hydraulic model (275-53).

Category 273: Drinking Water Pumping

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
273	**Category Total**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Category 274: Drinking Water Storage

Background

An essential component of the drinking water distribution system is the capacity to store drinking water to maintain adequate flows and pressure throughout the system during all demand conditions. By absorbing or "dampening" short-term variations in demand, drinking water storage provides important system-wide benefits, including:

- the ability to operate the water treatment plant (WTP) and pumping facilities at more stable and uniform rates. Among other benefits, this helps optimize facility operations and reduce energy costs;
- the ability to maintain adequate and uniform pressure throughout the system during periods of peak demand; and
- the availability of adequate emergency reserves for contingencies such as fire suppression, water treatment plant maintenance, or water main breaks.

Manning Drive Elevated Storage Tank

Drinking water storage facilities typically include clearwells, ground level tanks, and elevated tanks. Clearwells are usually located at a WTP and are sized to help maintain relatively constant production of treated water and to provide sufficient contact time for disinfection. Ground storage tanks are built at ground level, oftentimes at higher elevations than the surrounding service area. Elevated storage tanks are used when natural elevations are not high enough for ground storage to provide for gravity flow. Both types of storage help maintain stable flow and operating pressures throughout the distribution system.

State of North Carolina regulations require that the combined elevated and ground storage capacity meet at least 50 percent of the average annual daily demand of the service area. OWASA's existing drinking water storage facilities have a total capacity of 8 million gallons (MG). OWASA's system storage exceeds the State requirement, as average daily drinking water demand (finished water pumped to the distribution system) in fiscal year 2022 was only about 6.6 million gallons per day (MGD). The ongoing update to the distribution system hydraulic model will continue to evaluate storage requirements, particularly looking at improvements that could be made in the 740-foot pressure zone.

Existing Facilities

OWASA's existing facilities include the 1.5 MG underground clearwell at the WTP and five storage tanks located throughout the distribution system in Chapel Hill and Carrboro.

- An elevated tank on Manning Drive near the University of North Carolina (UNC) Hospitals provides 1 MG of storage capacity. This tank was built in 1957 with an overflow elevation of 642.5 feet MSL.
- An elevated tank built in 1976 and located off of Old Fayetteville Road south of Hillsborough Road near McDougle School in Carrboro provides 0.5 MG of storage at an elevation of 642 feet MSL.
- A 3 MG ground level tank with an overflow elevation of 642 feet above mean sea level (MSL) was

built in 1977 on OWASA's 27-acre tract at Nunn Mountain.

- A 0.5 MG elevated tank with an overflow of 740 feet MSL was built at the Nunn Mountain site in 1984, which enabled the establishment of the 740-foot pressure zone to improve water pressure in the northern portion of the service area.

- An elevated tank located on OWASA's 17-acre parcel near McCauley Street (Hilltop Tank) was built in 1998 and provides 1.5 MG of storage in the 642-foot pressure zone with an overflow elevation of 645 feet MSL.

This information is summarized in the following table:

Tanks	Size (MG)	Pressure Zone (ft)
1. Clearwell at Water Plant	1.5	-----
2. Nunn Mountain Ground Storage Tank	3.0	642
3. Nunn Mountain Elevated Tank	0.5	740
4. Carrboro Elevated Tank	0.5	642
5. Hilltop Elevated Tank	1.5	642
6. Manning Drive Tank	1.0	642
Total Storage	**8.0**	

Planned Improvements

Funding is included for upgrades to control systems at the Hilltop, Manning, and Carrboro storage tanks.

Category 274: Drinking Water Storage

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
274-14	Storage Tank Water Quality Monitors	$0	$0	$0	$0	**$ 100,000**	**$100,000**
274-15	Storage Tank PLC Upgrades	$100,000	$0	$0	$0	$0	**$100,000**
274	**Category Total**	**$100,000**	**$0**	**$0**	**$0**	**$0**	**$100,000**

274-14 Storage Tank Water Quality Monitors

Description/Background:

This project will provide real time, continuous water quality monitoring and incident detection at water storage tanks and will also help to optimize operations and support Partnership for Safe Water goals. Communication upgrades will also allow for additional site security improvements.

Funding is provided in FY 2027 for programming and installation of water quality monitors in conjunction with CIP 274-15.

Benefits: increases operational efficiency, reduces operational risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$90,000	$90,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$10,000	$10,000
TOTAL	**$0**	**$0**	**$0**	**$0**	**$100,000**	**$100,000**

Current Status: Not yet started

274-15 Storage Tank Controls Improvements

Description/Background:

The Hilltop, Manning, and Carrboro elevated water storage tanks currently utilize outdated and obsolete communications equipment. This project will install new Programmable Logic Controller (PLC) cabinets at each of these tank sites and convert to cellular communications for standardization and increased data transmission capacity. Funds are included in FY 2023 for these installations.

Benefits: replaces aging assets; increases operational efficiency

Funding:

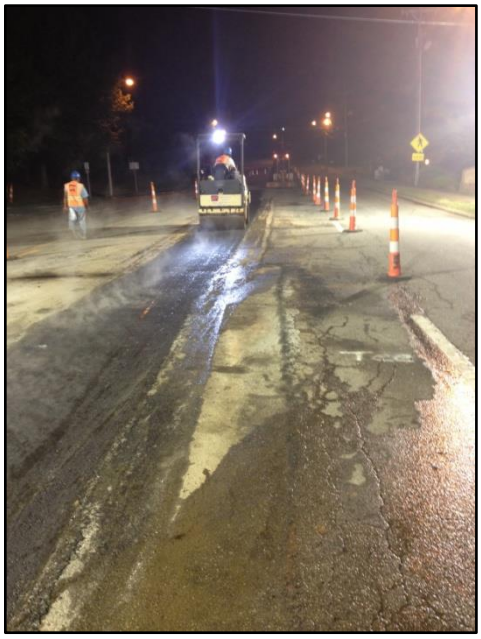
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$95,000	$0	$0	$0	$0	$95,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$5,000	$0	$0	$0	$0	$5,000
TOTAL	**$100,000**	**$0**	**$0**	**$0**	**$0**	**$100,000**

Current Status: Under contract with integrator

Category 275: Drinking Water Transmission and Distribution

Background

The drinking water transmission and distribution system is designed to deliver an adequate volume of high-quality water at sufficient pressures to meet all demands of the service area, including adequate flows for fire protection.



Paving over the water main installation at night in South Estes Drive

Existing Facilities

OWASA's drinking water is distributed through approximately 384 miles of water mains and lines ranging from 2 to 24 inches in diameter. Various pipe materials have been used over the years, including cast-iron (CI), ductile iron (DI), polyvinyl chloride (PVC), galvanized steel, copper, and asbestos-cement (AC). The distribution system also includes about 2,300 fire hydrants and over 13,300 valves.

Since beginning operations in 1977, OWASA has utilized a systematic replacement program for aging water distribution mains. Under this program, projects are identified or triggered by the following conditions:

- where existing pipe conditions impair water quality;
- where there are serious risks to water service reliability;
- where the costs of repairing pipes and leaks have become excessive;
- where line breaks may result in major damage; and
- where capacity is no longer adequate.

OWASA catalogs the risk conditions listed above using the following three sources: a system hydraulic model, a risk-based pipe prioritization model:

- In 2011, a hydraulic model of the water distribution system was developed as an update to the existing model, to identify and prioritize any areas of capacity and/or pressure concerns that need to be addressed in OWASA's water system through 2030. It determined that OWASA's distribution system has relatively few hydraulic deficiencies, and that near-term investment requirements are not significant.

- In 2020, as part of a comprehensive Distribution System Management Plan Update, OWASA updated its detailed distribution system prioritization model, which systematically evaluates and prioritizes water mains for replacement. This model relies on a statistical analysis of historical breaks to define pipe deterioration drivers for water main failures and determine potential failure patterns. The detailed understanding of failure patterns was combined with criteria regarding

the consequence of specific main failures to develop the risk prioritization framework to guide decisions on replacement projects

Recent Improvements

An average of 1.8 miles per year of new or replacement water mains have been installed over the past 10 years. This total does not include new or replacement water mains installed as “system development” projects. (System development projects are those that are not paid for and completed by OWASA or its contractors.)

Planned Improvements

The CIP includes $35.3 million within this category for improvements to increase the reliability of the water system and to ensure a sufficient water supply at adequate pressure to areas undergoing development. This total is nearly one-third of the entire five-year CIP funding, and reflects a continued emphasis on addressing this asset class.

OWASA continues to seek opportunities to work with the North Carolina Department of Transportation (NCDOT), the Town of Chapel Hill, and the Town of Carrboro to replace water mains in conjunction with roadway construction and other planned public and private improvement projects. This approach funded under CIP 275-15 helps minimize disturbances in local neighborhoods and reduces project costs through economies of scale.

OWASA crews and private contractors will replace over 12 miles of aging water mains (slightly over 3% of the system) in the five-year period through the projects funded in this category, including some notable projects at West Rosemary Street (275-95), Legion Road (275-94), West Cameron Avenue (275-52), South Road and Manning Drive West (both part of 275-96), Oakwood-Rogerson Drive neighborhood (275-21) and Scarlett-Copper neighborhood (275-20).

The update to the Distribution System Hydraulic Model (275-53), in conjunction with updated projections of future demand conditions as part of the Long Range Water Supply Plan , will identify any recommended improvements to improve hydraulic conditions within the system in the coming years.

Category 275: Drinking Water Transmission and Distribution

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
275-01	Lead and Copper Rule Revisions Compliance	$200,000	$100,000	$0	$0	$0	**$300,000**
275-15	Reimbursement for Distribution System Improvements	$250,000	$0	$0	$0	$0	**$250,000**
275-20	Water Distribution System Rehabilitation	$1,000,000	$1,750,000	$2,664,000	$2,229,000	$2,678,000	**$10,321,000**
275-21	Water Main Replacement Program FY 2018-2023	$1,215,000	$1,100,000	$0	$0	$0	**$2,315,000**
275-52	West Cameron Avenue Water Main Replacement	$3,500,000	$500,000	$0	$0	$0	**$4,000,000**
275-53	Distribution System Hydraulic Model	$100,000	$200,000	$30,000	$30,000	$30,000	**$390,000**
275-92	Jones Ferry Rd Water Main Replacements	$100,000	$0	$0	$0	$0	**$100,000**
275-94	Legion Road Water Main	$50,000	$210,000	$3,460,000	$0	$0	**$3,720,000**
275-95	West Rosemary Water Main Replacement	$50,000	$300,000	$4,330,000	$520,000	$0	**$5,200,000**
275-96	Water Main Replacements - Group II	$50,000	$250,000	$1,745,000	$3,960,000	$0	**$6,005,000**
275-97	Polk Place Water Main Replacement	$0	$0	$10,000	$140,000	$1,320,000	**$1,470,000**
275-98	Fordham at Eastowne Water Main Replacement	$0	$0	$125,000	$850,000	$0	**$975,000**
275-99	Distribution System Condition Assessment Program	$30,000	$30,000	$30,000	$30,000	$30,000	**$150,000**
275-03	South Elliot Road Water Main Replacement	$0	$0	$0	$0	$55,000	**$55,000**
275	**Category Total**	**$6,545,000**	**$4,440,000**	**$12,394,000**	**$7,759,000**	**$4,113,000**	**$35,251,000**

275-01 Lead and Copper Rule Revisions Compliance

Description/Background:

On December 16, 2021, the Environmental Protection Agency (EPA) announced next steps to strengthen the regulatory frame work on lead and copper in drinking water through the Lead and Copper Rule Revisions (LCRR).

This project provides funding for the initial phases of LCRR compliance through development of the material service line inventory, development of lead service line replacement plans and public education and outreach, among other tasks. Funding is planned for FY 2023 through FY 2024 to meet the compliance deadline. Additional funding may be required in the future for ongoing work for regulatory compliance.

Benefits: replaces aging assets; increases operational reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$180,000	$90,000	$0	$0	$0	$270,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$20,000	$10,000	$0	$0	$0	$30,000
TOTAL	$200,000	$100,000	$0	$0	$0	$300,000

Current Status: Under contract

275-15 Reimbursement for Distribution System Improvements

Description/Background:

Funds are allocated in this project to reimburse other entities (NCDOT, Town of Chapel Hill, Town of Carrboro, private developers) for constructing improvements to the distribution system at OWASA's request in conjunction with external projects. The improvements consist of upgrading pipe materials, increasing the water main size, extending the limits of replacement, etc. above and beyond the requirements of the external project. Installation is accomplished through construction by the other party, and OWASA reimburses the incremental cost per the terms of negotiated agreements. Many of the agreements listed are still being negotiated, and the anticipated scope and timing of funds is based on information available at time of budget development.

Anticipated project funding:

Location	Project Owner	System Improvements
Old Durham Road	NCDOT	Water main installation and upsizing
Elliott Road Extension	Town of Chapel Hill	Water main and sewer main installations and upsizing
Amity Court and Andrews Court	Developer	Water main and meter box replacements

Benefits: replaces aging assets; increases operational reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$250,000	$0	$0	$0	$0	$250,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$0	$0
TOTAL	$250,000	$0	$0	$0	$0	$250,000

Current Status: Under construction

275-20 Water Distribution System Rehabilitation

Description/Background:

This line item consists of ongoing water main, isolation valve, and meter vault replacement projects, as well as long term funding for distribution system recapitalization purposes. The majority of CIP 275-20 is being completed by OWASA's own construction crew and is composed of the following three elements:

1. **Water main replacements**: Most of the funding in FY 2023 through FY 2027 for this project line is dedicated to the replacement of aging water mains by OWASA construction crews. These mains were identified for replacement through the consideration of their consequence and likelihood of failure as determined through the Water Main Prioritization Model. Streets identified for FY 2023 water main replacement projects include: Colony Woods Road, White Plains Road, Clover Lane, Lark Court, Heather Court, Meadowbrook Drive, Scarlett Drive, Cooper Street, and portions of Oakwood Drive.

2. **Water isolation valve installations:** The Water Main Prioritization Model update, completed in FY 2020, identified several opportunities throughout the distribution system where installation of isolation valves would be of particular benefit. FY 2025 includes funding for the installation of isolation valves in locations at North Greensboro Street and Boundary Street; installation will be completed by OWASA construction crews.

3. **Large meter vault installations:** Funding is provided in FY 2025 for the replacement of deteriorating vaults for large meters in several locations, including Estes Park Apartments, and Royal Park Apartments.

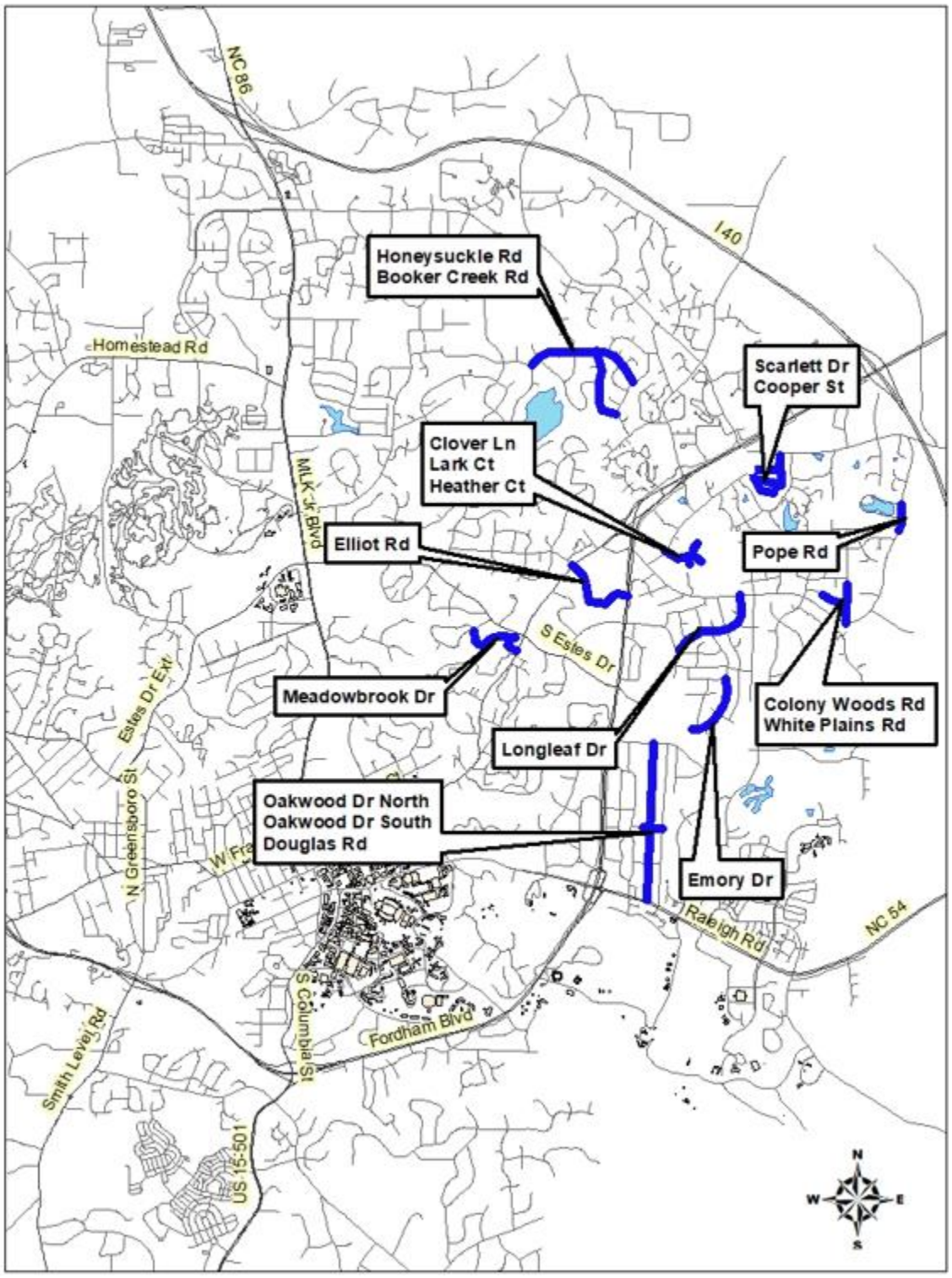
Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$90,000	$100,000	$250,000	$100,000	$150,000	$690,000
Construction	$730,000	$1,400,000	$2,014,000	$1,800,000	$2,180,000	$8,124,000
Inspection	$50,000	$70,000	$100,000	$100,000	$85,000	$400,000
Construction Admin	$50,000	$70,000	$100,000	$100,000	$85,000	$400,000
Contingency	$80,000	$110,000	$200,000	$129,000	$200,000	$707,000
TOTAL	**$1,000,000**	**$1,750,000**	**$2,664,000**	**$2,229,000**	**$2,678,000**	**$10,320,000**

Current Status: Under Construction

275-20 Water Main Replacement Projects – FY 2023-2027



275-21 Water Main Replacement Program FY 2018-2023

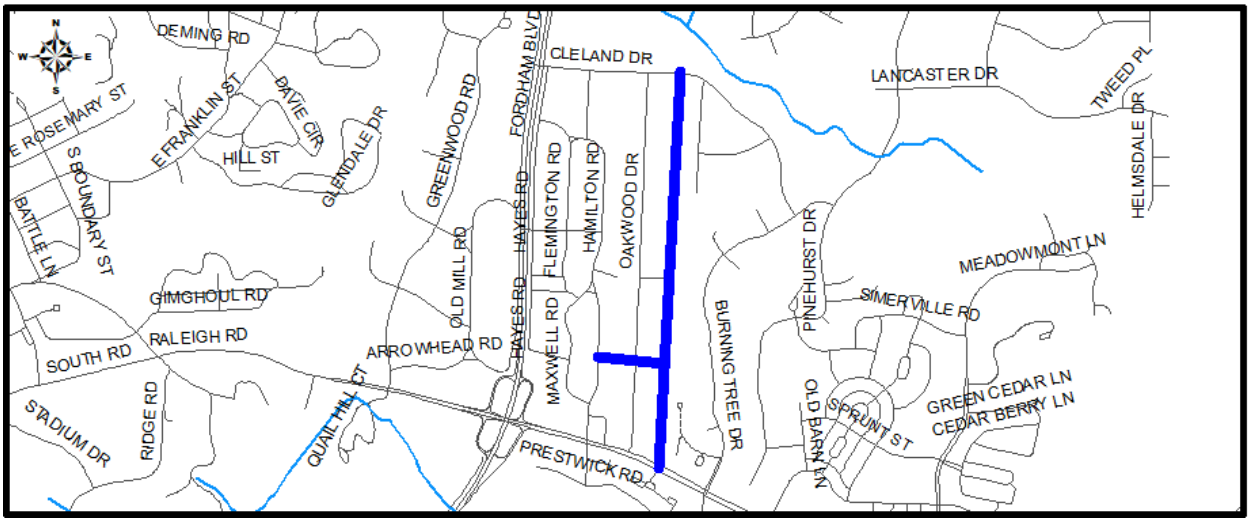
Description/Background:

This program is composed of water main replacements in critical locations as identified by either the Distribution System Prioritization Model or staff input. This multi-year program represents 5.5 miles of water main replacement at nine locations; the majority of the design and construction for this program is complete with the exception of the Rogerson-Berkley water mains shown below (note that other mains in this neighborhood are being replaced by OWASA construction crews as part of CIP 275-20; see map, previous page). The program was initiated early in FY 2018.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	0
Construction	$1,000,000	$950,000	$0	$0	$0	$2,000,000
Inspection	$60,000	$60,000	$0	$0	$0	$130,000
Construction Admin	$60,000	$60,000	$0	$0	$0	$130,000
Contingency	$20,000	$30,000	$0	$0	$0	$55,000
TOTAL	**$1,215,000**	**$1,100,000**	**$0**	**$0**	**$0**	**$2,315,000**



Current Status: Construction under contract but not yet started

275-52 West Cameron Avenue Water Main Replacement

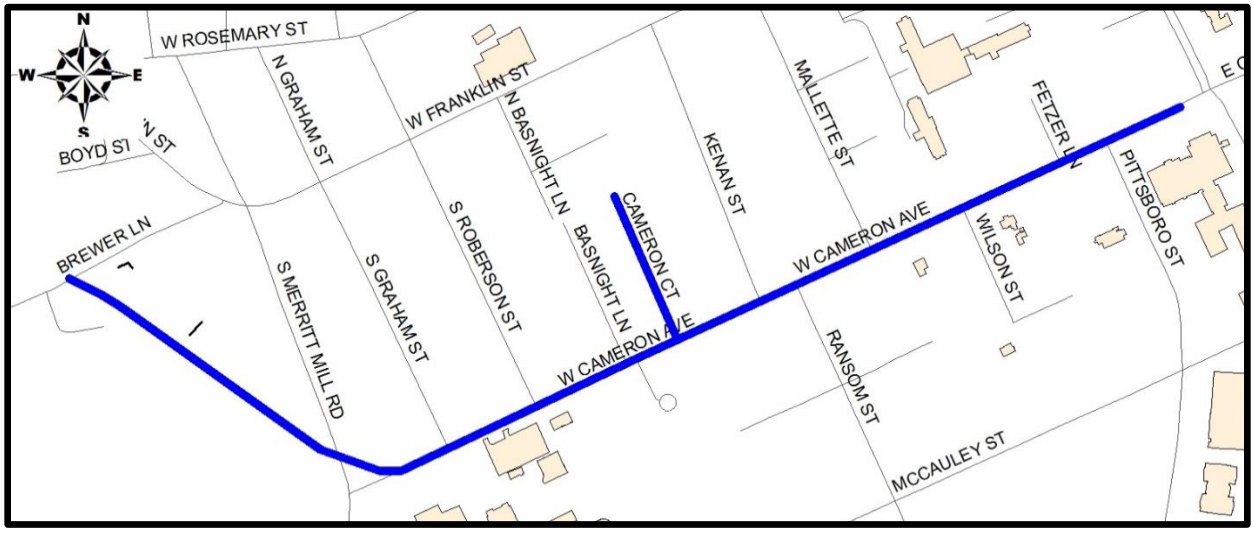
Description/Background:

This project includes replacement, rehabilitation, or abandonment of several mains within the West Cameron Avenue corridor in Chapel Hill and Carrboro, as indicated by the Distribution System Prioritization Model. The project includes the rehabilitation or replacement of approximately 3,000 LF of existing 12-inch asbestos cement pipe along Cameron Avenue from South Columbia Street to Merritt Mill Road. The project also includes the abandonment of approximately 1,100 LF of existing 12-inch asbestos cement pipe along the railroad tracks between Merrit Mill Road and Brewer Lane. A portion of the work within and near South Columbia Street was accelerated for completion in Summer 2020. Design of the remainder of the project was completed in FY 2021 and construction started in FY 2022.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$2,900,000	$410,000	$0	$0	$0	$3,460,000
Inspection	$74,500	$30,000	$0	$0	$0	$115,000
Construction Admin	$74,500	$30,000	$0	$0	$0	$115,000
Contingency	$200,000	$30,000	$0	$0	$0	$310,000
TOTAL	**$3,500,000**	**$500,000**	**$0**	**$0**	**$0**	**$4,000,000**



Current Status: Under Construction

275-53 Distribution System Hydraulic Model

Description/Background:

Water distribution system hydraulic models are used to simulate current and projected future conditions in the system in order to plan and design pumps, pipes, and storage tanks. OWASA first developed a water distribution system model in 1982. The model was a “skeletonized” model including only 12-inch diameter and larger transmission pipes and key 8-inch diameter pipes in addition to pumping and storage facilities. The model was updated in 1992 and again in 2000 as part of the Comprehensive Water and Sewer Master Plan. OWASA began developing an “all pipes” distribution system model as part of the Unidirectional Flushing project completed in 2004. That project combined OWASA’s GIS and the hydraulic model so that all of the water pipes are represented in the model. The full pipe model was calibrated under current water demand conditions in 2006 and long-range water demand projections were added to the 740-pressure zone. In FY 2011, long-range water demand projections were added for the 642-foot pressure zone.

- Placeholder funding is included in FY 2023 through FY 2027 for on call hydraulic modeling of the distribution system
- Funding in FY 2023 and FY 2024 supports the development and calibration of a full pipe model to account for pipes replaced or added to the system, changed demand conditions and demand projections from the Long-Range Water Supply Plan. Additionally, placeholder funds are included each fiscal year for modeling simulations that may be required to support capital projects.

This hydraulic modeling effort will also revisit the desirability, conceptual alternatives, cost and timing of any potential improvements to the distribution system interconnection with the City of Durham’s distribution system along the Highway 54 corridor near Barbee Chapel Road.. Additionally, the hydraulic modeling effort will also include a re-evaluation of the unidirectional flushing program.

Benefits: determines asset risk; identifies future capital investments

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$95,000	$190,000	$30,000	$30,000	$30,000	$375,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$5,000	$10,000	$0	$0	$0	$15,000
TOTAL	**$100,000**	**$200,000**	**$30,000**	**$30,000**	**$30,000**	**$390,000**

Current Status: Consultant selected, in scoping

275-92 Jones Ferry Road Water Main Improvements

Description/Background:

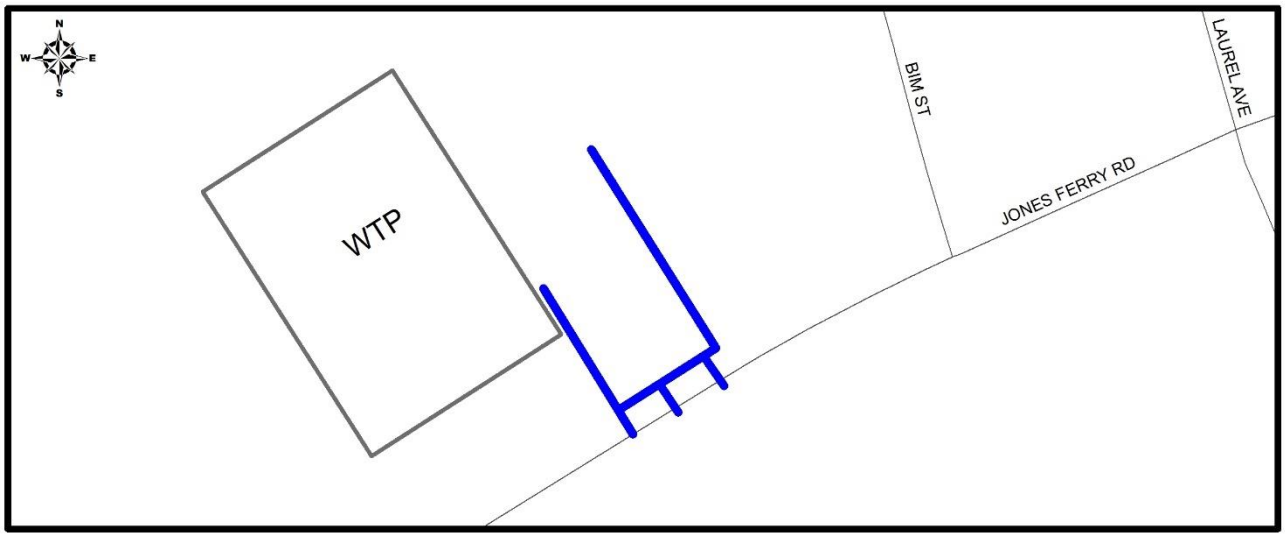
This project began in FY 2019 in response to the November 2018 water emergency in order to address the risks associated with aging isolation valves and a complex piping network at and adjacent to the WTP, and to provide additional redundancy and resiliency for the distribution system in this area. A failure analysis completed in FY 2019 identified primary and secondary failure scenarios for a comprehensive portion of the distribution system immediately adjacent to the WTP clearwell and finished water pumps. Completion of project preliminary engineering in early FY 2020 refined the scope of the improvements, and design was completed in FY 2020.

Construction began in FY 2021 and is expected to be completed in FY 2023.

Benefits: reduces operational risk; replaces aging assets

Funding:

	FY 2023	FY 2023	FY 2024	FY 2025	FY 2026	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$80,000	$0	$0	$0	$0	$80,000
Inspection	$5,000	$0	$0	$0	$0	$5,000
Construction Admin	$5,000	$0	$0	$0	$0	$5,000
Contingency	$10,000	$0	$0	$0	$0	$10,000
TOTAL	**$100,000**	**$0**	**$0**	**$0**	**$0**	**$100,000**



Current Status: Under Construction

275-94 Legion Road Water Main Replacement

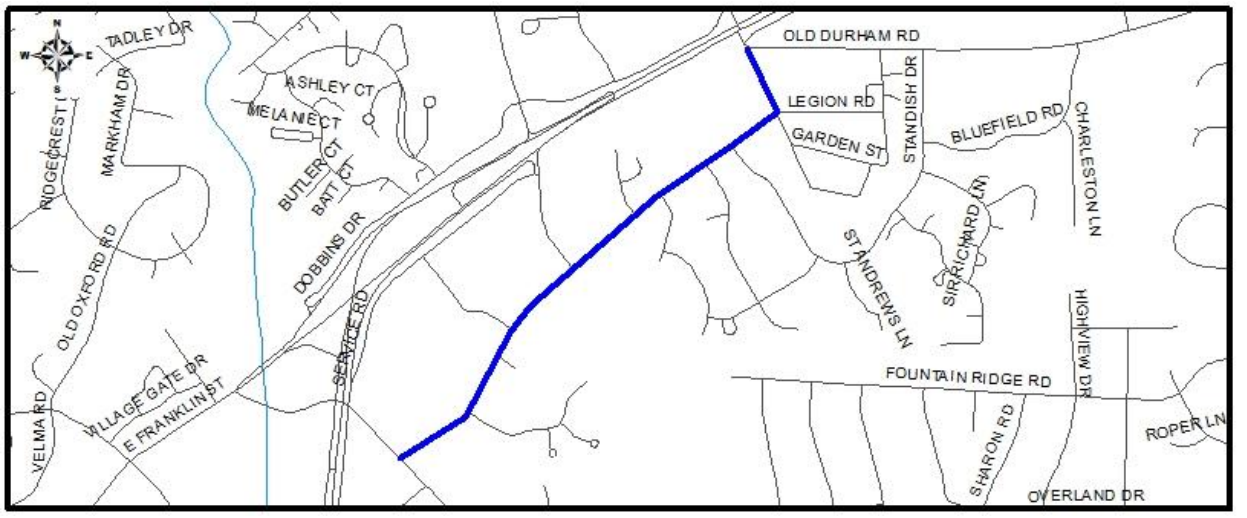
Description/Background:

This project includes the replacement of existing 8-inch diameter asbestos cement water main with new 8-inch or 12-inch ductile iron for 4,240 feet along Legion Road from Scarlett Drive to Ephesus Church Road. The construction timing will be coordinated to avoid overlaps with certain adjacent development projects as well as water main replacements in the Scarlett-Cooper neighborhood (275-20). The project was identified by the Distribution System Prioritization Model. The majority of construction is expected to occur in FY 2025, in advance of roadway restoration of this corridor by the Town of Chapel Hill.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$10,000	$0	$0	$0	$0	$10,000
Design/Land	$30,000	$160,000		$0	$0	$190,000
Construction	$0	$30,000	$3,060,000	$0	$0	$3,090,000
Inspection	$0	$5,000	$150,000	$0	$0	$155,000
Construction Admin	$0	$5,000	$150,000	$0	$0	$155,000
Contingency	$10,000	$10,000	$100,000	$0	$0	$120,000
TOTAL	**$50,000**	**$210,000**	**$3,460,000**	**$0**	**$0**	**$3,720,000**



Current Status: Consultant Solicitation Underway

275-95 West Rosemary Street Water Main Replacement

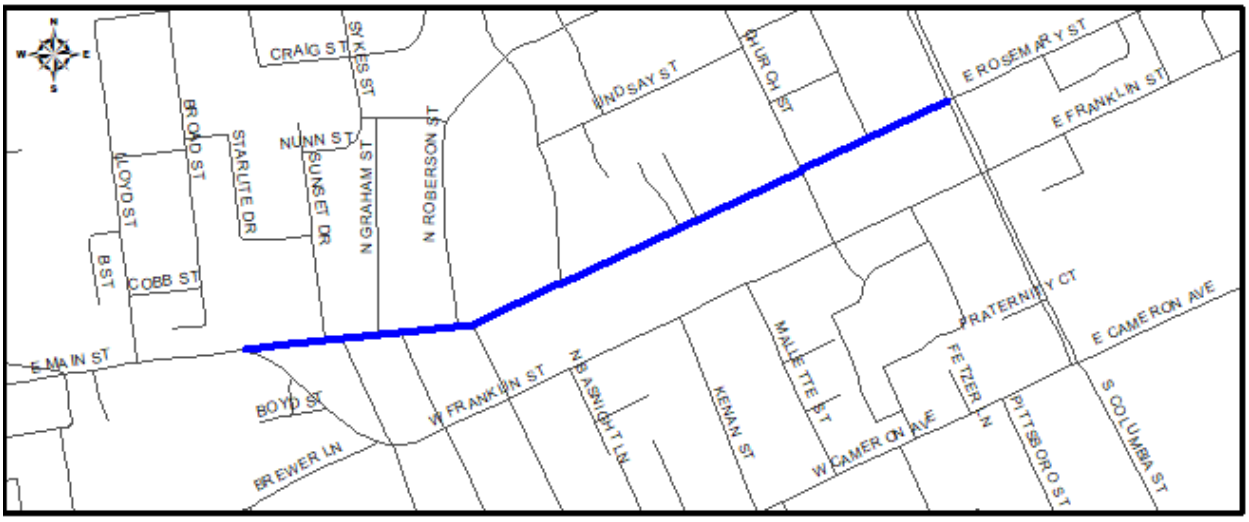
Description/Background:

This project includes the replacement of existing 12-inch diameter asbestos cement water main with new 12-inch ductile iron for 5,500 feet along West Rosemary Street from South Columbia Street to East Main Street. The project was identified by the Distribution System Prioritization Model. The majority of construction is expected to occur in FY 2025 and FY 2026.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$10,000	$0	$0	$0	$0	$10,000
Design/Land	$30,000	$250,000	$0	$0	$0	$280,000
Construction	$0	$30,000	$3,830,000	$450,000	$0	$4,310,000
Inspection	$0	$5,000	$100,000	$20,000	$0	$125,000
Construction Admin	$0	$5,000	$100,000	$20,000	$0	$125,000
Contingency	$10,000	$10,000	$300,000	$30,000	$0	$350,000
TOTAL	**$50,000**	**$300,000**	**$4,330,000**	**$520,000**	**$0**	**$5,200,000**



Current Status: Consultant Solicitation underway

275-96 Water Main Replacements – Group II

Description/Background:

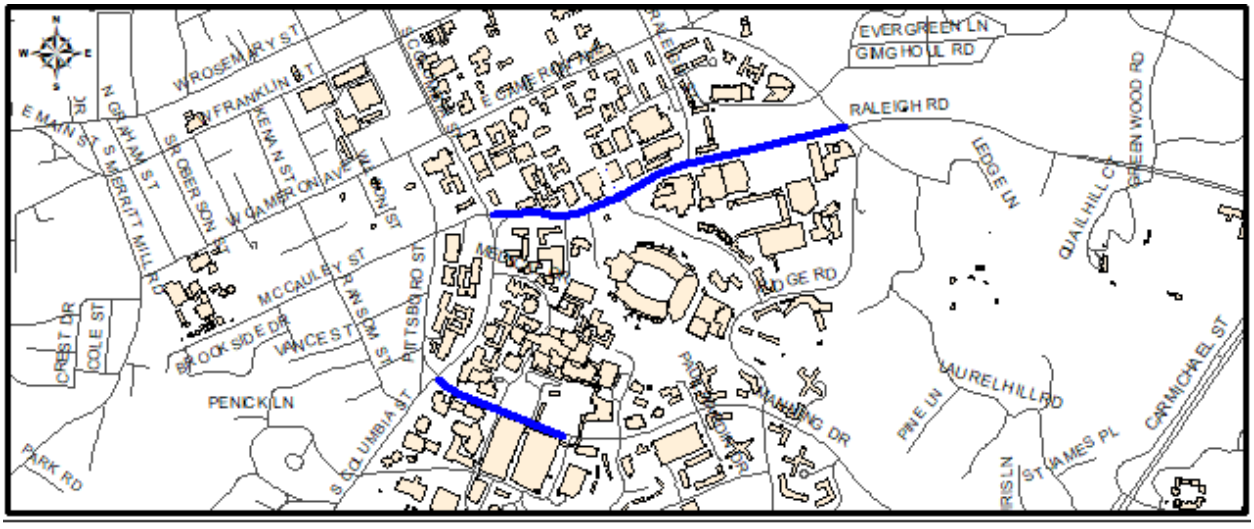
The first round of high priority water main replacements (Group I originally within CIP 275-21) was contracted in FY 2018 and is still underway with design and constrction activities. This project identifies two additional high priority water main replacement projects needed throughout the distribution system:

- The replacement of 3,240 feet of 12-inch asbestos cement water main in South Road from South Columbia Street to Country Club Road. This work is planned to start in FY 2024.
- The replacement of approximately 1,300 of 12-inch asbestos cement water main in Manning Drive from South Columbia Street to New East Drive. This work is planned to start in FY 2023.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$10,000	$20,000	$0	$0	$0	$30,000
Design/Land	$35,000	$220,000	$300,000	$0	$0	$555,000
Construction	$0	$0	$1,100,000	$3,460,000	$0	$4,485,000
Inspection	$0	$0	$80,000	$200,000	$0	$265,000
Construction Admin	$0	$0	$80,000	$200,000	$0	$265,000
Contingency	$5,000	$10,000	$100,000	$300,000	$0	$405,000
TOTAL	**$50,000**	**$250,000**	**$1,745,000**	**$3,960,000**	**$0**	**$6,005,000**



Current Status: Consultant RFQ Solicitation underway

275-97 Polk Place Water Main

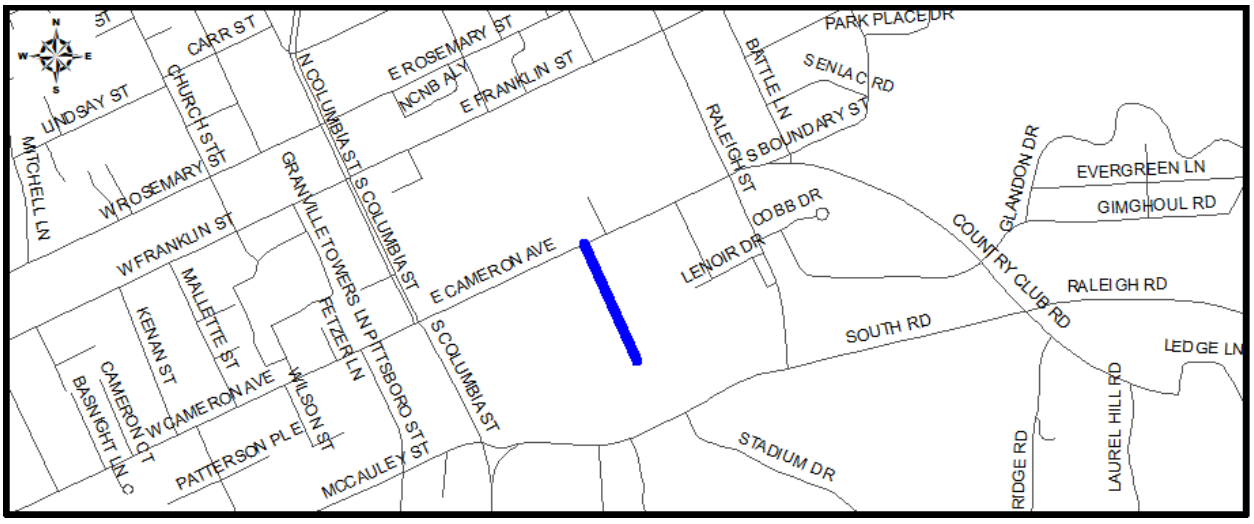
Description/Background:

This project includes the replacement of existing 12-inch diameter asbestos cement water main with new 12-inch ductile iron for 753 feet along Polk Place from East Cameron Avenue to Bingham Hall. The project was identified by the Distribution System Prioritization Model. Construction is currently programmed to occur in FY 2027.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$5,000	$0	$0	$5,000
Design/Land	$0	$0	$0	$130,000	$0	$130,000
Construction	$0	$0	$0	$0	$1,020,000	$1,020,000
Inspection	$0	$0	$0	$0	$90,000	$90,000
Construction Admin	$0	$0	$0	$0	$90,000	$90,000
Contingency	$0	$0	$5,000	$10,000	$120,000	$135,000
TOTAL	**$0**	**$0**	**$10,000**	**$140,000**	**$1,320,000**	**$1,470,000**



Current Status: Not yet started

275-98 Fordham at Eastowne

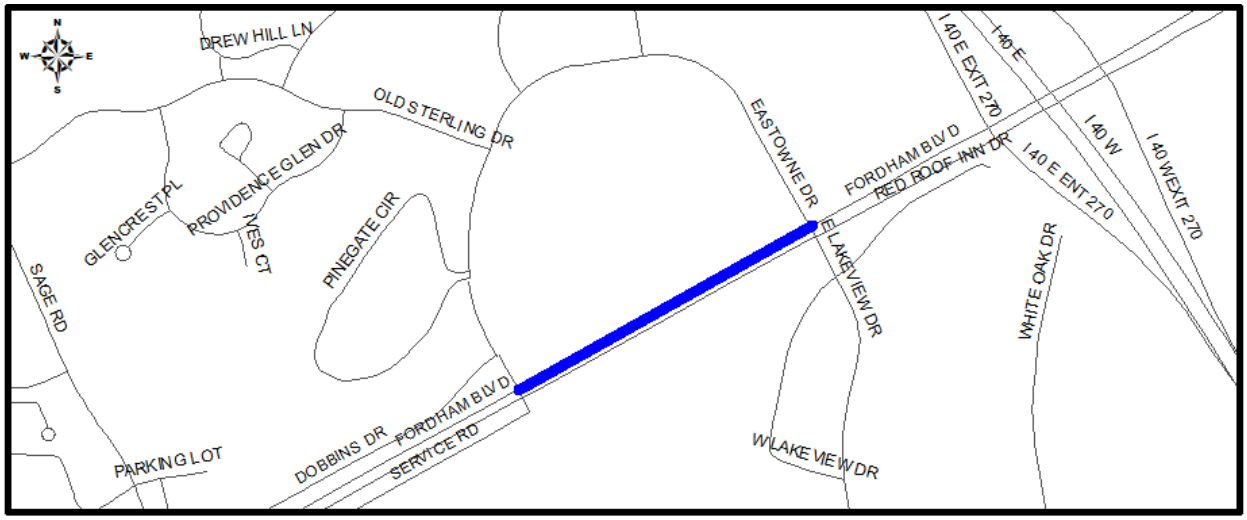
Description/Background:

This project includes the replacement of existing 12-inch diameter asbestos cement water main with new 16-inch ductile iron for 1,500 feet along Fordham Boulevard in between the two entrances to Eastowne Drive. The project was identified by the Distribution System Prioritization Model and would provide a redundant avenue to receive water from the City of Durham via the I-40 Booster Pump Station. Construction is expected to occur in FY 2026.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$35,000	$0	$0	$35,000
Design/Land	$0	$0	$85,000	$0	$0	$85,000
Construction	$0	$0	$0	$705,000	$0	$705,000
Inspection	$0	$0	$0	$50,000	$0	$50,000
Construction Admin	$0	$0	$0	$50,000	$0	$50,000
Contingency	$0	$0	$5,000	$45,000	$0	$50,000
TOTAL	**$0**	**$0**	**$125,000**	**$850,000**	**$0**	**$975,000**



Current Status: Not yet started

275-99 Distribution System Asset Management

Description/Background:

The Distribution System Management Plan provided a framework for the long-term incorporation of condition assessment activities for this asset class. Funding is provided for opportunistic assessment, leak detection and pressure monitors.

- **Opportunistic Condition Assessment** – When a water main is exposed for any reason (e.g. service tap, break, valve replacement, water main replacement), it provides a cost-effective opportunity to gather pipe samples and soil samples for assessment since roughly 90% of the cost of testing is in accessing the pipe.
- **Leak Detection and Pressure Monitoring Equipment** – Leak detection and pressure monitoring in the distribution system can offer advanced warning about breaks as well as allow us to locate leaks and breaks faster and provide overall insight into the health of the underground infrastructure. Remote pressure monitors are expected to be deployed in FY 2023 as part of this program.

Additional elements of the recommended condition assessment program may be added in future years as technology developments, pricing, and budget constraints allow.

Benefits: determines asset risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$25,000	$25,000	$25,000	$25,000	$25,000	$125,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
TOTAL	**$30,000**	**$30,000**	**$30,000**	**$30,000**	**$30,000**	**$150,000**

Current Status: Procurement of smart hydrant technology, continuation of opportunistic condition assessment

275-03 South Elliot Road Water Main Replacement

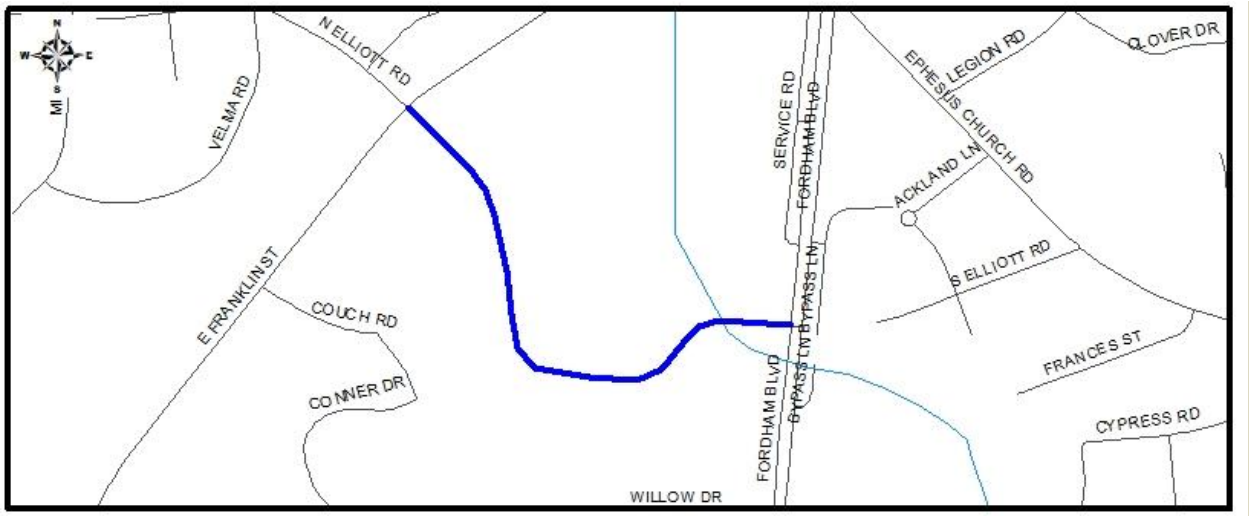
Description/Background:

This project includes the replacement of existing 8-inch diameter asbestos cement water main with new 8-inch ductile iron for 1,550 feet along South Elliot Road from East Franklin Street to Fordham Boulevard. The project was identified by the Distribution System Prioritization Model.

Benefits: replaces aging assets; improves service reliability

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$40,000	$40,000
Design/Land	$0	$0	$0	$0	$10,000	$10,000
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$5,000	$5,000
TOTAL	**$0**	**$0**	**$0**	**$0**	**$55,000**	**$55,000**



Current Status: Not yet started

Category 276: Wastewater Collection Lines

Background

The wastewater (sewer) collection system represents a significant portion of the total investment in OWASA's wastewater infrastructure. Particular care is given to the materials and techniques of collection line construction as well as planning and design to accommodate long-term needs within the service area. OWASA carefully reviews plans for new development, enforces detailed standards and specifications, and inspects the construction of all new collection system components.

Morgan Creek Aerial Crossing with Pedestrian Barricades

Existing Facilities

The collection system serving Chapel Hill and Carrboro includes approximately 336 miles of pipe ranging in size from 6- to 60-inches in diameter, of which more than 80% is 8-inch diameter pipe. Ductile iron and vitrified clay represent more than 90% of pipe material by length, however the collection system also contains pipe materials such as reinforced concrete, cast iron, polyvinyl chloride (PVC), cured-in-place pipe (CIPP), and various other materials. The collection system also includes about 11,000 manholes and is configured in a network that generally provides gravity flow to the Wastewater Treatment Plant (WWTP) through four drainage basins: Bolin Creek, Booker Creek, Little Creek, and Morgan Creek. Flow from the Booker Creek, Little Creek, and Bolin Creek basins is conveyed to the Rogerson Drive Pump Station and pumped to the WWTP. Flow from the Morgan Creek basin is conveyed to the Morgan Creek Pump Station (located at the WWTP) and pumped to the plant headworks. The largest gravity line is a 60-inch diameter interceptor flowing into the Morgan Creek Pump Station. (An interceptor is a large collection line that receives wastewater from smaller collection lines throughout the drainage basin.)

Recent Improvements

OWASA completed a collection system master planning study in 2020 which identified and prioritized sewer system rehabilitation and replacement needs. The study included the development of a calibrated hydraulic model of the interceptors and critical collector pipes in the system, utilizing temporary flow monitors throughout the system, establishment of a revised design storm, and wastewater demand projections in alignment with the Long-Range Water Supply Plan Update projections. The study's recommendations were the basis for most of the projects shown in the FY 2023 – 2027 CIP for this asset class.

A preliminary condition assessment (done as part of a FY 2011 planning study) assigned priority rankings to all sewer mains for ongoing field-based condition evaluation. Field-based evaluations are being performed on targeted sewer mains (in priority order) to determine whether rehabilitation or replacement is warranted.

Planned Improvements

The CIP includes slightly over $16 million in planned improvements for this category. Projects are grouped into three general categories:

- Improvements to repair deteriorated pipe and reduce sources of stormwater inflow and groundwater infiltration; for various high-priority locations throughout the service area, funding is included in the Gravity Sewer Rehabilitation Program (276-18). OWASA typically repairs existing, deteriorated lines by installing cured-in-place pipe (CIPP) liners or replacing individual segments between manholes. The combination of manhole rehabilitation and CIPP installation is an ongoing program at OWASA intended to reduce peak flows at the WWTP associated with stormwater infiltration into the collection system. Reducing inflow and infiltration, we reduce the energy required to pump and treat this water.
- Improvements needed to accommodate present flows; and
- Improvements to OWASA's "backbone" infrastructure as necessary to accommodate future flows resulting from anticipated growth. Notable capacity projects in the five-year CIP include Bolin Creek Interceptor at Pathway Drive (276-60), Morgan Creek Interceptor at Bartram Drive (276-59), and the Bolinwood Drive Interceptor (276-45).

Other notable projects in the five-year plan include upgrades to stream crossings to improve vehicular access for the operation and maintenance of our sanitary sewer interceptors (276-53) and improvements to the Rocky Branch interceptor to accommodate expected increases in process water discharge from the WTP (276-52).

Category 276: Wastewater Collection Lines

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
276-18	Gravity Sewer Rehabilitation Program	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$5,000,000**
276-45	Bolinwood Interceptor Replacement	$2,240,000	$1,000,000	$0	$0	$0	**$3,240,000**
276-52	Rocky Branch Interceptor Replacement	$0	$0	$750,000	$350,000	$0	**$1,100,000**
276-53	Creek Crossing Access Improvements	$0	$0	$600,000	$0	$0	**$600,000**
276-59	Morgan Creek Interceptor Replacement (at Bartram Drive)	$234,000	$1,615,000	$0	$0	$0	**$1,849,000**
276-60	Bolin Creek Interceptor (at Pathway Drive)	$0	$25,000	$50,000	$400,000	$0	**$475,000**
276-61	Brigham Rd Interceptor Replacement	$0	$0	$0	$50,000	$400,000	**$450,000**
276-63	East Main Street Sewer Rehabilitation	$1,000,000	$0	$0	$0	$0	**$1,000,000**
276-70	Collection System On-Call Modeling	$20,000	$20,000	$20,000	$20,000	$20,000	**$100,000**
276-99	Collection System Asset Management	$50,000	$40,000	$50,000	$50,000	$50,000	**$240,000**
276-02	Gravity Sewer Larger then 12" Evaluation Surveys	$0	$250,000	$0	$0	$0	**$250,000**
276-05	Morgan Creek Aerial Crossings Assessment	$0	$150,000	$0	$0	$0	**$150,000**
276-06	Westwood Neighborhood Sewer Replacement	$0	$100,000	$300,000	$1,700,000	$0	**$2,100,000**
276-07	Siphon Line Condition Assessment	$0	$50,000	$0	$0	$0	**$50,000**
276	**Category Total**	**$4,544,000**	**$4,250,000**	**$2,770,000**	**$3,570,000**	**$1,470,000**	**$16,604,000**

276-18 Gravity Sewer Rehabilitation

Description/Background:

OWASA rehabilitates and repairs the wastewater collection system in order to maintain the integrity and reliability of the system and to reduce stormwater inflow and groundwater infiltration. These rehabilitation projects may include emergency sewer replacements or the correction of defective manholes and laterals, as well as rehabilitation of sewer mains and manholes shown to be warranted through inspections. Sewer rehabilitation and replacement design, construction, and inspection services may be performed by OWASA staff or by consultants and contractors.

Funding is provided in FY 2023 through FY 2027 for the rehabilitation of approximately 7.5 miles of sewer mains that were identified through prior inspections and current projects.

Benefits: reduces inflow and infiltration into collection system; maintains permit compliance through reduction of sanitary sewer overflows; replaces aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
Construction	$850,000	$850,000	$850,000	$850,000	$850,000	$4,250,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
TOTAL	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$5,000,000**

Current Status: Under construction, additional services and construction to be solicited in FY 2023

276-45 Bolinwood Interceptor Replacement

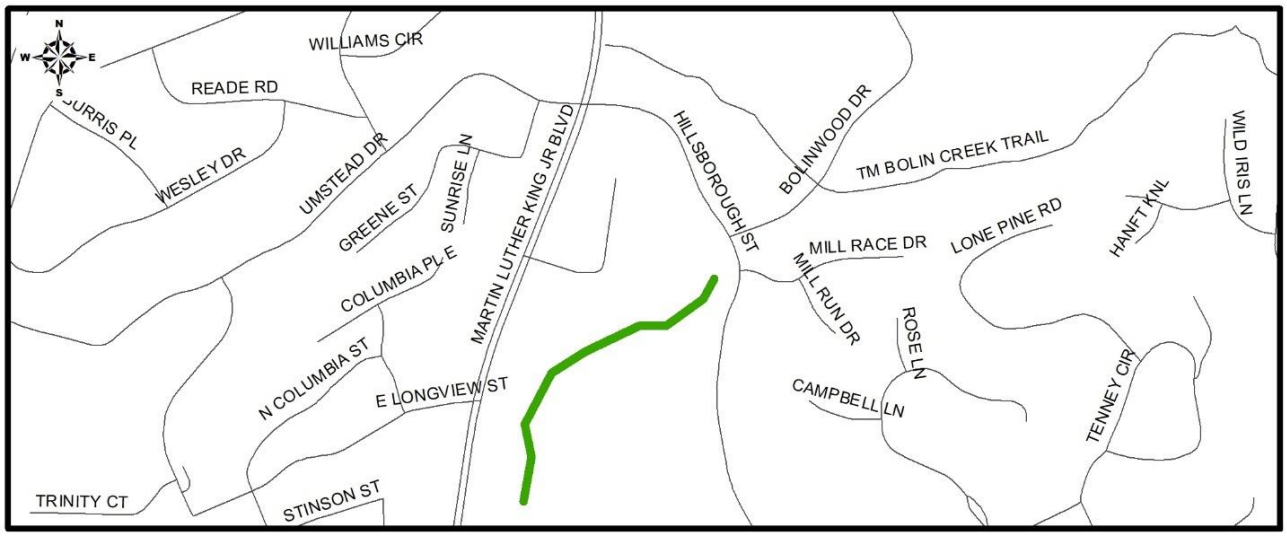
Description/Background:

This project will address surcharging issues along a portion of the Bolinwood Drive Interceptor from north of Hillsborough Street and Mill Run Drive to the Mill Creek Apartments. The need for the project was initially identified as a result of flow monitoring conducted during the Sanitary Sewer Service Area Study completed in 2011. Preliminary engineering was completed in FY 2018. Design was completed in FY 2021.Funds are provided in FY 2023 and FY 2024 for construction.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$1,810,000	$825,000	$0	$0	$0	$2,635,000
Inspection	$90,000	$40,000	$0	$0	$0	$130,000
Construction Admin	$90,000	$40,000	$0	$0	$0	$130,000
Contingency	$250,000	$95,000	$0	$0	$0	$345,000
TOTAL	**$,2,240,000**	**$1,000,000**	**$0**	**$0**	**$0**	**$3,240,000**



Current Status: Under Construction

276-52 Rocky Branch Interceptor Replacement

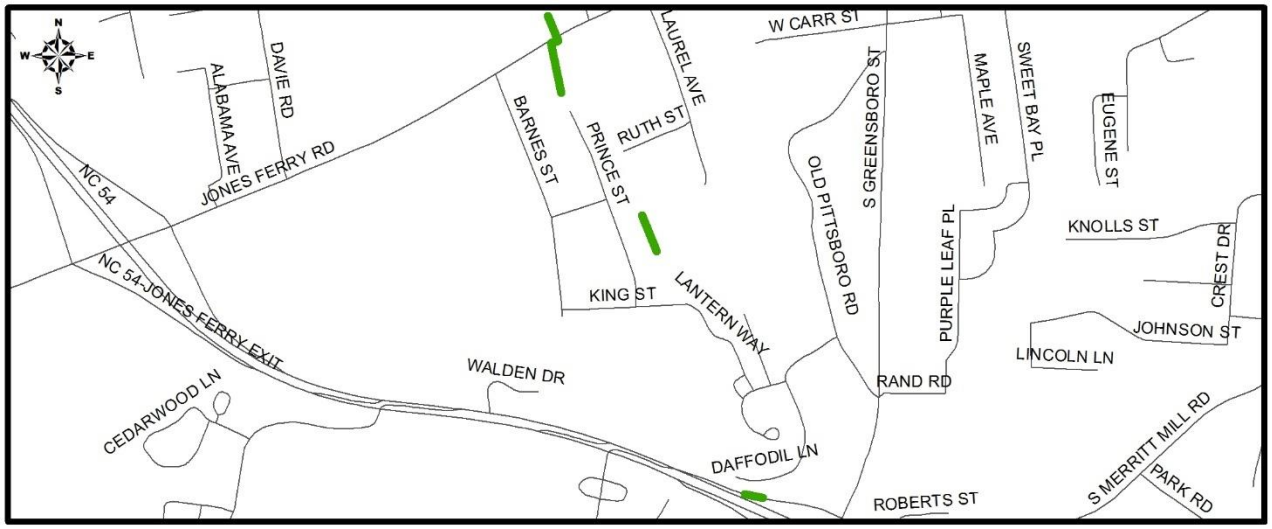
Description/Background:

Funding is provided in FY 2026 through FY 2027 to increase pipe capacity at certain locations in the Rocky Creek Interceptor to allow for process water discharges from the WTP of up to 1,000 gpm. Design was completed in FY 2021. A small portion of the sewer work that crosses Jones Ferry Road was constructed as part of the Jones Ferry Road Water Main Replacements (275-92); however, the funding was supplied out of CIP 276-52. The funding shown in FY 2026 and FY 2027 is for additional Phase 1 interceptor work shown to the south of Jones Ferry Road and further down on the map. At this time the WTP anticipates needing the upsized process water discharge capability by FY 2027.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$600,000	$140,000	$750,000
Inspection	$0	$0	$0	$50,000	$30,000	$80,000
Construction Admin	$0	$0	$0	$50,000	$30,000	$80,000
Contingency	$0	$0	$0	$50,000	$40,000	90,000
TOTAL	**$0**	**$0**	**$0**	**$750,000**	**$250,000**	**$1,000,000**



Current Status: Portions to the South of Jones Ferry Road are not yet started

276-53 Creek Crossing Access Improvements

Description/Background:

Streambank erosion from heavy rain events make it difficult for OWASA crews to safely cross area streams with equipment used to maintain the sewer collection system. This project will develop solutions to improve “at grade” creek crossings adjacent to existing gravity sanitary sewer creek crossings so crews/contractors can cross the creeks safely and with minimal environmental impacts.

Design is complete for six (6) creek crossings previously identified by OWASA staff; however, changing conditions since the completion of the design requires additional evaluation. Three of the original six sites have been addressed through other projects and additional sites have been identified. Funding is provided for additional design efforts and the start of the highest priority construction in FY 2026.

Benefits: reduces operational risk by improving vehicular access for maintenance purposes

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$130,000	$0	$130,000
Construction	$0	$0	$0	$400,000	$0	$400,000
Inspection	$0	$0	$0	$20,000	$0	$20,000
Construction Admin	$0	$0	$0	$20,000	$0	$20,000
Contingency	$0	$0	$0	$30,000	$0	$30,000
TOTAL	**$0**	**$0**	**$0**	**$600,000**	**$0**	**$600,000**

Current Status: Not yet started

276-59 Morgan Creek Interceptor Replacement at Bartram Drive

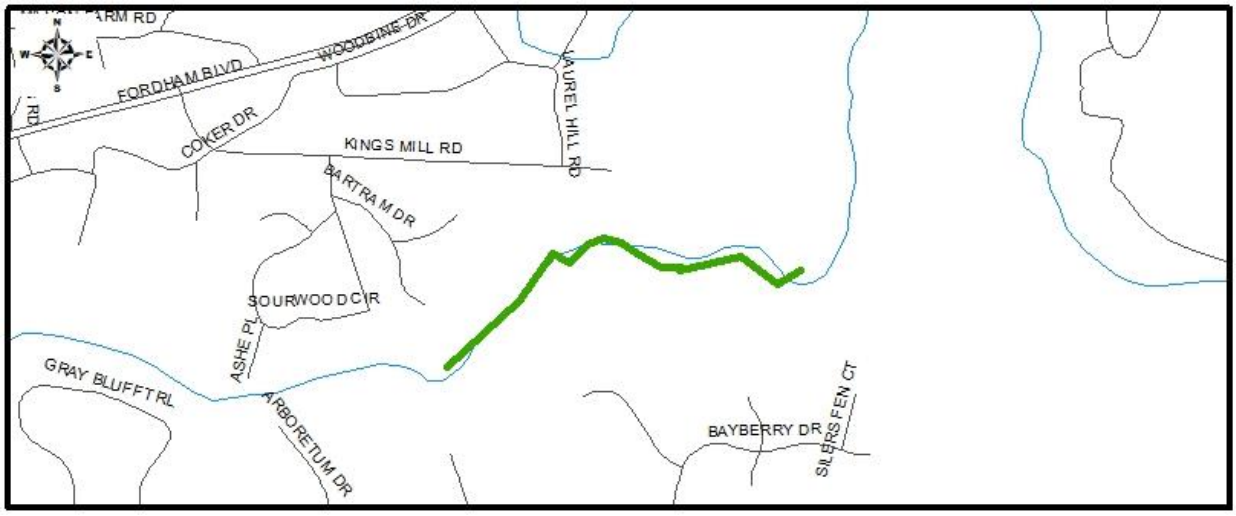
Description/Background:

This project was identified by the 2020 Collection System Master Plan and will upsize 2,000 LF of 24-inch gravity sewer to 30-inch pipe in the Morgan Creek Interceptor from MH 64410 to MH 7475 in order to eliminate surcharging conditions at 21 manholes under existing peak wet weather conditions. Design is planned for FY 2023 and construction is expected to occur in FY 2024.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure; increases system capacity

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$204,000	$0	$0	$0	$0	$204,000
Construction	$0	$1,315,000	$0	$0	$0	$1,315,000
Inspection	$0	$90,000	$0	$0	$0	$90,000
Construction Admin	$0	$90,000	$0	$0	$0	$90,000
Contingency	$30,000	$120,000	$0	$0	$0	$150,000
TOTAL	**$234,000**	**$1,615,000**	**$0**	**$0**	**$0**	**$1,849,000**



Current Status: In design

276-60 Bolin Creek Interceptor Replacement at Pathway Drive

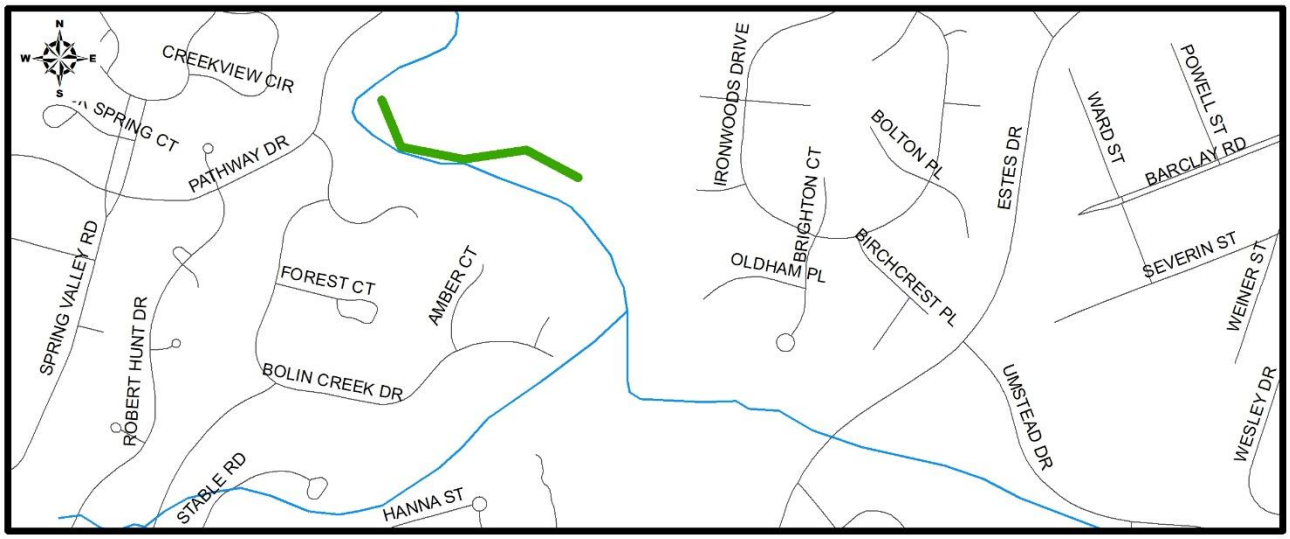
Description/Background:

This project was identified by the 2020 Collection System Master Plan and will upsize 1,200 LF of 15-inch sewer to 18-inch pipe in the Bolin Creek Interceptor from MH 3197 to MH 3365 in order to eliminate surcharging conditions at six manholes under existing peak wet weather conditions. Construction is expected to occur in FY 2026.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure; increases system capacity

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2026	5-Year Total
Planning	$0	$20,000	$0	$0	$0	$20,000
Design/Land	$0	$0	$40,000	$31,000	$0	$71,000
Construction	$0	$0	$0	$301,000	$0	$301,000
Inspection	$0	$0	$0	$16,000	$0	$16,000
Construction Admin	$0	$0	$0	$16,000	$0	$16,000
Contingency	$0	$5,000	$10,000	$36,000	$0	$51,000
TOTAL	**$0**	**$25,000**	**$50,000**	**$400,000**	**$0**	**$475,000**



Current Status: Not yet started

276-61 Brigham Road Sewer Replacement

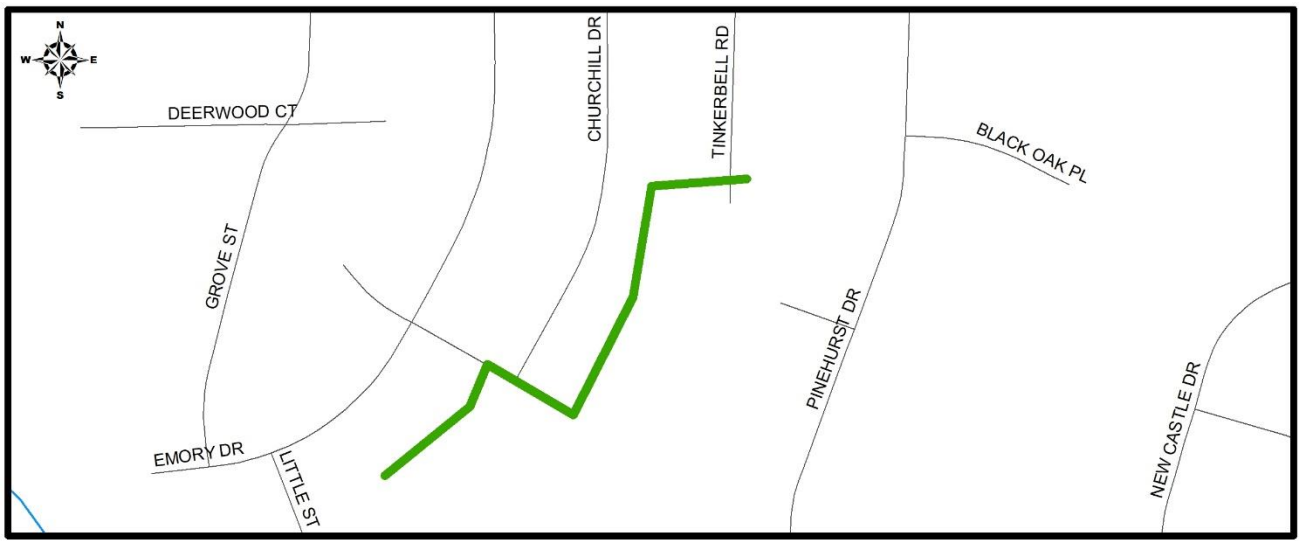
Description/Background:

This project will address surcharging during existing peak wet weather conditions by upsizing 1,500 LF of 12-inch sewer to 16-inch pipe from MH 3905 to MH 4256 along the Little Creek Interceptor. Construction is expected to occur in FY 2027.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure; increases system capacity

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$35,000	$0	$35,000
Construction	$0	$0	$0	$0	$295,000	$305,000
Inspection	$0	$0	$0	$0	$15,000	$20,000
Construction Admin	$0	$0	$0	$0	$15,000	$20,000
Contingency	$0	$0	$0	$15,000	$35,000	$70,000
TOTAL	**$0**	**$0**	**$0**	**$50,000**	**$400,000**	**$450,000**



Current Status: Not yet started

276-63 East Main Street Sewer Rehabilitation

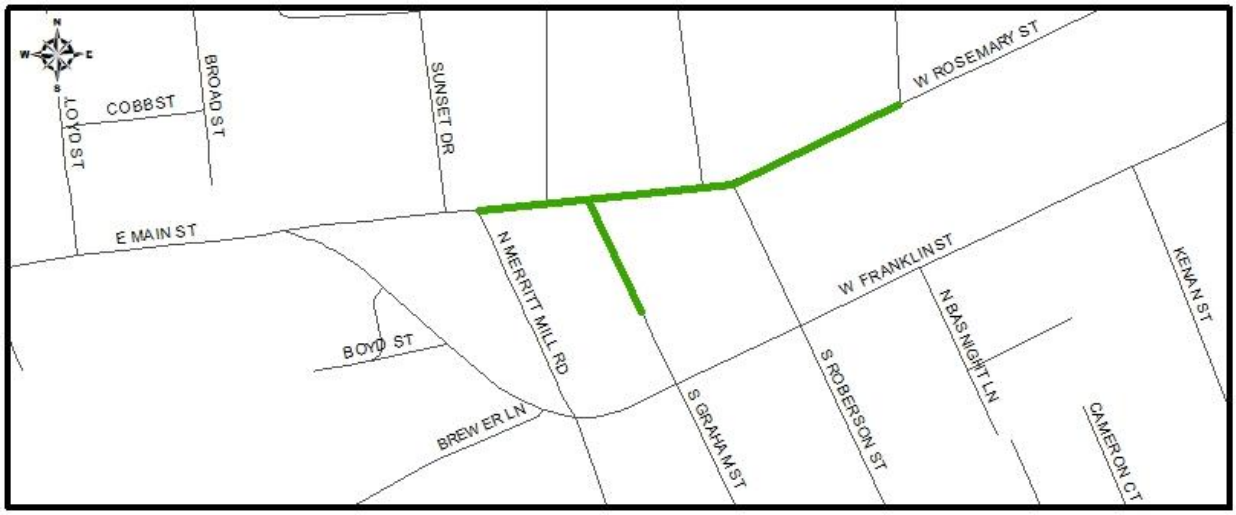
Description/Background:

This project will address the second phase of work associated with the sewer mains and manholes in poor condition along East Main Street in the Town of Carrboro and West Rosemary Street in the downtown section of the Town of Chapel Hill. The first phase of the work was completed in downtown Carrboro ahead of NCDOT resurfacing in FY 2022. The work is planned to consist of a combination of sewer main lining, manhole replacements, and pipe replacement.. Construction is expected to occur in FY 2023 along West Rosemary Street.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure

Funding:

	FY 2023	FY 2023	FY 2024	FY 2025	FY 2026	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$800,000	$0	$0	$0	$0	$800,000
Inspection	$50,000	$0	$0	$0	$0	$50,000
Construction Admin	$50,000	$0	$0	$0	$0	$50,000
Contingency	$100,000	$0	$0	$0	$0	$100,000
TOTAL	**$1,000,000**	**$0**	**$0**	**$0**	**$0**	**$1,000,000**



Current Status: In design

276-70 Collection System On-Call Modeling

Description/Background:

This project will provide funds for additional on-call modeling services related to the Collection System model completed in 2020. The model will be updated annually with pertinent changes in gravity sewer sizes, rehabilitation projects, upgrades to pump stations and future developments. Efforts to update the model shall ensure that results from the model are accurate and allow for proper planning of capacity limitations as development projects are evaluated.

Benefits: maintains accurate model data

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$0	$0
TOTAL	**$20,000**	**$20,000**	**$20,000**	**$20,000**	**$20,000**	**$100,000**

Current Status: Ongoing

276-99 Collection System Asset Management

Description/Background:

A recently updated Asset Management Plan provided a framework for the long-term incorporation of activities that improve the understanding of this asset class. Funding is provided for the following components:

Flow Monitoring Pilot Program – This project provided funding for the installation of two flow monitors and rain gauges in the collection system in FY 2022. As an effort to gain more insight into inflow and infiltration, this project also provides funding for a micromonitoring study to investigate one or more of the high priority basins within the collection system

Condition Assessment - Additional funding is included in FY 2023 through 2027 for minor rehabilitation items identified in the Collection System Master Plan, such as condition assessment, typically to be completed by OWASA staff.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure, increases system capacity

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$40,000	$35,000	$40,000	$40,000	$40,000	$195,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$10,000	$5,000	$10,000	$10,000	$10,000	$45,000
TOTAL	**$50,000**	**$40,000**	**$50,000**	**$50,000**	**$50,000**	**$240,000**

Current Status: Ongoing

276-02 Gravity Sewers Larger than 12" Evaluation Surveys

Description/Background:

This project provides funding to inspect and survey aging gravity sewer mains larger than 12 inches in diameter. With current equipment and staff, OWASA crews are able to inspect gravity lines up to 12 inches but there are several miles of larger diameter pipe that are not inspected as regularly. These larger pipes often carry higher flows that do not accommodate our existing equipment or require bypass pumping to inspect. This project will provide for inspection of high-priority and prioritized large diameter gravity mains to aid in identifying future rehabilitation needs.

Benefits: determines asset risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$225,000	$0	$0	$0	$225,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$25,000	$0	$0	$0	$25,000
TOTAL	**$0**	**$250,000**	**$0**	**$0**	**$0**	**$250,000**

Current Status: Not yet started, consultant RFQ to be released in FY 2023

276-05 Morgan Creek Aerial Assessments

Description/Background:

The Morgan Creek Interceptor was originally constructed in 1971, however since that time, the creek has moved and piers and pipes that were not originally intended to be in the water now operate within the stream. Recent failures of some aerial crossings has prompted additional need to investigate the condition of the interceptor in additional stream crossing locations. This project provides funding to complete a field investigation and then prioritize and assess priority aerial crossings along the Morgan Creek Interceptor. It is anticipated that this project will inform future rehabilitation projects along this corridor.

Benefits: determines asset risk, maintains permit compliance through reduction of sanitary sewer overflows

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$130,000	$0	$0	$0	$130,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$20,000	$0	$0	$0	$20,000
TOTAL	**$0**	**$150,000**	**$0**	**$0**	**$0**	**$150,000**

Current Status: Not yet stated, consultant RFQ to be released in FY 2023

276-06 Westwood Neighborhood Sewer Replacement

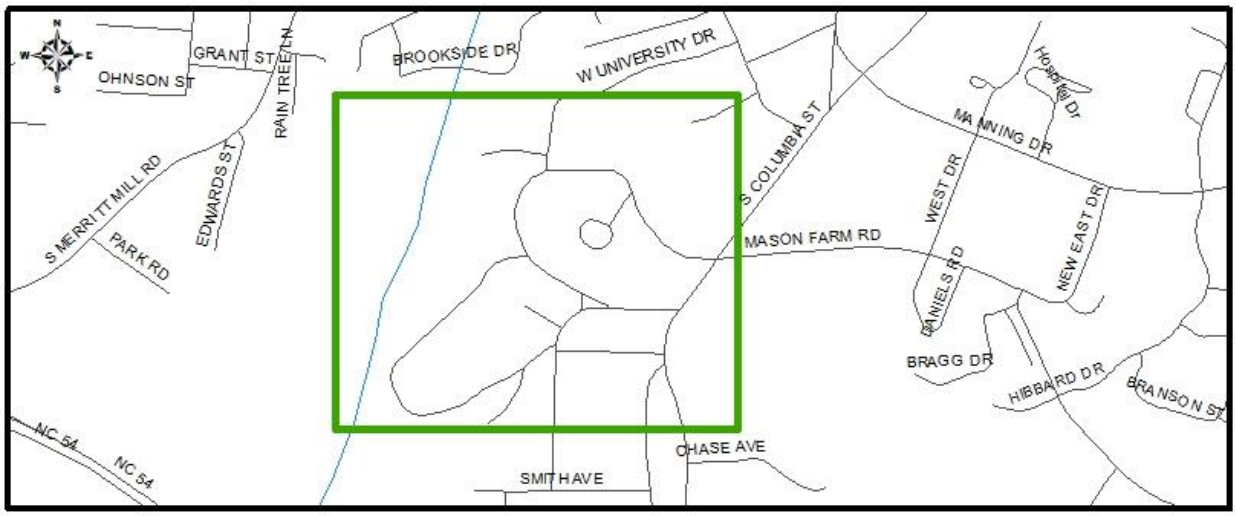
Description/Background:

The Westwood neighborhood is serviced by vitrified clay sewer lines installed in the late 1940s. In 2013-2014, a condition assessment in this neighborhood indicated that over 3,000 linear feet of gravity sewer lines need to be replaced or have point repairs followed by cured-in place pipe lining. This project provides the funding in FY 2024 and FY2025 for the design and funding in FY 2026 for the construction for the necessary work to repair and rehabilitate this aging sewer system within the Westwood neighborhood.

Benefits: maintains permit compliance through reduction of sanitary sewer overflows; replaces aging infrastructure, increases system capacity

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$30,000	$25,000	$0	$0	$55,000
Design/Land	$0	$65,000	$225,000	$0	$0	$290,000
Construction	$0	$0	$0	$1,500,000	$0	$1,400,000
Inspection	$0	$0	$0	$50,000	$0	$50,000
Construction Admin	$0	$0	$0	$50,000	$0	$50,000
Contingency	$0	$5,000	$50,000	$100,000	$0	$155,000
TOTAL	**$0**	**$100,000**	**$300,000**	**$1,700,000**	**$0**	**$2,000,000**



Current Status: Not yet started, consultant RFQ to be released in FY 2023

276-07 Siphon Line Condition Assessment

Description/Background:

OWASA's collection system contains a siphon that was installed in 1974 that runs through the UNC Finley Golf Course paralleling the Rogerson Drive Force Main. Since its installation is has required increasing levels of maintenance due to grit accumulation and difficulty flushing. This project provides funding in FY 2024 for the planning and condition assessment necessary to determine the asset risk. It is anticipated that the condition assessment completed as part of the FY 2024 work will inform future rehabilitation needs of the siphon line.

Benefits: determines asset risk, maintains permit compliance through reduction of sanitary sewer overflows;

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$45,000	$0	$0	$0	$45,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$5,000	$0	$0	$0	$5,000
TOTAL	**$0**	**$50,000**	**$0**	**$0**	**$0**	**$50,000**

Current Status: Not yet started; RFQ to be released in FY 2023

Category 277: Wastewater Pump Stations and Force Mains

Background

Where feasible, wastewater collection lines are constructed with a downhill slope to allow wastewater to flow by gravity to the Wastewater Treatment Plant (WWTP). Where collection mains encounter a hill or become prohibitively deep, a pump station raises the wastewater to a level where it can flow again by gravity to the WWTP. Pump stations are essential for moving wastewater out of areas where gravity configurations are not feasible. Pump stations discharge wastewater to force mains, which are pressurized pipes that transmit wastewater to a gravity collection main or to the WWTP.

Rogerson Drive Pump Station

OWASA's goal is to reduce the number of wastewater pump stations and force mains to the lowest practical number. Where these facilities are necessary, OWASA strives to achieve 100 percent reliability.

Existing Facilities and Recent Improvements

There are 21 pump stations and 14 miles of force mains in the service area. The pump stations at Rogerson Drive and Morgan Creek are the largest. The Rogerson Drive pump station collects all wastewater generated in the Bolin Creek, Booker Creek, and Little Creek drainage basins and conveys it via force main to the WWTP. The Morgan Creek pump station is located at and considered to be part of the WWTP. This pump station delivers all wastewater collected from the Morgan Creek basin into the plant.

Most of OWASA's wastewater pump stations are supported by permanent on-site electrical generators to provide standby power during outages. Out of the 21 total pump stations, 18 have permanent standby generators. Other reliability improvements have included the installation of standardized outlets to enable quick connection of portable generators during power outages, and the installation of pipes and valves to enable bypass pumping.

The Morgan Creek pump station was constructed as part of the 14.5 MGD Upgrade and Expansion Project for the WWTP in FY 2008. It includes four submersible pumps rated at 9.5 MGD each and has a firm pumping capacity of 30 MGD. All four pumps have variable frequency drives (VFDs) that allow adjustment of the pumping rate and help reduce the amount of electrical energy used for pumping. This station lies within the WWTP site and improvements are typically funded under Category 278.

Other projects completed within the past 15 years include the expansion and upgrade of several existing facilities and the elimination ("phase out") of other pump stations through the construction of additional gravity sewer mains. The Heritage Hills pump station was improved in FY 2005 with a new wet well, new pumps, and controls. The North Forest Hills pump station was phased out in FY 2006, and the Piney Mountain pump station was replaced in FY 2007. The Lloyd Street and Starlite Drive pump stations were phased out in FY 2008, and the Cleland Drive pump station was phased out in FY 2009. The removal of these four wastewater pumping stations reduced OWASA's electrical energy use by about 17,000 kilowatt-hours per year.

Improvements to the Countryside pump station and the Forest Creek pump station were completed in FY 2012, while improvements at the Oaks 3 and Tinkerbell pump stations were completed in FY 2014.

The 8-inch diameter asbestos cement (AC) force main serving the Heritage Hills subdivision was replaced with an 8-inch diameter polyvinyl chloride (PVC) pipe in FY 2014. A FY 2016 study found the Manning Drive force main to be in good condition. Construction of improvements at Piney Mountain pump station, which is located outside of OWASA;'s service area, were completed in FY 2017. (The Piney Mountain Homeowners' Association, as the sole beneficiary of OWASA's Piney Mountain pump station and force main, pays all associated CIP, operational and maintenance expenses.).

Construction of improvements to the pump stations at Eastowne, Eubanks Road, and Meadowmont 1, as well as the rehabilitation of a portion of the Rogerson Drive Force Main between NC Highway 54 and South Hamilton Road were completed in FY 2018, as was an evaluation of potential redundancy alternatives for the Rogerson Drive Force Main.

A two-phased project to upgrade the electrical and HVAC systems and install channel grinders and odor control at the Rogerson Drive Pump Station was completed in FY 2020. The emergency repair of the Rogerson Drive Force Main along Rogerson Drive, and across and along the south side of Raleigh Road was also completed in FY 2020.

Additionally, some minor control and pump replacements were completed at several pump stations during FY 2021. The pumps at Meadowmont 1, were replaced with chopper pumps to improve ragging issues.

Planned Improvements

The CIP includes an investment of about $2.2 million for this asset class, primarily in asset assessments and rehabilitation of components at several smaller pump stations.

Category 277: Wastewater Pump Stations and Force Mains

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
277-21	Force Main Condition Evaluation	$0	$50,000	$0	$0	$75,000	**$125,000**
277-43	Rogerson Drive Force Main and Pump Station Program Services	$100,000	$100,000	$0	$0	$0	**$200,000**
277-44	Rogerson Drive Pump Station Capacity Upgrade	$0	$0	$0	$0	$100,000	**$100,000**
277-45	Chapel Hill North Pump Station Rehabilitation	$600,000	$0	$0	$0	$0	**$600,000**
277-47	Rogerson Drive Fuel Storage Improvements	$0	$0	$90,000	$500,000	$0	**$590,000**
277-48	Lake Ellen Pump Station Rehabilitation	$0	$0	$0	$60,000	$250,000	**$310,000**
277-49	North Lakeshore Pump Station and Clayton Road Pump Station Generator Design and Installation	$200,000	$0	$0	$0	$0	**$200,000**
277-50	Knolls Pump Station Evaluatioin	$0	$0	$100,000	$0	$0	**$100,000**
277	**Category Total**	**$900,000**	**$150,000**	**$190,000**	**$560,000**	**$425,000**	**$2,225,000**

277-21 Force Main Condition Evaluation

Description/Background:

This project includes field condition evaluation of collection system force mains as identified by a FY 2011 master plan. The extent of any rehabilitation is uncertain until the field work is performed, and any capital needs will be funded under separate line items. Condition evaluation may consist of a combination of ultrasonic testing, coupon extraction, leak detection, and/or other technologies suitable for pressure pipe condition assessment.

Evaluations are scheduled in FY 2024 for the Rangewood, Eubanks, and Countryside force mains.

Benefits: replaces or extends useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$45,000	$0	$0	$0	$45,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$50,000	$0	$0	$0	$5,000
TOTAL	**$0**	**$50,000**	**$0**	**$0**	**$0**	**$50,000**

Current Status: Not yet started

277-43 Rogerson Drive Force Main and Pump Station Program Services

Description/Background:

The 2-mile long Rogerson Drive force main runs from the wastewater pump station north of Cleland Drive southward across North Carolina Highway 54 (NC 54), to Prestwick Road and then continues to the Mason Farm Wastewater Treatment Plant (WWTP). The northern section of the force main, including the crossing under NC 54, does not have a parallel line for redundancy, whereas the portion from Prestwick Road nearly to the WWTP site does.

Failure of the pipe at a spot along Prestwick Road in September 2016 led to the CIPP rehabilitation of approximately 700 feet of 24" and 30" force main surrounding that location. Failure of the pipe at a spot along Rogerson Drive in April 2019 led to emergency repair completed in FY 2020 which included approximately 1300 feet of pipe replacement of 24" and 30" force main.

While several risk studies and capital projects related to the pump station and force main system have been completed since 2013, CIP 277-43 was developed as the long-term facility planning effort for this critical part of the collection system, with the following major objectives:

- Determine the temporal and spatial dynamics of flow through the force main through a range of operating conditions; determine any recommended improvements to operating schemes;
- Determine the likelihood of failure for key portions of the force main, including through the use of appropriate condition assessment technologies;
- Complete the rehabilitation/replacement of high-risk portions of the force main;
- Determine the optimal route for a future redundant force main.

Benefits: replaces or extends the life of aging infrastructure

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$90,000	$91,000	$0	$0	$0	$181,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$10,000	$9,000	$0	$0	$0	$19,000
TOTAL	**$100,000**	**$100,000**	**$0**	**$0**	**$0**	**$200,000**

Current Status: Phase 1 Condition Assessment completed, Phase 2 Condition Assessment planned for FY 2023

277-44 Rogerson Drive Pump Station Capacity Upgrade

Description/Background:

The Rogerson Drive Pump Station is the largest wastewater pump station in the collection system, collecting wastewater flow from about half of the service area. The collection system master plan completed in FY 2020 identified a potential near-term capacity restriction for this pump station based on hydraulic modeling of the system. Funding is included in FY 2027 to begin planning efforts for the capacity project. The efficacy of the gravity sewer rehabilitation program (CIP 276-18) in identifying and reducing sources of inflow and infiltration into the system will directly impact the need and timing of this project.

Benefits: meets expected future wastewater demand

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$91,000	$91,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$9,000	$9,000
TOTAL	**$0**	**$0**	**$0**	**$0**	**$100,000**	**$100,000**

Current Status: Not yet started

277-45 Chapel Hill North Pump Station Rehabilitation

Description/Background:

This funding focuses on the rehabilitation of the Chapel Hill North Pump Station to include updated pumps, electrical equipment and site improvements.

Benefits: replaces aging infrastructure; meets expected future wastewater demand

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$450,000	$0	$0	$0	$0	$450,000
Inspection	$50,000	$0	$0	$0	$0	$50,000
Construction Admin	$50,000	$0	$0	$0	$0	$50,000
Contingency	$50,000	$0	$0	$0	$0	$50,000
TOTAL	**$6000,000**	**$0**	**$0**	**$0**	**$0**	**$600,000**

Current Status: Bidding anticipated at beginning of FY2023

277-47 Rogerson Drive Fuel Storage Improvements

Description/Background:

The Rogerson Drive Pump Station currently has two fuel tanks totaling 1,840 gallons of storage for the onsite generator. Based on the Backup Generator Evaluation and Fuel Management Strategy study completed in 2020, the Rogerson Drive Pump Station is recommended to increase its overall fuel storage capacity to 3,600 gallons. This project provides funding for increasing fuel storage at the Rogerson Drive Pump Station to 3,600 gallons to allow for 48-hours of generator run time.

Benefits: increases operational efficiency; improves service reliability; improves safety

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$5,000	$0	$5,000
Design/Land	$0	$0	$0	$50,000	$0	$50,000
Construction	$0	$0	$0	$20,000	$400,000	$420,000
Inspection	$0	$0	$0	$5,000	$30,000	$35,000
Construction Admin	$0	$0	$0	$5,000	$30,000	$35,000
Contingency	$0	$0	$0	$5,000	$30,000	$45,000
TOTAL	**$0**	**$0**	**$0**	**$90,000**	**$500,000**	**$590,000**

Current Status: Not yet started

277-48 Lake Ellen Pump Station Rehabilitation

Description/Background:

A Pump Station Operational Assessment completed in January 2020 identified several issues with the Lake Ellen Pump Station. Through this Assessment, pump station components were ranked on a scale of one to five, with one indicating good condition and 5 indicating imminent signs of failure. This project provides funding for a series of improvements needed at the Lake Ellen Pump Station for components that scored 4 or higher from the assessment including VFD replacement, installation of fall protection, and site access improvements.

Benefits: replaces aging infrastructure, reduces safety risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$5,000	$0	$5,000
Design/Land	$0	$0	$0	$50,000	$0	$50,000
Construction	$0	$0	$0	$0	$200,000	$200,000
Inspection	$0	$0	$0	$0	$15,000	$15,000
Construction Admin	$0	$0	$0	$0	$15,000	$15,000
Contingency	$0	$0	$0	$5,000	$20,000	$25,000
TOTAL	**$0**	**$0**	**$0**	**$60,000**	**$250,000**	**$310,000**

Current Status: Not yet started

277-49 North Lakeshore Pump Station and Clayton Road Pump Station Generator Design and Installation

Description/Background:

This project provides funding in FY 2023 to support the design and installation of permanent generators at the North Lakeshore Pump Station and the Clayton Road Pump Station. These are two of the three remaining pump stations within OWASA's collection system that do not have permanent on-site generators.

Benefits: reduces risk, increases resiliency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$30,000	$0	$0	$0	$0	$30,000
Construction	$150,000	$0	$0	$0	$0	$160,000
Inspection	$5,000	$0	$0	$0	$0	$5,000
Construction Admin	$5,000	$0	$0	$0	$0	$5,000
Contingency	$10,000	$0	$0	$0	$0	$10,000
TOTAL	**$200,000**	**$0**	**$0**	**$0**	**$0**	**$200,000**

Current Status: Not yet started

277-50 Knolls Pump Station Evaluation

Description/Background:

The Knolls Pump Station (PS) is one of two remaining dual pump dry well stations within OWASA's collection system. Preliminary engineering was completed FY 2018 to identify options for the Knolls PS since there are options to upgrade the site, relocate the PS or potentially abandon the pump station. This project provides the funding in FY 2025 for a study to finalize a path forward and create a business case for the best option for the Knolls PS.

Benefits: replaces aging infrastructure

Funding:

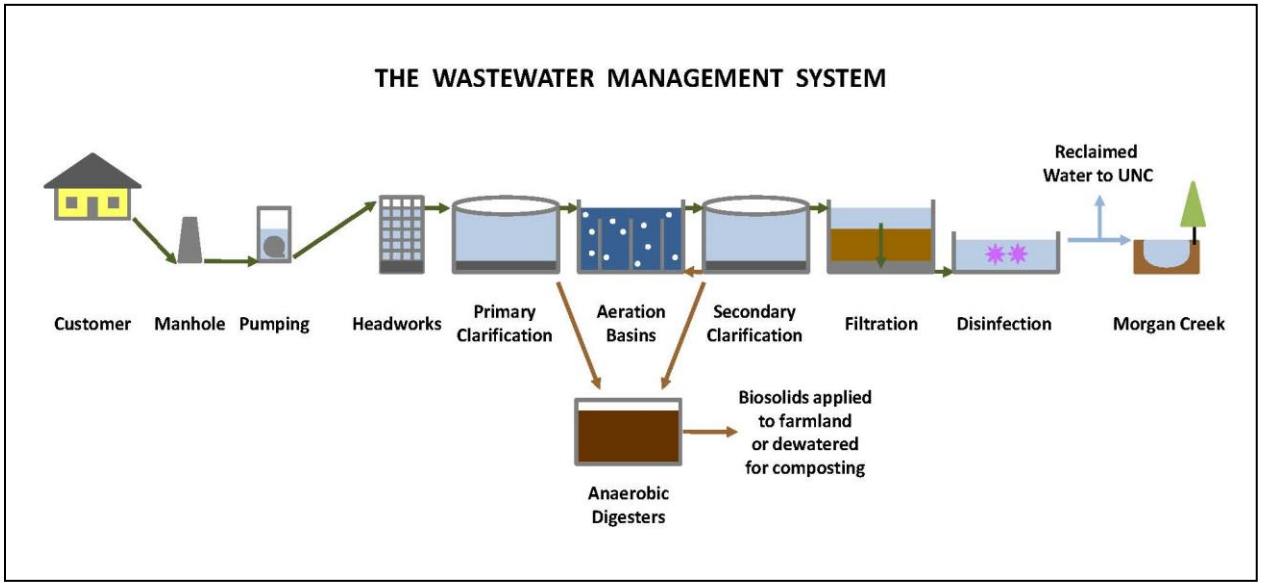
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$95,000	$0	$0	$95,000
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$5,000	$0	$0	$5,000
TOTAL	**$0**	**$0**	**$100,000**	**$0**	**$0**	**$100,000**

Current Status: Not yet started

Category 278: Wastewater Treatment and Recycling

Background

After collection and conveyance from sources throughout the community, wastewater is treated at the Mason Farm Wastewater Treatment Plant (WWTP). A portion of the treated wastewater is reused as reclaimed water (RCW) for non-drinking purposes on the UNC campus and elsewhere, and the remainder is discharged to Morgan Creek, which is a tributary to Jordan Lake. The WWTP employs biological, chemical and physical processes to treat the wastewater. Solids separated from the wastewater are treated and recycled as biosolids. Biosolids are beneficially recycled at multiple agricultural sites in Orange, Alamance and Chatham Counties or sent for composting at a privately-owned facility in Chatham County.



The WWTP is OWASA's largest energy-consuming facility, typically using about half of OWASA's total electrical energy used in any given year. The energy intensity (amount of energy required for every wastewater unit treated) has declined by about 40% since the installation of a fine bubble diffused aeration system, energy efficient blowers and mixers in 2014.

Existing Facilities

The WWTP is located on Old Mason Farm Road next to UNC's Finley Golf Course. When first placed in service in 1948, the WWTP had a capacity of 2.25 million gallons per day (MGD). Secondary treatment was achieved through one primary clarifier followed by a trickling filter and final clarifier. Solids particles were digested anaerobically. Some of the original facilities are still in service today.

Treatment capacity was increased to 4.5 MGD in 1968 with a doubling of existing facilities. Included in this expansion was the addition of two anaerobic digesters and a centrifuge to dewater the biosolids. Improvements completed in 1978 increased treatment capacity to 5.5 MGD and included the construction of an activated sludge basin for ammonia-nitrogen removal and a chlorine contact chamber for effluent disinfection. A 1983 expansion and renovation project, partially funded through a 201 Wastewater Facilities

Grant from the United States Environmental Protection Agency (USEPA), increased the treatment capacity to 8 MGD. This project included two additional activated sludge basins, major improvements to the aeration equipment, two new final clarifiers, a new chlorine contact chamber, and other major renovations throughout the plant. It also included the acquisition and preparation of the first tract of OWASA-owned land for our biosolids land application program.

Additional improvements were completed in 1991 to meet the state's phosphorus effluent limit, as well as a new limit on the amount of chlorine that could be discharged. Other key improvements included aeration basin tie-ins and an engine-driven air blower system capable of using methane gas produced in the digesters. These improvements and others enabled full time use of a biological phosphorus removal process developed and patented by OWASA.

A 0.9 MG off-site liquid biosolids storage tank was constructed in 1994 on OWASA's Headwaters property, located west of Carrboro, to provide approximately 30 days of biosolids storage capacity. This improvement allowed a re-rating of the plant capacity from 8 to 9 MGD.

An additional 3 MGD of treatment capacity was provided through the FY 2000 expansion and renovation project, thereby increasing the plant's permitted capacity to 12 MGD. This project included construction of a new headworks, Primary Clarifier No. 3, Aeration Basins Nos. 4A and 4B, Secondary Clarifier No. 4, two 250 horsepower (HP) Electric Blowers for the aeration basins, a new Solids Handling Building that included two new Gravity Belt Thickeners, two new boilers, and Anaerobic Digesters Nos. 3 and 4. A 2,000-kilowatt (kW) electrical generator was installed in FY 2001 to improve reliability during power outages. Two 6 MGD diesel powered pumps were installed in 2002 at Intermediate Pump Station No. 2 to provide additional reliability and redundancy.

Another 1.5 MG off-site biosolids storage tank was constructed in FY 2003 to provide adequate biosolids storage capacity needed during extended periods when land application of biosolids was not possible.

The WWTP was upgraded and expanded to a capacity of 14.5 MGD as part of a 3-year, $50 million construction project completed in 2007. This project provided six new deep-bed denitrification filters, an ultraviolet (UV) disinfection system, new headworks, new influent sewers and influent pump station (Morgan Creek pump station), new Secondary Clarifier No. 5, and major improvements to the aeration basins. In addition, the project converted digester covers from floating to fixed, installed a new digester gas storage system, added chemical storage tanks, and installed a 2,700-kW generator and new switchgear. The denitrification filters will help meet future, more stringent, total nitrogen permit limits required by the state's Jordan Lake Nutrient Management Rules. The filters will also enhance our ability to meet the stringent total phosphorus limit as plant flows increase.

Biosolids are processed in a series of four anaerobic digesters and then either recycled in liquid form as a low strength fertilizer and soil amendment via land application to local farmlands or dewatered and transported for composting. The land application sites include both privately-owned sites and one OWASA-owned site. OWASA has both "Class A" and "Class B" permits for the land application of biosolids. A rotary press was installed in 2007 to provide onsite biosolids dewatering to about 20% solids content.

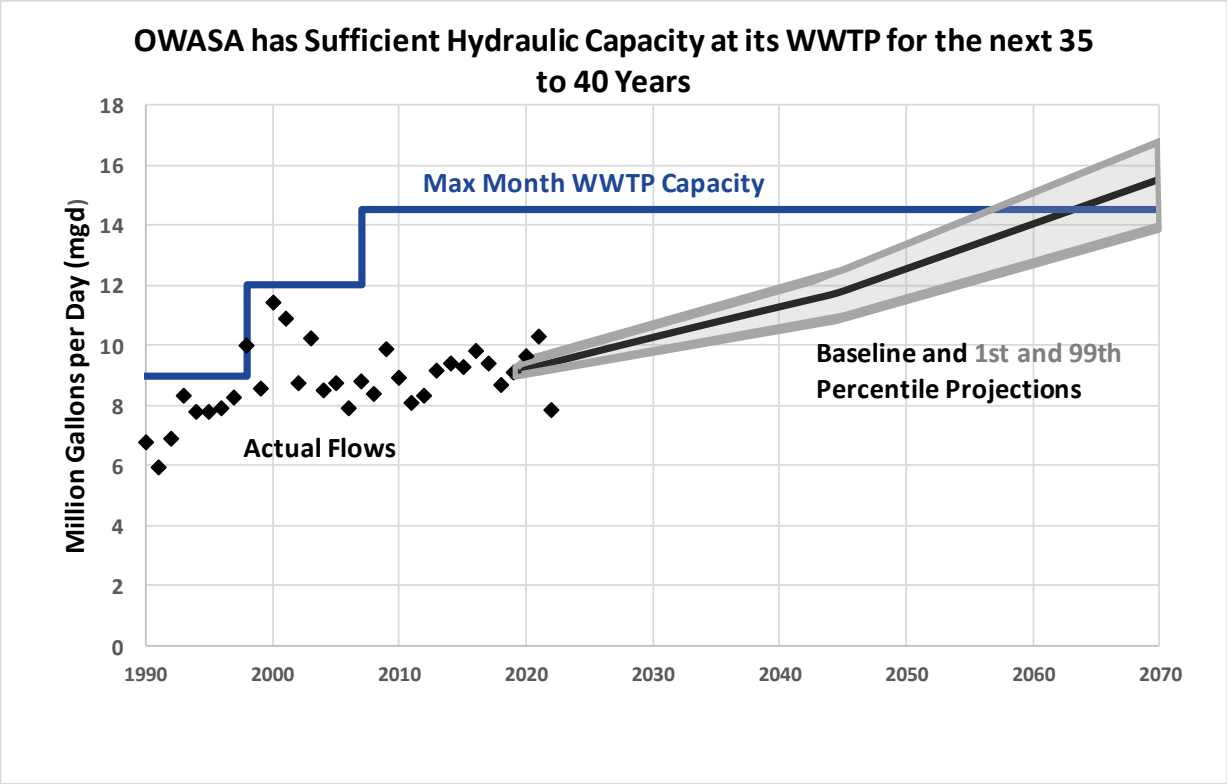
As a result of a FY 2007 odor study, phased projects were recommended to help achieve OWASA's odor control objectives. The first phase was completed in 2007 and included covering and treating foul air from the primary clarifier splitter boxes, the intermediate pump station wetwells, and the aeration basin influent channel. The second phase, completed in FY 2010, covered the primary clarifiers and treated the foul air emanating from them. The third phase (as part of CIP 278-40), completed in FY 2015, covered and treated the air from 10 of the 16 aeration/ nutrified sludge basin cells and included installation of three new odor

scrubbers. Going forward, odor control will be addressed on a project by project basis.

In 2009, RCW facilities (storage tank, pumping, distribution pipe, etc.) were completed and put into service, and an upgrade of the Digester Complex electrical system was completed. Improvements to the existing flood protection system, including work on the berm around the WWTP site, stream bank stabilization to Morgan Creek adjacent to the WWTP berm, and rehabilitation of the existing stormwater pumps were completed in FY 2014.

A 2010 engineering study recommended that to improve treatment process performance, meet more stringent nutrient limits, and reduce energy use and costs, the existing blowers, aeration system, and mixers be replaced with more efficient fine-bubble diffusers, new blowers, and new mixers. As noted above, that project was completed in FY 2015 in conjunction with the third phase of odor control improvements. The new blowers, aeration system, and mixers reduced electricity use at the WWTP by about 40 percent and energy costs by about $300,000 in 2015.

The 2010 engineering study also recommended certain operational changes for optimizing existing processes as well as other capital improvements to address future capacity limitations. Implementation of several of these operational recommendations resulted in immediate and significant benefits through reduced operating costs. The study's main findings were significant in that the plant is now expected to be able to meet the more stringent future permit limits for total nitrogen without additional capital facilities, assuming flow conditions associated with the WWTP's permitted capacity of 14.5 MGD. Major capacity expansion of the WWTP is not expected to be required for several decades based on OWASA's current flow projections but the current master plan will inform the next years of improvements needed at the facility.



Planned Improvements

The five-year CIP includes $21.8 million for this asset class. Notable projects include the conversion of Secondary Clarifier #4 (278-20), Fermenter Improvements (278-78), and Digester #3 and #4 condition assessment and improvements and rehabilitation (278-97) and improvements to all three Primary Clarifiers (278-86). In addition, a master plan for the facility completed over the next fiscal year is expected to inform future capital investment.

Category 278: Wastewater Treatment

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
278-11	Wastewater Facility Asset Rehabilitation	$0	$0	$0	$2,730,000	$2,730,000	**$5,460,000**
278-20	WWTP Clarifier #4 Conversion	$200,000	$2,360,000	$100,000	$0	$0	**$2,660,000**
278-85	Gas Monitoring at the WWTP	$0	$280,000	$0	$0	$0	**$280,000**
278-50	WWTP Warehouse	$0	$95,000	$1,000,000	$0	$0	**$1,095,000**
278-75	WWTP Facilities Planning	$150,000	.	$0	$0	$0	**$150,000**
278-78	WWTP Fermenter Improvements	$1,350,000	$0	$0	$0	$0	**$1,350,000**
278-86	WWTP Primary Clarifier Rehabilitation	$0	$200,000	$3,010,000	$0	$0	**$3,210,000**
278-89	WWTP RAS Pumping Improvements	$0	$0	$150,000	$250,000	$0	**$400,000**
278-91	WWTP Scum Pump Station Rehabilitation	$0	$0	$0	$60,000	$290,000	**$350,000**
278-94	Biogas Removal System Improvements	$250,000	$0	$0	$0	$0	**$250,000**
278-95	WWTP NPW System Assessment and Rehab	$0	$0	$0	$0	$375,000	**$375,000**
278-97	WWTP Digester #3 and #4 Condition Assessment and Repairs	$300,000	$1,000,000	$800,000	$0	$0	**$2,100,000**
278-01	WWTP and Pump Station PLC Replacements	$100,000	$650,000	$850,000	$0	$0	**$1,600,000**
278-02	Heat Exchanger for Rotary Drum Thickeners	$60,000	$0	$0	$0	$0	**$60,000**
278-03	WWTP Digester #3 and #4 Stairwell Safety Improvements	$50,000	$200,000	$0	$0	$0	**$250,000**
278-04	Biosolids Tank Mixing System Equipment	$50,000	$0	$0	$0	$0	**$50,000**
278-14	WWTP HVAC Systems	$0	$150,000	$0	$0	$0	**$150,000**
278-15	WWTP Condition Assessments	$0	$40,000	$50,000	$50,000	$50,000	**$190,000**
278-16	Morgan Creek Pump Station Ventilation, Recoatings, and Improvements	$0	$25,000	$200,000	$90,000	$0	**$315,000**
278-17	WWTP Aeration Basin Rehab	$0	$0	$405,000	$700,000	$0	**$1,105,000**
278-18	Intermediate Pump Station #1 Improvements	$0	$0	$0	$372,000	$0	**$372,000**
278-21	WW Primary Influent to IPS Capacity Improvements	$0	$0	$0	$0	$50,000	**$50,000**
278	**Category Total**	**$2,510,000**	**$5,000,000**	**$6,565,000**	**$4,252,000**	**$3,495,000**	**$21,822,000**

278-11 Wastewater Facility Asset Rehabilitation

Description/Background:

This project provides funding for replacement, rehabilitation, or improvement of components of wastewater facilities such as the WWTP, wastewater pump stations, and offsite biosolids storage facility in order to maintain reliable, efficient performance. Funding is provided in the fourth and fifth fiscal years of any given five-year CIP to assure that capital investment decisions account for some rate of asset replacement in future years where specific projects are not yet identified. This placeholder funding is the primary mechanism used to gauge infrastructure replacement needs not only over the five-year CIP, but over a fifteen-year financial planning horizon. Funding is based on estimates of remaining life and replacement costs for over 3,800 individual assets (pumps, motors, etc.) within this asset class. The funding totals are adjusted to account for rehabilitation projects funded elsewhere in this category (278 – Wastewater Treatment and Disposal).

Benefits: renews or extends the useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$2,730,000	$2,730,000	$5,460,000
TOTAL	**$0**	**$0**	**$0**	**$2,730,000**	**$2,730,000**	**$5,460,000**

Current Status: Long-term funding to be allocated to future identified projects

278-20 WWTP Secondary Clarifier No. 4 Improvements

Description/Background:

The WWTP has five secondary clarifier units of various capacities, ages, and features. Maintenance of Secondary Clarifier No.4 has been a concern for staff for many years. The inboard effluent launder design has not performed as well as the other 4 clarifiers with exterior launders. This limits the overall operational flexibility of secondary clarification (especially during wet weather flows).

Preliminary engineering was completed in FY 2019. Detailed design was started in FY 2021 and completed in FY2022. Construction funds are provided in FY 2023 through FY 2025 for the rehabilitation of this clarifier, including its conversion to an exterior launder design.

This project has been awarded a State Revolving Fund loan.

Benefits: replaces or extends the useful life of aging assets; improves operational flexibility and efficiency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$20,000	$0	$0	$0	$0	$20,000
Construction	$140,000	$2,100,000	$80,000	$0	$0	$2,320,000
Inspection	$10,000	$75,000	$5,000	$0	$0	$90,000
Construction Admin	$10,000	$75,000	$5,000	$0	$0	$90,000
Contingency	$20,000	$110,000	$10,000	$0	$0	$140,000
TOTAL	**$200,000**	**$2,360,000**	**$100,000**	**$0**	**$0**	**$2,660,000**

Current Status: Bidding to occur in FY 2023 in alignment with SRF process.

278-85 Gas Monitoring at the Wastewater Treatment Plant

Description/Background:

Gas monitoring systems are needed for the Morgan Creek Pump Station and Old Digester Building to address safety concerns. WWTP staff need to enter these spaces routinely to perform various operational and maintenance duties. Installation of fixed continuous gas monitoring systems will communicate to SCADA as well as provide local alarms for potentially unsafe conditions. Funding is provided in FY 2024 for installation of these monitors.

Benefits: reduces safety risks

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$30,000	$0	$0	$0	$30,000
Construction	$0	$220,000	$0	$0	$0	$220,000
Inspection	$0	$5,000	$0	$0	$0	$5,000
Construction Admin	$0	$5,000	$0	$0	$0	$5,000
Contingency	$0	$20,000	$0	$0	$0	$20,000
TOTAL	**$0**	**$280,000**	**$0**	**$0**	**$0**	**$280,000**

Current Status: Not yet started

278-50 Wastewater Treatment Plant Warehouse

Description/Background:

This project provides funding for the design and construction of an on-site warehouse at the Wastewater Treatment Plant (WWTP). The warehouse will aid in asset management by maintaining and controlling critical spare parts and allowing for more efficient system maintenance. It is expected that the new warehouse will be brought online in conjunction with a new work order tracking system or computerized maintenance management software project currently underway and being funded out of the operating budget.

Benefits: provides storage for critical spare parts for the WWTP and pump stations; improves asset management

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$90,000	$0	$0	$0	$90,000
Construction	$0	$0	$860,000	$0	$0	$860,000
Inspection	$0	$0	$35,000	$0	$0	$35,000
Construction Admin	$0	$0	$35,000	$0	$0	$35,000
Contingency	$0	$5,000	$70,000	$0	$0	$75,000
TOTAL	**$0**	**$95,000**	**$1,000,000**	**$0**	**$0**	**$1,095,000**

Current Status: Not yet started

278-75 WWTP Facilities Planning

Description/Background:

The most recent hydraulic and treatment capacity evaluation of the WWTP was completed in 2010 and determined that the next WWTP capacity upgrade to 18.5 million gallons per day (MGD) would cost $59 million (2010 dollars) but would not be required until 2030.

Funds are provided in FY 2023 to finish the updated capacity evaluation and facility master plan for the WWTP. The primary purpose of the master plan is to identify near and long-term improvements that will help the WWTP provide reliable and efficient wastewater treatment. The master plan will include a regulatory review, hydraulic capacity assessment, nutrient removal and recovery evaluation, biosolids management evaluation, energy recovery and resiliency assessment, and prioritized condition assessment to identify improvement projects that will optimize performance, reduce resource consumption, accommodate flow and load conditions, and consider regulatory implications and challenges.

Benefits: determines asset risk; identifies future capital investment needs

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$130,000	$0	$0	$0	$0	$130,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$20,000	$0	$0	$0	$0	$20,000
TOTAL	**$150,000**	**$0**	**$0**	**$0**	**$0**	**$150,000**

Current Status: Master plan is under development

278-78 WWTP Fermenter Improvements

Description/Background:

At the WWTP, settled solids from the primary clarifiers are pumped into a tank where they undergo fermentation under anaerobic conditions. The fermentation process breaks down some of the more complex organic molecules to form short-chain volatile fatty acids (SCVFAs) – mainly acetic and propionic acids. Using thickening equipment, the fermented product is separated into solid and liquid components; the latter is then pumped to the Nutrified Sludge (NSL) cells to serve as a food source for the biological process.

In FY 2019, the draining, cleaning, and inspection of the primary sludge fermenter found the interior lining of the tank to be in relatively good condition, but recommended improvements to the mixing system. Funding is included in FY 2023 for completion of construction of an improved mixing system and related improvements.

Benefits: restores useful life; determines asset risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$1,140,000	$0	$0	$0	$0	$1,140,000
Inspection	$50,000	$0	$0	$0	$0	$50,000
Construction Admin	$50,000	$0	$0	$0	$0	$50,000
Contingency	$110,000	$0	$0	$0	$0	$110,000
TOTAL	**$1,350,000**	**$0**	**$0**	**$0**	**$0**	**$1,350,000**

Current Status: Under Construction

278-86 WWTP Primary Clarifier Rehabilitation

Description/Background:

The WWTP has three primary clarifiers and two flow distribution boxes, all of which were covered between 2007 and 2009. Corrosion of several internal components has been accelerated due to covering of the clarifiers and inadequate foul air removal by the odor scrubber systems. Due to this corrosion, concrete rehabilitation is needed in the primary influent and effluent flow distribution boxes and the effluent troughs of Primary Clarifiers Nos. 1 and 2. These two clarifiers also require rehabilitation or replacement of internal rake arms. In addition, the scum pump stations for all three clarifiers are in need of rehabilitation to address electrical safety concerns and improved pumping.

Solids from the primary clarifiers are pumped via pumps located in the basement of Old Lab Building. A study completed in FY 2018 found that construction of a new pump station was preferable due to the high cost of rehabilitating the existing equipment and structure. The new facility will provide improved access for operations and maintenance, improved redundancy, and better pumping performance. The priority, design and location of the new facility will be coordinated with findings from CIP 278-75 WWTP Facilities Planning.

Funding is provided in FY 2024 and FY 2025 for design and construction of these improvements.

Benefits: reduces operational risk; replaces aging assets; reduces safety risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$190,000	$0	$0	$0	$190,000
Construction	$0	$0	$2,486,000	$0	$0	$2,486,000
Inspection	$0	$0	$125,000	$0	$0	$125,000
Construction Admin	$0	$0	$125,000	$0	$0	$125,000
Contingency	$0	$10,000	$274,000	$0	$0	$284,000
TOTAL	**$0**	**$200,000**	**$3,010,000**	**$0**	**$0**	**$3,440,000**

Current Status: Not yet started

278-89 WWTP Return Activated Sludge (RAS) Pumping Improvements

Description/Background:

A FY 2018 evaluation of the WWTP RAS pumping system made several recommendations to improve the reliability of the system:

- Installation of piping to allow for rapid connection of a backup diesel pump (to be purchased through future Capital Equipment budget)
- Installation of new RAS piping between Clarifier Nos. 2 and 3 and the nutrified sludge (NSL) tanks

Funds are included in FY 2025 and FY 2026 for completion of the recommended improvements.

Benefits: increases operational efficiency and redundancy

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$134,000	$0	$0	$134,000
Construction	$0	$0	$0	$215,000	$0	$215,000
Inspection	$0	$0	$0	$11,000	$0	$11,000
Construction Admin	$0	$0	$0	$11,000	$0	$11,000
Contingency	$0	$0	$16,000	$13,000	$0	$29,000
TOTAL	**$0**	**$0**	**$150,000**	**$250,000**	**$0**	**$400,000**

Current Status: Not yet started

278-91 WWTP Scum Pump Station Rehabilitation

Description/Background:

The existing scum pump station is subject to increased maintenance due to various outdated features. A preliminary engineering study was completed in FY 2018 which recommended the scope for this project. Funding is provided in FY 2026 and FY 2027 for the rehabilitation of existing pumps, electrical, and controls.

Benefits: replaces aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$55,000	$0	$55,000
Construction	$0	$0	$0	$0	$242,000	$242,000
Inspection	$0	$0	$0	$0	$10,000	$10,000
Construction Admin	$0	$0	$0	$0	$10,000	$10,000
Contingency	$0	$0	$0	$5,000	$28,000	$33,000
TOTAL	**$0**	**$0**	**$0**	**$60,000**	**$290,000**	**$350,000**

Current Status: Not yet started

278-94 Biogas Removal System Improvements

Description/Background:

Biogas is produced during the anaerobic digestion of organic materials within the digesters and fermenter at the WWTP. The biogas removal system is comprised of gas lines and valves to remove the produced gas from the treatment process. The biogas can be used within boilers to heat the digesters or excess gas can be burned via a torch. This project provides funding in FY 2023 to install a previously procured redundant torch, gas lines and control system. Additionally, this project funds the rehabilitation of the existing torch, gas lines and controls.

Benefits: increases operational efficiency; increases operational resiliency; ensures reduced use of natural gas

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$220,000	$0	$0	$0	$0	$220,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$30,000	$0	$0	$0	$0	$30,000
TOTAL	**$250,000**	**$0**	**$0**	**$0**	**$0**	**$250,000**

Current Status: Equipment purchased. Installation and repairs to be solicited in FY 2023

278-95 WWTP NPW System Assessment and Rehabilitation

Description/Background:

Non-potable water (NPW) is water that has been treated through the wastewater treatment processes and is not of drinking water quality but still may be used for many other purposes. The NPW system is comprised of non-potable water lines, valves and hydrants and serves as the water source for various purposes, such as cleaning equipment, across the WWTP. The majority of the NPW system is more than 30 years old and is made of a variety of pipe materials including ductile iron, galvanized, and PVC. This project provides funding for a condition assessment of the NPW system along with the installation of additional valves and piping to improve the resiliency of the system.

Benefits: increases operational efficiency; increases service reliability; potentially reduces energy use

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$45,000	$45,000
Construction	$0	$0	$0	$0	$256,000	$256,000
Inspection	$0	$0	$0	$0	$17,000	$17,000
Construction Admin	$0	$0	$0	$0	$17,000	$17,000
Contingency	$0	$0	$0	$0	$40,000	$40,000
TOTAL	**$0**	**$0**	**$0**	**$0**	**$375,000**	**$375,000**

Current Status: Not yet started

278-97 Digester No.3 and No.4 Condition Assessment

Description/Background:

Thickened waste activated sludge and fermented primary sludge are pumped into digester where they undergo temperature phased anaerobic digestion to produce Class A biosolids. The four existing digesters are arranged in series with the biosolids passing through three digesters operated at thermophilic temperatures, followed by one digester operated at mesophilic temperatures.

This funding covers the condition assessment for Digesters No. 3 and 4. This project will address draining and cleaning, condition assessment, and valve replacement on Digesters No. 3 and 4. The condition assessment will further inform the appropriate steps on the mixing system.

In FY 2022, Digester No. 3 experienced a roof failure and the work was accelerated. Cleanout of Digester No. 3 has been completed and condition assessment is ongoing. When remediation activities are finalized and completed for Digester No. 3 then additional cleanout and assessment work with Digester No. 4 will begin.

Benefits: determines asset risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$50,000	$50,000	$0	$0	$0	$100,000
Construction	$210,000	$830,000	$720,000	$0	$0	$1,760,000
Inspection	$10,000	$40,000	$30,000	$0	$0	$80,000
Construction Admin	$10,000	$40,000	$30,000	$0	$0	$80,000
Contingency	$20,000	$40,000	$20,000	$0	$0	$80,000
TOTAL	**$300,000**	**$1,000,000**	**$800,000**	**$0**	**$0**	**$2,100,000**

Current Status: Digester No.3 under construction, Digester No.4 pending

278-01 Wastewater Treatment Plant and Pump Station PLC Replacements

Description/Background:

A SCADA Master plan was completed in 2021 and identified that a large number of PLCs at the Wastewater Treatment Plant and remote pump stations are obsolete and in need of replacement. This project will prove funding and engineering support to replace the associated PLCs over a three-year time period from FY 2023 through FY 2025.

Benefits: replaces aging assets; increases operational efficiency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$10,000	$50,000	$70,000	$0	$0	$130,000
Construction	$80,000	$560,000	$720,000	$0	$0	$1,360,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$10,000	$40,000	$60,000	$0	$0	$110,000
TOTAL	**$100,000**	**$650,000**	**$850,000**	**$0**	**$0**	**$1,600,000**

Current Status: Not yet started

278-02 Heat Exchanger for RDTs

Description/Background:

The WWTP Solids Thickening Improvements Project was completed in 2021. Since the new thickening equipment, two Rotary Drum Thickeners (RDTs), has been in service, opportunities to improve regular maintenance activities to remove grease and optimize the thickeners with heated NPW have been identified. This project provides funding in FY 2023 for the purchase and installation of a heat exchanger on the NPW line to assist with operational activities within the solids handling building.

Benefits: increases operational efficiency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$5,000	$0	$0	$0	$0	$5,000
Construction	$45,000	$0	$0	$0	$0	$45,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$10,000	$0	$0	$0	$0	$10,000
TOTAL	**$60,000**	**$0**	**$0**	**$0**	**$0**	**$60,000**

Current Status: Not yet started

278-03 Digester No.3 and No.4 Stairwell Safety Improvements

Description/Background:

Recent updates to the NFPA 70 Standards require updates to the Digester No. 3 and No. 4 stairwell to include positive pressure, gas monitoring, door alarming and electrical improvements. Funding is provided in FY 2023 for design and in FY 2024 for construction of the needed improvements.

Benefits: reduces safety risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$45,000	$0	$0	$0	$0	$45,000
Construction	$0	$170,000	$0	$0	$0	$170,000
Inspection	$0	$5,000	$0	$0	$0	$5,000
Construction Admin	$0	$5,000	$0	$0	$0	$5,000
Contingency	$5,000	$20,000	$0	$0	$0	$25,000
TOTAL	**$50,000**	**$200,000**	**$0**	**$0**	**$0**	**$250,000**

Current Status: Not yet started

278-04 Biosolids Tank Mixing System Equipment

Description/Background:

The onsite biosolids storage tank currently utilizes a diffused air mixing system that is operated intermittently. The air mixing is not effective or efficient and operations struggles with stratification and settling issues within the tank resulting in inconsistent feeds to the solids processes. In 2018 a study was completed to evaluate hyperboloid mixing and in 2019 a study was completed to evaluate pulsed large bubble mixing in the onsite tank.

The offsite biosolids tanks utilizes recirculation pumps for mixing. This recirculation mixing is not effective or efficient. Operations experiences significant clogging and settling issues with this system.

This project will provide the funding to evaluate different mixing technologies for both the onsite and offsite biosolids storage facilities and provide a clear path forward that considers operational optimization and energy efficiency.

Benefits: increases operational efficiency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$45,000	$0	$0	$0	$0	$45,000
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$5,000	$0	$0	$0	$0	$5,000
TOTAL	**$50,000**	**$0**	**$0**	**$0**	**$0**	**$50,000**

Current Status: Consultant scoping

278-14 Wastewater Treatment Plant Lab HVAC System

Description/Background:

An assessment conducted through the Energy Management Program recommended the replacement of aging, inefficient HVAC units with more efficient units once they have reached the end of their rated life. This project provides scheduled funding for the HVAC system in the WWTP Lab.

Benefits: replaces aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$10,000	$0	$0	$0	$10,000
Construction	$0	$125.000	$0	$0	$0	$125,000
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$15,000	$0	$0	$0	$15,000
TOTAL	**$0**	**$0**	**$0**	**$0**	**$0**	**$150,000**

Current Status: Work to be bid in FY 2023

278-15 Wastewater Condition Assessments

Description/Background:

This project provides funding from FY 2024 through FY 2027 for the prioritized condition assessment of processes, structures, and pumping systems throughout the Wastewater Facilities. Near term areas in need of condition assessment include the boiler and biogas system, hot water recirculation systems, aeration basins, nitrified sludge basins and system, secondary clarifier no. 1 and no. 5, denitrification filters, post aeration and effluent pump station, and the reclaimed water wet well and pumping system. The WWTP master plan is expected to inform some of the prioritization of the above systems for assessment.

Benefits: determines asset risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$30,000	$40,000	$40,000	$40,000	$150,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$10,000	$10,000	$10,000	$10,000	$40,000
TOTAL	**$0**	**$40,000**	**$50,000**	**$50,000**	**$50,000**	**$190,000**

Current Status: Not yet started

278-16 Morgan Creek Pump Station Ventilation, Recoatings, and Improvements

Description/Background:

The Morgan Creek Pump Station does not have the appropriate air-turnover rates to maintain Class I Division II requirements. As such the station is experiencing corrosion at high rates. The corrosion is affecting all portions of the system, including the fall protection for the hatches. A current study is working on identifying ventilation improvements that would be necessary to improve air turn over and meet requirements. This project provides funding for replacement of the fall protection for each hatch in FY 2023 and then design and installation of the ventilation improvements in FY 2024 followed by the necessary recoatings in FY 2025.

Benefits: reduces safety risk, replaces aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$150,000
Design/Land	$0	$50,000	$0	$0	$0	$0
Construction	$20,000	$130,000	$70,000	$0	$0	$0
Inspection	$0	$5,000	$5,000	$0	$0	$0
Construction Admin	$0	$5,000	$5,000	$0	$0	$0
Contingency	$5,000	$10,000	$10,000	$0	$0	$40,000
TOTAL	**$25,000**	**$200,000**	**$90,000**	**$0**	**$0**	**$190,000**

Current Status: Not yet started

278-17 WWTP Aeration Basin Rehab

Description/Background:

The aeration basins were originally constructed in 1984 and have been periodically updated and modified through the past years. A previously conducted condition assessment identified corrosion on concrete and piping and valves throughout the basins. The assessment also identified several coating failures. This project provides the funding in FY 2025 and FY 2026 for the necessary repairs to rehabilitate the concrete, piping, valves and coatings as previously identified.

Benefits: replaces aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$70,000	$0	$0	$70,000
Construction	$0	$0	$300,000	$540,000	$0	$840,000
Inspection	$0	$0	$10,000	$30,000	$0	$40,000
Construction Admin	$0	$0	$10,000	$30,000	$0	$40,000
Contingency	$0	$0	$15,000	$100,000	$0	$115,000
TOTAL	**$0**	**$0**	**$405,000**	**$700,000**	**$0**	**$1,105,000**

Current Status: Not yet started

278-18 Intermediate Pump Station No.1 Improvements

Description/Background:

The Intermediate Pump Station (IPS) No. 1 was constructed in 1976. An evaluation on IPS 1 was completed in 2016 that identified that the VFD and associated electrical system was in poor condition. This project provides the funding in FY 2026 to replace VFDs, replace conduit and control wiring, conduct an arc flash study and improve ventilation.

Benefits: replaces aging assets, reduces safety risk

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$50,000	$0	$50,000
Construction	$0	$0	$0	$250,000	$0	$250,000
Inspection	$0	$0	$0	$20,000	$0	$20,000
Construction Admin	$0	$0	$0	$20,000	$0	$20,000
Contingency	$0	$0	$0	$32,000	$0	$32,000
TOTAL	**$0**	**$0**	**$0**	**$372,000**	**$0**	**$372,000**

Current Status: Not yet started

278-21 Wastewater Primary Effluent to Intermediate Pump Station Capacity Improvements

Description/Background:

The primary effluent from the primary clarifiers flows through a 30-inch effluent line from splitter box 2 through to the next stages of treatment. A 2010 hydraulic and treatment capacity study completed at the wastewater plant indicated that the primary effluent 30-inch line from splitter box 2 cannot carry the 43.5 peak flow of the plant and it must be diverted through Trickling Filter 2. This project is expected to evaluate adding an additional primary effluent line and modifying the existing lines to bypass the trickling filters through a study with funding in FY 2027. This project shall be done in accordance with findings from the Wastewater Treatment Master Plan (278-75).

Benefits: replaces aging assets, increases operational efficiency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$40,000	$40,000
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$10,000	$10,000
TOTAL	**$0**	**$0**	**$0**	**$0**	**$50,000**	**$50,000**

Current Status: Not yet started

Category 279: Reclaimed Water

Background

In April 2009, OWASA began operating a reclaimed water (RCW) system that provides non-drinking water for certain uses that were previously met with drinking water. RCW is the highly treated water produced through advanced treatment at the Wastewater Treatment Plant (WWTP). Disinfection is provided by ultraviolet light and chlorine.

Reclaimed Water System

Among other benefits, the RCW system:

- enables OWASA to meet non-drinking water needs in a cost-effective manner while freeing up the community's drinking water supply and treatment capacities to meet essential needs;
- lowers the risk of a water shortage for all customers during drought conditions;
- defers or eliminates the need for costly water supply and/or treatment facilities; and
- requires about 35% less energy per 1,000 gallons of water supplied compared to our drinking water system.

Following the record drought of 2001/2002, OWASA and the University of North Carolina at Chapel Hill (UNC) partnered to develop the RCW system to meet certain non-drinking water demands on campus. In April 2006, OWASA and UNC entered into a contract in which UNC agreed to pay the entire cost of building the RCW system, and OWASA agreed to operate and maintain the system. Capital and operating costs for the RCW system are paid for solely by OWASA's RCW customers, rather than by the entire customer base.

OWASA received $1.6 million in grant funds from the North Carolina Clean Water Management Trust Fund to pay for engineering design and permitting costs and a $625,500 grant from the U.S. Environmental Protection Agency to help pay for construction of the RCW pump station and storage tank. The system was completed in 2009 at a cost of about $14 million.

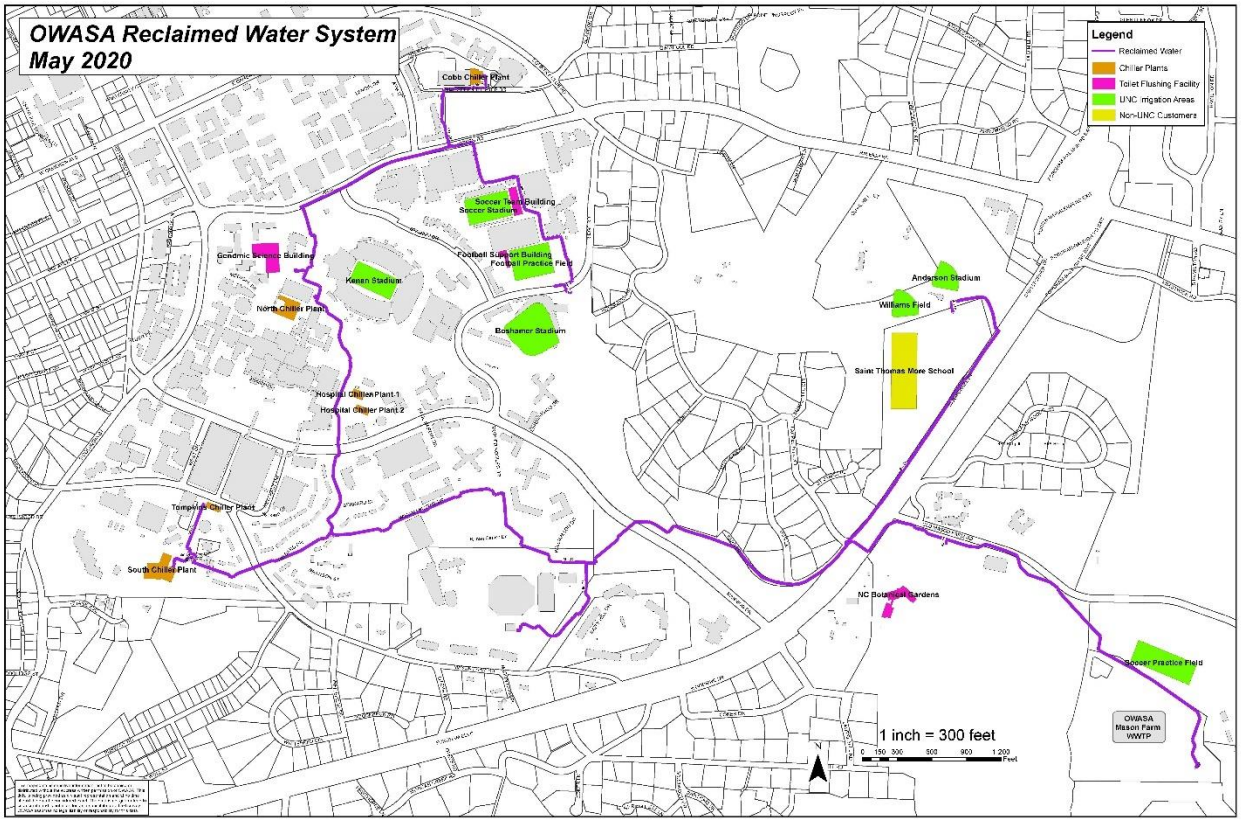
RCW is used by UNC and UNC Hospitals as make-up water for the cooling towers at the five major chilled water plants on the main campus. It is also used for irrigating athletic fields and for toilet flushing at the Genomic Sciences Building and NC Botanical Gardens Visitor Education Center. In 2011, OWASA began providing RCW to a nearby private customer (St. Thomas More School) for irrigating an all-purpose athletic field and toilet flushing.

Existing Facilities

The RCW system consists of a 600,000-gallon RCW storage tank and pumping station at the WWTP, a bulk-fill facility for loading RCW into tank trucks, and about five miles of RCW pipe ranging in size from 6 to 24 inches in diameter.

The RCW system currently is configured to meet a total peak day demand of 3 million gallons per day (MGD). The system was designed and constructed to allow for cost-effective expansion to about 5 MGD in

the future. RCW average demands for FY 2022 were 0.7 MGD and are expected to increase to about 0.82 MGD by 2025 based on the latest information provided by UNC. The system's current configuration will meet projected RCW demands for the foreseeable future.



Planned Improvements

The CIP includes the funding of the replacement of eight flanged coupling adapters along the reclaimed water main along with a water quality evaluation of the reclaimed water.

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
279-13	Reclaimed Water Coupling Replacement	$490,000	$0	$0	$0	$0	**$490,000**
279-14	Reclaimed Water - Water Quality Evaluation	$0	$75,000	$0	$0	$0	**$75,000**
279-15	Reclaimed Water Recap	$0	$0	$0	$80,000	$80,000	**$160,000**
279	**Category Total**	**$490,000**	**$75,000**	**$0**	**$80,000**	**$80,000**	**$725,000**

279-13 Reclaimed Water Coupling Replacements

Description/Background:

A flanged coupling adapter (FCA) on the Reclaimed Water (RCW) main failed in 2019, requiring shutdown of the system to replace the component. Investigation revealed that the welds on flanged coupling adapters (FCA) had failed due to internal corrosion, and that proactive inspection and replacement of further similar FCA's was warranted. Preliminary visual inspection was conducted in 2019. Remaining scope includes the phased replacement of FCA's at nine locations within the system.

Benefits: replaces aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$	$0	$0	$0	$0	$0
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$400,000	$0	$0	$0	$0	$400,000
Inspection	$25,000	$0	$0	$0	$0	$25,000
Construction Admin	$125,000	$0	$0	$0	$0	$25,000
Contingency	$40,000	$0	$0	$0	$0	$40,000
TOTAL	**$490,000**	**$0**	**$0**	**$0**	**$0**	**$490,000**

Current Status: Construction Contract is Awarded

279-14 Reclaimed Water – Water Quality Evaluation

Description/Background:

This project provides the funding to perform a study on the incoming wastewater to assess the sources of conductivity within the collection system and assess if there are meaningful opportunities to reduce conductivity levels in the system and throughout the wastewater treatment process. This project will also assess the impacts from the concentrated blowdown discharges at the UNC Chiller Plants during the summer months and assess the benefits of adding a corrosion inhibitor to the reclaimed water system.

Benefits: increases operational efficiency

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$70,000	$0	$0	$0	$70,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$5,000	$0	$0	$0	$5,000
TOTAL	**$0**	**$75,000**	**$0**	**$0**	**$0**	**$75,000**

Current Status: Not yet started

279-15 Reclaimed Water Recapitalization

Description/Background:

This project provides funding for replacement, rehabilitation, or improvement of components of the reclaimed water system in order to maintain reliable, efficient performance. Funding is provided in the fourth and fifth fiscal years of any given five-year CIP to assure that capital investment decisions account for some rate of asset replacement in future years where specific projects are not yet identified. This placeholder funding is the primary mechanism used to gauge infrastructure replacement needs not only over the five-year CIP, but over a fifteen-year financial planning horizon. The funding totals are adjusted to account for rehabilitation projects funded elsewhere in this category (279 – Reclaimed Water).

Benefits: renews or extends the useful life of aging assets

Funding:

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	5-Year Total
Planning	$0	$0	$0	$80,000	$80,000	$160,000
Design/Land	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Inspection	$0	$0	$0	$0	$0	$0
Construction Admin	$0	$0	$0	$0	$0	$0
Contingency	$0	$0	$0	$0	$0	$0
TOTAL	**$0**	**$0**	**$0**	**$80,000**	**$80,000**	**$160,000**

Current Status: Long-term funding to be allocated to future identified projects

Category 280: Central Office and Operations

Background

OWASA employs approximately 139 people. The majority work at the Jones Ferry Road Administration Building and the Operations Center. A safe, functionally efficient workplace is vital to maintaining high employee productivity; top notch customer service; the ability to store essential vehicles, equipment and materials; and maintenance of critical infrastructure.

Jones Ferry Road Administration Building

Existing Facilities

OWASA's administrative offices, warehouse, and storage facilities are located at the 17-acre site on Jones Ferry Road in Carrboro. The Administration Building, completed in 1990, is about 22,300 square feet (SF) in size and includes a large general-purpose room for public use by community groups. The 36,000 SF Operations Center, which was completed in FY 2004, houses the Water Distribution and Wastewater Collection Department, warehouse operations, fleet maintenance, material and equipment storage, and a vehicle wash facility.

Recent Improvements

Renovations to the Administration Building completed in FY 2005 included reconfiguring into office space the areas vacated by the Water Distribution and Wastewater Collection Department, including the warehouse, after it was relocated to the Operations Center. This increased the amount of finished office space in the Administration Building from 19,900 to 22,300 SF and provided a new roof, repaired the exterior facade and exterior canopy on the employee entrance, and relocated the rear entrance. The Administration Building HVAC system was commissoned in 2019 and is responsible for approximately $11,500 in electrical expenses and approximately $4,500 in natural gas expenses in FY 2022.

Planned Improvements

The current CIP does not include any funding for the Central Office or Operations Center

Category 280: Central Office and Operations

		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Five-Year Total
		$0	$0	$0	$0	$0	**$0**
280	**Category Total**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Abbreviations

AC	Asbestos Cement	MLSS	Mixed Liquor Suspended Solids
BG	Billion Gallons	MSL	Mean Sea Level
CI	Cast Iron	NCDOT	North Carolina Department of Transportation
CIB	Capital Improvements Budget	NCWRC	North Carolina Wildlife Resource Commission
CIP	Capital Improvements Program	NFPA	National Fire Protection Association
DI	Ductile Iron	NPW	Non-potable Water
FCA	Flanged Coupling Adapters	NSL	Nutrified Sludge
FY	Fiscal Year	O&M	Operations and Maintenance
GHG	Greenhouse Gas	OWASA	Orange Water and Sewer Authority
GIS	Geographic Information System	PLC	Programmable Logic Controller
gpm	gallons per minute	PV	Photovoltaic
HVAC	Heating, Venting, and Air Conditioning	PVC	Polyvinyl Chloride
IPS	Intermediate Pump Station	RAS	Return Activated Sludge
JLP	Jordan Lake Partnership	RCW	Reclaimed Water
kW	Kilowatt	RFQ	Rquest for Qualifications
LRWSP	Long Range Water Supply Plan	RDT	Rotary Drum Thickeners
MGD	Million gallons per day	SCADA	Supervisory Control and Data Acquisition

SCVFA	Short-Chain Volatile Fatty Acids	VFD	Variable frequency drive
SF	Square Feet	WIP	Western Intake Partnership
UNC	University of North Carolina	WTP	Jones Ferry Water Treatment Plant
UV	Ultraviolet		