

The Narragansett Bay Commission

Phase III CSO Program

Bucklin Point WWTF

Facilities Plan Amendment

Date: April 15, 2021

Stantec

PARE CORPORATION

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Revisions

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List of Abbreviations and Acronyms

BNR	Biological Nutrient Removal
BOD	Biochemical Oxygen Demand
BPSA	Bucklin Point Service Area
BPWWTF	Bucklin Point Wastewater Treatment Facility
BVI	Blackstone Valley Interceptor
CA	Consent Agreement
CBOD	Carbonaceous Biochemical Oxygen Demand
CCP	Community Comprehensive Plan
CGP	Construction General Permit
CRMC	Coastal Resources Management Council
CSO	Combined Sewer Overflow
DAF	Dissolved Air Flotation
EIS	Environmental Impact Statement
EPI	East Providence Interceptor
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FPSA	Field's Point Service Area
FWS	Fish and Wildlife Service
GARFO	Greater Atlantic Regional Fisheries Office
GBT	Gravity Belt Thickness
HASP	Health and Safety Plan
HMI	Human-Machine Interface
IPaC	Information for Planning and Conservation
LTCP	Long-Term Control Plan
MLE	Modified Ludzack-Ettinger
MLSS	Mixed Liquor Suspended Solids
NBC	Narragansett Bay Commission
NTHPO	Narragansett Tribal Historical Preservation Office
OPCC	Opinion of Probable Construction Costs
OWTS	Onsite Wastewater Treatment System
RAS	Returned Activated Sludge
RIDEM	Rhode Island Department of Environmental Management
RIDOT	Rhode Island Department of Transportation
SGP	State Guide Plan
SLR	Solids Loading Rate
SOR	Surface Overflow Rate
TMDL	Total Maximum Daily Loads
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TSS	Total Suspended Solids
UV	Ultraviolet
WAS	Waste Activated Sludge

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Executive Summary

Introduction and Existing Conditions

The Narragansett Bay Commission (NBC), along with the team of Stantec and Pare Corporation (Stantec/Pare), has prepared this Facilities Plan Amendment relative to recommended improvements for the Bucklin Point Wastewater Treatment Facility (BPWWTF). The Facilities Plan Amendment also assesses flows and loads to the facility over a 20-year planning period, from 2020 - 2040. This Facilities Plan Amendment has been prepared in accordance with the RIDEM Office of Water Resources Facilities Plan Review Checklist, as applicable.

NBC embarked on a three-phase combined sewer overflow (CSO) control program in 1998, aimed at lowering annual CSO volumes and reducing annual shellfish bed closures in accordance with a 1992 Consent Agreement with the Rhode Island Department of Environmental Management (RIDEM). Phases I and II of this program, which focused on the Fields Point Service Area (FPSA) in Providence, were completed in 2008 and 2015, respectively. The program to date has succeeded in lowering annual CSO volumes and reducing annual shellfish bed closures to levels that are in keeping with a 1992 Consent Agreement between NBC and the RIDEM.

Phase III of the program (Phase III CSO Program), which began in 2016, is focused primarily on the Bucklin Point Service Area (BPSA). With the future construction and commissioning of the Pawtucket Tunnel and other Phase III CSO Program projects, which will divert CSO flow from existing outfalls for treatment at the BPWWTF, there will be an increase in prolonged high flow periods to the BPWWTF during tunnel dewatering. Upgrades to the BPWWTF are required to improve performance of secondary treatment to accommodate future tunnel pump out operations after wet weather events. Also, more stringent discharge limitations included in a new RIPDES permit for the facility necessitate upgrades to maintain compliance.

Project Need and Water Quality Objectives

RIDEM issued a new RIPDES Discharge Permit for the BPWWTF in 2017 that regulates discharges and establishes minimum acceptable performance in terms of water quality. The BPWWTF operates under RIPDES Permit No. RI0100072. The RIPDES permit has a seasonal limit for effluent total nitrogen and other pollutants of concern. RIDEM agreed to interim limits in Consent Agreement RIA-424 for seasonal discharge limits for Total Suspended Solids (TSS) and Carbonaceous Biochemical Oxygen Demand (CBOD). This Facilities Plan Amendment focuses on alternative processes and facility modifications required to reliably meet the RIPDES permit requirements when the future Pawtucket Tunnel is put into operation.

Table ES-1 provides the current RIPDES discharge permit limits. The current permit limits represent revisions to the original RIPDES permit issued by RIDEM effective December 1, 2017. Those revisions went into effect through Consent Agreement RIA-424, which was signed by NBC and RIDEM in September 2018.

Table ES-1 Current Discharge Limits

Parameter	Average Monthly Limit (mg/L)	Average Weekly Limit (mg/L)	Max Daily Limit (mg/L)
TSS (Nov 1 – April 30)	30	45	50
TSS (May 1 – Oct 31)	20	20	45
CBOD5 (Nov 1 – April 30)	25	40	45
CBOD5 (May 1 – Oct 31)	20	20	30
Total N (May 1 – Oct 31)	5.0	- -	- -

Flows and Loads

The most recent RIDEM approved Facilities Plan Amendment for the BPWWTF, dated August 2009, provided detailed flow-and-load projections and established the basis-of-design for the facility's biological nutrient removal system. To date, the BPWWTF has not experienced the flows and loads projected over the planning period of the 2009 Facility Plan Amendment and there have been no significant trends in recent plant data that result in meaningful impacts to these projections.

Historical plant data was analyzed to establish the existing baseline conditions for projection of future flows and loads. Daily data from January 1, 2014 to September 30, 2017 was used to calculate the existing flows and loads. Due to data gaps for certain parameters, additional data beyond the above time period was used to supplement the data set.

Future flows and loads are projected through the planning period (2020-2040) to include: 1) additional dry weather flow and load associated with population projection; 2) additional collection system inflow/infiltration flow associated with future newly developed residential units; and 3) additional wet weather flow from the tunnel dewatering after the tunnel is placed into operation.

As the Phase III CSO Program is commissioned and the Pawtucket Tunnel system becomes operational, it is anticipated the BPWWTF will experience extended periods of higher than average influent flow. The Pawtucket Tunnel is designed to store the volume of CSO flow currently discharged to the receiving waters during the three-month design storm up to a capacity of 58.5 million gallons (MG). The stored volume will be pumped to the BPWWTF by the Tunnel Pump Station. The Tunnel Pump Station is being designed for a firm capacity of 27.3 MGD. Four main dewatering pumps will have a nominal rating of 9.1 MGD each. The combined capacity of three main pumps will be 27.3 MGD. The fourth pump will serve as standby. To accommodate a wide range of flow conditions, each of the four main pumps will be provided with a variable frequency drive (VFD).

Depending on the plant's influent flow, the rate of flow from the tunnel pump station is anticipated to fluctuate to maximize the plant's secondary treatment system as much as possible without exceeding its capacity, which has a design maximum-day peak flow capacity of 46 MGD. In order to estimate the future impact of tunnel operations on the influent flow projections, NBC's InfoWorks ICM hydraulic model simulation of the tunnel system was performed using the typical year rainfall with the total influent flow controlled at 46 MGD during tunnel pump back operation. Based on the model results, the annual average flow from tunnel dewatering is projected to be 4.3 MGD and the maximum month tunnel dewatering flow is projected to be 7.8 MGD.

Table ES-2 provides a summary of the projected influent flows to the BPWWTF for planning years 2020, 2025, 2030, 2035, and 2040, including additional flow from tunnel dewatering operations. Table ES-3 provides a summary of the existing and projected plant influent BOD, TSS and TKN loads.

Table ES-2 Existing and Projected Flows

Flow (MGD)	Existing	Projected[1]				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Plant Influent [2]	18.7	19.5	19.7	24.1	24.1	24.0
To Secondary Treatment [3]	18.5	19.4	19.6	24.0	24.0	23.8
Max Month [4]						
Plant Influent [2]	29.7	31.1	31.3	39.3	39.3	39.1
To Secondary Treatment [3]	27.9	29.2	29.4	37.4	37.4	37.1

Note:

1. The tunnel is expected to be operational between 2025-2030. Therefore, the projected flows for 2030, 2035 and 2040 included tunnel dewatering flow.
2. The plant influent peak hourly flow is 116 MGD.
3. The peak hourly flow to the secondary treatment system is 46 MGD.
4. Existing maximum month flows are based on 98th percentile of daily data in 2014-2017.

Table ES-3 Existing and Projected Loads for Plant Influent

Plant Influent Loads (lbd)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
BOD	30,008	31,269	31,494	32,853	32,848	32,653
TSS	23,133	24,105	24,278	25,938	25,933	25,783
TKN	4,430	4,616	4,649	4,942	4,941	4,912
Max Month						
BOD	37,100	38,659	38,937	41,325	41,318	41,077
TSS	29,945	31,204	31,428	34,383	34,378	34,183
TKN	5,178	5,395	5,434	5,952	5,951	5,917

Table ES-4 provides a comparison of the projected plant influent flows and loads after the tunnel is operational to the design flows and loads in the 2009 Facilities Plan. As shown in the table, the projected average annual and maximum monthly flows are higher than the design flows due to the additional wet weather flow captured by the tunnel and pumped to the BPWWTF for treatment. However, the projected influent loads are lower than the design loads in the 2009 Facilities Plan.

Table ES-4 Comparison of Plant Influent Flows and Loads

	Design Flows and Loads in 2009 Facilities Plan		Existing		Projected Future (with Tunnel)	
	Average	Max Month	Average	Max Month	Average	Max Month
Flow (MGD)	23.7	31	18.7	29.7	24.1	39.3
BOD_5 (lbd)	45,710	59,420	30,008	37,100	32,853	41,325
TSS (lbd)	44,950	58,440	23,133	29,945	25,938	34,383
TKN (lbd)	6,200	7,440	4,430	5,178	4,942	5,952

For planning purposes, future BPWWTF facilities design will use the higher projected average annual flow, the projected maximum monthly flow and the 2009 Facilities Plan design maximum day flow. The higher design loads from the 2009 Facilities Plan will be carried forward for planning and design purposes as well. These flows and loads are summarized in Table ES-5.

Table ES-5 Projected Plant Influent Flows and Loads

	Average	Max Month	Max Day	Peak Hour
Flow (MGD)	24.1	39.3	116 [1]	116 [1]
BOD_5 (lbd)	45,710	59,420	77,710	
TSS (lbd)	44,950	58,440	98,890	
TKN (lbd)	6,200	7,440	------	

Note:

1. 116 MGD is the total peak flow and design maximum-day flow to the plant, consisting of 46 MGD peak flow to the biological system and 70 MGD peak flow to wet-weather treatment.

It should be noted that although the flow projections herein assume that tunnel pump out operations will maximize flow to secondary treatment at 46 MGD at all times, actual future tunnel pump out operations will be adjusted after pump station startup to optimize pump run times against plant influent flow conditions with the goal of maximizing secondary treatment as much as possible.

Evaluation of Alternatives

Evaluation of different process alternatives for the operation of the current facility and future improvements was performed using a calibrated dynamic simulation model developed by CDM and published in the report titled "Bucklin Point WWTF Stress Testing Program" dated May 23, 2017. System stress testing conducted by CDM Smith indicated the following observations during prolonged high flow periods that could be anticipated following the construction of the Pawtucket Tunnel and Tunnel Dewatering Pump Station:

- Secondary process shows evidence of stress.
- Settled sludge blanket depth increases and effluent quality decreases in the final clarifiers, polymer is used during these times.
- Projected decrease in mixed liquor suspended solids (MLSS) temperature is expected during storage tunnel pump outs, based on experience with other NBC facilities.

Following the stress testing, NBC conducted an evaluation of potential improvement alternatives to mitigate the impact of the prolonged high influent flow periods. Six design alternatives were developed and evaluated by Stantec/Pare to improve the treatment process as follows:

- Alternative 1 – Install Two New Final Clarifiers
- Alternative 2 – Convert Existing Bioreactor to Solids Storage During High Flows
- Alternative 3 – Convert Bioreactors to Contact Stabilization During High Flows
- Alternative 4 – Install Polymer Feed System
- Alternative 5 – Increase Return Activated Sludge (RAS) Pumping
- Alternative 6 – Increase Bio-reactor Volume

Alternatives 5 and 6 were eliminated during preliminary screening of the alternatives. Without additional clarifiers, an increase in RAS pumping alone in Alternative 5 did not meet the minimum performance requirements of the plant. Alternative 6 improved process performance, however, the improvement was not significantly greater than Alternatives 1 and 2 and would also require enhanced operator attention and control to ensure process reliability. The cost of Alternative 6 is significantly more to construct and operate, thus resulting in its elimination.

A performance analysis of the remaining alternatives was conducted using the existing BioWin™ process model utilizing data from the 2017 stress test and plant daily operating data to predict the performance of each alternative. A summary of the alternatives is provided in Table ES-6, including a preliminary opinion of probable construction cost that was developed for the purposes of comparing alternatives only.

Table ES-6 Alternatives Summary

Alternative	Cost ($ mill)	Comments
Alternative 1 Install Two New Final Clarifiers	$14.2	• Provides redundancy for clarification process • Improves influent hydraulics and flow split • Increases RAS pumping • Enhanced operational control • Least complicated operations
Alternative 2 Convert Existing Bioreactor to Solids Storage During High Flows	$0.9	• Risk of overloading clarifiers during transition from wet weather to dry weather operations
Alternative 3 Convert Bioreactors to Contact Stabilization During High Flows	$5.7	• Provides opportunity for total nitrogen reduction during normal operating conditions • Risk of overloading clarifiers during transition from wet weather to dry weather operations
Alternative 4 Install Polymer Feed System	$0.2	• Operated when SVIs > 150 ml/g • Can be implemented in conjunction with any alternative

Alternative 1, *Install Two New Final Clarifiers,* was determined to provide the best effluent quality, easiest to operation, and additional unit process redundancy to the BPWWTF. Alternative 4, *Install Polymer Feed System,* is a low-cost solution that was also selected to be implemented in conjunction with Alternative 1 to improve plant performance when the sludge is experiencing poor settling characteristics. Alternatives 1 and 4 represent the selected alternatives for the BPWWTF to accommodate future Pawtucket Tunnel pump out flows.

Performance of Selected Alternative

The selected alternatives include construction of two new secondary clarifiers and other ancillary systems. Related system improvements will also include enhancements to:

- Secondary clarification system influent flow split;
- RAS pumping system;
- WAS system;

- Addition of a polymer feed system to provide operational flexibility and aid gravity settling; and,
- Other ancillary system improvements.

Following the alternatives analysis in 2017, the simulation model was developed to evaluate performance of the selected alternative under the future flow and load conditions established in Section 4.0. The previous BioWin™ model was updated by CDM Smith in 2019, incorporating a validation based on 2018 BPWWTF plant data. The model was then refined in BioWin™ 6.0 to evaluate wastewater treatment performance of the selected alternative herein.

The BioWin™ model consisted of the secondary treatment process including bioreactors and final clarifiers. The primary treatment process is not included in the model, therefore the "influent" in the model is primary effluent. Flow and water quality parameters such as BOD, TSS, and TKN concentrations in the primary effluent were estimated using future BPWWTF influent flows and loads and primary treatment removal efficiencies described in Section 4.0. Table ES-7 below summarizes the estimated primary effluent flows and loads to secondary treatment. Water characterization/ fractionization parameters of the primary effluent were not changed from the earlier version of the model.

Table ES-7 Future Flows and Loads to the Secondary Treatment (with Pawtucket Tunnel In Operation)

Parameters	To Secondary Treatment	
	Average	Max Month
Flow (MGD)	24.0	37.4
BOD_5 (lbd) [1]	29,712	38,623
TSS (lbd) [2]	17,980	23,376
TKN (lbd) [3]	6,219	7,463

Notes:
1. Assuming the primary clarifier BOD removal efficiency is 35%.
2. Assuming the primary clarifier TSS removal efficiency is 60%.
3. Assuming the primary clarifier TKN removal efficiency is 12.7%.

Both steady-state and dynamic models were simulated for the selected alternative. Steady-state model simulations were conducted for both average and max month flow and loads conditions, while 30-day dynamic model simulations were conducted for the maximum month conditions only.

Figure ES-1 shows effluent TSS, BOD and TN results for both steady-state and dynamic model simulations. For all simulated scenarios, the effluent TSS is below monthly discharge limit of 20 mg/L for May 1 - Oct. 31 (30 mg/L for Nov. 1 - Apr. 30), the effluent BOD is below monthly discharge limit of 10 mg/L for May 1 - Oct. 31 (25 mg/L for Nov. 1 - Apr. 30), and the effluent TN is below monthly discharge limit of 5 mg/L for May 1 - Oct. 31 (no limit for Nov. 1 - Apr. 30).

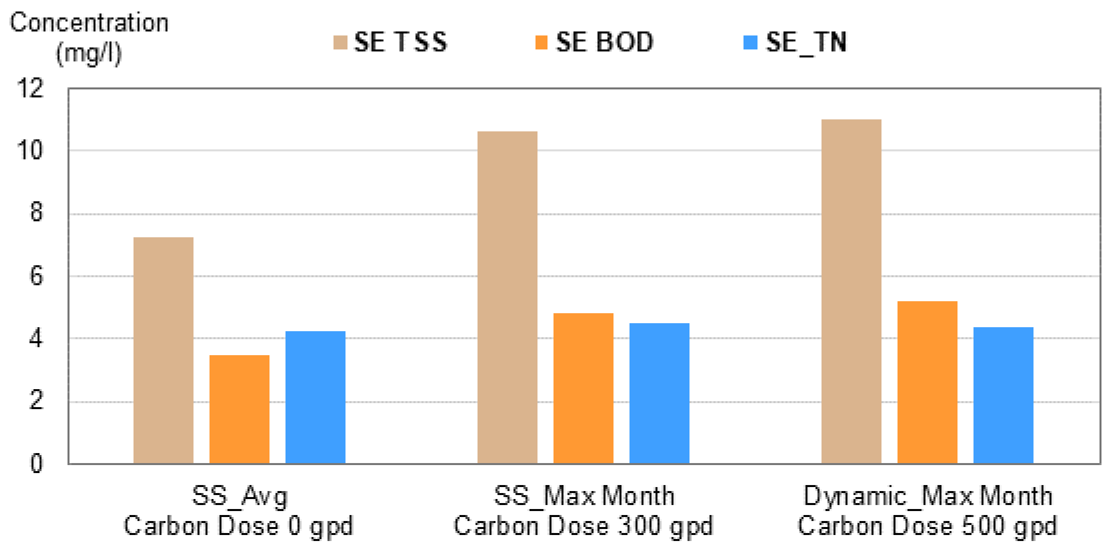

Figure ES-1 Modeling Results for Steady-State and Dynamic Model Simulations

Figure ES-2 shows 30-day effluent TSS, BOD and TN profiles for the dynamic simulation of the max month flow and loads. The dynamic simulation indicates that the effluent TSS meets weekly limit (20 mg/L for May 1 - Oct. 31, and 45 mg/L for Nov. 1 - Apr. 30) and daily discharge limit (30 mg/L for May 1 - Oct. 31, and 50 mg/L for Nov. 1 - Apr. 30), and the effluent BOD meets weekly limit (10 mg/L for May 1 - Oct. 31, and 40 mg/L for Nov. 1 - Apr. 30) and daily discharge limit (15 mg/L for May 1 - Oct. 31, and 45 mg/L for Nov. 1 - Apr. 30).

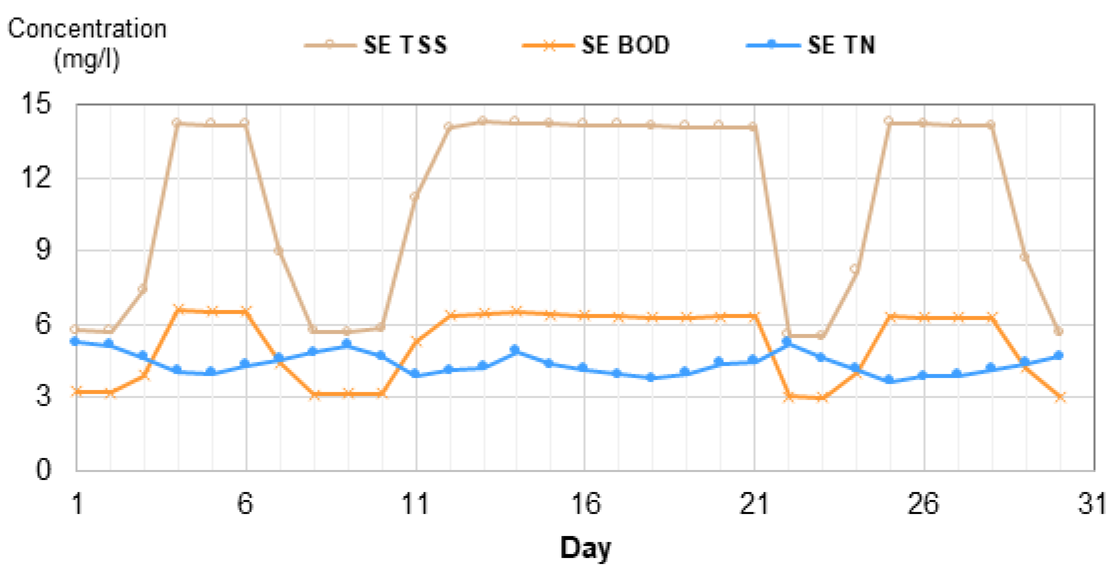

Figure ES-2 Effluent Water Quality Parameter Profiles for 30-day Dynamic Model Simulation

In summary, the process model predicted that the selected alternative will be able to meet the discharge limits of TSS, BOD and TN for both future average and max month conditions.

Redundancy

In response to RIDEM's comments received on September 16, 2020 regarding equipment redundancy for the aeration tanks, the biological process model was simulated with three aeration tanks in service for the projected max month flow and loads conditions.

A two-weeks' special sampling effort was conducted during September 13, 2020 through September 27, 2020 to better characterize the model influent for supplemental biological process modeling with three aeration tanks in service. The primary effluent data from the 2020 special sampling period were screened and averaged to generate key inputs to the BioWin Influent Specifier (as part of the Biowin model software package). After applying the new COD fractions and adjusting flows and bioreactor volumes to reflect three aeration tanks in service based on actual operating conditions during the special sampling period, the supplemental model was used to simulate the projected max month flow and loads conditions with three aeration tanks and seven secondary clarifiers in service. The steady-state modeling results show that all the effluent parameters are below the BPWWTF monthly discharge limits, indicating that the facility can meet its monthly discharge limits with three aeration tanks in service and the fourth tank as a stand-by tank.

Implementation Cost and Schedule

Preliminary cost estimates were prepared as part of the evaluation of treatment alternatives. The preliminary cost estimate for construction of two new clarifiers was approximately $14.2 million. The preliminary cost estimate for the polymer system was for an additional $0.2 million.

Other modifications are required, as described in Section 6.3. Cost estimates have not yet been developed for these other improvements; however, they are anticipated to be approximately $5 million - $6 million. A detailed Opinion of Probable Construction Cost (OPCC) for all BPWWTF improvements will be refined as design progresses. For the purposes of this Facilities Plan Amendment, the OPCC for the selected plan presented in Section 6.0 is estimated to be $20 million (based on December 2018 dollars, ENR Construction Cost Index of 11,185 for December 2018).

Changes to NBC's operation and maintenance (O&M) costs associated with these improvements will also be identified during detailed design. It is not anticipated that the selected plan will significantly increase NBC's O&M costs at the BPWWTF.

According to Consent Agreement RIA-424, upon RIDEM approval of this Facilities Plan Amendment, the NBC must complete the design and construction and initiate operation of the selected alternative in accordance with the approved Phase IIIA schedule. Construction and start-up of the BPWWTF new clarifiers and associated improvements will be completed prior to start-up of the Pawtucket Tunnel Pump Station. The Pawtucket Tunnel Pump Station is anticipated to be operational in accordance with the approved Phase IIIA schedule.

Environmental Impacts

As part of the facility planning process, environmental impacts of necessary WWTF upgrades need to be identified. Few direct environmental impacts are expected to result from this project. Direct impacts that have been identified as part of the environmental assessment are generally short-term and limited to the active construction of the project. In most cases, adverse impacts can be effectively mitigated during construction.

The required evaluation criteria with respect to environmental impacts for the recommended WWTF upgrades are as follows:

<u>Vegetation and Wildlife</u>
No impact to wetlands is anticipated due to the construction of the additional secondary clarifiers and influent pumping station modifications; however, NBC intends to pursue possible modifications to the facility's protective berm as part of the needed secondary clarifier modifications. Provisions will be made in the project's construction documents to mitigate the impacts to any environmentally sensitive resource areas, or within the 200-foot contiguous buffer from the shoreline feature. The anticipated work is not expected to affect any threatened or protective vegetation or wildlife.

<u>Air Quality</u>
During construction, there will be temporary emissions from vehicles and other construction equipment, and dust from construction activities. Construction activities may also result in a temporary increase in localized hydrocarbon and carbon monoxide levels, but not to an extent that would cause adverse impact to air quality.

As identified in Section 8.0 – Environmental Impacts and Appendix E within this plan, there may be several other short-term and temporary environmental impacts (i.e. erosion and sedimentation, groundwater, safety, traffic, etc.) as a result of this project. All short-term impacts will be mitigated through provisions in the project's Contract Documents. Long-term, adverse impacts are not anticipated. Rather, the proposed project improvements will result in long-term environmental benefits, helping to significantly improve water quality within the environmentally sensitive receiving waters of the Seekonk River and Narragansett Bay. A Finding of No Significant Impact (FONSI) is warranted for this project and an Environmental Impact Statement (EIS) is not required.

Financial Impacts

The financial impacts of implementing the improvements recommended in the Facility Plan Amendment were evaluated. As detailed in Section 7.0 – Plan Implementation and Costs, the opinion of probable construction costs for the recommended capital improvements is $20M (based on December 2018 dollars, ENR Construction Cost Index of 11185 for December 2018).

Public Participation

This Facility Plan Amendment has been developed in response to comments received thus far in the Public Participation aspect of the project. Intergovernmental review agencies were contacted, and substantive comments were incorporated into this plan as appropriate. Also, a public meeting was held on October 25, 2018 to introduce the project's need, discuss the alternatives considered, and present the preferred WWTF upgrades.

Additional details regarding the project's Public Participation process and responses to the public participation aspects of this project are summarized in Section 10.0 and in Appendices G and H.

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Section 1.0

Introduction

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1.0 Introduction

The Narragansett Bay Commission (NBC), along with the team of Stantec and Pare Corporation (Stantec/Pare), has prepared this Facilities Plan Amendment relative to recommended improvements for the Bucklin Point Wastewater Treatment Facility (BPWWTF). The Facilities Plan Amendment also assesses flows and loads to the facility over a 20-year planning period, from 2020 to 2040. This Facilities Plan Amendment has been prepared in accordance with the RIDEM Office of Water Resources Facilities Plan Review Checklist, as applicable. The checklist is provided as Appendix A.

NBC was formed and is authorized to operate as a public corporation of the State of Rhode Island through Rhode Island General Law. A Board of Commissioners manages the affairs of the NBC, made up of appointed members representing each community served by NBC. An Executive Director is appointed by the Board to administer, manage, and direct the affairs of the NBC in the capacity of Chief Operating Officer.

1.1 Background

NBC's stated mission is to maintain a leadership role in the protection and enhancement of water quality in Narragansett Bay and its tributaries by providing safe and reliable wastewater collection and treatment services to its customers at a reasonable cost. NBC owns and operates Rhode Island's two largest wastewater treatment plants along with extensive infrastructure of interceptors, sewers, pump stations, tide-gates, and combined sewer overflow (CSO) structures. The focus of this assessment is the BPWWTF, which is in East Providence and provides treatment of wastewater flow from NBC's Bucklin Point Service Area (BPSA). The BPSA includes all or parts of Central Falls, Pawtucket, East Providence, Lincoln, Cumberland, and Smithfield as depicted on Figure B-1 in Appendix B. Pawtucket and Central Falls have combined sewer systems while the other member communities served by NBC's BPWWTF have separated storm and sanitary collection systems. The current rate structure is available on the NBC website at www.narrabay.com.

NBC embarked on a three-phase CSO control program in 1998, aimed at lowering annual CSO volumes and reducing annual shellfish bed closures in accordance with a 1992 Consent Agreement with the Rhode Island Department of Environmental Management (RIDEM). Phases I and II of this program, which focused on the Fields Point Service Area (FPSA) in Providence, were completed in 2008 and 2015, respectively. The program to date has succeeded in lowering annual CSO volumes and reducing annual shellfish bed closures to levels that are in keeping with a 1992 Consent Agreement between NBC and the RIDEM.

Phase III of the program (Phase III CSO Program), which began in 2016, is focused primarily on the BPSA. With the construction and commissioning of the Pawtucket Tunnel and other Phase III CSO Program projects, which will divert CSO flow from existing outfalls for treatment at the BPWWTF, there will be an increase in prolonged high flow periods during tunnel dewatering. Upgrades to the BPWWTF are required to improve performance once the facility is required to provide secondary treatment for prolonged periods of higher flows from wet weather events.

Also, more stringent discharge limitations required through a new RIPDES permit for the facility necessitate upgrades to maintain compliance.

1.2 Project Need

The RIDEM has indicated that an amendment to the Wastewater Facilities Plan for the BPWWTF is required due to the BPWWTF upgrades that NBC is proposing to construct. These upgrades are in response to the new RIPDES discharge permit issued by RIDEM and the anticipated increase in wet weather flow requiring treatment at the facility following construction of Phase III CSO Program projects. Specifically, Consent Agreement RIA-424 entered into between NBC and the RIDEM indicates the following:

> *By December 31, 2018, NBC shall submit a Facilities Plan Amendment ("FPA") that includes the results of the Bucklin Point hydraulic and treatment process capacity evaluation described in the July 3, 2017 letter from NBC to DEM (Attachment E of this Agreement, which is attached hereto and incorporated herein). The FPA shall recommend an alternative to comply with the effluent limitations for outfall 001 during sustained periods of tunnel dewatering and shall include a schedule for completing design, construction, and initiation of operation of the recommended alternative…*

The purpose of the Facilities Plan Amendment is to reaffirm and/or update the existing facilities plan for the BPWWTF, from 1997, to address the requirements noted above. The Facilities Plan was last amended in 2009 due to modifications made in response to treatment upgrades required to meet more stringent nitrogen discharge limits. This Facilities Plan Amendment (2021) focuses on the alternatives considered and the preferred alternatives resulting from evaluations performed by NBC; and the expected long-term flows and loads anticipated at the BPWWTF. Much of the processes at the BPWWTF will remain unchanged, including those plant improvements described in the 2009 Facilities Plan Amendment that have since been implemented by NBC.

1.3 History of Facility Upgrades and Facility Plan Amendments

NBC prepared an amendment to the Facility Plan for the BPWWTF in 1997 to evaluate the existing unit processes and determine their ability to provide wet-weather primary treatment capacity of up to 70 MGD during storms and secondary treatment capacity up to 46 MGD. Construction of the capital upgrades resulting from the 1997 Facilities Plan update began in 2002 and commissioning of the upgraded systems was completed in 2006. The major facilities constructed included the following:

- New influent pumping and headworks facilities with 116 MGD peak capacity
- New dry-weather primary clarifiers and associated flow-distribution boxes
- Upgraded aeration tanks to provide some nitrogen removal
- New ultraviolet (UV) disinfection system and effluent pump station
- Retrofit of existing primary clarifiers into a wet-weather treatment process

The plant upgrades allowed the facility to achieve biological nutrient removal (BNR) targeting an effluent total nitrogen concentration of 8 milligrams per liter (mg/L), as well as increasing the facility's capacity to provide a primary level of treatment to wet weather flows. During construction of that project, NBC received notification that the BPWWTF would be required to meet a more-stringent monthly average effluent total nitrogen (TN) limit of 5 mg/L in the months of May through October. NBC received its official RIPDES permit modification, including the 5-mg/L effluent TN limit, in June 2005 with the permit going into effect starting August 1, 2005.

NBC and RIDEM completed negotiations and executed Consent Agreement No. RI-372 in June 2006, which defined a course of action and schedule for the BPWWTF to comply with the seasonal 5-mg/L monthly average TN limit. The first obligation for NBC under Consent Agreement RI-372 was to complete an engineering analysis to evaluate the upgraded biological process at the facility, to determine if the facility "as-is" could comply with the limit. This *BPWWTF Total Nitrogen Compliance Study* was submitted to RIDEM in November 2007. The report concluded that the facility was not able to meet the 5 mg/L TN limit without an upgrade. Given that conclusion, NBC's next obligation was to complete a Facilities Plan Amendment to address alternatives to meet the specified TN limit. NBC completed this Facilities Plan Amendment in July 2009. It represented the last amendment to the Facilities Plan for the BPWWTF prior to this amendment provided herein.

Construction of the upgrades from the 2009 Facilities Plan Amendment began in 2012 and commissioning of the upgraded facilities was performed in 2014. Major improvements are summarized as follows:

- Modifications for improved nitrogen removal
- Dry-weather primary clarification system improvements
- Dry-weather flow distribution improvements
- Aeration improvements (scum removal system added)
- Secondary clarifier improvements
- Disinfection system improvements
- Miscellaneous additional improvements:
    - Solids processing, plant water, wet-weather tank return pumping
    - Instrumentation and electrical upgrades
    - Staffing increases and modifications

Upgrades implemented since the 2009 Facilities Plan Amendment are further described in Section 3.

1.4 BPWWTF Facility Plan Amendment Content

The major components of this Facilities Plan Amendment are as follows:

1. Introduction
2. Existing Conditions and Planning Criteria

3. Existing System
4. Flows and Loads
5. Development and Evaluation of Alternatives
6. Plan Selection
7. Plan Implementation and Cost
8. Environmental Impacts
9. Intergovernmental Agency Reviews
10. Public Participation

Section 2.0

Existing Conditions and Planning Criteria

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2.0 Existing Conditions and Planning Criteria

2.1 Planning Area

The BPWWTF is located at 102 Campbell Avenue in East Providence, RI. This facility serves the 75-square mile Bucklin Point Service Area (BPSA), treating flow from all or parts of East Providence, Pawtucket, Central Falls, Smithfield, Cumberland, and Lincoln. Figure B-1 in Appendix B depicts the geographic area and political boundaries within the BPSA as well as NBC's other service area, the Fields Point Service Area (FPSA). Figure B-2 in Appendix B depicts the major NBC infrastructure in the BPSA. This infrastructure includes approximately 30 miles of interceptor, three (3) pumping stations, and 27 CSO outfalls in addition to the BPWWTF.

2.1.1 Site Description

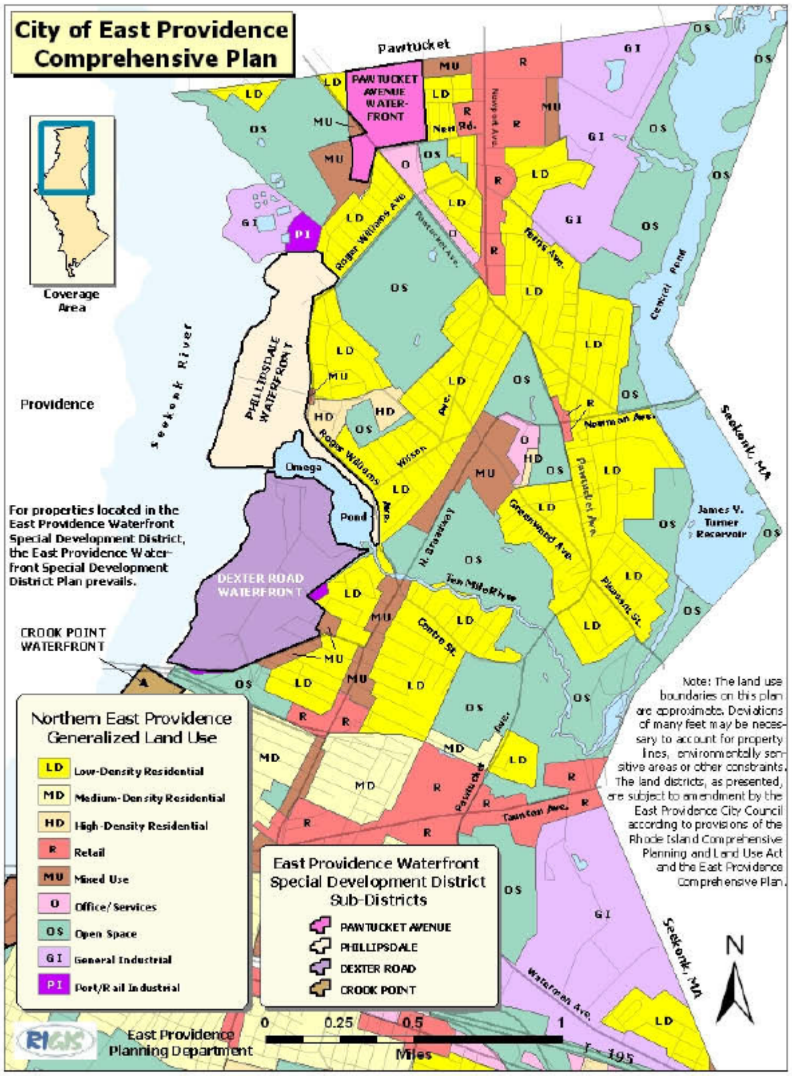
The BPWWTF provides primary and secondary treatment for up to 46 MGD with primary treatment of wet weather flow up to 116 MGD. The site consists of operational areas of the wastewater treatment facility as well as a closed sludge landfill immediately to the north of the facility's operational footprint. The site is bound by the Seekonk River to the west and railroad tracks to the east. The property boundaries are depicted in Figure B-3 in Appendix B. Figure B-4 in Appendix B depicts land use at the site and surrounding area based on available RIGIS mapping. This shows that the site's land usage is designated as Water and Sewage Treatment and Waste Disposal. Surrounding land uses include residential, commercial, and industrial as well as a cemetery. Other land use is identified as forest and brushland.

2.1.2 Relationship to East Providence Community Comprehensive Plan

The City of East Providence's Community Comprehensive Plan (CCP) was reviewed to identify how the proposed project and this Facilities Plan Amendment may impact the City's identified goals and objectives. The proposed project is limited to the existing BPWWTF site and the entire project is on property owned and operated by NBC. As such, this project will not have any adverse impact on land use with respect to the Land Use Element of the City's CCP.

One of the strategies of the Land Use Element is to continue to implement the East Providence Waterfront Special Development District Plan. The City has prioritized redevelopment in this district. Figure 2-1, adapted from the East Providence CCP, shows Generalized Land Use as well as East Providence Waterfront Special Development Sub-Districts within the northern part of the City. The operational footprint of the BPWWTF is mapped as General Industrial. Construction of the recommended plan presented herein is limited to this area and is consistent with General Industrial land use. The Phillipsdale Waterfront sub-district is depicted immediately south of this area, and actually encroaches onto property owned by NBC. Another area, the Pawtucket Avenue Waterfront sub-district, is mapped to the northeast of the BPWWTF. However, the majority of mapped development districts within the City are outside of the BPSA. Areas outside of the BPSA are served by the City's WWTF in Riverside.

Figure 2-1 East Providence Generalized Land Use



As part of the Historic and Cultural Resources Element in the CCP, the City identified the Phillipsdale Historic District Study Area immediately to the south of the BPWWTF as a historic resource. Two historic properties, the Richmond Paper Company Mill Complex and Nathaniel Daggett House, are located in this district. RIGIS-mapping also identifies a historic cemetery and two candidate historic sites to the northeast of the BPWWTF site. Mapped historic resources in the vicinity of the site are depicted on Figure B-5 in Appendix B. No impacts to any of these sites or historic districts are anticipated from this project.

As part of the Natural Resources Element of the CCP, the City identified the following goals and objectives:

- Preserve and protect the water bodies and groundwater and their sources within the City of East Providence for continuation of their natural beauty and as components of the East Providence ecosystem.

- Preserve and expand access to the state's rivers, lake, ponds, streams and other inland waters for recreational use, while maintaining water quality.
- Expand shoreline access for passive recreation and opportunities for saltwater fishing (dependent upon improved water quality).

The purpose of this project is to upgrade the BPWWTF to better treat the expected increase in wet weather flow following construction of Phase III CSO facilities. This will result in improved water quality in the Seekonk River and Narragansett Bay, wholly consistent with the goals and objectives in the Natural Resources Element of the East Providence CCP.

2.2 Effluent Limitations

RIDEM issued a new RIPDES Discharge Permit for the BPWWTF, RIPDES Permit No. 0100072 effective December 1, 2017, which establishes new seasonal discharge limits for Total Suspended Solids (TSS) and Carbonaceous Biochemical Oxygen Demand (CBOD). NBC and RIDEM signed Consent Agreement RIA-424 in September 2018 which revised certain seasonal limits. Table 2-1 provides the current discharge permit limits.

Table 2-1 Current Discharge Limits

Parameter	Average Monthly Limit (mg/L)	Average Weekly Limit (mg/L)	Max Daily Limit (mg/L)
TSS (Nov 1 – April 30)	30	45	50
TSS (May 1 – Oct 31)	20	20	45
CBOD5 (Nov 1 – April 30)	25	40	45
CBOD5 (May 1 – Oct 31)	20	20	30
Total N (May 1 – Oct 31)	5.0	- -	- -

A copy of Consent Agreement (CA) RIA-424 that describes modifications to the RIPDES permit and that establishes the current discharge limits is provided in Appendix C.

Effluent from the BPWWTF is discharged to the Seekonk River. RIDEM identifies the Seekonk River as impaired and it is included on the 303(d) List of Impaired Waters. There are currently no Total Maximum Daily Loads (TMDL) for the Seekonk River, but TMDLs may be established for Total Nitrogen and Dissolved Oxygen. The 2016 RIDEM List of Impaired Waters Report, published in March 2018, indicates that the need for TMDLs for Nitrogen and Dissolved Oxygen will be determined post WWTF upgrades, with a TMDL schedule of 2022. While not specifically mentioned, the BPWWTF is the only WWTF that discharges directly to the Seekonk River. The NBC completed upgrades to the BPWWTF in 2013 to meet seasonal nitrogen discharge limits set to 5 mg/L.

The 2016 RIDEM List of Impaired Waters Report also indicates that a TMDL may be required for Fecal Coliform by 2025; however, it is identified that "Compliance with Consent Agreement for CSO abatement and TMDLs on major tributaries expected to negate need for TMDL". NBC is complying with Consent Agreement RIA-424 and is moving forward with the Phase III CSO Program in accordance with the approved schedule stipulated in the CA. The proposed upgrades to the BPWWTF described herein are an element to the Phase III CSO Program. They are aimed at ensuring that the facility can adequately treat the increase in flow expected following construction of Phase III CSO facilities.

2.3 Existing Environmental Conditions

Figure B-6 in Appendix B depicts the BPWWTF site with respect to existing environmental data layers available through RIGIS. Available RIGIS mapping indicates that the site is not located in a sole source aquifer or wellhead protection area and there are no water supply sources impacted by this project. Groundwater beneath the site is classified as GB by RIDEM. Groundwater classified as GB is defined as groundwater not suitable for drinking water use without treatment. This classification can be attributed to a highly urbanized area, permanent waste disposal area, or an active site permitted for land disposal of sewage sludge.

There are no freshwater wetlands within the anticipated project limits, but small wetland areas exist to the northeast and south of the project limits. No impact to these wetland areas are anticipated. Because this project will be within 200 feet of the Seekonk River, it is within the Contiguous Area managed by the RI Coastal Resources Management Council (CRMC) and will require an Assent from CRMC.

Existing topography at the site is depicted on Figure B-7 in Appendix B. Topography was obtained from LiDAR survey obtained by NBC for use in design of Phase III CSO Program projects. Existing topography shows that the proposed project area is primarily flat, at approximate elevation 10 feet. A levy surrounds the operational footprint of the BPWWTF on the north, west, and east sides. Its maximum elevation is approximately 17.66 feet (based on NGVD 1929 datum). The project is proposed entirely inside this levy. Regrading of the landward side of a portion of the levy may be required as part of the construction of the recommended plan presented herein. This will be determined as the design of the recommended plan is developed.

FEMA Floodplain mapping is depicted on Figure 2-2. The site and the anticipated project area are within FEMA Flood Zone X associated with the Seekonk River. Zone X is defined as an area with 0.2% annual chance flood hazard area with average depth less than one foot or with drainage areas of less than one square mile.

The site is currently protected from flooding during a 100-year event with the levee that surrounds the operational footprint of the BPWWTF. The report “NBC Resiliency Plan” (Plan), prepared by Kleinfelder and submitted to RIDEM in November 2019, states that NBC’s infrastructure in coastal areas could be exposed to 3 feet of relative sea level rise by 2050-2060. The Plan establishes the design flood elevation for the Bucklin Point WWTF to be 17.8 ft. NGVD29 (14.8 ft. base flood elevation plus 3 ft. freeboard). The existing levee provides flood protection to 19.3 ft. NGVD29, which is 4.5 ft higher than the base flood elevation and 1.5 ft. higher than the design flood elevation. The Plan does not recommend a proposed action based on the findings of this assessment. Design of future improvements at the BPWWTF will comply with applicable regulations as they relate to sea level rise.

According to the Soil Survey of Rhode Island (accessed via the NRCS Online Web Soil Survey), the project is located within several soil classes. Soils within the project area are classified as Bigapple sand (BiB), Udorthents-Urban land complex (UD), and Urban land (UrS). Figure B-8 in Appendix B presents mapped soil types at and around the BPWWTF. Mapped soil types within the portion of the site anticipated for construction, as part of the recommended plan presented in this Facilities Plan Amendment, include:

- BiB, which consists of bigapple sand and similar soils. This complex is approximately 90% bigapple sand and similar soils and 10% other soils, somewhat excessively drained Merrimac soils and areas of Urban land. This type of soil is mapped along the north and west of the existing operational footprint of the BPWWTF.
- UD, which consists of Udorthents soils and areas of Urban land. This complex is approximately 70 percent Udorthents soils, 20 percent Urban land, and 10 percent other soils. This soil type makes up the southwest corner of the anticipated project area.
- UrS, which consists of Urban land. This complex is approximately 90 percent urban land, and 10 percent other soils. This soil type makes up the remainder of the anticipated project area.

The proposed project is suitable for construction within these soil types.

There are no onsite wastewater treatment system (OWTS) Critical Resource Areas within the BPSA, nor are there any areas requiring cesspool phase-out. None of the communities served by the BPSA have a municipal onsite wastewater program according to a listing compiled by RIDEM in 2014.

The Cumberland CCP indicates that large parts of northern Cumberland that are currently unsewered contain soils with limitations for supporting onsite wastewater systems. Unsewered areas in Cumberland are those outside the BPSA. There are no other municipal sewer collection systems in Cumberland. It does not appear that these areas currently represent

OWTS problem areas that require abatement. Rather, it appears that OWTS limitations may impact future development in these areas as most recent development has been new residential development performed in this part of Town. The Cumberland CCP acknowledges that extending sewer collection to this area of Town may promote development that is denser than desired.

The Public Facilities and Services Element of the Cumberland CCP states that the Town should be extremely cautious in planning sanitary sewer extensions. It also indicates that there are no immediate plans to expand the Town’s sanitary sewer system. It appears that connections made to the sewer collection system in the immediate future will largely be within or in very close proximity to the existing collection system limits and have relatively little impact on flows to the BPWWTF. However, flow and load projections described in Section 4 do account for some of the Town’s anticipated overall population growth tied to future development.

The CCP for the Town of Smithfield presents planned sewer extensions in areas currently served by OWTS. These areas will be connected to the Town’s collection system and will be treated at the Town’s wastewater treatment facility. A very small portion of Smithfield is served by NBC, and there currently are no plans for expansion of the BPSA into other areas of the Town.

National Flood Hazard Layer FIRMette

FEMA

41°51'16.10"N

71°22'27.84"W

71°21'50.39"W

41°50'49.30"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) *Zone A, V, A99*
		With BFE or Depth *Zone AE, AO, AH, VE, AR*
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
		Future Conditions 1% Annual Chance Flood Hazard *Zone X*
		Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
		Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN	Area of Minimal Flood Hazard *Zone X*
		Effective LOMRs
		Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES	B 20.2 / 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation
	8	Coastal Transect
	513	Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/16/2018 at 9:08:43 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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Section 3.0
Existing System

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3.0 Existing System

This section includes a general description of the existing treatment processes at the BPWWTF. It specifically provides details of system process changes, facility upgrades, and/or improvements that have occurred since the previous Facility Plan Amendment completed in 2009. Figure 3-1 at the end of this section represents a flow schematic of the BPWWTF.

3.1 BPWWTF Overview

The BPWWTF is located off Campbell Avenue in the Rumford area of East Providence, Rhode Island. A primary treatment plant was constructed in the 1950s and in 1972 the plant was upgraded to provide secondary treatment. Recent major upgrades were completed in 2006 and 2013 that advanced the plant's treatment capabilities and increased the plant's average, peak, and wet-weather treatment capacities. The 2009 Facility Plan Amendment was prepared in advance of the facility upgrades performed from 2012-2014. Primarily, these upgrades aimed to increase the plant's ability to treat effluent TN concentrations to an average monthly RIPDES permit limit of 5 mg/L between May and October. Ancillary WWTF improvements were also implemented to address plant deficiencies that were necessary to continue acceptable facility operations.

Flow enters the plant via the 90-inch semi-elliptical Blackstone Valley Interceptor (BVI) and the 48-inch East Providence Interceptor (EPI). The BVI first flows through the North Diversion Structure which limits flow to approximately 116 MGD. Wet weather flows exceeding this discharge to the Seekonk River through OF-002.

Flow from the two interceptors is measured separately and totalized in the SCADA system. The two flows combine and are pumped so that they may flow by gravity through the preliminary, primary, and secondary treatment processes. Preliminary treatment, which has capacity up to 116 MGD, consists of influent screening and grit removal. Following preliminary treatment, flow up to 46 MGD is directed to three dry weather primary clarifiers. Flow that exceeds 46 MGD (up to 116 MGD) is directed to wet weather primary clarifiers.

Downstream of the dry-weather primary clarifiers, the primary effluent enters the plant's secondary treatment system which consists of four (4) biological reactors, six (6) secondary clarifiers, an aeration building, a supplemental carbon feed system, and two (2) return activated sludge (RAS) pump stations. Effluent from the secondary clarifiers is disinfected using ultraviolet (UV) light prior to discharge to the Seekonk River through OF-001.

During wet-weather flow conditions, plant flow that exceeds 46 MGD is diverted downstream of the preliminary treatment process to wet-weather clarifiers. Clarified effluent from these tanks is disinfected with sodium hypochlorite and dechlorinated with sodium bisulfite prior to discharge into the same outfall to the Seekonk River that is used for the dry weather process effluent.

Primary sludge is thickened in the primary clarifiers and is pumped to an anaerobic digestion process. Waste activated sludge (WAS) is removed from the biological process and is thickened by gravity belt thickeners (GBT) prior to being pumped to the digesters. The digested WAS and primary sludge are dewatered by centrifuges prior to hauling offsite.

A table providing design criteria for the unit operations at the BPWWTF is provided as Appendix D. Section 3.2 summarizes the major existing unit operations at the BPWWTF.

3.2 Unit Process Operations

3.2.1 Preliminary Treatment Processes

The intent of preliminary treatment is to measure influent flow to the facility and to remove non-biodegradable solids from the waste stream ahead of other operations. The preliminary treatment processes at the BPWWTF include the following components:

- Two Parshall Flumes, one on the BVI and one on the EPI;
- Four Influent Screw Pumps;
- Four Automatic Bar Screens;
- Four Vortex Grit Collectors and Grit Pumps;
- One Screenings Wash Press;
- Screenings and Grit Screw Conveyors; and
- A dry-wet weather Splitter Box.

The BVI carries combined sanitary and stormwater flow from the portion of the service area comprised of Pawtucket, Central Falls, Lincoln, Cumberland, and Smithfield. It has a capacity of 116 MGD but average daily design flow is approximately 23.7 MGD. The EPI carries flow from the East Providence portion of the service area and consists only of sanitary flow. The Omega Pump Station, which pumps flow in the EPI to the BPWWTF, currently has a capacity of 8.0 MGD. The average daily design flow in the EPI is approximately 1.7 MGD.

The North Diversion Structure regulates flow to the BPWWTF through a 96-inch by 96-inch hydraulically operated sluice gate. Flow is monitored from both the BVI and EPI and plant operators control the sluice gate to limit flow to the plant at 116 MGD. The North Diversion Structure also includes a 25-foot long overflow weir to limit combined flow to the plant at 116 MGD. Flows in excess of this limit overflow to the Seekonk River through a 72-inch line.

Flow passes through each Parshall Flume and flow rates are measured using ultrasonic level indicators. Following the Parshall Flumes, flow combines into one box culvert and enters the Influent Pump Station. Each influent pump has a capacity of approximately 38.67 MGD and lifts flow approximately 9.7 feet to a delivery channel that carries flow to the Grit and Screenings facility. There are four, chain-driven automatic mechanical bar screens at this facility. Screenings are deposited in a screw conveyor and transferred to the Screenings Wash Press before being loaded into a roll-off container.

Flow is then directed to the Vortex Grit Collectors. Flow enters tangentially, causing rotary flow conditions that allows grit to settle to the bottom of each conical collector. Grit Pumps, located in the basement of the Screening and Grit Building, pump grit slurry from the collectors to Grit Classifiers where the slurry is dewatered. A conveyor directs dewatered grit to screw conveyors that load a roll-off container for off-site disposal.

Effluent from the Vortex Grit Collectors discharge to the dry/wet weather Splitter Box. Dry weather flow up to 46 MGD is directed to primary clarifiers while flow exceeding this is diverted to wet weather clarifiers. An adjustable weir slide gate is used to divert flow to the wet weather facilities.

3.2.2 Primary Treatment Processes

Dry weather flow is measured using a 60-inch magnetic flow meter following the dry/wet weather Splitter Box. This flow then enters a Dry Weather Flow Splitter Box where it is directed to three primary clarifiers controlled by weir slide gates. All three (3) clarifiers are 102-foot diameter and 14 feet deep. Each is fed from individual 36-inch lines out of this splitter box. Flow is discharged into the center column of each clarifier where it passes through an energy dissipator to prevent short circuiting and promote conditions best for solids settling.

Two rake arms, set at the bottom and 180 degrees apart, direct sludge to a central sludge collection well at the bottom of each clarifier. Progressive cavity, primary sludge pumps located in the basement of the Dry Weather Primary Sludge Pump Station are used to pump sludge to primary anaerobic digesters. Effluent from the clarifiers passes under a scum baffle and over a v-notch weir before falling into an effluent trough. The effluent trough discharges to a 48-inch line, which increases to a 72-inch and then 80-inch diameter line that flows into the Dry Weather Primary Effluent Splitter Box. The scum baffle is on the outer perimeter of each clarifier and removes floatable materials, preventing them from being discharged to secondary treatment processes. Scum is similarly pumped to anaerobic digesters by two primary scum pumps.

3.2.3 Secondary Treatment Processes

After receiving Primary Treatment, the Primary Clarifier Effluent flows to the Dry Weather Primary Effluent Splitter Box. Effluent lines from each Primary Clarifier are 48 inches in diameter but they combine to 72 inches and then 84 inches prior to discharge into the Splitter Box. The RAS from the Final Settling Tanks is discharged into this line. A Soda Ash solution is injected directly into the RAS line to provide pH control and alkalinity for nitrification. The Soda Ash feed rate is an automatic operation, which requires monitoring by BPWWTF operations staff. The speed set point of the on-line soda ash system volumetric feeder is controlled based upon the aeration basin effluent alkalinity measured by the SCADA system.

The Mixed Liquor, which is the combination of primary effluent and RAS, enters the Dry Weather Primary Effluent Splitter Box from the bottom. The splitter box is rectangular and has six adjustable weir slide gates, four of which regulate flow to the existing four aeration tanks while two gates are reserved for potential future use. The four active gates can be controlled locally or from the OWS. The position of the gates is typically set to maintain the hydraulic grade line through the aeration tanks, and they would only be raised in the event that an aeration tank is taken off-line. There is no automatic mode of operation for the Dry Weather Primary Effluent

Splitter Box Weir Slide Gates either locally at the gate or at the OWS. Height adjustment of the gates is done manually.

Flow from the Dry Weather Primary Effluent Splitter Box is conveyed through a 48-inch line to the first pre-anoxic zone in each aeration tank. In addition, internal recycle flow from various cells and mixed liquor from the effluent end of the aeration tanks is also introduced into the first pre-anoxic zone. Each of the pre-anoxic zones is equipped with a floating mixer. These mixers keep the solids suspended without introducing oxygen into the zones. The pre-anoxic zones serve two purposes. They provide:

- Denitrification (conversion of nitrate (NO_3) and nitrite (NO_2) to nitrogen gas (N_2)
- Improved settleability of MLSS in the Final Settling Tanks

Effluent from the pre-anoxic zone enters an aerobic zone where oxygen is added and mixing occurs. It then enters a post-anoxic zone and aerobic reaeration zone prior to discharge to final settling tanks. Denitrification takes place in the pre-anoxic zone and post-anoxic zone of the aeration tanks. At times, BOD in the mixed liquor is not enough to meet the needs of the nitrification and/or denitrification processes and a supplemental source of carbon is required. Modifications were made during the 2012-2014 facility upgrade to provide a supplemental carbon storage and feed facility. This facility includes three carbon bulk storage tanks, a recirculation/transfer peristaltic hose pump, six carbon feed peristaltic tube metering pumps, and associated piping. It is used when deemed to be required by BPWWTF operations staff. Supplemental carbon is typically added to the post-anoxic zone while BOD levels in the mixed liquor in the pre-anoxic zone is typically a sufficient carbon source.

After mixed liquor flows from the aeration system, it is divided among six final settling tanks, FSTs 1 – 6 (also referred to as secondary clarifiers herein). They separate the mixed liquor into a more concentrated sludge (underflow) and a clean treated effluent (overflow). This separation allows continuous return of the active culture of microorganisms in the settled sludge to the aeration tanks to help maintain the desired MLSS level. This fulfills two objectives; clarifying the final effluent and thickening the return and waste sludges.

The mixed liquor flow enters each final settling tank through the lower center of the tank where it moves upward through a steel center column and out into the main body of the tank through ports just below the surface. A circular steel skirt outside the ports and extending below the water surface directs the flow downward, which prevents short-circuiting across the top of the tank. The sludge collector mechanism in each final settling tank consists of two truss-type collection arms with V-type squeegee blades extending from a center drive mechanism that rotates around the bottom of the tank to push sludge towards sludge withdrawal pipes. The collectors remove sludge uniformly and continuously from the floor of the settling tank to avoid long sludge detention time. The sludge is discharged into a collection box mounted on the center column of each settling tank. The sludge flow from each collection box is conveyed to the Sludge Distribution Chamber. From here, the sludge is either returned to the influent line into the Dry Weather Effluent Flow Splitter Box as RAS or is removed as WAS for thickening and disposal.

Floating material is retained in the tank by a circular scum baffle with adjustable skimmer blade inside the overflow weir, where it is transferred into scum wells and ultimately conveyed to onsite anaerobic digesters. All final settling tank mechanical equipment was replaced during the 2012-2014 facility upgrade with new, in-kind equipment.

3.2.4 Ultraviolet Disinfection

Effluent from the secondary clarifiers flows through a 72-inch line to the Dry Weather Effluent Pump Station, where it is disinfected with UV light prior to discharge to the Seekonk River. A Trojan UV4000 UV disinfection system manufactured by Trojan Technologies, Inc. is used. Flow enters a reaction chamber that has two banks of UV lamps. Each bank has 100 lamps and provides a treatment capacity of up to 35 MGD. Both banks are utilized to treat flows in excess of 35 MGD, up to the facility's secondary treatment capacity of 46 MGD.

3.2.5 Effluent Pumping

Flow passes over a weir to discharge from the UV disinfection chamber to a wetwell in the Dry Weather Effluent Pump Station. Three 125 HP wet-pit, vertical propeller pumps (2 duty pumps, 1 standby pump in an alternating configuration) are in place to lift flow to a discharge channel. The design capacity of the pump station is 46 MGD. The discharge channel flows to a 96-inch wide by 120-inch high outfall to the Seekonk River.

3.2.6 Wet Weather

Wet weather treatment processes following preliminary treatment consist of primary clarification, disinfection with Sodium Hypochlorite, and dechlorination using Sodium Bisulfite prior to effluent discharge to the Seekonk River.

Flows that exceed 46 MGD through preliminary treatment trigger activation of wet weather treatment facilities. When the flow reaches 46 MGD in the 60-inch Magmeter at the Dry/Wet Weather Splitter Box, an adjustable weir slide gate drops incrementally to lower flow to dry weather until it meets 43 MGD before rising again. The weir slide gate is 15 feet long and is adjustable over a 20-inch range.

Flow diverted by this slide gate is directed to Wet Weather Tanks via a 60-inch line. Two rectangular settling tanks, each 230 feet by 68 feet and 11.5 feet deep, are used for settling during wet weather. These tanks are dewatered to the headworks by three 20 HP centrifugal screw pumps and two 25 HP centrifugal submersible pumps, following the wet weather event.

Effluent from the settling tanks is directed to a chlorine contact tank consisting of a 410-foot long channel with 10.5-foot width and 10.75-foot depth. Effluent is dechlorinated using Sodium Hypochlorite through a feed system consisting of three, 8,000-gallon storage tanks and four (4) feed pumps.

Following dechlorination, effluent from the wet weather treatment train is pumped to the discharge channel where it combines with dry weather effluent from the UV Disinfection process. Four 75 HP, vertical turbine single stage pumps are used for wet weather effluent pumping.

3.2.7 Solids Processing and Recycle Flow

Sludge processing is done using three primary, and one secondary, anaerobic digesters. Sludge is collected from the primary clarifiers and pumped via three primary sludge pumps to the anaerobic digesters. Scum from the primary clarifiers is also pumped to the anaerobic digesters via two scum pumps that draw from a scum well. Scum collected from secondary clarifiers and the BNR aeration basins are also pumped to the anaerobic digesters by three secondary scum pumps. Finally, two WAS pumps convey activated sludge to two gravity belt thickeners, where three pumps direct thickened WAS to the anerobic digesters. Filtrate from the gravity belt thickeners is discharged into the BVI at the headworks of the plant.

Three pumps convey sludge from the anaerobic digesters to two storage tanks prior to it passing through two centrifuges. Two centrate pumps direct centrate from the centrifuges to two “sidestream” equalization (SSE) tanks, where it is combined with overflow from the anaerobic digesters. Dewatered sludge is hauled offsite for disposal while two transfer pumps convey effluent from the SSE tanks to the headworks of the facility.

3.3 Improvements to BPWWTF Since 2009

The 2009 Facilities Plan detailed an Implementation Plan that recommended capital improvement upgrades to enable BPWWTF to comply with the average monthly permit limit of 5 mg/L effluent TN from May through October while continuing to provide operational efficiency that achieves this level of performance and resolves maintenance problems throughout the plant. Additionally, other plant improvements not tied to enhanced nitrogen removal were also performed. Below is a summary of the work that has been completed at the BPWWTF since the 2009 Facility Plan Amendment.

3.3.1 Modifications to Nitrogen Removal Process

Prior to the 2012-2014 facility improvements, the BPWWTF’s biological nutrient removal (BNR) process utilized the Modified Ludzack-Ettinger (MLE) process year-round. This provided BOD removal and year-round nitrification and nitrogen removal, targeting a level of approximately 8 mg/L effluent TN. Mixed liquor flowed from the biological tanks to the secondary clarifiers, and settled activated sludge was recycled via a RAS pump station back to the flow-distribution structure.

After the 2012-2014 facility improvements, the BNR process was modified to achieve compliance with the seasonal average monthly TN concentration of 5 mg/L. The four (4) bio-reactors were modified to operate in a four-stage Bardenpho configuration, which is an enhanced MLE process with additional anoxic and oxic zones to help increase nitrogen removal. As part of the modifications, the basins’ diffuser systems were reconfigured and additional baffle walls and anoxic mixers were installed. A spray nozzle system, supplied by plant water, was also installed to address increased foam production that resulted from the Bardenpho process.

Two (2) Turbo Blowers (NX 300) were installed to complement the existing blowers used for aeration. The new blowers are more efficient and are able to better control the flow of air, avoiding excess aeration during periods of low process oxygen demand.

3.3.2 Dry-Weather Primary Clarification

NBC modified their wet weather drain system to discharge upstream of preliminary treatment. Prior to these upgrades, the drain system discharged downstream of the grit removal system. This modification was completed to enable proper handling of the fine grit that periodically enters the plant which had previously had poor removal efficiency.

3.3.3 Secondary Clarification

All six (6) secondary clarifiers were upgraded to replace mechanisms that had been original to the system. These upgrades included installation of beach plates to increase the efficiency of scum removal.

NBC also upgraded their RAS pumping system to increase the peak pumping system capacity. Currently, the pumping system can reach a peak pumping capacity of 22 MGD.

3.3.4 Wet-Weather Treatment

NBC upgraded their wet-weather tank submersible pumping system to increase the pumping capacity and expedite emptying the wet-weather primary clarifiers.

3.3.5 Solids Processing

In the 2009 Facilities Plan, it was noted that the plant’s existing Dissolved Air Flotation (DAF) thickeners, used for WAS thickening, were reaching the end of their service life. Since then, NBC has replaced their DAF thickeners with two (2) Gravity Belt Thickeners (GBTs) that now handle all WAS thickening at the plant.

3.3.6 Plant Water System

NBC has upgraded their plant water system to address greater water demands that have resulted from the improvements made to the BPWWTF. These upgrades primarily include higher capacity pumps, new process piping, and a new strainer.

3.3.7 Instrumentation and Control System

As part of the 2009 Facility Plan Amendment, NBC identified the need to upgrade the BPWWTF SCADA system to address two basic problems: 1) finding a cost-effective upgrade path for the human-machine interface (HMI) graphic software portion of the SCADA system; and 2) obtaining reliable and cost-effective maintenance service of their system. Since 2009, NBC has regularly modified and updated their SCADA programming functions. No new equipment has been installed to date, as it was identified by NBC that the existing equipment is adequate to properly operate and monitor the plant.

3.3.8 Electrical Systems

The 2009 Facility Plan identified that the plant's electrical distribution system has 88 electrical manholes, and groundwater intrusion has historically proven to be problematic. Additionally, many of the older buildings at the plant were serviced by 600-volt electrical systems and motor control centers. NBC replaced older electrical equipment with new 480-volt equipment and the whole facility switched to 480-volt service.

3.4 BPWWTF Performance

NBC maintains a detailed Operations Manual for the BPWWTF. This manual provides key information for all treatment processes, categorized as follows:

- Functional Description
- Design Data
- Equipment Controls
- Process Controls
- Normal Operations
- Alternate and Emergency Operations
- Shutdown Considerations
- Restart Considerations
- Safety Considerations

Operating and maintenance costs are sufficiently accounted for in user charges. Existing plant hydraulics, operations, maintenance, sampling programs, staffing, and support facilities are all of a high standard that ensures that NBC maintains compliance with its RIPDES Discharge Permit. NBC has recently upgraded its laboratory facilities at Fields Point, which performs all major analysis of samples collected at BPWWTF.

NBC accepts septage, but it represents a small amount of the loading to the BPWWTF. In 2017, NBC accepted 7.68 million gallons of septage which is approximately 2% less than compared to 2016. Septage has been under 10 million gallons annually dating to 2004, whereas it was as high as 23 million gallons in 2000. No significant changes to flows and loading from septage is anticipated for the planning period of this Facilities Plan Amendment.

Necessary improvements to the BPWWTF presented in this plan are to ensure that NBC continues to meet its discharge limitations once proposed CSO abatement facilities are online and wet weather flows requiring secondary treatment increases. Existing and future flows and loads, alternatives for upgrading the facility to meet the increased demand for secondary treatment, and the selected plan are described in subsequent sections. Otherwise, the BPWWTF will remain substantially unchanged.

3.5 Collection System

Figure B-2 in Appendix B shows the major NBC infrastructure in the BPSA. NBC maintains three pump stations in the collection system, as follows:

- Omega Pump Station, in East Providence;
- Saylesville Pump Station, in Lincoln; and
- Washington Highway Pump Station, in Lincoln.

NBC-owned sewers in the BPSA are limited to approximately 30 miles of interceptors, as all local sewers are owned by each municipality. The NBC Interceptors in the BPSA are as follows:

- Abbott Run Valley Interceptor;
- Blackstone Valley Interceptor;
- East Providence Interceptor;
- Moshassuck Valley Interceptor;
- Taft Pleasant Interceptor; and
- Washington Highway Interceptor.

Figure B-2 also shows the location of each CSO outfall in the BPSA, limited to locations in Pawtucket and Central Falls. These are the only communities in the BPSA with combined sewers. The Phase III CSO Program will result in abatement of CSOs in the BPSA in accordance with the approved CSO Control Facilities Phase III Amended ReEvaluation Report and Consent Agreement RIA-424 between NBC and RIDEM.

There are approximately 160,000 residents within the BPSA and the majority of flow to the BPWWTF is from residential users. NBC maintains a pretreatment program that regulates industrial discharges. Industrial discharges must be permitted under one of several categories, based on industry type and the anticipated discharge. For 2017, there were 33 significant industrial users in the BPSA. Each year NBC publishes an annual report summarizing its pretreatment program, which includes a listing of all commercial and industrial users in each service area.

The collection system remains substantially unchanged from the 1997 Facilities Plan Amendment, and average daily flow now is essentially the same as in 1997.

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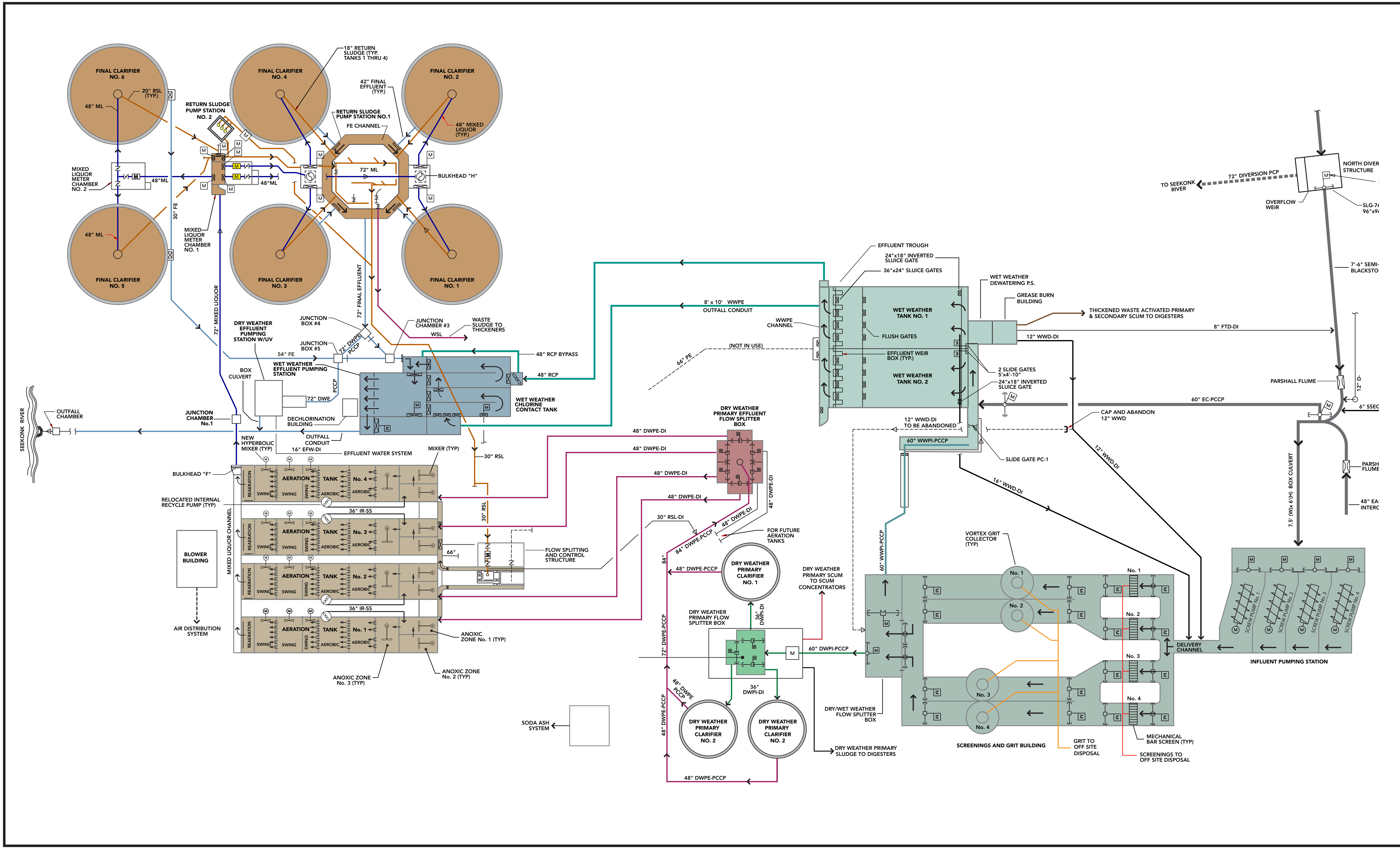

Narragansett Bay Commission
Bucklin Point Facility

Figure 3-1

Liquid Process Flow Schematic

CDM Smith

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Section 4.0
Flows and Loads

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4.0 Flows and Loads

Future wastewater flows and loads must be estimated to evaluate the adequacy of the hydraulic capacity and treatment effectiveness of the BPWWTF to accommodate long term changes. Future wastewater flows and loads are projected using existing and future population data for the Bucklin Point service area, typical per capita water consumption rates, infiltration and inflow projections, and city/town community and development plans.

Additionally, NBC is currently designing the third and final phase for components of its CSO Long Term Control Plan, including a new CSO storage tunnel (the “Pawtucket Tunnel”) and its associated tunnel dewatering pump station which will ultimately discharge to the BPWWTF. When the new facilities come on-line there will be a slight increase in average annual daily flows entering the treatment plant due to periodic operation of the tunnel pump station. During future tunnel pump out operations, it is anticipated that the Bucklin Point WWTF will experience extended periods of higher than average influent flow not to exceed 46 MGD, which is the peak flow capacity of the secondary biological treatment process.

In this section, existing flows and loads data to the BPWWTF are evaluated and future flows and loads are projected through 2040, including future Pawtucket Tunnel pump out flow rates. These projected flows and loads are then compared to the flows and loads in the BPWWTF 2009 Facilities Plan, and a recommendation is provided for flows and loads to be used for facility planning purposes.

4.1 Existing Flows and Loads

Historical plant data was analyzed to establish the existing baseline conditions for projection of future flows and loads. Daily data from January 1, 2014 to September 30, 2017 was used to calculate the existing flows and loads. Due to data gaps for certain parameters, additional data beyond the above time period was used to supplement the data set.

4.1.1 Existing Flows

The BPWWTF has an annual average daily design flow of 23.7 million gallons per day (MGD). It treats flow from a combined sewer collection system. As described in Section 3, flow enters the plant via the Blackstone Valley Interceptor (BVI) and the East Providence Interceptor (EPI). The flow from these two interceptors is measured separately and totalized in SCADA. The plant influent pump station pumps a maximum hourly flow of 116 MGD. The excess flow from the lower BVI beyond the influent pump station capacity is directed to the Seekonk River by the North Diversion Structure (CSO OF-002). After the flow is pumped to the plant, up to 46 MGD receives full treatment (primary, secondary and UV disinfection) and up to 70 MGD is diverted to the wet weather treatment train (primary and chorine disinfection) during a wet weather event. The current design maximum month flow for the secondary treatment is 31 MGD.

Table 4-1 provides a summary of the annual average flow, maximum month flow and maximum day flow in the plant influent as well as to the secondary treatment. The flows to the secondary treatment are calculated using plant influent data capped at 46 MGD. The calculations are as follows:

- Annual average flow is calculated as average of all daily flow data.
- Maximum month flow is calculated as the 98th percentile of the 30-day rolling average flow data.
- Maximum day flow is calculated as the 98th percentile of all daily flow data.

The flow value is the total of all flow components as measured by the plant meters including dry weather flow, base inflow/infiltration as well as wet weather inflow (stormwater) and infiltration.

Peaking factors for the maximum month and maximum day flows are calculated as a ratio of the maximum flow to the annual average flow. The maximum month and maximum day peaking factors are used for future maximum month and maximum day flow calculations, respectively.

Table 4-1 Summary of Existing Flows

Parameters	Plant Influent Flow		Flow To Secondary Treatment	
	Flow Rate (MGD)	Peaking Factor	Flow Rate (MGD)	Peaking Factor
Annual Average	18.7	--	18.5	--
Maximum Month	29.7	1.59	27.9	1.50
Maximum Day	44.5	2.38	44.5	2.40
Peak Hourly	116	--	46	--

The daily influent flow for the time period analyzed is presented in Figure 4-1. Figure 4-2 presents the average flow from different years for the same day in a year, with the upper and lower bar indicating the maximum and the minimum of the flows on the same day. The data shows a seasonal trend with regards to base flow to the plant. Flows are at their lowest average when summer transitions to fall and at their highest when winter transitions to spring. The variation in the minimum flows provides some indication of the amount of existing I/I.

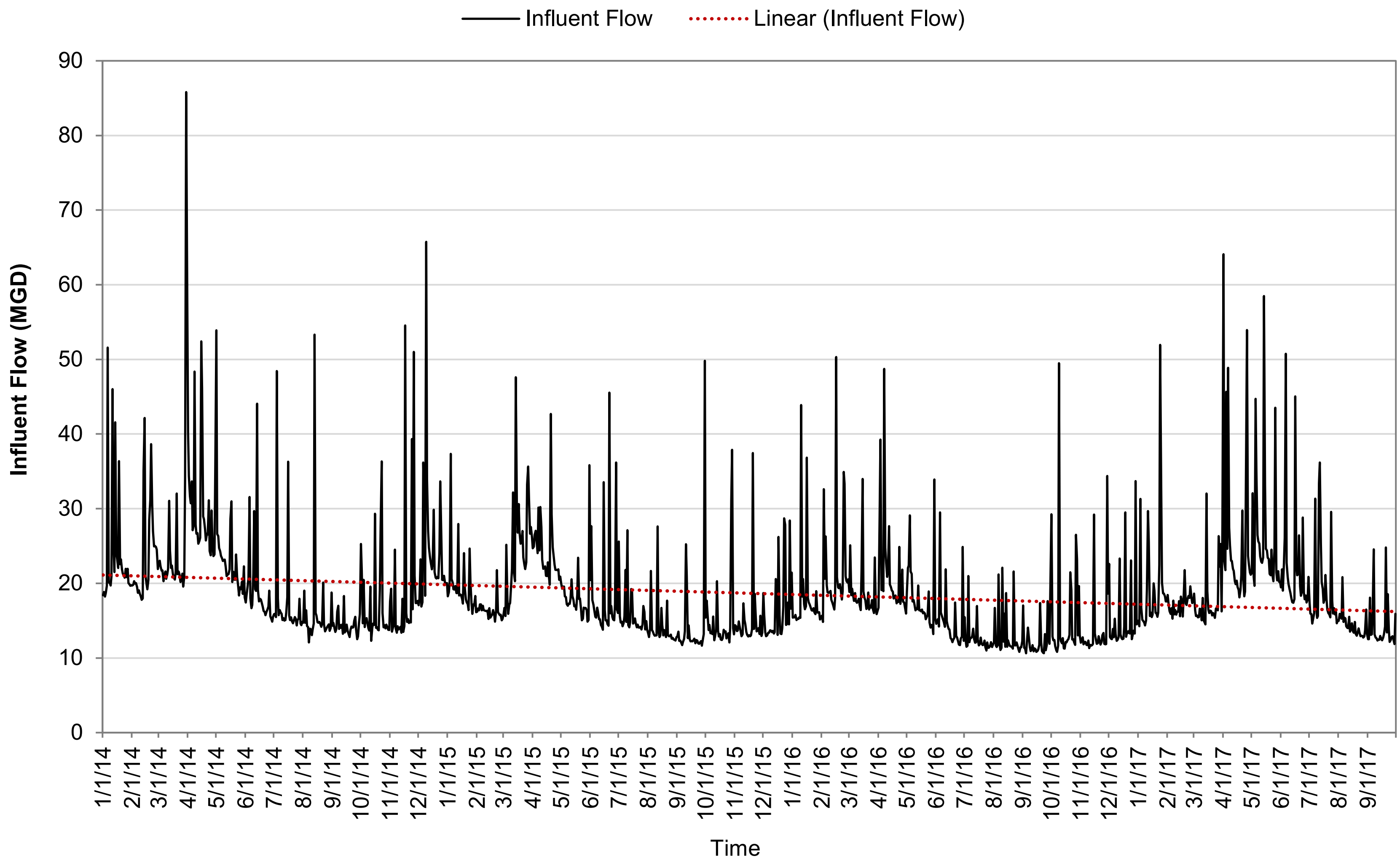

Figure 4-1 Daily Plant Influent Flow (1/1/14-9/30/17)

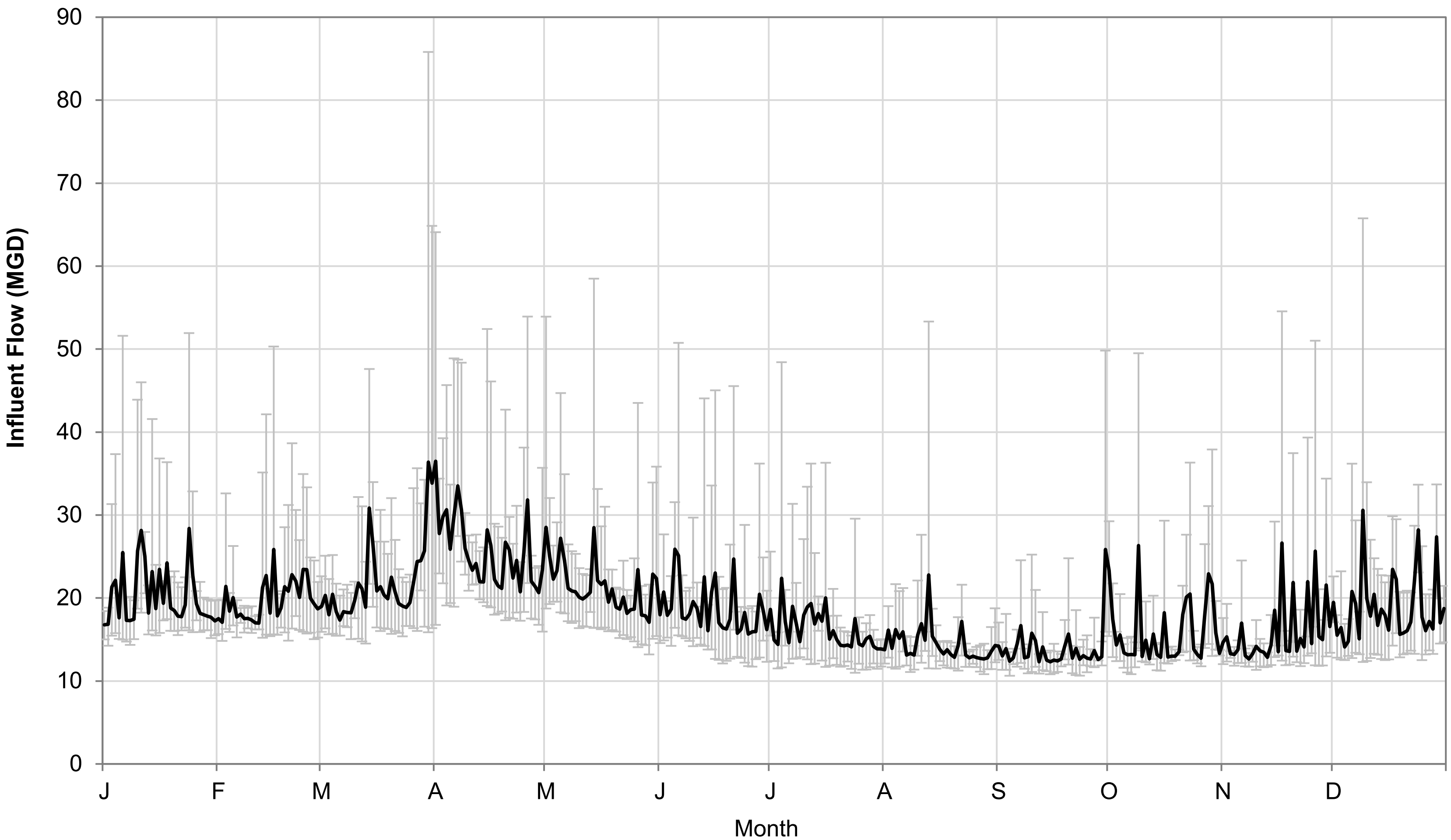

Figure 4-2 Day Average Plant Influent Flow with Maximum and Minimum (average for the same day from different years 2014-2017)

4.1.2 Existing Loads

The existing loads are calculated as follows:

- Plant influent daily loads are calculated as the plant influent daily flow multiplied by plant influent concentrations for BOD, TSS and TKN.
- Primary treatment influent loads are calculated as primary influent flow (which is the influent daily flow capped at 46 MGD) multiplied by plant influent concentrations plus the loads from the sidestream equalization (SSE) tank. The SSE tank receives centrate from the digested sludge dewatering centrifuges as well as overflow from the digesters.
    - Flow from the SSE tank (average approximately 198,000 gpd) to the headwork is approximately 0.8% of the average plant influent flow.
    - The cBOD and TSS concentrations in the sidestream are not measured but they are typically assumed to be within 2 to 5 times of influent cBOD and TSS concentrations. However, considering the small amount of the SSE flow, the cBOD and TSS loads from the sidestream are insignificant and not included in the calculation of the primary influent loads.
    - The nitrogen load from sidestream is significant. The plant monitors ammonia but not TKN in the sidestream. The average ammonia concentration is 395 mg N/L, with a max month concentration of 625 mg/L. This is more than 10 times of the TKN concentration in the plant influent. Typically, the ammonia contributes to the majority of TKN in the sidestream for a system with anaerobic digestion such as BPWWTF. Ammonia data was used in this analysis to estimate TKN load from the sidestream. The available sidestream data from July 25, 2015 to December 31, 2017 was analyzed and indicated that the average sidestream TKN load is 14.9% of the average plant influent TKN load.
- The loads to the second treatment (i.e. primary effluent loads) are calculated using the primary clarifier removal efficiency for BOD, TSS and TKN listed below:
    - Based on the plant data between January 1, 2014 and September 30, 2017, the BOD removal by the primary treatment was determined to be 35%, and TSS removal was 60%.
    - TKN removal was calculated using the data from July 25, 2015 to December 31, 2019, including the sidestream nitrogen loading. The average removal was 12.7%.

The annual average, maximum month and maximum day loads are calculated similarly to the flows as described in Section 4.1.1.

Table 4-2 provides a summary of the annual average loads, maximum month loads, and maximum day loads in the plant influent as well as to the secondary treatment for all three parameters.

Table 4-2 Summary of Existing Loads

Parameters	Plant Influent Load		Load To Secondary Treatment	
	Load (lbd)	Peaking Factor	Load (lbd)	Peaking Factor
BOD_5				
Annual Average	30,008	--	19,392	--
Maximum Month	37,100	1.24	26,956	1.39
Maximum Day	60,424	2.01	39,768	2.05
TSS				
Annual Average	23,133	--	9,944	--
Maximum Month	29,945	1.29	15,322	1.54
Maximum Day	53,846	2.33	24,751	2.49
TKN				
Annual Average	4,430	--	4,419	--
Maximum Month	5,178	1.17	5,109	1.16
Maximum Day	8,554	1.93	8,211	1.86

The daily influent loads for BOD, TSS and TKN are depicted in Figure 4-3 through Figure 4-8. Figure 4-3 shows daily influent BOD loading from 1/1/2014 to 9/30/2017 and Figure 4-4 shows the average BOD loading from different years for the same day in a year, with the upper and lower bars indicating the maximum and the minimum of the loads on the same day. Figure 4-5 shows daily influent TSS loading from 1/1/2014 to 9/30/2017 and Figure 4-6 shows the average TSS loading from different years for the same day in a year, with the upper and lower bars indicating the maximum and the minimum of the loads on the same day. Figure 4-7 shows daily influent TKN loading from 1/1/2014 to 9/30/2017 and Figure 4-8 shows the average TKN loading from different years for the same day in a year, with the upper and lower bars indicating the maximum and the minimum of the loads on the same day. TKN was measured three times in a week, therefore discrete data points instead of continuous line were shown in Figure 4-7 and Figure 4-8.

The data shows a seasonal trend with regards to influent BOD loading to the plant. BOD loads are at their lowest average when summer transitions to fall and at their highest when winter transitions to spring, similar to the trend seen with the average day flow. Influent TSS loads are more consistent than BOD loads throughout the year, but similar to BOD they are lowest as summer transitions to fall. No seasonal effect was observed for the influent TKN loads.

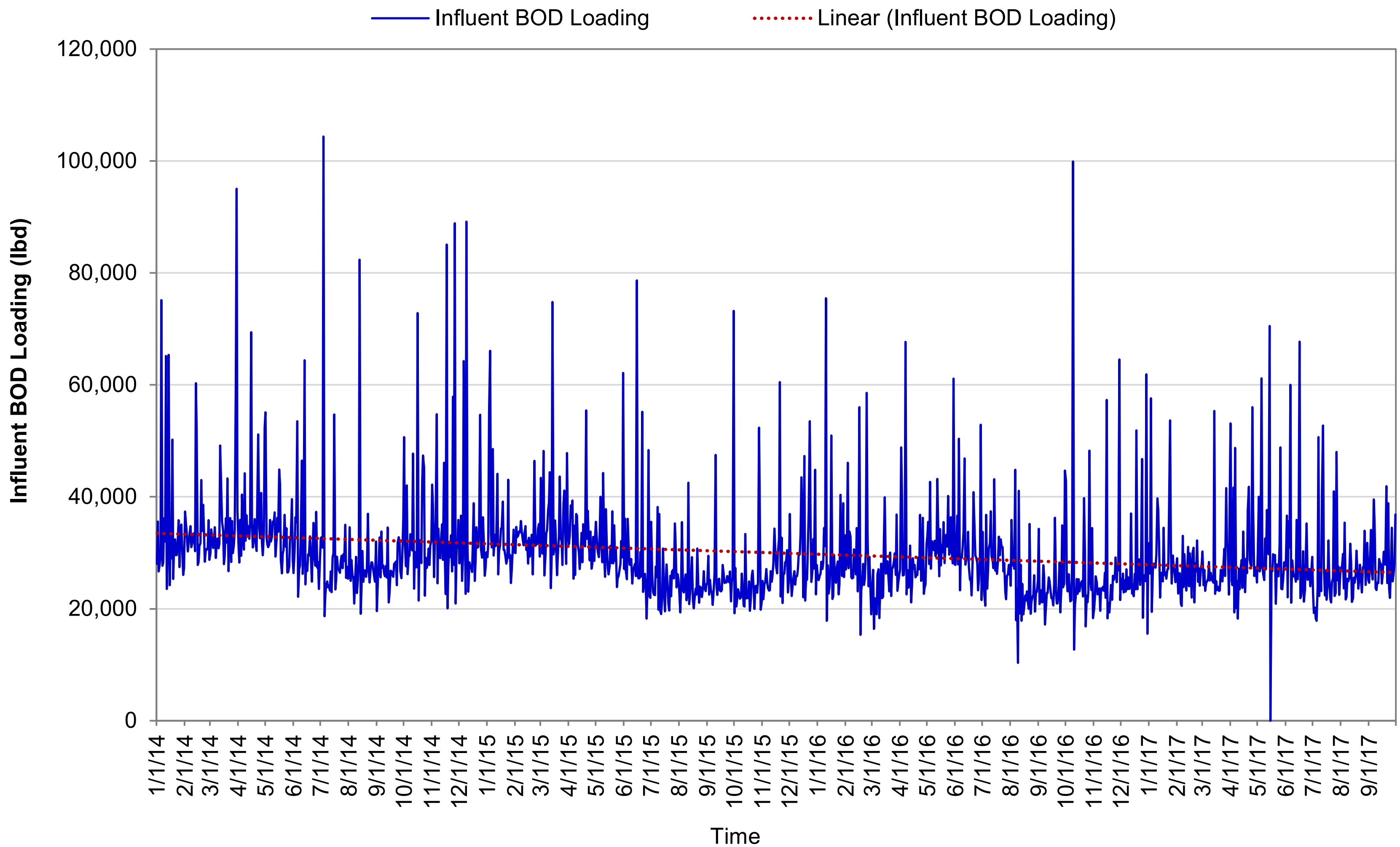

Figure 4-3 Daily Plant Influent BOD Loading (1/1/14-9/30/17)

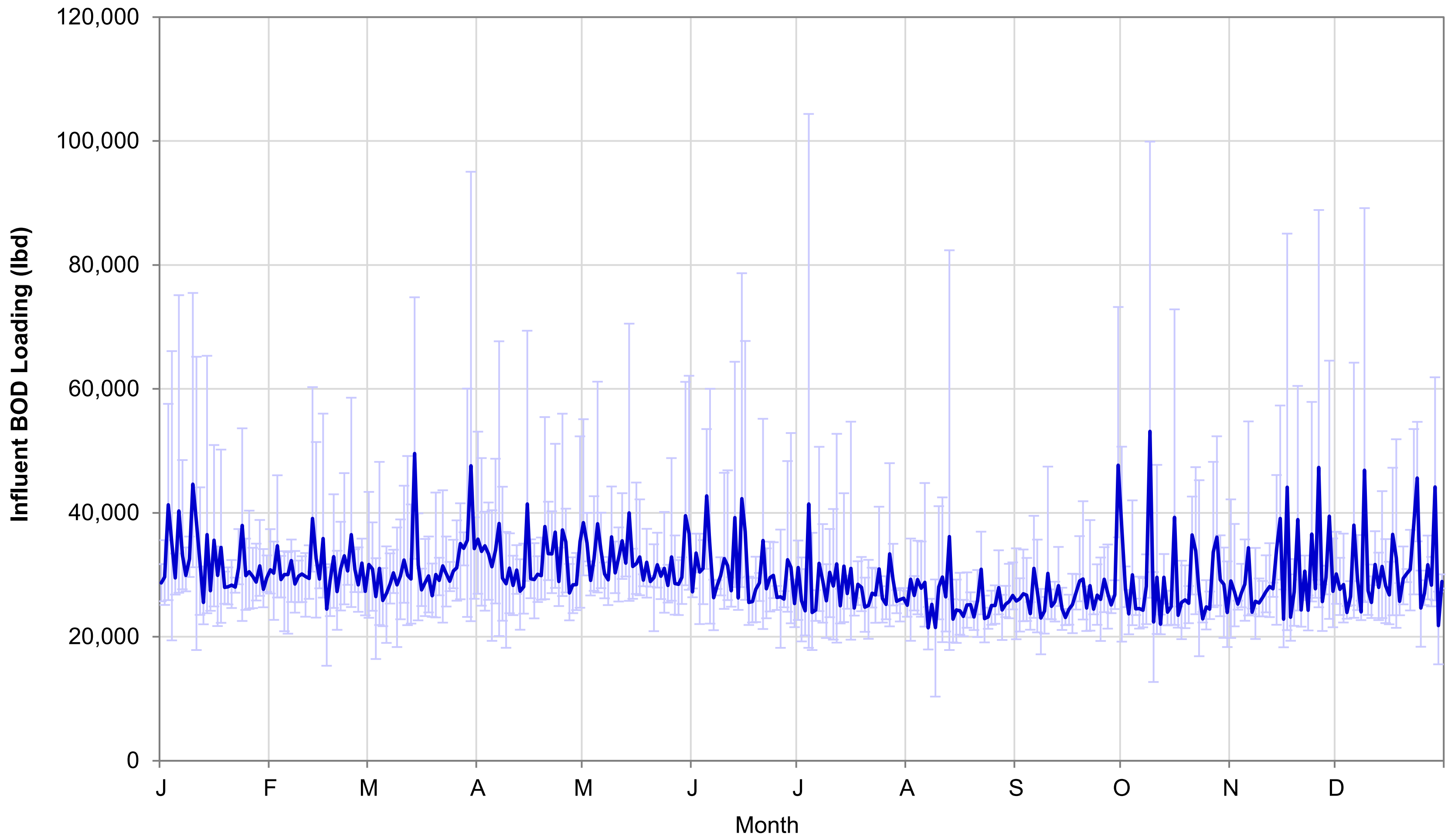

Figure 4-4 Day Average Plant Influent BOD Loading with Maximum and Minimum

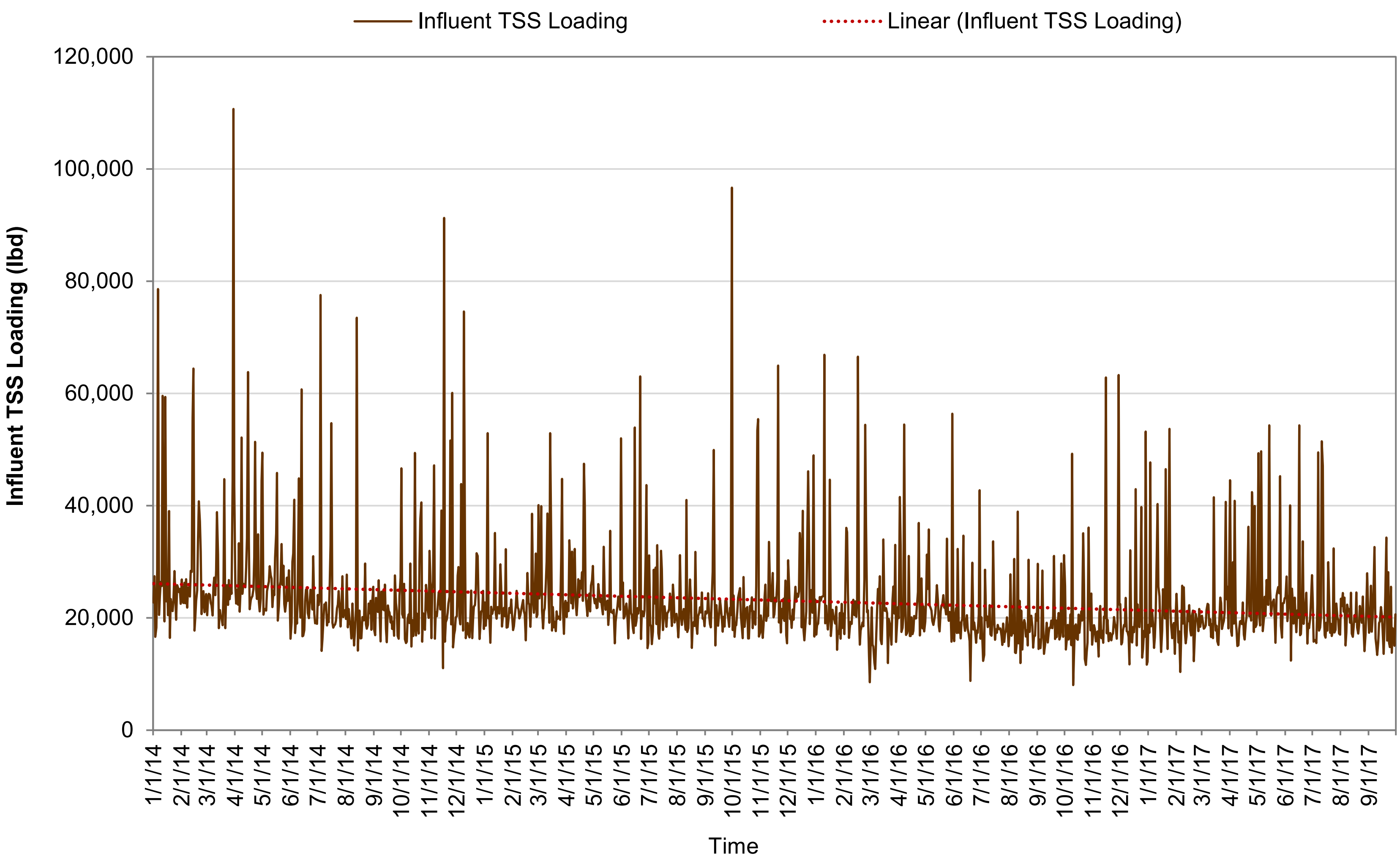

Figure 4-5 Daily Plant Influent TSS Loading (1/1/14-9/30/17)

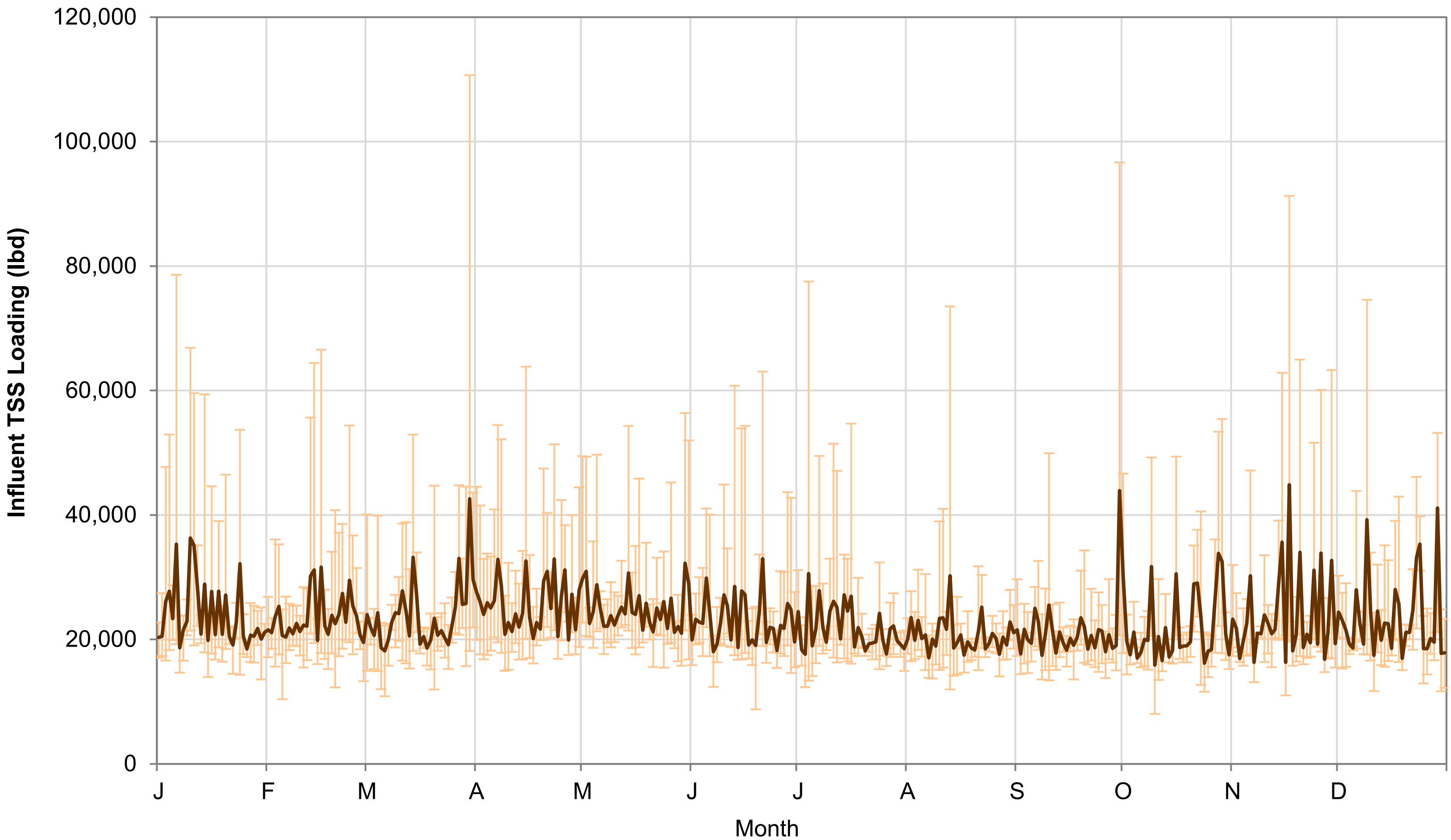

Figure 4-6 Day Average Plant Influent TSS Loading with Maximum and Minimum

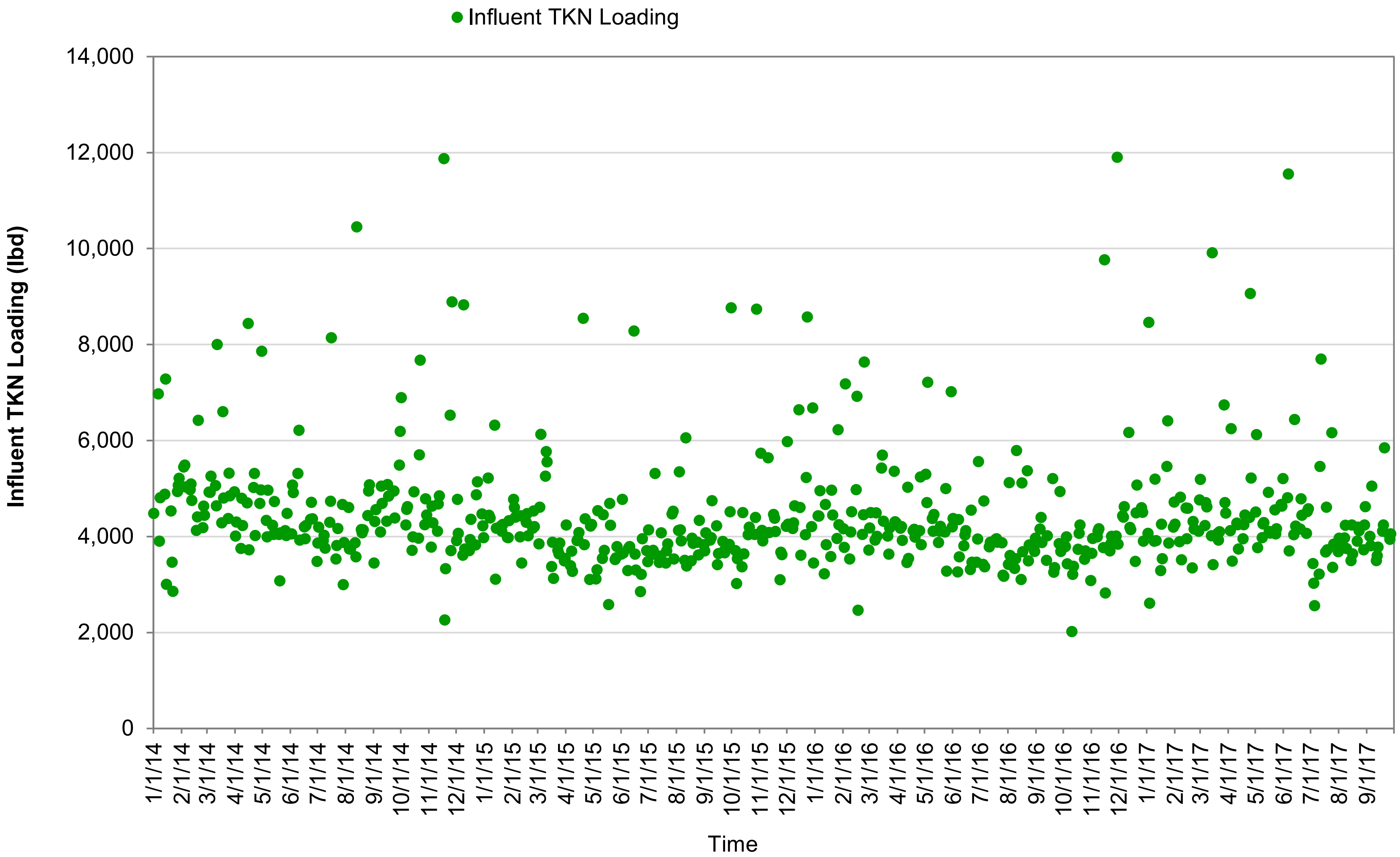

Figure 4-7 Daily Plant Influent TKN Loading (1/1/14-9/30/17)

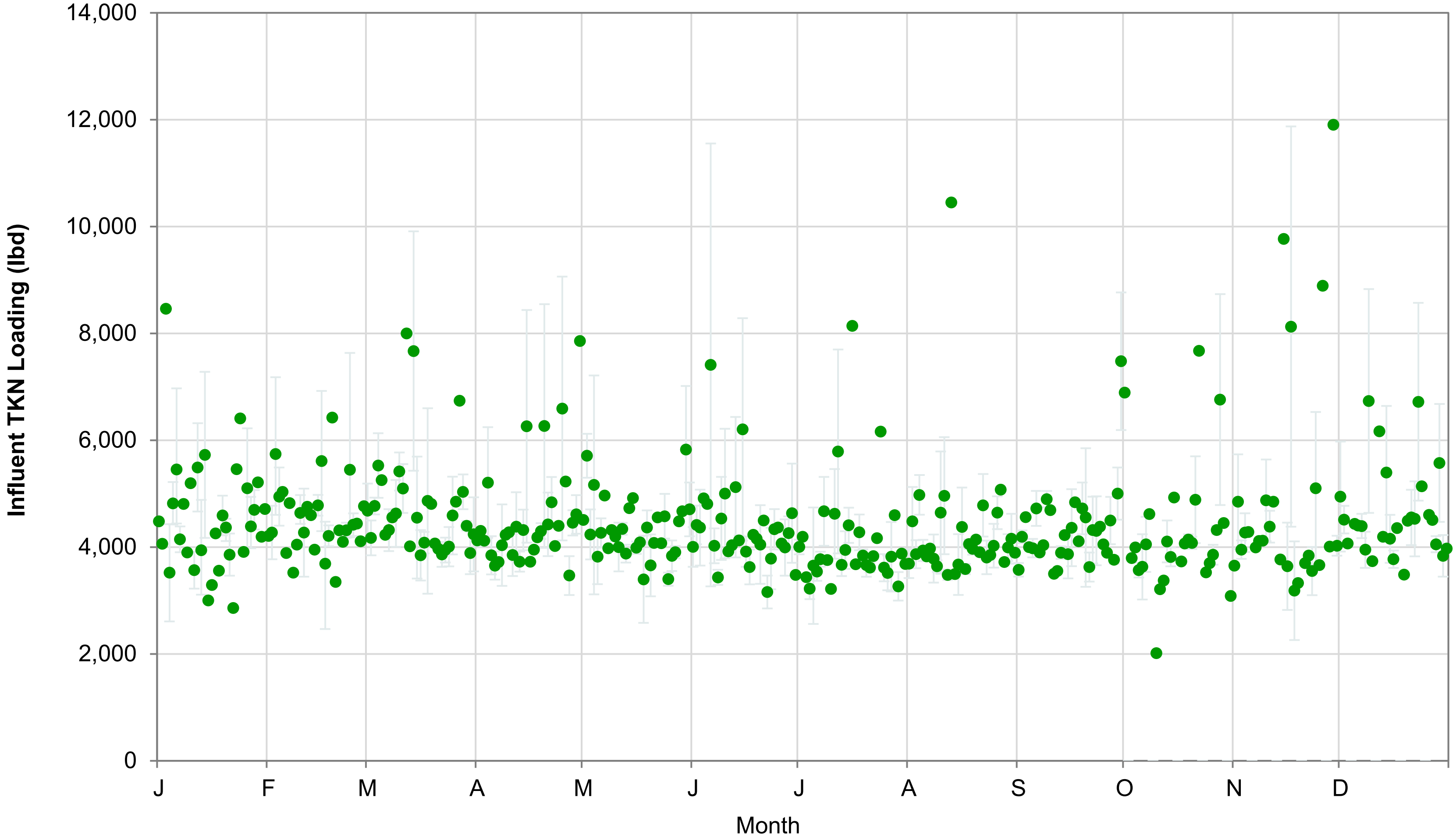

Figure 4-8 Day Average Plant Influent TKN Loading with Maximum and Minimum

4.2 Future Flows and Loads

Future flows and loads are projected through the planning period (2020-2040) to include: 1) additional dry weather flow and load associated with population projection; 2) additional I/I flow associated with future newly developed residential units; and 3) additional wet weather flow and load from the tunnel dewatering after the tunnel is placed into operation.

4.2.1 Population Projection

There are approximately 550 permitted industrial and commercial users in the Bucklin Point Service Area (BPSA) as of 2017, accounting for approximately 5.4% of total flow to the BPWWTF. The vast majority of flow to the BPWWTF is from residential users. Review of the Comprehensive Community Plans for the municipalities that are served by the BPWWTF does not suggest that significant industrial and commercial development is anticipated in the service area. It is anticipated that residential use will continue to make up the majority of the flow to the BPWWTF throughout the planning period of this Facilities Plan Amendment. Therefore, population projections play a significant role in the development of future flow predictions and hence anticipated loads to the BPWWTF.

The BPWWTF service area includes all or parts of Pawtucket, Central Falls, Lincoln, Cumberland, East Providence, and Smithfield. Population data from the Technical Paper 162 - Rhode Island Population Projections 2010-2040 were assessed for these locations. Additionally, the Pawtucket & Central Falls Station District Vision Plan was reviewed and was used to estimate potential population increases resulting from anticipated development in and around the planned Conant Thread Transit Oriented Development (TOD) District. These population increases would be in Pawtucket and Central Falls and are conservatively assumed to be in addition to the population projections for both of those communities.

Table 4-3 shows the estimated number of units to be developed by 2020 based on the Pawtucket & Central Falls Station District Vision Plan published in 2016. While the 2016 Vision Plan shows anticipated development within five miles of the TOD District, only development within the BPSA has been included in Table 4-3. The 2016 Vision Plan did not provide population projections associated with this development. Instead, an average of 4 people per unit, based on RIDEM guidance of 300 gpd per unit and 75 gpd/capita, was assumed. Therefore, an additional 6,140 people associated with this development are expected in the BPSA.

Table 4-3 Anticipated Development - Pawtucket & Central Falls

Development Activity	Units
Under Construction	
521 Roosevelt Avenue, Central Falls	90
Front St at Middle St, Pawtucket	53
Planned	
Nulco Loft, 125 Goff Avenue, Pawtucket	104
Fuller Mill Lofts, 151 Exchange Street, Pawtucket	15
110 Kenyon Avenue, Pawtucket	40
RI Textiles, Central Falls	90
The Stables, Pawtucket	26
Proposed	
Bourne Ave at Roger Williams, East Providence	295
1005 Main Street, Pawtucket	149
90 Industrial Circle, Lincoln	48
St. Mary's on George Street, Pawtucket	100
Other Citywide Development in Pipeline, Pawtucket	525
TOTAL	**1,535**

Source: Pawtucket & Central Falls Station District Vision Plan (2016)

Table 4-4 shows the estimated population for different years in the various service areas, including buildout through new development. It is predicted that population in the BPWWTF service area will increase slightly in the coming years to reach a peak in 2030 and decline slightly after 2030. Data presented for 2010 is from the US Census, while all other data represent future projections based on projections made for each community using available data. All of Pawtucket and Central Falls and the majority of Lincoln are served by the BPWWTF. Portions of Cumberland, East Providence, and Smithfield also contribute flow to the BPWWTF. The total population within the service area is presented in the table for each of these municipalities. Further discussion on the projected growth rates for each municipality and the methodology used to estimate projections are provided in the subsequent subsections.

Table 4-4 Population Data in BPWWTF Service Areas

Service Area	US Census	Projected Population					
	2010	2015	2020	2025	2030	2035	2040
Pawtucket	71,148	69,596	68,683	68,405	67,898	67,024	65,736
Central Falls	19,376	19,403	19,612	20,001	20,325	20,537	20,613
Lincoln	20,050	20,366	20,764	21,358	21,886	22,297	22,563
Cumberland	18,250	18,665	18,949	19,457	19,950	20,434	20,794
East Providence	11,289	10,879	10,605	10,432	10,224	9,965	9,647
Smithfield	150	150	150	150	150	150	150
New Development	–	–	6,140	6,140	6,140	6,140	6,140
TOTAL	**140,263**	**139,059**	**144,903**	**145,943**	**146,573**	**146,547**	**145,643**

4.2.1.1 Pawtucket and Central Falls

All of Pawtucket and Central Falls are served by the BPWWTF; therefore, current and projected City-wide populations were used to estimate the number of residents served by BPWWTF. The 2010 United States Census was used for the actual populations in each City for 2010, while Technical Paper 162 Rhode Island Population Projections 2010-2040 was used to project populations from 2015 - 2040.

4.2.1.2 Town of Lincoln

The Town of Lincoln is served by both the BPWWTF and onsite wastewater treatment systems (OWTS). The Town's November 2006 Wastewater Facilities Plan assumes that 95% of the Town's population is served by municipal sewer. Also, the Rhode Island Division of Statewide Planning Program predicts a steady increase in population in the Town of Lincoln. Population projections for the part of Lincoln served by the BPWWTF were estimated assuming that 95% of the Town would continue to be served in future years.

4.2.1.3 Town of Cumberland

The Town of Cumberland is served by the BPWWTF as well as onsite wastewater treatment systems (OWTS). Based on available data provided by the Town of Cumberland Sewer Department, it is estimated that there are 7,300 residential sewer accounts in Cumberland. The Rhode Island Division of Statewide Planning Program estimates that average density is 2.5 people per household. Using this and the estimated number of residential accounts, approximately 18,250 people in Cumberland are served by the BPWWTF. This represents 55% of the entire town's population, based on the 2010 US Census.

The Rhode Island Division of Statewide Planning Program also projects the population in Cumberland to increase steadily between now and 2040. While there are currently no plans for a substantial expansion of the sewer collection system in Cumberland, it can be expected that these increases will be in areas served by OWTS as well as areas to be served by the BPWWTF. As such, population projections for the BPWWTF service areas were estimated assuming that 55% of the total Town's population would continue to be served by municipal sewer in future years.

4.2.1.4 City of East Providence

The City of East Providence is served by the BPWWTF and the Town's wastewater treatment facility in Riverside, operated by Suez. The Town's treatment facility in Riverside also receives flow from the Town of Barrington. Both East Providence and Barrington are primarily served by municipal sewers. There are relatively few onsite wastewater treatment systems (OWTS) in both municipalities.

The 2007 East Providence Facilities Plan shows that about 24% of the sewer connections in the City of East Providence are served by NBC's BPWWTF. Analysis of the flows to NBC's East Providence Interceptor (EPI) and East Providence's Riverside wastewater treatment facility indicated that the percentage of flow going to the BPWWTF varied between 20% and 24%. To be conservative, it is assumed that 24% of the East Providence population will be served by the BPWWTP.

The population in East Providence was 47,037 people in 2010, and 24% of this is 11,289 as presented in Table 4-4. The total population is projected to decrease over time in East Providence, based on the population projections made by the Rhode Island Division of Planning in 2013. The predicted City-wide decline in population was applied throughout the City, including the part of East Providence served by the BPWWTF.

4.2.1.5 Town of Smithfield

A very small part of the Town of Smithfield, bordering with the Town of Lincoln, is serviced by the BPWWTF. The remainder of the Town is served by the Smithfield Wastewater Treatment Facility or uses onsite wastewater treatment systems (OWTS). There are no plans for expanding the BPWWTF service area within the Town of Smithfield. It is estimated that 150 people in Smithfield are serviced by the BPWWTF currently, which has been used in future projections as well.

4.2.2 Inflow and Infiltration (I/I) Associated with Future Newly Developed Units

Since future sewer extensions in NBC service area will be separated sanitary collection systems, no increase in seasonal and snowmelt related inflow is expected to occur. The source for spring I/I will be infiltration from local sewer system extensions in the newly developed commercial and residential units. It is expected that the infiltration rate from this source will be lower than the present since pipe materials and joints would be superior to those existing, particularly in the older systems in Pawtucket and Central Falls. The common practice for infiltration flow estimates is based on 500 gpd per inch of diameter per mile of pipeline (gpd/idm) for sewer system facility planning. Because the pipeline length and specification for the new development is not currently available, the I/I associated with the future development is assumed to be the same as the sanitary sewage, i.e., 300 gal/day/unit. Assuming 4 people per unit, the I/I flow associated with the future newly developed units would be 75 gallons per capita day (gpcd), and the total sanitary sewage plus I/I would be 150 gpcd. Based on the US EPA New England Water Infrastructure Outreach's publication *"Guide for Estimating Infiltration and Inflow" (June 2014),* the estimated sanitary sewage and associated I/I flows are in the range of 100-150 gpcd. For this BPWWTF plan, 150 gpcd is used as a conservative assumption for estimating the sanitary and I/I flows associated with newly developed units.

Because the analysis and projection of the flow generated from the current service area are based on historical data, the existing I/I flow is an intrinsic part of it and is included in the overall projection. Therefore, the future I/I projection was only calculated for the future developed service areas after 2020.

4.2.3 Tunnel Dewatering Flow

Construction of the Pawtucket Tunnel will reduce CSO discharges to the receiving water but will increase the frequency of sustained periods of high flow to the BPWWTF when the tunnel is dewatered and conveyed to the plant for treatment. The Pawtucket Tunnel Pump Station is being designed for a firm capacity of 27.3 MGD. NBC will operate the tunnel dewatering pumps to maximize the total influent flow to the plant up to 46 MGD as the plant operating conditions allow. For flow and load projection purposes, NBC's InfoWorks ICM hydraulic model simulation of the tunnel system was performed using the typical year rainfall with the total influent flow controlled at 46 MGD during tunnel pump back operation.

Based on the model results, the annual average flow from tunnel dewatering is 4.3 MGD and the maximum month tunnel dewatering flow is 7.8 MGD.

4.2.4 Future Flows

Future average, maximum month and maximum day flows are projected in two steps. Step 1 is to project the future flows without the tunnel. Only the additional sanitary and associated I/I is added to the existing flow. Step 2 is to project the future flows after the tunnel is in operation. Additional flow from tunnel dewatering is added to flows projected in Step 1.

The peak hour influent flows are projected to be 116 MGD for influent flow and 46 MGD for flow to secondary treatment, which have been carried forward from the 2009 Facilities Plan.

Table 4-5 provides a summary of the projected influent flows to the BPWWTF and flows to the secondary treatment for projected years 2020, 2025, 2030, 2035, and 2040 **without** the storage tunnel in operation.

- The baseline existing flows are summarized in Table 4-1. The peaking factor for the maximum month and maximum day flows for the existing conditions is assumed to be unchanged for future conditions without the tunnel.
- For the projected flows 2020, 2025, 2030, 2035 and 2040:
    - The annual average plant influent flows were estimated based on existing plant influent annual average flow plus flow generated from the population growth (assuming 150 gpd per capita for additional population, inclusive of I/I). Annual average flows to the secondary treatment were developed using the projected daily plant influent flow data capped at 46 MGD.
    - The peak hour flows are based on the 2009 Facilities Plan, i.e., 116 MGD for plant influent and 46 MGD for secondary treatment.
    - The max day flows for the future years were estimated based on projected annual average flow multiplying the maximum day peaking factor.
    - The max month flows for the future years were estimated by the projected annual average flow multiplying the max month peaking factor.

Table 4-5 Existing and Projected Future Flows without Operational Storage Tunnel

Flow (MGD)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Plant Influent	18.7	19.5	19.7	19.8	19.8	19.7
To Secondary Treatment [1]	18.5	19.4	19.6	19.7	19.7	19.5
Peak Hour						
Plant Influent	116.0	116.0	116.0	116.0	116.0	116.0
To Secondary Treatment [1]	46.0	46.0	46.0	46.0	46.0	46.0
Max Day						
Plant Influent	44.5 [2]	46.6	46.9	47.2	47.1	46.8
To Secondary Treatment [1]	44.5 [2]	46.0	46.0	46.0	46.0	46.0
Max Month						
Plant Influent	29.7	31.1	31.3	31.5	31.5	31.3
To Secondary Treatment [1]	27.9	29.2	29.4	29.6	29.6	29.3

Notes:

1. Secondary treatment flow is capped at 46 MGD.
2. Existing maximum day flow is based on 98th percentile of daily flow data in 2014-2017.

The storage tunnel is expected to be operational between 2025-2030. Therefore, flows projected for 2030, 2035, and 2040 in Table 4-5 above need to be adjusted to account for the future storage tunnel in operation. During all projected years, peak hour flows to the plant's influent and secondary treatment system are based on 116 and 46 MGD respectively.

Table 4-6 provides a summary of the projected flows to the BPWWTF and to the secondary treatment for 2020, 2025, 2030, 2035, and 2040 with the storage tunnel in operation. The flows for 2020 and 2025 are the same as the flows in Table 4-5 since the tunnel will not yet be in operation. For years beyond 2025:

- The annual average plant influent flows were estimated by projected annual average plant influent flows without tunnel plus annual average tunnel dewatering flow (4.3 MGD).
- The peak hour flows are unchanged from the existing design conditions, i.e., 116 MGD for plant influent and 46 MGD for secondary treatment.
- The maximum day flows are unchanged from the projection without the storage tunnel in operation. It is assumed that tunnel pump out operations would not occur during maximum day flow conditions because it would exceed the secondary treatment capacity.
- The maximum month flows were estimated by projecting maximum month flows without tunnel plus the maximum month tunnel dewatering flow (7.8 MGD).

Table 4-6 Existing and Projected Flows <u>with</u> Operational Storage Tunnel

Flow (MGD)	Existing 2014-2017	Projected 2020	2025	2030	2035	2040
Average Day						
Plant Influent	18.7	19.5	19.7	24.1	24.1	24.0
To Secondary Treatment	18.5	19.4	19.6	24.0	24.0	23.8
Peak Hour						
Plant Influent	116.0	116.0	116.0	116.0	116.0	116.0
To Secondary Treatment [1]	46.0	46.0	46.0	46.0	46.0	46.0
Max Day [2]						
Plant Influent	44.5 [3]	46.6	46.9	47.2	47.1	46.8
To Secondary Treatment [1]	44.5 [3]	46.0	46.0	46.0	46.0	46.0
Max Month						
Plant Influent	29.7	31.1	31.3	39.3	39.3	39.1
To Secondary Treatment	27.9	29.2	29.4	37.4	37.4	37.1

<u>Notes</u>:

1. Secondary treatment flow is capped at 46 MGD.
2. BPWWTF maximum day flow is the same with or without tunnel dewatering because it is assumed tunnel dewatering operations would not occur during max day flow conditions.
3. Existing maximum day flow is based on 98th percentile of daily flow data in 2014-2017.

4.2.5 Future Loads

Future BOD, TSS and TKN loads were determined in a similar fashion to future flows. The following methods are used to project the future loads:

- For future plant influent loads <u>**without**</u> the tunnel:
    - The future additional loads for BOD, TSS and TKN are mostly from the sanitary sewage associated with population growth. Therefore, a population ratio, which is calculated as the population in each future year divided by the population in 2015 (see Table 4-4), is applied to the existing annual average loads to project future annual average loads.
    - The future maximum month loads are calculated as the projected future annual average loads multiplied by the maximum month load peaking factor (**Table 4-2**).
    - The future maximum day loads are calculated as the projected future annual average loads multiplied by the maximum day load peaking factor.
    - Peak hour load is not a design parameter and therefore is not calculated and included in the table.
- For future plant influent loads <u>**with**</u> the tunnel:
    - The BOD, TSS and TKN levels in the tunnel dewatering stream are unknown at this point, however, water characteristics of a similar type such as Field Point tunnel dewatering were used to represent dewatering flow water quality. The 2014 Field Point dewatering flow water quality data was analyzed, with average concentrations of BOD 34.1mg/L, TSS 43.3 mg/L, and TKN 7.6 mg/L. These were used in estimating loads from future Pawtucket Tunnel dewatering flows.

- The future annual average loads with the tunnel are calculated as the future annual average loads without the tunnel plus annual average loads from the tunnel dewatering flow (annual average tunnel dewatering flow 4.3 MGD multiplied by the concentration for each parameter).
- The future maximum month loads with the tunnel are calculated as the future maximum month loads without the tunnel plus the maximum month loads from the tunnel dewatering flow (maximum month tunnel dewatering flow 7.8 MGD multiplied by the concentration for each parameter).
- The future maximum day loads with the tunnel are the same as the loads without tunnel. On a maximum day, the tunnel is not expected to be dewatered.

- For loads to the secondary treatment:
  - Same approach is used to calculate the future loads to the secondary treatment as described in Section 4.1.2 for the existing conditions, without and with the tunnel. Assume the removal efficiencies by the primary treatment are the same for the existing and future conditions.

Table 4-7 to Table 4-9 provides a summary of BOD, TSS and TKN loads for plant influent flows and flows to the secondary treatment, without the storage tunnel in operation. Table 4-10 to Table 4-12 provides a summary of BOD, TSS and TKN loads for plant influent flows and flows to the secondary treatment **with** the storage tunnel in operation.

Table 4-7 Existing and Projected BOD Loads without Operational Storage Tunnel

BOD Load (lbd)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Plant Influent	30,008	31,269	31,494	31,630	31,624	31,429
To Secondary Treatment [1]	19,392	20,207	20,352	20,440	20,436	20,310
Max Day [2]						
Plant Influent	60,424 [3]	62,963	63,415	63,689	63,678	63,285
To Secondary Treatment [1]	39,768 [3]	41,439	41,439	41,439	41,439	41,439
Max Month						
Plant Influent	37,100	38,659	38,937	39,105	39,098	38,857
To Secondary Treatment [1]	26,956	28,089	28,290	28,413	28,408	28,232

Notes:

5. Assuming the primary clarifier BOD removal efficiency is 35%, and secondary treatment flow is capped at 46 MGD.
6. Projected max day loads are estimated assuming the same max day factor for existing and future (max day factor = max day loads / average day loads)
7. Existing maximum day loads are based on 98th percentile of daily data in 2014-2017.

Table 4-8 Existing and Projected TSS Loads without Operational Storage Tunnel

TSS Load (lbd)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Plant Influent	23,133	24,105	24,278	24,383	24,379	24,228
To Secondary Treatment [1]	9,944	10,362	10,436	10,481	10,479	10,415
Max Day [2]						
Plant Influent	53,846 [3]	56,109	56,512	56,756	56,746	56,396
To Secondary Treatment [1]	24,751 [3]	25,791	25,791	25,791	25,791	25,791
Max Month						
Plant Influent	29,945	31,204	31,428	31,563	31,558	31,363
To Secondary Treatment [1]	15,322	15,966	16,081	16,150	16,147	16,048

Notes:

1. Assuming the primary tank TSS removal efficiency is 60%, and secondary treatment flow is capped at 46 MGD.
2. Projected max day loads are estimated assuming the same max day factor for existing and future (max day factor = max day loads / average day loads).
3. Existing maximum day loads are based on 98th percentile of daily data in 2014-2017.

Table 4-9 Existing and Projected TKN Loads without Operational Storage Tunnel

TKN Load (lbd)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Influent	4,430	4,616	4,649	4,669	4,668	4,639
To Secondary Treatment [1]	4,419	4,605	4,638	4,658	4,657	4,628
Max Day [2]						
Influent	8,554	8,914	8,978	9,017	9,015	8,959
To Secondary Treatment [1]	8,211	8,556	8,556	8,556	8,556	8,556
Max Month						
Influent	5,178	5,395	5,434	5,457	5,456	5,423
To Secondary Treatment [1]	5,109	5,324	5,362	5,385	5,384	5,351

Notes:

1. Assuming the primary clarifier TKN removal efficiency is 12.7%, and TKN load from sidestream equalization tank to the primary clarifiers is 14.9% of the influent TKN loads. Secondary treatment flow is capped at 46 MGD.
2. Existing maximum day loads are based on 98th percentile of daily data in 2014-2017.
   Projected max day loads are estimated assuming the same max day factor for existing and future (max day factor = max day loads / average day loads)

Table 4-10 Existing and Projected BOD Loads with Operational Storage Tunnel

BOD Load (lbd)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Plant Influent	30,008	31,269	31,494	32,853	32,848	32,653
To Secondary Treatment	19,392	20,207	20,352	21,236	21,232	21,106
Max Day						
Plant Influent	60,424	62,963	63,415	63,689	63,678	63,285
To Secondary Treatment	39,768	41,439	41,439	41,439	41,439	41,439
Max Month						
Plant Influent	37,100	38,659	38,937	41,325	41,318	41,077
To Secondary Treatment	26,956	28,089	28,290	29,856	29,851	29,676

Table 4-11 Existing and Projected TSS Loads with Operational Storage Tunnel

TSS Load (lbd)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Plant Influent	23,133	24,105	24,278	25,938	25,933	25,783
To Secondary Treatment	9,944	10,362	10,436	11,101	11,099	11,034
Max Day						
Plant Influent	53,846	56,109	56,512	56,756	56,746	56,396
To Secondary Treatment	24,751	25,791	25,791	25,791	25,791	25,791
Max Month						
Plant Influent	29,945	31,204	31,428	34,383	34,378	34,183
To Secondary Treatment	15,322	15,966	16,081	17,278	17,275	17,176

Table 4-12 Existing and Projected TKN Loads with Operational Storage Tunnel

TKN Load (lbd)	Existing	Projected				
	2014-2017	2020	2025	2030	2035	2040
Average Day						
Plant Influent	4,430	4,616	4,649	4,942	4,941	4,912
To Secondary Treatment	4,419	4,605	4,638	4,931	4,930	4,902
Max Day						
Plant Influent	8,554	8,914	8,978	9,017	9,015	8,959
To Secondary Treatment	8,211	8,556	8,556	8,556	8,556	8,556
Max Month						
Plant Influent	5,178	5,395	5,434	5,952	5,951	5,917
To Secondary Treatment	5,109	5,324	5,362	5,881	5,880	5,847

4.2.6 Comparison to 2009 Design Flows and Loads

Table 4-13 provides a comparison of the plant influent flows and loads among the 2009 Facilities Plan, existing conditions, and 2040 projected conditions (with the tunnel in operation). Table 4-14 provides a comparison of the flows and loads to the secondary treatment among the 2009 Facilities Plan, existing conditions, and 2040 projected conditions (with the tunnel in operation).

As shown in the tables, the existing plant flows and loads are lower than the design flows and loads in the 2009 Facilities Plan. The projected average annual and maximum monthly flows are higher than the design flows due to the additional wet weather flow captured by the tunnel and pumped to the BPWWTF for treatment. However, the projected loads are lower than the design loads in the 2009 Facilities Plan for both the plant influent and secondary treatment.

Table 4-13 Comparison of Plant Influent Flows and Loads

	Design Flows and Loads in 2009 Facilities Plan		Existing		Projected Future (with Tunnel)	
	Average	Max Month	Average	Max Month	Average	Max Month
Flow (MGD)	23.7	31	18.7	29.7	24.1	39.3
BOD_5 (lbd)	45,710	59,420	30,008	37,100	32,853	41,325
TSS (lbd)	44,950	58,440	23,133	29,945	25,938	34,383
TKN (lbd)	6,200	7,440	4,430	5,178	4,942	5,952

Table 4-14 Comparison of Flows and Loads to the Secondary Treatment

	Calculated from Design Influent Flows and Loads in 2009 Facilities Plan		Existing		Projected Future (with Tunnel)	
	Average	Max Month	Average	Max Month	Average	Max Month
Flow (MGD)	23.7	31	18.5	27.9	24.0	37.4
BOD_5 (lbd) [1]	29,712	38,623	19,392	26,956	21,236	29,856
TSS (lbd) [2]	17,980	23,376	9,944	15,322	11,101	17,278
TKN (lbd) [3]	6,219	7,463	4,419	5,109	4,931	5,881

Notes:

1. Assuming the primary clarifier BOD removal efficiency is 35%.
2. Assuming the primary tank TSS removal efficiency is 60%.
3. Assuming the primary clarifier TKN removal efficiency is 12.7%, and TKN load from sidestream equalization tank to the primary clarifiers is 14.9% of the influent TKN loads.

For planning purposes, future BPWWTF facilities design will use the higher projected average annual flow, the projected maximum monthly flow and the 2009 Facilities Plan design maximum day flow. The higher design loads from the 2009 Facilities Plan will be carried forward for planning and design purposes as well. These flows and loads are summarized in Table 4-15.

It should be noted that although the flow projections herein assume that tunnel pump out operations will maximize flow to secondary treatment at 46 MGD at all times, actual future tunnel pump out operations will be adjusted after pump station startup to optimize pump run times against plant influent flow conditions with the goal of maximizing secondary treatment as much as possible.

Table 4-15 Projected Plant Influent Flows and Loads

	Average	Max Month	Max Day	Peak Hour
Flow (MGD)	24.1	39.3	116 [1]	116 [1]
BOD_5 (lbd)	45,710	59,420	77,710	
TSS (lbd)	44,950	58,440	98,890	
TKN (lbd)	6,200	7,440	------	

Note:

2. 116 MGD is the total peak flow and design maximum-day flow to the plant, consisting of 46 MGD peak flow to the biological system and 70 MGD peak flow to wet-weather treatment.

Section 5.0

Development and Evaluation of Alternatives

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5.0 Development and Evaluation of Alternatives

5.1 Operation of Existing Facilities

As explained in Section 4.0, when the future Pawtucket Tunnel Pump Station is operational, it is expected that future average and monthly influent flows to the BPWWTF will increase, however the future influent loads will not increase. Therefore, the anticipated impact on the process performance is expected to be driven by prolonged periods of higher influent flows from pump out of the Pawtucket Tunnel following wet weather events.

In anticipation of the future prolonged periods of higher influent flows due to tunnel dewatering operations, NBC conducted a Stress Testing Program of the secondary treatment process at the BPWWTF in 2017 (CDM Smith Report, May 23, 2017) in order to evaluate the operation of the existing facility under these potential conditions. The stress testing indicated the following observations during prolonged high flow periods that could be anticipated following the construction of the Pawtucket Tunnel and Tunnel Dewatering Pump Station:

- Secondary process shows evidence of stress especially when one of the six clarifiers is out of service.
- Settled sludge blanket depth increases and effluent quality decreases in the final clarifiers, and polymer is used during these times.

Following the stress testing, NBC conducted an evaluation of potential improvement alternatives to mitigate the impact of the prolonged high flow periods. The analysis of the alternatives was performed using the BioWin™ model of the existing facility developed in 2017 for the stress testing program. The model was deemed suitable for comparison purposes to select a preferred alternative. This Section summarizes the alternatives and the results of the comparison as a basis for the selection.

5.2 Evaluation of Facility Upgrade Alternatives

The purpose of this subsection is to present and evaluate potential alternatives to improve the BPWWTF's ability to effectively treat wastewater during prolonged periods of higher than average influent flows, while meeting and maintaining compliance with the plant's current RIPDES permit. Each design alternative evaluation includes a breakdown of benefits and a conceptual construction cost opinion.

Six potential design alternatives were developed to improve the treatment process as follows:

- Alternative 1 – Install Two New Final Clarifiers
- Alternative 2 – Convert Existing Bioreactor to Solids Storage During High Flows
- Alternative 3 – Convert Bioreactors to Contact Stabilization During High Flows
- Alternative 4 – Install Polymer Feed System
- Alternative 5 – Increase Return Activated Sludge (RAS) Pumping
- Alternative 6 – Increase Bio-reactor Volume

As a result of preliminary screening and discussions with NBC, Alternatives 5 and 6 were eliminated from further analysis. Without additional clarifiers, an increase in RAS pumping alone in Alternative 5 did not meet the minimum performance requirements of the plant. Alternative 6 improved process performance, however, the improvement was not significantly greater than Alternatives 1 and 2 and would also require enhanced operator attention and control to ensure process reliability. The cost of Alternative 6 is significantly more to construct and operate, thus resulting in its elimination.

A performance analysis of the remaining alternatives was conducted using the existing BioWin™ process model utilizing data from the 2017 stress test and plant daily operating data to predict the performance of each alternative. The influent flow and loads to the process model were based on 12 days of average flow, followed by a 6-day peak flow event, then followed by 12 days of average flow to understand the impact of a 6-day peak flow event. The 6-day peak flow event was used to represent dewatering of the future Pawtucket Tunnel. A peak day event was 46 MGD and assumed loading remain constant (i.e. lower concentrations during peak event). In this assessment it was assumed that all existing clarifiers were in operation for comparing alternatives.

A brief description of the four explored alternatives is summarized below:

5.2.1 Alternative 1: Install Two New Final Clarifiers

Alternative 1 would construct two new final clarifiers similar to existing final clarifiers 5 and 6, as depicted on Figure 5-1. The project would include new MLSS piping, flow splitting, a RAS pump station, and instrumentation and controls to match the existing clarifiers. There appears to be available land to the west of existing clarifiers 5 and 6 for the construction of two additional clarifiers. Final clarifiers 5 and 6 have a diameter of 110 ft, a mean water surface elevation of 4.28 ft, and a sidewater depth of 12.17 ft at the highest point.

Figure 5-2 shows the results of the simulation for effluent BOD and TSS over time based on the 30-day dynamic simulation. The 30-day dynamic simulation used a synthetic hydrograph to the secondary treatment process which included 6 consecutive days at the secondary treatment capacity of 46-MGD. The intent of this simulation was to represent future Pawtucket Tunnel pump out conditions.

When simulating the 6-day peak flow event, the total BOD and TSS in the secondary effluent did not surpass 12 mg TSS/L and 4.5 mg TSS/L respectively. Both TSS and BOD concentrations remain in compliance with RIPDES permit maximum daily discharge limits based on the modeling.

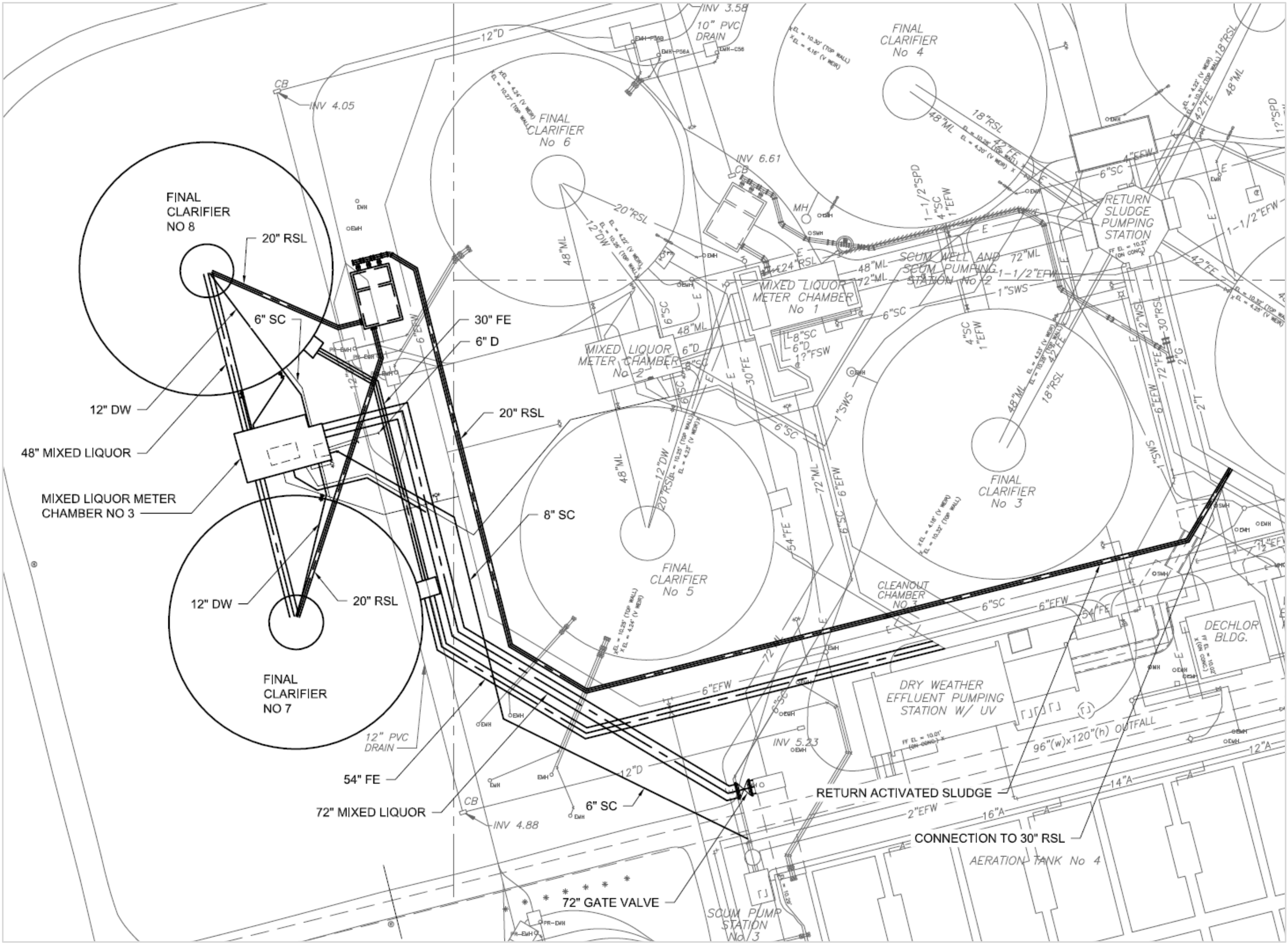

Figure 5-1 Alternative 1 Design Schematic

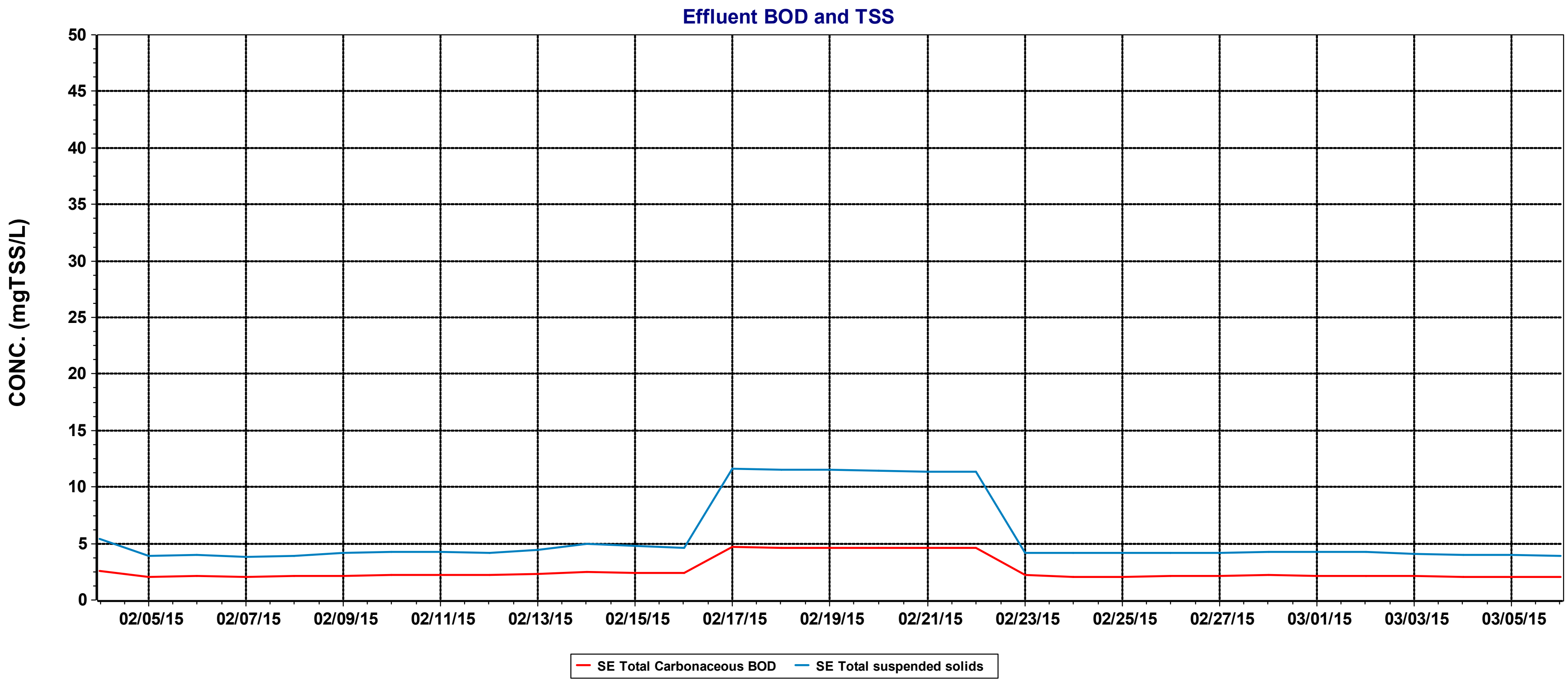

Figure 5-2 Effluent BOD and TSS over Time for Alternative 1

5.2.2 Alternative 2: Convert Existing Bioreactor to Solids Storage During High Flows

Alternative 2 would store biosolids in the fourth bioreactor during prolonged wet weather events. During the first day of a storm, fifty percent of the RAS flow would be diverted to the fourth bioreactor and the influent primary effluent feed would be shut off. The other three bioreactors would operate as normal, with the exception of the reduced RAS flow. This alternative would increase the MLSS concentration in the fourth bioreactor from 3,000 mg/L to 7,500 mg/L, thus storing biomass in the fourth bioreactor and reducing the combined MLSS concentration to the clarifiers to 1,200 mg/L. Figure 5-3 depicts the modifications required to implement this alternative.

Figure 5-4 shows the results of the simulation for effluent BOD and TSS over time based on the 30-day dynamic simulation. When simulating the 6-day peak flow event, the total carbonaceous BOD and total suspended solids in the secondary effluent did not surpass 16 mg TSS/L and 7.0 mg TSS/L respectively. Both TSS and BOD concentrations remain in compliance with RIPDES permit maximum daily discharge limits based on the modeling.

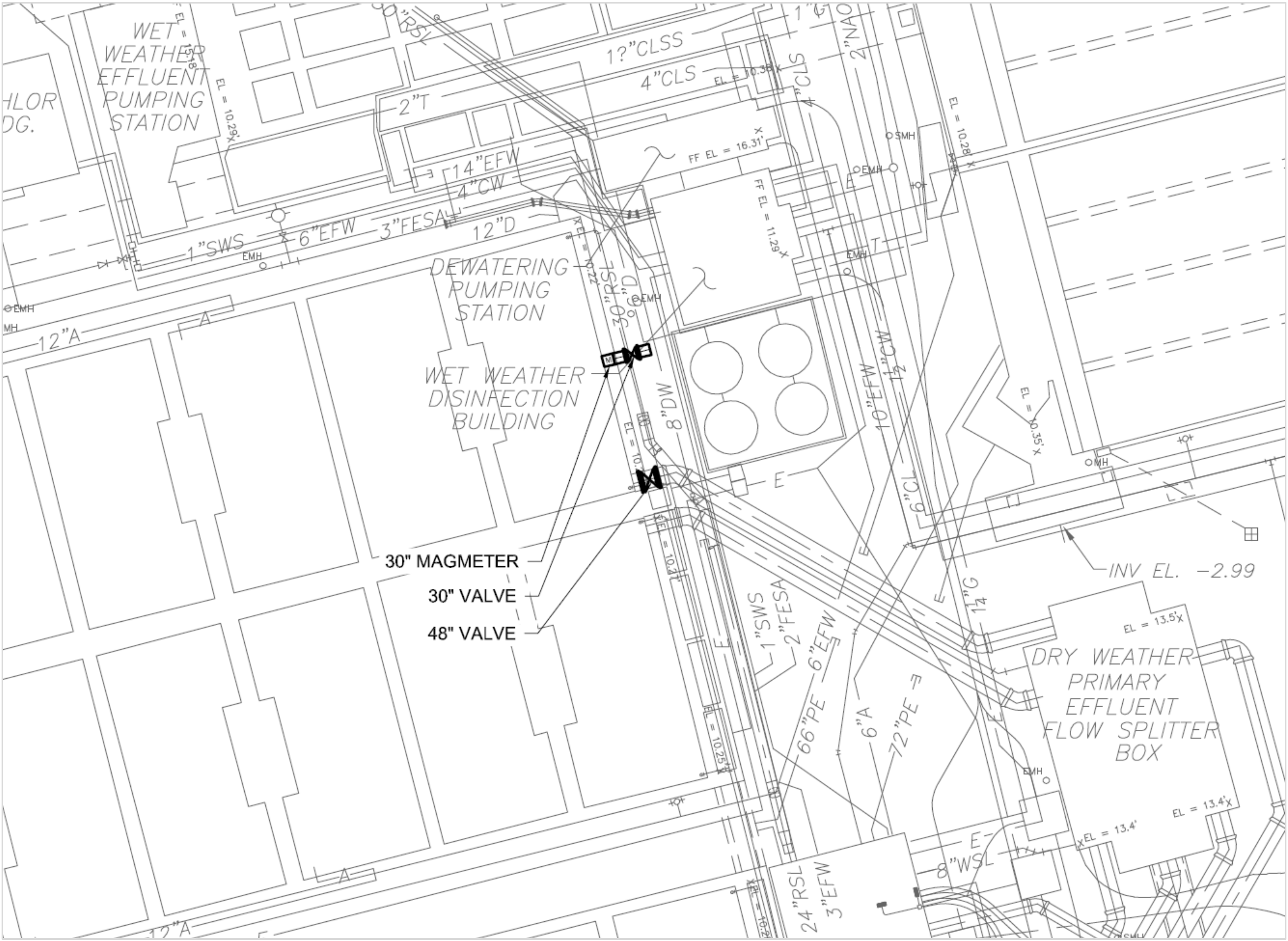

Figure 5-3 Alternative 2 Design Schematic

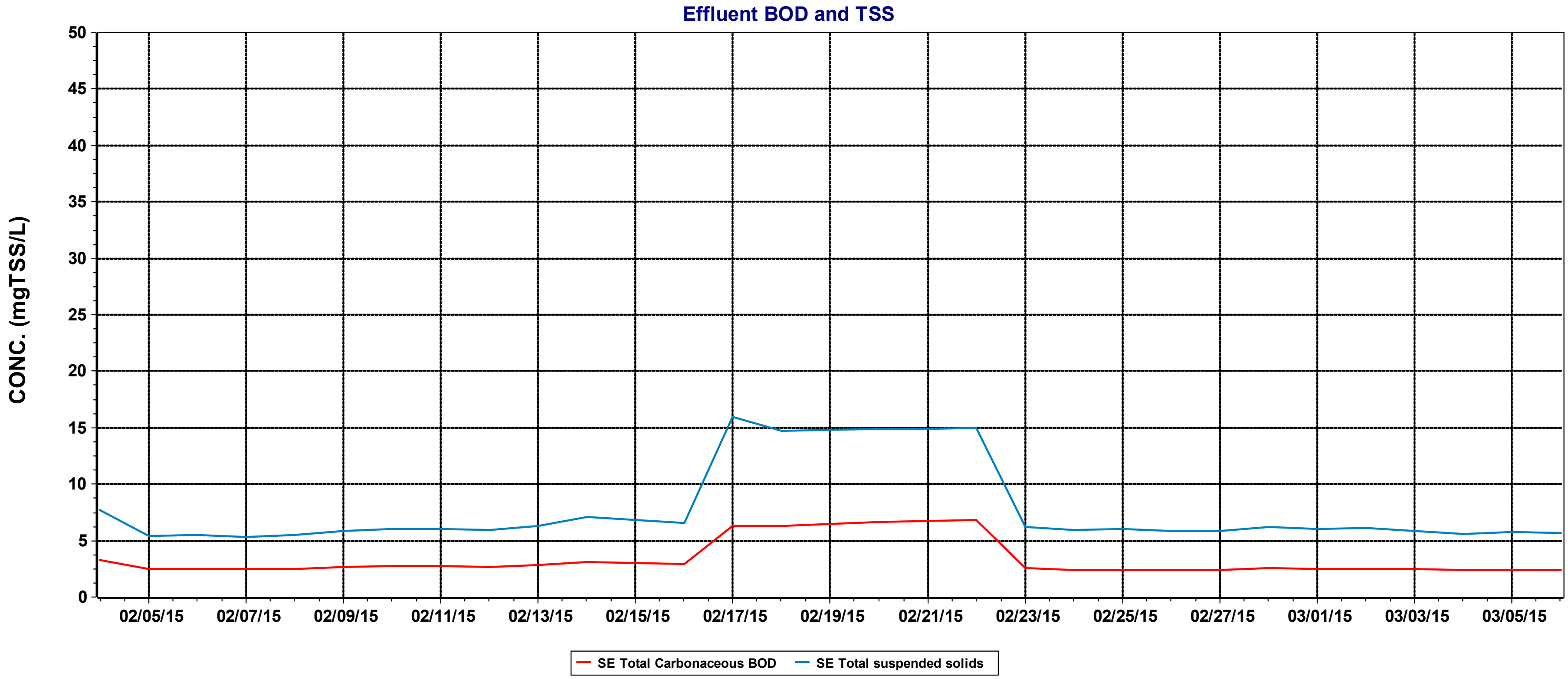

Figure 5-4 Effluent BOD and TSS over Time for Alternative 2

5.2.3 Alternative 3: Convert Bioreactors to Contact Stabilization During High Flows

Alternative 3 would allow the bioreactors to operate in a Contact Stabilization mode during prolonged wet weather events and step feed during normal dry weather operations. This treatment strategy is commonly used for wastewater treatment plants that serve systems with combined sewers.

During wet weather operations, all of the primary effluent (46 MGD) would be diverted upstream of Cells C-2 of each of the bioreactors. The RAS would continue to enter the front of the bioreactors, thus storing biomass in the first passes of the bioreactors. This alternative would reduce the MLSS concentration to the clarifiers to approximately 900 mg/L. While the reduction of solids loading to the clarifiers will improve the final effluent TSS, the final effluent BOD concentration is expected to increase.

This feed point could also be used during dry weather operations to improve the plant's ability to lower the total nitrogen concentration in the effluent. During dry weather operations, most of the primary effluent would be mixed with RAS and flow into the front of the bioreactors, as is the current practice. A smaller percentage, generally less than 25 percent, would be diverted upstream of cells C-2. Cell C-2 would need to operate in an anoxic environment to allow the nitrates that were formed in the upstream passes to be used as the source of oxygen for the removal of carbonaceous BOD from the primary effluent.

When this alternative was originally conceived, it was envisioned that the primary effluent could flow by gravity to Cell C-1 of the reactors. However, due to the limited hydraulic grade line between the primary clarifiers and the bioreactors, a primary effluent pump station would be needed, which significantly increases the cost of this alternative. The RAS will be fed to the head of each bioreactor train as is the current mode of operation.

Figure 5-5 depicts the facility modifications required to implement this alternative. Figure 5-6 shows the process schematic of the current system. The dynamic simulation was performed on the current situation with the assumption of all the clarifiers, both 10-ft depth and 12-ft depth clarifiers.

Figure 5-7 shows the results of the simulation for effluent BOD and TSS over time based on the 30-day dynamic simulation. When simulating the 6-day peak flow event, the total carbonaceous BOD and total suspended solids in the secondary effluent did not surpass 14 mg TSS/L and 8 mg TSS/L respectively. Both TSS and BOD concentrations during wet weather remain in compliance with RIPDES permit maximum daily discharge limits based on the modeling.

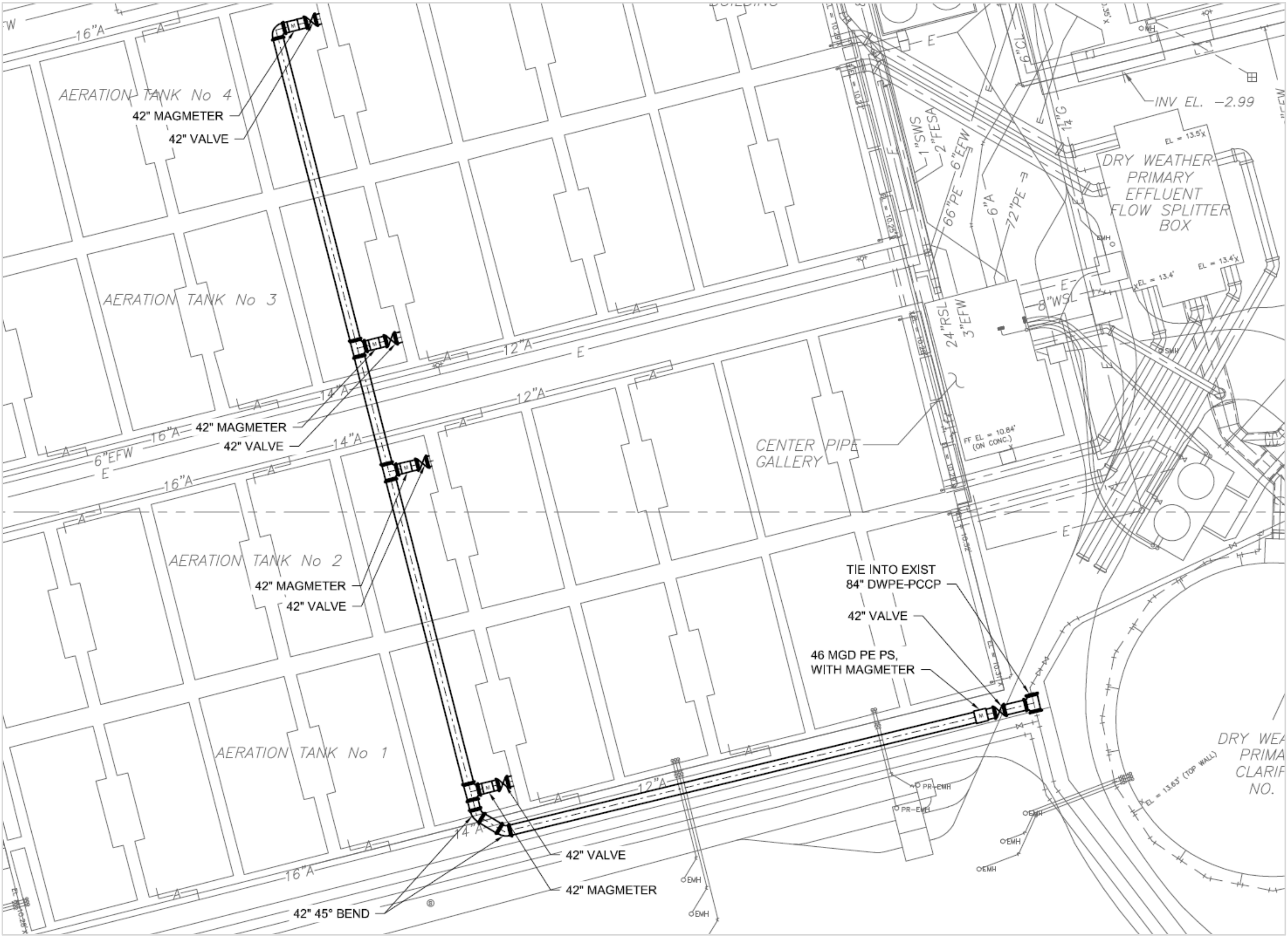

Figure 5-5 Alternative 3 Design Schematic

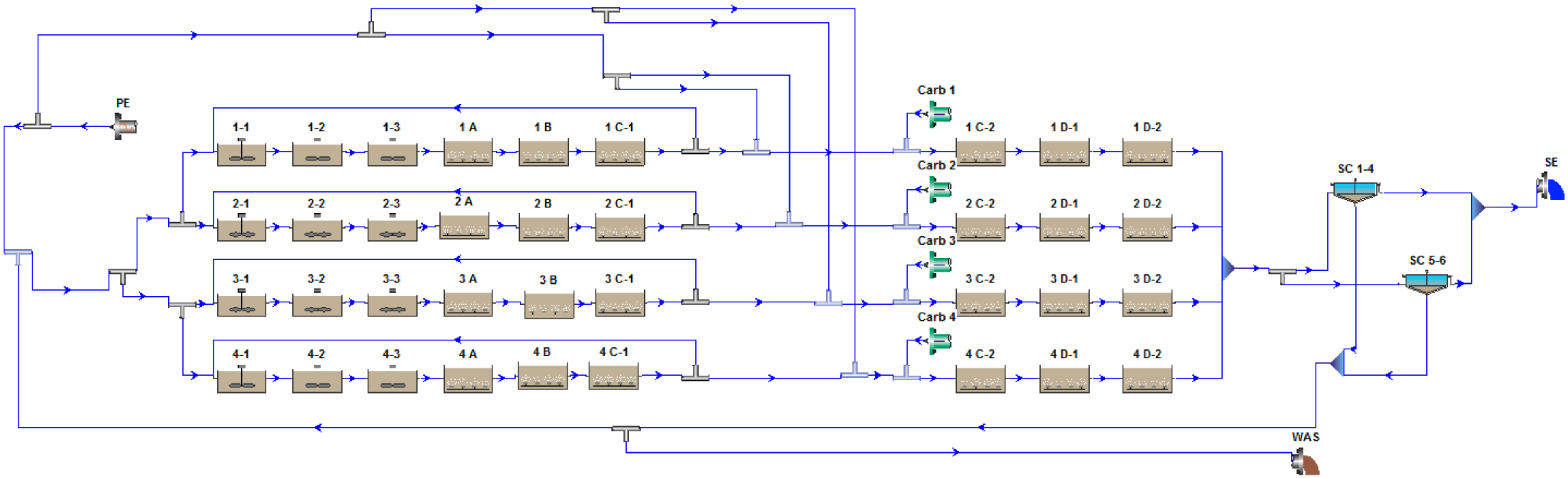

Figure 5-6 Alternative 3 Process Schematic

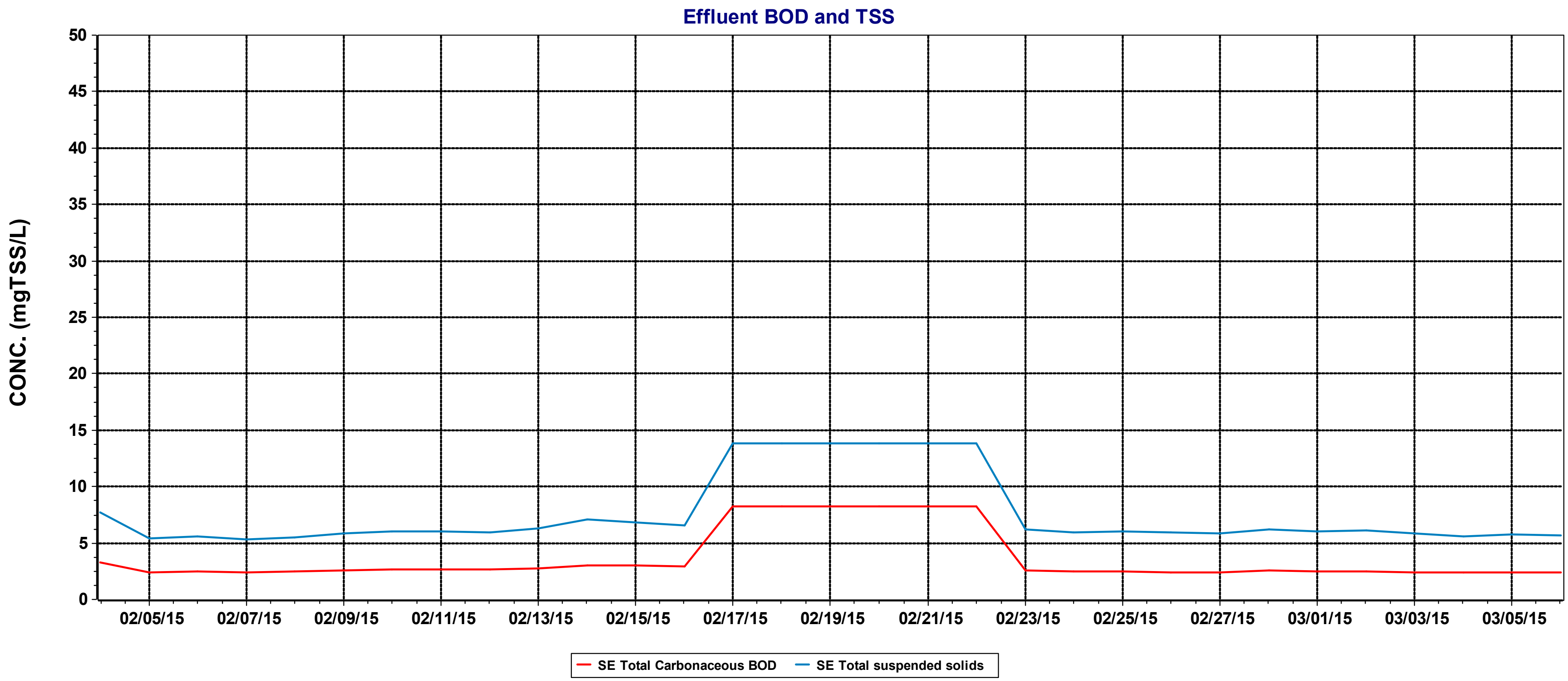

Figure 5-7 Effluent BOD and TSS over Time for Alternative

5.2.4 Alternative 4: Install Polymer Feed System

Alternative 4 would add a polymer feed system, which would be used only when the clarifiers are in need of a settling aid (i.e. SVI is greater than 150 mL/g). This alternative could be implemented in conjunction with the previously identified alternatives, but it is considered an operational tool and not a long-term solution for addressing future conditions. Currently polymer is periodically added to the mixed liquor channel by hand during wet weather events, but no automated system exists. Modifications required for this alternative are conceptually depicted on Figure 5-8.

A dry or liquid emulsion polymer feed system would add polymer upstream of the final clarifiers to aid with settleability of the wastewater. A dry system typically includes one to two batch make-up tanks with mixers, a duplex metering pump system, and secondary containment. A liquid emulsion system typically draws directly from a 55-gallon drum or a larger tote to a duplex metering pump skid that mixes the polymer with plant or potable water for makeup and for carrying to the wastewater. Dry polymer requires making up batches on an as-needed basis, which might be a benefit for a facility that plans to use polymer intermittently. Whereas, the liquid emulsion polymer is more of an automated process, it may run into issues of expiration and shelf life of the polymer if the demand is lower than initially projected.

Jar testing will be performed to identify the most suitable candidates for polymer addition including type of polymer for the wastewater (cationic, anionic, nonionic) and dosage for desired settling characteristics. In most cases, the desired polymer can be purchased in a dry or liquid form.

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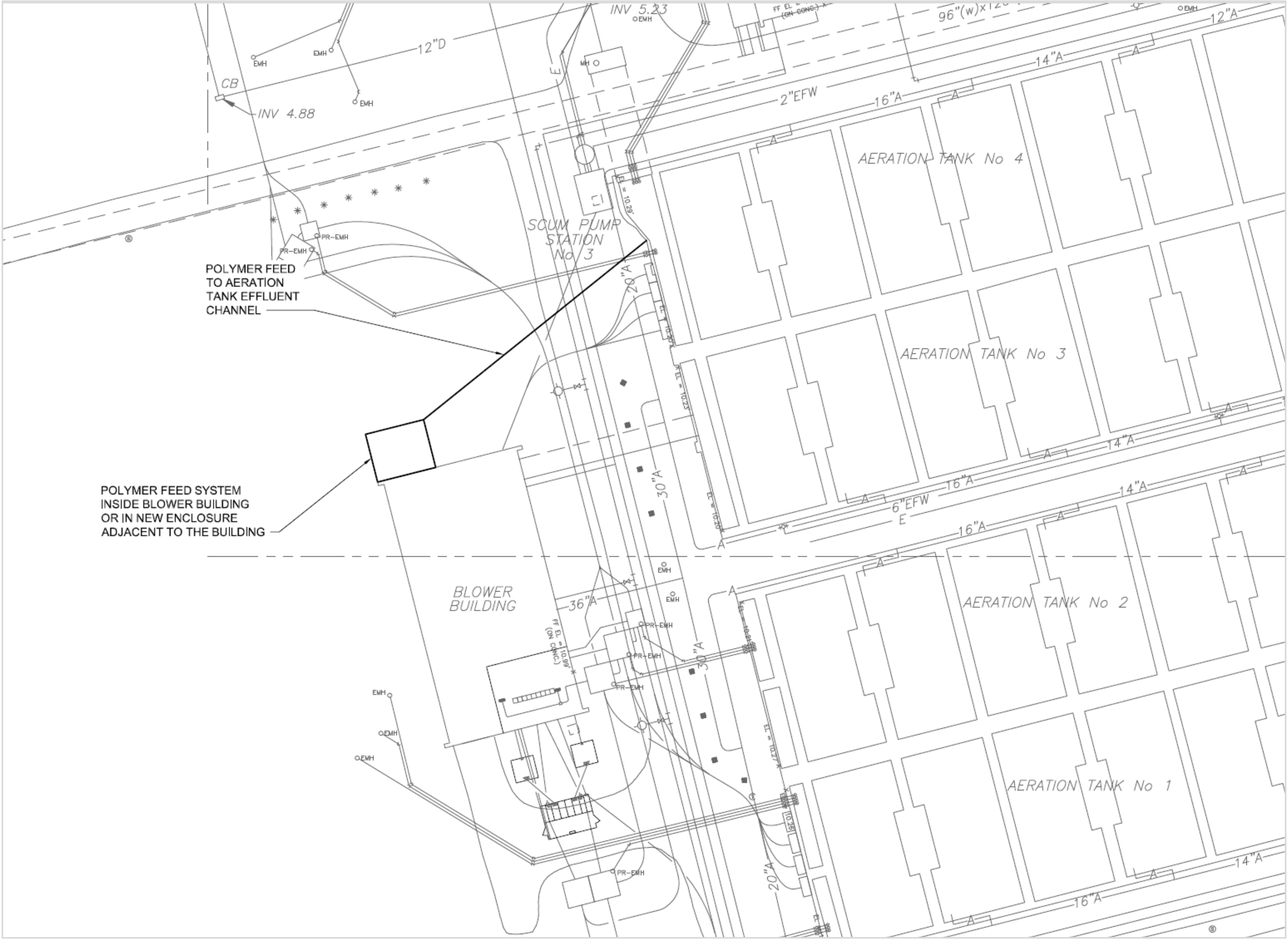

Figure 5-8 Alternative 4 Design Schematic

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5.3 Additional Considerations

5.3.1 Regional Solutions

The BPWWTF treats all of the municipal sanitary sewer flow from Pawtucket, Central Falls, Lincoln, and Cumberland. Large parts of Cumberland and Lincoln are served by onsite wastewater treatment systems (OWTS). Sanitary flow from the northern part of East Providence also flows to the BPWWTF for treatment, and the City operates its own wastewater treatment facility for sanitary flow collected from other parts of East Providence. A small section of Smithfield has municipal sewer that flows to BPWWTF while other parts of Smithfield are served by the Town's wastewater collection and treatment system or rely on OWTS.

Given the scale of the BPSA, the system is currently acting as a regional solution for wastewater treatment. The only other wastewater treatment facilities in the communities served by the BPWWTF are in East Providence and Smithfield. There are currently no plans of combining these systems into a larger regional wastewater treatment system and that was not evaluated as part of this Facilities Plan Amendment. Further regionalizing facilities would likely require substantial new collection and treatment infrastructure. Combining these systems into a regional solution would increase effluent discharge and loading to the Seekonk River.

5.3.2 Unsewered Areas and Sewer Extensions

Pawtucket, Central Falls, Lincoln, and the parts of East Providence and Smithfield that lie within the BPSA all have substantially developed municipal sewer systems. Cumberland is served by a combination of municipal sewer collection and OWTS.

The 2016 Town of Cumberland Comprehensive Plan indicates that 33 percent of the Town's area is serviced by sanitary sewer, while the rest of the area, primarily rural, is serviced by individual OWTS. The Town has indicated that it has nearly reached capacity for sewer service; however, there are no immediate plans to extend Cumberland's sewer system as future expansions are expected to be costly and will not achieve the same economy of scale of past sewer extensions. Any sewer extensions proposed within the BPSA that increase flow to the facility must also be approved by NBC. There does not appear to be a demand for sewer extensions at the present or immediate future that would have a significant impact on flows to the BPWWTF.

5.3.3 Combined Sewer Overflows

RIDEM has approved NBC's Phase III CSO Control Facilities Amended Re-Evaluation Report which serves as the Long-Term Control Plan (LTCP) for CSO control. NBC and RIDEM have entered into Consent Agreement RIA-424 based on the approval of this plan which sets milestones for implementing approved CSO controls.

5.3.4 Septage Treatment and Disposal

Septage accounts for a relatively small amount of the loading to the BPWWTF. No modifications are proposed for the facility's septage treatment and disposal practices.

5.3.5 Treatment Technologies

The Biowin model analysis was used to compare the ability of each proposed alternative to effectively treat wastewater to meet RIPDES discharge limits during a 6-day peak flow event. Alternative 1, *Install Two New Final Clarifiers*, and Alternative 4, *Install Polymer Feed System*, were identified as the selected plan based on this analysis. The recommended plan is appropriate to the character and quality of wastewater anticipated.

5.3.6 Sludge Treatment and Disposal

No modifications are proposed for the BPWWTF sludge treatment and disposal process and facility upgrades made since the last Facilities Plan Amendment introduced gravity belt thickeners that improve sludge handling. A detailed explanation of the facility's sludge treatment process is provided in Section 3.0.

Section 6.0
Plan Selection

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6.0 Plan Selection

6.1 Selected Alternative

A summary of the alternatives is provided in Table 6-1, including a preliminary opinion of probable construction cost for comparing alternatives only.

Table 6-1 Alternatives Summary

Alternative	Cost ($ mill)	Comments
Alternative 1: Install Two New Final Clarifiers	$14.2	• Provides redundancy for clarification process • Improves influent hydraulics and flow split • Increases RAS pumping • Enhanced operational control • Least complicated operations
Alternative 2: Convert Existing Bioreactor to Solids Storage During High Flows	$0.9	• Risk of overloading clarifiers during transition from wet weather to dry weather operations
Alternative 3: Convert Bioreactors to Contact Stabilization During High Flows	$5.7	• Provides opportunity for total nitrogen reduction during normal operating conditions • Risk of overloading clarifiers during transition from wet weather to dry weather operations
Alternative 4: Install Polymer Feed System	$0.2	• Operated when SVIs > 150 ml/g • Can be implemented in conjunction with any alternative

Alternative No. 1, *Install Two New Final Clarifiers,* provides the best effluent quality, is the easiest to operate, and provides the needed additional unit process redundancy to the BPWWTF's secondary clarification system. While Alternative 1 is significantly costlier than the other alternatives, it has been selected because it not only improves performance to meet the new permit limits during prolonged periods of elevated flows through the secondary treatment systems and provides needed unit process redundancy but will provide new facilities that would allow refurbishment of the existing facilities to address other operational issues. Alternative No. 4, *Install Polymer Feed System,* is a low-cost solution that can be implemented in conjunction with new clarifiers to improve plant performance when the sludge is experiencing poor settling characteristics.

Based on the preliminary screening analysis and discussions with NBC, implementation of Alternative Nos. 1 and 4 was selected for the BPWWTF to accommodate future Pawtucket Tunnel pump out flows.

6.2 Process Simulation of the Selected Alternative

Following the alternatives analysis in 2017, the simulation model was developed to evaluate performance of the selected alternative under the future flow and load conditions established in Section 4.0. The previous BioWin^{TM} model was updated by CDM Smith in 2019, incorporating a validation based on 2018 BPWWTF plant data. The model was then refined in BioWin^{TM} 6.0 to evaluate wastewater treatment performance of the selected alternative herein.

Both steady-state and dynamic models were simulated for the selected alternative. Steady-state model simulations were conducted for both average and max month flow and loads conditions, while 30-day dynamic model simulations were conducted for the maximum month conditions only.

6.2.1 Model Configuration

Figure 6-1 illustrates the layout of the refined model. The BioWin^{TM} model consists of the secondary treatment process including bioreactors and final clarifiers. The primary treatment process is not included in the model, therefore the “influent” in the model is primary effluent. The bioreactors were set up as a 4-stage Bardenpho process with an option of feeding carbon supplement to the beginning of the second anoxic zone (Cell 2). Cell D1 was operated as an anoxic zone as shown in Figure 6-1 under normal conditions. However, it needs to be operated as an aerobic zone under future max month flow and loads conditions in order to provide enough volume for nitrification process.

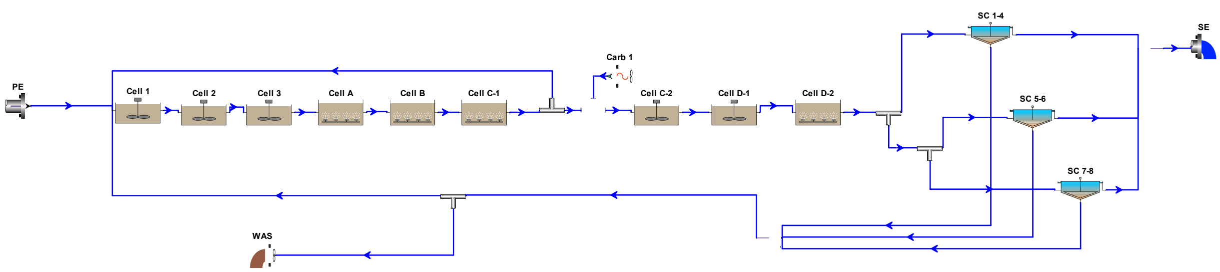

Figure 6-1 Layout of BioWin Model

6.2.2 Model Inputs

Flow and water quality parameters such as BOD, TSS, and TKN concentrations in the primary effluent were estimated using future BPWWTF influent flows and loads and primary treatment removal efficiencies described in Section 4.0. Table 6-2 below summarizes the estimated primary effluent flows and loads to secondary treatment. Water characterization/ fractionization parameters of the primary effluent were not changed from the earlier version of the model.

Table 6-2 Future Flows and Loads to the Secondary Treatment (with Pawtucket Tunnel In Operation)

Parameters	To Secondary Treatment	
	Average	Max Month
Flow (MGD)	24.0	37.4
BOD_5 (lbd) [1]	29,712	38,623
TSS (lbd) [2]	17,980	23,376
TKN (lbd) [3]	6,219	7,463

Notes:
1. Assuming the primary clarifier BOD removal efficiency is 35%.
2. Assuming the primary clarifier TSS removal efficiency is 60%.
3. Assuming the primary clarifier TKN removal efficiency is 12.7%.

The average wastewater temperature of 16°C for the month of May was used in model simulations. The temperature in May is the lowest for the permit compliance season May through October, and using the lower temperature is conservative in predicting the nitrification process in the bioreactors. The 30-day dynamic flow inputs were developed based on the collection system hydrologic and hydraulic modeling results to simulate extended periods of high flow under tunnel dewatering conditions. Figure 6-2 shows the 30-day flow profile and temperature profile adopted for the simulation.

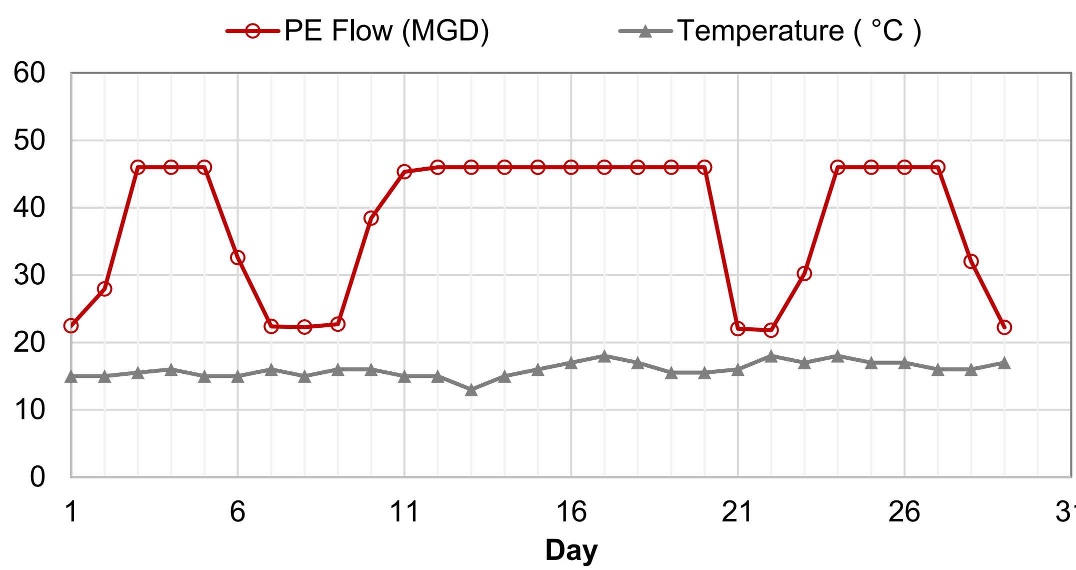

Figure 6-2 30-day Dynamic Inputs for Flow and Temperature

Dynamic concentration inputs (COD, TKN, etc.) were modified with the flow, where days with higher flow the concentrations were reduced such that the load stayed consistent.

Carbon supplemental dosage was adjusted during modeling process to ensure that the effluent total nitrogen (TN) concentration remained below the permit requirement of 5 mg/L. No carbon supplement was needed for the average flow and loads conditions. For the max month flow and loads, carbon supplemental dosage is 300 gpd (650 g COD/L) for the steady-state simulation and 500 gpd (650 g COD/L) for the dynamic simulation.

Four aeration tanks were used in simulations for both average and max month flow and loads conditions. Six secondary clarifiers were used in the simulations for the average conditions, while seven clarifiers were used for the max month conditions.

6.2.3 Model Results and Conclusion

Figure 6-3 shows effluent TSS, BOD and TN results for both steady-state and dynamic model simulations. For all simulated scenarios, the effluent TSS is below monthly discharge limit of 20 mg/L for May 1 - Oct. 31 (30 mg/L for Nov. 1 - Apr. 30), the effluent BOD is below monthly discharge limit of 10 mg/L for May 1 - Oct. 31 (25 mg/L for Nov. 1 - Apr. 30), and the effluent TN is below monthly discharge limit of 5 mg/L for May 1 - Oct. 31 (no limit for Nov. 1 - Apr. 30).

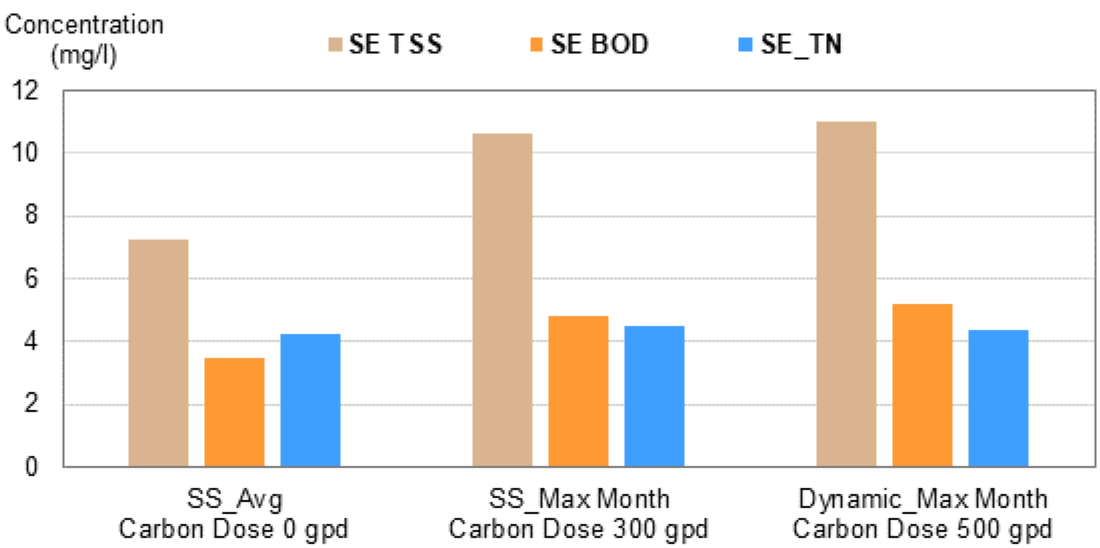

Figure 6-3 Modeling Results for Steady-State and Dynamic Model Simulations

Figure 6-4 shows 30-day effluent TSS, BOD and TN profiles for the dynamic simulation of the max month flow and loads. The dynamic simulation indicates that the effluent TSS meets weekly limit (20 mg/L for May 1 - Oct. 31, and 45 mg/L for Nov. 1 - Apr. 30) and daily discharge limit (30 mg/L for May 1 - Oct. 31, and 50 mg/L for Nov. 1 - Apr. 30), and the effluent BOD meets weekly limit (10 mg/L for May 1 - Oct. 31, and 40 mg/L for Nov. 1 - Apr. 30) and daily discharge limit (15 mg/L for May 1 - Oct. 31, and 45 mg/L for Nov. 1 - Apr. 30).

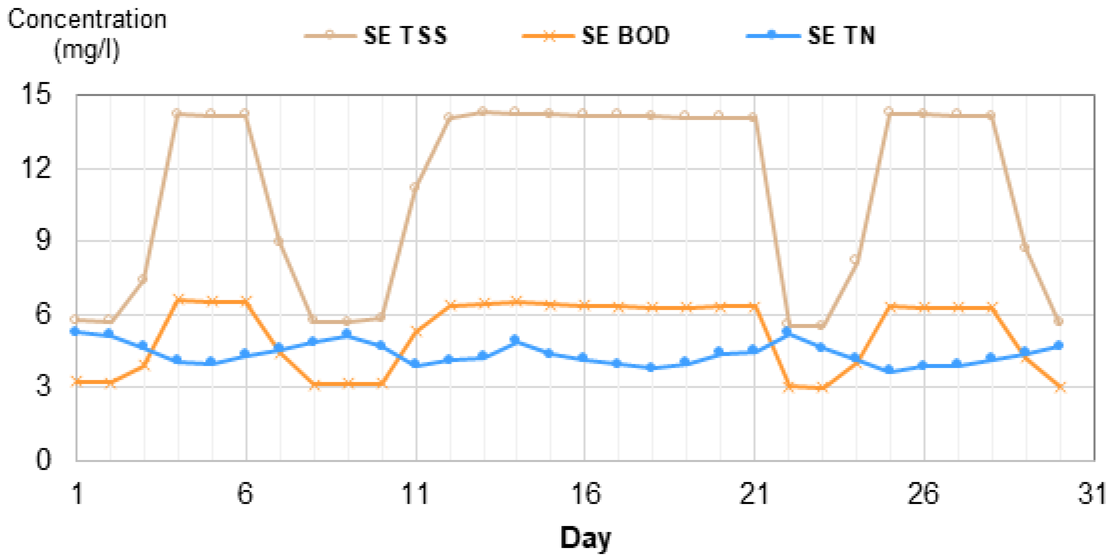

Figure 6-4 Effluent Water Quality Parameter Profiles for 30-day Dynamic Model Simulation

In summary, the process model predicted that the selected alternative will be able to meet the discharge limits of TSS, BOD and TN for both future average and max month conditions.

6.2.4 Supplemental Biological Process Modeling

In response to RIDEM's comments received on September 16, 2020 regarding equipment redundancy for the aeration tanks, the biological process model was simulated with three aeration tanks in service for the projected max month flow and loads conditions.

A two-weeks' special sampling effort was conducted during September 13, 2020 through September 27, 2020 to better characterize the model influent for supplemental biological process modeling with three aeration tanks in service. The primary effluent data from the 2020 special sampling period were screened and averaged to generate key inputs to the BioWin Influent Specifier (as part of the Biowin model software package). The Influent Specifier is an automatic calculator that helps to estimate COD fractions for the primary effluent based on the special sampling results. Specifier fraction updates included the following:

- F_{bs}, readily biodegradable COD
- F_{us}, unbiodegradable soluble COD
- F_{up} unbiodegradable particulate COD
- F_{na}, ammonia and TKN ratio
- Particulate substrate COD:VSS
- Particulate inert COD:VSS

After applying the new COD fractions and adjusting flows and bioreactor volumes to reflect three aeration tanks in service based on actual operating conditions during the special sampling period, the model was able to replicate the actual primary effluent water quality, the mixed liquor suspended solids (both total and volatile), and effluent water quality within one standard deviation.

The refined model was then applied to simulate the projected future max month flow and loads conditions (Table 6-2). The primary effluent flow and concentration, and other operating controls were adjusted accordingly. Other model inputs, including COD fraction (Fbs) and model stoichiometry parameter (particulate COD:VSS ratio), were fine-tuned to represent the predicted future primary effluent characteristics. The simulation was performed with three aeration tanks and seven secondary clarifiers in service. The average wastewater temperature of 16°C for the month of May was used, and the second anoxic zone Cell D1 was operated as an aerobic zone to provide enough volume for nitrification process. The model layout is shown in Figure 6-5, volumes labeled below individual aeration zones reflect total sub-zone volumes from three aeration tanks.

The steady-state modeling results are summarized in Table 6-3, with the secondary effluent TSS of 10.6 mg/L, cBOD of 4.9 mg/L, and TN of 4.6 mg /L. All the effluent parameters are below the monthly discharge limits, indicating that the facility can meet its monthly discharge limits with three aeration tanks in service and the fourth tank as a stand-by tank.

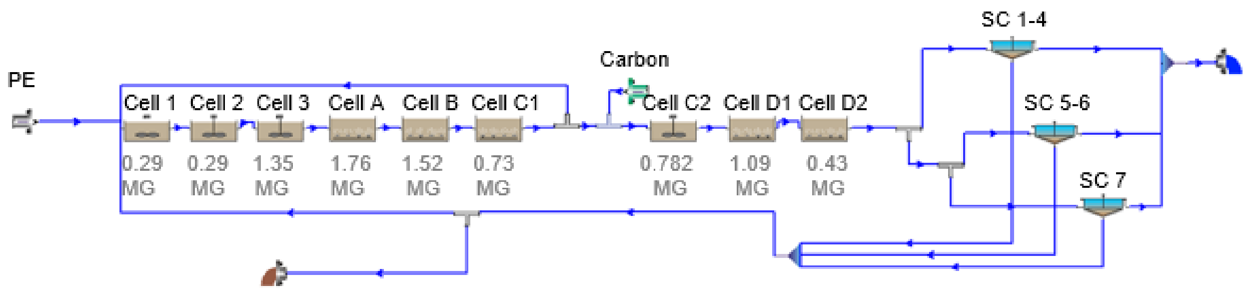

Figure 6-5 BioWin Model Layout for Supplemental Biological Process Modeling

Table 6-3 Simulation Results with Three Aeration Tanks and Seven Final Clarifiers

Effluent Parameter	Max Month Modeling Results (3 Aeration Tanks) (mg/L)	Monthly Limit (mg/L)
TSS	10.6	30 (November 1 – April 30) 20 (May 1 – October 31)
$CBOD_5$	4.9	25 (November 1 – April 30) 20 (May 1 – October 31)
Total N	4.6	NA (November 1 – April 30) 5 (May 1 – October 31)

6.3 Other Improvements

In addition to the Alternative No. 1 and Alternative No. 4 improvements identified above, there are incidental improvements that will also be included in the design. The existing RAS line from the north side of the chlorine contact tank to the carbon feed building (approximately 200-feet of 30-inch and 24-inch steel pipe with cement mortar lining) will be rehabilitated or replaced to address operational and maintenance issues. Flow splitting modifications to balance the flow between existing and proposed clarifiers (i.e. clarifiers 1 through 8) will also be required.

To address future flow conditions described in Section 4.0 when the tunnel dewatering pump station is online, modifications to the influent pump station and its control set points will be necessary. Modifications to control the rate of flow will be identified during the progression of the design of the Phase III CSO Program facilities, however no changes to the influent pumping capacity of the plant will be made.

The BPWWTF's existing UV disinfection system was installed as part of the Contract 807 plant upgrades. The existing UV disinfection system is a single channel UV4000 system as manufactured by Trojan Technologies, Inc. and is comprised of high-wattage, polychromatic, medium-pressure lamps with two banks of lamps installed in a common channel. Due to the age of the existing system, the significant advancement in UV disinfection technology, the need to have an energy efficient UV system and to continue to reliably meet advanced treatment discharge limitations for enterococcus, the NBC has determined a new UV disinfection system is required.

NBC has evaluated alternatives to replace the existing UV disinfection system within the existing building and within a new building. The evaluations revealed that retrofitting a new UV system into the existing building proved too difficult and costly, and presented significant challenges and risks associated with maintenance of plant operations and management of flows during construction and system commissioning, Therefore, placing the new system in a new building has been determined to be necessary. The proposed UV Facility will be designed to provide UV disinfection capabilities and satisfy current TR-16 recommendations.

The use of chemically enhanced primary treatment (CEPT) will be evaluated if the extreme flow and loading conditions modeled for the FPA result in compromised treatment plant performance or permit violations that are attributed to low primary clarifier removal efficiencies. CEPT is a process in which chemicals, such as ferric chloride, aluminum sulfate or polymer, are added to the wastewater stream to enhance BOD, TSS and pollutant removal by employing the processes of chemical coagulation and flocculation as an aid to improve gravity settling characteristics. Furthermore, the BPWWTF Operations staff will use their profession judgement to utilize the third Primary Clarifier to help supplement primary clarifier operations during elevated loading conditions. A potential location for the CEPT treatment process is shown in Figure 6-6. Other locations may also be considered if necessary.

The use of polymer to enhance gravity settling characteristics in the final clarifiers will also be evaluated. A potential location for the polymer system includes the proposed Return Sludge Pump Station for the two proposed Final Clarifiers.

Figure 6-6 Potential location for Chemically Enhanced Primary Treatment Facility

Section 7.0
Implementation Plan

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7.0 Plan Implementation and Cost

This section addresses items IX, X, XI, and XII of the RIDEM Office of Water Resources Facilities Plan Review Checklist, included in Appendix A.

7.1 Implementation Steps

Design deliverables will be submitted to the RIDEM for review at the Preliminary and Final Design stages. These milestones are in accordance with the deadlines presented in Consent Agreement RIA-424 in order to meet and remain in compliance with the requirements of the RIPDES discharge permit.

According to Consent Agreement RIA-424, upon RIDEM approval of this Facilities Plan Amendment, the NBC must complete the design and construction and initiate operation of the selected alternative in accordance with the approved Phase IIIA schedule. Construction and start-up of the BPWWTF new clarifiers and associated improvements will be completed prior to start-up of the Pawtucket Tunnel Pump Station. The Pawtucket Tunnel Pump Station is anticipated to be operational in accordance with the approved Phase IIIA schedule.

7.2 Operation and Maintenance

The 2009 Facilities Plan Amendment for the BPWWTF proposed an increase in staffing at the facility for operation and maintenance of existing and proposed facilities. Since then, staffing has been increased to sufficiently support operations at the BPWWTF. For the scope of improvements in this Facilities Plan Amendment based on the planning period assessed, increases in staffing are not required. As a result, a staffing plan is not included in this Facilities Plan Amendment.

7.3 Preliminary Cost

Preliminary cost estimates were prepared as part of the evaluation of treatment alternatives. The preliminary cost estimate for construction of two new clarifiers was approximately $14.2 million. This estimate was based on the following assumptions:

- Site work includes excavating and rebuilding part of the existing levee, on the landward side, as part of site preparation for the new clarifiers.
- Site work also includes additional catch basin and stormwater collection infrastructure and associated excavation.
- Influent piping to the new clarifiers will be drawn off of a new 72-inch mixed liquor line, which originates at Junction Chamber #1. This line will include an isolation gate. A flow splitting chamber located between the new clarifiers will include provisions for isolating the 48-inch diameter line to each clarifier.
- Flow meters and flow control valves will be installed on the 48-inch diameter influent to each clarifier.
- Final effluent will connect into the 54" existing final effluent line from existing clarifiers Nos. 5 and 6, upstream of Junction Box #5.

- A new wetwell and submersible return sludge pump station will send RAS from the new clarifiers to the existing RAS line. There will be a flow meter on the RAS line. This is currently estimated at 10 MGD.
- Power for the clarifier drives and the new pump station can be provided by the power feed to the existing clarifiers.
- Each clarifier will have level switches, high level alarms, overload alarm, and start/stop/run modes.

The preliminary cost estimate for the polymer system was for an additional $0.2 million, which was based on the following assumptions:

- Polymer will be fed to the mixed liquor channel;
- Liquid emulsion polymer will be from a 55-gallon drum that utilizes plant water for makedown;
- The polymer feed system will be located in the blower building to the east of the bioreactors;
- Power feed will be from the panel in the blower building;
- Water supply will be tapped from the effluent water line out from the dechlorination building;
- Dosage of 2 mg/L will be used and will be flow-paced based on the influent flow meter; and
- No new building will be needed to house polymer feed system.

Other modifications are required, as described in Section 6.3. Cost estimates have not yet been developed for these other improvements, but they are anticipated to be approximately $5 million - $6 million. A detailed Opinion of Probable Construction Cost (OPCC) for all BPWWTF improvements will be refined as design progresses. For the purposes of this Facilities Plan Amendment, the OPCC for the selected plan presented in Section 6 is estimated to be $20 million (based on December 2018 dollars, ENR Construction Cost Index of 11,185 for December 2018). Changes to NBC's operation and maintenance (O&M) costs associated with these improvements will also be identified during detailed design. It is not anticipated that the selected plan will significantly increase NBC's O&M costs at the BPWWTF.

7.4 Cost and Effectiveness

The selected plan has been determined to be the most cost-effective approach to providing required BPWWTF upgrades of the several alternatives considered. While the selected plan is the costliest to construct of the alternatives evaluated, it provides the best effluent quality, is the easiest to operate, and provides additional unit process redundancy to the BPWWTF.

The selected plan provides the most treatment benefit through additional capacity to capture/recapture mixed liquor solids for processing and reuse as beneficial biosolids. The plan also provides more benefit in terms of increasing the plant's ability to treat additional CSO flows captured by the tunnel, which would otherwise have a negative impact on the receiving water. This accommodates capture, treatment and discharge of additional CSO flow as treated effluent which the other alternatives would not provide.

The design for potable water components related to the selected alternatives will specify use of water efficient fixtures to conserve water. The design for electrical components of the selected alternatives will specify use of energy efficient equipment and lighting fixtures to maximize energy conservation.

The replacement cost of the clarifiers would be significant, however the tank structures are unlikely to need replacement during their service life. The associated mechanical equipment may require maintenance or occasional replacement which has already been accounted for in the operation and maintenance cost estimates.

7.5 Fiscal Sustainability

NBC maintains a Capital Improvement Program that includes an annual Capital Improvement Plan which identifies the capital investments necessary to, in part, meet existing and future regulatory requirements, ensure the integrity of NBC's infrastructure, and to maintain operational efficiency. Capital investments are evaluated on all critical infrastructure throughout the system over a 5-year planning period. The plan presents the anticipated scope, schedule, and cost for required capital investments as well as the financial impacts and the anticipated project financing.

Capital Improvement Plans are used to establish NBC's annual operating budgets. Both annual Capital Improvement Plans and operating budgets are published on NBC's website. Past and present Capital Improvement Plans have included the anticipated costs of the Phase III CSO Program, of which the recommended plan for upgrading the BPWWTF included herein is made a part of (i.e. BPWWTF improvements are proposed as part of the Phase IIIA of the Phase III CSO Program).

Additionally, a Financial Impact and Affordability Analysis was performed as part of the CSO Control Facilities Phase III Amended ReEvaluation Report. The Implementation Schedule for the Phase III CSO Program has been established, in large part, to maximize water quality benefits while presenting a plan that is fiscally sustainable and minimizes the financial burden on the ratepayers.

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Section 8.0

Environmental Impacts

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8.0 Environmental Impacts

8.1 Direct Impacts

Few direct environmental impacts are expected to result from this project. Direct impacts that have been identified as part of the environmental assessment are generally short-term and limited to the active construction of the project. In most cases, adverse impacts can be effectively mitigated during construction. Long-term, adverse impacts are not anticipated. Rather, this project will result in long-term environmental benefits, helping significantly improve water quality in Narragansett Bay and its tributaries.

Upgrades are required to the BPWWTF in response to the new RIPDES discharge permit issued by RIDEM and the anticipated increase in wet weather flow requiring treatment at the facility following construction of Phase III CSO Program projects. The proposed upgrades will also provide more operational flexibility. Without this project, the facility may not be able to regularly meet permit limits during tunnel pump-out, for sustained periods at a 46 MGD flow rate through the plant.

No disruption of traffic, business, or other daily activities are anticipated from this project. Similarly, there will be no damage to historic, archaeological, or cultural resources, prime farmlands, or recreational areas. According to available RIGIS land use data, there is no USDA regulated farmland located near or surrounding the project area. There are no historic sites or districts listed on the National Register of Historic Places within the proposed project area for the BPWWTF upgrades. No businesses, households, or services will be displaced as a result of the proposed project. A discussion of other potential direct impacts, and how they will be mitigated, follows.

8.1.1 Erosion and Sedimentation

With construction of the two new clarifiers and associated improvements, erosion and sedimentation resulting from construction could potentially have an impact to the Seekonk River if proper controls are not in place. As such, standard construction phase environmental protection controls will be utilized during the construction of this project. Surface waters will be protected from sedimentation and other pollutant discharges by utilizing compost tubes, hay bales, and/or silt fences. The contractor will be required to provide proper erosion controls and fugitive dust prevention facilities as required by RIDEM and other applicable agencies.

Surface disturbance will be minimized wherever possible and disturbed surfaces will be restored when project conditions allow. Ongoing monitoring, maintenance, and repair of erosion controls will be required throughout construction to ensure proper function and adequate protection of adjacent surface waters. Temporary controls will be removed at the end of construction once the site is adequately restored.

8.1.2 Groundwater

While some subsurface construction may be within the existing groundwater zone, appropriate construction procedures will be utilized to discharge or recharge groundwater, as required. It is anticipated that the quality and quantity of groundwater will remain substantially unchanged as a result of this project.

8.1.3 Coastal Zones and Wetlands

Because this project falls within 200-feet of the Seekonk River, it will be within the Contiguous Area managed by the RI Coastal Resources Management Council (CRMC) and will require an Assent from CRMC. No impact to freshwater wetlands is anticipated. All work is proposed within the existing BPWWTF site and no adverse impacts to coastal zones or barrier resources are anticipated during, or as a result of, the construction of this project.

8.1.4 Noise and Air Quality

Excavation and general construction activities will be performed as part of this project. Inherent air quality issues are associated with these types of projects such as dust generation and emissions from construction equipment. Noise associated with construction is also inevitable. Noise generated from construction equipment will be typical of that from construction equipment used on other projects of this nature. Any noise impacts that do result from this project will be temporary, during construction activity. These construction-related impacts are of a short-term nature and will be effectively mitigated through proper controls.

Construction contractors will be required to suppress dust during construction by applying water or calcium chloride to excavations and disturbed areas. Construction equipment will be required to meet current RIDOT emission requirements. No long-term impacts to air quality or from excessive noise are anticipated as a result of this project.

8.1.5 Vegetation and Wildlife

Based on the proposed area for this project, it appears that there will be minimal impacts to vegetation and wildlife because the proposed work for the BPWWTF upgrades will be entirely within the existing treatment plant site, which is already developed with wastewater treatment facilities. Vegetation removed as part of construction will be restored to its previous condition to the greatest extent possible.

8.1.6 Water Supply/Use

Some potable water will be used during the construction process (i.e., dust control and concrete mixing). This water use will be minor and of a short-term nature. Potable water used during construction will be obtained from onsite sources and appropriate backflow prevention will be used.

8.1.7 Soil Disturbance

Soil disturbance will occur as part of constructing the new clarifiers and modifying distribution piping. Soil erosion and sedimentation, if left uncontrolled, is always a possible consequence of soil disturbance and earth work activities. It is also possible that contaminated soil is encountered during construction. Erosion and sedimentation controls will be used throughout construction and disturbed areas will be restored as soon as possible.

8.1.8 Safety

Construction safety will be a top priority and the project will adhere to all pertinent OSHA requirements. In addition to meeting these requirements, construction contractors will be required to provide a project-specific Health and Safety Plan (HASP). The work of this project is away from residences, businesses, and the general public whereas additional safety precautions are not anticipated to be required. The area of the BPWWTF site where work is proposed is not accessible to the public and access to the construction site will be restricted by using temporary fences and construction signage.

8.1.9 Solid Waste

Solid waste will be generated during construction, much of which will consist of debris typical of construction activity. All construction debris and other solid waste will be disposed of in accordance with Federal, State, and local regulations and no significant impacts are anticipated from solid waste generated during construction. It is also possible that contaminated soil will be encountered during the course of construction due to the amount of earthwork that is required. Contaminated soil may require disposal at a solid waste landfill or other disposal facility, should it be encountered. The presence of contaminated soil will be identified during design. If present, contaminated soil will be managed in accordance with a soil management plan developed as part of bidding and construction contract documents. Contaminated soil will be handled in accordance with RIDEM Remediation Regulations. No long-term impacts associated with solid waste are anticipated as part of this project.

8.1.10 Traffic

This project will be constructed entirely within the BPWWTF site and away from existing roadways and rights-of-way. Construction vehicle traffic is anticipated to be minimal, limited to the movement of personnel, material deliveries, and surplus soil hauling over access roadways currently used by NBC and on existing public streets through generally commercial areas of Pawtucket and East Providence. As such, no significant short-term or long-term traffic impacts are anticipated as a result of this project.

8.2 Indirect Impacts

No indirect impacts are anticipated as part of this project. This project is proposed to provide better treatment of wastewater associated with the anticipated increase in wet weather flow when new CSO facilities are constructed. The upgrades proposed are not intended to increase the daily treatment capacity at the facility, and no significant increase in sanitary flow is expected over the 20-year planning period. This project will not impact offsite uses and would not be expected to induce sprawl or land development. No increase in the demand for services or utilities associated with sprawl is expected as a result of this project.

8.3 Environmental Assessment

An Environmental Assessment (EA) has been performed for this project. The text of the EA is provided as Appendix E and the complete EA is provided under separate cover. It further describes the potential environmental impacts, consequence, and mitigation strategies associated with this project. A Finding of No Significant Impact (FONSI) is warranted for this project and an Environmental Impact Statement (EIS) is not required.

Section 9.0 Intergovernmental Agency Reviews

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9.0 Intergovernmental Agency Reviews

Several agencies were contacted as part of this Facilities Plan Amendment and the EA. Each agency was provided a conceptual site plan, sketch of the preferred BPWWTF improvements, and a cover letter with a description of the proposed BPWWTF upgrades. The following agencies were contacted:

- Rhode Island Coastal Resources Management Council (RI CRMC);
- Rhode Island Department of Environmental Management-Division of Fish and Wildlife;
- Rhode Island Department of Environmental Management - Office of Technical and Customer Assistance;
- Rhode Island Division of Planning;
- Narragansett Tribal Historic Preservation Office (NTHPO);
- NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO);
- USDA Natural Resources Conservation District;
- Rhode Island Historic Preservation and Heritage Commission; and
- Rhode Island Department of Transportation (RIDOT).

Letters were distributed on September 26, 2018 by certified mailings and review comments were requested from each agency within 30 days of their receipt of the letter. Certified mail return receipts were received from most agencies, and several of these agencies have not provided any comments to date. These include:

- Rhode Island Coastal Resources Management Council;
- NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO);
- USDA Natural Resources Conservation District; and
- Rhode Island Historic Preservation and Heritage Commission.

Return receipts were not received from the letters sent to the NTHPO and RIDOT. Based on past correspondence with the NTHPO, email is their preferred method of communication relative to project reviews. Therefore, the letter was sent via email on Wednesday, November 7th but no comments have been received.

Three agencies, the RIDEM Division of Fish and Wildlife, RIDEM Office of Technical and Customer Assistance, and Rhode Island Division of Planning provided comments. The following sections summarize the review comments received from these agencies. Copies of the comment letters received are included as Appendix F.

9.1 RIDEM Division of Fish and Wildlife

Comments were received from the RIDEM Division of Fish and Wildlife via email on October 26, 2018, as summarized below. Response to these comments follows.

Comments:
We have recent records of diamond-backed terrapins in the immediate area of the facility in question. Diamond-backed terrapins are a ‘critically imperiled’ species in the state. The species spends the majority of its life in the water column but will come into the uplands to bask and

nest. There is an unvegetated area (between points “2” and “218” on figure provided) on the property that, from aerial imagery, looks like it could be appropriate nesting habitat. Have terrapins ever been observed using this area or in any other area that may be impacted by construction?

Response:
All work associated with implementing the recommended alternative described herein is interior to the existing, armored coastal levee that surrounds the BPWWTF. No shoreline survey has been conducted to identify the presence of diamond-backed terrapins and/or appropriate nesting habitats.

Comments:
Also, it is not entirely clear what the nature of the construction in question will entail. The figures provided by you appear to indicate the construction of three additional outfalls as well as the construction of a tunnel shaft between the yellow squares on the figures. Is this a correct interpretation? Will there be an additional tunnel built underwater between points “2” (on east side of Seekonk River) and “27” (on west side of Seekonk River)? If not, what will be the source of the water being deposited by the outfall on the west side of the river and what will be the scale of construction associated with this feature?

Response:
The purpose of the EA and Facilities Plan Amendment is to update flows and loads to the BPWWTF for a 20-year planning period as well as to describe required upgrades to the facility to meet RIPDES discharge limits. Construction associated with these upgrades is entirely within the current operational footprint of the BPWWTF. The construction associated with the recommended alternative include the following elements: construction of two secondary clarifiers, associated process piping, upgrade to existing pump facilities, and miscellaneous instrumentation. As noted above, all proposed work is landward of the existing coastal levee that protects the plant.

Please note the outfalls represented above (i.e. 2, 27, 218) are existing combined sewer overflows. Outfall 27 is a CSO within the combined sewer that is within the sewershed of the Fields Point system in Providence. Outfall 27 has been addressed by sewer separation during the previous phase of the CSO program. No tunnel and/or conveyance conduit is proposed between outfall 27 and outfall 218.

Comments:
As a general question, will there be any temporary or permanent constructed features that may be accessible to a terrapin swimming in the water column at any point during the tidal cycle?

Response:
No work is proposed seaward of the existing levee.

9.2 RIDEM Office of Technical and Customer Assistance

Comments were received from the RIDEM Office of Technical and Customer Assistance via email on November 15, 2018, as summarized below. Responses to these comments follow.

Comments:

The only comments that we have at this time is that NBC must ensure that the schedule to complete the Phase III CSO project must comply with the requirements from their consent agreement RIA-424, which was entered into between the NBC and DEM on September 6, 2018.

Also, it appears that the project will improve water quality in the river. It may need a RIPDES Construction General Permit (CGP).

Responses:

NBC acknowledges and will comply with the schedule of major milestones for the Phase III CSO Program laid out in Consent Agreement RIA-424. It is also understood that a RIPDES Construction General Permit (CGP) may be required for the BPWWTF upgrades project.

9.3 Rhode Island Division of Planning

Comments were received from Ms. Nancy Hess of the Rhode Island Division of Planning via email on October 24, 2018, as summarized below. Response to these comments were provided by email and certified mail on November 14, 2018. Ms. Hess responded by email on November 15, 2018 indicating that her comments have been adequately addressed.

A summary of the comments from October 24th and the responses issued November 14th follow.

Comments:

Please be advised that there have been several changes to the State Guide which are pertinent to your review. The following Elements have been rescinded and no longer need to be checked within project assessments:

- 110, Goals 7 Policies
- 112, Ruse of Surplus Military Lands
- 162, Rivers Policy & Classification Plan
- 621, Policy Statement for …Public transit…
- 711, Blackstone Region Water Resources Management Plan
- 715, CCMP for Narraganset Bay, 912, Howard Center Master Plan

There has been an update to the Element 731, Nonpoint Source Pollution Management Plan. It was replaced with a new Element, *Water Quality 2035*. It was adopted by the State Planning Council on October 13, 2016. This Element is most relevant to your project.

Would you please resubmit your assessment considering the updated information on the State Guide Plan?

Responses:

As indicated in the above comments, several State Guide Plan (SGP) elements have been rescinded and are therefore no longer necessary for review with respect to project assessments. These are as follows:

- Element 110: Goal and Policies for the Development of Rhode Island
- Element 112: Resources Management in the Reuse of Surplus Navy Lands
- Element 162: Rivers Policy and Classification Plan
- Element 621: Policy Statement – Proposals for New or Restructured Public Transit Facilities or Service
- Element 711: Blackstone Region Water Resource Management Plan
- Element 715: Comprehensive Conservation and Management Plan for Narragansett Bay
- Element 912: Howard Center Master Plan

SGP Elements 110, 112, 621, and 912 were not applicable to this project. The comments also indicated that Element 731: Nonpoint Source Pollution Management, was replaced with a new element, Water Quality 2035. Water Quality 2035 updates and replaces former SGP Element 731 as well as SGP Elements 162, 711, and 715.

It was also noted that Water Quality 2035 appears to be the SGP Element most relevant to this project. As such, it was requested that we update our assessment based on the findings of our review of this element. An assessment of how Water Quality 2035 relates to this project follows.

Water Quality 2035

Water Quality 2035 is the State's plan to protect and restore the quality of Rhode Island's water resources. It encompasses freshwater and saltwater surface waters, groundwaters, and wetlands – from inland lakes and streams to Narragansett Bay and coastal salt marshes. Central to this plan is a focus on watersheds as the appropriate basis for management of water resources. It is intended that state agencies will integrate work at the watershed scale and identify ways that such work can align with and support the related activities of municipal, regional, and federal agencies; watershed organizations; and other entities.

The primary goals of Water Quality 2035 are to promote:

- Protection of existing quality of RI's waters and aquatic habitats and prevention of further degradation.
- Restoration of degraded waters and aquatic habitats to a condition that meets their water quality and habitat goals.

The goals and objectives of the Phase III CSO Program, and in turn the environmental benefits that will result by the proposed upgrades to the BPWWTF, help realize the State's goal of protecting existing water quality and preventing further degradation of Rhode Island's waterways. Upgrades are required to the BPWWTF to better treat the increase in flow expected once proposed CSO abatement facilities are constructed. An alternatives evaluation was performed, and the currently preferred alternative of two (2) new secondary clarifiers and a polymer injection system provides the best effluent water quality of all the alternatives considered. The proposed upgrades will also provide more operational flexibility allowing for better treatment of wastewater to meet new RIPDES discharge limits. The Facilities Plan Amendment will present the alternatives evaluated and identify the preferred alternative.

"Wastewater discharges to surface waters and collection sewers" are classified as pollution sources in Water Quality 2035. Combined sewer overflows and effluent discharges from WWTFs are cited as sources of biological and nutrient loading to Rhode Island waters. NBC's CSO Program and their operation of the two largest WWTFs in the State are specifically referenced. Ten policies are identified in Water Quality 2035 with respect to managing possible impacts from WWTF discharges and CSO overflows, several of which relate to NBC's operations. The proposed improvements to the BPWWTF, and to a greater extent the Phase III CSO Program as a whole, are consistent with these policies.

Based on our assessment, it appears that the proposed project furthers the State's goals of protecting water quality in Rhode Island and maintains consistency with the policies presented in Water Quality 2035.

9.4 United States Fish and Wildlife Service

In lieu of issuing a letter requesting project review, the US Fish and Wildlife Service (FWS) requires that applicants obtain official species lists from their online Information for Planning and Conservation (IPaC) tool for determination of potential impacts to any federally listed or proposed, threatened, or endangered species and wildlife habitats within the proposed project areas. This was performed for the project area. This has been addressed in Section 4.10 of the EA.

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Section 10.0
Public Participation

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10.0 Public Participation

This section describes the public participation process as it relates to this Facilities Plan Amendment.

10.1 Public Meeting

A public meeting for the BPWWTF EA and Facilities Plan Amendment was scheduled for 10:00 am at NBC offices on October 25, 2018 to discuss project scope, alternatives, and the preferred BPWWTF upgrades. The public meeting was advertised in the Providence Journal 30 days in advance of the meeting. No members of the public attended, and the meeting was cancelled.

The newspaper advertisement, sign-in sheet, and presentation materials prepared for the meeting are included in Appendix G.

10.2 Public Hearing

A Public Hearing will be scheduled following RIDEM review of the draft Facilities Plan Amendment and EA, submitted in December 2018. Presentation materials and meeting minutes from the public hearing will be added to Appendix H of this plan, and this section will be updated accordingly.

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Section 11.0
References

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11.0 References

Information presented in this report was based or derived from the following references in addition to original derivations, calculations, and observations made as part of the Phase III CSO Program.

1. Camp, Dresser and McKee (CDM) Corporation, 1997. *Bucklin Point Waste Water Treatment Facilities Plan Amendment and Environmental Assessment*.

2. Camp, Dresser and McKee (CDM) Corporation, Revised 2009. *Narragansett Bay Commission, Bucklin Point Wastewater Treatment Facility, Wastewater Facilities Plan Amendment*.

3. CDM-Smith, August 21, 2017. *Bucklin Point Waste Water Treatment Facility Stress Testing Program.*

4. Rhode Island Statewide Planning Program, Department of Administration, April 2013. *Technical Paper 162: Rhode Island Population Projections 2010-2014.*

5. Pawtucket & Central Falls Station District Vision Plan (2016)

6. Kleinfelder, November 2019. *NBC Resiliency Plan*.

Appendix A

RIDEM Office of Water Resources Facilities Plan Review Checklist

Wastewater Planning & Design / State Revolving Fund
Facilities Plan Checklist

USE OF THIS CHECKLIST: This checklist must be completed and attached to any Facilities Plan (FP) submitted for review and approval. All checklist items in plain text must be answered/addressed in the FP. All checklist items in *italics* must be answered/addressed in the FP to be eligible for construction funding assistance programs involving federal funds (e.g. State Revolving Fund [SRF] Program). For a FP Reaffirmation, please refer to the FP Reaffirmation Checklist.

	Page No./NA
I. Executive Summary	13
II. Statement of Project Need	
A. Health, Security, Aging Infrastructure, and Resiliency	N/A
B. Service Area Growth	N/A
C. New RIPDES permit limit(s) or other enforceable actions	26
III. Planning Area	
A. Provide a description of the following:	
1. Planning area (include map)	31
2. Geographical boundaries (include map)	31
3. Institutional (governmental unit) structure	25
4. A description of wastewater utility management structure	25
5. The current rate structure	25
6. The entities conducting planning	25
B. Relationship between FP and the Community Comprehensive Plan (CCP)	31
C. Provide a map which shows:	
1. Service area	31
2. Political boundaries	31
3. Natural (e.g. wetlands, coastal), cultural, historical and archeological resources consistent with CCP inventory	32
IV. Effluent Limitations	
A. Copy of RIPDES permit	33
B. Is the receiving water impaired (303(d) List: Category 5)?	34
C. Will the project(s) contemplated in the FP address impacted waters (303(d) List: Cat. 4a, 4b, 5)?	34
V. Assess Current Situation	
A. Existing Environmental Conditions (provide text and maps)	
1. Geophysical	
a. Soils	35
b. Topography	34
c. Geology	35
d. Hydrology	35
2. Surface water watersheds, wetlands, floodplains, estuarine (coastal) areas and water supply sources	35
3. Groundwater aquifers, recharge, and wellhead protection areas	34
4. Surface and Groundwater quality, quantity, and uses	34
5. Documentation of OWTS problem areas	35

6. Land-use and demographic data consistent with CCP 31

B. Existing System and Flows
   1. Existing System
      a. Wastewater Treatment Facilities (WWTF)
         i. Location of all treatment plants, sludge treatment and disposal areas, pretreatment facilities 41
         ii. WWTF performance compared to RIPDES permit 48
         iii. Quality of operation and process control 48
         iv. Actual number and qualifications of operating staff versus planned/needed 48
         v. Adequacy of
            1) Plant hydraulics 48
            2) Laboratory facilities 48
            3) Sampling & testing 48
            4) Maintenance program 48
         vi. Cost recovery and user charges 48
         vii. Impact of septage on WWTF 48
         viii. Effluent treatment/reuse methods 48
         ix. Sludge treatment/disposal/reuse methods 46
         x. Flow/waste reduction measures 46
      b. Collection System (include map)
         i. Location of all pumping stations and sewers 49
         ii. Number of service connections and population currently served by sewers 49
         iii. Present design service population 49
         iv. Location and description of major industrial discharges 49
         v. Location of all bypasses and overflows 49
   2. Existing Flows and Wasteloads
      a. Monthly average, maximum month, maximum day and peak hour flows 55
      b. Dry and wet weather 55
      c. Septage (in-town and out-of-town) 48
      d. Combined sewer overflows 99
      e. Proportion and quantity of flow attributed to infiltration/inflow 56,70
      f. Wastewater characteristics (BOD, TSS, TN, TP, Ammonia, etc.) 59
      g. Proportion of residential/commercial/industrial flows 49

VI. Assess Future Situation (Twenty-Year Planning Period)

A. Land-use Forecasts
   1. Consistent with local CCP 67
   2. Utilized in estimating future development 67
   3. Utilized in estimating future wasteloads 67

B. Demographic Forecasts (consistent with State Guide Plan (SGP)) 67

C. Socioeconomic Forecasts (consistent with SGP)
   1. Industrial projections 67
   2. Commercial projections 67
   3. Median household income or other financial data N/A
   4. Designated environmental justice area(s) N/A

D. Forecasted Flows and Wasteloads
   1. Residential
      a. Residential wastewater strength approximates 0.17 lb/day BOD, 0.2 lb/day TSS 67
      b. Domestic future flows are based on analysis of flow records and/or approximates 70 gpcd 67

c. Sewer service area extensions consistent with CCP — 67

2. Industrial
   a. Future industrial flows are consistent with similar flows and loads within the service area — 67
   b. Forecasted future industrial flows are consistent with the CCP — 67
3. Commercial
   a. Future commercial flows are consistent with similar flows and loads within the service area — 67
   b. Forecasted future commercial flows are consistent with the CCP — 67
4. Septage
   a. Septage forecasts are based on sewered/unsewered forecasts in CCP — 48
   b. Septage forecasts consider domestic, industrial, commercial sources — 48
   c. Out-of-town septage considered in forecasts — 48
5. Sludge treatment and disposal
   a. Forecasts quantity and composition of sludge generated from WWTF treatment process(es) and septage — 46,100
   b. Forecasts quantity and composition of sludge from sludge treatment and dewatering process — 46,100
   c. Method for final disposal of sludge complies with DEM's Sewage Sludge Management Regulations — 46,100
   d. If method for final disposal is for liquid sludge only, ability to dewater sludge is still maintained — 46,100
6. Flow and wasteload reduction programs
   a. Infiltration/Inflow (I/I)
      i. Does an I/I study exist for the sewer service area? — 70
      ii. Does excessive I/I exist by DEM criteria? (i.e. 120 gpcd of infiltration during periods of high groundwater, and during a storm event inflow flow does not exceed 275 gpcd or cause WWTF operational problems) — 70
      iii. Does a sewer rehabilitation program (SSES) exist or is one proposed which includes a cost-effectiveness analysis of reduction versus treatment costs, scope of work, cost estimates, and schedule for completion which is reasonable and represents realistic expectations for excessive I/I reduction? — N/A
   b. Pretreatment
      Is the Pretreatment Program currently in compliance with DEM regulations? — 49

E. Climate Change and Resiliency

Wastewater infrastructure will need to be resilient to the impacts of climate change. To that end the FP must address the following:

1. Consistency with DEM's Guidance for the Consideration of Climate Change Impacts in the Planning and Design of Municipal Wastewater Collection and Treatment Infrastructure — 35
2. Implementation of projects and/or improvements identified in any WWTF Resiliency Plan required under the RIPDES permit. — 35

VII. Development and Evaluation of Alternatives

All reasonable alternatives generated must be based upon and consistent with the local CCP and the SGP and must be evaluated to include the following factors: no action alternative; direct, indirect, beneficial, and detrimental impacts of the entire municipal wastewater treatment system on all other related environmental objectives; existing and future environmental conditions, including all other related environmental objectives, affected by the entire system; the total life-cycle costs of the alternative, including net annualized cost; land-use and other socioeconomic parameters affected by the entire system; cumulative impacts evaluated within the context of complete municipal treatment system as well as other public works projects and future community growth.

A. Optimizing Existing Facilities (i.e. "no-build" alternative)
   1. The optimum performance level possible with the existing process design ___81___
   2. The age and reliability of existing equipment and its remaining useful life ___N/A___
   3. The qualifications, number and training of current operating personnel ___N/A___
   4. Additional operating modifications/improvements and laboratory facilities needed to monitor and/or improve operations ___N/A___
   5. Possible process or operational modifications ___81___
   6. The impact of reducing I/I or other flow and waste reduction programs including storm water (i.e. integrated planning) ___N/A___

B. Regional Solutions

   Regionalizing facilities and services must be considered. An analysis of regional solutions should address the following special considerations:
   1. Effects of interceptor location on land use, particularly where land is undeveloped ___99___
   2. Effects of alternative combinations on surface waters in the region ___99___
   3. Possible limitation on future expansion due to unavailability of land ___99___
   4. Differences in reliability, operation, and maintenance of facilities. ___99___
   5. The regionalization alternative is consistent with the recommendations of the applicable water quality management (WQM) plan/TMDL and the SGP ___99___
   6. Are there inter-municipal service agreements? ___99___
   7. Evaluates cost savings realized through economies of scale/more efficient operation ___99___

C. Unsewered Areas

   (If after a public meeting, the recommendation of this section is to implement an OWTS management program solely featuring the repair/replacement of individual systems on individual lots, then the community may elect to end the facilities planning process for unsewered areas at this point and request a Categorical Exclusion. The information developed to this point shall be used to justify the Categorical Exclusion request. A group or community OWTS unit cannot qualify for a Categorical Exclusion.)
   1. Description of the unsewered area
      a) Identification of the approximate number, type, and location of OWTS ___99___
      b) Map of the unsewered area ___99___
      c) Identification of the approximate number of and impacts of failed/failing systems on surface and ground water ___N/A___
      d) An analysis of the cause(s) in OWTS failure area(s) ___N/A___
      e) An estimated cost for repairing/replacing failed OWTS in the area ___N/A___
   2. Assessment of the continued use of OWTS within the unsewered area(s). If continued use is found to be unsuitable, evaluate alternatives (e.g. septic system management program, advanced OWTS, cluster systems, sewers) for other means of wastewater disposal and establish a schedule for implementation of those alternatives. (Note: this assessment can form the basis for an Onsite Wastewater Management Plan (OWMP) but is not, in and of itself, an OWMP.) ___N/A___
   3. Description of a method to ensure regular OWTS maintenance including, but not limited to: an information and education initiative with a method for tracking maintenance activities; an information and education initiative with inspection and maintenance incentives (e.g. pump-out subsidies); a requirement for regular inspection and maintenance. ___N/A___
   4. Description of a community assistance program for OWTS repair/replacement. At a minimum this should include:

a) The nature and extent of the assistance to be provided to the community (i.e. financial, technical, etc.) N/A
b) Application procedure and any community-imposed eligibility requirements N/A
c) Method to advertise the assistance N/A
d) Designation of a party responsible for the assistance program N/A
e) Estimated cost(s) for OWTS management program as described N/A

D. Sewer Extensions
1. The need for sewers is justified and documented, including justification for abandoning OWTS rather than implementing a wastewater management district (WWMD) 99
2. Consideration is given to conveyance of treated wastewater by small diameter, low-pressure, vacuum or variable grade sewers N/A
3. Alternative methods of collection and disposal have been evaluated and compared to conventional sewers with regard to total costs *and environmental impacts* N/A
4. The sewers will not encourage or induce development in identified environmentally sensitive areas (e.g. wetlands, prime farmland) N/A
5. The sewers are aligned and designed so construction will minimize impacts to identified environmentally sensitive areas N/A
6. Preliminary designs and the resulting cost estimates reflect state design guidelines N/A

E. Combined Sewer Overflows (CSOs)
1. Does the municipality/sewer authority have an approved Long-Term Control Plan (LTCP) and, if so, are the CSO controls in the FP consistent with the CSO controls in the approved LTCP? 99

If yes to item 1 above, no further evaluation is necessary. If no, the FP must include an evaluation consistent with items 2-6 below. The plan for control of pollution from CSOs must be considered if application of Best Available Technology (BAT) for wet-weather flows would not meet water quality standards. Where measures are to be considered for CSOs, the FP is to evaluate the following for a 20-year planning period.

2. Alternative control techniques and management practices that could attain various levels of pollution control see VII E1
3. Cost of achieving various levels of pollution control by each of the control techniques that appear to be most feasible and cost effective see VII E1
4. Benefits to receiving waters of a range of pollution control alternatives during wet weather conditions see VII E1
5. Costs and benefits from addition of advanced wastewater treatment (AWT) processes or dry weather flows in the area as an alternative to CSO control see VII E1
6. A final alternative selected for control of CSOs must meet the following criteria:
   a. Recommendations are consistent with the RI CSO Policy see VII E1
   b. Provision has been made for treatment to RIPDES effluent limits of all dry weather flows in the planning area see VII E1

F. Septage Treatment and Disposal
1. Does the FP consider a WWMD as the mechanism for regulating septage? 99
2. Has the applicant given appropriate consideration to current and future septage treatment and disposal by evaluating several alternatives? 99
3. Do the alternatives evaluated include regionalized treatment and disposal at an existing WWTF? 99

G. Treatment Technologies
1. Evaluated treatment technologies capable of meeting RIPDES effluent limits 100

2. Small communities (usually populations of 10,000 or less) have considered low cost treatment technologies N/A
3. Treatment process appropriate for the character and quantity of the wastewater and the size and location of the community 100
4. Treatment technologies evaluated for water and energy efficiency N/A

H. Sludge Treatment and Disposal
   1. Sludge treatment and disposal methods comply with regulatory requirements of applicable state and federal laws (e.g. RI Clean Air Act, RI Groundwater Protection Act, Resource Conservation and Recovery Act) 100
   2. Appropriate consideration given to sludge treatment and disposal by evaluating several alternatives 100
   3. Selected/evaluated sludge treatment and disposal method(s) appropriate to the size and location of the project 100
   4. Consideration given to sludge treatment and disposal alternatives which recycle or reclaim sludge such as methane recovery, self-sustaining incineration, composting, and land application 100

I. Environmental
   1. Forecasts the future environment in the planning area without the proposed project(s) (i.e. "no build" alternative) 119
   2. Direct Impacts
      a. Disruption of traffic, business or other daily activities during construction 119
      b. Damage to historical, archaeological, cultural, prime farmlands or recreational areas during construction or permanently 119
      c. Disturbance of sensitive ecosystems such as wetlands, essential fish habitats, Floodplains, and habitats of endangered or threatened species during construction or permanently 119
      d. Pollution of surface waters due to erosion in the project(s) area(s) during or after construction 119
      e. Impacts on water quality from WWTF effluent discharge(s) during construction or operation 119
      f. Displacements of households, businesses, or services during construction or permanently (indicate how many) 119
      g. Visual impacts resulting from the project 119
      h. Increased air or noise pollution, solid waste production, or demand for potable water from induced changes in population and land use 119
      i. Impacts to barrier beaches and other coastal zone features 119
   3. Indirect Impacts
      a. Adequate discussion of indirect impacts 121
      b. Special attention given to determine that the project(s) will not violate federal, state, or local laws 121
      c. Consideration given to impacts on induced sprawl 121
   4. General Aspects
      a. Adequate consideration of cumulative impacts 119
      b. Mitigation measures specified for direct and indirect detrimental impacts 119
   5. Summary of Environmental Considerations
      a. Summary of the existing system and environmental needs 119
      b. Summary of the future environment without the project 119
      c. Summary of the alternatives generation, evaluation, and selection process which led to the preferred alternative 119

J. Phased Construction

1. Determine if adding plant capacity or extending sewers in phases during the planning period is more cost effective/affordable than full construction initially 113
2. Compare the relative cost of providing full capacity initially to the present worth of deferred costs for providing capacity when needed N/A

K. Is this a multiple purpose project? (i.e. meets RIPDES permit requirements, but also may serve agricultural, recreational, commercial, industrial, water supply, or energy production purposes) N/A

L. Financial
1. For phased construction, develop a schedule and an affordable financing plan for the construction of all contracts, to provide adequate capacity for wastewater treatment needs during the twenty-year planning period 114
2. Construction and costs consistent with the implementation and capital improvement budget elements of the CCP for the next five years 114
3. Rate structure analysis performed that defines the least expensive cost recovery/rate increases necessary to build the contracts proposed in the FP 114

VIII. Plan Selection

A. Selected Plan
1. Summary of why the proposed plan was selected 103
2. Narrative summary demonstrating that the proposed plan is cost-effective and environmentally sound 103
3. Summary of how the selected alternative will address and comply with federal, state, and local environmental laws and regulations 103

B. Evaluation and Ranking of Proposals
1. Engineering considerations (e.g. reliability, energy use, process complexity) used to evaluate and select the plan 103
2. Monetary considerations (e.g. capital costs, annual O&M costs, cost per user/household/capita) used to evaluate and select the plan 103
3. Waste reduction, recycling, and reclamation considered in evaluating and selecting the plan 103
4. Legal, institutional, and financial constraints considered in evaluating and selecting the plan 103

C. Environmental Impacts of Selected Alternative
1. Unavoidable detrimental impacts identified 119
2. Mitigation measures for unavoidable detrimental impacts identified 119
3. Irretrievable and irreversible commitments of resources identified 119
4. Relationship between short-term impacts to the environment and the maintenance and/or enhancement of long-term environmental benefits 119
5. Mitigation measures for all significant detrimental impacts 119

IX. Plan Implementation

A. Implementation Steps (including phased construction) 113
1. Implementation/construction schedule (if necessary to implement the FP) consistent with enforceable requirements of the RIPDES discharge permit 113

B. Operation and Maintenance
1. Staffing plan for both the WWTF and collection system 113

X. Preliminary Design and Cost Estimates

A. Basic design criteria that meet state guidelines 113

B. If applicable, explanation of whether each phased contract will result in a fully operational component of the plan 113

C. Detailed cost estimates along with a current ENR cost index number 113

XI. Cost and Effectiveness

Evaluate the cost and effectiveness of the process, materials, techniques, and technologies for carrying out the proposed project(s). The selection of a project or activity that maximizes the following factors must also be considered:

A. Efficient water use, reuse, recapture, and conservation	114
B. Energy conservation	114
C. Cost of construction	114
D. Cost of operating and maintaining the project over the life of the project	114
E. The cost of replacing the project	114

XII. Fiscal Sustainability Plan (FSP)

The recipient of a loan for a project that involves the repair, replacement, or expansion of a publicly owned treatment works must develop and implement an FSP that includes, at minimum, the following factors:

A. Inventory of critical assets that are part of the treatment works	115
B. Evaluation of the condition and performance of inventoried assets or asset groupings	115
C. Certification that the assistance recipient has evaluated and will be implementing water and energy conservation efforts as part of the plan	115
D. A plan for maintaining, repairing, and, as necessary, replacing the treatment works and a plan for funding such activities	115
E. FSP to be regularly reviewed, revised, expanded and implemented as a part of the operation and management of the system	115

XIII. Public Participation

A. Public participation program implemented which adequately informed the public of the project alternatives and provided a mechanism for comment	133
B. Public meeting/workshop held to solicit further public comment at the point where several reasonable alternatives were identified for detailed study	133
C. Public notice of a scoping meeting (if an EIS is necessary)	N/A
D. Public hearing held to present the final DRAFT FP and EA/EIS	133
E. Discussion of any substantive public comments	133
F. Copies of all agency and substantive public comments appended to the FP	133
G. Responses to all substantive comments	133
H. Views of the public considered in selecting the preferred alternative	133

XIII. Intergovernmental Review

A. Copies of the FP recommended alternatives sent to the agencies indicated on DEM's Intergovernmental Review Contacts list	125
B. Copies of all intergovernmental review correspondence appended to the FP	125

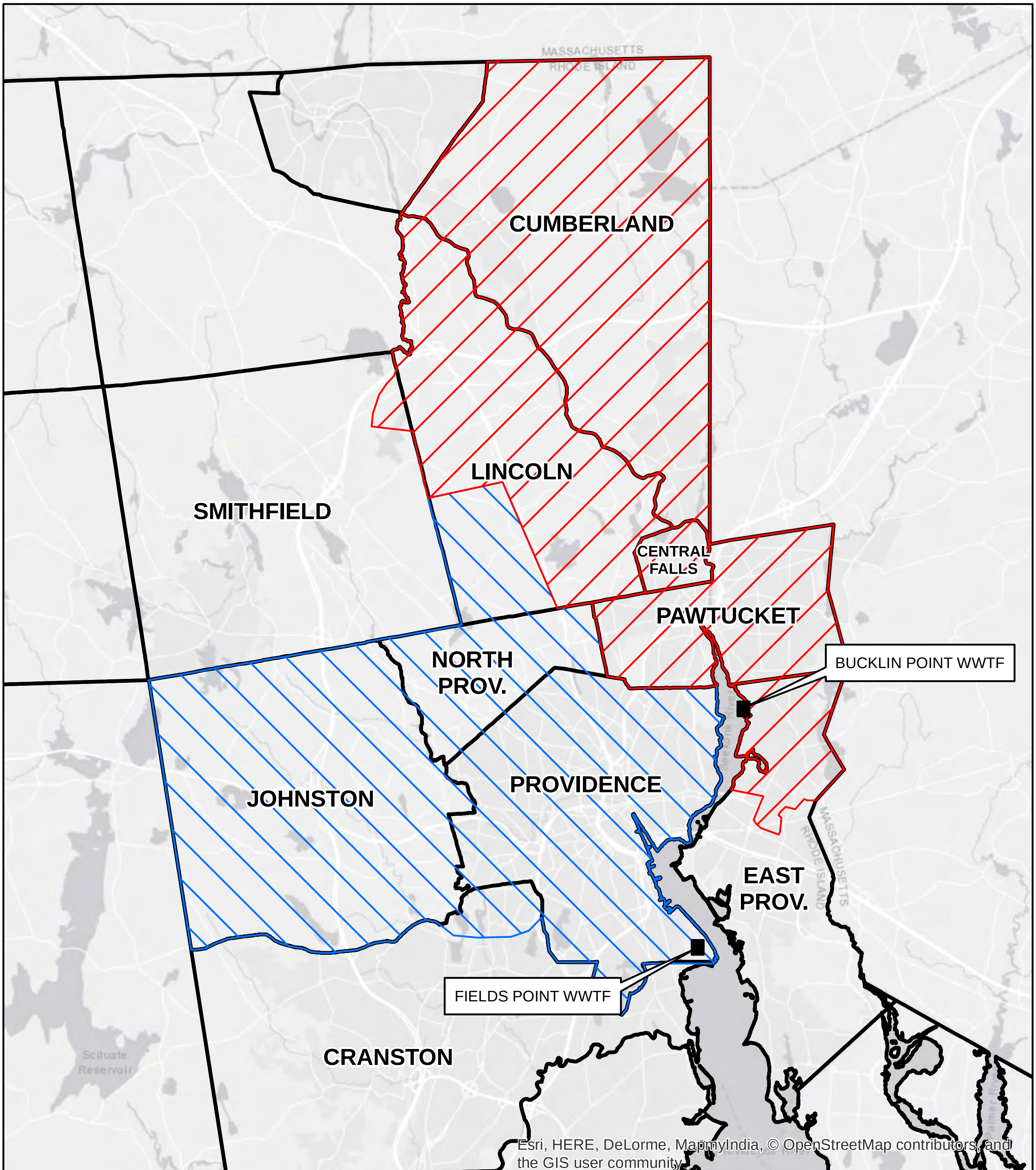
FOR DEM USE ONLY

	(Yes/No)
Is the environmental information sufficient to be considered an Environmental Assessment?	________
Do(es) the project(s) qualify for Categorical Exclusion?	________
Will a FONSI be required?	________
Will an EIS and ROD be required?	________

REVIEWED BY: ____

Appendix B

Figures



LEGEND:

- Bucklin Point Service Area
- Fields Point Service Area
- Town Lines

N W E S

13,000 6,500 0 13,000 Feet

TITLE:

NBC SERVICE AREA

PHASE III CSO CONTROL FACILITIES PROGRAM

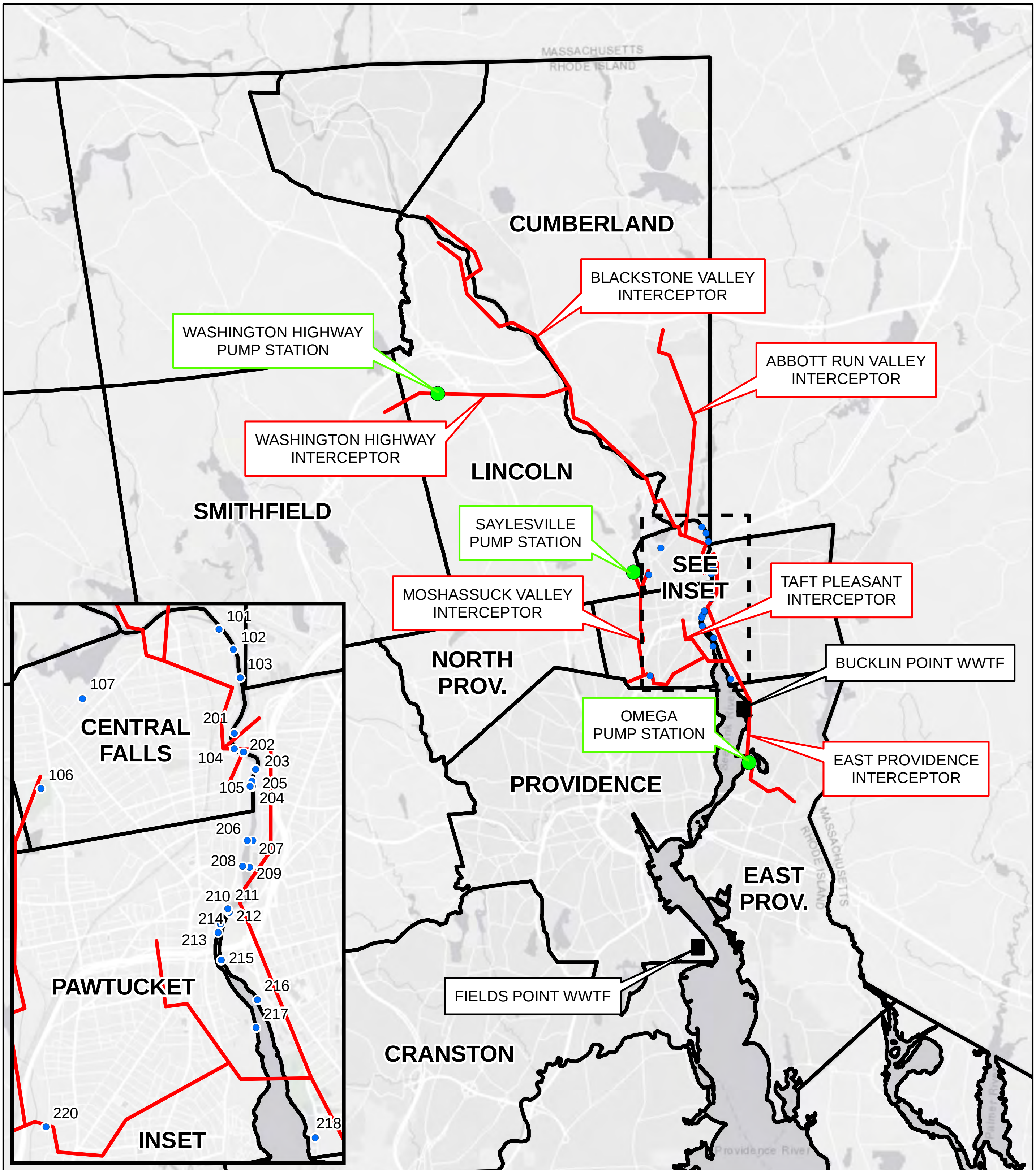
REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **B-1**



LEGEND:

- Pump Station
- CSO Outfalls
- Interceptors
- Town Lines

N W E S

13,000 6,500 0 13,000 Feet

TITLE: **MAJOR BPSA INFRASTRUCTURE**

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **B-2**

LEGEND:

Property Line

N
W E
S

600 300 0 600 Feet

TITLE:

BUCKLIN POINT AERIAL

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S):

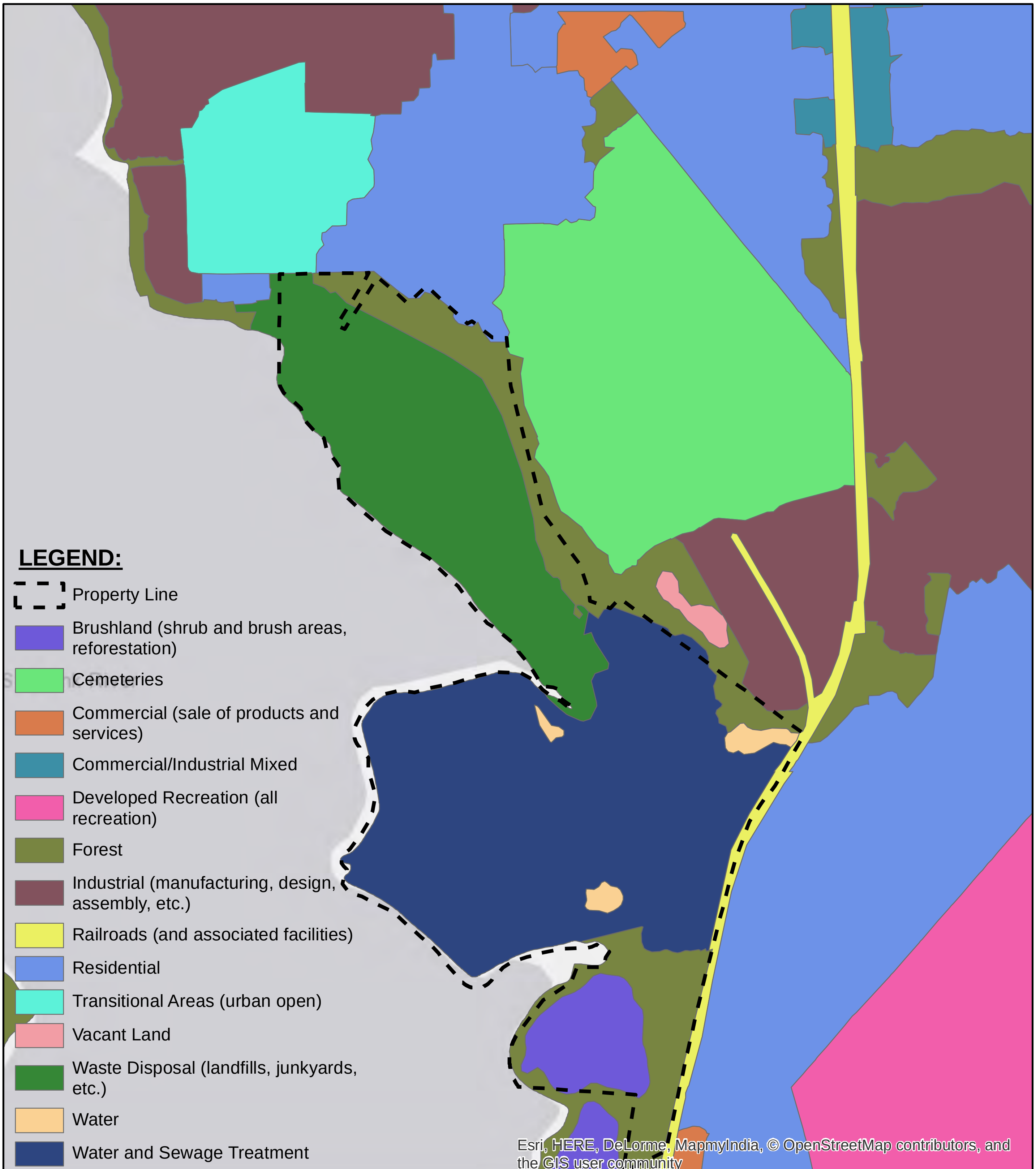
DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **B-3**



TITLE:

LAND USE

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **B-4**

N
W E
S

LEGEND:

Property Line

Phillipsdale Historic District Study Area

Historic Candidate Site

Historic Cemetery

600 300 0 600 Feet

TITLE:

HISTORIC RESOURCES

PHASE III CSO
CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018
Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: B-5

LEGEND:

Water Use Categories

- Conservation Area
- Multi-Purpose Water
- Industrial Waterfronts and Commercial Navigation Channels

- Property Line
- 200' Contingous Area
- RIGIS Stream
- RIGIS Wetland

600 300 0 600 Feet

N W E S

TITLE: **WETLAND RESOURCES**

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

FIGURE: **B-6**

LEGEND:

Property Line

2' Contour

N
W E
S

300 150 0 300 Feet

TITLE:

SITE TOPOGRAPHY

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **B-7**

LEGEND:

BiB	Bigapple sand, 0 to 8 percent slopes
FtA	Fortress sand, 0 to 3 percent slopes
HkA	Hinckley gravelly sandy loam, 0 to 3 % slopes
HkC	Hinckley gravelly sandy loam, rolling
MU	Merrimac sandy loam, 3 to 8 % slopes
MmB	Merrimac-Urban land complex
UD	Udorthents-Urban land complex
UrS	Urban land, 0 to 3 percent slopes, sandy substratum
W	Walpole sandy loam
Wa	Water
Ws	Water, saline

N
W E
S

600 300 0 600 Feet

TITLE:

SOILS

PHASE III CSO
CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018
Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: B-8

Appendix C
Consent Agreement RIA-424

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES

IN RE: Narragansett Bay Commission — Permit Nos.: RI0100072 &
AAD Nos. 17-001/WRA & 17-002/WRA — RI0100315

CONSENT AGREEMENT RIA-424

This Consent Agreement (the "Agreement") is entered into by and between the Department of Environmental Management (the "DEM") and the Narragansett Bay Commission (the "Respondent" or the "NBC"), which is responsible for the operation and maintenance of the Field's Point Wastewater Treatment Facility (the "FPWWTF"), located in Providence, Rhode Island, and the Bucklin Point Wastewater Treatment Facility (the "BPWWTF"), located in East Providence, Rhode Island, and their associated sewer systems. This Agreement is entered into in accordance with Chapters 46-12 and 42-17.1 of the Rhode Island General Laws ("RIGL").

On September 29, 2017, the DEM issued final Rhode Island Pollutant Discharge Elimination System ("RIPDES") permits to each of the two facilities operated by NBC. Permit RI0100072 was issued to the BPWWTF and Permit RI0100315 was issued to the FPWWTF (the "Final Permits"). In separate letters dated October 26, 2017, NBC requested an administrative adjudicatory hearing and moved to stay certain conditions set forth in the Final Permits. In a letter dated November 22, 2017 DEM granted in part and denied in part NBC's request to stay the contested permit conditions. In a letter dated December 12, 2017 NBC requested a hearing on DEM's denial in part of its stay request. In an effort to resolve NBC's December 12, 2017 appeal of DEM's denial in part of its request for a stay of all contested permit conditions, to resolve NBC's October 26, 2017 appeal of certain permit conditions, and to allow settlement negotiations to continue, the DEM and NBC agreed to a Consent Order issued by the Hearing Officer on July 19, 2018. This Consent Order anticipated that NBC and DEM would enter into this Consent Agreement.

In lieu of convening an administrative adjudicatory hearing regarding the disputed permit conditions and in order to affect a timely and amicable resolution of NBC's appeal, DEM and NBC agree that it is in the best interest of the parties and in the public interest to resolve the issues raised by NBC's appeal, as follows:

1. The Respondent is subject to the provisions of Chapter 46-12 of the RIGL for purposes of this Agreement.

2. DEM has jurisdiction over the subject matter of this Agreement and has personal jurisdiction over the Respondent for purposes of this Agreement.

3. The provisions of this Agreement shall apply to and be binding upon the Respondent, its agents, servants, employees, successors and assigns, and all persons, firms and corporations acting under, through and for it.

4. The compliance with the terms of this Agreement does not relieve the Respondent from compliance with any other applicable laws or regulations administered by DEM or any other governmental entity. Execution of this Agreement is for the sole purpose of resolving AAD case numbers 17-001/WRA and 17-002/WRA with the exception of Parts I.C.5.i and I.D.3 of the Final Permits (which were previously withdrawn by the Hearing Officer's Consent Order dated July 19, 2018) and Part II(o) which remains unresolved. It does not in any way resolve any other compliance issues associated with the Final Permits. This Agreement shall not operate to shield the Respondent from liability arising from future activities, as of the date of execution of this Agreement.

5. Upon the determination by the Director of the DEM that there is an immediate threat to the public health or the environment, or upon the discovery of new information, the DEM reserves the right to order additional remedial action or other enforcement measures as provided by law or regulations.

6. The Director of the DEM may, for good cause shown, defer any of the compliance dates prescribed herein. In the event that the Respondent believes that good cause exists for extending any such dates, the Respondent may submit a written request to DEM for an extension at least seven (7) days prior to such deadline, together with a complete statement of the reasons why the Respondent believes that such an extension is justified. Any such request shall be subject to DEM review, modification, and approval. The Agreement may be amended by mutual agreement of the parties in writing. If DEM denies the Respondent's extension request, that decision is a final administrative decision of DEM, which may be appealed to Superior Court in accordance with RIGL 42-35-1 et seq.

7. In the event that the Respondent fails to comply with any of the schedules in paragraph 11, 12, 13, 15, and/or 16 of this Agreement it shall pay a stipulated penalty of one thousand dollars ($1,000) a day for each and every day it remains in violation of the schedule except that DEM may, for good cause shown, defer or reduce such penalty. The payment of a stipulated penalty in accordance with this paragraph shall not preclude DEM from seeking any other appropriate remedy.

8. In the event the Respondent fails to comply with any of the interim limits of paragraph 10, 12, and/or 16 of this Agreement it may be subject to an administrative penalty as determined by the DEM in accordance with the Rules and Regulations for Assessment of Administrative Penalties. The payment of an administrative penalty in accordance with this paragraph shall not preclude DEM from seeking any other appropriate remedy.

9. This Agreement shall have the full force and effect of a final administrative adjudication, shall be deemed a final administrative

decision under the Administrative Procedures Act (RIGL Chapter 42-35) and shall be fully enforceable in the Superior Court of the State of Rhode Island.

10. Within thirty (30) days of the date of execution of this Agreement, the DEM shall initiate the permit modifications in *Attachments A and B* of this Agreement, which are attached hereto and incorporated herein. The BPWWTF permit modifications do not supersede the interim limits that are agreed to and specified in Paragraph 10(b) until such time as is specified in Paragraph 10(b). The Respondent agrees not to appeal the attached permit modifications.

    (a) From the date of execution of this Agreement until the effective date of a final decision on the CBOD and TSS permit modification pursuant to Rule 46 of the RIPDES Regulations, the FPWWTF shall be subject to the May 1 - October 31 interim limits for CBOD and TSS at the FPWWTF specified in *Attachment C* of this Agreement, which is attached hereto and incorporated herein.

    (b) From the date of execution of this Agreement until three (3) months after the completion of construction and initiation of operation of the selected BPWWTF treatment alternatives under Paragraph 11(b), the BPWWTF shall be subject to the May 1 - October 31 interim limits for CBOD and TSS at the BPWWTF specified in *Attachment D* of this Agreement, which is attached hereto and incorporated herein.

11. NBC shall complete a Bucklin Point hydraulic and treatment process capacity evaluation in accordance with the following schedule:

    (a) By December 31, 2018, NBC shall submit a Facilities Plan Amendment ("FPA") that includes the results of the Bucklin Point hydraulic and treatment process capacity evaluation described in the July 3, 2017 letter from NBC to DEM (*Attachment E* of this Agreement, which is attached hereto and incorporated herein). The FPA shall recommend an alternative to comply with the effluent limitations for outfall 001 during sustained periods of tunnel dewatering and shall include a schedule for completing design, construction, and initiation of operation of the recommended alternative.

    (b) Upon DEM approval of the FPA required under Paragraph 11(a), the NBC shall complete the design and construction and initiate operation of the selected alternative in accordance with the approved schedule.

12. NBC shall attain compliance with the Maximum Daily Total Residual Chlorine ("TRC") and Enterococci Treated Wet Weather Outfall effluent

limits from Part I.A.7 of the Field's Point permit and Part I.A.8 of the Bucklin Point permit in accordance with the following schedule:

(a) By December 1, 2022 NBC shall submit a report summarizing the TRC and Enterococci data, the frequency of discharge, and the average volume discharged based on data collected under the Final Permits between January 1, 2019 and September 1, 2022.

(b) From the date of execution of this agreement until February 1, 2023 (which may be extended if DEM has not made a determination on the need to maintain these permit limits) the NBC shall be subject to the Maximum Daily interim limits for TRC and Enterococci at the FPWWTF and the BPWWTF from *Attachments F and G* of this Agreement, respectively, which are attached hereto and incorporated herein.

13. NBC shall attain compliance with the Combined Sewer Overflow ("CSO") permit conditions and the effluent limitations specified in Parts I.D.1.a of the Final Permits (with the exception of Parts I.D.1.a.ii.1-9) in accordance with the following schedule:

(a) By June 30, 2020, NBC shall submit preliminary design plans, an outline of specifications, and an Order of Approval ("OA") application for Phases IIIA and IIIB of the CSO control plan approved in the November 2017 CSO Control Facilities Phase III Amended Reevaluation Report (the "Reevaluation Report").

(b) Within 18 months after DEM approval of the preliminary design plans from Paragraph 13(a), NBC shall submit final design plans and specifications and an OA application for Phases IIIA and IIIB of the CSO control plan approved in the Reevaluation Report. The final design shall include a detailed schedule for completion of construction and initiation of operation for Phase IIIA, not to exceed five (5) years.

(c) Upon DEM approval of the final design plans from paragraph 13(b), the NBC shall complete construction and initiate operation of the Phase IIIA CSO control facilities in accordance with the approved schedules.

(d) Within six (6) months after issuing the Notice to Proceed for the last construction contract for Phase IIIA, NBC shall evaluate financial conditions and will notify DEM whether it is appropriate to expedite construction of Phase IIIB. If appropriate and approved by the NBC Board of Commissioners, the notification shall include a proposed schedule for the completion of construction and initiation of operation for Phase IIIB and, upon DEM approval of the notification, NBC shall complete construction and initiate operation of the Phase IIIB CSO control facilities in accordance with the approved schedule

(e) Unless superseded by Paragraph 13(d), within 24 months after initiating operation of the Phase IIIA CSO control facilities, the NBC shall submit a report which details the results of an Integrated Planning Framework assessment of all regional Clean Water Act projects, an evaluation of water quality improvements achieved through Phase IIIA, and the affordability of the CSO program after completion of Phase IIIA construction. If the report recommends substantial changes to the Phase IIIB design approved in Paragraph 13(b). The report shall include final design plans and specifications and an OA application for the modified Phase IIIB design.

(f) Within 30 months after DEM approval of the report from Paragraph 13(e) unless superseded by Paragraph 13(d), the NBC shall complete construction and initiate operation of Phase IIIB CSO control facilities.

(g) Within 12 months after initiating operation of the Phase IIIB CSO control facilities under Paragraph 13(f) or within 66 months of initiating operation of the Phase IIIB CSO control facilities if construction was expedited under Paragraph 13(d), the NBC shall submit a report which details the results of an Integrated Planning Framework assessment of all regional Clean Water Act projects, an evaluation of water quality improvements achieved through Phase IIIB, and the affordability of the CSO program after completion of Phase IIIB construction.

(h) Within 24 months after DEM approval of the report from Paragraph 13(g), NBC shall submit preliminary design plans, an outline of specifications, and an OA application for Phase IIIC. Preliminary design of Phase IIIC shall modify the conceptual design approved in the Reevaluation Report as necessary to meet the Federal Clean Water Act, USEPA CSO control policies and the Rhode Island Water Quality Regulations.

(i) Within 18 months of DEM approval of the Phase IIIC preliminary design from Paragraph 13(h), NBC shall submit final design plans and specifications and an OA application for Phase IIIC of the CSO control plan approved in the Reevaluation Report. The final design shall include but not be limited to a detailed schedule for completion of construction and initiation of operation, not to exceed three (3) years.

(j) Upon DEM approval of the Phase IIIC final design from Paragraph 13(i), NBC shall complete construction and initiate operation of the Phase IIIC CSO control facilities in accordance with the approved schedules.

(k) Within 24 months of DEM approval of the Phase IIIC final design from Paragraph 13(i), NBC shall submit preliminary design plans, an outline of specifications, and an OA application for Phase IIID. Preliminary design of Phase IIID shall modify the conceptual design approved in the Reevaluation Report as necessary to meet the Federal Clean Water Act, USEPA CSO control policies and the Rhode Island Water Quality Regulations.

(l) Within 12 months after DEM approval of the Phase IIID preliminary design from Paragraph 13(k), NBC shall submit final design plans and specifications and an OA application for Phase IIID. The final design shall include but not be limited to a detailed schedule for completion of construction and initiation of operation, not to exceed three (3) years.

(m) Upon DEM approval of the Phase IIID final design from Paragraph 13(l), NBC shall complete construction and initiate operation of Phase IIID CSO control facilities in accordance with the approved schedule.

14. All FPAs, reports, design plans, and OA applications submitted under paragraphs 11, 12, and 13 of this Agreement shall be subject to DEM review, modification, and approval in accordance with Paragraph 20. All OA applications shall, at a minimum, include preliminary or final plans (as necessary); the appropriate fee, technical specifications or outline of specifications (as necessary), and design calculations; a summary of all local and State approvals/permits that will be required; and a proposed schedule to obtain all required approvals and construct the recommended compliance alternative.

15. NBC shall submit semi-annual reports summarizing progress with the compliance schedules from Paragraph 13 to the DEM. These reports shall be due January 15th and July 15th of each year.

16. The Respondent shall attain compliance with the monthly average Total Nickel limit and the monthly average and daily maximum Total Copper limits as specified in Part I.A.4 of the BPWWTF Permit in accordance with the following schedule:

(a) By December 1, 2022 NBC will submit to DEM for review and approval, a report summarizing the monthly average Total Nickel concentration data and the monthly average and daily maximum Total Copper concentration data collected under the Bucklin Point Permit Part I.A.4, between January 1, 2019 and September 1, 2022 and an evaluation of the NBC's ability to comply with the final limits.

(b) From the date of execution of this Agreement until February 1, 2023 (which may be extended if DEM has not made a determination on NBC's ability to comply with final limits), NBC shall meet the interim limitations for monthly average Total Nickel and monthly average and daily maximum Total Copper in *Attachment H* of this Agreement, which is attached hereto and incorporated herein.

17. The Respondent shall attain compliance with the web-based CSO notification requirements from Part I.D.4 of the Final Permits in accordance with the following schedule

(a) Within thirty (30) days of the effective date of this Agreement, NBC and DEM will establish a working group to evaluate ways to improve communication of CSO overflows to the public including, but not limited to:

(b) By June 1, 2019, the NBC will submit, to DEM, an evaluation of the feasibility of a web-based public notification process to inform the public of when and where CSOs occur, including feasibility of a pilot area where such process could be tested.

(c) If implementation in a pilot area is deemed feasible, the workgroup shall evaluate implementation options.

(d) Within 90 days after the workgroup reviews implementation options, if any, NBC shall submit a plan and schedule for implementation within the pilot area.

(a) DEM shall provide written notification to NBC either granting approval or stating the deficiencies revealed in the feasibility study and implementation plan.

18. On the date of execution of this Agreement, the Respondent withdraws its appeals of the FPWWTF and BPWWTF Final Permits filed in AAD case numbers 17-001/WRA and 17-002/WRA, with the exception of Parts I.C.5.i and I.D.3 of the Final Permits (which were previously withdrawn by the Hearing Officer's Consent Order dated July 19, 2018) and Part II(o) which remains unresolved.

19. No later than fourteen (14) calendar days following a date identified in any schedule of compliance, the Respondent shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the

notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

20. All reports and other documentation that the Respondent is required to submit to the DEM by the terms of this Agreement shall be sent to the Rhode Island Department of Environmental Management, RIPDES Program, 235 Promenade Street, Providence, RI 02908-5767. Each document shall be subject to DEM review and approval. Upon DEM review of the document, DEM shall provide written notification to the Respondent, either granting approval or stating the deficiencies revealed therein. DEM will provide NBC the opportunity to respond to any deficiencies; if DEM's final determination results in disapproval of the NBC's submittal, it will provide a written explanation of its findings; and NBC may appeal DEM's final decision to DEM's Administrative Adjudication Division. Within thirty (30) days (unless a longer time is specified) of receiving a notification of deficiencies, the Respondent shall submit to DEM either a response to the deficiencies or a revised document consistent with the DEM comments.

21. The Agreement may be amended only by mutual agreement of the parties in writing.

22. This Agreement supersedes Consent Agreement RIA-330.

23. This Agreement shall be deemed entered as of the date of execution by the parties.

Narragansett Bay Commission

Raymond Marshall, P.E., Executive Director   9/5/18 Date

Vincent J. Mesolella, Chairman   09/05/018 Date

The individuals signing on behalf of the Narragansett Bay Commission represent that they have the actual authority to enter into this Agreement, and the authority to bind the Narragansett Bay Commission to the requirements contained within.

In Providence, on the 5th day of September 2018, before me personally appeared Raymond Marshall, to me known and known by me to be the party executing the foregoing Consent Agreement on behalf of the Narragansett Bay Commission and the acknowledged said instrument executed by them to be their free act and deed.

Notary Public
My Commission expires: Jan. 20, 2021

In Providence, on the 5th day of September 2018, before me personally appeared Vincent J. Mesolella, to me known and known by me to be the party executing the foregoing Consent Agreement on behalf of the Narragansett Bay Commission and the acknowledged said instrument executed by them to be their free act and deed.

Notary Public
My Commission expires: Jan. 20, 2021

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
FOR THE DIRECTOR

Angelo S. Liberti, P.E.
Chief of Surface Water Protection
Office of Water Resources

September 6, 2018
Date

MODIFICATION

AUTHORIZATION TO DISCHARGE UNDER THE
RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 46-12 of the Rhode Island General Laws, as amended, RIPDES Permit No. RI0100315 issued to the Narragansett Bay Commission on September 29, 2017 shall be modified as follows:

The corresponding May 1 – October 30 $CBOD_5$ and TSS limits from Part I.A.1 of the permit shall be replaced with the limits found in Attachment 1 of this modification. The TSS Monthly Average quantity and concentration limits and Weekly Average concentration limits shall remain as they are in the Final Permit.

The requirements from Part I.D.1.a.ii.6 of the permit shall be deleted and replaced with the following requirements:

> *The permittee shall implement measures to control solid and floatable materials in CSOs. These measures shall include, but not be limited to, implementation by the NBC's Industrial Pretreatment Program of a litter educational effort for Significant Industrial Users as an element of the annual inspection process to educate these users about the importance of controlling the discharge of litter from their site to the combined sewer system as part of the SIU pretreatment inspections required under Part I.C of this permit.*

The requirements from Part I.D.2.a of the permit shall be deleted and replaced with the following requirements:

> *The Permittee must implement the nine minimum controls contained in Part I.D.1.a.i and ii of this permit in accordance with the documentation approved by DEM. Compliance with the approved Nine Minimum Controls Plan shall be considered compliance with the portions of Parts I.D.1 and I.D.2 of this permit that relate to the implementation of the Nine Minimum Controls, with the exception of the prohibition against dry weather overflows from CSO outfalls contained in Part I.D.1a.ii.5 of this permit. This implementation must include the following controls:*

The requirements from Part I.E.4 of the permit shall be deleted and replaced with the following requirements:

> *By December 1, 2019 the NBC shall submit a Resiliency Plan and schedule of short and long term actions that will be taken to maintain operation and protect key collection and treatment system assets. The plan shall be consistent with the DEM's Guidance for the Consideration of Climate Change Impacts in the Planning and Design of Municipal Wastewater Collection and Treatment Infrastructure and include consideration of the findings of the 2017 DEM report Implications of Climate Change for Rhode Island Wastewater Collection and Treatment Infrastructure. The Resiliency Plan shall include, but not be limited to: (i) an assessment of current and projected impacts from natural*

hazards on critical components within the NBC collection and treatment systems, as well as on the systems themselves; (ii) a plan to adapt and protect vulnerable components and systems; (iii) an analysis that provides justification for selected adaptation methods. The analysis must consider component and system design life and sea-level rise projections. For the purposes of this Resiliency Plan, critical components are considered those necessary to ensure the forward flow and treatment of wastewater in accordance with the limits set forth in this permit. The Resiliency Plan shall also consider impacts on NBC from neighboring facilities during high hazard events. This Plan shall be subject to DEM review and approval. If DEM determines that modifications need to be made to the Plan, DEM shall notify the permittee in writing which elements of the Plan need to be modified and the reason for the needed modification. This notification shall include a schedule for making the changes. After such notification from the DEM, the permittee shall make changes to the Plan and submit the revisions to the DEM for their approval. NBC retains the right to continue to evaluate and modify the Resiliency Plan, including adaptation methods and the schedule for implementing the Resiliency Plan, after the date of submittal. Significant modifications to the Plan shall be subject to DEM review and approval, as indicated above.

The permit shall be modified to include new Part I.I that includes the following requirements:

Sample collection and analysis required under Part I.A is not required when the Governor of Rhode Island has declared a State of Emergency or during times that NBC has determined sample collection and analysis represents an unacceptable risk to its employees. NBC will perform additional sampling and analysis, during the same calendar month whenever feasible, for any parameters that are not required to be sampled and analyzed on a daily basis. In addition, NBC will analyze any daily samples that were automatically collected during the emergency event, although sample and analysis holding times and protocols may have been exceeded.

The remaining effluent limitations, monitoring requirements and other conditions in the original permit are unchanged.

This modification shall become effective on __________________.

This permit and the authorization to discharge expire at midnight, November 30, 2022.

This change modifies the permit issued on September 29, 2017.

This modification consists of four (4) pages.

Signed this ____________ day of ____________________________, 20____.

____

Angelo S. Liberti, P.E., Chief of Surface Water Protection
Office of Water Resources
Rhode Island Department of Environmental Management
Providence, Rhode Island

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 001A (Advanced Treatment Discharge After Disinfection).

   Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations					Monitoring Requirement	
	Quantity - lbs./day		Concentration - specify units				
	Average Monthly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
$CBOD_5$ (May 1 – Oct. 30)	10,842	16,263	20 mg/l	20 mg/l	30 mg/l	1/Day	24-Hr. Comp.
TSS (May 1 – Oct. 30)		24,395			45 mg/l	1/Day	24-Hr. Comp.

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

Sampling for TSS, $CBOD_5$, Flow, and Settleable Solids shall be performed Sunday-Saturday. All $CBOD_5$ and TSS samples shall be taken on the influent and effluent.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 001A (Advanced Treatment Discharge After Disinfection).

FACT SHEET

RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM (RIPDES) PERMIT TO DISCHARGE TO WATERS OF THE STATE

RIPDES PERMIT NO. **RI0100315**

NAME AND ADDRESS OF APPLICANT:

The Narragansett Bay Commission
One Service Road
Providence, RI 02905

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Field's Point Wastewater Treatment Facility
2 Ernest Street
Providence, RI 02905 and
associated Combined Sewer Overflows (CSOs)

RECEIVING WATER:

Providence River, Water Body ID# RI0007020E-01B (Field's Point WWTF)
Seekonk River, Water Body ID# RI0007019E-01 (CSO Outfalls)
Moshassuck River, Water Body ID# RI0003008R-01 (CSO Outfalls)
West River, Water Body ID# RI0003008R-03C (CSO Outfalls) and
Woonasquatucket River, Water Body ID#RI0002007R-10D (CSO Outfalls)

CLASSIFICATION: **SB1 {a} (Providence and Seekonk Rivers); B1{a} (Woonasquatucket River) & B{a} (Moshassuck and West Rivers)**

I. Proposed Action

On September 29, 2017, the DEM issued a final RIPDES permit to this facility. In letters dated October 26, 2017, NBC requested an administrative adjudicatory hearing and moved to stay certain conditions set forth in the Final Permit. In lieu of convening an administrative adjudicatory hearing regarding the disputed permit conditions and in order to affect a timely and amicable resolution of NBC's appeal, DEM and NBC agreed to modify: certain May 1 – October 30 $CBOD_5$ and TSS limits from Part I.A.1 of the permit, Part I.D.1.a.ii.6 of the permit to clarify the solid and floatable materials control requirements for NBC's Industrial Pretreatment Program, Part I.D.2.a of the permit to clarify the NBC's requirements to implement the Nine Minimum Controls Plan approved by DEM, the deadline to submit a Resiliency Plan under Part I.E.4 of the permit, and include a new Part I.I that clarifies the sampling requirements during declared a States of Emergency or similar events when NBC has determined that sample collection and analysis represents an unacceptable risk to its employees. All other remaining effluent limitations, monitoring requirements, and other conditions in the original permit are unchanged.

II. Permit Limitations and Conditions

Facility Description

The Narragansett Bay Commission (NBC) owns and operates the Field's Point Wastewater Treatment Facility (WWTF) located on Ernest Street in Providence, Rhode Island and several associated Combined Sewer Overflows (CSOs). The Field's Point facility services the communities of Johnston, Providence, North Providence, and portions of Lincoln and Cranston. Specific details regarding the WWTF, CSOs, and its receiving waters can be found in the Fact Sheet to the permit that was issued on September 29, 2017.

Proposed Permit Modifications

This modification changes certain May 1 – October 30 $CBOD_5$ and TSS limits from Part I.A.1 of the permit to the following limits:

Parameter	Quantity Limits		Concentration Limits		
	Monthly Ave	Daily Max	Monthly Ave	Weekly Ave	Daily Max
CBOD (May 1 – Oct 31)	10,842 lb/d	16,263 lb/d	20 mg/l	20 mg/l	30 mg/l
TSS (May 1 – Oct 31)		24,395 lb/d			45 mg/l

These concentration-based limits are set at levels more stringent than those required by 40 CFR 133.102 (a)-(c) and are based on BPJ due to increased pollutant removals that will be achieved from the WWTF's operation of nutrient removal equipment. In making the determination to assign these limits, DEM considered the factors identified in 40 C.F.R § 125.3(d), including the design influent flow and loading WWTF process modeling results that NBC submitted prior to DEM approval of the final design and during the public comment period on the draft RIPDES permit. Based upon a review of the NBC's historic data since the nutrient removal upgrades were placed on-line and the WWTF design calculations submitted by NBC it has been determined that the NBC can meet these new limits. The mass-based (i.e. lb/day) $CBOD_5$ and TSS limits were calculated using the above-mentioned concentration-based limits in mg/L, the WWTF's monthly average design flow in MGD, and the appropriate conversion factor of 8.34 lbs/gallon. Based upon a review of the NBC's historic data since the nutrient removal upgrades were placed on-line and the WWTF design calculations submitted by NBC it has been determined that the NBC can meet these new limits. Furthermore, under Consent Agreement No. RIA-424, NBC has agreed not to object to the establishment of these limits.

The language from Part I.D.1.a.ii.6 of the permit has been modified to clarify the solids and floatables control measures that NBC shall implement by its Industrial Pretreatment Program. These measures consist of a litter educational effort for Significant Industrial Users as an element of the annual inspection process to educate these users about the importance of controlling the discharge of litter from their site to the combined sewer system.

The language from Part I.D.2.a of the permit has been modified to clarify that the nine minimum control measures that must be implemented by NBC are the measures included in the Nine Minimum Controls Plan that is approved by DEM.

The deadline to submit a Resiliency Plan under Part I.E.4 of the permit has been extended to December 1, 2019 and language has been added to this part of the permit clarifying that NBC retains the right to continue to evaluate and modify the Resiliency Plan and that significant modifications to the Plan shall be subject to DEM review and approval.

The permit is being modified to include a new Part I.I that clarifies that sample collection and analysis under Part I.A of the permit is not required when the Governor of Rhode Island has declared a State of Emergency or during times that NBC has determined sample collection and analysis represents an unacceptable risk to its employees. It also clarifies that NBC will perform additional sampling and analysis, during the same calendar month whenever feasible, for any parameters that are not required to be sampled and analyzed on a daily basis. In addition, NBC will analyze any daily samples that were automatically collected during the emergency event, although sample and analysis holding times and protocols may have been exceeded.

The remaining general and specific conditions of the permit are based on the RIPDES regulations as well as 40 CFR Parts 122 through 125 and remain unchanged.

III. Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit modification is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the Rhode Island Department of Environmental Management, Office of Water Resources, 235 Promenade Street, Providence, Rhode Island, 02908-5767. In accordance with Chapter 46-17.4 of the Rhode Island General Laws, a public hearing will be held prior to the close of the public comment period. In reaching a final decision on the draft permit the Director will respond to all significant comments and make these responses available to the public at DEM's Providence Office.

Following the close of the comment period, and after the public hearing, the Director will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments, provided oral testimony, or requested notice. Within thirty (30) days following the notice of the final permit decision any interested person may submit a request for a formal hearing to reconsider or contest the final decision. Requests for formal hearings must satisfy the requirements of Rule 49 of the Regulations for the Rhode Island Pollutant Discharge Elimination System.

IV. DEM Contact

Additional information concerning the permit may be obtained between the hours of 8:30 a.m. and 4:00p.m., Monday through Friday, excluding holidays from:

Joseph Haberek, P.E.
Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, Rhode Island, 02908-5767
Telephone: (401) 222-4700, ext: 7715
joseph.haberek@dem.ri.gov

Date

Joseph B. Haberek, P.E.
Supervising Sanitary Engineer
Office of Water Resources
Department of Environmental Management

MODIFICATION

AUTHORIZATION TO DISCHARGE UNDER THE
RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 46-12 of the Rhode Island General Laws, as amended, RIPDES Permit No. RI0100072 issued to the Narragansett Bay Commission on September 29, 2017 shall be modified as follows:

The corresponding May 1 – October 30 $CBOD_5$ and TSS limits from Part I.A.1 of the permit shall be replaced with the limits found in Attachment 1 of this modification. The TSS Monthly Average quantity and concentration limits and Weekly Average concentration limits shall remain as they are in the Final Permit.

The requirements from Part I.D.1.a.ii.6 of the permit shall be deleted and replaced with the following requirements:

The permittee shall implement measures to control solid and floatable materials in CSOs. These measures shall include, but not be limited to, implementation by the NBC's Industrial Pretreatment Program of a litter educational effort for Significant Industrial Users as an element of the annual inspection process to educate these users about the importance of controlling the discharge of litter from their site to the combined sewer system as part of the SIU pretreatment inspections required under Part I.C of this permit.

The requirements from Part I.D.2.a of the permit shall be deleted and replaced with the following requirements:

The Permittee must implement the nine minimum controls contained in Part I.D.1.a.i and ii of this permit in accordance with the documentation approved by DEM. Compliance with the approved Nine Minimum Controls Plan shall be considered compliance with the portions of Parts I.D.1 and I.D.2 of this permit that relate to the implementation of the Nine Minimum Controls, with the exception of the prohibition against dry weather overflows from CSO outfalls contained in Part I.D.1a.ii.5 of this permit. This implementation must include the following controls:

The requirements from Part I.E.4 of the permit shall be deleted and replaced with the following requirements:

By December 1, 2019 the NBC shall submit a Resiliency Plan and schedule of short and long term actions that will be taken to maintain operation and protect key collection and treatment system assets. The plan shall be consistent with the DEM's Guidance for the Consideration of Climate Change Impacts in the Planning and Design of Municipal Wastewater Collection and Treatment Infrastructure and include consideration of the findings of the 2017 DEM report Implications of Climate Change for Rhode Island Wastewater Collection and Treatment Infrastructure. The Resiliency Plan shall include, but not be limited to: (i) an assessment of current and projected impacts from natural *hazards on critical components within the NBC collection and treatment systems, as well as on the systems themselves; (ii) a plan to adapt and protect vulnerable components and systems; (iii) an analysis that provides justification for selected adaptation methods. The analysis must consider component and system design life and sea-level rise projections. For the purposes of this Resiliency Plan, critical components are considered those necessary to ensure the forward flow and treatment of wastewater in accordance with the limits set forth in this permit. The Resiliency Plan shall also consider impacts on NBC from neighboring facilities during high hazard events. This Plan shall be subject to DEM review and approval. If DEM determines that modifications need to be made to the Plan, DEM shall notify the permittee in writing which elements of the Plan need to be modified and the reason for the needed modification. This notification shall include a schedule for making the changes. After such notification from the DEM, the permittee shall make changes to the Plan and submit the revisions to the DEM for their approval. NBC retains the right to continue to evaluate and modify the Resiliency Plan, including adaptation methods and the schedule for implementing the Resiliency Plan, after the date of submittal. Significant modifications to the Plan shall be subject to DEM review and approval, as indicated above.*

The permit shall be modified to include new Part I.I that includes the following requirements:

Sample collection and analysis required under Part I.A is not required when the Governor of Rhode Island has declared a State of Emergency or during times that NBC has determined sample collection and analysis represents an unacceptable risk to its employees. NBC will perform additional sampling and analysis, during the same calendar month whenever feasible, for any parameters that are not required to be sampled and analyzed on a daily basis. In addition, NBC will analyze any daily samples that were automatically collected during the emergency event, although sample and analysis holding times and protocols may have been exceeded.

The remaining effluent limitations, monitoring requirements and other conditions in the original permit are unchanged.

This modification shall become effective on ____________________.

This permit and the authorization to discharge expire at midnight, November 30, 2022.

This change modifies the permit issued on September 29, 2017.

This modification consists of four (4) pages.

Signed this ______________ day of ______________________________, 20____.

____

Angelo S. Liberti, P.E., Chief of Surface Water Protection
Office of Water Resources
Rhode Island Department of Environmental Management
Providence, Rhode Island

PART I

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. During the period beginning on the effective date and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 001A (Advanced Treatment Discharge After Disinfection).

   Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations					Monitoring Requirement	
	Quantity - lbs./day		Concentration - specify units				
	Average Monthly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
$CBOD_5$ (May 1 – Oct. 30)	5,171	7,756	20 mg/l	20 mg/l	30 mg/l	1/Day	24-Hr. Comp.
TSS (May 1 – Oct. 30)		11,634			45 mg/l	1/Day	24-Hr. Comp.

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

Sampling for TSS, $CBOD_5$, Flow, and Settleable Solids shall be performed Sunday-Saturday. All $CBOD_5$ and TSS samples shall be taken on the influent and effluent.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 001A (Advanced Treatment Discharge After Disinfection).

FACT SHEET

RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM (RIPDES) PERMIT TO DISCHARGE TO WATERS OF THE STATE

RIPDES PERMIT NO. **RI0100072**

NAME AND ADDRESS OF APPLICANT:

The Narragansett Bay Commission
One Service Road
Providence, RI 02905

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Bucklin Point Wastewater Treatment Facility
102 Campbell Avenue
East Providence, Rhode Island
and
associated Combined Sewer Overflows (CSOs)

RECEIVING WATER:

Seekonk River (Water Body ID# RI0007019E-01) (Bucklin Point WWTF),
Moshassuck River (Water Body ID# RI0003008R-01C) (CSO Outfalls), and
Blackstone River (Water body ID# RI0001003R-01B) (CSO Outfalls)

CLASSIFICATION: **SB1{a} (Seekonk River);B{a} (Moshassuck River);B1{a} (Blackstone River)**

I. **Proposed Action**

On September 29, 2017, the DEM issued a final RIPDES permit to this facility. In letters dated October 26, 2017, NBC requested an administrative adjudicatory hearing and moved to stay certain conditions set forth in the Final Permit. In lieu of convening an administrative adjudicatory hearing regarding the disputed permit conditions and in order to affect a timely and amicable resolution of NBC's appeal, DEM and NBC agreed to modify: certain May 1 – October 30 $CBOD_5$ and TSS limits from Part I.A.1 of the permit, Part I.D.1.a.ii.6 of the permit to clarify the solid and floatable materials control requirements for NBC's Industrial Pretreatment Program, Part I.D.2.a of the permit to clarify the NBC's requirements to implement the Nine Minimum Controls Plan approved by DEM, the deadline to submit a Resiliency Plan under Part I.E.4 of the permit, and include a new Part I.I that clarifies the sampling requirements during declared a States of Emergency or similar events when NBC has determined that sample collection and analysis represents an unacceptable risk to its employees. All other remaining effluent limitations, monitoring requirements, and other conditions in the original permit are unchanged.

II. Permit Limitations and Conditions

Facility Description

The Narragansett Bay Commission owns and operates the Bucklin Point Wastewater Treatment Facility (WWTF) located on Campbell Avenue in East Providence, Rhode Island and several associated Combined Sewer Overflows (CSOs). Although the Narragansett Bay Commission is responsible for the flows that discharge from the CSOs, the actual CSOs in the Bucklin Point service area are owned by the municipalities in which the CSOs are located. The Bucklin Point facility services the communities of Central Falls, Cumberland, Pawtucket, and portions of Lincoln, East Providence, and Smithfield. Specific details regarding the WWTF, CSOs, and its receiving waters can be found in the Fact Sheet to the permit that was issued on September 29, 2017.

Proposed Permit Modifications

This modification changes the May 1 – October 30 $CBOD_5$ and TSS limits from Part I.A.1 of the permit to the following limits:

Parameter	Quantity Limits		Concentration Limits		
	Monthly Ave	Daily Max	Monthly Ave	Weekly Ave	Daily Max
CBOD (May 1 – Oct 31)	5,171 lb/d	7,756 lb/d	20 mg/l	20mg/l	30 mg/l
TSS (May 1 – Oct 31)		11,634 lb/d			45 mg/l

These concentration-based limits are set at levels more stringent than those required by 40 CFR 133.102 (a)-(c) and are based on BPJ due to increased pollutant removals that will be achieved from the WWTF's operation of nutrient removal equipment. In making the determination to assign these limits, DEM considered the factors identified in 40 C.F.R § 125.3(d) including and the design influent flow and loading WWTF process modeling results that NBC submitted prior to DEM approval of the final design and during the public comment period on the draft RIPDES permit. Based upon a review of the NBC's historic data since the nutrient removal upgrades were placed on-line and the WWTF design calculations submitted by NBC it has been determined that the NBC can meet these new limits. The mass-based (i.e. lb/day) $CBOD_5$ and TSS limits were calculated using the above-mentioned concentration-based limits in mg/L, the WWTF's monthly average design flow in MGD, and the appropriate conversion factor of 8.34 lbs/gallon. Based upon a review of the NBC's historic data since the nutrient removal upgrades were placed on-line and the WWTF design calculations submitted by NBC it has been determined that the NBC can meet these new limits. Furthermore, under Consent Agreement No. RIA-424, NBC has agreed not to object to the establishment of these limits.

The language from Part I.D.1.a.ii.6 of the permit has been modified to clarify the solids and floatables control measures that NBC shall implement by its Industrial Pretreatment Program.

These measures consist of a litter educational effort for Significant Industrial Users as an element of the annual inspection process to educate these users about the importance of controlling the discharge of litter from their site to the combined sewer system.

The language from Part I.D.2.a of the permit has been modified to clarify that the nine minimum control measures that must be implemented by NBC are the measures included in the Nine Minimum Controls Plan that is approved by DEM.

The deadline to submit a Resiliency Plan under Part I.E.4 of the permit has been extended to December 1, 2019 and language has been added to this part of the permit clarifying that NBC retains the right to continue to evaluate and modify the Resiliency Plan and that significant modifications to the Plan shall be subject to DEM review and approval.

The permit is being modified to include a new Part I.I that clarifies that sample collection and analysis under Part I.A of the permit is not required when the Governor of Rhode Island has declared a State of Emergency or during times that NBC has determined sample collection and analysis represents an unacceptable risk to its employees. It also clarifies that NBC will perform additional sampling and analysis, during the same calendar month whenever feasible, for any parameters that are not required to be sampled and analyzed on a daily basis. In addition, NBC will analyze any daily samples that were automatically collected during the emergency event, although sample and analysis holding times and protocols may have been exceeded.

The remaining general and specific conditions of the permit are based on the RIPDES regulations as well as 40 CFR Parts 122 through 125 and remain unchanged.

III. Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit modification is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the Rhode Island Department of Environmental Management, Office of Water Resources, 235 Promenade Street, Providence, Rhode Island, 02908-5767. In accordance with Chapter 46-17.4 of the Rhode Island General Laws, a public hearing will be held prior to the close of the public comment period. In reaching a final decision on the draft permit the Director will respond to all significant comments and make these responses available to the public at DEM's Providence Office.

Following the close of the comment period, and after the public hearing, the Director will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments, provided oral testimony, or requested notice. Within thirty (30) days following the notice of the final permit decision any interested person may submit a request for a formal hearing to reconsider or contest the final decision. Requests for formal hearings must satisfy the requirements of Rule 49 of the Regulations for the Rhode Island Pollutant Discharge Elimination System.

IV. DEM Contact

Additional information concerning the permit may be obtained between the hours of 8:30 a.m. and 4:00p.m., Monday through Friday, excluding holidays from:

Joseph Haberek, P.E.
Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, Rhode Island, 02908-5767
Telephone: (401) 222-4700, ext: 7715
joseph.haberek@dem.ri.gov

______________________ Date

____
Joseph B. Haberek, P.E.
Supervising Sanitary Engineer
Office of Water Resources
Department of Environmental Management

PART I

C. **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

3. During the period beginning on the effective date of Consent Agreement RIA-424 and lasting through completion of Paragraph 10.a of RIA-424, the permittee is authorized to discharge from outfall serial number(s) 001A (Advanced Treatment Discharge After Disinfection).
   Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations					Monitoring Requirement	
	Quantity - lbs./day		Concentration - specify units				
	Average Monthly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
$CBOD_5$ (May 1 – Oct. 30)	13,553	28.898	25 mg/l	40 mg/l	45 mg/l	1/Day	24-Hr. Comp.
TSS (May 1 – Oct. 30)	16,263	32,109	30 mg/l	45 mg/l	50 mg/l	1/Day	24-Hr. Comp.

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

Sampling for TSS, $CBOD_5$, Flow, and Settleable Solids shall be performed Sunday-Saturday. All $CBOD_5$ and TSS samples shall be taken on the influent and effluent.

[1]Flow to the WWTF's headworks shall be reported. All flows received at the headworks shall receive at least primary treatment and disinfection. Up to 77 MGD must receive advanced treatment. Flows greater than 77 MGD shall be diverted to the wet weather treatment facility – Outfall 002A.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 001A (Advanced Treatment Discharge After Disinfection).

PART I

A. **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

1. During the period beginning on the effective date of Consent Agreement RIA-424 and lasting through completion of Paragraph 10.b of RIA-424, the permittee is authorized to discharge from outfall serial number(s) 001A (Advanced Treatment Discharge After Disinfection).

   Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations					Monitoring Requirement	
	Quantity - lbs./day		Concentration - specify units				
	Average Monthly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
$CBOD_5$ (May 1 – Oct. 31)	6,464	17,264	25 mg/l	40 mg/l	45 mg/l	1/Day	24-Hr. Comp.
TSS (May 1 – Oct. 31)	7,756	19,182	30 mg/l	45 mg/l	50 mg/l	1/Day	24-Hr. Comp.

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

Sampling for TSS, $CBOD_5$, Flow, and Settleable Solids shall be performed Sunday-Saturday. All $CBOD_5$ and TSS samples shall be taken on the influent and effluent with appropriate allowances for hydraulic detention (flow-through) time.

[1]Flow to the WWTF's headworks shall be reported. All flows up to 116 MGD shall receive at least primary treatment and disinfection. Up to 46 MGD must receive advanced treatment.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 001A (Advanced Treatment Discharge after Disinfection).

Attachment E: Copy of July 3, 2017 letter from NBC to DEM

The Narragansett Bay Commission
One Service Road
Providence, RI 02905
401 • 461•8848
401 • 461•6540 Fax
TTY (RI RELAY OPERATOR:711)

http://www.narrabay.com

The Narragansett Bay Commission

Vincent J. Mesolella
Chairman

Raymond J. Marshall, P.E.
Executive Director

July 3, 2017

David E. Chopy, Chief
DEM Office of Compliance and Inspection
235 Promenade Street
Providence, RI 2908

RE: Executed Consent Agreement
File Nos.: OCI-WP-14-95 and RIPDES RI0100072

Dear Mr. Chopy:

Enclosed are two copies of the final report for the Bucklin Point stress test. An electronic version of this document was emailed to Bill Patenaude and Alex Pinto on May 31, 2017.

On July 26, 2016, the Rhode Island Department of Environmental Management (RIDEM) issued a Notice of Violation (NOV) in response to violations that occurred at the Bucklin Point Wastewater Treatment Facility (Facility) in 2013. A Consent Agreement (CA) for this NOV was executed on August 9, 2016. Section B(9) of the CA states that a scope of work to complete a stress test of the Facility (the "Stress Test") was submitted to RIDEM on May 12, 2016. Section B(11) of the CA states that the Stress Test would satisfy the Order section of the NOV.

The scope of work for the stress test included an evaluation of the secondary clarifiers to determine the actual operational efficiency and capacity during periods of high flow and an evaluation of the return activated sludge (RAS) and mixed liquor flow splitting systems. The stress test was conducted during the months of November and December 2016.The findings of the stress test indicate that, at a peak secondary flow rate of 46 MGD, the final clarifiers are operating at the limits of their capacity with 6 clarifiers in operation and beyond their capacity with 5 clarifiers in operation; the RAS pumps have an actual firm capacity of 19 MGD, and there is an uneven distribution of mixed liquor at the Facility.

NBC has started to implement recommendations presented in Section 8.2 of the final report. Operations staff have begun to slowly lower the MLSS concentration and have been adjusting the butterfly valves to better balance the mixed liquor flows to the final clarifiers. They continue to treat flows with polymer during periods of high flow to improve settleability.

NBC will continue to evaluate the hydraulic and treatment process capacity at Bucklin Point and is in the process of entering into an Agreement with Stantec Consulting Services to perform the following activities over the next 9-12 months:

- Develop plant hydraulic model as an extension of the BPSA model using Infoworks ICM to determine hydraulic conditions and physical throughput limitations. Identify opportunities to enhance flow throughput through existing flow "bottlenecks".
- Review inlet pump arrangement, by-pass, CSO, storm tank, flow to full treatment (FFT), etc.
- Evaluate existing treatment units firm capacity (e.g. "n+1" bar screen capacity, pumps), and opportunities to enhance firm hydraulic capacity/throughput.
- Use NBC's existing BIOWIN model and the results of the recently completed full scale BPWWTF stress test to perform an analysis of the BPWWTF performance with the tunnel dewatering pump station in operation. Operating procedures will also be reviewed to determine if further optimization of wet weather performance can be developed.
- Analyze clarifier configuration and performance using CFD modelling to evaluate flow splits, internal short circuiting, and other issues related to clarifier performance, including identifying cost effective improvements to correct these issues.
- Create up to three (3) alternatives for increasing conveyance to BPWWTF to reduce CSO overflows and maintain permit limits for secondary treatment for sustained periods during tunnel dewatering. These alternatives may include evaluation of solids management alternatives at higher flows, including biosolids storage in existing and/or potential new tankage, evaluation of additional clarifiers to allow higher flow rates, addition of polymer to improve solids settling characteristics during wet weather, and other operational techniques and engineering options that could improve secondary treatment capacity and/or improve performance at existing peak flows.

Should you have any questions or comments, please feel free to contact me at 461-8848 x331 or Paul Nordstrom at 461-8848 x332.

Very Truly Yours,

Laurie Horridge, Esquire
Director of Executive Affairs
& General Counsel

Copy: Ray Marshall, P.E.-NBC
Paul Nordstrom, P.E.-NBC
Kathryn Kelly, P.E.-NBC
Marc Pariseault - NBC

PART 1

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

7. During the period beginning on the effective date of Consent Agreement RIA-424 and lasting through completion of Paragraph 12 of RIA-424, the permittee is authorized to discharge from outfall serial number(s) 002A (Treated Wet Weather Outfall – South Channel). Such discharges shall be monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations: Quantity - lbs./day		Concentration - specify units			Monitoring Requirement	
	Monthly Average	Maximum Daily	Monthly Average *(Minimum)	Weekly Average *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
Enterococci[1]			--- cfu / 100 mL		--- cfu / 100 mL	When in Use[2]	Grab[3,4]
Total Residual Chlorine (TRC)[1,5]			--- ug/l[6]		--- ug/l[6]	When in Use[2]	Grab[4]

[1]The TRC, Fecal Coliform, and Enterococci samples shall be taken at the same time.

[2]For monitoring purposes, an overflow is defined as any occurrence of a discharge from the wet weather facility with a minimum duration of 15 minutes. Overflows shall be considered to be separate if they are separated by six (6) hours or more. During months of no overflow, DMR's shall be marked as "no discharge". All wet weather overflows created by storm events that are greater than the one year six hour storm (2.4 inches) are not subject to these limitations and should not be included in DMR reporting calculations. However, any wet weather overflow, regardless of the size of the storm event, must be reported to the DEM's Operations and Maintenance Program.

[3]The Geometric Mean shall be used to obtain the "monthly average", "weekly average", and "daily maximum" (when there are multiple samples taken in a given day) fecal coliform and enterococci results. Sampling for treated wet weather overflows taken between the hours of 2:30AM - 3:00PM on weekdays and during the hours of 2:30AM -11:00AM on weekends/holidays shall be reported on Discharge Monitoring Reports. Sampling at all times shall be reported on Monthly Operating Reports.

[4]One grab sample shall be taken per day of each overflow event. If an overflow event lasts longer than 24 hours, a grab sample shall be taken for each 24-hour period of the event.

[5]At each sampling event, one TRC sample shall be taken after chlorination but prior to dechlorination to verify that the wet weather flow has been properly chlorinated and one TRC sample shall be taken after dechlorination to verify that the wet weather flow has been properly dechlorinated. The sample after dechlorination shall be reported on DMR's.

[6]The following methods may be used to analyze the grab samples: (1) Low Level Amperometric Titration, Standard Methods (18^{th} Edition) No. 4500-Cl E; (2) DPD Spectrophotometric, EPA No. 330.5 or Standard Methods (18^{th} Edition) No. 4500-Cl G.

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

*Values in parentheses () are to be reported as Minimum/Average/Maximum for the reporting period rather than Average Monthly/Average Weekly/Maximum Daily.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 002A (Treated Wet Weather Outfall – South Channel).

PART 1

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

8. During the period beginning on the effective date of Consent Agreement RIA-424 and lasting through completion of Paragraph 12 of RIA-424, the permittee is authorized to discharge from outfall serial number 003A (Treated Wet Weather Outfall After Dechlorination and Prior to Combination with the Advanced Treatment Discharge). Such discharges shall be monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations: Quantity - lbs./day: Monthly Average	Quantity - lbs./day: Maximum Daily	Concentration - specify units: Monthly Average	Concentration: Weekly Average	Concentration: Maximum Daily	Monitoring Requirement: Measurement Frequency	Monitoring Requirement: Sample Type
Enterococci[1]			--- cfu / 100 mL		--- cfu / 100 mL	When in Use[2]	Grab[3,4]
Total Residual Chlorine (TRC)[1,5]			--- ug/l[6]		--- ug/l[6]	When in Use[2]	Grab[4]

[1] The TRC, Fecal Coliform, and Enterococci samples shall be taken at the same time.

[2]For monitoring purposes, an overflow is defined as any occurrence of a discharge from the wet weather facility with a minimum duration of 15 minutes. Overflows shall be considered to be separate if they are separated by six (6) hours or more. During months of no overflow, DMR's shall be marked as "no discharge". All overflows created by storm events that are greater than the one year six hour storm (2.4 inches) are not subject to these limitations and should not be included in DMR reporting calculations. However, any overflow, regardless of the size of the storm event, must be reported to the DEM's Operations and Maintenance Program.

[3]The Geometric Mean shall be used to obtain the "monthly average", "weekly average", and "daily maximum" (when there are multiple samples taken in a given day) fecal coliform and enterococci results. Sampling for treated wet weather overflows taken between the hours of 2:30AM - 3:00PM on weekdays and during the hours of 2:30AM -11:00AM on weekends/holidays shall be reported on Discharge Monitoring Reports. Sampling at all times shall be reported on Monthly Operating Reports.

[4]One grab sample shall be taken per day of each overflow event. If an overflow event lasts longer than 24 hours, a grab sample shall be taken for each 24-hour period of the event.

[5]At each sampling event, one TRC sample shall be taken after chlorination but prior to dechlorination to verify that the wet weather flow has been properly chlorinated and one TRC sample shall be taken after dechlorination to verify that the wet weather flow has been properly dechlorinated. The sample after dechlorination shall be reported on DMR's.

[6]The following methods may be used to analyze the grab samples: (1) Low Level Amperometric Titration, Standard Methods (18^{th} Edition) No. 4500-Cl E; (2) DPD Spectrophotometric, EPA No. 330.5 or Standard Methods (18^{th} Edition) No. 4500-Cl G.

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

*Values in parentheses () are to be reported as Minimum/Average/Maximum for the reporting period rather than Average Monthly/Average Weekly/Maximum Daily.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 003A (Treated Wet Weather Outfall after Dechlorination and Prior to Combination with the Advanced Treatment Discharge).

PART 1

A. **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

4. During the period beginning on the effective date of Consent Agreement RIA-424 and lasting through completion of Paragraph 16 of RIA-424, the permittee is authorized to discharge from outfall serial number 001A (Advanced Treatment Discharge After Disinfection). Such discharges shall be monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations					Monitoring Requirement	
	Quantity - lbs./day		Concentration - specify units				
	Monthly Average	Maximum Daily	Monthly Average	Weekly Average	Maximum Daily	Measurement Frequency	Sample Type
Copper, Total[1]			29.8 ug/l		86.1 ug/l	2/Week	24-Hr. Comp.
Nickel, Total[1]			25.0 ug/l		70.3 ug/l	2/Week	24-Hr. Comp.

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

[1] Samples shall be taken on the influent and effluent with appropriate allowances for hydraulic detention (flow-through) time.

Samples taken in compliance with the monitoring requirements specified above shall be taken Monday through Friday at the following locations: Outfall 001A (Advanced Treatment Discharge after Disinfection).

Appendix D

BPWWTF Unit Operation Design Criteria

Appendix D - BPWWTF Unit Operation Design Criteria

Preliminary Treatment	Comments
Flow Measurement	
Blackstone Valley Interceptor	
Type	Parshall Flume - Cast in Place Concrete
Throat Width (ft)	6
Measuring Device	Ultrasonic
Capacity Range (mgd)	0 - 120
East Providence Interceptor	
Type	Parshall Flume - FRP Liner
Throat Width (ft)	1
Measuring Device	Ultrasonic
Manufacturer	Warminster Fiberglass
Model	WFPAR1000-12
Capacity Range (mgd)	0 - 10
Influent Screw Pumps	
Number of Pumps	4
Type	Three Flight, Screw Type
Pump Diameter (in)	96
Incline (degrees)	30 degrees from Horizontal
Lift (ft)	9.7
Flow Capacity (mgd)	38.67
Max Rotational Speed (rpm)	23.4
Motor (hp)	100
Electric Service (ph/Hz/volts)	3/60/460
Manufacturer	US Filter/Zimpro
Model	Spiralift
Screening Equipment	
Type	Mechanical Bar Rack (Automatic, Chain Driven)
Number of Units	4
Unit Capacity (mgd)	40
Incline (degrees)	15 from Vertical
Opening Width	6' - 2"
Motor (Hp)	1.5
Electric Service (ph/Hz/volts)	3/60/460
Manufacturer	Fairfield Service Co.
Model	CHCFF
Bar Size	5/8" X 5/16" X 1-3/4" (Trapezoidal)

Clear Opening	3/4"
Rake Spacing	7 ft on center
Rake Speed (FPM)	10
Grit Channels	
Number	4
Type	Rectangular
Channel Width (ft) (avg)	6.7
Channel Depth (ft) (avg)	5
Length (ft)	88
Unit Volume (cu ft)	3000
Total Volume (cu ft)	12000
Grit Pumps	
Vortex Grit Collectors	
Number	4
Type	Vortex
Manufacturer	Waste-Tech Inc.
Model	1750
Trap zone (Diameter)	19'
Depth	14' - 3"
Storage Sump (Diameter)	5'
Depth	10' - 9"
Grit Removal Efficiency	95% of grit greater than, or equal to, 50 mesh size
Automatic Samplers	
Number	2
Type	Flow Proportional or Timed Sequential
Sample Type	24-hr Composite
Flow Signal Source	Parshall Flume
Max Sample Size (gal)	2.5
Electrical Service (volts)	120
Manufacturer/Model	American Sigma
Pre-aeration Channel	
Channel Width (ft)	7-16
Channel Depth (ft)	6.8-13.5
Channel Length (ft)	455
Air Supply	
Total scfm (1 blower)	1200
Horsepower	125

Primary Treatment

Dry Weather Primary Clarifiers

Number	3
Type	Circular
Tank Diameter (ft)	102
Tank Sidewater Depth (ft)	14
Tank Surface Area	8170
Average Overflow Rate (gpd/ft^2)	967
Peak Overflow Rate (gpd/ft^2)	1877
Sludge and Scum Collector	
Number	1 per clarifier
Manufacturer	Hi-Tech Inc.
Model	HBPS-S
Drive Motor (Hp)	1

Wet Weather Primary Settling Tanks

Number of Tanks	2
Tank Dimensions (L x W, ft)	230 x 68
Tank Sidewater Depth (ft)	11.5
Tank Volume (MG)	1.345 per tank
Peak Overflow Rate (gpd/ft^2)	2235 @ 70 MGD
Detention Time (hr)	0.92 @ 70 MGD

Wet Weather Dewatering Pumps (Nos. 1,2, and 3)

Number	3
Type	Screw, Centrifugal
Manufacturer	Haywood Gordon
Model	XCS5-A
Capacity (gpm)	900 @ 50FT TDH
Pump Speed (rpm)	1650
Motor (hp)	20
Electrical Service (v/ph/Hz)	480/3/60

Wet Weather Dewatering Pumps (Nos. 4 and 5)

Number	2
Type	Submersible Centrifugal
Manufacturer	Flygt
Model	3171 LT
Capacity (gpm)	2300
Pump Speed (rpm)	1160
Motor (hp)	25
Electrical Service (v/ph/Hz)	480/3/60

Secondary Treatment

Aeration Tanks-Pre-Anoxic Cells

Number of Tanks	4-1 per tank
Aerobic Volume (MG)	.59 per tank
Total Anoxic Volume (MG)	2.4
Anoxic Stages	3 per tank
Areas	
Zone 1&2 (sq ft)	31.5 X 20.5
Zone 3 (sq ft)	64 X 42.5
Sidewater Depth (ft)	19.8

Aeration Tanks-Aerobic Cells as MLE (4 cells per tank)

Number	16-4 per tank
Aerobic Volume (MG)	2.4 per tank
Dimensions	
Length (ft)	64
Width (ft)	64
Total Aerobic Volume (MG)	9.7
Sidewater Depth (ft)	19.2
MLSS (mg/L)	3,200
SRT (days)	10.65
Min. Month Waste Temp degrees C	11

Aeration Tanks - Aerobic Cells as 4-Stage BNR

Number	16-4 per tank
Aerobic Volume (MG)	1.34 per tank
Total Aerobic Volume (MG)	5.35
Depth (ft)	19.2
Post Anoxic (MG)	.625 per tank
Post Anoxic Volume (MG)	2.5
Reaeration Volume	.14 per tank
Total Reaeration Volume	.57
Manufacturer	Sanitaire

Aeration Blowers

Number of Aerators	2
Manufacturer	Roots
Model	16" - IGC - H
Type	Single-Stage Centrifugal Compressor
ACFM	12,100
Motor	
Horsepower	600
RPM	3,600

Manufacturer	Reliance Electric
Electrical Service (ph/Hz/v)	3/60/4000
Number	2
Manufacturer	APG Neuros
Model	NX300-C070
Type	Turbo
ACFM	6,000
Motor	
Horsepower	300
RPM	16,600
Manufacturer	APG Neuros
Electrical Service (ph/Hz/v)	3/60/460

Internal Recycle Pumps

Number	4
Manufacturer	ITT Flygt
Model	4660
Type	Horizontal, Propeller
Motor	
Horsepower	15
RPM	575
Electrical Service (ph/Hz/volts)	3/60/460

Supplemental Carbon Recirculation Pump

Number	1
Manufacturer	Watson-Marlow
Model	SPX40
Type	Peristaltic Hose
Flow/Revolution	.351 gallon/rev
Pump Speed	36 rpm
Nominal Flow (gpm)	12.63
Motor	
Horsepower	2
RPM	1775
Electrical Service (ph/Hz/volts)	3/60/230/460

Supplemental Carbon Feed Pump

Number	6
Manufacturer	Watson-Marlow
Model	520UmAS/REL
Type	Peristaltic Tube Metering
Pump Speed	.1-220 rpm
Nominal Flow	.68-1500 ml/min (.01-23.77 gal/hour)

Final Settling Tanks Nos. 1-4

Number of Tanks	4
Type	Circular, center feed, rapid sludge, withdrawal
Diameter (ft)	111
Sidewater Depth (ft)	10
Surface Area Each (sq ft)	9,677
Volume (cu ft)	96,700
Gal. each	723,830

Final Settling Tanks Nos. 5 and 6

Number of Tanks	2
Type	Circular, center feed, rapid sludge, withdrawal
Diameter (ft)	110
Sidewater Depth (ft)	12
Surface Area Each (sq ft)	9507
Volume (cu ft)	114,090
Gal. each	853,360

Return Activated Sludge Pumping RSPS No. 1

Number of Pumps	4
Type	Submersible, Centrifugal
Unit Capacity (gpm) @1200RPM	3,530
Total Discharge Head (ft)	27.4
Horsepower (hp)	40
Speed (rpm)	1200

Return Activated Sludge Pumping RSPS No.2

Number of Pumps	3
Type	Submersible, Centrifugal
Unit Capacity (gpm) @1200 RPM	2650
Total Discharge Head (ft)	23.9
Horsepower (hp)	25
Speed (rpm)	1200

UV Disinfection System

Manufacturer	Trojan
Model	UV4000 Plus
Number of Reactors	1
Number of Banks per Reactor	2
Number of Modules per Bank	5
Lamps per module	20
Total Number of Lmaps	200

Dry Weather Effluent Pumping

Number	3
Manufacturer	Patterson Pump Co.
Size (in)	24 X 30
Model	Single Stage, Axial Flow, Vertical
RPM	875
Capacity (gpm)	16,000
TDH (ft)	20
Motor	
Manufacturer	U.S. motors
Type	Vertical, Hollow Shaft
Horsepower	125
RPM	880
Volts/Phase/Hertz	460/3/60
Effluent Flow Meter	
Manufacturer/Model	Siemens-Milltronics HydroRanger 200
Type	Ultrasonic Level Transmitter
Flow Range, MGD	0-46

Chlorine and Effluent Pumping

Chlorine Contact Tank

Number	1
Effective length (ft)	410
Width (ft)	10.5
Depth (ft)	10.75
Total Volume MG	.34
Cubic Feet	51,020

Sodium Hypochlorite Feed System

Number of Storage Tanks	3
Type	Fiberglass Reinforced Plastic
Unit Volume (gals)	8,000
Number of Feed Pumps	4

Wet Weather Effluent Pumping

Number of Pumps	4
Type	Vertical Turbine
Manufacturer	Sulzer
Stages	Single
Capacity (gpm)	16,180 (each)
Total Discharge head (ft)	14.25
Horsepower (hp)	75

Appendix E

Environmental Assessment (EA)

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BPWWTF UPGRADES

Environmental Assessment

Date: April 14, 2021

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Revisions

Revision History

Date	Version	Description	Author(s)	Reviewer(s)	Date of Review(s)
9-26-18	0.1	1st Internal Draft	J. Damicis B. Blanchard	D. VanHoven	11-19-18
11-20-18	0.2	DRAFT for NBC Review	J. Damicis B. Blanchard	K. Kelly D. Bowen	12-18-18
12-20-18	**1.0**	**FINAL for RIDEM Submission**	**J. Damicis** **B. Blanchard**		
6-24-20	1.1	Resubmission to RIDEM	J. Damicis B. Blanchard		
3-24-21	1.2	Revised Draft for RIDEM Approval	B. Blanchard	K. Kelly	4-12-21

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LIST OF FIGURES

APPENDICES

List of Abbreviations and Acronyms

BPSA	Bucklin Point Service Area
BPWWTF	Bucklin Point Wastewater Treatment Facility
CA	Consent Agreement
CEPT	Chemically Enhanced Primary Treatment (CEPT)
CRMC	Coastal Resources Management Council
CSO	Combined Sewer Overflow
EA	Environmental Assessment
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FPSA	Field's Point Service Area
FWS	Fish and Wildlife Service
GARFO	Greater Atlantic Regional Fisheries Office
HASP	Health and Safety Plan
IPaC	Information for Planning and Conservation
MGD	Million Gallons per Day
MLSS	Mixed Liquor Suspended Solids
NBC	Narragansett Bay Commission
NRCS	Natural Resource Conservation Service
PA	Programmatic Agreement (PA)
RAS	Returned Activated Sludge
RIDEM	Rhode Island Department of Environmental Management
RIDEM DFW	RIDEM Division of Fish and Wildlife
RIDEM OTCA	RIDEM Office of Technical and Customer Assistance
RIDEM OWR	RIDEM Office of Water Resources
RIDOT	Rhode Island Department of Transportation
RI HPHC	Rhode Island Historic Preservation and Heritage Commission
RI SHPO	Rhode Island State Historic Preservation Office
SRF	State Revolving Fund
USFWS	United States Fish and Wildlife Service
UV	Ultraviolet

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Executive Summary

The Narragansett Bay Commission (NBC) embarked on a three-phase Combined Sewer Overflow (CSO) control program in 1998, aimed at lowering annual CSO volumes and reducing annual shellfish bed closures in accordance with a 1992 Consent Agreement (CA) with the Rhode Island Department of Environmental Management (RIDEM). Phases I and II of this program, which focused on the Fields Point Service Area in Providence, were completed in 2008 and 2015, respectively. The program to date has succeeded in lowering annual CSO volumes and reducing annual shellfish bed closures to levels that are in keeping with a 1992 Consent Agreement between NBC and the RIDEM.

Phase III of the program (Phase III CSO Program), which began in 2016, is focused primarily on the Bucklin Point Service Area (BPSA) in the communities of Pawtucket and Central Falls. The final sub-phase of the program also addresses the final remaining outfalls in the Fields Point Service Area (FPSA). Its projected completion date is 2041.

An Environmental Assessment (EA) was performed for the Phase III CSO Program in 2017 and RIDEM issued a Finding of No Significant Impact (FONSI) on December 13, 2017. While this EA evaluated the major projects anticipated in the program at that time, required upgrades to the Bucklin Point Wastewater Treatment Facility (BPWWTF) were not yet known. Since then, options for upgrading the BPWWTF have been evaluated and preferred alternatives selected. The RIDEM has indicated that a new EA, as well as a Wastewater Facilities Plan, are required due to these proposed upgrades.

Purpose and Need

The BPWWTF provides secondary treatment and nitrogen removal for flows up to 46 million gallons per day (MGD) and primary treatment for flows up to 116 MGD during wet weather conditions. The BPWWTF is located in East Providence and has an annual daily design flow of 23.7 MGD. With the construction and commissioning of the Pawtucket Tunnel and other Phase III CSO Program projects, which will divert CSO flow from existing outfalls for treatment at the BPWWTF, there will be an increase in prolonged high flow periods during tunnel dewatering. The Pawtucket Tunnel is designed to store the volume of CSO flow currently discharged to the receiving waters during the three-month design storm up to a capacity of 58.5 million gallons (MG). The stored volume will be pumped to the BPWWTF by the Tunnel Pump Station. The Tunnel Pump Station is being designed for a firm capacity of 27.3 MGD. The operation and performance of the BPWWTF during prolonged wet weather events has been simulated and potential deficiencies are anticipated to result from prolonged periods of high flow.

Upgrades to the BPWWTF are required to address the deficiencies anticipated once the facility is required to provide secondary treatment for prolonged periods of higher flows from wet weather events. Also, more stringent discharge limitations required through a new RIPDES permit for the facility also necessitate upgrades.

Proposed Actions and Alternatives

Six alternatives for BPWWTF upgrades were identified, with four of these alternatives evaluated relative to performance and cost. Two alternatives were disregarded immediately due to high costs or inadequate treatment efficiency. Two of the remaining alternatives were identified as a preferred approach to upgrading the BPWWTF. These include construction of two new final clarifiers and the potential future addition of a new polymer injection system.

Constructing new clarifiers provides the best effluent quality, is the easiest to operate, and provides additional unit process redundancy to the BPWWTF of all the alternatives considered. While it is more costly than other alternatives considered, it has been selected as a preferred alternative because it improves treatment performance to meet the new RIPDES permit limits while providing NBC operational flexibility. Additionally, the use of polymer to enhance gravity settling characteristics in the final clarifiers will be evaluated once the new clarifiers are put into operation. A potential location for the polymer injection system, should it be necessary, is the proposed Return Sludge Pump Station for the two proposed Final Clarifiers.

Because NBC's existing ultraviolet (UV) disinfection system is aging, a replacement UV disinfection system in a new facility is proposed as part of this project. The proposed UV Facility shall be designed to provide UV disinfection capabilities and satisfy current TR-16 recommendations. In the future, the use of chemically enhanced primary treatment (CEPT) will be evaluated by NBC if the extreme flow and loading conditions modeled for the Facility Plan Amendment result in compromised treatment plant performance or permit violations that are attributed to low primary clarifier removal efficiencies. CEPT is a process in which chemicals, such as ferric chloride, aluminum sulfate or polymer, are added to the wastewater stream to enhance BOD, TSS and pollutant removal by employing the processes of chemical coagulation and flocculation as an aid to improve gravity settling characteristics. Potential locations for the CEPT treatment process have been identified herein.

Environmental Impacts, Consequences, and Mitigation

No long-term adverse impacts are anticipated from this project. Rather, the proposed BPWWTF upgrades will result in an overall long-term improvement in water quality in the Seekonk River and Narragansett Bay. Through the EA process, potential temporary, short-term environmental impacts that may result during construction and implementation were identified. Measures will be taken during construction and project implementation to mitigate these short-term impacts to the greatest extent practicable.

The environmental benefits of this project far outweigh the short-term adverse impacts that may occur during construction. On this basis, it appears that a Finding of No Significant Impact (FONSI) for the BPWWTF upgrades project is appropriate.

Public Participation

This section describes the public participation process as it relates to this EA. A public meeting was conducted at NBC offices on October 25, 2018 to discuss project scope, alternatives, and the preferred BPWWTF upgrades. A Public Hearing will be scheduled following RIDEM review of this EA.

Agency Coordination and Review

Several agencies were contacted as part of this EA. Each agency was provided a conceptual site plan and sketch showing the addition of two new final clarifiers as well as a cover letter describing these modifications. Letters were distributed on September 26, 2018 by certified mailings and review comments were requested from each agency within 30 days of their receipt of the letter. Certified mail return receipts were received from each agency; however, not all agencies provided review comments. Review comments that have been received were addressed in the EA, as appropriate. At this time, there does not appear to be any significant issues or concerns based on reviews by these agencies.

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Section 1.0

Introduction

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1.0 Introduction

The Narragansett Bay Commission (NBC) embarked on a three-phase Combined Sewer Overflow (CSO) control program in 1998, aimed at lowering annual CSO volumes and reducing annual shellfish bed closures in accordance with a 1992 Consent Agreement with the Rhode Island Department of Environmental Management (RIDEM). Phases I and II of this program, which focused on the Fields Point Service Area in Providence, were completed in 2008 and 2015, respectively. The program to date has succeeded in lowering annual CSO volumes and reducing annual shellfish bed closures to levels that are in keeping with a 1992 Consent Agreement between NBC and the RIDEM.

Phase III of the program (Phase III CSO Program), which began in 2016, is focused primarily on the Bucklin Point Service Area (BPSA) in the communities of Pawtucket and Central Falls. The final sub-phase of the program also addresses the final remaining outfalls in the Fields Point Service Area (FPSA). Its projected completion date is 2041. The Phase III CSO Program has been subdivided into four sub-phases, as follows:

- Phase IIIA: Pawtucket Tunnel
- Phase IIIB: Upper BVI Relief Structure and OF-206 Sewer Separation
- Phase IIIC: Stub Tunnel to Control OF-220
- Phase IIID: West River Interceptor and OF-035 Sewer Separation

The NBC's stated mission is to maintain a leadership role in the protection and enhancement of water quality in Narragansett Bay and its tributaries by providing safe and reliable wastewater collection and treatment services to its customers at a reasonable cost. NBC owns and operates Rhode Island's two largest wastewater treatment plants along with extensive infrastructure of interceptors, sewers, pump stations, tide-gates, and CSO structures. The focus of this assessment is the Bucklin Point Wastewater Treatment Facility (BPWWTF), which is located in East Providence and provides treatment of wastewater flow from NBC's BPSA. This includes all or parts of Central Falls, Pawtucket, East Providence, Lincoln and Cumberland. The location of the BPWWTF and NBC service areas are shown on Figure A-1. Figure A-2 provides an aerial view of the BPWWTF. Pawtucket and Central Falls have combined sewer systems while the other member communities served by NBC's BPWWTF have separated storm and sanitary collection systems.

The objective of the Phase III CSO Program is specifically to improve the environment by achieving significant reductions in annual CSO volumes and shellfish bed closures. The Program, which includes upgrades to the BPWWTF, will result in significant improvement in water quality in the affected areas of Narragansett Bay, including the Seekonk River, the Blackstone River and other tributaries to the bay. An Environmental Assessment (EA) was performed for the Phase III CSO Program in 2017 and RIDEM issued a Finding of No Significant Impact (FONSI) on December 13, 2017. While this EA evaluated the major projects anticipated in the program at that time, required upgrades to the BPWWTF were not yet known. Since then, options for the BPWWTF have been evaluated and preferred alternatives selected.

The RIDEM has indicated that a new EA, as well as a Wastewater Facilities Plan, are required due to these proposed upgrades. The Facilities Plan is provided under separate cover.

Through the EA process, potential temporary, short-term environmental impacts that may result during construction and implementation were identified. These short-term impacts are expected to be generally typical of construction activities of similar scale and will be mitigated using industry standard means and methods commensurate in scale to their overall impact. Also, no significant adverse long-term impacts on the environment associated with the BPWWTF upgrades are expected at this time. The most significant long-term effect will be a substantial improvement in water quality to Narragansett Bay and its tributaries. On this basis, it appears that a FONSI for the work associated with the BPWWTF upgrades is appropriate.

Section 2.0

Purpose and Need

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2.0 Purpose and Need

The Phase III CSO Program is NBC's plan to abate combined sewer overflows to Narragansett Bay and several of its major tributaries. For Phase III CSO projects, such as the proposed BPWWTF upgrades, to be eligible for funding under the State of Rhode Island Clean Water State Revolving Fund (SRF) Program, environmental impacts of project alternatives shall be analyzed as part of an EA.

Within the BPSA, the BPWWTF provides secondary treatment and nitrogen removal for flows up to 46 million gallons per day (MGD) and primary treatment for flows up to 116 MGD during wet weather conditions. The BPWWTF is located in East Providence and has an annual daily design flow of 23.7 MGD. During normal dry weather operation, wastewater flows through the existing mechanical bar screens, vortex grit separators, primary clarifiers, biological reactors, secondary clarifiers and an ultraviolet disinfection system. Effluent is discharged to the Seekonk River through an existing outfall via an effluent pump station. Return activated sludge (RAS) from the final clarifiers is collected and pumped by two RAS pump stations and recycled to the biological reactors. During wet weather events, flow can be diverted from the grit collectors to on-site wet weather tanks, where it then flows through the wet weather chlorine contact tank prior to discharge to the Seekonk River.

With the construction and commissioning of the Pawtucket Tunnel and other Phase III CSO Program projects, which will divert CSO flow from existing outfalls for treatment at the BPWWTF, there will be an increase in prolonged high flow periods during tunnel dewatering. The Pawtucket Tunnel is designed to store the volume of CSO flow currently discharged to the receiving waters during the three-month design storm up to a capacity of 58.5 million gallons (MG).The stored volume will be pumped to the BPWWTF by the Tunnel Pump Station. The Tunnel Pump Station is being designed for a firm capacity of 27.3 MGD.

The operation and performance of the BPWWTF during prolonged wet weather events has been simulated and potential deficiencies are anticipated to result from prolonged periods of high flow. These are as follows:

- Secondary treatment processes show evidence of stress.
- Settled sludge blanket depth may increase and effluent quality may decrease in the final clarifiers. Polymer is used during these times, which is currently applied manually by BPWWTF staff.
- Projected decrease in mixed liquor suspended solids (MLSS) temperature is expected during tunnel pump-out, based on experience with other NBC facilities.

Upgrades to the BPWWTF are required to address the potential deficiencies once the facility is required to provide secondary treatment for prolonged periods of higher flows from wet weather events. Also, more stringent discharge limitations required through a new RIPDES permit for the facility further necessitate upgrades. The alternatives considered, and identification of the preferred alternatives, is included in Section 3 of this EA. Potential environmental impacts and proposed mitigation strategies are included in Section 4. Section 5 describes the public review and comment process while Section 6 addresses review comments provided by State and Federal agencies.

Section 3.0

Proposed Actions and Alternatives

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3.0 Proposed Actions and Alternatives

A total of six (6) alternatives were developed to address the BPWWTF's ability to effectively treat wastewater during prolonged periods of high flows. These alternatives were as follows:

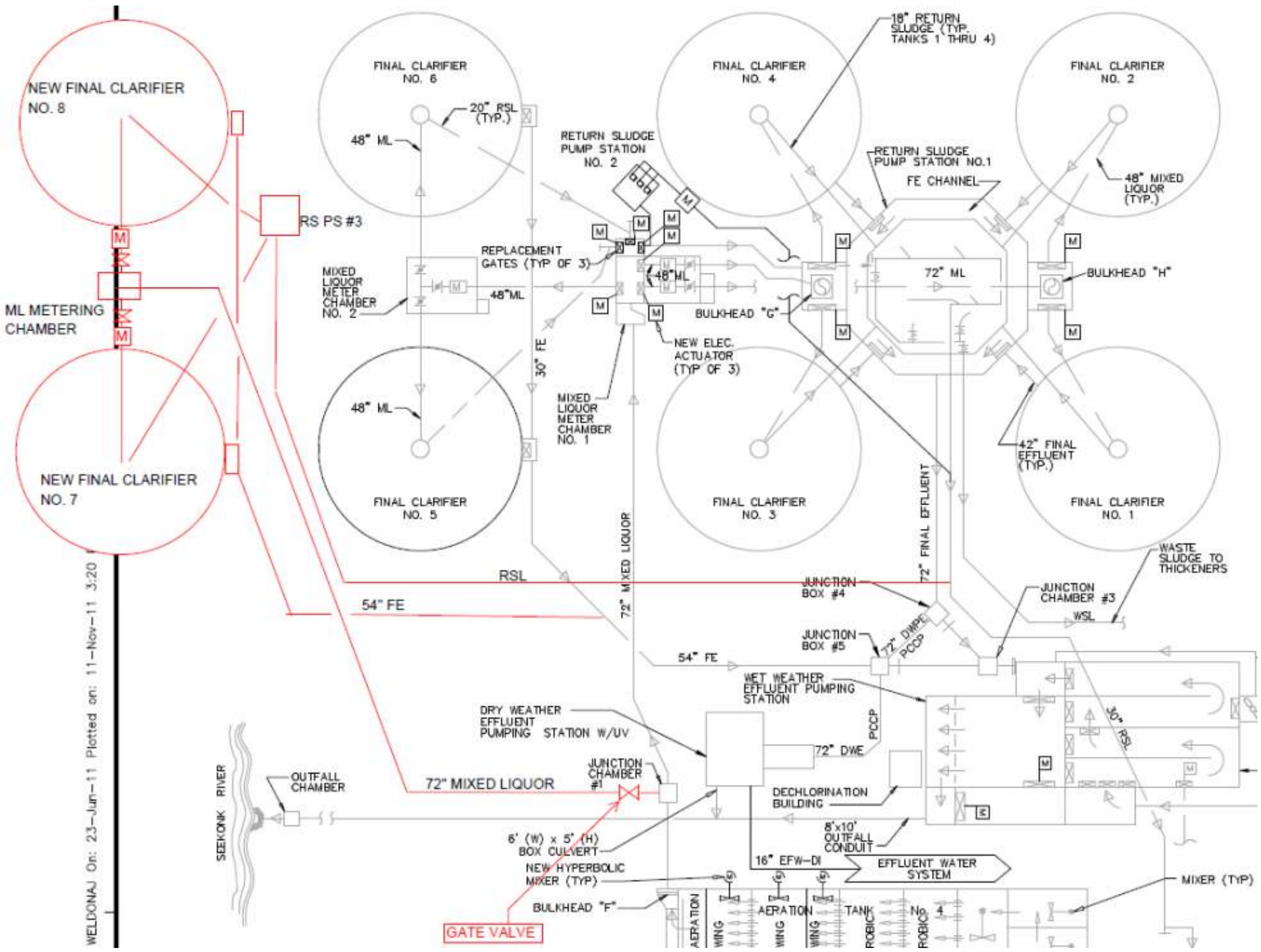
1. Install two (2) new final clarifiers;
2. Convert existing bioreactor to solids storage during high flows;
3. Convert bioreactors to contact stabilization during high flows;
4. Install polymer feed system;
5. Increase return active sludge (RAS) pumping; and
6. Increase bio-reactor volume.

Alternatives 5 and 6 were eliminated from an in-depth analysis due to concerns over their effectiveness and cost. The remaining four (4) alternatives were assessed in detail in the BPWWTF Operational and Capacity Evaluation and are each discussed in the following sections.

3.1 Alternative 1: Install Two New Final Clarifiers

The first alternative would construct two new final clarifiers (Nos. 7 and 8) similar to the existing final clarifiers Nos. 5 and 6, conceptually illustrated in red on Figure 3-1. The project would include new mixed liquor suspended solids (MLSS) piping, flow splitting, a new RAS pump station, and instrumentation and controls to match the existing clarifiers. The new clarifiers are proposed in an existing open area of the BPWWTF site, to the west of clarifiers Nos. 5 and 6. The proposed clarifiers will match existing Clarifiers Nos. 5 and 6 with a diameter of 110 ft, a mean water surface elevation of 4.28 ft, and a sidewater depth of 12.17 ft at their highest point.

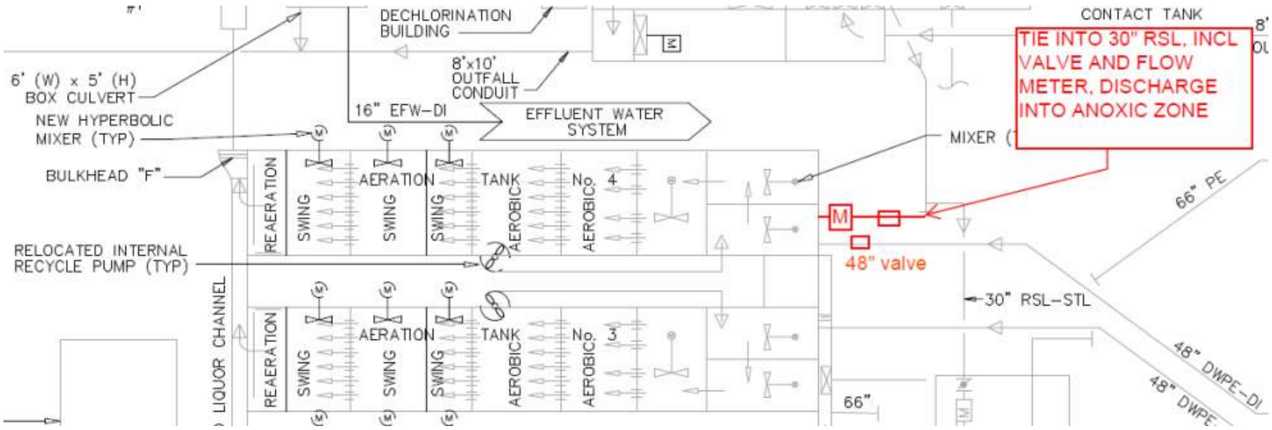
Figure 3-1 Alternative 1 Schematic Layout



3.2 Alternative 2: Convert Existing Bioreactor to Solids Storage During High Flows

Alternative 2 would require the construction of new piping with a valve and new meter to convert one of the four existing bioreactors to a solids storage tank during prolonged wet weather events. This is illustrated in red on Figure 3-2. During the first day of a storm, fifty percent of the RAS flow would be diverted to this bioreactor and the influent primary effluent feed would be shut off. The other three bioreactors would operate as normal, with the exception of the reduced RAS flow. This alternative would increase the MLSS in the other bioreactor from 3000 mg/l to 7500 mg/l, thus storing biomass in this bioreactor and reducing the combined MLSS concentration to the clarifiers to 1200 mg/l. An estimated construction cost for this alternative is approximately $0.90 million.

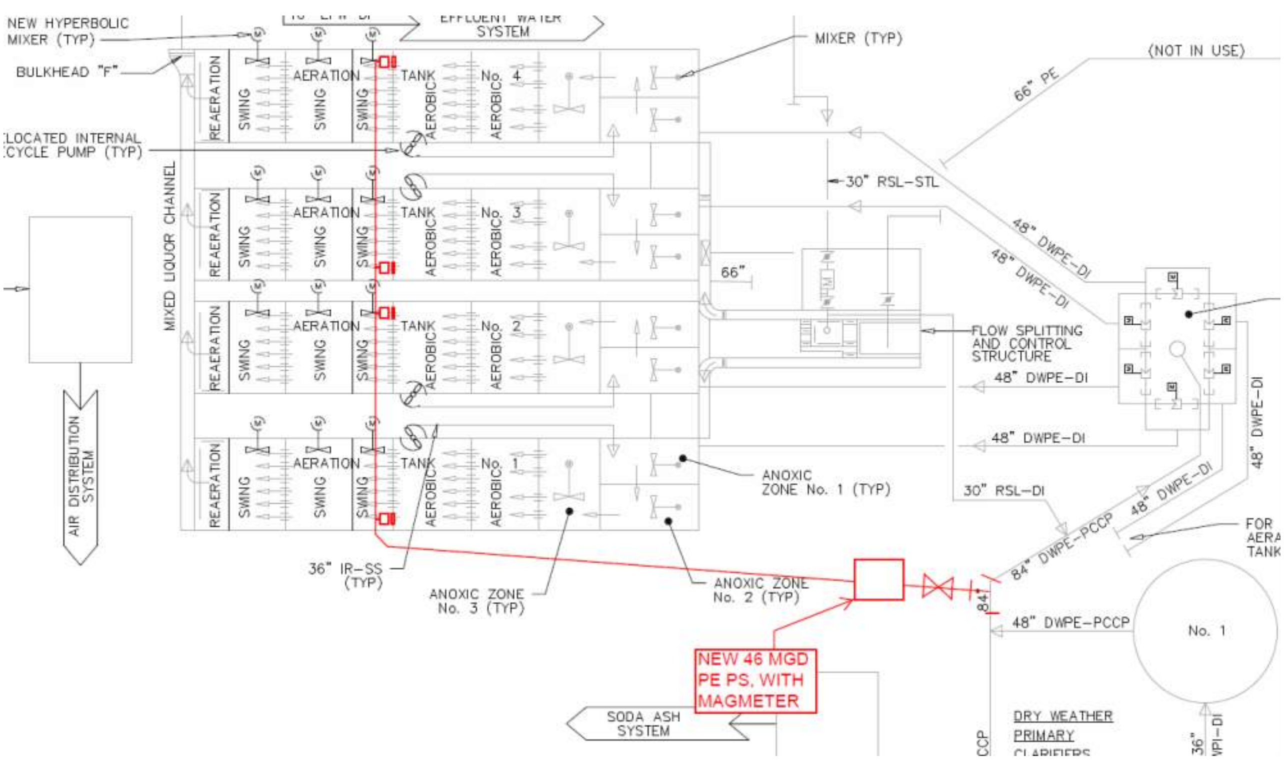
Figure 3-2 Alternative 2 Schematic Layout



3.3 Alternative 3: Convert Bioreactors to Contact Stabilization During High Flows

Alternative 3 would require new piping and a new pump station with a magnetic flow meter to allow the four existing bioreactors to operate in a contact stabilization mode during prolonged wet weather events and in a step feed mode during normal dry weather operations. This is depicted on Figure 3-3. This treatment strategy is commonly used for wastewater treatment plants that serve systems with combined sewers. It would reduce the MLSS concentration to the clarifiers to approximately 900 mg/l. While the reduction of solids loading to the clarifiers will improve the final effluent TSS, the final effluent BOD concentration is expected to increase. As such, this alternative is not considered preferable. An estimated construction cost for this alternative is approximately $5.7 million.

Figure 3-3 Alternative 3 Schematic Layout



3.4 Alternative 4: Install Polymer Feed System

Alternative 4 proposed a new polymer feed system, which would consist of two new polymer storage tanks with mixers and a metering pump dosing system. The polymer feed system would be used only when the clarifiers are in need of a settling aid as determined by BPWWTF operations staff. Currently, polymer is periodically added to the mixed liquor channel by hand during wet weather events, but no automated system currently exists.

A dry or liquid emulsion polymer feed system would add polymer upstream of the final clarifiers to aid in solids settling. A dry system typically includes one to two batch make-up tanks with mixers, a duplex metering pump system, and secondary containment. A liquid emulsion system typically draws directly from a 55-gallon drum or a larger tote to a duplex metering pump skid that mixes the polymer with plant or potable water for carrying to the wastewater. Further analysis is required to determine whether a dry or liquid polymer is more appropriate for this application.

3.5 Recommended Alternative

Alternative 1, *Install Two New Final Clarifiers,* provides the best effluent quality, is the easiest to operate, and provides additional unit process redundancy to the BPWWTF. While Alternative 1 is more costly than other alternatives, it has been selected as a preferred alternative because it not only improves performance to meet the new RIPDES permit limits but allows NBC operational flexibility. Constructing new clarifiers allows NBC to temporarily take others offline for refurbishment to address other operational issues.

Alternative 4, *Install Polymer Feed System,* is a low-cost solution that could be implemented in conjunction with the new clarifiers to improve plant performance when the sludge is experiencing poor settling characteristics. The use of polymer to enhance gravity settling characteristics in the final clarifiers will be evaluated once the new clarifiers are put into operation. A potential location for the polymer injection system, should it be necessary, is the proposed Return Sludge Pump Station for the two proposed Final Clarifiers.

With regard to the environmental impact of all of the alternatives considered, Alternative 1 offers the best net environmental benefit by providing the best level of treatment of CSO flows. Alternative 4 further enhances this level of treatment, should it be necessary based on facility performance following the addition of the two new final clarifiers.

3.6 Additional Modifications

Additional plant modifications have been considered since the initial evaluation and selection of alternatives to address effective treatment of wastewater during prolonged periods of high flows.

3.6.1 UV Disinfection Upgrades

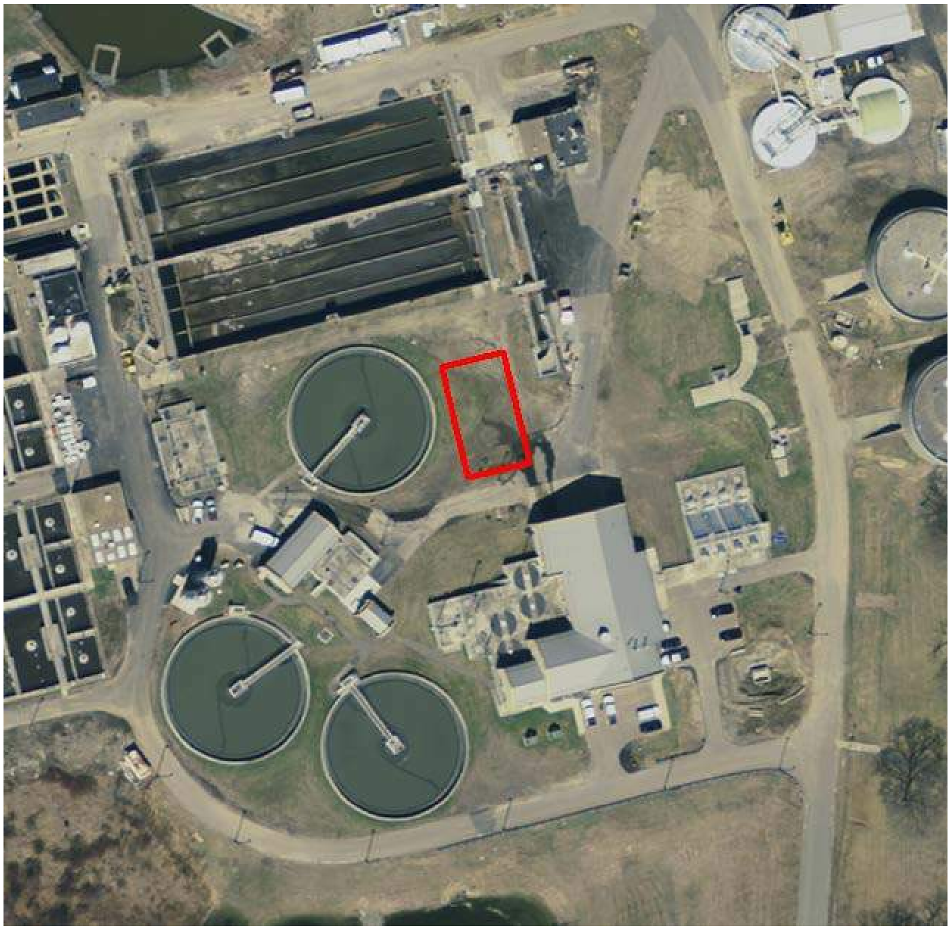
The BPWWTF’s existing UV disinfection system was installed as part of the Contract 807 plant upgrades. The existing UV disinfection system is a single channel UV4000 system as manufactured by Trojan Technologies, Inc. and is comprised of high-wattage, polychromatic, medium-pressure lamps with two banks of lamps installed in a common channel. Due to the age of the existing system, the significant advancement in UV disinfection technology, the need to have an energy efficient UV system and to continue to reliably meet advanced treatment discharge limitations for enterococcus, the NBC has determined a new UV disinfection system is required.

NBC has evaluated alternatives to replace the existing UV disinfection system within the existing building and within a new building. The evaluations revealed that retrofitting a new UV system into the existing building proved too difficult and costly, and presented significant challenges and risks associated with maintenance of plant operations and management of flows during construction and system commissioning. Therefore, placing the new system in a new building has been determined to be necessary. The proposed UV Facility shall be designed to provide UV disinfection capabilities and satisfy current TR-16 recommendations. It will be located to the south of the two new final clarifiers.

3.6.2 Chemically Enhanced Primary Treatment (CEPT)

The future use of chemically enhanced primary treatment (CEPT) will be evaluated if the extreme flow and loading conditions modeled for the Facilities Plan Amendment (FPA) result in compromised treatment plant performance or permit violations that are attributed to low primary clarifier removal efficiencies. CEPT is a process in which chemicals, such as ferric chloride, aluminum sulfate or polymer, are added to the wastewater stream to enhance BOD, TSS and pollutant removal by employing the processes of chemical coagulation and flocculation as an aid to improve gravity settling characteristics. Furthermore, the BPWWTF Operations staff will use their professional judgement to utilize the third Primary Clarifier to help supplement primary clarifier operations during elevated loading conditions. A potential location for the CEPT treatment process is shown in Figure 3-4. Other locations may also be considered if necessary.

Figure 3-4 Potential CEPT Facility Location



Section 4.0

Environmental Impacts, Consequences, and Mitigation

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4.0 Environmental Impacts, Consequences, and Mitigation

Provided below is a discussion of the environmental conditions around the project area, the potential for environmental impact, and the measures that will be used to mitigate the identified impacts associated with the proposed BPWWTF improvements.

Direct environmental impacts identified in this assessment are those that occur temporarily during construction or permanently as a result of the project. Direct impacts could include potentially adverse effects on surface water, disturbance of wetlands and wildlife habitat, disturbance of sensitive historical, archaeological, cultural or recreational areas, and impacts to traffic, business operations or other daily activities in the project area. These types of impacts are generally short-term and can be effectively mitigated during construction. Adverse post-construction impacts are not anticipated. Rather, this project will result in long-term environmental benefits, helping significantly improve water quality in Narragansett Bay and its tributaries. The upgrades proposed to the BPWWTF improve treatment capacity during periods of high flow due to wet weather and provide NBC with operational flexibility and redundant treatment facilities during normal flow conditions.

4.1 Surface Water

Effluent from the BPWWTF discharges to the Seekonk River. The proposed BPWWTF upgrades will improve treatment capacity and produce a higher quality effluent. No adverse permanent or long-term impacts to surface water are anticipated.

With construction of the proposed facility improvements, erosion and sedimentation resulting from construction could potentially have an impact to the Seekonk River if proper controls are not in place. Stockpiled materials and associated site work may also impact the river if they are not stored and handled properly. As such, standard construction phase environmental protection controls will be utilized during the construction of this project. The contractor will be required to provide proper erosion controls and fugitive dust prevention facilities as required by RIDEM and other applicable agencies.

Surface disturbance shall be minimized wherever possible and disturbed surfaces will be restored when project conditions allow. Surface waters will be protected from sedimentation and other pollutant discharges by utilizing compost tubes, hay bales, and/or silt fences. Contractors will be required to provide spill and erosion control measures when working near any surface water bodies or wetlands. Any water that is pumped or bailed from excavations shall be conveyed by conduit or hose and treated for sediment removal and to lower velocity prior to discharge. Ongoing monitoring, maintenance, and repair of erosion controls will be required throughout construction to ensure proper function and adequate protection of adjacent surface waters. Temporary controls will be removed at the end of construction once the site is adequately restored.

4.2 Groundwater

According to RIDEM's online Environmental Resource Map the classification of the groundwater beneath the project area is GB. RIDEM has classified GB as groundwater that is not suitable for drinking water use without treatment. This classification can be attributed to a highly urbanized area, permanent waste disposal area, or an active site permitted for the land disposal of sewage sludge. It is anticipated that the quality and quantity of groundwater will remain substantially unchanged as a result of this project. While some subsurface construction may be within the existing groundwater zone, appropriate construction procedures will be utilized to discharge or recharge groundwater, as required.

4.3 Wetlands and Floodplains

Based on review of FEMA flood zone mapping, National Wetland Inventory data layers obtained from RIGIS, and the online FEMA Flood Map Service Center, the entire project area is located within Zone X associated with the Seekonk River, the 0.2% annual chance flood hazard area with average depth less than one foot or with drainage areas of less than one square mile. FEMA FIRM maps are provided in Appendix B.

The site is currently protected from flooding during a 100-year event with the levee that surrounds the operational footprint of the BPWWTF. The report "NBC Resiliency Plan" (Plan)", prepared by Kleinfelder and submitted to RIDEM in November 2019, states that NBC's infrastructure in coastal areas could be exposed to 3 feet of relative sea level rise by 2050-2060. The Plan establishes the design flood elevation for the BPWWTF to be 17.8 ft. NGVD29 (14.8 ft. base flood elevation plus 3 ft. freeboard). The existing levee provides flood protection to 19.3 ft. NGVD29, which is 4.5 ft higher than the base flood elevation and 1.5 ft. higher than the design flood elevation. The Plan does not recommend a proposed action based on the findings of this assessment. Design of future improvements at the BPWWTF will comply with applicable regulations as they relate to sea level rise.

There are no wetlands within the project limits but there are small wetland areas to the northeast and south of the project limits. No impact to these wetland areas are anticipated. Because this project falls within 200-feet of the Seekonk River, it will be within the Contiguous Area managed by the RI Coastal Resources Management Council (CRMC). The CRMC has issued an Assent for the Program following review and approval of a Master Plan for the Phase III CSO Program. This project will require an Assent Modification from CRMC. Figure A-3 depicts the BPWWTF relative to coastal and freshwater wetlands.

This project will be designed to minimize, or altogether avoid, impacts to wetlands and floodplains to the greatest extent possible. All work is proposed within areas of the BPWWTF site that are currently developed or otherwise reserved for such uses. Erosion and sedimentation controls will be used during construction to mitigate potential short-term impacts to nearby freshwater or riverbank wetlands. No short-term nor long-term impacts to nearby freshwater wetlands are anticipated.

4.4 Wild or Scenic Rivers

To date, there are no designated wild or scenic rivers in Rhode Island. Given the absence of any designated wild or scenic rivers near the project site, it does not appear that there will be any short-term or long-term impacts to these types of natural resources.

4.5 Coastal Zones/ Costal Barrier Resources

Based on review of RIDEM regulatory mapping, it appears that coastal resources near the project area are limited to the tidal Seekonk River and its associated 200-foot contiguous area. As such, the project will require permitting through the CRMC and design and construction shall comply with the requirements stipulated in an Assent issued by that agency. Also, all work is proposed within the existing BPWWTF site and no adverse impacts to coastal zones or barrier resources are anticipated during or as a result of this construction.

4.6 Sole Source Aquifers

According to available RIGIS land use data, there are no sole source aquifers beneath the project area. As such, there will be no impact to sole source aquifers as a result of this project.

4.7 Farmlands and Agricultural Uses

According to available RIGIS land use data, there is no USDA regulated farmland located near or surrounding the project area. As such, there will be no impact to farmland as a result of this project.

4.8 Air Quality

Excavation and general construction activities will be performed as part of this project. Inherent air quality issues are associated with these types of projects such as dust generation and emissions from construction equipment. However, these impacts are anticipated to be of a short-term nature and are not expected to be of significant concern with proper controls.

Dust generated from excavation and spoils piles will be controlled using water for calcium chloride. Street sweeping will be required to remove any accumulated soil from roadways subject to traffic. Emissions from construction equipment will be consistent with that typical of construction equipment on projects of this nature. Construction vehicles will be required to meet the most recent RIDOT emissions standards.

No long-term impacts to air quality are anticipated. While new clarifiers are proposed, the treatment process will remain relatively unchanged and no change to emissions or significant air quality or odor concerns are expected.

4.9 Noise

Noise associated with construction is inevitable. Noise generated from construction equipment will be typical of that from construction equipment used on other projects of this nature.

The construction of the BPWWTF upgrades will require construction vehicles and site work. These projects will be constructed entirely within the BPWWTF site and will therefore be away from businesses and residences. The nearest abutters to the work zone include the landfill, cemetery, and industrial area to the north of the site. The nearest residential properties are located approximately 1,500 feet to the east of the work zone. Construction equipment will be equipped with mufflers that meet the most recent RIDOT standards to keep noise to a minimum. Hauling of construction materials and the staging of equipment and materials will be required; however, the effects of this activity will be short-term in nature. Construction activities will be scheduled during normal business hours (7 a.m. – 5 pm.). It is not anticipated that construction will occur beyond these working hours or on weekends.

Any noise impacts that do result from this project will be temporary, during construction activity. No long-term noise impacts will result from this project.

4.10 Vegetation and Wildlife

The construction of this project should have minimal impact to vegetation and wildlife because the project is proposed entirely within actively used areas of the BPWWTF site.

In accordance with Section 7 of the Endangered Species Act, official species lists from the online United States Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) tool were reviewed for determination of potential impacts to any federally listed or proposed, threatened, or endangered species and wildlife habitats within the project areas. No critical habitats under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur within the project area; however, one threatened species, the Northern long-eared bat, was identified within the project limits. This species roosts in cavities, hollows, or under loose bark of many different species of trees, and forages in a variety of forest types. Any proposed work that would disturb such trees and habitats would require additional investigations to determine potential impacts to the species and possible impact mitigation measures. This type of habitat is not expected to be encountered on the BPWWTF site, therefore, critical habitat is not anticipated to be impacted by this project. A letter from the USFWS identifying threatened and endangered species within the project area is provided in Appendix C.

Based on the proposed area for this project, it appears that there will be minimal impacts to vegetation and wildlife because the proposed work for the BPWWTF upgrades will be entirely within the existing treatment plant site which is already developed with wastewater treatment facilities. Vegetation removed as part of construction will be restored to its previous condition to the greatest extent possible.

4.11 Water Supply/Use

Water supply concerns are not applicable to this project. Some potable water will be used during the construction process (i.e., dust control and concrete mixing). This water use will be minor and of a short-term nature. Potable water used during construction will be obtained from onsite sources and appropriate backflow prevention will be used, so no impact to water supply systems are anticipated.

4.12 Soil Disturbance

Soil disturbance will occur as part of construction of this project. According to the Soil Survey of Rhode Island (accessed via the NRCS Online Web Soil Survey), the project is located within several soil classes. Soils within the project area are classified as Bigapple sand (BiB), Udorthents-Urban land complex (UD), and Urban land (UrS). Please refer to the attached soil map, identified as Figure A-4 in Appendix A, for a geographic representation of the underlying soils within the site of the proposed BPWWTF upgrades.

- BiB consists of bigapple sand and similar soils. This complex is approximately 90% bigapple sand and similar soils and 10% other soils, somewhat excessively drained Merrimac soils and areas of Urban land.
- UD consists of Udorthents soils and areas of Urban land. This complex is approximately 70 percent Udorthents soils, 20 percent Urban land, and 10 percent other soils. The available water capacity is high.
- UrS consists of Urban land. This complex is approximately 90 percent urban land, and 10 percent other soils.

Soil erosion and sedimentation, if left uncontrolled, is always a possible consequence of soil disturbance and earth work activities. It is also possible that contaminated soil is encountered during construction.

Geotechnical investigations will be performed to evaluate subsurface conditions and identify potential geotechnical and environmental constraints. Part of the scope of work for those investigations will include field screening of soil and groundwater as well as potential sample collection and laboratory analysis to assess for the presence of oil and/or hazardous materials in the subsurface. During geotechnical investigations and throughout the course of construction, appropriate project personnel will be directed to be aware of obvious signs of oils or hazardous materials in soils and groundwater through visual, olfactory, and PID field screening. Additionally, subsurface samples will be collected for laboratory analysis where deemed appropriate based on field screening, past site use, or other information compiled prior to or during construction. If any contaminated soil is encountered during the course of the subsurface investigation or construction, then RIDEM will be notified and appropriate remediation measures will be conducted, in accordance with RIDEM Remediation Regulations.

Erosion and sedimentation controls will be used throughout construction and disturbed areas will be restored as soon as possible.

4.13 Historical, Archaeological, and Cultural Resources

There are no historic sites or districts listed on the National Register of Historic Places within the proposed project area for the BPWWTF upgrades. Two historic properties, the Butler Hospital and Swan Point Cemetery are located in Providence across the Seekonk River from the BPWWTF. Figure A-5 depicts the project location relative to these resources.

NBC and the Rhode Island State Historic Preservation Office (now the RI Historic Preservation and Heritage Commission, RI HPHC) entered into a Programmatic Agreement (PA) prior to the initiation of Phase I of the CSO Program. As part of this PA, NBC has agreed to several stipulations for the protection of potentially affected properties and structures for the duration of the CSO Program. A copy of the PA is included in Appendix D. The proposed BPWWTF upgrades are not anticipated to disturb historical, archaeological, or cultural resources given the project's location entirely within the BPWWTF site.

4.14 Aesthetics

The project is located entirely within the BPWWTF site. While aesthetics are not anticipated to be a major concern for this project, construction of the new facilities will complement the appearance of existing facilities. Also, the site will be restored at the completion of construction.

4.15 Land Use

The project is proposed entirely within the BPWWTF site and construction will not impact offsite land uses.

4.16 Economic

This project is not expected to negatively impact local businesses because work will be entirely on the BPWWTF site and away from existing businesses and commerce. To the contrary, during the construction phase this project can be expected to benefit the local economy through increased local construction employment, material supplies, etc. NBC will endeavor to use local construction firms for this project if feasible. It is anticipated that much of the work required for the BPWWTF upgrades, if not all of it, could be constructed by construction firms that currently work in the local market.

4.17 Community Facilities

There are no community facilities within close proximity to the BPWWTF. Therefore, the proposed upgrades to the existing BPWWTF site are not anticipated to adversely impact community facilities.

4.18 Recreation

There are no parks or recreational areas within the BPWWTF site or within close proximity to the site. Therefore, the proposed upgrades to the existing BPWWTF site are not anticipated to adversely impact recreational facilities.

4.19 Safety

Construction safety will be a top priority and the project will adhere to all pertinent OSHA requirements. In addition to meeting these requirements, construction contractors will be required to provide a project-specific Health and Safety Plan (HASP) that details the safety risks of each project component and the necessary measures to avoid them.

The BPWWTF upgrades are proposed entirely within the existing treatment plant site and it is expected that the plant will remain operational throughout construction. During construction, unauthorized personnel will be prohibited from entering construction zones. Special attention will be made to ensure the safety of treatment plant personnel on site.

The work of this project is away from residences, businesses, and the general public whereas additional safety precautions are not anticipated to be required. The BPWWTF site is not open to the public but access to the construction site will be restricted by using temporary fences and construction signage.

4.20 Solid Waste

Solid waste will be generated during construction, much of which will consist of debris typical of construction activity. All construction debris and other solid waste will be disposed of in compliance with Federal, State, and local regulations. Surplus excavated soil that cannot be used as backfill, whether due to displacement by construction of permanent facilities or due to it being unsuitable for reuse, will also be generated. Construction contractors will be required to appropriately manage solid waste at the project site to prevent it from becoming a nuisance to NBC. Likewise, surplus soil shall be managed appropriately and hauled offsite to an appropriate facility. No long-term impacts associated with solid waste are anticipated as part of this project.

It is possible that contaminated soil will be encountered during the course of construction due to the amount of earthwork that is required. Contaminated soil may require disposal at a solid waste landfill or other disposal facility in accordance with the program's soils management plan, should it be encountered. Throughout construction, appropriate project personnel will be directed to be aware of obvious signs of oils or hazardous materials in soils and other types of solid waste through visual and olfactory observations. Additionally, subsurface soil samples will be collected for laboratory analysis where deemed appropriate based on field screening, past site use, or other information compiled prior to or during construction. If any contaminated soil is encountered during subsurface investigation or construction, then RIDEM will be notified and appropriate remediation measures will be conducted, in accordance with RIDEM Remediation Regulations. Contaminated soil, should it be encountered, may require disposal at a solid waste landfill or other disposal facility.

4.21 Traffic and Business Activities

This project will be constructed entirely within the BPWWTF site and away from existing roadways and rights-of-way. Construction vehicle traffic is anticipated to be minimal, limited to the movement of personnel, material deliveries, and surplus soil hauling over access roadways currently used by NBC. As such, no significant short-term or long-term traffic impacts are anticipated as a result of this project.

4.22 Other Indirect Impacts

Indirect environmental impacts are those which result from the circumstances imposed by the implementation of this project that have not specifically been addressed elsewhere in this EA. Because this project will be confined to the BPWWTF site, no short-term or long-term adverse indirect environmental impacts are anticipated.

The primary goal of the Phase III CSO Program is to improve water quality in Narragansett Bay and surrounding surface water bodies. Though difficult to measure, there may be indirect benefits associated with implementation of this program and specifically the proposed upgrades to the BPWWTF. This might include increased recreational opportunities resulting from improved water quality, advances in tourism and development from positive public relations, and overall improvements in community pride. However, significant growth in development and population directly linked to this program is not anticipated.

Section 5.0
Public Participation

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5.0 Public Participation

This section describes the public participation process as it relates to this EA.

5.1 Public Meeting

A public meeting for the BPWWTF Environmental Assessment and Facilities Plan Amendment was scheduled for 10:00 am at NBC offices on October 25, 2018 to discuss project scope, alternatives, and the preferred BPWWTF upgrades of new final clarifiers and possible polymer injection. The public meeting was advertised in the Providence Journal and on the NBC website 30 days in advance of the meeting. No members of the public attended, and the meeting was closed.

The newspaper advertisement, sign-in sheet, and presentation materials prepared for the meeting are included in Appendix E.

5.2 Public Hearing

A Public Hearing will be scheduled following RIDEM review of the Draft EA. The public hearing will be held to review the recommended plan, addressing any substantive comments received from the public, RIDEM, and other inter-governmental review agencies. Similar to the public meeting, it will be conducted at NBC and will be advertised in the Providence Journal and on the NBC website 30 days in advance of the meeting. Presentation materials and meeting minutes from the public hearing will be added to Appendix E of the Final EA.

Since the Public Meeting was conducted, NBC has determined that replacement of the UV Disinfection system is required. NBC has also considered the potential future need for a CEPT facility, though such a facility is not currently proposed and will be evaluated in the future based on plant performance. This is further addressed in the Facilities Plan Amendment. These changes to the project will be addressed during the Public Hearing.

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Section 6.0

Agency Coordination and Review

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6.0 Agency Coordination and Review

Several agencies were contacted as part of this EA. Each agency was provided a conceptual site plan and sketch showing the addition of two new final clarifiers as well as a cover letter describing these modifications. The following agencies were contacted:

- Rhode Island Coastal Resources Management Council (RI CRMC);
- Rhode Island Department of Environmental Management-Division of Fish and Wildlife;
- Rhode Island Department of Environmental Management - Office of Technical and Customer Assistance;
- Rhode Island Division of Planning;
- Narragansett Tribal Historic Preservation Office (NTHPO);
- NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO);
- USDA Natural Resources Conservation District;
- Rhode Island Historic Preservation and Heritage Commission; and
- Rhode Island Department of Transportation (RIDOT).

Letters were distributed on September 26, 2018 by certified mailings and review comments were requested from each agency within 30 days of their receipt of the letter. Certified mail return receipts were received from most agencies, and several of these agencies have not provided any comments to date. These include:

- Rhode Island Coastal Resources Management Council;
- NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO);
- USDA Natural Resources Conservation District; and
- Rhode Island Historic Preservation and Heritage Commission.

Return receipts were not received from the letters sent to the Narragansett Tribal Historic Preservation Office (NTHPO) and RIDOT. Based on past correspondence with the NTHPO, the letter was sent via email on Wednesday, November 7th but no comments have been received.

Three agencies, the RIDEM Division of Fish and Wildlife, RIDEM Office of Technical and Customer Assistance, and Rhode Island Division of Planning provided comments. The following sections summarize the review comments received from these agencies. Copies of the comment letters received are included as Appendix F.

6.1 RIDEM Division of Fish and Wildlife

Comments were received from the RIDEM Division of Fish and Wildlife via email on October 26, 2018, as summarized below. Response to these comments follows.

<u>Comments</u>:
We have recent records of diamond-backed terrapins in the immediate area of the facility in question. Diamond-backed terrapins are a ‘critically imperiled’ species in the state. The species spends the majority of its life in the water column but will come into the uplands to bask and nest. There is an unvegetated area (between points “2” and “218” on figure provided) on the

property that, from aerial imagery, looks like it could be appropriate nesting habitat. Have terrapins ever been observed using this area or in any other area that may be impacted by construction?

Response:
All work associated with implementing the recommended alternative described herein is interior to the existing, armored coastal levee that surrounds the BPWWTF. No shoreline survey has been conducted to identify the presence of diamond-backed terrapins and/or appropriate nesting habitats.

Comments:
Also, it is not entirely clear what the nature of the construction in question will entail. The figures provided by you appear to indicate the construction of three additional outfalls as well as the construction of a tunnel shaft between the yellow squares on the figures. Is this a correct interpretation? Will there be an additional tunnel built underwater between points “2” (on east side of Seekonk River) and “27” (on west side of Seekonk River)? If not, what will be the source of the water being deposited by the outfall on the west side of the river and what will be the scale of construction associated with this feature?

Response:
The purpose of the EA and Facilities Plan Amendment is to update flows and loads to the BPWWTF for a 20-year planning period as well as to make required upgrades to the facility to meet RIPDES discharge limits. Construction associated with these upgrades is entirely within the current operational footprint of the BPWWTF. The construction associated with the recommended alternative include the following elements: construction of two secondary clarifiers, associated process piping, upgrade to existing pump facilities, and miscellaneous instrumentation. As noted above, all proposed work is landward of the existing coastal levee that protects the plant.

Please note the outfalls represented above (i.e. 2, 27, 218) are existing combined sewer overflows. Outfall 27 is a CSO within the combined sewer that is within the sewershed of the Fields Point system in Providence. Outfall 27 has been addressed by sewer separation during the previous phase of the CSO program. No tunnel and/or conveyance conduit is proposed between outfall 27 and outfall 218.

Comments:
As a general question, will there be any temporary or permanent constructed features that may be accessible to a terrapin swimming in the water column at any point during the tidal cycle?

Response:
No work is proposed seaward of the existing levee.

6.2 RIDEM Office of Technical and Customer Assistance

Comments were received from the RIDEM Office of Technical and Customer Assistance via email on November 15, 2018, as summarized below. Response to these comments follows.

Comments:

The only comments that we have at this time is that NBC must ensure that the schedule to complete the Phase III CSO project must comply with the requirements from their consent agreement RIA-424, which was entered into between the NBC and DEM on September 6, 2018.

Also, it appears that he project will improve water quality in the river. It may need a RIPDES Construction General Permit (CGP).

Responses:

NBC acknowledges and will comply with the schedule of major milestones for the Phase III CSO Program laid out in Consent Agreement RIA-424. It is also understood that a RIPDES Construction General Permit (CGP) may be required for the BPWWTF upgrades project.

6.3 Rhode Island Division of Planning

Comments were received from Ms. Nancy Hess of the Rhode Island Division of Planning via email on October 24, 2018, as summarized below. Response to these comments were provided by email and certified mail on November 14, 2018. Ms. Hess responded by email on November 15, 2018 indicating that her comments have been adequately addressed.

A summary of the comments from October 24th and the responses issued November 14th follow.

Comments:

Please be advised that there have been several changes to the State Guide which are pertinent to your review. The following Elements have been rescinded and no longer need to be checked within project assessments:

- 110, Goals 7 Policies
- 112, Ruse of Surplus Military Lands
- 162, Rivers Policy & Classification Plan
- 621, Policy Statement for …Public transit…
- 711, Blackstone Region Water Resources Management Plan
- 715, CCMP for Narraganset Bay, 912, Howard Center Master Plan

There has been an update to the Element 731, Nonpoint Source Pollution Management Plan. It was replaced with a new Element, *Water Quality 2035*. It was adopted by the State Planning Council on October 13, 2016. This Element is most relevant to your project.

Would you please resubmit your assessment considering the updated information on the State Guide Plan?

Responses:

As indicated in the above comments, several State Guide Plan (SGP) elements have been rescinded and are therefore no longer necessary for review with respect to project assessments. These are as follows:

- Element 110: Goal and Policies for the Development of Rhode Island
- Element 112: Resources Management in the Reuse of Surplus Navy Lands
- Element 162: Rivers Policy and Classification Plan
- Element 621: Policy Statement – Proposals for New or Restructured Public Transit Facilities or Service
- Element 711: Blackstone Region Water Resource Management Plan
- Element 715: Comprehensive Conservation and Management Plan for Narragansett Bay
- Element 912: Howard Center Master Plan

SGP Elements 110, 112, 621, and 912 were not applicable to this project. The comments also indicated that Element 731: Nonpoint Source Pollution Management, was replaced with a new element, Water Quality 2035. Water Quality 2035 updates and replaces former SGP Element 731 as well as SGP Elements 162, 711, and 715.

It was also noted that Water Quality 2035 appears to be the SGP Element most relevant to this project. As such, it was requested that we update our assessment based on the findings of our review of this element. An assessment of how Water Quality 2035 relates to this project follows.

Water Quality 2035

Water Quality 2035 is the State's plan to protect and restore the quality of Rhode Island's water resources. It encompasses freshwater and saltwater surface waters, groundwaters, and wetlands – from inland lakes and streams to Narragansett Bay and coastal salt marshes. Central to this plan is a focus on watersheds as the appropriate basis for management of water resources. It is intended that state agencies will integrate work at the watershed scale and identify ways that such work can align with and support the related activities of municipal, regional, and federal agencies; watershed organizations; and other entities.

The primary goals of Water Quality 2035 are to promote:

- Protection of existing quality of RI's waters and aquatic habitats and prevention of further degradation.
- Restoration of degraded waters and aquatic habitats to a condition that meets their water quality and habitat goals.

The goals and objectives of the Phase III CSO Program, and in turn the environmental benefits that will result by the proposed upgrades to the BPWWTF, help realize the State's goal of protecting existing water quality and preventing further degradation of Rhode Island's waterways. Upgrades are required to the BPWWTF to better treat the increase in flow expected once proposed CSO abatement facilities are constructed. An alternatives evaluation was performed, and the currently preferred alternative of two (2) new secondary clarifiers and a polymer injection system provides the best effluent water quality of all the alternatives considered. The proposed upgrades will also provide more operational flexibility allowing for better treatment of wastewater to meet new RIPDES discharge limits. The Facilities Plan Amendment will present the alternatives evaluated and identify the preferred alternative.

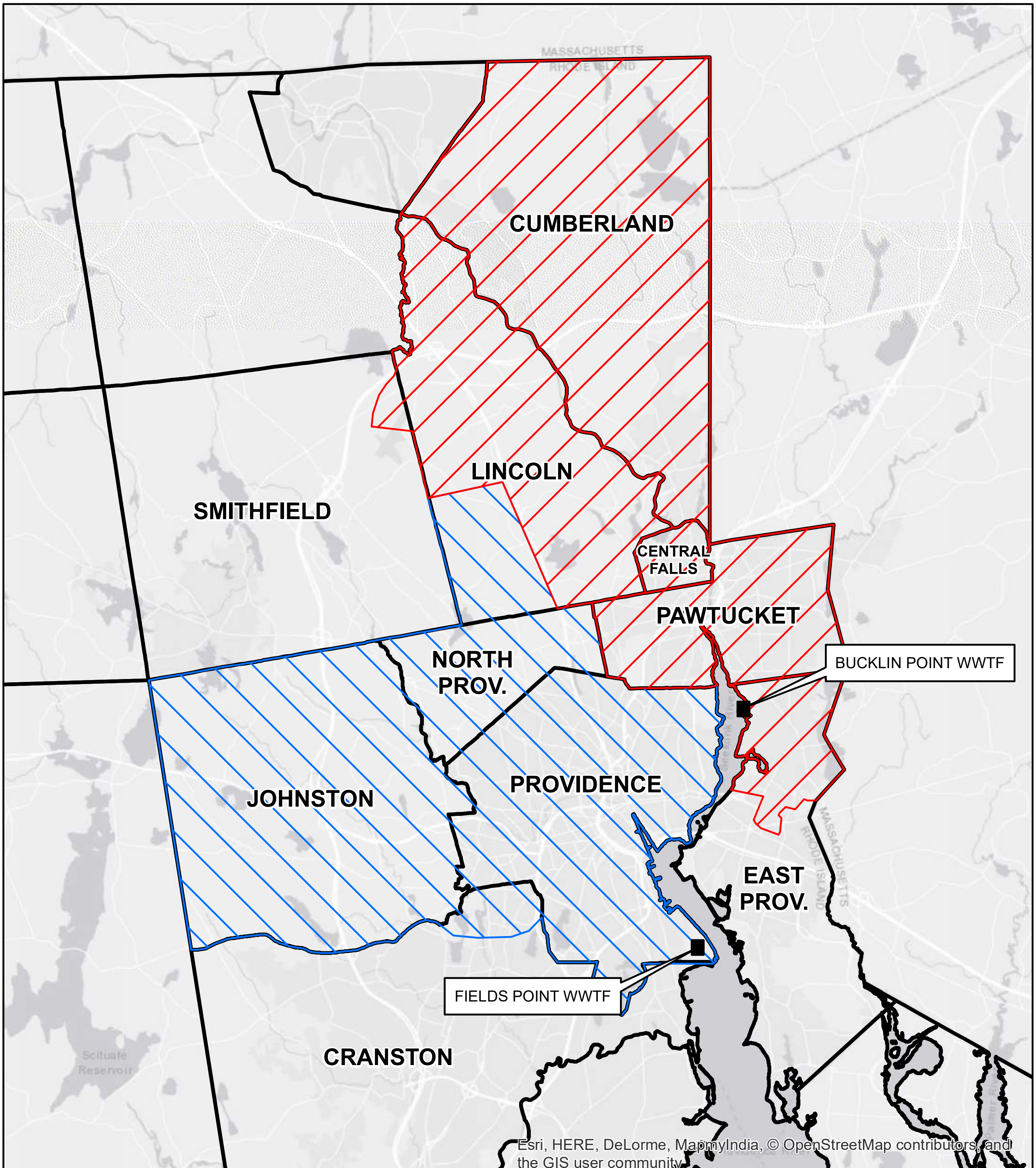
"Wastewater discharges to surface waters and collection sewers" are classified as pollution sources in Water Quality 2035. Combined sewer overflows and effluent discharges from WWTFs are cited as sources of biological and nutrient loading to Rhode Island waters. NBC's CSO Program and their operation of the two largest WWTFs in the State are specifically referenced. Ten policies are identified in Water Quality 2035 with respect to managing possible impacts from WWTF discharges and CSO overflows, several of which relate to NBC's operations. The proposed improvements to the Bucklin Point WWTF, and to a greater extent the Phase III CSO Program as a whole, are consistent with these policies.

Based on our assessment, it appears that the proposed project furthers the State's goals of protecting water quality in Rhode Island and maintains consistency with the policies presented in Water Quality 2035.

6.4 United States Fish and Wildlife Service

In lieu of issuing a letter requesting project review, the US Fish and Wildlife Service (FWS) requires that applicants obtain official species lists from their online Information for Planning and Conservation (IPaC) tool for determination of potential impacts to any federally listed or proposed, threatened, or endangered species and wildlife habitats within the proposed project areas. This was performed for the project area. This has been addressed in Section 4.10 of this EA. Refer to Appendix C for information obtained from the US FWS relative to endangered species and wildlife habitats.

Appendix A
Figures



LEGEND:

- Bucklin Point Service Area
- Fields Point Service Area
- Town Lines

N W E S

13,000 6,500 0 13,000 Feet

TITLE:

NBC SERVICE AREAS

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **A-1**

LEGEND:

Property Line

N
W E
S

600 300 0 600 Feet

TITLE:

BUCKLIN POINT AERIAL

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **A-2**

LEGEND:

Water Use Categories

- Conservation Area
- Multi-Purpose Water
- Industrial Waterfronts and Commercial Navigation Channels

- Property Line
- 200' Contingous Area
- RIGIS Stream
- RIGIS Wetland

600 300 0 600 Feet

N W E S

TITLE:

WETLAND RESOURCES

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **A-3**

LEGEND:

BiB Bigapple sand, 0 to 8 percent slopes
FtA Fortress sand, 0 to 3 percent slopes
HkA Hinckley gravelly sandy loam, 0 to 3 % slopes
HkC Hinckley gravelly sandy loam, rolling
MU Merrimac sandy loam, 3 to 8 % slopes
MmB Merrimac-Urban land complex
UD Udorthents-Urban land complex
UrS Urban land, 0 to 3 percent slopes, sandy substratum
W Walpole sandy loam
Wa Water
Ws Water, saline

600 300 0 600 Feet

TITLE:

SOIL TYPES

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018
Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **A-4**

LEGEND:

- Property Line
- Phillipsdale Historic District Study Area
- Historic Candidate Site
- Historic Cemetery

N W E S

600 300 0 600 Feet

TITLE:

HISTORIC RESOURCES

PHASE III CSO CONTROL FACILITIES PROGRAM

REFERENCE(S): DATE: DECEMBER 2018

Coordinate System: NAD83 Rhode Island ft
Units: Foot US

Stantec

PARE CORPORATION

FIGURE: **A-5**

Appendix B

FEMA FIRM Maps

National Flood Hazard Layer FIRMette

FEMA

41°51'16.10"N

71°22'27.84"W

71°21'50.39"W

41°50'49.30"N

Feet 0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/16/2018 at 9:08:43 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix C
US Fish and Wildlife Reports

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN RHODE ISLAND

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Bristol	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- Unknown, Summer – wide variety of forested habitats	Statewide
Kent	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter-Unknown, Summer – wide variety of forested habitats	Statewide
Newport	Piping Plover	Threatened	Coastal Beaches	Little Compton, Middletown, Tiverton
	Roseate Tern	Endangered	Coastal beaches, islands and the Atlantic Ocean	Newport
	Red knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- Unknown, Summer – wide variety of forested habitats	Statewide
Providence	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Glocester
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- Unknown, Summer – wide variety of forested habitats	Statewide
Washington	Roseate Tern	Endangered	Coastal beaches, islands and the Atlantic Ocean	Westerly
	Piping Plover	Threatened	Coastal Beaches	Narragansett, Charlestown, Westerly, New Shoreham and South Kingstown.
	Red knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal towns
	American burying beetle	Endangered	Upland grassy meadows	New Shoreham
	Sandplain Gerardia	Endangered	Sandplain grasslands	Charlestown, Exeter, Richmond
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter - Unknown, Summer – wide variety of forested habitats	Statewide

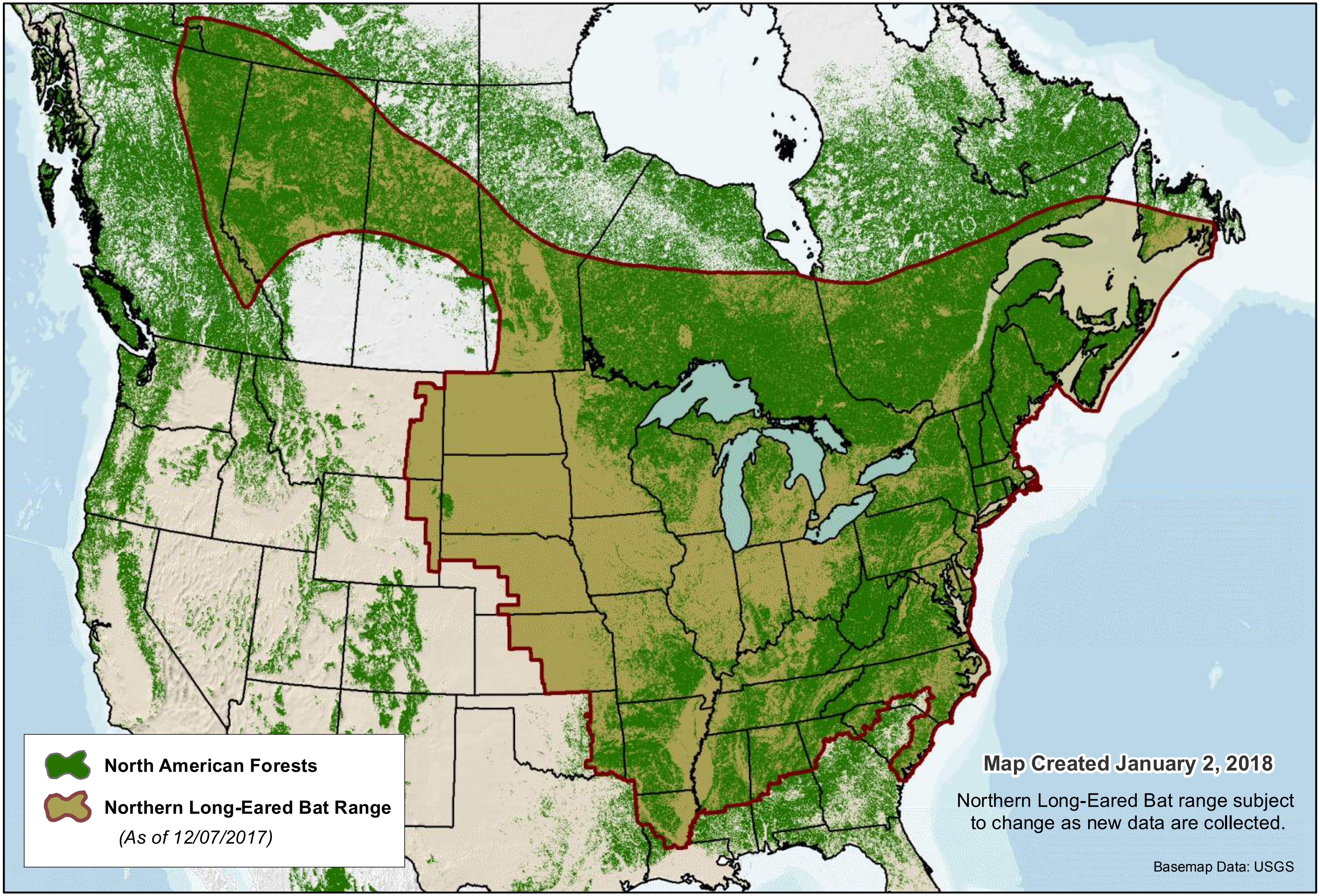
[1]Migratory only, scattered along the coast in small numbers

-Eastern cougar, gray wolf and Northeastern beach tiger beetle are considered extirpated in Rhode Island.

-There is no federally-designated Critical Habitat in Rhode Island.

U.S. Fish & Wildlife Service

Northern Long-Eared Bat Range



U.S. Fish & Wildlife Service

ECOS **Environmental Conservation Online System**

Conserving the Nature of America

Search ECOS

ECOS / Species Profile for Northern long-eared Bat (Myotis septentrionalis)

Northern Long-Eared Bat (Myotis septentrionalis)

Range Information | Federal Register | Recovery | Critical Habitat | Conservation Plans | Petitions | Biological Opinions Life History

Taxonomy: View taxonomy in ITIS

Listing Status: Threatened

Where Listed: WHEREVER FOUND

General Information

The northern long-eared bat is a medium-sized bat about 3 to 3.7 inches in length but with a wingspan of 9 to 10 inches. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, Myotis, which are actually bats noted for their small ears (Myotis means mouse-eared). The northern long-eared bat is found across much of the eastern and north central United States and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. The species' range includes 37 states. White-nose syndrome, a fungal disease known to affect bats, is currently the predominant threat to this bat, especially throughout the Northeast where the species has declined by up to 99 percent from pre-white-nose syndrome levels at many hibernation sites. Although the disease has not yet spread throughout the northern long-eared bat's entire range (white-nose syndrome is currently found in at least 25 of 37 states where the northern long-eared bat occurs), it continues to spread. Experts expect that where it spreads, it will have the same impact as seen in the Northeast.

The species historical range included Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, Wyoming. See below for information about where the species is known or believed to occur.

Current Listing Status Summary

Status	Date Listed	Lead Region	Where Listed
Threatened	05/04/2015	Great Lakes-Big Rivers Region (Region 3)	Wherever found Additional species information

» Range Informa

Current Range

Wher

Zoom in! Some sp
and hard to see fr
narrow-in on locat
county lists (below) and then use the zoom tool

Want the FWS's current range for all species?
Click here to download a zip file containing all individual shapefiles and metadata for all species.

- **Wherever found**

  Listing status: Threatened

  - **States/US Territories** in which this population is known to or is believed to occur: Alabama , Arkansas , Connecticut , Delaware , District of Columbia , Georgia , Illinois , Indiana , Iowa , Kansas , Kentucky , Louisiana , Maine , Maryland , Massachusetts , Michigan , Minnesota , Mississippi , Missouri , Montana , Nebraska , New Hampshire , New Jersey , New York , North Carolina , North Dakota , Ohio , Oklahoma , Pennsylvania , Rhode Island , South Carolina , South Dakota , Tennessee , Vermont , Virginia , West Virginia , Wisconsin , Wyoming
  - **US Counties** in which this population is known to or is believed to occur: View All
  - **USFWS Refuges** in which this population is known to occur: Moosehorn National Wildlife Refuge

» Federal Register Documents

Federal Register Documents

Show 10 entries

Date	Citation Page	Title
06/20/2016	81 FR 39947	Draft Environmental Assessment, Draft Habitat Conservation Plan, and Draft Implemen an Application for an Incidental Take Permit, Wildcat Wind Farm, Madison and Tipton C
04/27/2016	81 FR 24707 24714	Determination That Designation of Critical Habitat Is Not Prudent for the Northern Long determination.
01/14/2016	81 FR 1900 1922	4(d) Rule for the Northern Long-Eared Bat; Final rule
04/02/2015	80 FR 17973 18033	Threatened Species Status for the Northern Long-Eared Bat With 4(d) Rule
01/30/2015	80 FR 5079	Listing the Northern Long-Eared Bat With a Rule Under Section 4(d) of the Act; Correct
01/16/2015	80 FR 2371 2378	Listing the Northern Long-Eared Bat With a Rule Under Section 4(d) of the Act
11/18/2014	79 FR 68657 68659	Endangered Species Status for the Northern Long-Eared Bat: Reopening of comment p
06/30/2014	79 FR 36698 36699	6-Month Extension of Final Determination on the Proposed Endangered Status for the N
12/02/2013	78 FR 72058 72059	Listing the Northern Long-Eared Bat as an Endangered Species
10/02/2013	78 FR 61045 61080	12-Month Finding on a Petition To List the Eastern Small-Footed Bat and the Northern L Endangered or Threatened Species; Listing the Northern Long-Eared Bat as an Endang Rule

Showing 1 to 10 of 11 entries

‹ Previous 1 2 Next ›

Special Rule Publications

Show 10 entries

Date	Citation Page	Title
01/14/2016	81 FR 1900 1922	4(d) Rule for the Northern Long-Eared Bat; Final rule
04/02/2015	80 FR 17973 18033	Threatened Species Status for the Northern Long-Eared Bat With 4(d) Rule

Showing 1 to 3 of 3 entries ‹ Previous 1 Next ›

» Recovery

- Recovery Plan Information Search
- Information Search FAQs

No recovery information is available for the Northern long-eared Bat.

» Critical Habitat

Show 10 entries

Date	Citation Page	Title	Document Type
04/27/2016	81 FR 24707 24714	Determination That Designation of Critical Habitat Is Not Prudent for the Northern Long-Eared Bat: Critical habitat determination.	Notice of rule correcti rule withdrawal or rule

Showing 1 to 1 of 1 entries ‹ Previous 1 Next ›

To learn more about critical habitat please see http://ecos.fws.gov/crithab

» Conservation Plans

Habitat Conservation Plans (HCP) (learn more)

Show 10 entries

HCP Plan Summaries
Wildcat Wind Farm
Pioneer Trail Wind Farm E.ON
Hoopeston HCP

Showing 1 to 3 of 3 entries ‹ Previous 1 Next ›

» Petitions

Show 10 entries

Showing 1 to 2 of 2 entries

‹ Previous 1 Next ›

» Biological Opinions

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
08/05/2015	Assistant Regional Director-Ecological Services	Southern Region National Forests northern long-eared bat	04E00000-2015-F-0003	Land Management Plans - Forest		Forest Service	Biological Opinion Rendered (Final) _04E00000-2015-E-00008
07/16/2015	Tennessee Ecological Services Field Office	ER# 15/0275 Proposed Broad Run Expansion Project	04ET1000-2015-F-0633	Oil / Gas Pipeline - Onshore - New Constr - Above Ground		Federal Energy Regulatory Commission	Biological Opinion Rendered (Final) _04ET1000-2015-E-01540
12/17/2015	Assistant Regional Director-Ecological Services	Tennessee FO Participation in Conservation MOUs for the Indiana Bat and/or Northern Long-eared Bat	04E00000-2016-F-0001	Land Acquisition - Forest, Land Clearing - Forest, Land Preservation - Forest, Land Restoration / Enhancement - Forest		Fish and Wildlife Service	Biological Opinion Rendered (Final) _04E00000-2016-E-00001
12/22/2015	Kentucky Ecological Services Field Office	Hwy 92 realignment	04EK1000-2016-F-0023	Transport - Road / Hwy - M / M / R / U - Federal		Federal Highway Administration	Biological Opinion Rendered (Final) _04EK1000-2016-E-00440
01/12/2016	Kentucky Ecological Services Field Office	LG&E Trimble County Special Waste Landfill	04EK1000-2015-F-0385	Landfill		Army Corps of Engineers	Biological Opinion Rendered (Final) _04EK1000-2016-E-00442

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
05/15/2015	Arkansas Ecological Services Field Office	Wolf Pen Gap, Wolf Pen Gap BO	04ER1000-2013-F-0735, 04ER1000-2015-F-0598	RECREATION CONSTRUCTION / MAINTENANCE, Recreation - Maint / Mod / Replace / Upgrade		Forest Service	Biological Opinion Rendered (Final) _04ER1000-2015-E-00416
01/29/2016	Arkansas Ecological Services Field Office	Diamond Pipeline Project	04ER1000-2016-F-0255	Oil / Gas Pipeline - Onshore - New Constr - Below Ground		Army Corps of Engineers	Biological Opinion Rendered (Final) _04ER1000-2016-E-00126
02/06/2017	Tennessee Ecological Services Field Office	Forest Management Activities Affecting NLEBs & IN Bats on Region 4 NWRs	04ET1000-2015-F-0653	Fire - Prescribed Burn, FORESTRY, Forestry - Clearing, Forestry - Harvest, Forestry - Pesticide Use, Forestry - Planting / Silviculture, Forestry - Weed Control / Vegetation Management, Land Restoration / Enhancement - Forest		Fish and Wildlife Service	Biological Opinion Rendered (Final) _04ET1000-2017-E-00502

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
01/06/2016	Tennessee Ecological Services Field Office	AEDC (AFMC) Routine Training, Land Mgmt and Elk River Dam Operations	04ET1000-2015-F-0420	Agriculture - Crop Maintenance, Dam - Maint / Mod / Replace / Upgrade - Federal, Development - Government / Military, Fire - Control / Suppression, Fire - Prescribed Burn, Forestry - Clearing, Forestry - Harvest, Forestry - Timber Sale, Forestry - Weed Control / Vegetation Management, Invasive Plant Control, Land Clearing - Other, Land Clearing - Upland, Land Management Plans - Other, Land Restoration / Enhancement - Forest, Military - Maneuvers, Military - Operations, Transport - Airport - Maint / Mod / Replace / Upgrade, Transport - Road / Hwy - M / M / R / U - Federal, Veg Management - Fire - Forest, Veg Management - Mechanical, Veg Management - Pesticide / Chem - Upland, Water Quality Mod - Stormwater Discharge, Water Quality Mod - Stormwater Discharge with NPDES Permit	Coffee (TN), Franklin (TN)	DEPT OF DEFENSE	Biological Opinion Rendered (Final) _04ET1000-2016-E-01566

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
07/27/2017	Kentucky Ecological Services Field Office	USDOJ Federal Bureau of Prisons, Letcher Co. KY	04EK1000-2014-F-0421	** OTHER **		Federal Bureau of Prisons	Biological Opinion Rendered (Final) _04EK1000-2017-E-02279
02/09/2018	Alabama Ecological Services Field Office	GeoSense - Licensing_Demopolis Lock & Dam Hydroelectric -Marengo & Sumter Co AL	43410-2011-F-0682	Power Gen - Hydropower - New License - FERC	Greene (AL)	Federal Energy Regulatory Commission	Biological Opinion Rendered (Final) _04EA1000-2018-E-01229

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
04/12/2018	Tennessee Ecological Services Field Office	Evaluation of Impacts of TVA's Routine Actions on Four Federally Listed Bats	04ET1000-2018-F-0017	Development - Government / Municipal, Fire - Prescribed Burn, Forestry - Clearing, Forestry - Harvest, Forestry - Pesticide Use, Forestry - Planting / Silviculture, Forestry - Weed Control / Vegetation Management, Invasive Plant Control, Land Clearing - Forest, Land Creation - Forest, Land Easement / Right-of-Way - Forest, Land Easement / Right-of-Way - Other, Land Restoration / Enhancement - Forest, Power Gen - Coal, Power Gen - Natural Gas, Power Gen - Nuclear, Recreation - Maint / Mod / Replace / Upgrade, Recreation - New Construction, Stream Preservation, Transmission Line - Electrical - M / M / R / U - Above Ground, Transmission Line - Electrical - New Constr - Above Ground, Transport - Road / Hwy - M / M / R / U - Federal, Transport - Road / Hwy - New Constr - Federal, Veg Management - Fire, Veg Management - Fire		Tennessee Valley Authority (Federal Government)	Biological Opinion Rendered (Final) _04ET1000-2018-E-01049

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
				- Forest, Veg Management - Fire - Grassland, Veg Management - Fire - Invasives, Veg Management - Mechanical - Forest, Veg Management - Mechanical - Grassland, Veg Management - Mechanical - Invasives, Veg Management - Pesticide / Chem - Forest, Veg Management - Pesticide / Chem - Grassland, Veg Management - Pesticide / Chem - Invasives			

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
04/12/2018	Tennessee Ecological Services Field Office	Evaluation of Impacts of TVA's Routine Actions on Four Federally Listed Bats	04ET1000-2018-F-0017	Development - Government / Municipal, Fire - Prescribed Burn, Forestry - Clearing, Forestry - Harvest, Forestry - Pesticide Use, Forestry - Planting / Silviculture, Forestry - Weed Control / Vegetation Management, Invasive Plant Control, Land Clearing - Forest, Land Creation - Forest, Land Easement / Right-of-Way - Forest, Land Easement / Right-of-Way - Other, Land Restoration / Enhancement - Forest, Power Gen - Coal, Power Gen - Natural Gas, Power Gen - Nuclear, Recreation - Maint / Mod / Replace / Upgrade, Recreation - New Construction, Stream Preservation, Transmission Line - Electrical - M / M / R / U - Above Ground, Transmission Line - Electrical - New Constr - Above Ground, Transport - Road / Hwy - M / M / R / U - Federal, Transport - Road / Hwy - New Constr - Federal, Veg Management - Fire, Veg Management - Fire		Tennessee Valley Authority (Federal Government)	Biological Opinion Rendered (Final) _04ET1000-2018-E-01049

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
				- Forest, Veg Management - Fire - Grassland, Veg Management - Fire - Invasives, Veg Management - Mechanical - Forest, Veg Management - Mechanical - Grassland, Veg Management - Mechanical - Invasives, Veg Management - Pesticide / Chem - Forest, Veg Management - Pesticide / Chem - Grassland, Veg Management - Pesticide / Chem - Invasives			
10/15/2018	Kentucky Ecological Services Field Office	Fort Knox INRMP	04EK1000-2018-F-0797	MILITARY OPERATIONS / MANEUVERS	Bullitt (KY), Hardin (KY), Meade (KY)	Department of Defense (DOD) - Army	Biological Opinion Rendered (Final) _04EK1000-2019-E-00099
11/29/2018	Kentucky Ecological Services Field Office	CVG Amazon Development	04EK1000-2017-F-0412	DEVELOPMENT	Boone (KY)	Federal Aviation Administration	Biological Opinion Rendered (Final) _04EK1000-2019-E-00577
05/20/2016	Assistant Director-Ecological Services	Programmatic BO for Transportation Projects in the Range of the Ibat and NLEB	09E00000-2016-F-0001	Transport - Railroad - Maint / Mod / Replace / Upgrade, Transport - Road / Hwy - M / M / R / U - Federal		Federal Highway Administration	Biological Opinion Rendered (Final) _09E00000-2016-E-00002
02/05/2018	Assistant Director-Ecological Services	Programmatic BO for Transportation Projects in the Range of the Ibat and NLEB	09E00000-2016-F-0001	Transport - Railroad - Maint / Mod / Replace / Upgrade, Transport - Road / Hwy - M / M / R / U - Federal		Federal Highway Administration	Biological Opinion Rendered (Amendment) _09E00000-2018-E-00121

BO date	Lead Office	Title	Activity Code	Project Type	Location	Lead Agency	Document
05/11/2017	Arkansas Ecological Services Field Office	USFS_Mena Ogden Dist_West Chula Project_AR	04ER1000-2017-F-0239	Forestry - Clearing, Forestry - Harvest, Forestry - Pesticide Use, Forestry - Planting / Silviculture, Forestry - Timber Sale, Invasive Plant Control, Stream Restoration / Enhancement, Veg Management - Fire	Montgomery (AR), Yell (AR)	Forest Service	Biological Opinion Rendered (Final) _04ER1000-2017-E-02028
11/20/2018	South Carolina Ecological Services	P/N 2016-00756, Peter Lawson, Berkeley County, SC	04ES1000-2018-F-0954	Development - Residential	Berkeley (SC)	Army Corps of Engineers	Biological Opinion Rendered (Final) _04ES1000-2019-E-00244
05/24/2018	West Virginia Ecological Services Field Office	Threedubs CF - Grizzel Alternative 1	05E2WV00-2018-F-0246	OIL OR GAS	Brooke (WV)	Army Corps of Engineers	Biological Opinion Rendered (Final) _05E2WV00-2018-E-02662

To see all Issued Biological Opinions please visit the report .

» Life History

Habitat Requirements

During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible.

Food Habits

Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces.

Reproductive Strategy

Breeding begins in late summer or early fall when males begin swarming near hibernacula. After copulation, females store sperm during hibernation until spring, when they emerge from their hibernacula, ovulate, and the stored sperm fertilizes an egg. This strategy is called delayed fertilization. After fertilization, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies, with young, generally have 30 to 60 bats, although larger maternity colonies have been observed. Most females within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Adult northern long-eared bats can live up to 19 years.

» Other Resources

NatureServe Explorer Species Reports -- NatureServe Explorer is a source for authoritative conservation information on more than 50,000 plants, animals and ecological communtities of the U.S and Canada. NatureServe Explorer provides in-depth information on rare and endangered species, but includes common plants and animals too. NatureServe Explorer is a product of NatureServe in collaboration with the Natural Heritage Network.

ITIS Reports -- ITIS (the Integrated Taxonomic Information System) is a source for authoritative taxonomic information on plants, animals, fungi, and microbes of North America and the world.

FWS Digital Media Library -- The U.S. Fish and Wildlife Service's National Digital Library is a searchable collection of selected images, historical artifacts, audio clips, publications, and video.

Appendix D

Programmatic Agreement (NBC and RI Historic Preservation and Heritage Commission

The Narragansett Bay Commission
One Service Road
Providence, Rhode Island 02905

401 • 461 • 8848
401 • 461 • 6540 FAX
401 • 461 • 6549 TDD

http://www.narrabay.com

Vincent J. Mesolella
Chairman

Paul Pinault, P.E.
Executive Director

April 1, 2003

Don L. Klima, Director
Eastern Office of Review
Advisory Council on Historic Preservation
Old Post Office Building
1100 Pennsylvania Avenue NW
Washington, D.C. 20004

Re: Narragansett Bay Commission
Combined Sewer Overflow Control Facilities Program
Programmatic Agreement

Dear Mr. Klima:

Please find enclosed a copy of the executed Programmatic Agreement between the Narragansett Bay Commission (NBC) and the Rhode Island State Historic Preservation Office (SHPO) for the NBC Combined Sewer Overflow Control Facilities Program in Rhode Island. This Agreement was prepared in compliance with Section 106 of the National Historic Preservation Act (16 U.S.C. 470f) and as provided for in 36 CFR 800.14(b)(1)(ii).

By letter of July 23, 2002, in accordance with 36 CFR 800.6(a)(1)(C), the Bay Commission notified the Council of its finding that the undertaking may have an adverse effect on historic properties, including properties yet to be identified, and invited the Council to participate in development of a Programmatic Agreement. Since the Council did not express in writing its intention to participate in the consultations, the Bay Commission proceeded to develop the Agreement in consultation with the SHPO. By letter of September 11, 2002, the Bay Commission forwarded a draft Agreement to the SHPO for review and comment and to the Narragansett Indian Tribe in the event that the Tribe wished to be a party to the consultation. The Bay Commission received no comment or other communication from the Tribe concerning the proposed Agreement and therefore concluded that the Tribe did not wish to participate. Please note also that the Rhode Island Department of Transportation declined to concur in the Agreement on the grounds that it had no legal responsibilities with reference to the undertaking.

Don L. Klima, Director
April 1, 2003

The Bay Commission understands that submission of this executed Agreement to the Council concludes the Section 106 process for this undertaking. If you have any questions, please contact Joe Pratt at (401) 521-5980.

Sincerely,

THE NARRAGANSETT BAY COMMISSION

Thomas Brueckner

Thomas G. Brueckner, P.E.
Engineering Manager

cc: E. Sanderson/RIHPHC
J. Pratt/LBG
M. Powers/LBG

PROGRAMMATIC AGREEMENT
BETWEEN
THE NARRAGANSETT BAY COMMISSION
AND
THE RHODE ISLAND STATE HISTORIC PRESERVATION OFFICE
REGARDING
THE COMBINED SEWER OVERFLOW FACILITIES PROJECT
Providence, Rhode Island

Submitted to the Advisory Council on Historic Preservation
pursuant to 36 CFR 800, Sections 6(b)(iv) and 14(b)(ii)

WHEREAS, the Narragansett Bay Commission (Bay Commission), an agency created by the State of Rhode Island in 1982, proposes to improve water quality in Narragansett Bay by building facilities to capture combined stormwater and wastewater during periods of high precipitation and runoff, storing it until it can be properly treated and released into the bay (CSO Facilities); and

WHEREAS, the Bay Commission will finance its construction of the CSO Facilities through a loan from the Rhode Island Clean Water Finance Agency (CWFA) which administers the State Revolving Fund (SRF); and

WHEREAS, the SRF includes capitalization grants provided to the State of Rhode Island by the U.S. Environmental Protection Agency (EPA) under Title VI of the Federal Water Pollution Control Act (33 USC Section 1251 et seq.)(Clean Water Act); and

WHEREAS, the Rhode Island Department of Environmental Management (RIDEM) must issue a Certificate of Approval for any project being proposed pursuant to the requirements of Section 201 of the Clean Water Act in order for an applicant to receive an SRF loan; and

WHEREAS, the Bay Commission has certified in writing that it will comply with the National Historic Preservation Act as a condition of receiving federal funds through the SRF and is therefore, pursuant to 36 CFR 800.2, serving as the Agency Official in this Agreement; and

WHEREAS, the Bay Commission has determined that Phase I of the Undertaking may have adverse effects on the former Rhode Island Department of Transportation (RIDOT) Headquarters and Garage (RIDOT Garage) at 30 Arline Street which is eligible for listing in the National Register of Historic Places; and

WHEREAS, the Bay Commission has determined that Phase I of the Undertaking may also have adverse effects on prehistoric and historical archaeological resources yet to be identified at the proposed location of Outfall 032 (Charles Street); and

WHEREAS, the Bay Commission has determined that Phases II and III of the CSO Program may also have adverse effects on archaeological or historical resources at locations yet to be selected for Outfalls 213, 210, Seekonk Interceptor, Woonasquatucket Interceptor, 219/220 Interceptor and proposed Sewer Separations in Providence and Pawtucket; and

WHEREAS, The Bay Commission has consulted with the SHPO, and with the Narragansett Indian Tribe and Waterfire Providence in accordance with 36 CFR 800.6 to resolve the adverse effects of the Undertaking on historic properties; and

WHEREAS, the Rhode Island Department of Transportation has participated in the consultation and has been invited to concur in this Agreement;

NOW, THEREFORE, the Bay Commission and the SHPO agree that the Bay Commission will ensure that the following stipulations are implemented in order to take into account the effects of the Undertaking on historic properties, and that these stipulations shall govern the Undertaking and all of its parts until this Agreement expires or is terminated.

STIPULATIONS

The Bay Commission will ensure that the following measures are implemented:

I. FORMER RIDOT HEADQUARTERS AND GARAGE

A. Protection

1. The Bay Commission shall ensure that the former RIDOT Headquarters and Garage at 30 Arline Street is protected against damage during the Bay Commission's use of the surrounding site for purposes of constructing the Foundry Shaft.

2. After completion of the Foundry Shaft, the Bay Commission shall ensure the historic property is protected against damage until treatment measures agreed upon with the SHPO (see Stipulation I.B below) have been properly executed.

B. Marketing and Disposal

1. In consultation with the SHPO, and consistent with applicable laws governing disposal of State property in Rhode Island, the Bay Commission shall prepare and implement a marketing plan for the former RIDOT Headquarters and Garage. The plan shall include the following elements:

An information package about the building containing notification that the purchaser will be required to convey an historic preservation easement on the building (a copy of which is found at Appendix A to this Agreement) to the Rhode Island Historic Preservation and Heritage Commission;

- A distribution list of potential purchasers or transferees;
- An advertising plan and schedule;
- A schedule for receiving and reviewing offers.

2. The Bay Commission shall employ the results of this marketing effort in its decision regarding the ultimate disposal of the former RIDOT Headquarters and Garage. The Bay Commission shall make this decision, including identification of measures to minimize or mitigate any adverse effects arising from disposal, in consultation with the SHPO.

II. OUTFALL 032

A. Prior to initiation of any construction-related ground disturbing activities, the Bay Commission will undertake a program to determine the presence or absence of soil levels associated with pre-colonial Native American settlement, and of any potentially significant archaeological deposits associated with the Town Work House. This program, developed in consultation with the SHPO, may include continuous soil borings and/or machine trenching. The Bay Commission will prepare and submit reports of the results to the SHPO and the Narragansett Indian Tribe. As necessary, based on the report findings and consultations with the SHPO, the Bay Commission will complete identification of historic properties in accordance with 36 CFR 800.4. In the event that historic properties are identified, the Bay Commission will consult with the SHPO and Narragansett Indian Tribe to resolve any adverse effects.

III. CSO FACILITIES, PHASE II AND PHASE III

A. In consultation with the SHPO, the Bay Commission will complete any studies required to identify historic properties that may be affected by construction in Phases II and III of Outfalls 213 and 210, Seekonk Interceptor, Woonasquatucket Interceptor, 219/220 Interceptor and proposed Sewer Separations in Providence and Pawtucket, in accordance with 36 CFR 800.4. In the event that historic properties are identified, the Bay Commission will consult with the SHPO, Narragansett Indian Tribe, and other consulting parties, as appropriate, to resolve any adverse effects.

IV. REVIEW AND COMMENT PERIODS

Unless otherwise specified in this Agreement, the SHPO and other consulting parties shall have thirty (30) calendar days from receipt to provide written comment on any reports, letters or other written communications prepared by the Bay Commission in its execution of this Agreement.

V. TECHNICAL REPORTING

All reports of archaeological investigations conducted under Stipulations II and III shall be prepared in accordance with the Rhode Island Historical Preservation and Heritage Commission's *Performance Standards and Guidelines for Archaeological Projects*.

VI. PROFESSIONAL QUALIFICATIONS

A. All archaeological investigations conducted pursuant to this Agreement shall be accomplished by or under the supervision of an individual or individuals meeting the standards for archaeologist set forth in the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (NPS 1983:44738-9).

B. All studies involving identification, evaluation and treatment of historic buildings and structures conducted pursuant to this Agreement shall be accomplished by or under the supervision of an individual or individuals meeting the standards for historian, architectural historian, or other professional as appropriate for the work, set forth in the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (NPS 1983:44738-9).

VII. ANNUAL REPORTING

A. On or before January 1of each year until the Bay Commission and the SHPO agree in writing that the terms of this Agreement have been fulfilled, the Bay Commission shall prepare and provide an annual report to the SHPO and Narragansett Indian Tribe addressing the following topics:

1. Progress in completing Stipulations I through III;
2. Any problems or unexpected issues encountered during the year;
3. Anticipated schedule for planning and design work over the coming year;
4. Any changes that Bay Commission believes should be made in implementation of this agreement.

B. The Bay Commission shall ensure that its annual report is made available for public inspection, that potentially interested members of the public are made aware of its availability, and that interested members of the public are invited to provide comments to the SHPO and Narragansett Indian Tribe as well as to the Bay Commission.

VIII. DISPUTE RESOLUTION

A. Should any party to this agreement object in writing to the Bay Commission regarding any action carried out or proposed with respect to the undertaking or implementation of this agreement, the Bay Commission shall consult with the objecting party to resolve the objection. If after initiating such consultation the Bay Commission determines that the objection cannot be resolved through consultation, the Bay Commission shall forward all documentation relevant to the objection to the Advisory Council on Historic Preservation (Council), including the Bay Commission's proposed response to the objection. Within 30 days after receipt of all pertinent documentation, the Council shall exercise one of the following options:

1.The Council will consult with the objecting party, and with other parties as appropriate, to resolve the objection.

2 Provide the Bay Commission with recommendations, which the Bay Commission shall take into account in reaching a final decision regarding its response to the objection; or

3.. Notify the Bay Commission that the objection will be referred for comment pursuant to 36 CFR 800.7(a)(4), and proceed to refer the objection and comment. The Bay Commission shall take the resulting comment into account in accordance with 36 CFR 800.7(c)(4) and Section 110(l) of NHPA.

B. Should the Council not exercise one of the above options within 30 days after receipt of all pertinent documentation, the Bay Commission may assume the Council's concurrence in its proposed response to the objection.

C. The Bay Commission shall take into account any Council recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; the Bay Commission's responsibility to carry out all actions under this agreement that are not the subjects of the objection shall remain unchanged.

IX. AMENDMENT AND TERMINATION

A. Any of the signatories to this Agreement may request that this Agreement be amended, whereupon these parties will consult in accordance with 36 C.F.R. Section 800.6(c)(7) .

B. Any of the signatories to this Agreement may terminate this Agreement by providing 30 days written notice to all consulting parties, provided that the signatories consult during the 30-day notice period in order to seek agreement on amendments or other actions that would avoid termination. In the event of termination, the Bay Commission will comply with 36 C.F.R. Sections 800.3 through 800.7(c)(3), with regard to individual actions covered by this Agreement.

Execution of this Agreement by the Bay Commission and the SHPO, and its submission to the Council in accordance with 36 CFR 800.6(b)(1)(iv) shall pursuant to 36 CFR 800.6, be considered to be an Agreement with the Council for the purposes of Section 110(1) of NHPA. Execution and submission of this Agreement, and implementation of its terms, evidence that the Bay Commission has afforded the Council an opportunity to comment on the Undertaking and its effects on historic properties, and that the Bay Commission has taken into account the effects of the Undertaking on historic properties.

Signed:

NARRAGANSETT BAY COMMISSION

By: Paul Pinault Date: 2/21/03

RHODE ISLAND STATE HISTORIC PRESERVATION OFFICER

By: Edward F. Sanderson Date: 3/3/03

Concur:

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

By:______________________________ Date:______________

ACCEPTED FOR THE ADVISORY COUNCIL ON HISTORIC PRESERVATION

By:______________________________ Date:______________

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

HISTORICAL PRESERVATION COMMISSION

HISTORICAL EASEMENT

THIS HISTORIC PRESERVATION EASEMENT is made this_____day of_____by and between meaning and intending to include therein their successors and assigns (hereinafter Grantor), and the STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS through its Historical Preservation & Heritage Commission (hereinafter sometimes called Grantee).

W I T N E S S E T H :

WHEREAS the Grantor is the owner of land in fee simple, and holds title under the document recorded with the land evidence records of the Town/City of ________ as recorded in Book_____, Page _____, which instrument is not violated by this conveyance, which land (hereinafter "land") is described in Exhibit "A" attached hereto which land is improved with historic structure(s) (said structure sometimes hereinafter called the building), more fully described in Exhibit "B" attached hereto (said land and structures together being hereinafter called the "Premises") which premises have been registered on the National Register of Historic Places by the United States Department of the Interior;

WHEREAS the State of Rhode Island, through its Historical Preservation and Heritage Commission, is presently responsible for precluding any activity at the premises which would destroy or impair the value of the premises as a registered place on the National Register of Historic Places; and

WHEREAS the Grantor is willing to grant to the State of Rhode Island the easement as hereinafter expressed for the purpose of insuring that the value of the premises for such purpose will not be destroyed or impaired;

NOW, THEREFORE, in consideration of the sum of One Dollar, and other valuable consideration paid to the Grantor, the receipt whereof is hereby acknowledged, and Grantor does hereby give, grant, bargain, sell, and convey unto the State of Rhode Island and Providence Plantations an easement in the following described premises of the Grantor, of the nature and character and to the extent hereinafter expressed as a covenant running with the land, to be binding upon the parties hereto and their respective successors and assigns, and to that end and for the purpose of accomplishing the intent of the parties hereto to preserve, protect, and maintain the value of the premises of the Grantor as a registered place on the State Register of Historic Places, the Grantor does hereby covenant on behalf of itself, its successors and assigns, with the Grantee, its successors and assigns, to refrain from doing, and to permit the Grantee to do upon the premises of the Grantor, the various acts hereinafter mentioned.

THE EASEMENTS AND RESTRICTIONS shall be effective in perpetuity (or for a term of ____ years).

and are as follows:

A. Grantor's Covenants. In furtherance of the Preservation Easement herein granted, Grantor covenants:
   1. Review Without the written permission of Grantee, executed by a duly authorized officer under its corporate seal, which written permission or refusal to grant such permission, including a statement of reasons for refusal, shall be delivered to Grantor by Grantee within thirty (30) days of receipt of Grantor's written request for such approval, there shall be:
      a. no demolition or partial demolition or removal of any building or structure located on the real property except in connection with interior renovation and exterior alterations described in Exhibit "C"
      b. no change in the facade or to the landscape features and improvements or interior portions that are being protected, as set forth in Exhibit "B" subject to the Preservation Easement, including no alteration, partial removal, construction, remodeling or physical or structural change, or change in color or surfacing with respect to the appearance or construction of the facade or the landscape features and improvements or interior portions, except as described in Exhibit "C"
      c. no addition of signs or addition to the facade including fences, or awnings except as described in Exhibit "C"
      d. no expansion of the building either horizontally or vertically except as described in Exhibit "C"
      e. no construction of additional building's on the premises, except as described in Exhibit "C"
      f. no significant alteration of the topography, except as may be required by good husbandry.
   2. Specification of Materials. Grantor covenants that Grantee in providing its written authorizations for work may specify all materials, methods, cleaning substances and colors to be used in any such work, provided, nevertheless, that repair or replacement of surface

materials will be with materials of the same or similar texture and quality as currently existing and reasonably available.

3. Casualty Damage. In the event of casualty damage, no repairs or reconstruction of any type, other than temporary emergency work to prevent further damage to the real property and to protect public safety, shall be undertaken by Grantor without the prior written approval of the work by Grantee (which written approval shall be given as provided in paragraph (2) above).
4. Inspection. Grantor covenants that representatives of Grantee shall be permitted to inspect the building at reasonable times upon reasonable notice for the purpose of determining conformance to this Preservation Easement.
5. Insurance. Grantor covenants that it will maintain in force standard property and liability insurance policies. The property insurance policy shall be adequate to provide for reconstruction of the building and the liability policy shall provide coverage in the amount of at least One Million Dollars ($1,000,000). The liability policy shall name the Grantee as a named additional insured. The amount of property and liability insurance maintained by Grantor shall be adjustable, upon the request of Grantee, to reflect proportionate increases in the cost of construction and the cost of living, respectively, provided that such a request may not be made more frequently than once every three (3) years.
6. Real Estate Taxes. The Grantor shall promptly pay all real estate taxes assessed and levied against the building on or prior to the due date, regardless of the status of protests or appeals.
7. Public View. Grantor agrees not to obstruct the substantial and regular opportunity of the public to view the exterior architectural features of any building, structure, or improvements of the premises from adjacent publicly accessible areas such as public streets. Grantor shall make the premises accessible to the public from time to time and by appointment to permit persons affiliated with educational organizations, professional architectural associations and historical societies to study the property. Any such public admission may be subject to restrictions, mutually agreed upon as reasonably designed for the protection and maintenance of the property. Such admission may be subject to a reasonable fee, if any, as may be approved by the Grantee.

8. Publication. The Grantee may make photographs, drawings or other representations documenting the significant historical, cultural, or architectural character and features of the property and distribute them to magazines, newsletters, or other publicly available publications, or

use them in any of its efforts or activities for the preservation and conservation of Rhode Island's heritage.

9. Indemnity. The Grantor covenants that it shall indemnify and hold Grantee harmless for any liability, costs, attorney's fees, judgments or expenses to the Grantee or any officer, employee, agent or independent contractor of the Grantee resulting from actions or claims of any nature by third parties arising from defaults under this Preservation Easement by the Grantor, or arising out of the conveyance of, possession of, or exercise of rights under this Preservation Easement, excepting any such matters arising solely from the negligence of the Grantee.

B. Grantee's Remedies. In the event of a violation of any provision of this Preservation Easement, in addition to any remedies now or hereafter provided by law, (i) Grantee may, following reasonable notice to Grantor, institute a suit for injunctive relief, specific performance or damages, or (ii) representatives of Grantee may enter upon the real property to correct any such violation, and hold Grantor and Grantor's successors, heirs and assigns in title responsible for the cost thereof, and such cost, until repaid, shall constitute a lien on the real property. In the event Grantor is adjudicated to have violated any of Grantor's obligations herein, Grantor shall reimburse Grantee for any costs or expenses incurred in connection with the enforcement of its rights, including court costs and attorney's fees. The exercise by Grantee of one remedy hereunder shall not have the effect of waiving any other remedy, and the failure to exercise any remedy shall not have the effect of waiving the use of such remedy at any other time.

C. Standards for Review. In exercising any authority created by the Easement to inspect the premises, the buildings, or the facades; to review any construction, alteration, repair or maintenance; or to review casualty damage or to reconstruct or approve reconstruction of the buildings following casualty damage, Grantee shall apply the Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, issued and as may be amended from time to time by the Secretary of the United States Department of the Interior. In the event that the Standards are abandoned or materially altered or otherwise become, in the sole judgment of the Grantee, inappropriate for the purposes set forth above, the Grantee may apply reasonable alternative standards, and notify the Grantor of the substituted standards.

D. Assignability. Grantor agrees that Grantee may, in its discretion, and without prior notice to Grantor, convey and assign this Preservation Easement to any agency of the State of Rhode Island, to a unit of local government, or not-for-profit corporation or trust provided that the mandated purpose of such assignee includes the preservation of properties of historical, architectural, or cultural significance. Such conveyance, assignment, or transfer shall require that the preservation and conservation purposes for which the Easement was granted will continue to be carried out.

E. Duration. This Preservation Easement shall be effective for a period of ____ years. Grantor and Grantee hereby recognize that an unexpected change in the conditions surrounding the premises may make impossible the continued ownership or use of the premises for preservation and conservation purposes and necessitate extinguishment of the Easement. Such a change in conditions includes, but is not limited to, partial or total destruction of the building resulting from a casualty of such magnitude that in the opinion of Grantee the building and premises have lost their historical and architectural significance, or condemnation or loss of title through an eminent domain proceeding. Grantor agrees that this Easement shall not be released to the Grantor or its successors or assigns without the consent of the Grantee, which consent shall be appended to such release.

F. Runs with the Land. The obligations imposed by this Preservation Easement shall be deemed to run as a binding servitude with the land. This instrument shall extend to and be binding upon Grantor and all persons hereafter claiming under or through Grantor, and the word "Grantor" when used herein shall include all persons. Anything contained herein to the contrary notwithstanding, a person shall have no obligations pursuant to this instrument after such person shall cease to have any interest in the Premises by reasons of a bona fide transfer for full value.

G. Statutory Authority. This instrument is valid in Rhode Island by virtue of the enactment of Chapter 39 of title 34 of the General Laws of Rhode Island, but the invalidity of such Act or any part thereof shall not effect the validity and enforceability of this instrument according to its terms, it being the intent of the parties that this instrument constitutes a charitable trust, a preservation restriction, a common law easement in gross and a restrictive covenant.

H. Notices. Any notice called for herein shall be in writing and shall be mailed postage prepaid by registered or certified mail with return receipt requested, or hand delivered and receipted. If to Grantor, then at and if to Grantee, then at the Rhode Island Historical Preservation and Heritage Commission, 150 Benefit Street, Providence, Rhode Island. Each party may change its address set forth herein by a notice to such effect to the other party. The failure to service a change of address notice shall not waive the notice requirement.

I. Compliance with Applicable Ordinances. To the extent this easement permits future development of the Premises, such development shall conform with appropriate local, state or federal standards for construction or rehabilitation. Furthermore, nothing contained herein shall be interpreted to authorize or permit Grantor to violate any ordinance relating to building materials, construction methods or use. In the event of any conflict between such ordinance and the terms hereof, the ordinance shall prevail and the Grantor promptly shall notify the Grantee of such conflict and shall cooperate with Grantee and the Town of _________ and the State of Rhode Island or other appropriate authority to accommodate the purposes of both this instrument and such ordinance.

1. A copy of this Preservation Easement shall be recorded with the City Recorder of Deeds and copies shall be furnished by the Grantor to the Rhode Island Historical Preservation and Heritage Commission.
2. The Grantee shall have the right to install a plaque of suitable design at a point easily visible by the public, from a public way, which plaque shall name the architect, the date of construction and state that the facade is subject to a Preservation Easement held by the Rhode Island Historical Preservation and Heritage Commission.
3. The Grantor acknowledges that the subject matter of this conveyance is a historic preservation restriction which can no longer be transferred, hypothecated or subordinated to liens or encumbrances by the Grantor except as regards to condemnation awards or insurance proceeds.
4. For purposes of furthering the preservation of the premises and buildings and of furthering the other purposes of this Easement, and to meet changing conditions, Grantor and Grantee are free to amend jointly the terms of this instrument in writing, without notice to any party. Such amendment shall become effective upon recording among the land records of the City or Town.

IN WITNESS THEREOF, on the date first shown above, Grantor has caused this Preservation Easement to be executed, sealed and delivered by its

ATTEST GRANTOR:

Accepted by Grantee, Rhode Island Historical Preservation and Heritage Commission, pursuant to Chapter 39, Conservation and Preservation Restriction on Real Property, this day of ,

19 .

By ______________________________
Edward F. Sanderson, Executive Director
Rhode Island Historical Preservation
and Heritage Commission

ATTEST:

State of Rhode Island

Town/City of

I, the undersigned, a Notary Public in and for said Town/City, in the State aforesaid, do hereby certify that personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person, and acknowledged that is duly authorized, signed, sealed and delivered the said instrument as his/her own free and voluntary act, for the uses and purposes therein set forth.

Given my hand and official seal, this day of 19 .

Notary Public

My commission expires;

State of Rhode Island)
) SS
City of Providence)

I, the undersigned, Notary Public, appointed in the City of for the State of Rhode Island, do hereby certify that Edward F. Sanderson, personally known to me to be the same person whose name is, as Executive Director of the Rhode Island Historical Preservation and Heritage Commission, a not-for-profit corporation of the State of Rhode Island, subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that he is duly authorized, signed, sealed with the corporate seal and delivered the said instrument as the free and voluntary act of the corporation and as his own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and official seal, this day of , 19 .

____
Notary Public

My commission expires;

____

Appendix E

Public Presentation Materials and Review Comments

Phase III CSO Control Facilities Program

Bucklin Point WWTF Upgrades

Facilities Plan Amendment
Environmental Assessment

Public Meeting

October 25, 2018

10:00 AM

Stantec

PARE CORPORATION

The Narragansett Bay Commission

Presenters

Narragansett Bay Commission
Kathryn Kelly, P.E. – Project Manager/ Principal Environmental Engineer

Stantec
David Van Hoven, P.E. – Project Manager/ Task Lead

Pare Corporation
Brandon Blanchard, P.E. – Deputy Program Manager

Bucklin Point Wastewater Treatment Facility

- Bucklin Point Wastewater Treatment Facility (BPWWTF) is located off Campbell Avenue in East Providence
- Serves NBC's Bucklin Point Service Area
- 46 MGD Secondary Treatment; 116 MGD Primary Treatment Capacity
- Average daily flow capacity: 23.7 MGD

2009 Facilities Plan Amendment

- Facilities plan last amended in 2009
- New RIPDES discharge permit issued June 2005
  - Seasonal limits for total nitrogen – 5 mg/L
- Modifications made to meet more stringent nitrogen discharge limits
- Implementation plan recommended:
  - Upgrades to enable BPWWTF to comply with average monthly effluent discharge limit
  - Provide operational efficiency
  - Resolve maintenance problems

Improvements to BPWWTF Since 2009

- Modifications for improved nitrogen removal
- Dry-weather primary clarification system
- Dry-weather flow distribution improvements
- Aeration improvements (scum removal system)
- Secondary clarifier improvements
- Disinfection improvements
- Miscellaneous improvements
  - Solids processing, plant water, wet-weather tank return pumping
  - Instrumentation and electrical upgrades
  - Staffing

2018 FP Amendment - Purpose and Need

- BPWWTF potential deficiencies include:
  - Evidence of stress
  - Sludge blanket depth will increase/effluent quality will decrease
  - Decrease in MLSS temperature

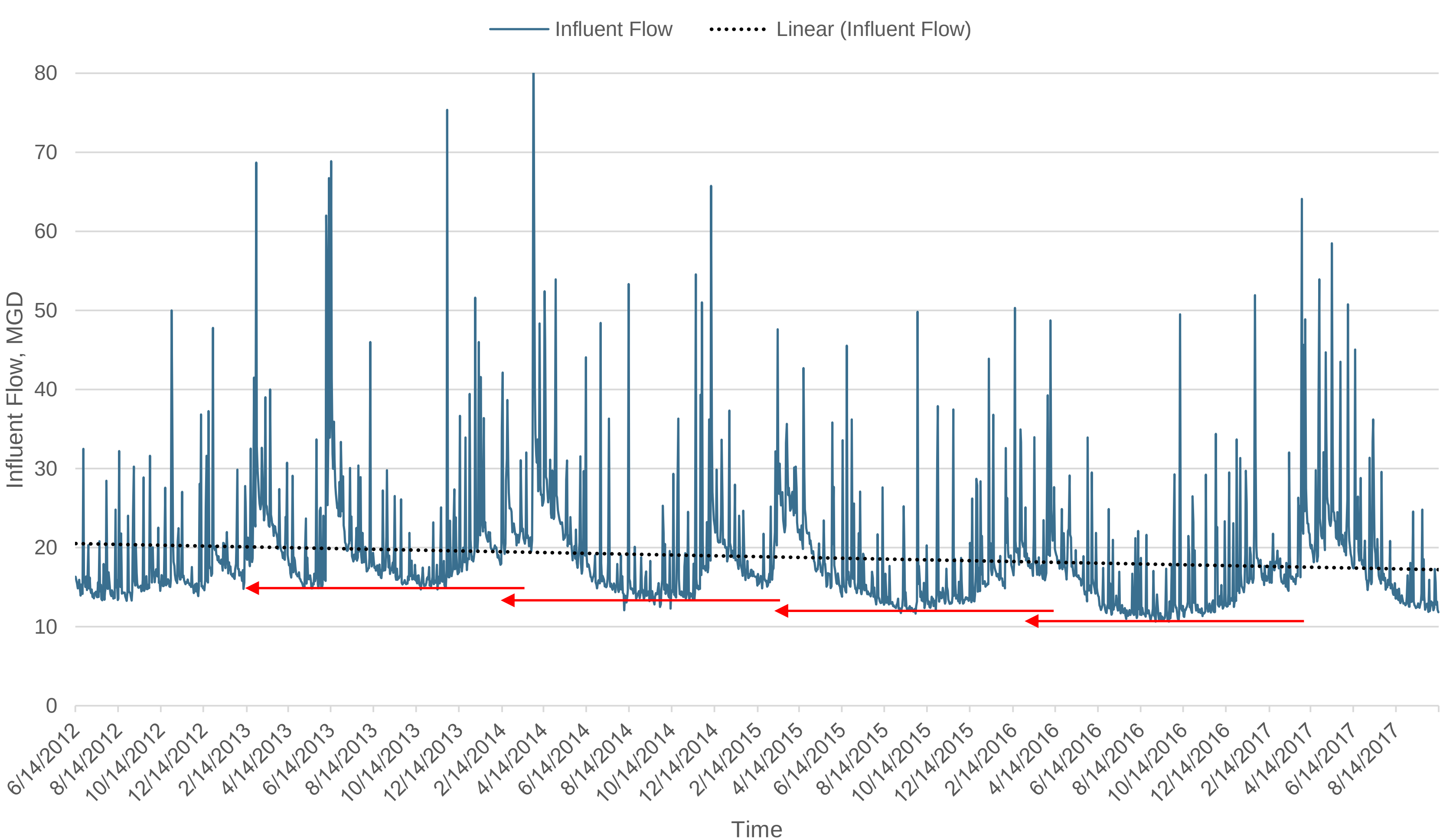
- Increased wet-weather flow to BPWWTF from Pawtucket Tunnel and Tunnel Pump Station

- New RIPDES Permit:
  - Issued December 1, 2017
  - Seasonal 5 mg/L Nitrogen Limit

Current Effluent Limits

Parameter	Monthly Limit (mg/L)	Weekly Limit (mg/L)	Daily Limit (mg/L)
TSS (Nov 1 – Apr 30)	30	45	50
TSS (May 1 – Oct 31)	20	20	45
$CBOD_5$ (Nov 1 – Apr 30)	25	40	45
$CBOD_5$ (May 1 – Oct 31)	20	20	30

Average Influent Flow for Every Day During the Time Period Analyzed



Population in Service Area

Service Area	Measured	Projected					
	2010	2015*	2020	2025	2030	2035	2040
Pawtucket	71,148	71,757	71,147	70,537	69,927	69,317	68,707
Central Falls	19,376	19,403	19,612	20,001	20,325	20,537	20,613
Lincoln	21,105	21,438	21,857	22,482	23,038	23,470	23,750
Cumberland	33,506	33,936	34,698	35,784	36,762	37,541	38,074
Smithfield	21,430	21,634	22,023	22,616	23,136	23,529	23,766
New Development	–	–	5,832	5,832	5,832	5,832	5,832
TOTAL	166,565	168,168	175,169	177,252	179,020	180,226	180,742

Measured and Anticipated Flows (bold with Operational Storage Tunnel)

Flow	Measured	Projected						
(MGD)	2014	2018	2019	2020	2025	**2030**	**2035**	**2040**
Average Day	21.22	21.34	21.38	22.11	22.37	**26.58**	**26.48**	**26.54**
Max Day	85.81	86.27	86.42	89.38	90.45	**91.35**	**91.96**	**92.23**
Max Week	46.01	46.26	46.34	47.93	48.50	**39.21**	**39.39**	**39.47**
Max Month	33.79	33.97	34.03	35.19	35.61	**35.03**	**35.20**	**35.29**
Peak Hour to Secondary Treatment	46.00	46.00	46.00	46.00	46.00	**46.00**	**46.00**	**46.00**
Peak Hour to Wet-weather Treatment	7.06	7.35	7.44	9.27	9.93	**10.48**	**10.86**	**11.03**

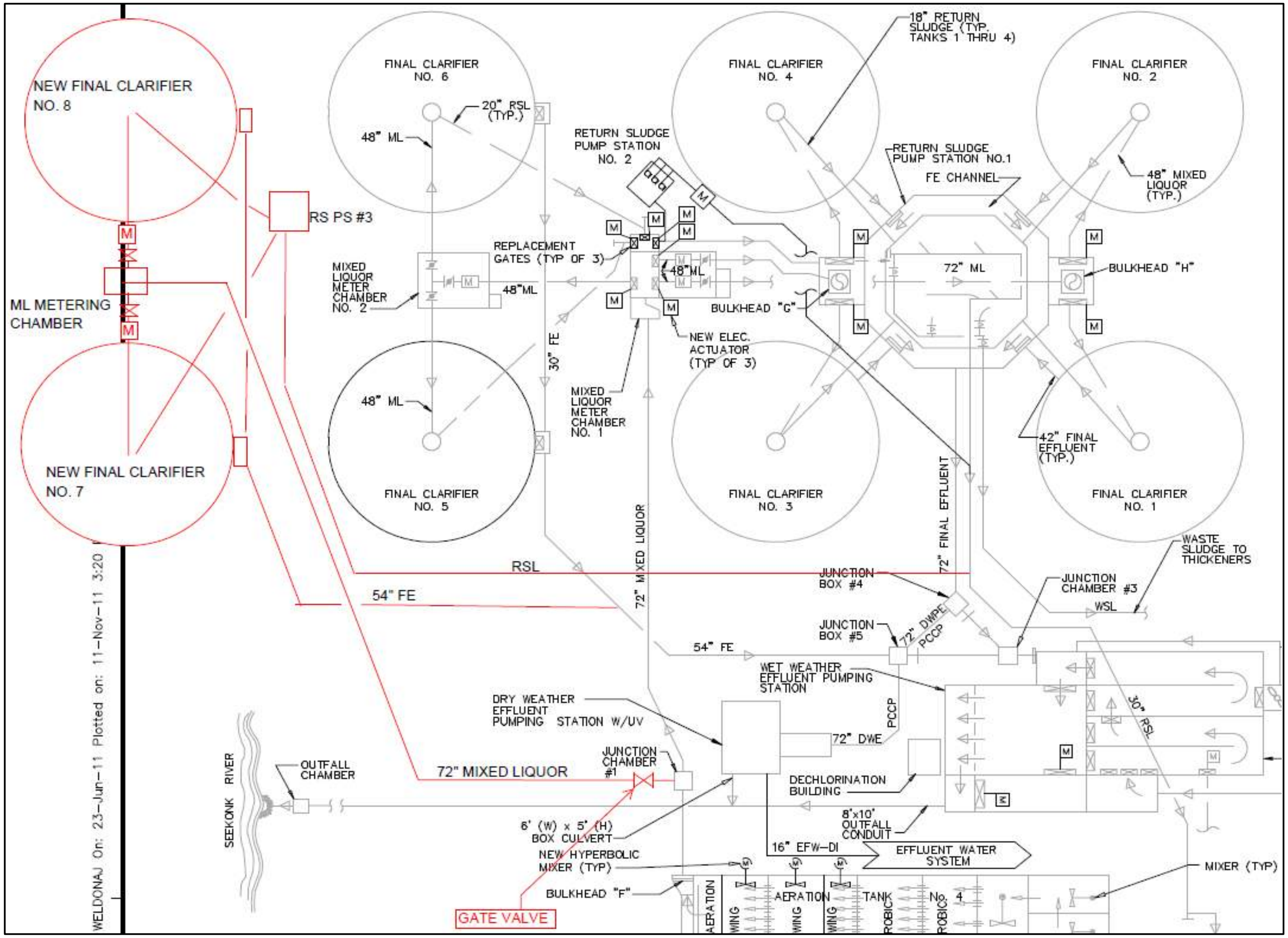
Measured and Anticipated BOD Loads with Operational Storage Tunnel

BOD Load	Measured	Projected						
	2014	2018	2019	2020	2025	2030	2035	2040
Average Day (lb/day)	33,089	33,268	33,326	34,467	34,877	**35,225**	**35,462**	**35,564**
Average Day (mg/L)	186.94	186.94	186.94	186.94	186.94	**158.89**	**160.57**	**160.65**
Max Day (lb/day)	104,376	104,938	105,121	108,721	110,014	**111,112**	**111,860**	**112,180**
Max Week (lb/day)	46,289	46,539	46,620	48,216	48,790	**49,277**	**49,608**	**49,751**
Max Month (lb/day)	39,037	39,248	39,316	40,663	41,146	**41,557**	**41,837**	**41,956**

Alternative 1: Install Two (2) New Clarifiers

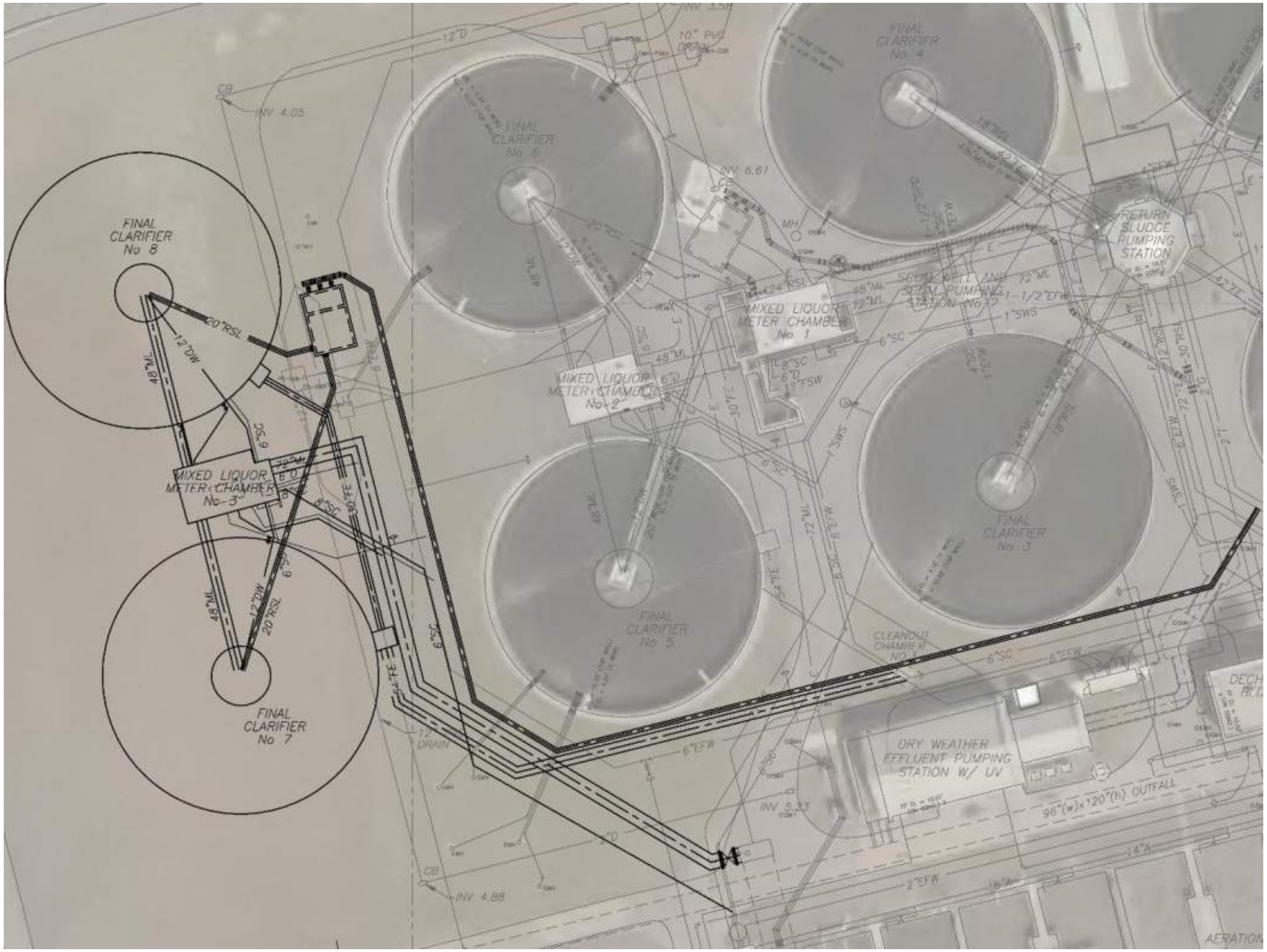
- Construction of two (2) new clarifiers (Nos. 7 and 8)
- Project would include:
  - New mixed liquor suspended solids (MLSS) piping
  - Flow splitting
  - New RAS pump station
  - Instrumentation and controls to match existing clarifiers.
- New clarifiers are proposed to the west of Nos. 5 and 6
- New clarifiers to match their existing specifications

Alternative 1 Schematic Layout



Alternative 1 Schematic Layout

Install Two New Final Clarifiers



Alternative 2: Convert Existing Bioreactor to Solids Storage During High Flows

- Convert one of existing bioreactors to a solid storage tank.
  - Install new piping, valve, and meter

- During first day of a storm, 50% of the RAS flow would be directed to solid storage bioreactor, primary effluent feed would be shut off

- Remaining three (3) bioreactors would operate as normal

Alternative 2 Schematic Layout

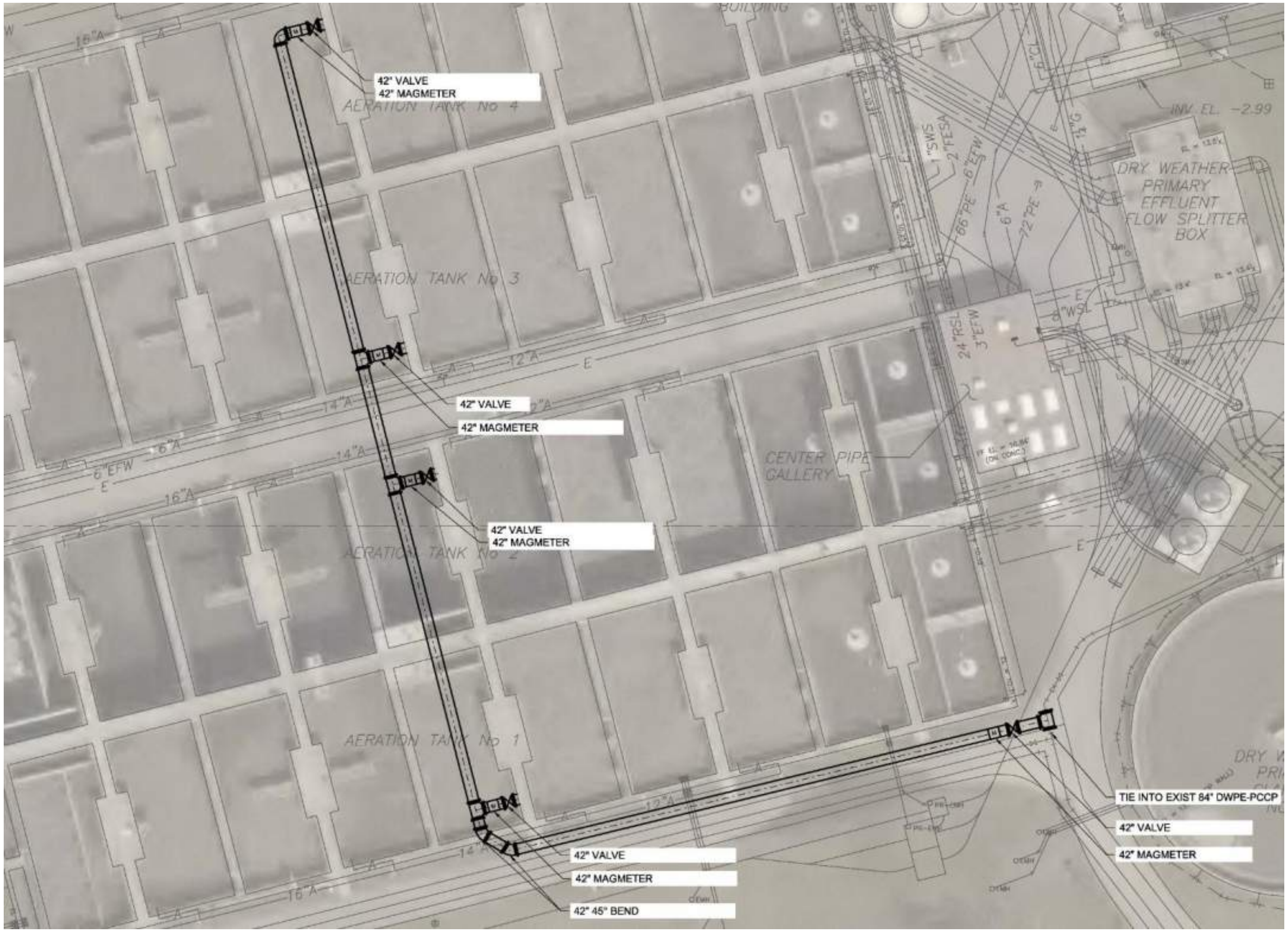
Convert Existing Bioreactor to Solids Storage During High Flows

Alternative 3: Convert Bioreactors to Contact Stabilization During High Flows

- Operate existing bioreactors to operate in constant stabilization mode during wet-weather events and step mode during normal operations
  - Install new piping, pump station, and flow meter
- Common strategy for treatment plants that serve systems with combined sewers
- Reduces MLSS concentration to clarifiers, but effluent BOD concentration expected to increase

Alternative 3 Schematic Layout

Convert Bioreactors to Contact Stabilization During High Flows



Alternative 4: Install Polymer Feed System

- Convert existing manual polymer addition to automated polymer feed system
- Install two (2) new polymer storage tanks with mixers and metering pump dosing system
- Polymer to be added upstream of final clarifiers as a settling aid
- Further analysis is required to determine whether a dry or liquid polymer is more appropriate

Alternatives Summary

Alternative	Comments
1: Install Two New Final Clarifiers	• Provides redundant clarifiers • Increases RAS pumping • Least complicated operations
2: Convert Existing Bioreactor to Solids Storage During High Flows	• Risk of overloading clarifiers during transition from wet weather to dry weather operations
3: Convert Bioreactors to Contact Stabilization During High Flows	• Provides opportunity for total nitrogen reduction during normal operating conditions • Risk of overloading clarifiers during transition from wet weather to dry weather operations
4: Install Polymer Feed System	• Operated when SVIs > 150 ml/g • Can be implemented in conjunction with any alternative

Recommended Plan: Alternatives 1 and 4

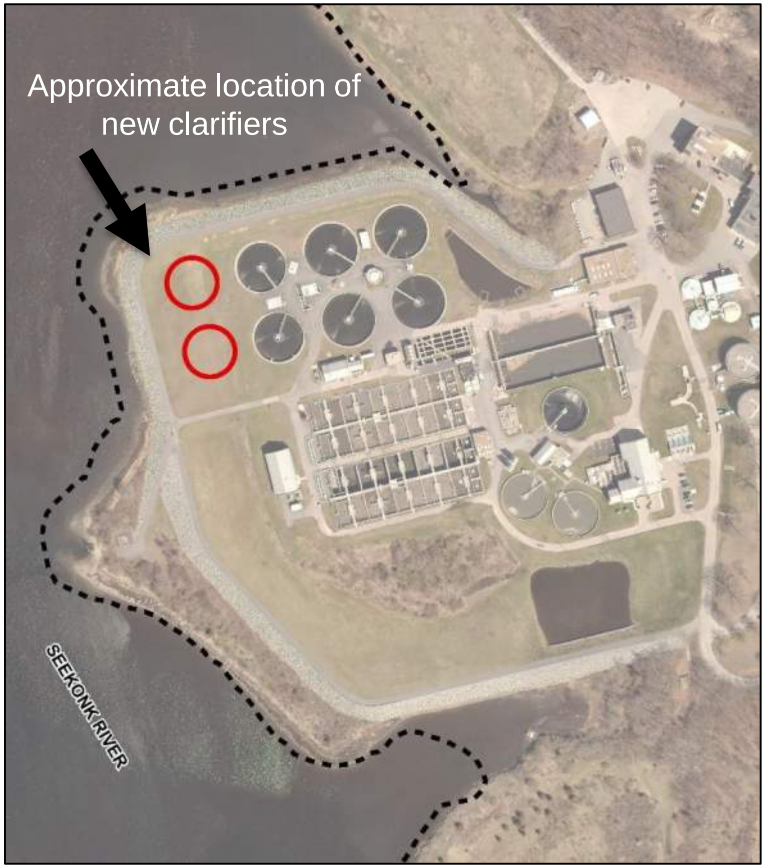
- Alternative 1:
  - best effluent quality
  - easiest to operate
  - Improves performance to meet new RIPDES permit limits

- Constructing new clarifiers allows NBC to temporarily take others offline

- Alternative 4 is low cost solution when clarifiers experience poor settling

- Alternative 1 offers best level of treatment
- Alternative 4 enhances treatment

- Total Cost: $14.4 Million



- 30% Design to RIDEM by June 30, 2020 (per CA RIA-424)
- Final Design 18 months after 30% Design Approval
- Substantial Completion May 2023

Environmental Assessment

Potential impacts evaluated:

1. Surface Water
2. Erosion and Sedimentation
3. Groundwater
4. Wetlands and Floodplain
5. Wild or Scenic Rivers
6. Coastal Zones/Coastal Barrier Resources
7. Sole Source Aquifers
8. Farmlands and Agricultural Uses
9. Air Quality
10. Noise
11. Vegetation and Wildlife
12. Water Supply/Use
13. Soil Disturbance
14. Historical, Archaeological, and Cultural Resources
15. Aesthetics
16. Land Use
17. Economic
18. Community Facilities
19. Recreation
20. Safety
21. Solid Waste
22. Traffic
23. Other Indirect Impacts

Potential Environmental Impacts Evaluated

Some do not apply:

1. Surface Water
2. Erosion and Sedimentation
3. Groundwater
4. Wetlands and Floodplain
5. Wild or Scenic Rivers
6. Coastal Zones/Coastal Barrier Resources
7. Sole Source Aquifers
8. Farmlands and Agricultural Uses
9. Air Quality
10. Noise
11. Vegetation and Wildlife
12. Water Supply/Use
13. Soil Disturbance
14. Historical, Archaeological, and Cultural Resources
15. Aesthetics
16. Land Use
17. Economics
18. Community Facilities
19. Recreation
20. Safety
21. Solid Waste
22. Traffic
23. Other Indirect Impacts

Potential Environmental Impacts Evaluated

Others are potential short-term impacts typical of construction:

1. Surface Water
2. Erosion and Sedimentation
3. Groundwater
4. Wetlands and Floodplain
5. Wild or Scenic Rivers
6. Coastal Zones/Coastal Barrier Resources
7. Sole Source Aquifers
8. Farmlands and Agricultural Uses
9. Air Quality
10. Noise
11. Vegetation and Wildlife
12. Water Supply
13. Soil Disturbance
14. Historical, Archaeological, and Cultural Resources
15. Aesthetics
16. Land Use
17. Economics
18. Community Facilities
19. Recreation
20. Safety
21. Solid Waste
22. Traffic
23. Other Indirect Impacts

Avoidance, Minimization, and Mitigation

- Project limited to existing BPWWTF site
- Best management practices (BMPs) used in design and construction
  - Erosion/dust control and site restoration
  - Construction safety and solid waste management
  - Noise, traffic, odor controls
  - Work hours in accordance with local ordinances
- Project will receive appropriate permits and undergo regulatory review

This project will result in long-term environmental benefits, helping significantly improve water quality in the Seekonk River and Narragansett Bay

State and Federal Agency Review

- Intergovernmental agency review requested September 26, 2018:

  - RI Division of Planning
  - RI Department of Transportation
  - RI Historic Preservation and Heritage Commission
  - RI Department of Environmental Management-Division of Fish and Wildlife
  - Narragansett Tribal Historic Preservation Office
  - RI Coastal Resources Management Council;
  - RI Department of Environmental Management- Office of Technical and Customer Assistance
  - NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO)
  - Natural Resources Conservation Service
  - U.S. Fish and Wildlife Service

- Comments to be incorporated into Facilities Plan Amendment and Environmental Assessment
- Submit to RIDEM by December 31, 2018
- Public Hearing to follow RIDEM review

Phase III CSO Program
Sign-In Sheet

Meeting Information:

Meeting Topic: BPWWTF Facilities Plan/Environmental Assessment PUBLIC MEETING

Date: 10/24/2018 **Time:** 10:00 AM

Location: Narragansett Bay Commission Offices

Name	Organization	Email
BRANDON BLANCHARD	PARE CORPORATION	bblanchard@parecorp.com
Kathryn Kelly	NBC	KKelly@narrabay.com
David VanHaven	Stantec	david.vanhoven@stantec.com
Alex Pinto	RIDEM	alex.pinto@dem.ri.gov
Paul Nordstrom	NBC	pnordstrom@narrabay.com
DAVID BOWEN	NBC	dbowen@narrabay.com

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team wins this game
end up in the Division
per Bowl.
y pick: Burrillville
ision III & Division IV
naganset at Pilgrim
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V vs. the biggest sur-
e in Div. III? Don't tell
wife I'm picking against
alma mater.
y pick: Pilgrim

lish criteria for the allocation of Housing Tax Credits in Rhode Island. A draft of the Qualified Allocation Plan is available for public inspection on our website at www.rihousing.com.

All interested persons may submit their views, data or comments regarding the Qualified Allocation Plan, including statements concerning alternative approaches. For comments or more information, cootact Eric Shorter at (401) 457-1219 or e-mail eshorter@rihousing.com. The deadline for comments is 5:00 PM on October 24, 2018.

A public hearing regarding the Qualified Allocation Plan will be held on October 24, 2018, at 10:00AM at our offices at 44 Washington St., Providence, RI, 02903, Second Floor Boardroom. All interested parties are welcome to attend.

EQUAL HOUSING OPPORTUNITY

MORTGAGEE'S NOTICE OF SALE OF REAL ESTATE

586 BUCK HILL ROAD, BURRILLVILLE, RI 02859

The premises described in the mortgage will he sold subject to all encumhrances and prior liens on Octoher 5, 2018 at 10:00 AM on the premises, hy virtue of the power of sale contained in a mortgage hy John D. Marchand, Junior dated July 15, 2003 and recorded with the Town of Burrillville Land Evidence Records at Book 289, Page 696; the conditions of said mortgage having heen hroken.

TERMS OF SALE:

A deposit of FIVE THOUSAND DOLLARS AND 00 CENTS ($5,000.00) in the form of a certified check, hank treasurer's check, or money order will he required to be delivered at or hefore the time the hid is offered. The description of the premises cootained in said mortgage shall cootrol in the event of an error in this publication. Other terms will be annouoced at the sale.

ORLANS PC
Attorney for the Present Holder of the Mortgage
PO Box 540540
Waltham, MA 02454
Phone: (781) 790-7800
16-011421

plaintiff's attorney, whose address is Hemenway & Barnes LLP, 75 State Street, 16th Floor, Bostoo, MA 02109 an answer to the complaint which is filed in said Court and Demands which appear in this summons within 20 days after publicatioo. If you fail to do so, judgment hy default will he taken against you. You are also required to file your answer to the complaint in the office of the Register of this Court at CAMBRIDGE either hefore service upoo plaintiff's attorney or within a reasonahle time thereafter.

Unless otherwise provided hy Rule 13(a), Mass.R.Civ.P., your answer must state as a counter claim any claim which you may have against the plaintiff which arises out of the transaction or occurrence that is the subject matter of plaintiff's claim or you will thereafter he harred from making such claim in any other action.

WITNESS
Edward F.Donnelly, Jr.
Esquire/First Justice of said Court at Camhridge
Tara E. DeCristofaro
September 4, 2018
Register of Prohate
DEMANDS OF COMPLAINT:

STATE OF RHODE ISLAND
Prohate Court of the City of Providence
NOTICE
OF MATTERS PENDING AND FOR HEARING IN SAID COURT

The Court will be held in session at City Hall on the dates specified in the notices helow at 10:00 a.m. for hearing said matters.

ABREU VARGAS, YORDY LUIS – MINOR Appointment of guardian; for hearing October 9, 2018.

BECKEN, BRIAN ALLEN, – estate Anne Tracey Becken (Jeremiah C. Lynch, III, 97 John Clarke Road, Middletown, Rhode Island, Agent) has qualified as administratrix; creditors must file their claims in the office of the prohate clerk within the time required hy law heginning Septemher 21, 2018.

LOPEZ, JR., JOSE MANUEL – MINOR Appointment of guardian; for hearing October 9, 2018.

QUIROS, JORDAN LUIS – MINOR Appointment of guardian; for hearing October 9, 2018.

HANDICAPPED ACCESSIBLE: Individuals requesting interpreter services for hearing impaired must notify the office of the City Clerk at 421-7740 (ext. 248), 48 hours in advance of the hearing date.

PAUL V. JABOUR,
PROBATE CLERK

disposition.

You are hereby ORDERED to appear in tbis court, at the court address set forth above, on 11/02/2018 09:00 AM Other Hearing

You may bring an attorney with you. If you have a right to an attorney aod if the court determines that you are indigent, the court will appoint an attorney to represent you.

If you fail to appear, the court may proceed on that date and any date thereafter with a trial on the merits of the petition and an adjudication of this matter.

For further information call the Office of the Clerk-Magistrate at 413-322-6700.

WITNESS:
Hon. Lois M. Eaton,
FIRST JUSTICE
Paul R. Viets,
Clerk-Magistrate,
DATE ISSUED: 09/07/2018

NARRAGANSETT BAY COMMISSION
PHASE III COMBINED SEWER OVERFLOW PROGRAM
Notice of Public Meeting for Environmental Assessment and Facilities Plan Amendment

An Environmental Assessmeot and a Facilities Plao Amendment are being prepared for improvemeots proposed hy the Narragansett Bay Commission to the Bucklin Point Wastewater Treatment Facility in East Providence, RI. A Puhlic Meeting will be held on October 25, 2018 at 10:00 am at the Narragansett Bay Commission's Administrative Offices located at 1 Service Road, Provideoce, RI 02905. The meeting will he for the purposes of presenting the proposed improvements, the reasons for these improvements, and the alternatives considered. The meeting place is accessible.

Individuals requesting interpreter services must notify the Commission office at 401-461-8848/TTY (RI Relay Operator) at least 72 hours in advaoce of the meeting date.

YEAR OPTION-RIDE CTE INNOVATION & EQUITY GRANT.

FOOD SERVICE MANAGEMENT COMPANY (FSMC) RFP CONSULTANT-FOOD SERVICE ACCOUNT.

PCTA HOUSE BUILDING PROJECT-PERKINS GRANT & CATEGORICAL FUNDING.

RE-BID FOR CONTRACT SERVICES FOR A CONSULTANT TO ANALYZE AND PROVIDE RECOMMENDATIONS ON SERVICES FOR ENGLISH LEARNERS IN PROVIDENCE PUBLIC SCHOOLS ONE YEAR WITH TWO ONE YEAR OPTIONS FOR RENEWAL.

The City of Provideoce reserves the right to reject any and all hids in the hest interest of the City. An Equal Opportunity Employer and Minimum Wage Rates to he Paid.

Minority Business Enterprises and Women Business Enterprises are eocouraged to submit hids.

By Order of the Board of Contract and Supply, which will meet on the above day and date at 2:15 o'clock P.M. in the Chamhers of the City Council.

Offices and City Couocil Chamhers are accessihle to individuals with disahilities. Facilities are accessihle to people with disabilities. If you are in need of interpreter services for the hearing impaired, please contact the Office of Neighborhood Services at 421-7768 not less than 48 hours in advance of the meeting.

Jorge O. Elorza
Mayor and Chairman
Lori L. Hagen
City Clerk

Search for legal notices in-paper and online 24/7 on providencejournal.com/legals
To advertise call: 401.277.7788

child, and the child may be adopted.

Ronald J. Pagliarini,
Administrator/Clerk,
8/2/2018

TOWN OF JOHNSTON
Notice of matters pending and for hearing in said court

The Prohate Court of the Town Of Johnston will he in session on the dates specified in the notices helow at 9:00 A.M. at the Prohate Court, 1600 Atwood Aveoue, Johnston, R.I. 02919 unless noted helow, for hearing oo said matters.

Santagata, Thomas Estate #2018-119 Petition for Prohate of Will for hearing October 9, 2018

Santagata, William Estate #2018-120 Petition for Prohate of Will for hearing October 9, 2018

Cavanagh, Helena E Estate #2018-118 Mark J. Cavaoagh having qualified as Executor of the estate. Creditor must file their claims in the office of the Prohate Clerk in the time required hy law hegin Septemher 14, 2018

Cassiere, Michael F Estate #2018-112 Petition for Prohate of Will for hearing October 9, 2018

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS FAMILY COURT JUVENILE CLERK'S OFFICE
Providence/Bristol County.

Notice to BETHANY MARIE FUSTER-FIGUEROA A/K/A BETHANY FIGUEROA and any and all parties in interest. In re: ANGEL NIJASH ORELLANA-FIGUEROA A/K/A ANGEL ORELLANA, EVELIZ MARIE FUSTER FIGUEROA A/K/A EVELIZ FIGUEROA AND LEO SALVADOR FUSTER-FIGUEROA A/K/A LEO ORELLANA-FIGUEROA horn on 6/29/2012; 7/12/2014; 7/23/2016 Case Numher P 18-004490; P 18-004492; P 18-004496.

The Department of Children, Youth, and Families has filed Petitioos in the Rhode Islaod Family Court to terminate your parental rights. The Petitioos are scheduled for a hearing at One Dorraoce Plaza, Providence RI 02903 on 10/9/2018 at 9:00 AM. If you do not appear on 10/9/2018 at 9:00 AM, an Order will enter terminating your parental rights to these children.

Ronald J. Pagliarini,
Administrator/Clerk,
9/10/2018

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In The Matter Of:

Narragansett Bay Commission

Bucklin Point WWTF Upgrades

October 25, 2018

ALLIED

COURT REPORTERS, INC.

AND

VIDEO CONFERENCE CENTERS

Page 1

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

NARRAGANSETT BAY COMMISSION

PROCEEDINGS IN RE:

PHASE III CSO CONTROL
FACILITIES PROGRAM
BUCKLIN POINT WWTF UPGRADES

FACILITIES PLAN AMENDMENT
ENVIRONMENTAL ASSESSMENT
PUBLIC MEETING

NARRAGANSETT BAY COMMISSION
ONE SERVICE ROAD
PROVIDENCE, RI 02905
OCTOBER 25, 2018
10:00 A.M.

BEFORE:

KATHRYN KELLY, NARRAGANSETT BAY COMMISSION
BRANDON M. BLANCHARD, PE, PARE CORPORATION
DAVID VanHOVEN, STANTEC

ALSO PRESENT:

ALEX PINTO, RIDEM
PAUL NORDSTROM, NARRAGANSETT BAY COMMISSION
DAVID BOWEN, NARRAGANSETT BAY COMMISSION

Page 2

E X H I B I T S

NO.	DESCRIPTION	PAGE
A	POWERPOINT PRESENTATION (21 PGS.)	3

Page 3

(MEETING COMMENCED AT 10:10 A.M.)

MS. KELLY: So it is 10:10 A.M., and this is the public meeting of the Narragansett Bay Commission's Environmental Assessment for the Bucklin Point Wastewater Treatment Plant Facilities Plan Amendment. My name is Kathryn Kelly. With me is Dave Bowen and Paul Nordstrom of the Narragansett Bay Commission, Alex Pinto of Rhode Island Department of Environmental Management, Dave VanHoven of Stantec, and Brandon Blanchard of Pare Corporation.

Notice of this public meeting was published in the Providence Journal on September 21, 2018. There being no one present from the public, I'm closing this meeting at 10:11 A.M. I will enter this PowerPoint presentation into the record as Exhibit A.

(EXHIBIT A MARKED)

(PROCEEDINGS CONCLUDED AT 10:11 A.M.)

Page 4

C E R T I F I C A T E

I, Jane M. Poore, hereby certify that the foregoing is a true, accurate, and complete transcript of my notes taken at the above entitled hearing.

IN WITNESS WHEREOF I have hereunto set my hand this 25th day of October, 2018.

JANE M. POORE, NOTARY PUBLIC/RPR
My commission expires 9/11/21

DATE: October 25, 2018
IN RE: NBC public meeting

Appendix F

Regulatory Review Comment Letters

Brandon Blanchard

From: Hess, Nancy (DOA) <Nancy.Hess@doa.ri.gov>
Sent: Thursday, November 15, 2018 8:13 AM
To: Brandon Blanchard; Pinto, Alex (DEM); Liberti, Angelo (DEM)
Cc: Kathryn Kelly (kkelly@narrabay.com); Feeney, Christopher (christopher.feeney@stantec.com); Sean P. Searles (sean.searles@stantec.com); Carter, Melissa; VanHoven, David
Subject: RE: [EXTERNAL] : RE: NBC Environmental Assessment & Facilities Plan Amendment

Thank you. Brandon for your updated review. You have adequately addressed my comments.
Happy Thanksgiving

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning
Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

From: Brandon Blanchard <bblanchard@parecorp.com>
Sent: Wednesday, November 14, 2018 5:11 PM
To: Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>
Cc: Kathryn Kelly (kkelly@narrabay.com) <kkelly@narrabay.com>; Feeney, Christopher (christopher.feeney@stantec.com) <christopher.feeney@stantec.com>; Sean P. Searles (sean.searles@stantec.com) <sean.searles@stantec.com>; Carter, Melissa <melissa.carter@stantec.com>; VanHoven, David <david.vanhoven@stantec.com>
Subject: [EXTERNAL] : RE: NBC Environmental Assessment & Facilities Plan Amendment

Hello Nancy. Attached is a letter responding to your comments below. We also sent a hardcopy of this letter to you by certified mail.

Thank You,

Brandon M. Blanchard, P.E.
Managing Engineer

Pare Corporation
8 Blackstone Valley Place
Lincoln, RI 02865
401.334.4100 (T)
508.951.6581 (C)
401.334.4108 (F)
bblanchard@parecorp.com

14106.02

From: Hess, Nancy (DOA) <Nancy.Hess@doa.ri.gov>
Sent: Wednesday, October 24, 2018 2:20 PM
To: Zeman, Art (DEM) <art.zeman@dem.ri.gov>
Cc: Brandon Blanchard <bblanchard@parecorp.com>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

Yes, I will, Typo on my part.

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning
Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

From: Zeman, Art (DEM)
Sent: Wednesday, October 24, 2018 2:10 PM
To: Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

Thank you Nancy. BTW can you please forward my last email to Brandon Blanchard at Pare. His email address is incorrectly listed as bblanchard@parecopr.com. It should be bblanchard@parecorp.com I would guess.

Art Zeman, P.E.
Supervising Civil Engineer
Division of Planning & Development
RI Department of Environmental Management
235 Promenade Street, 3rd floor
Providence, RI 02908

T: 401.222.2776, x7702
E: art.zeman@dem.ri.gov

From: Hess, Nancy (DOA)
Sent: Wednesday, October 24, 2018 2:07 PM
To: Zeman, Art (DEM) <art.zeman@dem.ri.gov>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

Thanks Art. Good luck in your new position.

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning

Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

From: Zeman, Art (DEM)
Sent: Wednesday, October 24, 2018 1:34 PM
To: Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>; bblanchard@parecopr.com
Cc: kkelly@narrabay.com; Pinto, Alex (DEM) <alex.pinto@dem.ri.gov>; Liberti, Angelo (DEM) <angelo.liberti@dem.ri.gov>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

All –

Just a heads up that I'm no longer the wastewater planning & design contact in Water Resources. I've moved on to the DEM Division of Planning & Development. Please contact Alex Pinto (alex.pinto@dem.ri.gov) or Angelo Liberti (angelo.liberti@dem.ri.gov) for any wastewater-related projects.

Thanks,

Art Zeman, P.E.
Supervising Civil Engineer
Division of Planning & Development
RI Department of Environmental Management
235 Promenade Street, 3rd floor
Providence, RI 02908

T: 401.222.2776, x7702
E: art.zeman@dem.ri.gov

From: Hess, Nancy (DOA)
Sent: Wednesday, October 24, 2018 9:36 AM
To: bblanchard@parecopr.com
Cc: kkelly@narrabay.com; Zeman, Art (DEM) <art.zeman@dem.ri.gov>
Subject: NBC Environmental Assessment & Facilities Plan Amendment

Brandon
I'm reviewing your submission for Pare Project No: 14106.02 for the Bucklin Point WWTF Upgrades. Please be advised that there have a been several changes to the State Guide which are pertinent to your review. The following Elements have been rescinded and no longer need to be checked within project assessments:

- 110, Goals 7 Policies
- 112, Ruse of Surplus Military Lands
- 162, Rivers Policy & Classification Plan
- 621, Policy Statement for …Public transit…
- 711, Blackstone Region Water Resources Management Plan
- 715, CCMP for Narraganset Bay, 912, Howard Center Master Plan

There has been an update to the Element 731, Nonpoint Source Pollution Management Plan. It was replaced with a new Element, *Water Quality 2035*. It was adopted by the State Planning Council on October 13, 2016. This Element is most relevant to your project. Would you please resubmit your assessment considering the updated information on the State Guide Plan? Should you have any questions please feel free to call me.

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning
Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

Phase III CSO Program

November 14, 2018

Ms. Nancy Hess
Principal Environmental Planner
RI Statewide Planning Program
One Capitol Hill
Providence, Rhode Island 02908-5871

Subject: **Narragansett Bay Commission**
Environmental Assessment &
Facilities Plan Amendment
Bucklin Point WWTF Upgrades
Pare Project No: 14106.02

Certified Mail
Return Receipt Requested

Dear Ms. Hess:

Pare Corporation, on behalf of the Narragansett Bay Commission, is writing in response to your review comments provided via email on October 24, 2018 with respect to the Environmental Assessment (EA) and Wastewater Facilities Plan Amendment for the above referenced project. The Facilities Plan Amendment is being prepared due to proposed upgrades at the Bucklin Point Wastewater Treatment Facility (WWTF). It also assesses the facility over a 20-year planning period. The EA is being prepared in support of the Facilities Plan Amendment.

Your comments were provided in response to our letter dated September 26, 2018 and our responses are summarized below.

Comment:

Please be advised that there have been several changes to the State Guide which are pertinent to your review. The following Elements have been rescinded and no longer need to be checked within project assessments:

- 110, Goals 7 Policies
- 112, Ruse of Surplus Military Lands
- 162, Rivers Policy & Classification Plan
- 621, Policy Statement for …Public transit…
- 711, Blackstone Region Water Resources Management Plan
- 715, CCMP for Narraganset Bay, 912, Howard Center Master Plan

There has been an update to the Element 731, Nonpoint Source Pollution Management Plan. It was replaced with a new Element, *Water Quality 2035*. It was adopted by the State Planning Council on October 13, 2016. This Element is most relevant to your project.

Would you please resubmit your assessment considering the updated information on the State Guide Plan?

Response:

As you have indicated, several State Guide Plan (SGP) elements have been rescinded and are therefore no longer necessary for review with respect to project assessments. These are as follows:

- Element 110: Goal and Policies for the Development of Rhode Island
- Element 112: Resources Management in the Reuse of Surplus Navy Lands
- Element 162: Rivers Policy and Classification Plan
- Element 621: Policy Statement – Proposals for New or Restructured Public Transit Facilities or Service
- Element 711: Blackstone Region Water Resource Management Plan
- Element 715: Comprehensive Conservation and Management Plan for Narragansett Bay
- Element 912: Howard Center Master Plan

SGP Elements 110, 112, 621, and 912 were not applicable to this project. Your comments also indicated that Element 731: Nonpoint Source Pollution Management, was replaced with a new element, Water Quality 2035. Water Quality 2035 updates and replaces former SGP Element 731 as well as SGP Elements 162, 711, and 715.

You noted that Water Quality 2035 appears to be the SGP Element most relevant to this project. As such, you requested that we update our assessment based on the findings of our review of this element. Provided below is our assessment of how Water Quality 2035 relates to this project. Our assessment of this project relative to other applicable SGP elements remains unchanged from our letter issued to you on September 26, 2018.

Water Quality 2035

Water Quality 2035 is the State's plan to protect and restore the quality of Rhode Island's water resources. It encompasses freshwater and saltwater surface waters, groundwaters, and wetlands – from inland lakes and streams to Narragansett Bay and coastal salt marshes. Central to this plan is a focus on watersheds as the appropriate basis for management of water resources. It is intended that state agencies will integrate work at the watershed scale and identify ways that such work can align with and support the related activities of municipal, regional, and federal agencies; watershed organizations; and other entities.

The primary goals of Water Quality 2035 are to promote:

- Protection of existing quality of RI's waters and aquatic habitats and prevention of further degradation.
- Restoration of degraded waters and aquatic habitats to a condition that meets their water quality and habitat goals.

The goals and objectives of the Phase III CSO Program, and in turn the environmental benefits that will result by the proposed upgrades to the Bucklin Point Wastewater Treatment Facility (WWTF), help realize the State's goal of protecting existing water quality and preventing further degradation of Rhode Island's waterways. As indicated in our previous letter to you, upgrades are required to the Bucklin Point WWTF to better treat the increase in flow expected once proposed combined sewer overflow (CSO) abatement facilities are constructed. An alternatives evaluation was performed, and the currently preferred alternative of two (2) new secondary clarifiers and a polymer injection system provides the best effluent water quality of all the alternatives considered. The proposed upgrades will also provide more operational flexibility allowing for better treatment of wastewater to meet new RIPDES discharge limits. The Facilities Plan Amendment will present the alternatives evaluated and identify the preferred alternative.

"Wastewater discharges to surface waters and collection sewers" are classified as pollution sources in Water Quality 2035. Combined sewer overflows and effluent discharges from WWTFs are cited as sources of biological and nutrient loading to Rhode Island waters. NBC's CSO Program and their operation of the two largest WWTFs in the State are specifically referenced. Ten policies are identified in Water Quality 2035 with respect to managing possible impacts from WWTF discharges and CSO overflows, several of which relate to NBC's operations. The proposed improvements to the Bucklin Point WWTF, and to a greater extent the Phase III CSO Program as a whole, are consistent with these policies.

Based on our assessment, it appears that the proposed project furthers the State's goals of protecting water quality in Rhode Island and maintains consistency with the policies presented in Water Quality 2035. We trust that this letter addresses your comments.

Please do not hesitate to contact me should you have any further questions or require additional information.

Very truly yours,

Brandon Blanchard, P.E.
Managing Engineer, Pare Corporation

cc: Ms. Kathryn Kelly, P.E. – Narragansett Bay Commission
Ms. Melissa Carter, P.E. – Stantec
Mr. Sean Searles, P.E. – Stantec
Mr. Briscoe B. Lang, PWS – Pare Corporation

Stantec
260 W. Exchange Street
Suite 001
Providence, RI 02903

Brandon Blanchard

From: Buchanan, Scott (DEM) <Scott.Buchanan@dem.ri.gov>
Sent: Friday, October 26, 2018 10:32 AM
To: Brandon Blanchard
Cc: kkelly@narrabay.com; Mello, Leland (DEM)
Subject: Responding to NBC Env. Assessment & Facilities Plan Amendment Bucklin Point WWTF Upgrades

Follow Up Flag: Follow up
Flag Status: Flagged

Mr. Bucklin,

Thank you for the information regarding the upgrades at Bucklin Point. I received these on behalf of Chris Raithel who is now retired from DEM. I do have a couple of questions.

We have recent records of diamond-backed terrapins in the immediate area of the facility in question. Diamond-backed terrapins are a ‘critically imperiled’ species in the state. The species spends the majority of its life in the water column but will come into the uplands to bask and nest. There is an unvegetated area (between points “2” and “218” on figure provided) on the property that, from aerial imagery, looks like it could be appropriate nesting habitat. Have terrapins ever been observed using this area or in any other area that may be impacted by construction?

Also, it is not entirely clear what the nature of the construction in question will entail. The figures provided by you appear to indicate the construction of three additional outfalls as well as the construction of a tunnel shaft between the yellow squares on the figures. Is this a correct interpretation? Will there be an additional tunnel built underwater between points “2” (on east side of Seekonk River) and “27” (on west side of Seekonk River)? If not, what will be the source of the water being deposited by the outfall on the west side of the river and what will be the scale of construction associated with this feature? As a general question, will there be any temporary or permanent constructed features that may be accessible to a terrapin swimming in the water column at any point during the tidal cycle?

Thank you for your time and please let me know if I may clarify anything,

Scott W. Buchanan, Ph.D.
Herpetologist
Rhode Island DEM
Division of Fish and Wildlife
277 Great Neck Rd
West Kingston, RI 02892
Phone: (401) 789-0281 x28

Brandon Blanchard

From: Antonio, Joseph (DEM) <joseph.antonio@dem.ri.gov>
Sent: Thursday, November 15, 2018 11:04 AM
To: P. E. Kathryn Kelly (kkelly@narrabay.com); Brandon Blanchard
Subject: Comments on Narragansett Bay Commission Bucklin Point WWTF Upgrades, EA and FPA document

Hi Kathryn and Brandon,

The only comments that we have at this time is that NBC must ensure that the schedule to complete the Phase III CSO project must comply with the requirements from their consent agreement RIA-424, which was entered into between the NBC and DEM on September 6, 2018.

Also, it appears that he project will improve water quality in the river. It may need a RIPDES Construction General Permit (CGP).

Joe

Joseph Antonio, Senior Environmental Scientist RIDEM/Office of Customer & Technical Assistance
235 Promenade Street
Providence, RI 02908
401-222-4700, x4410
joseph.antonio@dem.ri.gov

Appendix F

Facilities Plan/EA Comment Letters

Brandon Blanchard

From: Hess, Nancy (DOA) <Nancy.Hess@doa.ri.gov>
Sent: Thursday, November 15, 2018 8:13 AM
To: Brandon Blanchard; Pinto, Alex (DEM); Liberti, Angelo (DEM)
Cc: Kathryn Kelly (kkelly@narrabay.com); Feeney, Christopher (christopher.feeney@stantec.com); Sean P. Searles (sean.searles@stantec.com); Carter, Melissa; VanHoven, David
Subject: RE: [EXTERNAL] : RE: NBC Environmental Assessment & Facilities Plan Amendment

Thank you. Brandon for your updated review. You have adequately addressed my comments.
Happy Thanksgiving

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning
Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

From: Brandon Blanchard <bblanchard@parecorp.com>
Sent: Wednesday, November 14, 2018 5:11 PM
To: Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>
Cc: Kathryn Kelly (kkelly@narrabay.com) <kkelly@narrabay.com>; Feeney, Christopher (christopher.feeney@stantec.com) <christopher.feeney@stantec.com>; Sean P. Searles (sean.searles@stantec.com) <sean.searles@stantec.com>; Carter, Melissa <melissa.carter@stantec.com>; VanHoven, David <david.vanhoven@stantec.com>
Subject: [EXTERNAL] : RE: NBC Environmental Assessment & Facilities Plan Amendment

Hello Nancy. Attached is a letter responding to your comments below. We also sent a hardcopy of this letter to you by certified mail.

Thank You,

Brandon M. Blanchard, P.E.
Managing Engineer

Pare Corporation
8 Blackstone Valley Place
Lincoln, RI 02865
401.334.4100 (T)
508.951.6581 (C)
401.334.4108 (F)
bblanchard@parecorp.com

14106.02

From: Hess, Nancy (DOA) <Nancy.Hess@doa.ri.gov>
Sent: Wednesday, October 24, 2018 2:20 PM
To: Zeman, Art (DEM) <art.zeman@dem.ri.gov>
Cc: Brandon Blanchard <bblanchard@parecorp.com>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

Yes, I will, Typo on my part.

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning
Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

From: Zeman, Art (DEM)
Sent: Wednesday, October 24, 2018 2:10 PM
To: Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

Thank you Nancy. BTW can you please forward my last email to Brandon Blanchard at Pare. His email address is incorrectly listed as bblanchard@parecopr.com. It should be bblanchard@parecorp.com I would guess.

Art Zeman, P.E.
Supervising Civil Engineer
Division of Planning & Development
RI Department of Environmental Management
235 Promenade Street, 3rd floor
Providence, RI 02908

T: 401.222.2776, x7702
E: art.zeman@dem.ri.gov

From: Hess, Nancy (DOA)
Sent: Wednesday, October 24, 2018 2:07 PM
To: Zeman, Art (DEM) <art.zeman@dem.ri.gov>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

Thanks Art. Good luck in your new position.

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning

Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

From: Zeman, Art (DEM)
Sent: Wednesday, October 24, 2018 1:34 PM
To: Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>; bblanchard@parecopr.com
Cc: kkelly@narrabay.com; Pinto, Alex (DEM) <alex.pinto@dem.ri.gov>; Liberti, Angelo (DEM) <angelo.liberti@dem.ri.gov>
Subject: RE: NBC Environmental Assessment & Facilities Plan Amendment

All –

Just a heads up that I'm no longer the wastewater planning & design contact in Water Resources. I've moved on to the DEM Division of Planning & Development. Please contact Alex Pinto (alex.pinto@dem.ri.gov) or Angelo Liberti (angelo.liberti@dem.ri.gov) for any wastewater-related projects.

Thanks,

Art Zeman, P.E.
Supervising Civil Engineer
Division of Planning & Development
RI Department of Environmental Management
235 Promenade Street, 3rd floor
Providence, RI 02908

T: 401.222.2776, x7702
E: art.zeman@dem.ri.gov

From: Hess, Nancy (DOA)
Sent: Wednesday, October 24, 2018 9:36 AM
To: bblanchard@parecopr.com
Cc: kkelly@narrabay.com; Zeman, Art (DEM) <art.zeman@dem.ri.gov>
Subject: NBC Environmental Assessment & Facilities Plan Amendment

Brandon
I'm reviewing your submission for Pare Project No: 14106.02 for the Bucklin Point WWTF Upgrades. Please be advised that there have a been several changes to the State Guide which are pertinent to your review. The following Elements have been rescinded and no longer need to be checked within project assessments:

- 110, Goals 7 Policies
- 112, Ruse of Surplus Military Lands
- 162, Rivers Policy & Classification Plan
- 621, Policy Statement for …Public transit…
- 711, Blackstone Region Water Resources Management Plan
- 715, CCMP for Narraganset Bay, 912, Howard Center Master Plan

There has been an update to the Element 731, Nonpoint Source Pollution Management Plan. It was replaced with a new Element, *Water Quality 2035*. It was adopted by the State Planning Council on October 13, 2016. This Element is most relevant to your project. Would you please resubmit your assessment considering the updated information on the State Guide Plan? Should you have any questions please feel free to call me.

Nancy Hess
Supervising Land Use Planner
Land Use and Natural Resources
Division of Planning
Department of Administration
One Capitol Hill, Providence, RI 02908
Phone: 401-222-6480
Email: nancy.hess@doa.ri.gov
Website: www.planning.ri.gov

Phase III CSO Program

November 14, 2018

Ms. Nancy Hess
Principal Environmental Planner
RI Statewide Planning Program
One Capitol Hill
Providence, Rhode Island 02908-5871

Subject: **Narragansett Bay Commission**
Environmental Assessment &
Facilities Plan Amendment
Bucklin Point WWTF Upgrades
Pare Project No: 14106.02

Certified Mail
Return Receipt Requested

Dear Ms. Hess:

Pare Corporation, on behalf of the Narragansett Bay Commission, is writing in response to your review comments provided via email on October 24, 2018 with respect to the Environmental Assessment (EA) and Wastewater Facilities Plan Amendment for the above referenced project. The Facilities Plan Amendment is being prepared due to proposed upgrades at the Bucklin Point Wastewater Treatment Facility (WWTF). It also assesses the facility over a 20-year planning period. The EA is being prepared in support of the Facilities Plan Amendment.

Your comments were provided in response to our letter dated September 26, 2018 and our responses are summarized below.

Comment:

Please be advised that there have been several changes to the State Guide which are pertinent to your review. The following Elements have been rescinded and no longer need to be checked within project assessments:

- 110, Goals 7 Policies
- 112, Ruse of Surplus Military Lands
- 162, Rivers Policy & Classification Plan
- 621, Policy Statement for ...Public transit...
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There has been an update to the Element 731, Nonpoint Source Pollution Management Plan. It was replaced with a new Element, *Water Quality 2035*. It was adopted by the State Planning Council on October 13, 2016. This Element is most relevant to your project.

Would you please resubmit your assessment considering the updated information on the State Guide Plan?

Stantec
260 W. Exchange Street
Suite 001
Providence, RI 02903

Response:

As you have indicated, several State Guide Plan (SGP) elements have been rescinded and are therefore no longer necessary for review with respect to project assessments. These are as follows:

- Element 110: Goal and Policies for the Development of Rhode Island
- Element 112: Resources Management in the Reuse of Surplus Navy Lands
- Element 162: Rivers Policy and Classification Plan
- Element 621: Policy Statement – Proposals for New or Restructured Public Transit Facilities or Service
- Element 711: Blackstone Region Water Resource Management Plan
- Element 715: Comprehensive Conservation and Management Plan for Narragansett Bay
- Element 912: Howard Center Master Plan

SGP Elements 110, 112, 621, and 912 were not applicable to this project. Your comments also indicated that Element 731: Nonpoint Source Pollution Management, was replaced with a new element, Water Quality 2035. Water Quality 2035 updates and replaces former SGP Element 731 as well as SGP Elements 162, 711, and 715.

You noted that Water Quality 2035 appears to be the SGP Element most relevant to this project. As such, you requested that we update our assessment based on the findings of our review of this element. Provided below is our assessment of how Water Quality 2035 relates to this project. Our assessment of this project relative to other applicable SGP elements remains unchanged from our letter issued to you on September 26, 2018.

Water Quality 2035

Water Quality 2035 is the State's plan to protect and restore the quality of Rhode Island's water resources. It encompasses freshwater and saltwater surface waters, groundwaters, and wetlands – from inland lakes and streams to Narragansett Bay and coastal salt marshes. Central to this plan is a focus on watersheds as the appropriate basis for management of water resources. It is intended that state agencies will integrate work at the watershed scale and identify ways that such work can align with and support the related activities of municipal, regional, and federal agencies; watershed organizations; and other entities.

The primary goals of Water Quality 2035 are to promote:

- Protection of existing quality of RI's waters and aquatic habitats and prevention of further degradation.
- Restoration of degraded waters and aquatic habitats to a condition that meets their water quality and habitat goals.

The goals and objectives of the Phase III CSO Program, and in turn the environmental benefits that will result by the proposed upgrades to the Bucklin Point Wastewater Treatment Facility (WWTF), help realize the State's goal of protecting existing water quality and preventing further degradation of Rhode Island's waterways. As indicated in our previous letter to you, upgrades are required to the Bucklin Point WWTF to better treat the increase in flow expected once proposed combined sewer overflow (CSO) abatement facilities are constructed. An alternatives evaluation was performed, and the currently preferred alternative of two (2) new secondary clarifiers and a polymer injection system provides the best effluent water quality of all the alternatives considered. The proposed upgrades will also provide more operational flexibility allowing for better treatment of wastewater to meet new RIPDES discharge limits. The Facilities Plan Amendment will present the alternatives evaluated and identify the preferred alternative.

"Wastewater discharges to surface waters and collection sewers" are classified as pollution sources in Water Quality 2035. Combined sewer overflows and effluent discharges from WWTFs are cited as sources of biological and nutrient loading to Rhode Island waters. NBC's CSO Program and their operation of the two largest WWTFs in the State are specifically referenced. Ten policies are identified in Water Quality 2035 with respect to managing possible impacts from WWTF discharges and CSO overflows, several of which relate to NBC's operations. The proposed improvements to the Bucklin Point WWTF, and to a greater extent the Phase III CSO Program as a whole, are consistent with these policies.

Based on our assessment, it appears that the proposed project furthers the State's goals of protecting water quality in Rhode Island and maintains consistency with the policies presented in Water Quality 2035. We trust that this letter addresses your comments.

Please do not hesitate to contact me should you have any further questions or require additional information.

Very truly yours,

Brandon Blanchard, P.E.
Managing Engineer, Pare Corporation

cc: Ms. Kathryn Kelly, P.E. – Narragansett Bay Commission
Ms. Melissa Carter, P.E. – Stantec
Mr. Sean Searles, P.E. – Stantec
Mr. Briscoe B. Lang, PWS – Pare Corporation

Brandon Blanchard

From: Buchanan, Scott (DEM) <Scott.Buchanan@dem.ri.gov>
Sent: Friday, October 26, 2018 10:32 AM
To: Brandon Blanchard
Cc: kkelly@narrabay.com; Mello, Leland (DEM)
Subject: Responding to NBC Env. Assessment & Facilities Plan Amendment Bucklin Point WWTF Upgrades

Follow Up Flag: Follow up
Flag Status: Flagged

Mr. Bucklin,

Thank you for the information regarding the upgrades at Bucklin Point. I received these on behalf of Chris Raithel who is now retired from DEM. I do have a couple of questions.

We have recent records of diamond-backed terrapins in the immediate area of the facility in question. Diamond-backed terrapins are a ‘critically imperiled’ species in the state. The species spends the majority of its life in the water column but will come into the uplands to bask and nest. There is an unvegetated area (between points “2” and “218” on figure provided) on the property that, from aerial imagery, looks like it could be appropriate nesting habitat. Have terrapins ever been observed using this area or in any other area that may be impacted by construction?

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Thank you for your time and please let me know if I may clarify anything,

Scott W. Buchanan, Ph.D.
Herpetologist
Rhode Island DEM
Division of Fish and Wildlife
277 Great Neck Rd
West Kingston, RI 02892
Phone: (401) 789-0281 x28

RI DEM

Brandon Blanchard

From: Antonio, Joseph (DEM) <joseph.antonio@dem.ri.gov>
Sent: Thursday, November 15, 2018 11:04 AM
To: P. E. Kathryn Kelly (kkelly@narrabay.com); Brandon Blanchard
Subject: Comments on Narragansett Bay Commission Bucklin Point WWTF Upgrades, EA and FPA document

Hi Kathryn and Brandon,

The only comments that we have at this time is that NBC must ensure that the schedule to complete the Phase III CSO project must comply with the requirements from their consent agreement RIA-424, which was entered into between the NBC and DEM on September 6, 2018.

Also, it appears that he project will improve water quality in the river. It may need a RIPDES Construction General Permit (CGP).

Joe

Joseph Antonio, Senior Environmental Scientist RIDEM/Office of Customer & Technical Assistance
235 Promenade Street
Providence, RI 02908
401-222-4700, x4410
joseph.antonio@dem.ri.gov

Appendix G

Public Meeting

(Newspaper Advertisement, Sign-in Sheet, Presentation

Providence Journal | The Newport Daily News

Ad Order Confirmation

Customer:	PARE CORPORATION	**Sales Rep:**	Local PJUnassigned
Customer Account:	100128200	**Order Taker:**	Kaitlin Knight
Agency:	PARE CORPORATION		
Agency/Parent Account:	100128200		
Ordered By:	Allison Viens		
PO Number:	14106.02		
Ad Order #:	0011147329		
Net Amount:	$350.05	**Payment Method:**	Credit Card
Amount Due:	**$350.05**	**Payment Amount:**	$0.00

Ad Number: 0011147329-01

Color: **Ad Size:** 1 X 3.85 In

Run Dates	Product	Placement/Classification - Position
9/21	Providence Journal	PJ Cls Legals - PJ LG Legal Notices **Sort Text** PN SEWER OVERFLOW AMENDMENT
	PJ Projo.com	PJ Cls Legals - PJ LG Legal Notices **Sort Text** PN SEWER OVERFLOW AMENDMENT

NARRAGANSETT BAY COMMISSION PHASE III COMBINED SEWER OVERFLOW PROGRAM

Notice of Public Meeting for Environmental Assessment and Facilities Plan Amendment

An Environmental Assessment and a Facilities Plan Amendment are being prepared for improvements proposed by the Narragansett Bay Commission to the Bucklin Point Wastewater Treatment Facility in East Providence, RI. A Public Meeting will be held on October 25, 2018 at 10:00 am at the Narragansett Bay Commission's Administrative Offices located at 1 Service Road, Providence, RI 02905. The meeting will be for the purposes of presenting the proposed improvements, the reasons for these improvements, and the alternatives considered. The meeting place is accessible.

Individuals requesting interpreter services must notify the Commission office at 401-461-8848/TTY (RI Relay Operator) at least 72 hours in advance of the meeting date.

Phase III CSO Program
Sign-In Sheet

Meeting Information:

Meeting Topic: BPWWTF Facilities Plan/Environmental Assessment PUBLIC MEETING

Date: 10/24/2018 **Time:** 10:00 AM

Location: Narragansett Bay Commission Offices

Name	Organization	Email
BRANDON BLANCHARD	PARE CORPORATION	bblanchard@parecorp.com
Kathryn Kelly	NBC	kkelly@narrabay.com
David Van Hoven	Stantec	david.vanhoven@stantec.com
Alex Pinto	RIDEM	alex.pinto@dem.ri.gov
Paul Nordstrom	NBC	pnordstrom@narrabay.com
DAVID BOWEN	NBC	[illegible]

Phase III CSO Control Facilities Program

Bucklin Point WWTF Upgrades

Facilities Plan Amendment
Environmental Assessment

Public Meeting

October 25, 2018
10:00 AM

Stantec

PARE CORPORATION

The Narragansett Bay Commission

Presenters

Narragansett Bay Commission
Kathryn Kelly, P.E. – Project Manager/
Principal Environmental Engineer

Stantec
David Van Hoven, P.E. – Project Manager/ Task Lead

Pare Corporation
Brandon Blanchard, P.E. – Deputy Program Manager

Bucklin Point Wastewater Treatment Facility

- Bucklin Point Wastewater Treatment Facility (BPWWTF) is located off Campbell Avenue in East Providence
- Serves NBC's Bucklin Point Service Area
- 46 MGD Secondary Treatment; 116 MGD Primary Treatment Capacity
- Average daily flow capacity: 23.7 MGD

2009 Facilities Plan Amendment

- Facilities plan last amended in 2009
- New RIPDES discharge permit issued June 2005
  - Seasonal limits for total nitrogen – 5 mg/L
- Modifications made to meet more stringent nitrogen discharge limits
- Implementation plan recommended:
  - Upgrades to enable BPWWTF to comply with average monthly effluent discharge limit
  - Provide operational efficiency
  - Resolve maintenance problems

Improvements to BPWWTF Since 2009

- Modifications for improved nitrogen removal
- Dry-weather primary clarification system
- Dry-weather flow distribution improvements
- Aeration improvements (scum removal system)
- Secondary clarifier improvements
- Disinfection improvements
- Miscellaneous improvements
  - Solids processing, plant water, wet-weather tank return pumping
  - Instrumentation and electrical upgrades
  - Staffing

2018 FP Amendment - Purpose and Need

- BPWWTF potential deficiencies include:
  - Evidence of stress
  - Sludge blanket depth will increase/effluent quality will decrease
  - Decrease in MLSS temperature

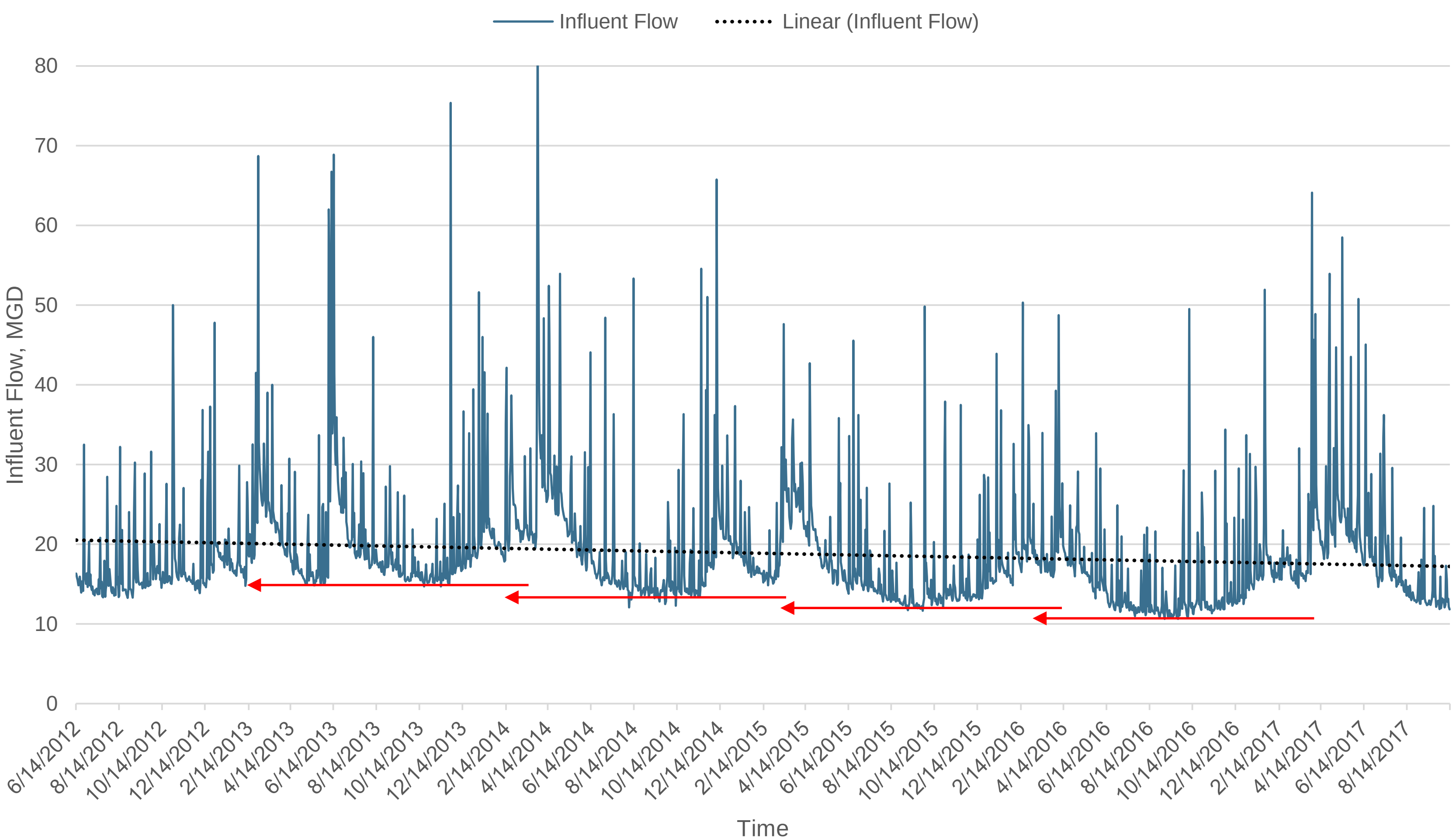
- Increased wet-weather flow to BPWWTF from Pawtucket Tunnel and Tunnel Pump Station

- New RIPDES Permit:
  - Issued December 1, 2017
  - Seasonal 5 mg/L Nitrogen Limit

Current Effluent Limits

Parameter	Monthly Limit (mg/L)	Weekly Limit (mg/L)	Daily Limit (mg/L)
TSS (Nov 1 – Apr 30)	30	45	50
TSS (May 1 – Oct 31)	20	20	45
$CBOD_5$ (Nov 1 – Apr 30)	25	40	45
$CBOD_5$ (May 1 – Oct 31)	20	20	30

Average Influent Flow for Every Day During the Time Period Analyzed



Population in Service Area

Service Area	Measured	Projected					
	2010	2015*	2020	2025	2030	2035	2040
Pawtucket	71,148	71,757	71,147	70,537	69,927	69,317	68,707
Central Falls	19,376	19,403	19,612	20,001	20,325	20,537	20,613
Lincoln	21,105	21,438	21,857	22,482	23,038	23,470	23,750
Cumberland	33,506	33,936	34,698	35,784	36,762	37,541	38,074
Smithfield	21,430	21,634	22,023	22,616	23,136	23,529	23,766
New Development	–	–	5,832	5,832	5,832	5,832	5,832
TOTAL	166,565	168,168	175,169	177,252	179,020	180,226	180,742

Measured and Anticipated Flows (bold with Operational Storage Tunnel)

Flow	Measured	Projected						
(MGD)	2014	2018	2019	2020	2025	2030	2035	2040
Average Day	21.22	21.34	21.38	22.11	22.37	**26.58**	**26.48**	**26.54**
Max Day	85.81	86.27	86.42	89.38	90.45	**91.35**	**91.96**	**92.23**
Max Week	46.01	46.26	46.34	47.93	48.50	**39.21**	**39.39**	**39.47**
Max Month	33.79	33.97	34.03	35.19	35.61	**35.03**	**35.20**	**35.29**
Peak Hour to Secondary Treatment	46.00	46.00	46.00	46.00	46.00	**46.00**	**46.00**	**46.00**
Peak Hour to Wet-weather Treatment	7.06	7.35	7.44	9.27	9.93	**10.48**	**10.86**	**11.03**

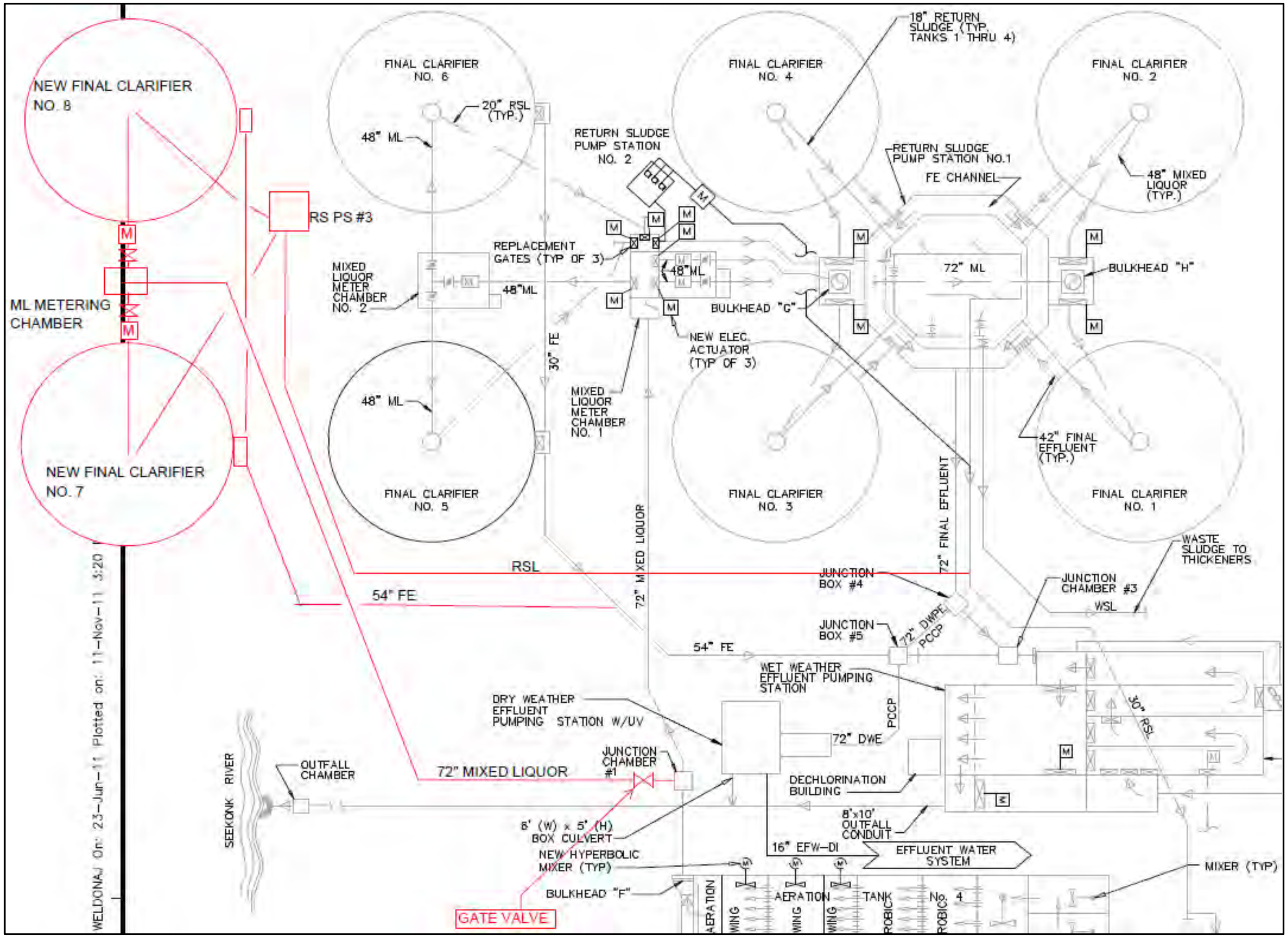
Measured and Anticipated BOD Loads with Operational Storage Tunnel

BOD Load	Measured	Projected						
	2014	2018	2019	2020	2025	2030	2035	2040
Average Day (lb/day)	33,089	33,268	33,326	34,467	34,877	**35,225**	**35,462**	**35,564**
Average Day (mg/L)	186.94	186.94	186.94	186.94	186.94	**158.89**	**160.57**	**160.65**
Max Day (lb/day)	104,376	104,938	105,121	108,721	110,014	**111,112**	**111,860**	**112,180**
Max Week (lb/day)	46,289	46,539	46,620	48,216	48,790	**49,277**	**49,608**	**49,751**
Max Month (lb/day)	39,037	39,248	39,316	40,663	41,146	**41,557**	**41,837**	**41,956**

Alternative 1: Install Two (2) New Clarifiers

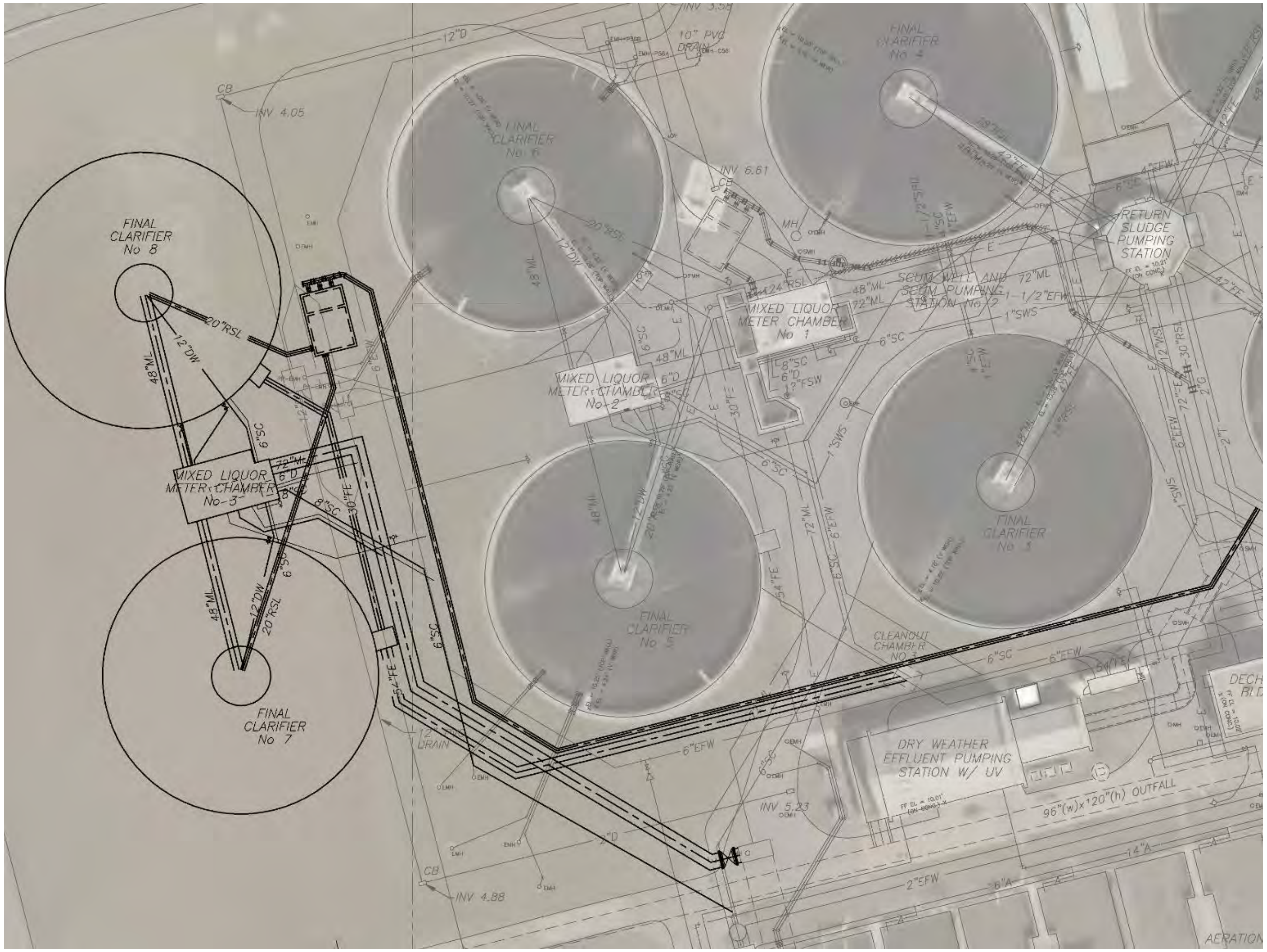
- Construction of two (2) new clarifiers (Nos. 7 and 8)
- Project would include:
  - New mixed liquor suspended solids (MLSS) piping
  - Flow splitting
  - New RAS pump station
  - Instrumentation and controls to match existing clarifiers.
- New clarifiers are proposed to the west of Nos. 5 and 6
- New clarifiers to match their existing specifications

Alternative 1 Schematic Layout



Alternative 1 Schematic Layout

Install Two New Final Clarifiers



Alternative 2: Convert Existing Bioreactor to Solids Storage During High Flows

- Convert one of existing bioreactors to a solid storage tank.
  - Install new piping, valve, and meter

- During first day of a storm, 50% of the RAS flow would be directed to solid storage bioreactor, primary effluent feed would be shut off

- Remaining three (3) bioreactors would operate as normal

Alternative 2 Schematic Layout

Convert Existing Bioreactor to Solids Storage During High Flows

Alternative 3: Convert Bioreactors to Contact Stabilization During High Flows

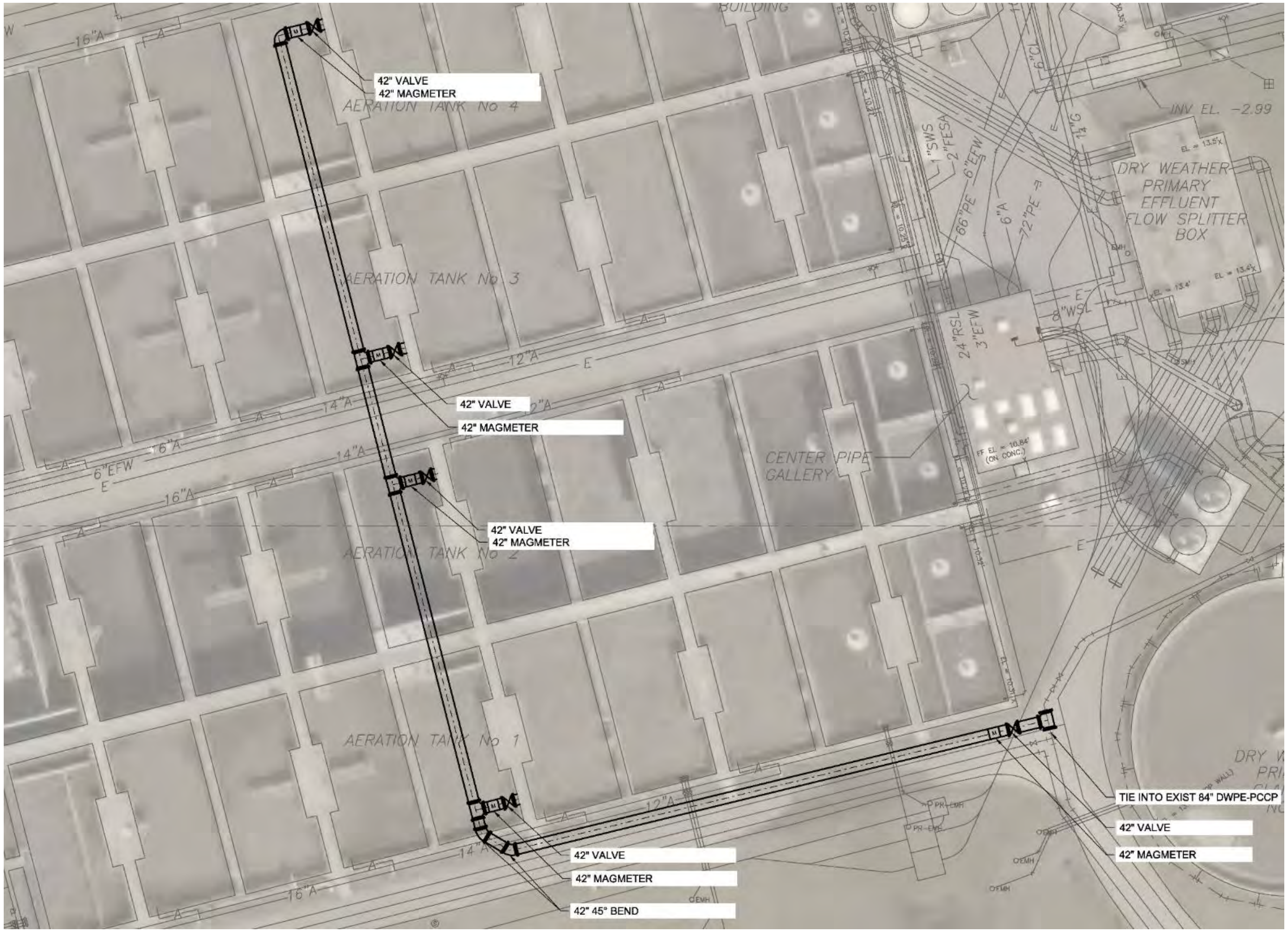
- Operate existing bioreactors to operate in constant stabilization mode during wet-weather events and step mode during normal operations
  - Install new piping, pump station, and flow meter

- Common strategy for treatment plants that serve systems with combined sewers

- Reduces MLSS concentration to clarifiers, but effluent BOD concentration expected to increase

Alternative 3 Schematic Layout

Convert Bioreactors to Contact Stabilization During High Flows



Alternative 4: Install Polymer Feed System

- Convert existing manual polymer addition to automated polymer feed system
- Install two (2) new polymer storage tanks with mixers and metering pump dosing system
- Polymer to be added upstream of final clarifiers as a settling aid
- Further analysis is required to determine whether a dry or liquid polymer is more appropriate

Alternatives Summary

Alternative	Comments
1: Install Two New Final Clarifiers	• Provides redundant clarifiers • Increases RAS pumping • Least complicated operations
2: Convert Existing Bioreactor to Solids Storage During High Flows	• Risk of overloading clarifiers during transition from wet weather to dry weather operations
3: Convert Bioreactors to Contact Stabilization During High Flows	• Provides opportunity for total nitrogen reduction during normal operating conditions • Risk of overloading clarifiers during transition from wet weather to dry weather operations
4: Install Polymer Feed System	• Operated when SVIs > 150 ml/g • Can be implemented in conjunction with any alternative

Recommended Plan: Alternatives 1 and 4

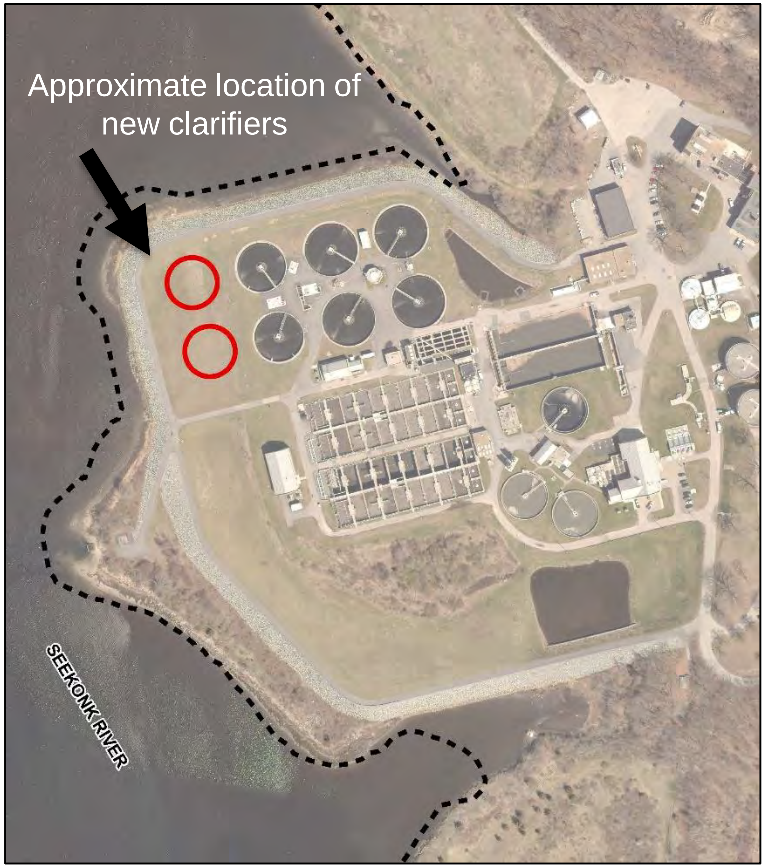
- Alternative 1:
  - best effluent quality
  - easiest to operate
  - Improves performance to meet new RIPDES permit limits

- Constructing new clarifiers allows NBC to temporarily take others offline

- Alternative 4 is low cost solution when clarifiers experience poor settling

- Alternative 1 offers best level of treatment
- Alternative 4 enhances treatment

- Total Cost: $14.4 Million



- 30% Design to RIDEM by June 30, 2020 (per CA RIA-424)
- Final Design 18 months after 30% Design Approval
- Substantial Completion May 2023

Environmental Assessment

Potential impacts evaluated:

1. Surface Water
2. Erosion and Sedimentation
3. Groundwater
4. Wetlands and Floodplain
5. Wild or Scenic Rivers
6. Coastal Zones/Coastal Barrier Resources
7. Sole Source Aquifers
8. Farmlands and Agricultural Uses
9. Air Quality
10. Noise
11. Vegetation and Wildlife
12. Water Supply/Use
13. Soil Disturbance
14. Historical, Archaeological, and Cultural Resources
15. Aesthetics
16. Land Use
17. Economic
18. Community Facilities
19. Recreation
20. Safety
21. Solid Waste
22. Traffic
23. Other Indirect Impacts

Potential Environmental Impacts Evaluated

Some do not apply:

1. Surface Water
2. Erosion and Sedimentation
3. Groundwater
4. Wetlands and Floodplain
5. Wild or Scenic Rivers
6. Coastal Zones/Coastal Barrier Resources
7. Sole Source Aquifers
8. Farmlands and Agricultural Uses
9. Air Quality
10. Noise
11. Vegetation and Wildlife
12. Water Supply/Use
13. Soil Disturbance
14. Historical, Archaeological, and Cultural Resources
15. Aesthetics
16. Land Use
17. Economics
18. Community Facilities
19. Recreation
20. Safety
21. Solid Waste
22. Traffic
23. Other Indirect Impacts

Potential Environmental Impacts Evaluated

Others are potential short-term impacts typical of construction:

1. Surface Water
2. Erosion and Sedimentation
3. Groundwater
4. Wetlands and Floodplain
5. Wild or Scenic Rivers
6. Coastal Zones/Coastal Barrier Resources
7. Sole Source Aquifers
8. Farmlands and Agricultural Uses
9. Air Quality
10. Noise
11. Vegetation and Wildlife
12. Water Supply
13. Soil Disturbance
14. Historical, Archaeological, and Cultural Resources
15. Aesthetics
16. Land Use
17. Economics
18. Community Facilities
19. Recreation
20. Safety
21. Solid Waste
22. Traffic
23. Other Indirect Impacts

Avoidance, Minimization, and Mitigation

- Project limited to existing BPWWTF site
- Best management practices (BMPs) used in design and construction
  - Erosion/dust control and site restoration
  - Construction safety and solid waste management
  - Noise, traffic, odor controls
  - Work hours in accordance with local ordinances
- Project will receive appropriate permits and undergo regulatory review

This project will result in long-term environmental benefits, helping significantly improve water quality in the Seekonk River and Narragansett Bay

State and Federal Agency Review

- Intergovernmental agency review requested September 26, 2018:
  - RI Division of Planning
  - RI Department of Transportation
  - RI Historic Preservation and Heritage Commission
  - RI Department of Environmental Management-Division of Fish and Wildlife
  - Narragansett Tribal Historic Preservation Office
  - RI Coastal Resources Management Council;
  - RI Department of Environmental Management- Office of Technical and Customer Assistance
  - NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO)
  - Natural Resources Conservation Service
  - U.S. Fish and Wildlife Service
- Comments to be incorporated into Facilities Plan Amendment and Environmental Assessment
- Submit to RIDEM by December 31, 2018
- Public Hearing to follow RIDEM review

Appendix H

Public Hearing

(Presentation Materials and Meeting Minutes)

To be included in Final Version of Facilities Plan following Public Hearing