



DEPARTMENT OF PUBLIC WORKS

# PEIRCE ISLAND

WASTEWATER TREATMENT FACILITY (WWTF)  
UPGRADE PROJECT

MAJOR COMPLIANCE MILESTONE  
FOR SECONDARY TREATMENT MET IN 2019

March 2020  
Progress Report



2020

2016



2018



2017



2019



The Peirce Island Wastewater Treatment Facility (WWTF) has entered its fourth year of construction. Construction of the upgrade started in September 2016 and has seen the majority of the work completed by the end of 2019. This included a major milestone which was substantial completion of construction of the biological treatment system in December 2019. In the year 2020, start-up of the biological treatment system will occur as well as continued construction to convert the old Sludge Processing Building to the new Operations/Laboratory Building. This project significantly increases the level of wastewater treatment provided at the facility resulting in improved effluent discharged to the Piscataqua River.



# Biological Aerated Filter

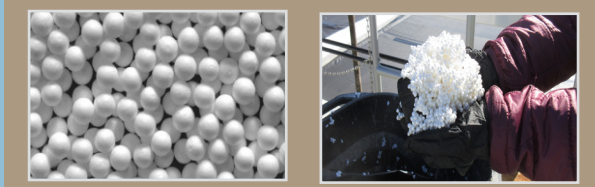
# BAF

A BAF is a treatment process in which biological treatment and filtration occur in one step. This allows the system to be more compact in area and is referred to as a “high rate” treatment system. Wastewater flows upward through media in the BAF providing a surface on which biological organisms can attach and grow. The media is retained in the filter cells while treated water is discharged at the top of the cells. Wastewater receives two phases of treatment in this system, meaning it is treated in the first stage cells and then further in the second stage cells.

Periodically a filter cell is removed from service and backwashed to remove accumulated excess biomass and solids. In the six first stage BAF cells, air is added at the bottom of the media to keep the process aerobic. Air is not required for treatment in the six second stage BAF cells. Multiple filter cells are provided in each stage in order to provide redundancy as well as accommodate flow and loading variation and backwash cycles. The system has flow nozzles to distribute the flow evenly across the filter area, and an aeration grid at the bottom of each cell.



## BAF Media and Start-up



The BAF is undergoing start-up. Wastewater will be flowing through the BAF cells while the biological organisms needed for treatment grow and establish themselves on the media. Because some of the organisms needed for treatment grow very slowly, it can take several months for them to establish a population large enough to treat the wastewater to the levels desired.

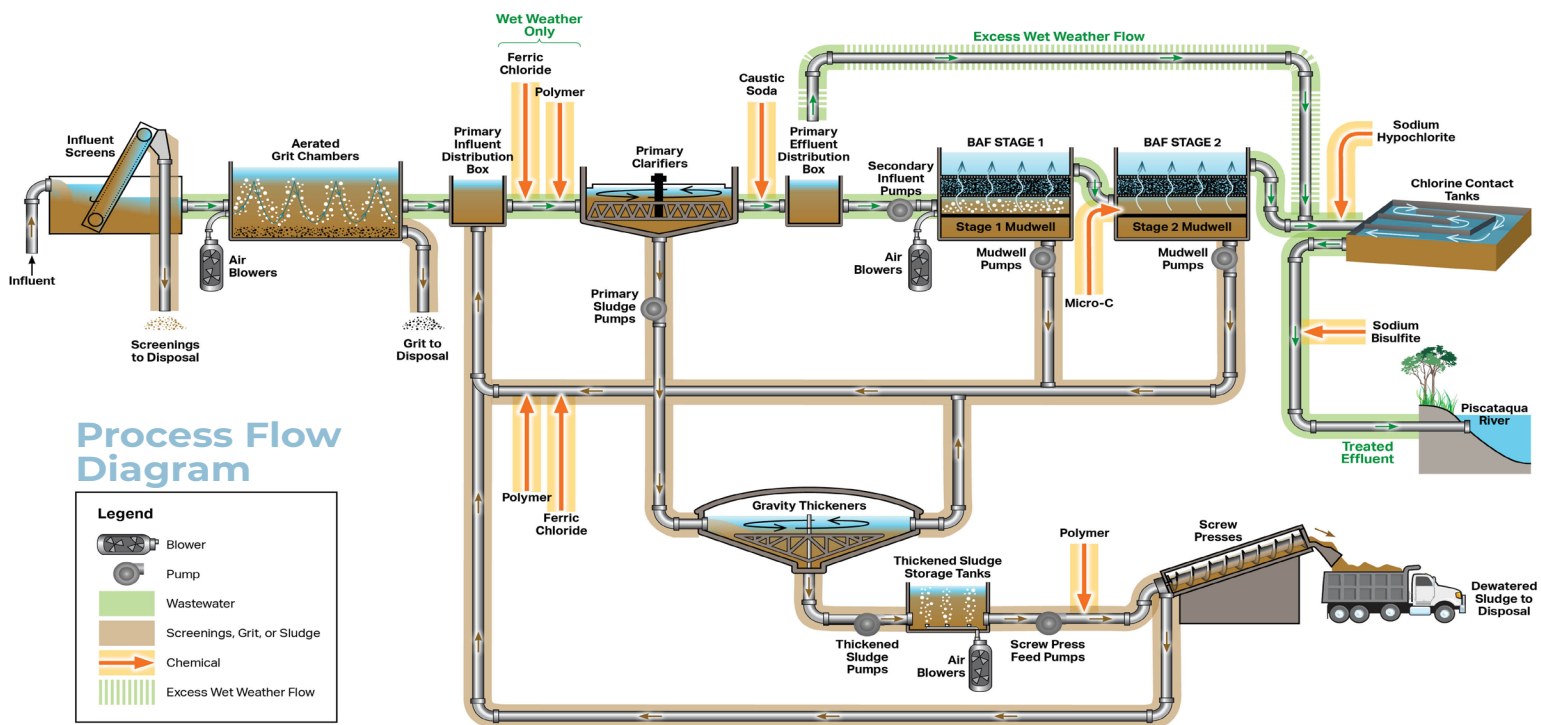
Representatives from the BAF manufacturer will assist during the start-up period to monitor its operation and confirm that it is working as intended. The BAF is a highly automated treatment system, so a portion of their effort will be spent testing and modifying the automated systems. The BAF manufacturer's staff will also be conducting training for the City's operators on an ongoing basis.



Filter Cell Netting



Media Being Loaded Into Cell



## Proposed Walking Path and Osprey Nesting Platform

City staff are working closely with the Peirce Island Committee to add a trail extending from the current “Cliff Overlook” along the Piscataqua River’s edge to the south side of the treatment facility, which would effectively complete the trail loop around this end of Peirce Island. The trail would be constructed as part of the restoration of the island as the construction contract winds down. The potential trail extension would provide a safe pathway for visitors to walk around the river side of the treatment facility and enjoy the views.

A 40-inch square Osprey nesting platform was installed on a decommissioned utility pole on the island. An article about the platform project will be featured in Treatment Plant Operator (TPO) Magazine PlantScapes section in either June or July.

Link to TPO Magazine: [www.tpomag.com](http://www.tpomag.com)

## Public Tours on the Island

City staff and AECOM, the project engineering firm, have conducted seven tours to date. In June 2019, two tours were organized. The New England Water Environment Association (NEWEA), toured the facility on June 4th. The annual public tour was conducted on June 6th. The public tour included approximately 40 attendees, including City Councilors.

Attendees were guided in small groups through the construction site. Participants viewed the Headworks, BAF, Grit, and Solids Buildings, along with the Primary Clarifiers.

Future tours are being planned for 2020.

## 2019 TOURS





# Cost Summary

PROJECT CONTRACT VALUE	AMOUNT
Original Contract	\$ 72,785,545.00
Change Order No. 1	367,290.42
Change Order No. 2	546,722.46
Change Order No. 3	93,838.31
Change Order No. 4	162,869.20
Change Order No. 5	249,828.16
Change Order No. 6	292,031.11
Change Order No. 7	169,138.30
Change Order No. 8	112,659.75
<b>TOTAL CONTRACT</b>	<b>\$74,779,922.71</b>
<b>CONTRACT COSTS</b>	
as of February 29, 2020	
Construction Costs Expended	\$68,681,199.60
% Expended Based on Total Contract	91.84%
<b>OVERALL PROJECT CAPITAL BUDGET (MILLIONS)</b>	
Primary Clarifier Replacement	1,600,000
Peirce Island Bridge Improvements	600,000
WWTF Design Engineering	5,200,000
WWTF Construction Engineering	7,900,000
WWTF Construction*	74,800,000
WWTF Construction Contingencies	1,500,000
WWTF Construction Mitigation and Public Art	300,000
<b>TOTAL</b>	<b>\$91,900,000</b>

\*\$0.4 million for water main improvements included in the contract, but not paid from sewer funds.

Since the prior progress report in November 2018, Change Orders 6, 7 and 8 have been executed. These change orders included adjustments necessary during the course of construction. This is common and expected with a construction project of this size and complexity. For a summary of modifications and changes associated with each change order, please visit the project web page at: [www.cityofportsmouth.com/publicworks/wastewater/peirce-island-wastewater-facility/peirce-island-wastewater-facility-upgrade-project](http://www.cityofportsmouth.com/publicworks/wastewater/peirce-island-wastewater-facility/peirce-island-wastewater-facility-upgrade-project).

On April 20, 2016 the City entered into an agreement with the New Hampshire Department of Environmental Services for a State Revolving Fund (SRF) Loan for \$75 million. On July 10, 2017 the City Council voted to authorize additional borrowing for up to \$6.9 million for the Peirce Island WWTF Upgrade project.

The City received four (4) amendments to the original loan agreement to date. Amendment No. 1 was approved on December 14, 2016 which decreased the interest rate. Amendment No. 2 was approved on February 7, 2018 in the amount of \$3.5 million. Amendment No. 3 was approved on April 17, 2019 in the amount of \$2.1 million. Amendment No. 4 was approved on March 11, 2020 in the amount of \$1.3 million.

# Schedule

PROJECT SCHEDULE	DATE	STATUS
Execute Contract to Construct Upgrades	September 1, 2016	Complete
Submit Two Additional Milestones for EPA Review and Approval	December 1, 2016	Complete
Additional Milestone 1: Transfer of the existing SCADA System to the New Headworks Bldg	November 21, 2017	Complete
Additional Milestone 2: Startup and testing of the Secondary Influent Pump Station in the New Solids Bldg	May 9, 2019	Complete
BAF Substantial Completion	December 1, 2019 December 31, 2019*	Complete
Achieve Compliance with NPDES Permit Limits	April 1, 2020	In Progress
Project Substantial Completion	June 30, 2020	In Progress
Project Final Completion	September 29, 2020	In Progress

\*BAF Substantial Completion date was extended by approval from the EPA in a letter dated December 9, 2019.

The City has a number of milestone dates related to this project as summarized in the adjacent table. The BAF Substantial Completion date, originally December 1, 2019 was extended to December 31, 2019. As reviewed earlier in this report, the City, vendors and engineers are working toward start-up, which is necessary to achieve compliance with the NPDES Permit Limits beginning April 1, 2020. The construction contractor's recent progress schedule shows that the work to complete the entire project will extend past the original completion June 30, 2020 date. The City is working closely with the contractor and engineers to finalize a revised schedule. During the course of this effort City staff are evaluating means to consolidate construction activities closer to the WWTF so that recreational activities on the island and parking areas can begin to be restored for public access. The following figure shows the major remaining planned work outside the WWTF fence for 2020.

Documentation is available online: [www.cityofportsmouth.com/publicworks/wastewater/resources](http://www.cityofportsmouth.com/publicworks/wastewater/resources)



