# Wastewater Operations CIP Presentation

*Dan Alford, Director of Wastewater Engineering and Maintenance*

GLWA
Great Lakes Water Authority

# WRRF Pump Station 1 Improvements

## Project Stats

- CIP Number: 211006
- Project Number: CS-102
- Project Engineer: Jason Williams
- Total CIP Budget: $26,776,000
- Dates
  - Completion of Design, September 2021
  - Start of Construction, January 2022
  - End of Construction, March 2025


GLWA FY 2021-2025 CIP

WRRF PS No. 1 Improvements

211006

Innovation
Conceptual WW MP
Water MP Right Sizing
Reliability/Redundancy
NEWTP Repurposing

Project Status Active
CIP Type Project
Project New To CIP

Pump Station 1 Interior

Project Engineer/Manager Jason Williams
Director Dan Alford
Managing Dept WW Design Eng
Date Original Business Case Prepared 4/13/2017
Year Project Added to CIP 2016

Budget Wastewater
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit
Fund and Cost Center Wastewater - 5421-892211

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

Scope of Work / Project Alternatives The study/design work will identify all major parts including impellers and wear rings to be refurbished for each pump and all related appurtenances. The construction services will provide rehabilitation and/or replacement as determined in the study and design along with the sequencing of pump shutdown throughout the rehabilitation period.
Investigation and evaluation of all the inlet gates, outlet gates and associated actuators, Motor Control Centers (MCCs) and other related equipment, HVAC system, Control System and provide recommendation and design for rehabilitation or replacement are also part of the scope.

Other Important Info Challenges: Maintaining the adequate pumping capacity during construction.

Project History: GLWA operate two raw sewage pumping stations: PS-1 and PS-2, at the Water Resources Recovery Facility. Raw wastewater (influent) from the collection system flows to the Influent Pumping Station through the Detroit River Interceptor (16 feet in diameter), Oakwood Interceptor (12.5 feet in diameter) and North Interceptor East Arm (NIEA). The main Influent Pumping Station No. 1 (PS-1) was constructed in the 1930s. PS-1 has eight constant speed pumps of various capacities (six were installed in the 1940s and two more were added in 1956) and has a Firm Capacity (largest pump out of service) of 1,225 MGD during wet weather event. The Influent Pumping Station No. 2 (PS-2) has eight raw sewage pumps (combination of variable and constant speed pumps) with a Firm Capacity of 805 MGD during wet weather event.
The pumps at PS-1 were rehabilitated in 2004 and 2005 under PC-744 project (DWP 1007).

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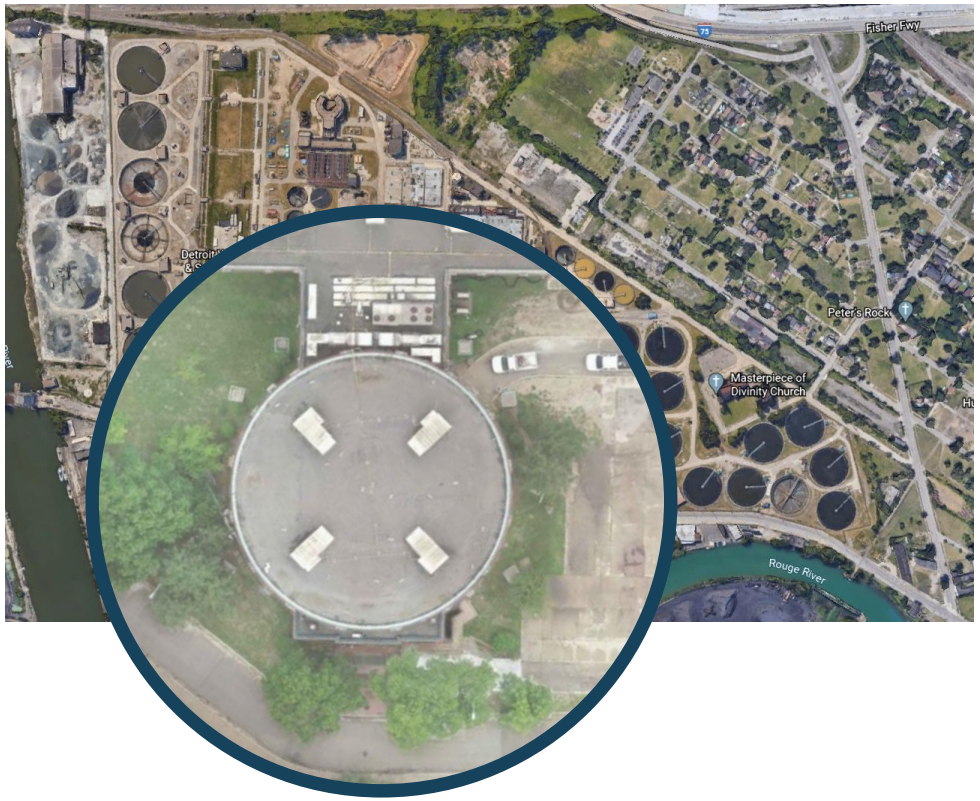
# WRRF Pump Station 1 Improvements

## Project Overview

- Ensure 1.2 BGD reliable pumping capacity and improve hydraulics
- Improve flow metering
- Improve grit distribution in the system
- Rehabilitate/replace gates and actuators
- Rehabilitate architectural, electrical and mechanical aspects of pump station

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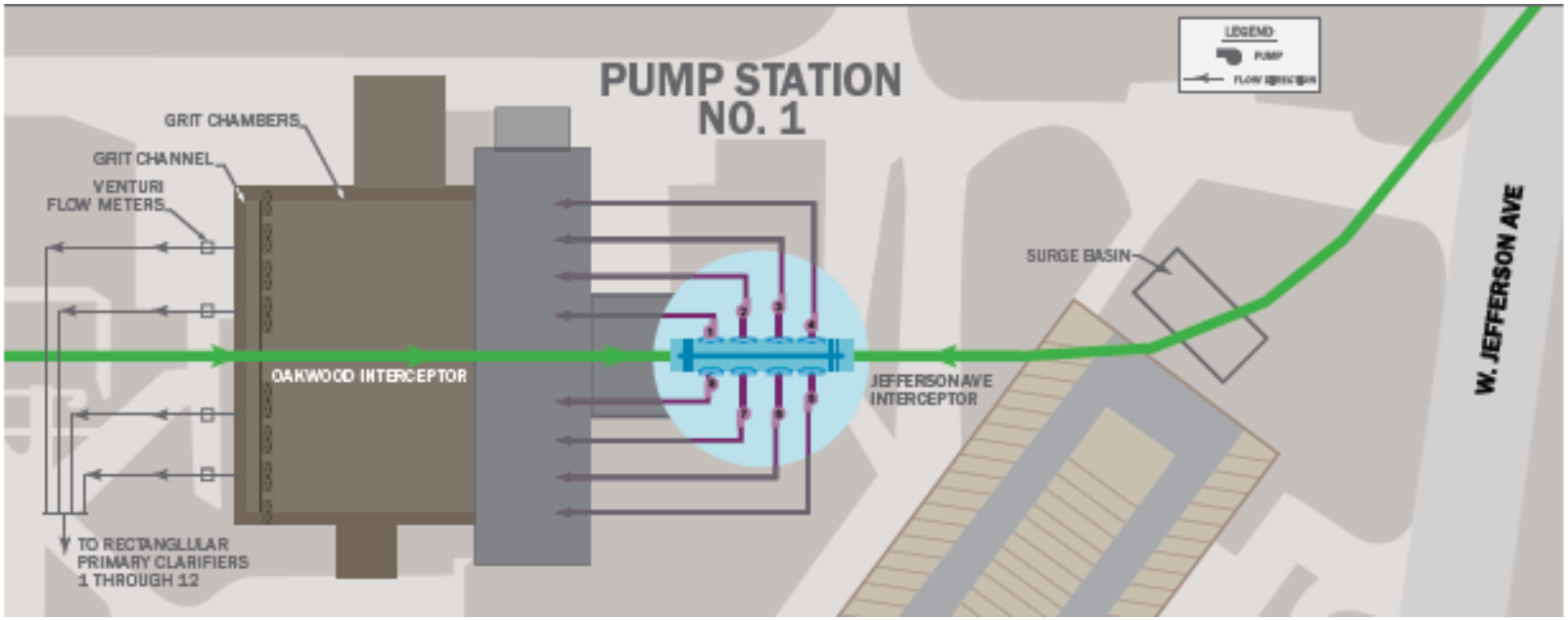
# WRRF Pump Station 1 Improvements

## Study

- Physical and CFD models of wetwell required

## Major Changes

- Variable speed pumps
- Improved maintenance access
- Right sizing of utilities

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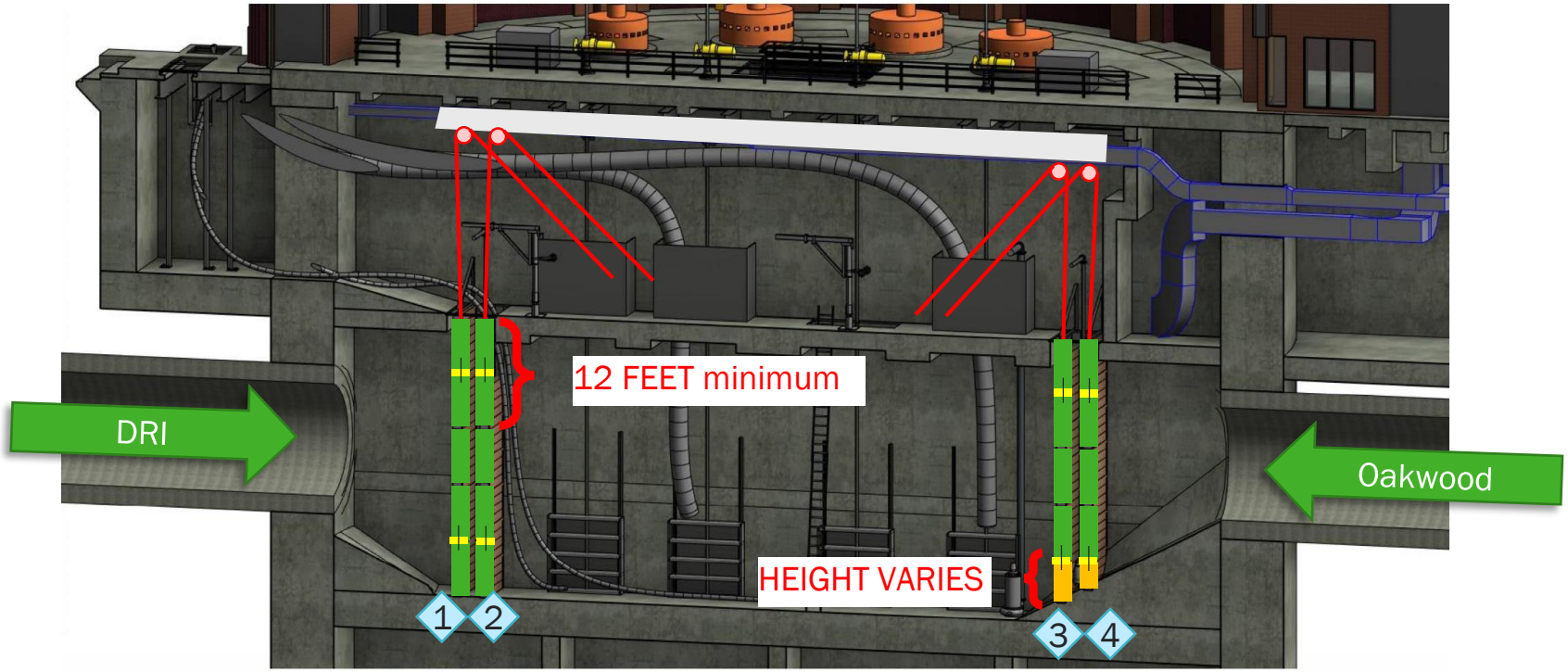
# WRRF Pump Station 1 Improvements

## Project Update

- Current Status: In Study Phase, new stop logs required to access wet wells, continuing with technical memo production and review

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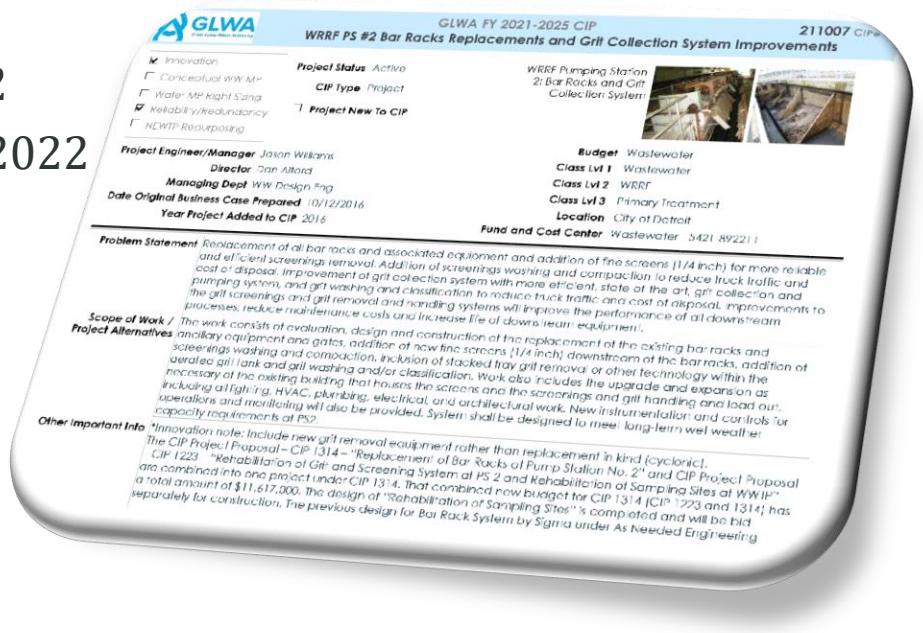
# Pump Station 2 Bar Screen and Grit System

## Project Stats

- CIP Number: 211007
- Project Number: 1904337
- Project Engineer: Jason Williams
- Total CIP Budget: $76,596,000
- Dates
  - Design Award, July 2020
  - Completion of Design, March 2022
  - Start of Construction, September 2022
  - End of Construction,  May 2027


GLWA FY 2021-2025 CIP

211007

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

Innovation
Concealed WW MP
Water MP Right Sizing
Reliability/Redundancy
NDWTP Repurposing

Project Status Active
CIP Type Project
Project New To CIP

WRRF Pumping Station 2: Bar Racks and Grit Collection System

Project Engineer/Manager Jason Williams
Director Dan Allard
Managing Dept WW Design Eng
Date Original Business Case Prepared 10/12/2016
Year Project Added to CIP 2016

Budget Wastewater
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Primary Treatment
Location City of Detroit
Fund and Cost Center Wastewater 5421 892211

Problem Statement Replacement of all bar racks and associated equipment and addition of fine screens (1/4 inch) for more reliable and efficient screenings removal. Addition of screenings washing and compaction to reduce truck traffic and cost of disposal. Improvement of grit collection system with more efficient, state of the art, grit collection and pumping system, and grit washing and classification to reduce truck traffic and cost of disposal. Improvements to the grit screenings and grit removal and handling systems will improve the performance of all downstream processes, reduce maintenance costs and increase life of downstream equipment.

Scope of Work / Project Alternatives The work consists of evaluation, design and construction of the replacement of the existing bar racks and ancillary equipment and gates, addition of new fine screens (1/4 inch) downstream of the bar racks, addition of screenings washing and compaction, inclusion of stacked tray grit removal or other technology within the aerated grit tank and grit washing and/or classification. Work also includes the upgrade and expansion as necessary of the existing building that houses the screens and the screenings and grit handling and load out, including all lighting, HVAC, plumbing, electrical, and architectural work. New instrumentation and controls for operations and monitoring will also be provided. System shall be designed to meet long-term wet weather capacity requirements at PS2.

Other Important Info *Innovation note: Include new grit removal equipment rather than replacement in kind (cyclonic).
The CIP Project Proposal – CIP 1314 – "Replacement of Bar Racks at Pump Station No. 2" and CIP Project Proposal CIP 1223 "Rehabilitation of Grit and Screening System at PS 2 and Rehabilitation of Sampling Sites at WWTP" are combined into one project under CIP 1314. That combined new budget for CIP 1314 (CIP 1223 and 1314) has a total amount of $11,617,000. The design of "Rehabilitation of Sampling Sites" is completed and will be bid separately for construction. The previous design for Bar Rack System by Sigma under As Needed Engineering

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# Pump Station 2 Bar Screen and Grit System

## Project Overview

- Rehabilitate Screenings Building Channels, Grit Channels, Gates, Stop Logs, and Supporting Systems

## Study

- Bar Rack to fine screening
- Grit Removal Technology
- Conveying Systems
- Grit and Screenings Washing
- Grit and Screenings Compacting

## Major Changes

- Removing Clamshell Crane
- Increasing Screening (Fine and Course)
- Improved Grit Removal


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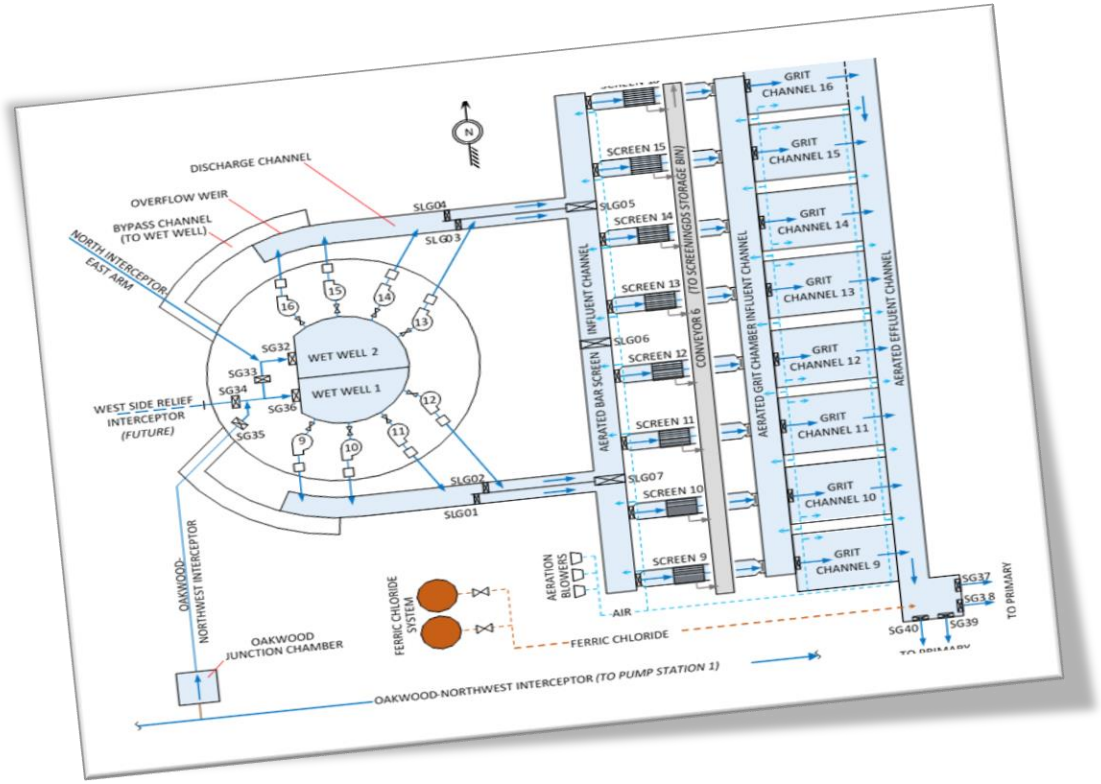
# Pump Station 2 Bar Screen and Grit System

## Project Update

- Current Status; Consulting Proposals returned and under negotiation

## Upcoming Events

- Award Contract

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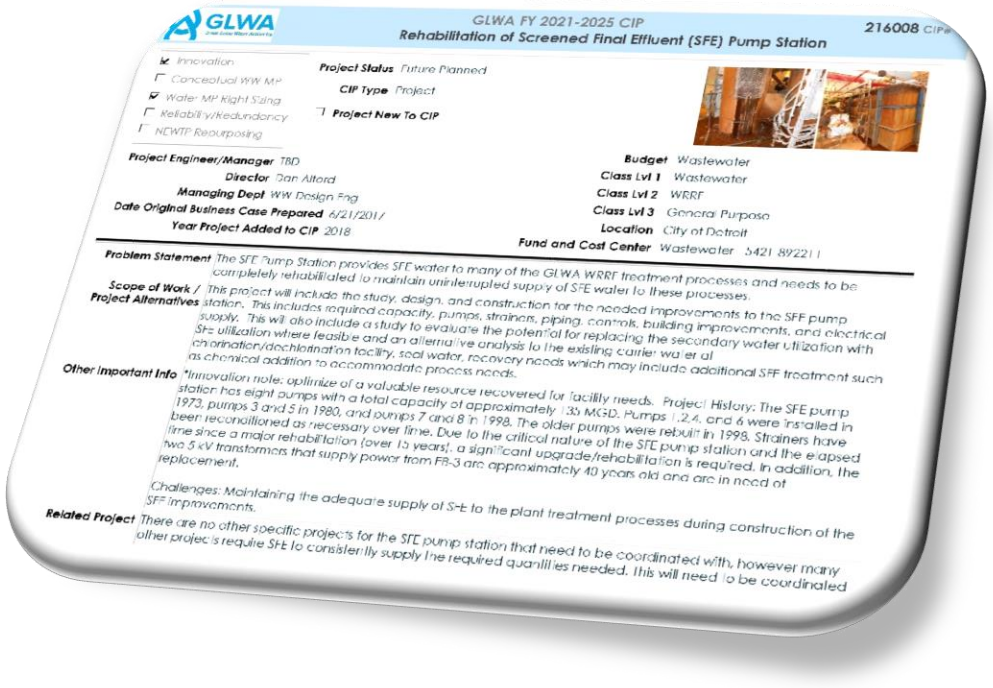
# Secondary Final Effluent Project

## Project Stats

- CIP Number: 216008
- Project Number: 2000970
- Project Engineer: Chris Wilson
- Total CIP budget: $37,000,000
- Dates
    - Approval, August 2020
    - NTP, November 2020
    - GMP, March 2022


GLWA FY 2021-2025 CIP

Rehabilitation of Screened Final Effluent (SFE) Pump Station

216008

Innovation
Conceptual WW MP
Water MP Right Sizing
Reliability/Redundancy
NCWTP Repurposing

Project Status Future Planned
CIP Type Project
Project New To CIP

Project Engineer/Manager TBD
Director Dan Allard
Managing Dept WW Design Eng
Date Original Business Case Prepared 6/21/2017
Year Project Added to CIP 2018

Budget Wastewater
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 General Purpose
Location City of Detroit
Fund and Cost Center Wastewater 5421 892211

Problem Statement The SFE Pump Station provides SFE water to many of the GLWA WRRF treatment processes and needs to be completely rehabilitated to maintain uninterrupted supply of SFE water to these processes.

Scope of Work / Project Alternatives This project will include the study, design, and construction for the needed improvements to the SFE pump station. This includes required capacity, pumps, strainers, piping, controls, building improvements, and electrical supply. This will also include a study to evaluate the potential for replacing the secondary water utilization with SFE utilization where feasible and an alternative analysis to the existing carrier water at chlorination/dechlorination facility, seal water, recovery needs which may include additional SFE treatment such as chemical addition to accommodate process needs.

Other Important Info *Innovation note: optimize of a valuable resource recovered for facility needs. Project History: The SFE pump station has eight pumps with a total capacity of approximately 135 MGD. Pumps 1,2,4, and 6 were installed in 1973, pumps 3 and 5 in 1980, and pumps 7 and 8 in 1998. The older pumps were rebuilt in 1998. Strainers have been reconditioned as necessary over time. Due to the critical nature of the SFE pump station and the elapsed time since a major rehabilitation (over 15 years), a significant upgrade/rehabilitation is required. In addition, the two 5 kV transformers that supply power from FB-3 are approximately 40 years old and are in need of replacement.

Challenges: Maintaining the adequate supply of SFE to the plant treatment processes during construction of the SFE improvements.

Related Project There are no other specific projects for the SFE pump station that need to be coordinated with, however many other projects require SFE to consistently supply the required quantities needed. This will need to be coordinated

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# Secondary Final Effluent Project

## Project Overview

- Construct New SFE Facility to Supply Both SFE and Dilution Water
- Utilize a Progressive Design Build Contract
- Utilize a Guaranteed Savings Model for Construction Project

## Demolition *(Concept)*

- SFE Pumps, Strainers, Electrical Transformers, and Building

## Major Changes *(Concept)*

- Move Location
- Right Sized Pumps
- Reduced System Pressure
- Complete Filtration with Chemical Addition


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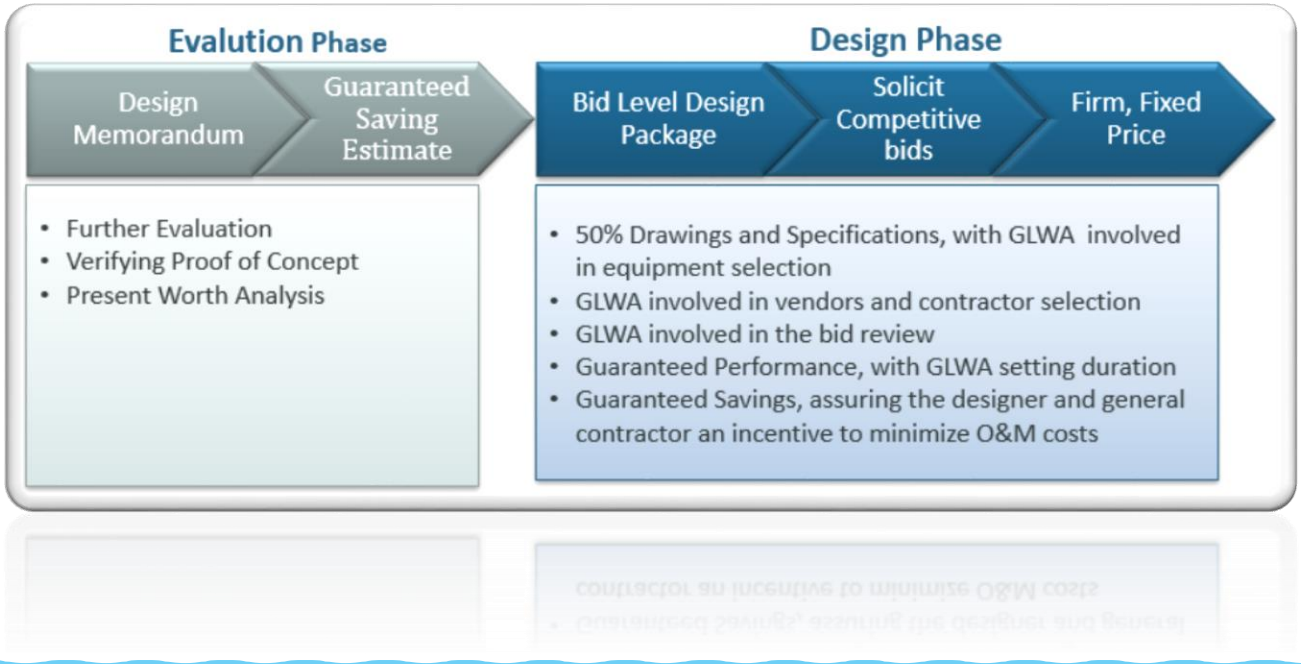
# Secondary Final Effluent Project

## Project Update

- Current Status; Reviewing DB Agreement including Scope of Work

## Upcoming Events

- Contract Reviews

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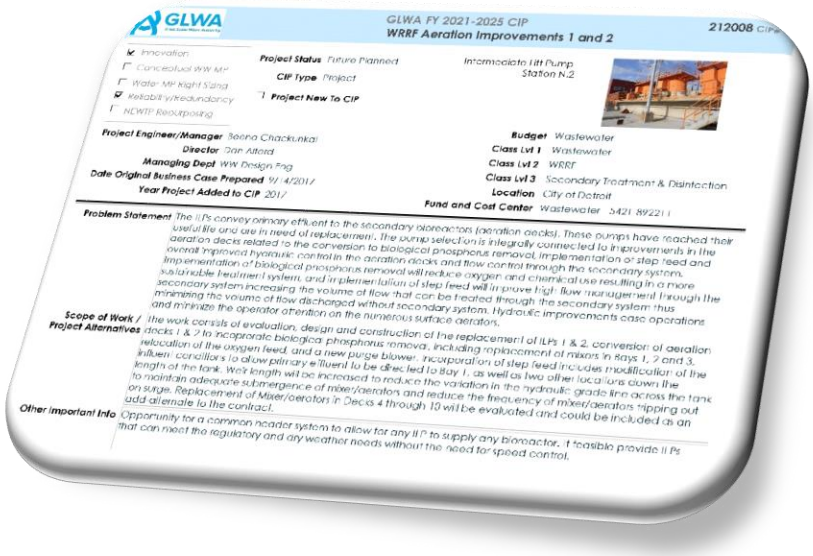
# Aeration System Improvements

## Project Stats

- CIP Number: 212008
- Project Number: Part of CS-272 Task# 7
- Project Engineer: Chris Wilson
- Total CIP Budget: $76,000,000
- Dates
    - Study Report, April 2021
    - RFP, September 2021
    - Construction Start, February 2022
    - Construction Complete, January 2026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GLWA FY 2021-2025 CIP

WRRF Aeration Improvements 1 and 2

212008

Innovation
Conceptual WW MP
Water MP Right Sizing
Reliability/Redundancy
NDWTF Relocp'osing

Project Status Future Planned
CIP Type Project
Project New To CIP

Intermediate Lift Pump Station N-2

Project Engineer/Manager Reena Chackunkal
Director Dan Allard
Managing Dept WW Design Eng
Date Original Business Case Prepared 9/14/2017
Year Project Added to CIP 2017

Budget Wastewater
Class Lvl 1 Wastewater
Class Lvl 2 WRRF
Class Lvl 3 Secondary Treatment & Disinfection
Location City of Detroit
Fund and Cost Center Wastewater 5421 892211

Problem Statement The IIPs convey primary effluent to the secondary bioreactors (aeration decks). These pumps have reached their useful life and are in need of replacement. The pump selection is integrally connected to improvements in the aeration decks related to the conversion to biological phosphorus removal, implementation of step feed and overall improved hydraulic control in the aeration decks and flow control through the secondary system. Implementation of biological phosphorus removal will reduce oxygen and chemical use resulting in a more sustainable treatment system, and implementation of step feed will improve high flow management through the secondary system increasing the volume of flow that can be treated through the secondary system thus minimizing the volume of flow discharged without secondary system. Hydraulic improvements ease operations and minimize the operator attention on the numerous surface aerators.

Scope of Work / Project Alternatives The work consists of evaluation, design and construction of the replacement of IIPs 1 & 2, conversion of aeration decks 1 & 2 to incoporate biological phosphorus removal, including replacement of mixers in Bays 1, 2 and 3, relocation of the oxygen feed, and a new purge blower. Incorporation of step feed includes modification of the influent conditions to allow primary effluent to be directed to Bay 1, as well as two other locations down the length of the tank. Weir length will be increased to reduce the variation in the hydraulic grade line across the tank to maintain adequate submergence of mixer/aerators and reduce the frequency of mixer/aerators tripping out on surge. Replacement of Mixer/aerators in Decks 4 through 10 will be evaluated and could be included as an add alternate to the contract.

Other Important Info Opportunity for a common header system to allow for any IIP to supply any bioreactor, if feasible provide IIPs that can meet the regulatory and dry weather needs without the need for speed control.

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# Aeration System Improvements

## Project Overview

- Rehabilitate Aeration Decks 1 and 2 to Support Long Term Operations
- Rehabilitate ILP #1 and #2 (Pump and Motor) to Support Long Term Operations

## Major Changes *(Concept)*

- Add Anaerobic Zone
- Add Step Feed to Reduce Washout
- Open Last Bay to Increase pH
- Reduce Mixing Costs


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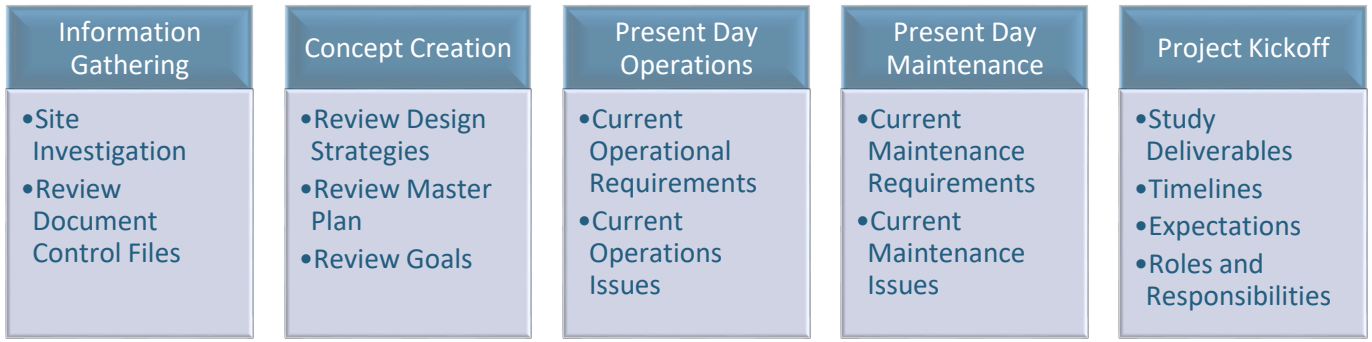
# Aeration System Improvements

## Project Update

- Current Status; Reviewing Scope of Work with AECOM for Study and RFP Development.

## Upcoming Events

- Engineering, Operations, and Maintenance Staff Workshops with AECOM.



# Short Term Engineering Projects

## Project List

- Sludge Hopper Structure Demolition at C-I Incineration
- Replace Reducers and RAS Flow Meters in Five B-houses
- Parking Structure Repairs
- Bird Centrifuge Hopper Demolition
- Diesel Storage Tank Rehabilitation
- JOC for I&C calibration
- Improve Access to Railcar Gate
- Complex A Biosolids Dryer Facility (BDF) Sludge Feed Pump
- Yard Piping Rehabilitation
- Complex II bridge and duct work
- Pump Station #2 Outdoor Switchgear

## Replacement

- Incinerator Complex II, Refractory Inspection and Repair
- Controls upgrade for Generators D1 and D2
- Complex A sub basement pump gallery Concrete rehab
- Aeration Deck Repair
- Grit Flight for Pump Station 1
- EB1 Roof Repair
- Primary Circular Clarifier Flow Meter Replacement
- Grit Tracking at PS#1 and PS#2
- BOD Instrumentation Testing at Aeration Deck #1

# Questions?

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