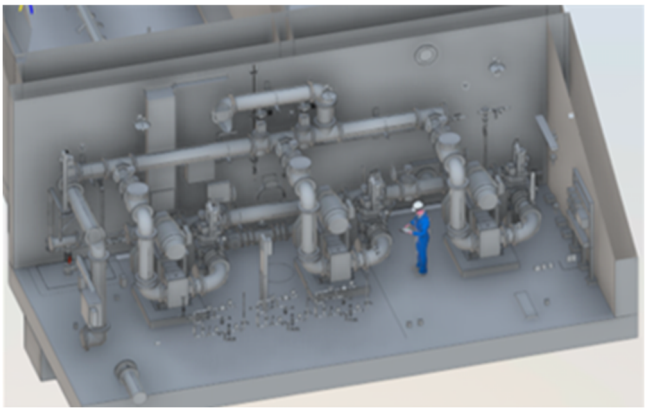
GREAT LAKES
WATER AUTHORITY

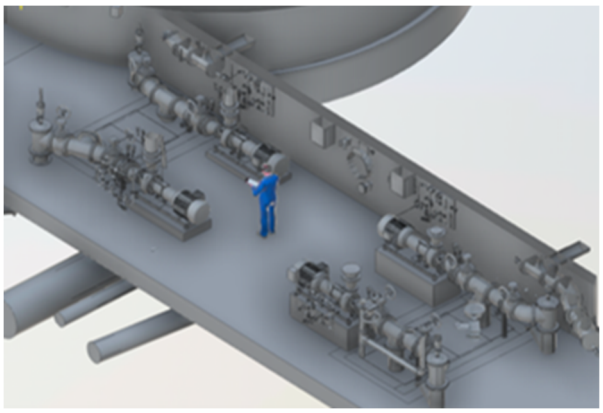
Water Resource Recovery Facility (WRRF)

Improvements to the Sludge Feed System for Solids Processing

CIP No. 213006

Project Plan Summary
April 2025





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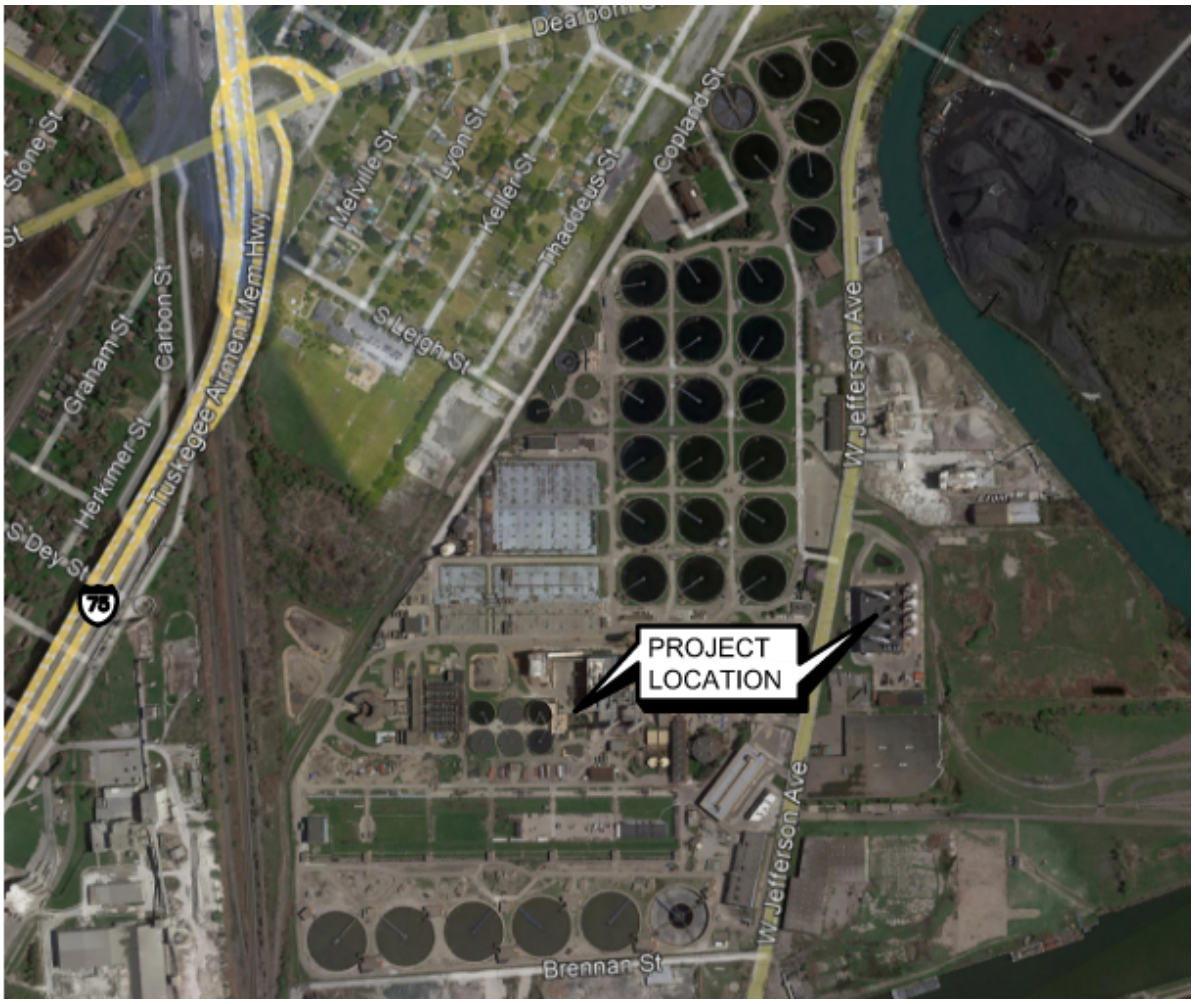

WRRF Aerial Map (9300 W. Jefferson Ave)

System Description

The WRRF generates solids through primary and secondary clarification. Solids handling processes include gravity thickening, blending, storage, dewatering, incineration, and drying treatment processes. Thickened primary sludge (TPS) and thickened waste activated sludge (TWAS) are blended prior to being discharged into six sludge storage tanks (SSTs). The sludge feed system is comprised of six sludge storage tanks (4 circular, 2 rectangular), six sludge feed pumps, piping, valves, instruments, and appurtenances. The system conveys sludge through pressurized sludge headers from the sludge storage tanks to flow control equipment upstream of dewatering equipment located in three dewatering facilities.

These dewatering facilities include belt filter presses (BFPs) located in Sludge Dewatering Complex I (C-I); BFPs in Sludge Dewatering Complex II (C-II); and centrifuges (CFGs) in the Biosolids Drying Facility (BDF).

The sludge feed system is a critical step in the WRRF's ability to process solids and maintain the facility's solids throughput capacity. System failure could result in excessive solids buildup which could cause inefficiencies in the WRRF's treatment processes and potentially lead to poor effluent water quality, odor issues, and permit compliance issues.

Summary of Project Needs

This project is focused on improving system reliability, flexibility, and ease of operation and maintenance. Numerous components of the sludge feed system are approaching the end of their expected useful lives. The sludge feed pumps are oversized for the feed rates required at each dewatering facility based on the current mode of operation. In addition, the sludge feed piping “dead ends” at each of the dewatering facilities, resulting in sludge header pressures that are difficult to maintain within the operating range required for the sludge flow control equipment upstream of the dewatering equipment.

Specific project issues and needs include:

- SST ultrasonic level sensors are inaccurate and difficult to access.
- System equipment is approaching the end of expected useful lives.
- SFP pump types and sizing result in inefficient operation and limits operational flexibility.
- Excessive rags in tanks can clog pumps.
- SSTs 1-4 Pipe Gallery has been prone to process flooding events.
- Limited washdown stations for process areas.
- Poor lighting in pump process areas.
- Sludge feed piping “dead ends” at each of the dewatering facilities, resulting in sludge header pressures that are difficult to maintain within the operating range requirements.
- Excessive wear/frequent replacement of the BDF sludge feed header recirculation line pinch valve that is used to maintain system pressure. Results in frequent replacements and system downtime.
- Limited and aging instruments results in challenges associated with monitoring pumping system performance and troubleshooting issues.
- Limited system flushing locations.
- Limited interconnections between feed headers to allow for sludge feed system operational flexibility.

Proposed Improvements

The proposed improvements are based on evaluation of cost and non-cost parameters to determine the appropriate improvements for implementation.

SSTs 1-4 Pipe Gallery

- Replacement of SFPs 1-4, seal water booster pumps, and associated piping and appurtenances. New equipment sized and configured to incorporate sludge conveyance loops and provide discharge location flexibility.
- New process sump and sump pumping system to mitigate gallery flooding.
- Replacement of HVAC equipment.
- Lighting upgrades.
- Additional pipe flushing and washdown station locations.
- New lifting devices and appurtenances to facility maintenance activities.
- Civil, Architectural, Structural, Plumbing, Electrical, and I&C improvements needed to support the process mechanical and HVAC improvements.

SSTs 5/6 Pump Building

- Replacement of SFPs 5 and 6 and associated piping and appurtenances. New equipment to include three rotary lobe sludge feed pumps with upstream grinders, sized and configured to incorporate sludge conveyance loops and provide discharge location flexibility.
- Replacement of building sump pumps.
- Replacement of HVAC equipment.
- Lighting upgrades.
- Additional pipe flushing and washdown station locations.
- New floor opening and lifting devices and appurtenances to facility maintenance activities.
- Civil, Architectural, Structural, Electrical, and I&C improvements needed to support the process mechanical, plumbing, and HVAC improvements.

Miscellaneous Improvements

- Sludge Dewatering Complex I, Sludge Dewatering Complex II, and Biosolids Dryer Facility: New piping and instrumentation to provide sludge conveyance loops.
- Sludge Processing Complex A: Conversion of existing room to SFP Electrical Room to house the new SFP VFDs.
- Sludge Processing Complex A: Replacement of Control and Telecom Rooms HVAC equipment.

Potential Alternatives

Alternative analyses for the WRRF Improvements to the Sludge Feed System for Solids Processing project were performed as part of the conceptual design phase and are documented in technical memorandums. Alternatives considered included no action, in-kind equipment replacement, and system enhancements to improve performance.

Environmental Evaluation

The project is located within existing facilities at the WRRF and BDF sites. Disturbance of traffic patterns outside of the fence lines are not anticipated. Short-term and long-term impacts due to construction activities such as noise, dust, and traffic disruption cannot be avoided but are expected to be limited to within the project site limits.

Where civil/site construction activities are anticipated, adverse environmental impacts will be mitigated through designed and well-planned construction sequencing. Hours of operation for noisy equipment will be specified and limited. Dust and soil deposits on WRRF access roads will be controlled though watering and frequent street sweeping. Construction area footprints will be minimized and WRRF access road traffic control measures will be implemented. Site restoration will minimize the adverse impacts of construction, and the implementation of a Soil Erosion and Sedimentation Control program will minimize the impacts due to ground disturbance, when such disturbance is found to be necessary. Specific techniques will be specified in the construction contract documents.

Estimated Project Cost

Item	Estimated Value
Design Cost	$3,600,000
Construction Admin Cost	$1,750,000
Construction Cost	$19,300,000
Contingency Cost	$1,900,000
Total Project Cost	**$26,550,000**
Annualized Cost of Project*	$1,310,000
Service Area Households	1,200,000
Illustrated, Estimated End User Impact per Household per Year	$1.09

*Assuming SRF discount rate of 2.75% over 30 years

The estimated total project cost of $26,550,000 will be incorporated into the regional system revenue requirement and allocated to member partners through the Sewer charges methodology process. GLWA serves approximately 2.8 million residents in approximately 1.2 million households. On a per household basis, this would equate to approximately $1.09 per year.

Proposed Implementation Schedule

Item	Date
Design Notice to Proceed	March 2023
Design Complete	April 2025
Bid Opening	October 2025
Construction Notice to Proceed	March 2026
Construction Substantial Completion	November 2028
Construction Final Completion	May 2029