

Fairhaven Water Pollution Control Facility Upgrade

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The Town of Fairhaven Board of Public Works has engaged consulting engineers Tighe & Bond to design essential upgrades to Fairhaven's Water Pollution Control Facility (WPCF). This project involves upgrading the WPCF to meet total nitrogen limits, improve safety for plant workers, and replace aging/obsolete infrastructure. The proposed design upgrades are presented herein for Planning Board review.

Project Objectives and History

Upgrading the WPCF is necessary to meet increasingly stringent total nitrogen limits (125 lbs/day or 3 mg/L). Nitrogen removal is being implemented to meet NPDES permit limits set forth in the Town of Fairhaven's Wastewater Treatment Facility NPDES Permit (No. MA0100765) issued in 2017, and subsequent 2023 Authorization to Discharge under the Medium WWTF General Permit (Authorization No. MAG590006). Furthermore, an Administrative Order (AO) from EPA dated April 23, 2018, has dictated that Fairhaven must implement necessary facility upgrades by December 31, 2025 and must be meeting the new permit removal limit by October 1, 2026.

The 5.0 MGD Fairhaven WPCF is currently configured as an activated sludge facility preceded by primary clarification and followed by ultraviolet disinfection. Sludge is thickened by gravity belt thickeners and then typically hauled off site for disposal. The existing facility also has an anaerobic digester and belt filter presses for further sludge processing but this equipment is typically not used. Treated effluent from the plant flows to the west to New Bedford inner harbor and the Acushnet River.

The Acushnet River within the inner harbor (i.e., inside the hurricane barrier) has been studied by the Massachusetts Estuaries Program (MEP) which determined that the area is impaired by excessive nitrogen and 60 to 70% of this nitrogen load is attributable to wastewater derived sources. This study established a threshold TN concentration of 0.50 mg/L which is typically exceeded throughout the harbor under both incoming and outgoing tidal conditions. This study is the basis for listing the area on the State's 303(d) list as a water requiring a TMDL. Study outcomes were also cited as the basis for low total nitrogen limits by USEPA prior to the issuance of the current NPDES permit for the Fairhaven WPCF. An additional bacterial TMDL has been established for New Bedford Harbor. The also includes elements which ensure effluent disinfection and sufficient capacity to avoid sanitary sewerage overflows.

The objectives of this project are to meet NPDES permit requirements and implementation schedule for nitrogen removal, upgrade aging/obsolete treatment equipment and implement cost effective improvements to promote a safe working environment while limiting water quality impacts to the receiving water bodies and surrounding community.

Proposed Design

The main components of this project include improved septage receiving, influent screen replacement, primary sludge and scum pump replacement, aeration system upgrades and conversion to an MLE activated sludge process configuration, replacement/upgrade of RAS/WAS pumps, addition of new intermediate pumping station and denitrification filters, replacement of existing sludge transfer and truck loading pumps along with a conversion to rotary drum thickeners, UD disinfection replacement, and numerous HVAC, electrical and building envelope upgrades. The major aspects of the project are described in further detail below:

Septage Acceptance: Septage acceptance facilities will be upgraded to include a septage receiving station with screening and metering. Existing septage pumps will be replaced with new pumps capable of dosing septage to the process during off-hours.

Influent Screening: The project will include replacing the existing screens with a chain and rake style screen with ¼-inch bar spacing to improve solids removal rates and maintain higher capacity during periods of high flow. A motor actuated gate operated by a level sensor will be added to the bypass channel to reduce the frequency of screen bypasses.

Primary Sludge & Scum: Primary sludge pumps will be replaced along with the primary scum pumps/grinders. The existing scum concentrator will also be replaced. All of these assets are original to the plant and at the end of their useful life.

Secondary Process Upgrades: The existing activated sludge process will be upgraded to include new blowers and aeration diffusers. Tanks will be added and existing tanks partitioned to create an MLE process configuration that will provide complete nitrification and improve total nitrogen removal. This portion of the upgrade will also include the addition of new anoxic zone mixers and internal recycle pumps. Dissolved oxygen control systems will be added to improve energy efficiency and process performance.

Intermediate Pump Station: Following the secondary clarifiers a new intermediate pump station will be constructed to serve as a feed well for new denitrification filters.

Denitrification Filters: A new building will be constructed to house denitrification filters as well as associated backwash pumps and blowers, chemical feed systems, chemical storage, and other support systems required to produce the permit mandated 125 lb/day nitrogen effluent. Plant water storage and pumping will be relocated to the denitrification filter building to replace aging pumps and improve plant water quality.

Solids Processing: Solids thickening operations will be relocated from their current location to the existing anaerobic digester building. Existing return sludge pumps, waste sludge pumps, filter press feed pumps and truck load out pumps will be replaced in their current locations. All pipe, valves and fittings associated with these pumps will also be replaced. Chemical storage and feed systems associated with solids processing will also be upgraded.

UV Disinfection & Discharge: The current UV system, effluent sampling, and effluent flow measurement system have reached the end of their useful life and require replacement to ensure compliance with NPDES permit requirements and the TMDL for bacteria impairment.

Building Envelope & Support Systems: Many of the building envelopes, HVAC systems, electrical systems and SCADA systems at the facility have exceeded their useful life and/or process improvements required by the nitrogen upgrade demand their replacement.