Field's Point Wastewater Treatment Facility Facility Plan Amendment - Biosolids Management Facilities Upgrades

October 24, 2025

Narragansett Bay Commission – Field's Point WWTF

NBC Project 207.01 - Biosolids Management Facilities Upgrades

Prepared by

Jacobs



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Field's Point Wastewater Treatment Facility

Facility Plan Amendment

Biosolids Management Facilities Upgrades

October 24, 2025



Narragansett Bay Commission

Vincent J. Mesolella
Chairman

Laurie A. Horridge
Executive Director

Biosolids Facility Planning Team

Narragansett Bay Commission

David C. Bowen, PE
Director of Engineering & Construction
Kathryn Kelly, PE
Asst. Director of Engineering & Construction
Robert M. Baglini Jr., PE
Engineering Manager
Charles D. Spellman Jr., PhD, PE
Principal Environmental Engineer
James McCaughey, PE
Deputy Director

Jacobs Engineering Group

Peter von Zweck, PE, PMP
Senior Technical Advisor
John J. Ososkie, PE
Senior Project Manager
Meredith Sullivan, PE, PMP
Assistant Project Manager
Kevin Baird, P.E.
Design Manger
Emily Bridgehouse, EIT
Project Engineer
Brian Wrigley, PE
Pare Corporation

Facility Plan Amendment Milestones

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Final Draft Submitted to RIDEM	

Executive Summary

The Narragansett Bay Commission's (NBC) Field's Point Wastewater Treatment Facility (WWTF), located in Providence, serves over 225,000 people and can provide advanced wastewater treatment for up to 77 million gallons per day (MGD). Semi-solid materials removed during the wastewater treatment process ("sludge") are processed on-site in the Field's Point dewatering facility where liquid is removed from the sludge ("dewatering") to produce a drier sludge material ("cake") which is easier to manage and dispose of. Dewatering operations at Field's Point and off-site cake disposal are currently managed by a third-party vendor.

NBC initiated this Facility Plan Amendment (FPA) effort to evaluate the existing condition of sludge management facilities and operations at the Field's Point WWTF and to recommend future facility needs. The intent of this Field's Point WWTF FPA is to identify current operational deficiencies and determine recommended improvements for establishing reliable dewatering and biosolids management operations now and over the next 20 years which are in the best interest of NBC and its ratepayers.

This FPA recommends immediate and short-term improvements to facilitate reliable and compliant dewatering processes while considering NBC's current and future biosolids management capacity requirements. An outline of recommended future improvements, including centralized dewatering and solids management facilities, is also included herein. Consideration for uncertainties in the future biosolids management disposal options, requirements to meet local, state, and federal guidelines, and what is in the best interest of NBC and its ratepayers were considered in these evaluations. A prioritized and phased implementation plan was developed for both short- and long-term facility improvements including recommendations for temporary dewatering to maintain operations while new facilities are constructed.

Existing Conditions

The existing dewatering facility was originally constructed in the early 2000's under Rhode Island Department of Environmental Management (RIDEM) Order of Approval #1515 following a RIDEM-approved FPA in 1997 with an approved 2004 Supplement. A simplified process flow diagram of the existing dewatering process is shown in Figure ES 1. The dewatering facility at Field's Point has been contract-operated by a third-party vendor since it was constructed.

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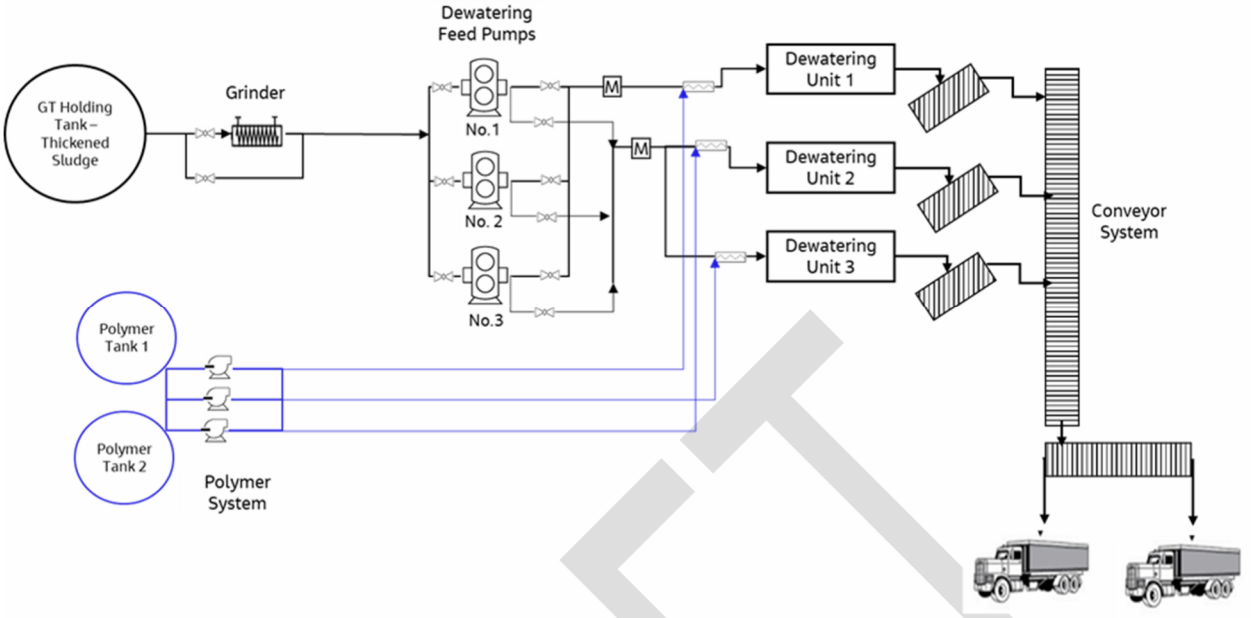


Figure ES 1 Field's Point Existing Dewatering Facility Process Flow Diagram

Sludge production at Field's Point over three and a half calendar-years (2022, 2023, 2024 and 2025) was evaluated. Statistical outliers were removed from the data set and a 25% contingency was added to provide a conservative estimate for equipment sizing. Recommendations for improvements will be sized to process 28 dry tons per day (DT/day) under annual average (AA) conditions and 38 DT/day under maximum month (MM) conditions based on this evaluation.

NBC has been experiencing difficulties with the reliability and performance of solids management operations at the Field's Point WWTF which has negatively impacted critical treatment processes and resulting water quality. A detailed condition assessment and operational evaluation was conducted to better understand these deficiencies and to evaluate potential improvements. The condition assessment found the facility and nearly all of its equipment to be in extremely poor condition, and beyond their useful life thus requiring replacement.

Development and Evaluation of Alternatives

Alternative solutions were developed to address deficiencies within the existing Field's Point WWTF solids management facility. The improvement alternatives are recommended to be implemented over the following three phases, to expedite the replacement of aging equipment and meet future goals efficiently while maintaining flexibility for NBC's long-term biosolids management vision:

1. **Immediate Improvements**: Address items in critically poor condition to allow for the dewatering building to operate safely and reliably, while handling sludge generated by the WWTF until short-term improvements can be implemented. NBC may elect to have intermediate improvements implemented by a 3rd party.

2. **Short-Term Improvements**: Upgrade the dewatering facility at Field's Point WWTF. The facility will include redundancy and provide flexibility for effective and efficient operations. Equipment will be sized to support current and future loading, including the capacity to receive and process merchant sludge. The short-term phase should also replace necessary dewatering process equipment at Bucklin Point in-kind.

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3. **Future Improvements**: Improve the overall biosolids management processes at Field's Point WWTF to reduce the volume of solids and improve the quality of biosolids produced. This will optimize potential outlets for disposal and minimize long-term risk associated with variable biosolids market conditions. Considerations for consolidating NBC biosolids management at Field's Point WWTF will be included.

Immediate improvements include the installation of temporary equipment at the Field's Point WWTF while the short-term improvements are being implemented. Temporary equipment at the Field's Point WWTF may include centrifuges or belt filter presses (BFPs) with a capacity equivalent to existing equipment. This temporary equipment will only serve as a backup to failing equipment, or to enable construction phasing while short-term improvements are being implemented. It is also possible that the Immediate improvements are implemented by a third-party contract operator.

Dewatering Technology

Based on the poor condition of the existing Field's Point dewatering building, both a new dewatering building and new equipment are required to bring the facility to a state of good repair. It is also recommended that, during the Field's Point short-term improvements project, essentially all dewatering process equipment at the Bucklin Point WWTF be replaced in-kind. The upgrades at Bucklin Point are generally considered to be an asset management maintenance activity rather than an upgrade, and should be bundled with any dewatering improvements at Field's Point. The estimated cost for the in-kind replacements at Bucklin Point are on the order of $12 million.

Three dewatering equipment technologies were short-listed and evaluated for the Field's Point WWTF upgrades:

1. Centrifuges - separates sludge solids from the liquid, using centrifugal forces generated by a rapidly rotating cylindrical bowl.
2. BFPs - use porous moving belts to continuously dewater solids through a combination of polymer conditioning, gravity drainage, and compression.
3. Screw presses - a filtration process that separates solids from liquids to achieve dry cake.

To identify the best dewatering technology for the Field's Point WWTF, both non-monetary and monetary criteria were evaluated. The total lifecycle costs for each technology were estimated using the NBC's particular operational requirements. Non-monetary evaluation results and the estimated total lifecycle costs for dewatering equipment were plotted according to a combined weighted benefit score. As shown in Figure ES 2, the centrifuge dewatering technology had the highest comparative weighted benefit score and lowest lifecycle cost, followed by the screw presses with a slightly lower weighted benefit score and more expensive lifecycle cost due to the need for more units. BFPs had the lowest weighted benefit score and more expensive lifecycle cost than centrifuges due to wetter cake with lower percent total solids. Accordingly, centrifuges are the recommended dewatering technology for the Field's Point WWTF equipment replacement.

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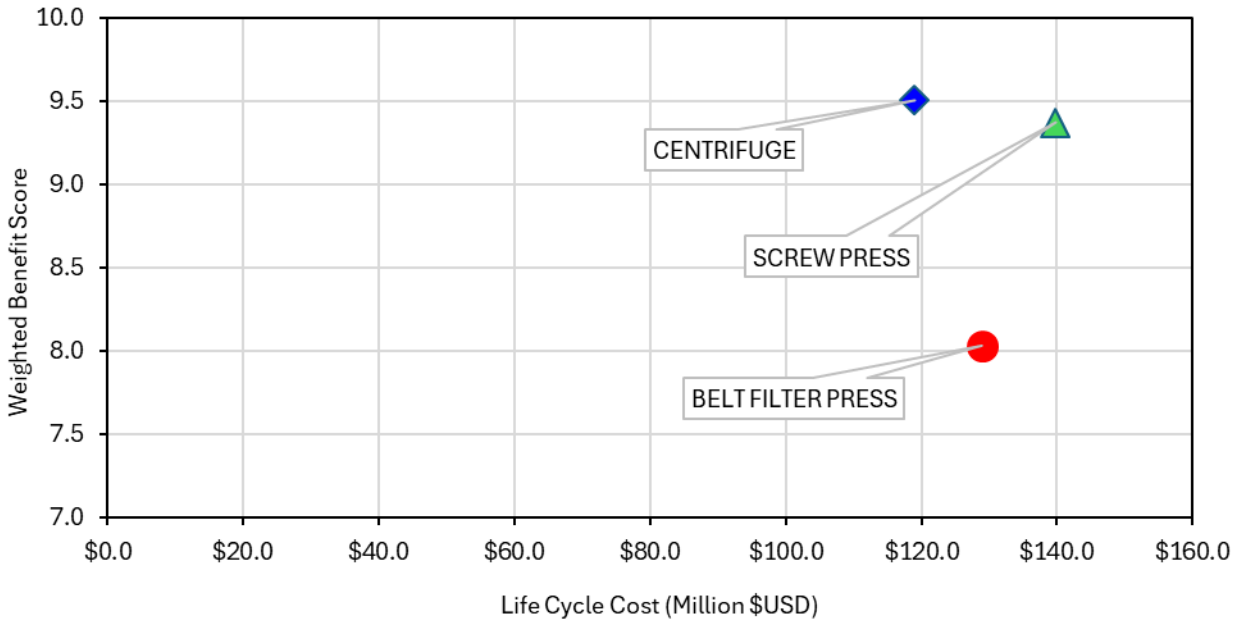


Figure ES 2. Field's Point WWTF Dewatering Alternatives Nonmonetary Benefits vs. Lifecycle Cost

Dewatering Equipment Design Basis

Dewatering centrifuge equipment is sized based on operating and design parameters including sludge production and solids-loading rates to achieve cake quality and performance criteria. The new dewatering facility will include three centrifuges, two duty units and one standby. The centrifuges will dewater thickened sludge from between 2.7% and 3.5% total solids (TS) up to 20-25% TS, with solids capture of 95%. These parameters describe the solids content in the cake product from the centrifuge, and are selected based on downstream processing or disposal as well as operational energy and polymer costs. The individual unit sizes will be determined based on the selected manufacturer, however the system design criteria will be used to size two operational duty units. A standby unit will be furnished to provide system redundancy that will decrease the risk of operational challenges and capacity restrictions currently experienced at the existing facility. The unit capacity of each centrifuge will be sized to accommodate the recommended operating schedule, where the dewatering system will be operated intermittently 16 hours per day, and 6 days per week.

Sludge storage tanks will be provided to accommodate thickened sludge from Field's Point and future merchant sludge receiving, with sufficient volume to accommodate two days of sludge production at max month conditions. The unit sizes and volume of sludge storage tanks will be revisited if the liquid merchant sludge projections change.

Short-Term Improvements

Two alternatives were considered to address short-term deficiencies:

1. Rehabilitation of the existing dewatering building
2. Construction of a new dewatering building

The costs to bring the existing building to a state of good repair range between $23 to $34 million. The cost estimate includes $1 million for temporary equipment for necessary immediate improvements. The cost estimate does not include improvements specific to merchant sludge receiving (such as truck scales,

truck unloading, and sludge storage) and associated costs for site civil work to construct them. Other non-cost considerations for the existing building are noted below.

- ☒ The existing building cannot meet NBC's short-term and future biosolids management goals.
- ☒ Currently all sludge truck traffic is directed through the center of the plant, which is disruptive to operations.
- ☒ It is not sized properly for the desired equipment and has inadequate space for maintenance.
- ☒ It would be difficult to retrofit into compliance with existing TR-16 design guidance.
- ☒ The existing building lacks sludge cake storage, which is recommended to improve O&M.
- ☒ The facility does not provide enclosed, odor-controlled cake storage and does not have redundant conveyors for O&M.
- ☒ The facility does not have a drive through truck loading bay, which inhibits cake loading efficiency.
- ☒ The footprint will limit the ability to process merchant sludge volumes that exceed the projections completed for this FPA.

A new building is expected to cost approximately $70 million, but it could cost between $49 and $105 million, because there is a level of uncertainty in a planning-level Class IV estimate. While more expensive than repurposing the existing building, there are some important non-cost benefits over the existing structure that should be noted:

- ☑ There would be two enclosed truck bays with odor control: one for sludge cake loading and disposal and one for liquid merchant sludge receiving.
- ☑ The truck bays would permit trucks to drive through, unlike the existing structure that requires roll-off containers for sludge cake storage.
- ☑ Sludge truck traffic would access the facility via Terminal Rd. which will alleviate current traffic through the plant.
- ☑ Redundant sludge cake hoppers would be provided to improve operations with redundant conveyance options. This additional equipment is why the process mechanical costs increase for a new building.
- ☑ The new facility would be two stories instead of one, providing the recommended space for centrifuge maintenance, which the existing facility does not have.
- ☑ The facility would include a bridge crane with an access hatch over the merchant sludge receiving truck bay, to permit the centrifuge scrolls to be hauled to the manufacturer for future maintenance and balancing.
- ☑ This estimate includes the necessary improvements needed for merchant sludge receiving, potentially including truck scales or flow meters, and truck unloading.

Based on the monetary and non-cost considerations, construction of a new dewatering facility on the existing NBC property is recommended. A site along Terminal Road will support both the NBC's immediate, short-term and long-term biosolids management objectives.

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Future Improvements

Due to the volatility and unpredictability of the regional and national biosolids management market, this Facility Plan also evaluated potential future biosolids management options to provide a sustainable biosolids management solution at Field's Point and reduce NBC's risk in future disposal markets. Following necessary immediate and short-term dewatering facility improvements, this FPA recommends additional processing technologies at Field's Point which would produce a higher-quality biosolids product and provide flexibility for future disposal options. Future biosolids management strategies seek to integrate the ability to achieve the following goals:

- Produce dewatered cake averaging 25% or greater total solids.
- Minimize truck traffic, odors, and other potential public nuisances.
- Potentially process sludge from the Bucklin Point WWTF and other Rhode Island WWTFs at the Field's Point WWTF.
- Consider integrating infrastructure to produce Class A, low-odor biosolids increasing potential disposal outlets.
- Include the capture and beneficial use of biogas.

During the preliminary screening phase, six alternatives were evaluated for future biosolids management at the Field's Point WWTF, to include various combinations of dewatering, mesophilic anaerobic digestion (MAD), thermal drying, and thermal hydrolysis process (THP).

Thermal drying was considered in the long list of alternatives, to be implemented in combination with dewatering and digestion to reduce the moisture content. However, the relative cost benefits are not currently beneficial to NBC nor its ratepayers as a result of high capital and operational costs, therefore thermal drying was not carried forward for consideration in this evaluation. Thermal drying should, however, be considered for integration in the future, and reevaluated for benefits after the improvements recommended in this section have been implemented. Under all explored alternatives, a third-party service provider would still handle final disposal offsite.

The following alternative technology configurations were evaluated based on monetary and non-monetary criteria and weighted scoring:

Alternative 0: No-build status quo (provides basis of comparison)

Alternative 1: The addition of anaerobic digestion at Field's Point WWTF (Class B)

Alternative 2: The addition of anaerobic digestion in combination with Thermal Hydrolysis Process (THP) (Class A)

Alternative 0 (no-build) represents a base case scenario, where short-term improvements are constructed with no additional biosolids management infrastructure improvements. This alternative was not considered an acceptable solution to NBC because it would generate a larger volume of biosolids that would not meet the requirements for classified biosolids, introducing elevated long-term risk to NBC based on the volatility and uncertainty in the New England biosolids management market.

Under Alternative 1, a new anaerobic digestion facility would be constructed at Field's Point WWTF to add an additional treatment step following sludge thickening. The dewatering building and storage tanks constructed under the recommended short-term improvements (Section 6.2) will continue to dewater final digested sludge. This alternative produces a reduced volume of Class B biosolids by including

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digestion. This is an improvement over the No-build alternative, because the Class B product will have reduced pathogens and odor. However, the dewatered cake produced will be less than 25% TS and the outlets for beneficial use of the Class B biosolids remain limited in New England, both of which would ultimately increase biosolids management cost for NBC.

Under Alternative 2, new centrifuge pre-dewatering and a THP facility would be implemented upstream of the digesters in addition to the improvements proposed under Alternative 1. THP pretreatment is a heat and high-pressure process that pairs with anaerobic digestion to improve digestion performance and the dryness of the final Class A product through advanced digestion. The dewatering building and storage tanks constructed under the short-term improvements recommended by this FPA will be used to dewater digested sludge. Regional merchant sludge from other facilities can be received and mixed with Field's Point liquid sludge. This alternative produces Class A biosolids with further reduction in pathogens and odor compared to Alternative 1.

The addition of THP reduces required digestion volume, increases solids reduction, increases biogas production which would offer potential energy recovery opportunities, and improves cake dryness compared to the other alternatives. A major benefit of this alternative is the diversity of market outlets for the final dewatered product and market resilience in the face of industry or regulatory shifts.

A cost-benefit analysis was applied to each alternative, combining qualitative and quantitative factors to assign a weighted score, similar to the evaluation for the short-term improvements. Alternative 2, the addition of anaerobic digestion and THP at Field's Point WWTF, is the recommended alternative to carry for further development due in large part because of more favorable assessment of nonmonetary criteria. This alternative will produce reduced-pathogen and low-odor Class A biosolids, the highest biosolid classification. The addition of THP will reduce the required digester tank volumes, increase solids reduction, increase biogas production, and improve final cake dryness. Figure ES 3 shows the proposed location for the recommended future improvements.



Figure ES 3. Proposed Site Layout for Future Facility Upgrades

A major benefit of this alternative is the diversity of market outlets for the final product, and the product's resiliency in the face of industry and regulatory shifts. For the aforementioned reasons, it is recommended that, within the 20-year planning horizon, NBC consider constructing an anaerobic digestion and THP facility at Field's Point on existing NBC-owned property. In addition to the major technologies considered for Future Improvements, ancillary associated processes (e.g., Sludge Thickening and Scum handling) were also preliminarily evaluated for potential improvements.

Recommended Plan

This FPA recommends immediate, short- and long-term facility improvements through a prioritized and phased implementation plan.

Immediate improvements include the installation of temporary equipment at the Field's Point WWTF while the short-term improvements are being implemented. Temporary equipment at the Field's Point WWTF may include centrifuges or BFPs with a capacity equivalent to existing equipment. This temporary equipment will only serve as a backup to failing equipment, or to enable construction phasing while short-term improvements are being implemented.

Short-term Improvements include a new dewatering building that will be constructed to house the dewatering equipment and its ancillary systems. The dewatering building will include a liquid sludge truck unloading bay to process merchant sludge. Merchant sludge will be pumped to the sludge storage tanks, where it will be blended with Field's Point thickened sludge. Blended sludge will be pumped from the liquid sludge storage tanks to the centrifuges. Immediately prior to entering the centrifuge, the sludge will be conditioned with polymer as a flocculant. Centrifuges will separate the solids and liquids to produce dewatered cake (solids) and centrate (liquids). This equipment will be sized to provide redundancy and operational flexibility. Centrate will return to secondary treatment by gravity. Dewatered cake will fall into a cake pump or conveyor system by gravity and will be conveyed to a sludge cake hopper for storage until a truck can offload the cake. A second truck loading bay will be provided for trucks hauling cake offsite.

Potential long-term future improvements are recommended to address the volatility and unpredictability of the regional and national biosolids management market. Following necessary immediate and short-term dewatering facility improvements, this FPA recommends improved sludge thickening and addition of anaerobic digestion with THP at Field's Point WWTF. These improvements would support NBC's objectives to produce a higher quality biosolids product and provide flexibility for future disposal options, and would be in the long-term best interest of NBC and its ratepayers.

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Acronyms and Abbreviations

A	ampere(s)
AA	annual average
AACE	Association for the Advancement of Cost Engineering
BFE	base flood elevation
BFP	belt filter presses
BNR	biological nitrogen removal
cBOD5	5-day carbonaceous biochemical oxygen demand
CCP	Community Comprehensive Plan
CRMC	Coastal Resources Management Council
DO	dissolved oxygen
DT/day	dry ton(s) per day
EA	environmental assessment
FEMA	Federal Emergency Management Agency
FPA	facility plan amendment
FTE	full-time equivalent
g	gravity (force)
HPHC	Historical Preservation & Heritage Commission
Hr	hour
HVAC	heating, ventilation, and air conditioning
IFAS	Integrated Fixed-Film Activated Sludge
kV	kilovolt(s)
kVA	kilovolt-ampere(s)
lbs/d	pound(s) per day
MAD	mesophilic anaerobic digestion
mg/L	milligram(s) per liter
MGD	million gallons per day
MM	Maximum Month

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NAVD88	North American Vertical Datum of 1988
NBC	Narragansett Bay Commission
O&M	operations and maintenance
PS	primary sludge
RIDEM	Rhode Island Department of Environmental Management
SLR	sea level rise
THP	thermal hydrolysis process
TR-16	TR-16 Guides for the Design of Wastewater Treatment Works (2011)
mL	milliliter(s)
TN	total nitrogen
TSS	total suspended solids
TWAS	thickened waste activated sludge
µg/L	microgram(s) per liter
UD	Udorthents-Urban land complex
V	volt(s)
W	watt(s)
WAS	waste activated sludge
WWTF	wastewater treatment facility
°C	degree(s) Celsius
+	positive
-	negative
%	percent
$	U.S. dollars

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1. Project Overview

The Narragansett Bay Commission (NBC) initiated this Facility Plan Amendment (FPA) effort to evaluate the existing condition of the sludge management facilities and operations at the Field's Point Wastewater Treatment Facility (WWTF), the largest WWTF in Rhode Island. The intent of this Field's Point WWTF FPA is to identify current operational deficiencies and recommended improvements to establish reliable dewatering and biosolids management operations now and over the next 20 years through 2046.

NBC has been experiencing difficulties with the reliability and performance of the solids management process at the Field's Point WWTF which is currently contract-operated by a third-party vendor. A condition assessment and operations evaluation was prepared to better understand these deficiencies and evaluate potential improvements. Based on the condition assessment, the facility and its equipment are in poor condition, are beyond their useful life, and require significant upgrades.

This FPA recommends the immediate and short-term improvements to facilitate safe and reliable dewatering processes while meeting NBC's current and future capacity requirements for the biosolids management system. It also provides an outline of recommended future facility improvements, including centralized dewatering and solids management facilities, that meet local, state, and federal guidelines. This FPA recommends both short- and long-term facility improvements through a prioritized and phased implementation plan, which also includes recommendations for temporary dewatering operations on an interim basis while new dewatering facilities are constructed.

1.1 History of Solids Management

The Field's Point WWTF was originally constructed in 1901 by the City of Providence as a chemical precipitation plant where sludge was gravity thickened and plate-pressed to cake (Figure 1-1), then hauled off site by small gauge rail cars and later by barge. Providence constructed the first Field's Point sludge incinerator in the 1940's which processed the WWTF's sludge until it was decommissioned, and the second multiple hearth incinerator was built in the 1960's and fully rehabilitated in 1980. Sludge was originally dewatered using cloth vacuum filters installed in the 1940's, which were in operation until 1988.

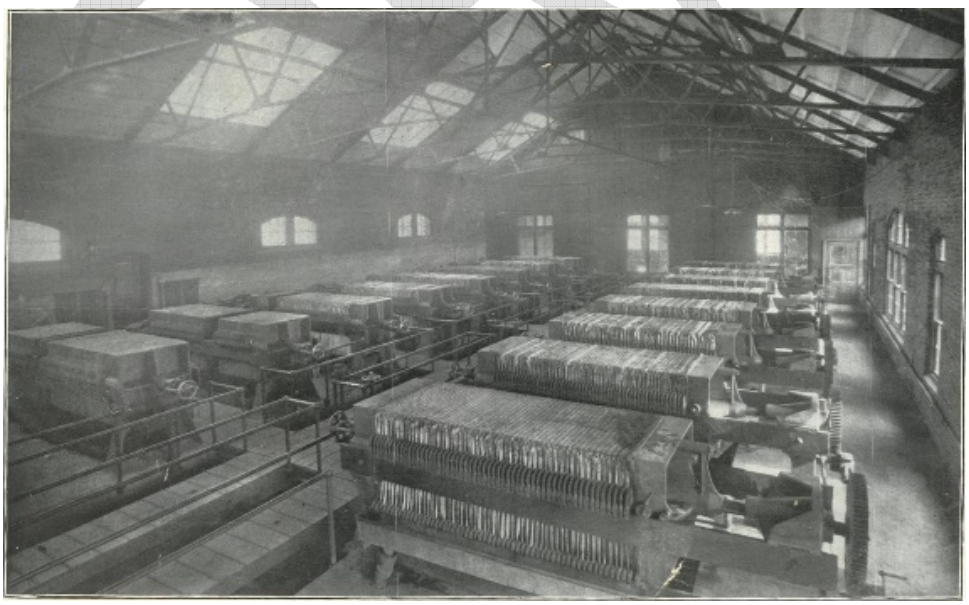


Figure 1-1. Field's Point Original Sludge Press House, 1901

After NBC assumed ownership of the Field's Point WWTF, a 1985 Rhode Island Department of Environmental Management (RIDEM)-approved FPA recommended constructing a new dewatering building at Field's Point with six new Belt Filter Presses (BFPs), which was never implemented. Instead, a smaller interim facility with two BFPs was constructed in 1988 to immediately replace the vacuum filters and address the solids processing needs at Field's Point. The existing sludge gravity thickening facility was also constructed in the late 1980's under a separate contract.

The interim solids facility operated well past its intended design life of 25 years resulting in a need for additional upgrades. In 1997, RIDEM approved another Field's Point sludge management FPA which recommended various facility improvements to adequately process Field's Point's maximum 30 dry tons per day (DT/d) of sludge. This 1997 FPA again recommended construction of a new dewatering building, with either BFPs or centrifuges, and the addition of new incinerator emissions control technology. Concurrently, a 1997 FPA for NBC's Bucklin Point WWTF in East Providence recommended that NBC consolidate sludge disposal for both WWTFs at Field's Point in the near future. While recommended by both WWTFs' approved FPAs, this recommended consolidation has not yet occurred. In 2004, a supplemental Field's Point sludge disposal FPA was approved by RIDEM as an amendment to the 1997 FPA. The 2004 FPA permitted off-site disposal of dewatered sludge.

The Field's Point dewatering facility recommended in the 1997 FPA was eventually constructed under RIDEM Order of Approval #1515 in 2005 by a third-party under a 20-year Design-Build-Operate-Disposal contract with NBC, which functions as the dewatering facility in use today. With a long-term third-party agreement in place, the Field's Point incineration facility was subsequently decommissioned and demolished in 2006 instead of being upgraded as recommended in the 1997 FPA. All subsequent RIDEM-approved FPA's for Field's Point, including the 2007 Biological Nitrogen Removal (BNR) FPA and its September 2011 revision, generally did not focus on improvements or upgrades to the solids handling process as the facilities were under contract operation. However, the BNR basis design data in the approved FPAs is utilized in this FPA.

1.2 Report Organization

Jacobs conducted this FPA on behalf of NBC to evaluate various proven biosolids management alternatives. The purpose was to improve the WTTF's current dewatering performance and provide reliable short and long-term biosolids handling operations. The FPA has been prepared in accordance with the RIDEM Management Facilities Plan Checklist, and is organized as follows:

- **Section 1, Project Overview**: Explains the objective of the study, and describes the facilities' historical operations and capital works, including current deficiencies, to support to the Statement of Project Need.
- **Section 2, Planning Area:** Describes and shows the planning area boundaries and parameters, including a description of the institutional structure and maps generated to show the proposed works.
- **Section 3, Regulatory Considerations & Effluent Limitations**: States the current and future regulations and explains their relevance to the proposed works.
- **Section 4, Existing Conditions:** Summarizes the planning area's existing flows and loads along with sludge quantities which are not expected to change during dewatering upgrades. This section also discusses the current environmental conditions within the planning area, which are used as a baseline for the environmental impact assessment. Additionally, this section provides details on the existing condition of the process equipment and dewatering facility.
- **Section 5, Consideration for Future Biosolids Management Plan**: Reviews objectives to improve future biosolids management and handling capacity at NBC facilities. This section provides context for future

sludge processing, which will provide efficiencies and potential connections between the Bucklin Point and Field's Point WWTFs. It summarizes the proposed and prescreened alternatives for future upgrades and discusses the phased implementation, with the short-term upgrades.

- **Section 6, Development and Evaluation of Alternatives**: Presents the screening methodology and shortlisted dewatering alternatives for short-term improvements. An evaluation of the comparative capital and operational costs and other criteria associated with each is provided. This section also discusses alternatives and recommendations for ancillary building systems and operational improvements.
- **Section 7, Plan Selection & Design**: Presents the selected alternative and recommended plan for short-term dewatering system improvements in detail, including descriptions and conceptual designs of process and building improvements. This section provides associated estimates for cost, schedule, and environmental impacts. It also includes the environmental impact assessment for the selected plan, compared to the baseline presented in Section 4.
- **Section 8, Plan Implementation**: Discusses the implementation schedule for the plan, including the design, construction, and commissioning phases, with milestones identified for major tasks or constraints.
- **Section 9, Public Participation:** Itemizes the major tasks and deliverables that make up the public participation plan, including a record of any interaction and feedback from the public associated with the project.
- **Section 10, Intergovernmental Review:** Itemizes the reviews government agencies must complete, per Intergovernmental Review Contacts list, and provides a record of review correspondence.

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2. Planning Area

The planning area is the Field's Point WWTF, whose main entrance is at the intersection of Ernest Street and Service Road (Figure 2-1). The WWTF is located within an industrial area, and is bound as follows:

- By Service Road to the west
- By Terminal Road to the north and east
- By New York Avenue to the south

The eastern portion of the Field's Point site is bordered by the Port of Providence (ProvPort, Inc.), which is located adjacent to the Providence River. To the north of the site, along Terminal Road, the facility is located across from oil storage tanks. Along the western side of the site, the facility is bordered by property owned by the City of Providence, at the corner of Ernest Street and Allens Avenue, as well as on the opposite side of Ernest Street. The southern portion of the site, along New York Avenue, is across from a scrap metal handling company. The southeastern edge of the site is located adjacent to an active Genesee & Wyoming freight railroad (Providence & Worcester). In the early 2000's NBC purchased a parcel of land that is proposed for the location of the new dewatering facility. This parcel is located along Terminal Road on the eastern side of the NBC's campus. A site survey is being completed to confirm suitability of this site.

The area in and around Field's Point WWTF is characterized by heavy truck and railroad traffic, dust, and noise that are typical of industrial areas. Field's Point WWTF is adjacent to the Providence River, but there are no wetland areas, wooded areas, or other environmentally sensitive areas or wildlife habitats on or adjacent to the site. Because the shoreline is fully developed with industrial facilities, it does not support wildlife on the western bank of the Providence River. The eastern bank of the river does support wildlife. Activities at the Field's Point WWTF would only impact the river, through the quality of the facility's treated effluent.



Figure 2-1. Planning Area – Field's Point Wastewater Treatment Facility

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3. Regulatory Considerations & Effluent Limitations

This section discusses regulatory considerations and effluent limitations.

3.1 Effluent Discharge Permit Limits

Field's Point WWTF is permitted to discharge into the Providence, Seekonk, Moshassuck, West, and Woonasquatucket Rivers. The current RIPDES Permit Number RI0100315 was issued on September 29, 2017, and put into effect on December 1, 2017. An amendment was issued in 2019, which provided modified total suspended solids (TSS) and 5-day carbonaceous biochemical oxygen demand ($cBOD_5$) limits, although a key performance indicator for the plant is seasonal effluent total nitrogen production of less than 5.0 mg/L. Table 3-1 lists discharge limits regulated under the RIPDES permit

Table 3-1. RIPDES Permit Effluent Limitations

Effluent Characteristics	Discharge Limitations				
	Quantity – lb/day		Concentration		
	Monthly Average	Max Daily	Monthly Average	Weekly Average	Max Daily
Flow (To Advanced Treatment)	65 MGD	___ MGD[a]			
$CBOD_5$ (November 1 – April 30)	13,553	24,395	25 mg/L	40 mg/L	45 mg/L
$CBOD_5$ (May 1 – October 31)	10,842	16,263	20 mg/L	20 mg/L	30 mg/L
$CBOD_5$ – % Removal	85%				
TSS (November 1 – April 30)	16,263	27,105	30 mg/L	45 mg/L	50 mg/L
TSS (May 1 – October 31)	10,842	24,395	20 mg/L	20 mg/L	45 mg/L
Enterococci			35 cfu/ 100 mL		276 cfu/ 100 mL
Total Residual Chlorine			65.0 µg/L		65.0 µg/L
pH			6		9
Nitrogen, Total (May 1- October 31)	2,711		5.0 mg/L		
Arsenic, Total			5.4 µg/L		306.3 µg/L
Copper, Total			24.35 µg/L		24.5 µg/L
Cyanide, Total			4 µg/L		4 µg/L
Nickel, Total			127 µg/L		331 µg/L

Notes:

µg/L = microgram(s) per liter
cfu = coliform-forming unit(s)
lb/day = pound(s) per day
mL = milliliter(s)
Max = maximum
[a]Daily flow is recorded/inputted

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3.2 Statement of Impacts to Permits

Field's Point WWTF treatment processes and associated sludge production will not change during the Immediate, Short-term, or Future improvements. Immediate improvements will restore the existing dewatering building's original design capacity utilizing temporary facilities. Short-term improvements will include the construction of a new dewatering building. Upgrades recommended in this FPA will have no direct impact on the Field's Point RIPDES permit nor change existing effluent water quality produced by Field's Point, but updates to previously-approved Facility Order of Approval(s) will be required prior to facility construction.

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4. Existing Conditions

This section discusses the existing conditions of the solids processing process at the Field's Point WWTF.

4.1 Facility System Description

The Field's Point WWTF located in Providence services over 225,000 people and can provide advanced wastewater treatment for up to 77 million gallons per day (MGD). Wastewater sludge removed during the treatment process are processed on-site at the Field's Point dewatering facility to produce a drier sludge cake for ultimate disposal. Dewatering operations and off-site cake disposal are currently managed by a third-party vendor. All sludge processing and disposal are in accordance with all relevant regulations such as Rhode Island Code of Regulations Title 250 Chapter 150-10-3, Section 405(d) of the Federal Clean Water Act, and Code of Federal Regulations Title 40 Part 503.

The existing dewatering facility was originally constructed as a design-build in the early 2000's under RIDEM Order of Approval #1515 following a RIDEM-approved Facility Plan Amendment (FPA) in 1997. A simplified process flow diagram of the existing dewatering process is shown in Figure 4-1. The dewatering facility at Field's Point has been contract-operated and maintained by a third-party vendor since it was constructed. The most recent version of the existing facilities Operations and Maintenance Manual was approved by RIDEM in 2025.

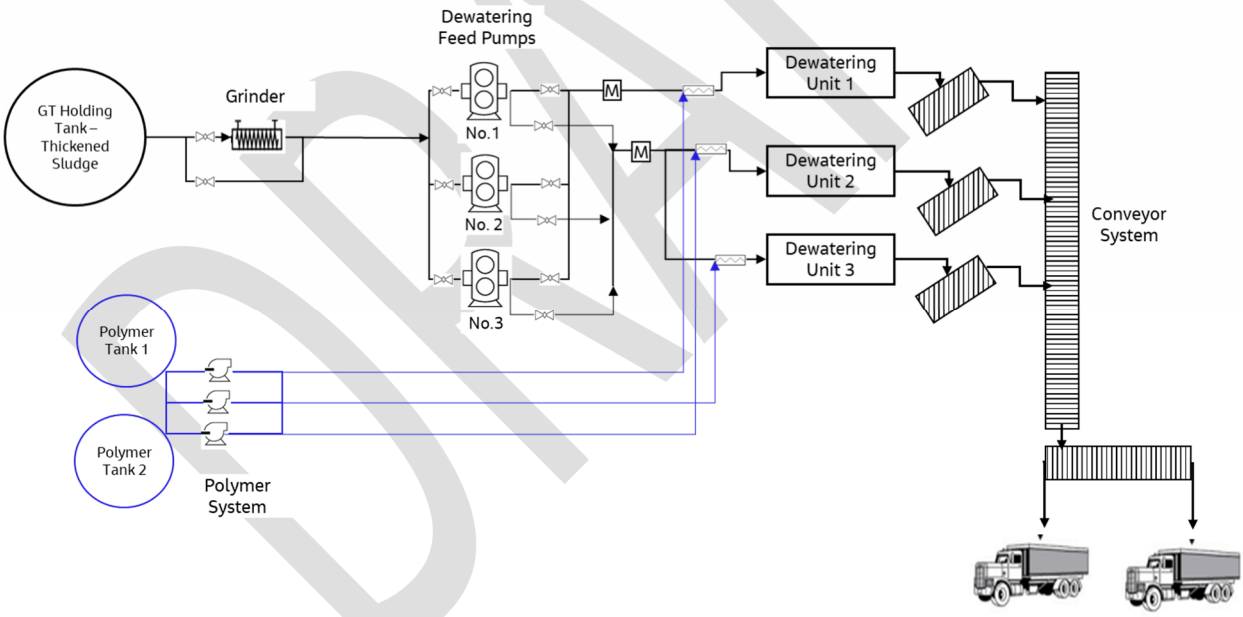


Figure 4-1. Process Flow Diagram for Field's Point Dewatering

Sludge removed during primary clarification is blended with secondary waste activated sludge (WAS) and thickened to approximately 3.5% solids in gravity thickeners constructed by NBC in the late 1980's. Thickened sludge is transferred into a final gravity thickener which was retrofitted into a 345,000-gallon sludge holding tank. Final sludge is macerated and pumped by three rotary lobe pumps to the dewatering building through two force mains.

A liquid polymer system is used to condition the thickened sludge before it is dewatered. Three progressive cavity pumps inject liquid polymer into the sludge line, feeding each piece of dewatering

equipment. Inline static mixers blend polymer with the sludge to enable flocculation for improved dewatering. The polymer is delivered in bulk by truck and stored in two 4,500-gallon polyethylene polymer bulk storage tanks in the dewatering building. Within the dewatering building are 2 two-meter belt filter presses (BFPs) and one decanter centrifuge which mechanically dewater the sludge to a final cake product slightly less than 25% solids. The dewatering equipment discharges the cake onto a conveyor system which transports the final product into a truck bay where it is loaded into trailers. The cake trailers are hauled off-site by a third-party vendor for ultimate disposal typically by incineration, but occasionally by landfilling. The dewatering building's odor control system is adjacent to the building exterior. It consists of a single scrubber tower with plastic media and a centrifugal blower, and it uses sodium hypochlorite to remove odor, which is pumped from a poly-storage tank. Scum removed from the primary clarifiers is also handled in the dewatering building. Scum is concentrated at the primary sludge pump station and manually trucked by NBC to the dewatering building where it is stored in a scum holding tank until it is hauled off site by a third-party vendor.

4.2 Flows and Loads

Plant sludge flows and loads from over three and a half calendar-years (2022, 2023, 2024 and 2025) were used to establish current operating parameters for the dewatering building. The following sections establish the current sludge production and design capacity at Field's Point WWTF, which are used as a benchmark for the design of the upgrades presented in Sections 6 and 7.

4.2.1 Historical and Projected Sludge Production

The 1997 FPA was approved based on projected maximum month (MM) sludge production of 30 dry tons per day (DT/day), and a daily annual average (AA) sludge production of 24 DT/day. This 1997 projected sludge production was based on a historical three-year period between 1993 and 1995 with a 25% contingency to represent a conservative estimate for equipment sizing, although the actual sludge production was projected to be constant through 2020. The sludge production utilized in this FPA is not expected to significantly differ from the base previously assumed in the 1997 FPA and revisited in the 2004 FPA Supplement.

Current sludge flows and loads were defined based on reported sludge production data from 2022 to early-2025. Since 2018, there has been a slightly-negative trend (decrease) in annual total sludge production (DT/year) at Field's Point. For reference, Field's Point produced 8,462 DT in reporting year 2018 while only producing 7, 515 DT, 7,010 DT, and 7,085 DT in reporting years 2022, 2023 and 2024, respectively, as reported in the respective Part 503 submittals for Field's Point. Average sludge production for the selected period is expected to be representative of the current operating conditions accounting for seasonal variations in flows and loading to the plant, where the more recent fluctuations in sludge production are likely attributed to inconsistent operational practices and unreliable equipment. The design condition for the new dewatering facility represents a conservative interpretation of the existing process flows and loads, as defined in Section 4.2.2 below.

Operating data were collected from daily monitoring reports and daily data worksheets between January 2022, and April 2025 and consolidated for statistical analysis. Statistical outliers were identified and scrubbed from the data set, according to the lognormal interquartile range method, whereby data points 1.5 points below the first quartile or 1.5 points above the third quartile were removed. The range of values were considered based on both 7-day and 30-day moving averages for both flow and loading parameters. The statistical analysis of the data determined a historical AA sludge production of approximately 24 dry tons per day (DT/day) and a MM production of approximately 30 DT/day during that period. These values for recent historical sludge production remain consistent with projected sludge production utilized in the 1997 FPA,

indicating no significant change in sludge production from the Fields Point WWTF over the last 28+ years (see Table 4-1).

Table 4-1. Historical Sludge Production at Field's Point WWTF

	Average Annual (DT/day)	Max. Month (DT/day)
Historical Field's Point Sludge Production		
Field's Point1997 FPA	24	30
Recent Historical (2022 – 2025)	22	30

4.2.2 Design Conditions for Field's Point Upgrades

Annual average, maximum month and maximum week sludge flows and loads were analyzed for the existing dataset from 2022 to mid-2025. Design conditions for the new dewatering facility were selected to represent the highest solids loading anticipated at the new dewatering facility. While sludge production at the WWTF is expected to remain consistent for the foreseeable future, a 25% contingency was added to the historical sludge production volumes to provide a conservative estimate for equipment sizing similar to the 1997 FPA. This will cover any unexpected fluctuations in dewatering requirements during the 20-year FPA planning period through 2046. The historical maximum week condition was considered to represent a peak scenario of anticipated dewatering requirements corresponding to current plant operation. Centrate production will remain consistent with current conditions, and as such, there will be no added impact or additional loading to the treatment process at the facility. This assertion is discussed further in Section 4.2.4.

Accordingly, the design condition used as a basis for dewatering equipment sizing for the Field's Point WWTF upgrades includes the range of historical flows and loads identified in Table 4-1 (22 DT/day AA, 30 DT/day MM) plus a 25% contingency as noted in Table 4-2 (30 DT/day AA, 38 DT/day MM). The sludge production carried as the design condition, as well as potential additional loadings are discussed later in Section 4.2.3.

4.2.3 Potential Future Sludge Production

The Field's Point WWTF upgrades will be designed for the sludge production identified and discussed above, however, there is potential for outside loadings to be handled at Field's Point in the future which are similar to the planning approved in the 1997 FPA and 2004 Supplement. It is anticipated that the possibility of processing these additional loadings at Field's Point could occur during the planning period of this FPA. The assumptions and consideration of these potential future loadings are described in this section.

Possible future loading also includes the potential for Field's Point WWTF to receive and process liquid sludge from other communities in the region that do not currently dewater. Providing an alternative liquid sludge management outlet for the state is a long-term goal of NBC. This conceptual strategy to support regional liquid sludge processing was preliminarily discussed with RIDEM and other RI WWTFs in April 2025. In order to determine the potential loadings from other RI WWTFs, NBC conducted a Request for Information (RFI) survey in June 2025 to gather information from potential participants. A copy of the RFI survey is provided in Appendix C. Based on the results of the RFI survey, if Field's Point WWTF becomes a

receiving facility for merchant sludge it may process an additional annual average 12.0 DT/day. A multiplier of 1.36 was used to determine a max month merchant sludge processing requirement of 16 DT/day for design purposes.

In addition to potential merchant sludge, possible future loading also includes the potential for NBC to consolidate and have Field's Point WWTF provide centralized solids processing for NBC's other WWTF (Bucklin Point). This potential scenario was previously recommended and approved in both the 1997 Field's Point and 1997 Bucklin Point FPAs, and maintained in this FPA. This future scenario is recommended for consideration during the Field's Point upgrades as the Bucklin Point digestion complex's useful life will expire within the planning period of this FPA (≤15 years) and, per a 2023 baseline evaluation conducted by NBC, could cost upwards of $140-million to replace. In this scenario, Field's Point would process undigested sludge from the Bucklin Point WWTF. Future loading from Bucklin Point is expected to remain within the approved quantity projected in the 1997 Field's Point FPA and is not expected to significantly vary within the planning period of this FPA.

Design and future sludge processing requirements at Field's Point are summarized in Table 4-2 and were determined as follows:

- A peaking factor of 1.36 (38 DT/day MM ÷ 28 DT/day AA) was used to predict future max month merchant sludge receiving based on Field's Point design loadings shown in Table 4-2. This assumes variations in merchant sludge will be similar to Field's Point production since more detailed merchant sludge data is not available.
- It was assumed that Bucklin Point sludge production will remain consistent as noted above. A 25% contingency was added to the combined Field's Point and Bucklin Point loadings approved in the 1997 Field's Point FPA (38 DT/day AA and 48 DT/day MM) to determine future dewatering requirements at Field's Point. This is consistent with recent sludge production data from Bucklin Point and Field's Point, the methodology used to determine current Field's Point dewatering design loading in Table 4-2 and design loading from the approved 1997 Field's Point FPA.

Table 4-2. Design and Future Sludge Processing at Field's Point WWTF

Condition	Average Annual (DT/day)	Max. Month (DT/day)
Current Field's Point Design Capacity (with 25% Contingency)	28	38
Future Merchant Sludge Design Capacity	12	16
Future Field's Point with Merchant Sludge Design Capacity	40	54
Future Field's Point with Bucklin Point Sludge Design Capacity	48	60
Future Field's Point with Merchant Sludge and Bucklin Point Sludge Design Capacity	60	76

Max week sludge production at Field's Point during the 2022-2025 timeframe analyzed was 37 DT/day. This is lower than the 38 DT/day MM design condition utilizing a 25% contingency. Past FPAs at Field's Point used a similar approach and sized equipment for max month plus 25% contingency. If a facility has sufficient sludge storage, using max month solids loading is common practice for dewatering equipment sizing. Providing 25% contingency and sizing for max week is not recommended as equipment and sludge storage recommendations may be oversized.

TR-16 permits gravity thickeners to be included in residuals storage calculations as in-process storage. This prevents needing to oversize dewatering equipment for max day conditions. Field's Point currently has four 345,000 gallon gravity thickeners, one of which is used as a sludge storage tank. The gravity thickeners will provide more than 2.7 days of storage at current peak day sludge production. The facility has operated successfully with this amount of storage for approximately 20 years. In addition to the gravity thickeners, space for 1-million gallons of liquid storage is proposed for the new dewatering facility (See Section 6.1.6) which will provide approximately 2 more days of storage under max day conditions.

TR-16 and WEF MOP 8 do not provide guidelines for how many days of sludge storage should be provided for dewatering facilities. The EPA Biosolids Technology Fact Sheet for centrifuge thickening and dewatering (Sept. 2000) recommends sludge be stored no longer than 24 hours which is consistent with how the new dewatering facility and sludge storage will be operated except for emergency conditions.

There is no best practice for sludge storage and recommendations vary but 2-3 days is a reasonable guideline. More than 3 days of storage risks oversizing storage tanks, wasting valuable real estate and capital. Ideally, sludge will be dewatered within 24 hours to prevent the sludge from becoming septic which will lower pH, increase odor and raise ammonia concentrations returned to secondary treatment via centrate. For these reasons, 2 days of storage is recommended. This will provide 1 day of storage required for the 6-day operating schedule recommended under this FPA (See Section 6.1.6). A second day of storage will act as a buffer during peak day and week conditions, permitting equipment to be safely sized for max month conditions.

Accordingly, Field's Point equipment will be sized for max month conditions for the following reasons:

- Using max month loading plus a 25% contingency is consistent with the 1997 Field's Point FPA and is more conservative than current max week loading.
- 2 days of sludge storage at max month conditions is recommended for providing operational flexibility without oversizing storage tanks risking sludge becoming septic.
- The existing gravity thickeners provide approximately 2.7 days of storage if needed. The facility has operated for approximately 20 years with this amount of storage.

4.2.4 Design Validation and Process Modelling

Process modeling was conducted to evaluate the existing biological treatment process at the Field's Point WWTF and confirm the validity of the proposed upgrades in terms of treatment performance. Specifically, the process model was used to confirm dewatering centrate will not overload secondary treatment or cause effluent permit exceedances.

Jacobs's Professional Process Design (Pro2D) proprietary simulation platform was used to develop and calibrate the process models for Field's Point WWTF. Pro2D is a plant simulation process model that uses International Water Association based models including Activated Sludge Model 2d. The same Pro2D model was also utilized as the basis in Field's Point's 2007 and 2011 FPAs. The process models were calibrated based on historical data from 1/1/2019 to 12/31/2023. Simulations of the calibrated models for the WWTF were performed for the period from 1/1/2024 to 6/30/2024 to verify the model against historical operating data and to predict sludge production and effluent quality.

Modeled sludge characteristics can be found in Appendix A. It was assumed that merchant sludge will have similar characteristics to undigested, blended (primary sludge + WAS) Field's Point sludge. A slightly higher TN concentration was used for merchant sludge to account for the possibility of sludge becoming septic during transportation. In the future scenario, undigested Bucklin Point sludge was thickened prior to transport to Field's Point, hence the higher TSS and TN concentrations.

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The existing integrated fixed-film activated sludge process (IFAS) is nitrogen-limited and required to meet a seasonal effluent limit of 5 mg/L total nitrogen (TN). However, dewatering undigested sludge will not impact the facility's ability to meet the seasonal effluent TN limit of 5 mg/L. Soluble, oxidized nitrogen will remain bound to the dewatered sludge and not significantly increase nutrient loading by centrate. Field's Point also has adequate solids capacity and centrate TSS will not affect the plant's ability to meet effluent TSS limits. This was confirmed by the Pro2D process modeling, which showed that additional dewatering capacity beyond that proposed in Table 4.2 could be accommodated before the 5 mg/L TN effluent limit is exceeded as indicated in Table 4-3.

Table 4-3. Process Modeling Results

Condition	Centrifuge Feed (DT/day)	Centrate TSS (lbs/day)	Centrate Total N (lbs/day)	Effluent TSS (mg/L)	Effluent Total N (mg/L)
Current Field's Point MM Loading	37	746	66	10	4.7
Current Field's Point + Merchant Sludge MM Loading	86	10,346	1,829	10	4.6
Future Field's Point + Bucklin Point + Merchant Sludge MM Loading	42	1,659	6,225	10	4.6

Only MM centrifuge loading are shown above as these indicate worst case scenarios. For modeling purposes, merchant sludge loads were increased until the existing carbon addition system was inadequate to enable secondary treatment to meet effluent TN requirements. Addition of Micro-C permitted a lower effluent TN concentration under these scenarios despite higher centrate TN loading.

Long-term improvements were evaluated to assess potential future dewatering requirements. This was done to determine if the dewatering facility proposed under this FPA will be sufficient for potential future needs. The future Field's Point + Bucklin Point + merchant sludge scenario was evaluated to assess dewatering requirements if long term improvements, evaluated under Section 6.3 and recommended under Section 7.1.2, are constructed in the future.

This scenario had lower centrifuge feed sludge loading because THP and digestion reduce solids requiring disposal as discussed in Section 6.3.3. This scenario had the highest overall sludge processing (107 DT/day) upstream for the THP and digestion process, however. Sidestream treatment was included under this scenario due to the higher sludge processing requirements and is recommended if Bucklin Point sludge is ever transferred to Field's Point in the future. A new FPA and additional modeling should be conducted at that time.

4.2.5 Condition Assessment and Inadequacies of Existing Facilities

In fall 2024, a comprehensive condition assessment was carried out at the Field's Point WWTF to identify inadequacies of the existing facilities and evaluate improvements for restoring or improving solids processing performance. The assessment used visual and measurable indicators to classify the condition of each piece of equipment available at the time of assessment. The observed condition was used to make a general assessment about the assets' immediate maintenance needs and to determine their estimated remaining useful life.

The following subsections provide additional detail on the current condition and inadequacies that were assessed for individual systems of equipment. The current operational state of many of these items are not

consistent with the current, updated guidelines in TR-16 Guides for the Design of Wastewater Treatment Works ("TR-16"), and upgrades are recommended to restore compliance.

4.2.6 Process Equipment

The observed condition and performance or capacity inadequacies of process equipment are summarized in the subsections below. Only equipment with notable inadequacies are recommended for upgrade due to poor operational condition or non-conformance with current TR-16. Other equipment included in the upgrades (i.e. grinder and sludge pumps) will be replaced to integrate with the proposed upgrades, which will restore the useful life of the system.

4.2.6.1 Belt Filter Presses

The two two-meter Andritz BFPs are original equipment and have been online since 2006. BFP #1 was operating during the assessment, however BFP #2 was offline for needed maintenance during the inspection but has since been operational. Both BFPs have undergone various corrective maintenance in line with typical maintenance intervals, including maintenance on belts, bearings, tensioners, and hydraulics. The typical design life for a BFP is 12 to 15 years, or 60,000 to 80,000 hours of operations before a complete rebuild is required to maintain proper operation. However, both BFPs have operated for 18 years and are operating beyond their expected lifespan.

4.2.6.2 Centrifuges

The rehabilitated centrifuge, originally manufactured by Flottweg, was installed in the dewatering building in 2012. As a rebuild, the true age and operating history of the centrifuge could not be determined during the condition assessment. Centrifuges require regular maintenance to achieve their design life. They must undergo major maintenance annually, biannually, and every 5 years. During the assessment, it could not be determined when the last major maintenance interval had taken place. Even without knowing the exact date of manufacture, the centrifuge appears to be approaching the end of its useful life and likely requires at least a factory rebuild to maintain reliable service.

4.2.6.3 Sludge Storage Tanks

The 345,000-gallon sludge storage tank is a converted gravity thickener tank originally constructed the late 1980s. The gravity thickeners are constructed of precast planks standing vertically on a cast-in-place concrete foundation. They are wrapped in reinforcement and shotcreted in place. The exterior of the storage tank showed some minor cracking, and efflorescence was noted at the visible portions of all concrete gravity thickeners, which are not considered a major structural issue. The inside walls of the gravity thickeners were not accessible during the condition assessment. No issues with piping integrity or blockages were reported between the holding tank and the sludge feed pumps. As part of this project, new storage tanks will be constructed for blended sludge that will replace the existing gravity thickener currently used for this purpose. The existing thickener-storage tank could be repurposed by NBC. Current MM sludge production from FP is ~400,000 gpd and future dewatering facilities are recommended to accommodate at least two days of blended sludge storage.

4.2.6.4 Sludge Conveyance Systems

Conveyors at the dewatering building are an open, shaftless screw type. Wear strips for conveyor troughs have a life expectancy of approximately 6 months and require regular replacement to prevent wear

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through the conveyor trough. The conveyors were identified as being in poor condition; they have exceeded their expected lifespan and should be replaced.

The conveyors cross from the dewatering building space to the loadout area. There is minimal clearance with the ceiling for the inclined conveyor and loadout conveyor, which makes it difficult to maintain the system. The drive for the loadout conveyor hangs below the rollup door, limiting the height of the trailers that can be used for sludge loadout.

There are no redundant conveyors and dewatering operations must be paused when conveyor maintenance is required. Adequate redundancy is recommended when implementing dewatering improvements.

4.2.6.5 Polymer Feed Systems

The polymer feed system is original equipment and has been repaired as recommended. This system could remain functional in the short term (0 to 2 years); however, its replacement is recommended for longer-term operations and to provide adequate redundancy in line with the current guidance in TR-16. In 2024, a supplemental Velodyne polymer dosing skid was installed to supplement the existing system. This system was noted as being in good condition during the condition assessment.

4.2.7 Ancillary Systems

4.2.7.1 Odor Control

The odor control system was identified as needing corrective maintenance to remain in service in the immediate- and short-term. The odor control media was not visible during the condition assessment, so its true condition was not determined. The odor control tower requires further evaluation to determine its internal condition. The recirculation pump was determined to be in fair condition, with no major issues. The chemical metering pump was identified as being severely corroded and in need of replacement. The odor control system has exceeded its expected lifespan and should be replaced due to its age.

4.2.7.2 Heating, Ventilation, and Air Conditioning

The heating, ventilation, and air conditioning (HVAC) unit is on the mezzanine level of the dewatering building and was noted as being in need of repair and/or replacement. The HVAC unit was not fully accessible during the condition assessment. The lack of reliable HVAC systems was noted to impact the building's air quality, which is not consistent with the requirements of TR-16 (11.9). Specifically, humidity levels in the building and the amount of corrosion and degradation of protective coatings on equipment were noted to be the result of the nonfunctioning HVAC system.

4.2.7.3 Electrical

The dewatering building is supplied from a dedicated Rhode Island Energy electrical service lateral line from Riser Pole 21, which is on Terminal Road at the northeastern corner of the property. The service was noted as being installed in March 2012. There is a 300-kilovolt-ampere (kVA), 12.47-kilovolt (kV) – 480Y/277-volt (V) pad-mounted, step-down transformer (Rhode Island Energy Pole 21-4) on the northern side of the building. An electricity meter is mounted on the transformer enclosure (Rhode Island Energy Meter 59204155). The transformer feeds a 1200-ampere (A) main service switch, mounted on the exterior northern wall of the building. This service switch feeds main distribution panel PP-1. PP-1 is a General Electric Spectra Series power panel rated 480Y/277V, 3-phase, 4 watts (W) with a 1200A, 3-phase main circuit breaker.

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The following components are in the electrical/operator room:

- Main distribution panel
- PP-1
- MCC-1
- LP1
- A 45kVA dry-type transformer
- BFP Control Panels 1 and 2
- Addressable type fire alarm control panel (FACP)

The control room has limited space with no floor or wall space available for any additional electrical power distribution or process control equipment.

4.2.7.4 Building & Structure

The existing dewatering building consists of a metal building clad on the exterior, with split-face, 8-inch masonry walls. The building was constructed in the mid-2000s to house the control room, dewatering equipment, conveyors, and loadout area, and is generally in good condition. The dewatering equipment area has limited space between the BFPs and centrifuge equipment, which significantly hinders maintenance activities. A tension rod cross bracing for the metal building structure along Column Line 1, between Lines B and C, is damaged and requires replacement, as does much of the failed paint system on the steel framing.

4.3 Environmental Conditions

This section provides a description of environmental conditions within the project area. All figures associated with this section can be referenced in Appendix D.

4.3.1 Location

Figure 4-2 shows the location of the Field's Point WWTP site relative to its surroundings, roadways, and proximity to the Providence River, a tidally influenced waterway, using the existing environmental data layers available from RIGIS.

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Figure 4-2. Aerial Site Locus

4.3.2 Soils

According to the Soil Survey of Rhode Island (accessed via the National Resource Conservation Service Online Web Soil Survey), the WWTF is within Udorthents-Urban land complex (UD). The Site Soils figure in Appendix D presents mapped soil types at and around Field's Point WWTF. The mapped soil type within the footprint of the facility is UD, which consists of Udorthents soils and areas of Urban land. This complex is approximately 70% Udorthents soils, 20% Urban land, and 10% other soils. This soil also exists at the location of the proposed improvements.

4.3.3 Topography

The site topography was obtained from a light and detection ranging survey obtained by RIGIS (see Site Topography figure in Appendix D). The existing topography shows that the proposed project area is primarily flat, at an approximate elevation of 20 feet, with localized areas increasing to an elevation of 30 feet. However, the site and surrounding areas to the north, east, and south have been developed, and several lots serve Port Facilities along the Providence River. These facilities, including the Field's Point WWTF, are considered flat as a result of the industrial development the final earthwork requirements will

be determined as the design of the recommended plan is developed. There is a residential neighborhood south and west of the facility. It is on a slope with a maximum elevation of approximately 60 feet, upgradient of the treatment facility.

4.3.4 Geology

The surficial geology under the site and the location of the proposed improvements is within artificial fill. Artificial fill is defined as human-transported materials (like soils, rocks, or debris) that have been moved and deposited to alter the natural land surface. In this case, areas were filled in adjacent to the Providence River to support the historical port development adjacent to the river. Adjacent to the site are areas of kame terraces, sand and gravel deposited by meltwater streams, produced by glacial activity.

The bedrock geology beneath the limits of the site is within the Rhode Island Formation. This is defined as greenish gray to black greywacke, conglomerate sandstone, shale, and meta-anthracite material. The depth to bedrock is greater than 6.5 feet.

4.3.5 Historical and Archaeological Features

The site and surrounding areas were researched to determine if they contained any historical or archaeological features, as defined by the Historical Preservation & Heritage Commission (HPHC) and shown in the Historical Resources figure in Appendix D. Existing geographic information system data sets and publications were used, and it was found that several buildings in and around the site were designated as Historic Buildings. The site and the surrounding area were not within a HPHC Historic District Boundary.

The following designated Historic Buildings were identified at the Field's Point WWTF:

- Ernest Street Pump Station, Code: 28108, State Register Individual Property
- Chemical Building (Currently the Field's Point WWTF Maintenance Building), Field's Point, Code: 28109, State Register Individual Property
- Sludge Press House, Code: 28110, State Register Individual Property. The building was demolished, with permission, in 2006.
- Return Sludge Pumping Station, Code: 28111, State Register Individual Property

The following building is south of the site and is considered a Historic Property:

- Washington Park Sewage Pump Station, Code: 28112, State Register Individual Property

4.3.6 Rare and Endangered Species

There are no rare or endangered species identified within the proposed project limits of the Field's Point WWTF; however, RIDEM has delineated a natural heritage area adjacent to the site (Natural Resources figure in Appendix D), on the eastern bank of the Providence River and extending to the west. This delineation represents the limits of expected range of the species based on visual observations provided to RIDEM. Two rare or endangered species have been identified in this area. The following species were identified adjacent to the proposed project site:

- Northern Diamondback Terrapin (Malaclemys terrapin terrapin), State Endangered Species (reptile)
- American Oystercatcher (Haematopus palliates), Species of State Concern (Bird)

This assessment on natural heritage areas has determined that this project is likely to have No Effect, as defined by the U.S. Fish & Wildlife Service, on the species listed above.

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4.3.7 Surface Water and Waters – Federal Emergency Management Agency Flood Zones

Federal Emergency Management Agency (FEMA) floodplain mapping is shown in Appendix D. Portions east and west of the Field's Point WWTF are within the FEMA Flood Zone X associated with the Seekonk River. Zone X is defined as an area with 0.2% annual chance of flood hazard area, with an average depth less than 1 foot or with drainage areas of less than one (1) square mile. The southeastern and northeastern corners of the WWTF are within the FEMA Flood Zone AE (base flood elevation, BFE), with a flood elevation of 12 feet NAVD88. AE flood zones are areas that present a 1% annual chance of flooding.

4.3.8 Surface Water and Waters – Sea Level Rise and Storm Inundation

In 2017, RIDEM evaluated the effects of climate change (SLR) and its effects on Rhode Island wastewater collection and treatment facilities. The study identified the Field's Point WWTF as one of the seven wastewater treatment facilities in Rhode Island that would be largely inundated during a 100-year storm. It was 1 of 10 treatment plants most at risk from climate change impacts.

As a result of this study, NBC has instituted a Resiliency Plan, completed and approved by RIDEM in 2019, and has incorporated mitigation strategies into all recent facility upgrades. From the 2019 resiliency plan, the Field's Point design flood elevation (DFE) is the FEMA 100-yr + 3 feet of freeboard. As such, the BFE is set at 12.0 ft NAVD88 (12.8 ft NGVD29) and the DFE is 15.0 ft NAVD88 (15.8ft (NGVD29)).

Future improvements at the Field's Point WWTF will comply with applicable regulations as they relate to DFE and, at a minimum, may include the installation of water-tight doors and building openings and/or the construction of berms around tanks.

TR-16 recommends new infrastructure critical to the operation of a wastewater treatment facility and collection system should be installed at least 3 feet above the BFE. It recommends that noncritical infrastructure be installed at least 2 feet above the BFE. The dewatering process facilities are considered noncritical infrastructure at the facility in this context, and DFE for the proposed improvements will comply with the applicable regulation.

4.3.9 Surface Water and Waters – Surface Water Quality

4.3.9.1 Rhode Island Department of Environmental Management

Sea water quality surrounding the Field's Point WWTF is rated as SB1, according to the State of Rhode Island's Water Quality Regulations. Table 4-4 describes current sea water classification within the state.

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Table 4-4. Water Quality Classifications

Classes	Sea Water Description
SA	Shellfish harvesting for direct human consumption; excellent fish and wildlife habitat; migration of fish; and good aesthetic value.
SA1	Primary contact recreational activities; excellent fish and wildlife; migration of fish; and good aesthetic value. There areas are near permanent structures associated with a marina or residential boating facility; therefore shell fishing is prohibited in accordance with National Shellfish Sanitation Program regulations. However, all SA criteria must be met, except fecal coliform, which must meet SB criteria.
SB	Primary contact recreational activities; fish and wildlife habitat; migration of fish; and good aesthetic value.
SB1	Secondary contact recreational activities; fish and wildlife habitat; migration of fish; and good aesthetic value. Primary recreational activities are impacted due to pathogens from an approved wastewater discharge. All SB criteria must be met.

SB1 waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They must be suitable for aquacultural uses (other than shellfish for direct human consumption), navigation, and industrial cooling. These waters must have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges.

Wastewater effluent standards and discharge limitations are based on the water quality classification of the receiving body of water. The class-specific pollutant limitations for seawater are based on the criteria in Table 4-5..

The Providence River has approved total maximum daily loads for nitrogen, total dissolved oxygen (DO), and fecal coliform impairments.

4.3.9.2 Coastal Resources Management Council

The Providence River is designated a Type 6 Multi-Purpose Water by the Coastal Resources Management Council (CRMC) in the area of the Field's Point WWTF. Type 6 Waters containing water-dependent industrial and commercial activities take precedence over all other activities.

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Table 4-5. Class-specific Pollutant Criteria – Sea Water

Criterion	Class SA	Class SB and SB-1	Class SC
DO	Not less than 4.8 mg/L. When instantaneous DO values fall to less than 4.8 mg/L, the water must not be: Less than 3.0 mg/L for more than 24 consecutive hours during the recruitment season; nor less than 1.4 mg/L for more than 1 hour more than twice during the recruitment season.	Not less than 4.8 mg/L. When instantaneous DO values fall to less than 4.8 mg/L, the water must not be: Less than 3.0 mg/L for more than 24 consecutive hours during the recruitment season; nor less than 1.4 mg/L for more than 1 hour more than twice during the recruitment season.	Not less than 4.8 mg/L. When instantaneous DO values fall to less than 4.8 mg/L, the water must not be: Less than 3.0 mg/L for more than 24 consecutive hours during the recruitment season; nor less than 1.4 mg/L for more than 1 hour more than twice during the recruitment season.
Sludge Deposits, Solid Refuse, Floating Solids, Oils, Grease, Scum	None allowable.	None allowable.	None in such amounts that would impair any usage assigned to this class.
Color and Turbidity	None in such concentrations that would impair any usage specifically assigned to this class. Turbidity not to exceed 5 NTU over background.	None in such concentrations that would impair any usage specifically assigned to this class. Turbidity not to exceed 10 NTU over background.	None in such concentrations that would impair any usage specifically assigned to this class. Turbidity not to exceed 10 NTU over background.
Fecal Coliform Bacteria/ 100 mL	Not to exceed geometric mean value of 50 MPN/100 mL and not more than 10% of the total samples taken must exceed 400 MPN/100 mL, applied only when adequate enterococci data are not available.	Not to exceed geometric mean value of 50 MPN/100 mL and not more than 10% of the total samples taken must exceed 400 MPN/100 mL, applied only when adequate enterococci data are not available.	None in such concentrations that would impair any usage specifically assigned to this class.
Taste and Odor	None allowable except as naturally occurs.	None in such concentrations that would impair any usage specifically assigned to this Class nor cause taste and odor in edible portions of fish and shellfish.	None in such concentrations that would impair any usage specifically assigned to this Class nor cause taste and odor in edible portions of fish and shellfish.
pH	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5

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Criterion	Class SA	Class SB and SB-1	Class SC
Temperature Increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F nor raise the normal temperature more than 1.6°F, June 16 through September and not more than 4°F from October through June 16. All measurements must be made at the boundary of such mixing zones.		
Chemical Constituents	None in the concentrations or combinations that could be harmful to human, or fish and wildlife or which would make the waters unsafe or unsuitable for fish and wildlife or their propagation, impair the palatability of same, or impair the waters for any other uses. The ambient concentration of a pollutant in a water body designated as suitable for fish and/or wildlife habitat must not exceed the RIDEM Ambient Water Quality guidelines for the protection of aquatic organisms from chronic effects unless the chronic guideline is modified by the Director based on the results of the bioassay tests conducted in accordance with the terms and conditions provided in the regulations.		
Nutrients	None in such concentrations that would impair any uses specifically assigned to said class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication. Total phosphorous, nitrates and ammonia may be assigned site specific permit limits based on best available technologies. Where waters have low tidal flushing rates, applicable treatment to prevent or minimize accelerated or cultural eutrophication may be required for regulated nonpoint source activities.		

Notes:

°F = degree(s) Fahrenheit
DO = dissolved oxygen
mL = milliliter(s)
MPN = most probable number
NTU = nephelometric turbidity unit(s)

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4.3.9.3 Regulated Wetlands

There are no freshwater wetlands within the anticipated project limits, and the project site is beyond the 200-foot contiguous area to the Providence River. Because this project will not be within 200 feet of the Providence River, it is not anticipated to require an Assent from the Rhode Island CRMC.

4.3.9.4 Water Supply Sources

The City of Providence Water Supply Board provides drinking water to all Providence residents, as well to approximately 60% of the state. Drinking water is derived from the Scituate Reservoir and is treated before it is distributed via mains and services. The Scituate Reservoir is in the northern and central portion of the state.

4.3.10 Groundwater

Available RIGIS mapping indicates the site is not in a sole-source aquifer or wellhead protection area, and no water supply sources will be impacted by this project. RIDEM classifies groundwater beneath the site as GB. GB groundwater 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 active site permitted for land disposal of sewage sludge.

4.3.11 Documentation of Onsite Water Treatment System Problem Areas

There are no onsite wastewater treatment system critical resource areas within the project site or within adjacent areas to the site. There are no sites in the immediate area requiring cesspool phase-out. None of the Providence communities served by the Field's Point service area in have a municipal onsite wastewater program, according to the City of Providence's 2024 Community Comprehensive Plan (CCP).

4.3.12 Land Use

Land use at the facility is a mixture of Water and Sewage Treatment, Other Transportation, and Industrial. All land surrounding the site is either Industrial or Other Transportation. The site is along an industrial corridor, along the historic port locations of the Providence River. The Land Use figure in Appendix D shows complete land use within and around the site.

The City of Providence's 2024 CCP was reviewed to identify how the proposed project may impact the City of Providence's identified goals and objectives. The proposed project is limited to the existing Field's Point WWTF site, and the entire project is on property owned and operated by NBC. As such, this project will not impact land use, per the CCP.

As part of the Sustainability, Resilience, and the Environment section of the CCP, the City identified the following goals and objectives:

- Protect, preserve, and restore the natural environment; improve resilience to climate and environmental hazards; ensure equity in environmental policy; and mitigate the impacts of greenhouse gas emissions, air and water pollution, and contamination on residents' health, safety, and quality of life.
- Ensure the protection and resilience of the people, natural environment, built environment, and infrastructure of Providence to the effects of climate change and extreme weather.

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- Ensure that buildings and infrastructure are environmentally sustainable and resilient to the effects of climate change.

The purpose of this project is to upgrade the Field's Point WWTF biosolids management process so it is more reliable. The effects of climate change were a nonmonetary criterion for equipment selection, and will be considered during the design phases of the project. Enhancing the facility's ability to dewater and dispose of sludge will result in improved and sustained water quality in the Providence River and the Narragansett Bay. This is consistent with the goals and objectives in the Sustainability, Resilience, and the Environment Element of the Providence CCP 2024 update.

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5. Future Biosolids Management Considerations

Biosolids management at Field's Point has been solely contract-operated by a third-party vendor since 2006. Historically, the third-party solids management services onsite at Field's Point and at offsite regional facilities have been unreliable. As such, NBC is evaluating future biosolids management options. The goal is to provide a sustainable solution and incorporate technologies that will reduce risk and uncertainty in the disposal market, while also being in the long-term best interest of NBC and its ratepayers. In addition to necessary immediate and short-term dewatering facility improvements, this FPA recommends additional processing technologies at Field's Point which would produce a higher-quality biosolids product and provide flexibility for future disposal options, thus reducing NBC's potential long-term risk.

Future biosolids management strategies seek to integrate the ability to achieve the following goals:

- Produce dewatered cake averaging 25% or greater total solids.
- Achieve long-term operating reliability and efficiency.
- Minimize truck traffic, odors, and other potential public nuisances.
- Potentially process sludge from NBC's Bucklin Point WWTF and other regional municipal WWTFs at Field's Point.
- Consider integrating infrastructure to produce Class-A, low-odor biosolids thus increasing potential disposal outlets.
- Include the capture and beneficial use of biogas to move Field's Point towards energy neutrality.

The EPA has not implemented federal regulations regarding PFAS concentrations and biosolids land application restrictions at this time; however, many states are implementing their own more stringent regulations. New England has emerged as a leader in implementing strict biosolids regulations, resulting in elevated costs for transportation, disposal, and incineration of these materials for utilities. In addition to changes in regulation, New England is also facing biosolids capacity issues. Land application restrictions significantly limit available avenues for biosolids disposal as well as limited landfill capacity for accepting wastewater residuals.

Processing and disposal flexibility can help address uncertainty in the biosolids management landscape in New England. NBC understands there is a similar need throughout the region. Accordingly, future biosolids management planning considers the potential for Field's Point to become a regional liquid sludge receiving facility with capability to accept liquid sludge from other publicly owned treatment plants in Rhode Island and the surrounding region. This plan also recommends the future possibility of consolidating NBC's biosolids management by bringing sludge from the Bucklin Point WWTF to the Field's Point WWTF, consistent with the approved recommendations in the 1997 FPA.

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6. Development and Evaluation of Alternatives

Alternatives were developed to address the existing Field's Point WWTF solids management facility deficiencies identified in Section 4. To expedite the replacement of aging equipment, meet future facility goals efficiently, and minimize impact on NBC ratepayers, recommended improvements will be implemented over the following three phases: (1) Immediate, (2) Short-Term, and (3) Future. Each phase was developed holistically within NBC's long-term biosolids management vision. In all phases, ultimate disposal of biosolids should still be handled off-site via a 3rd party.

1. **Immediate Improvements**: Address items in critically poor condition to allow for the safe and reliable operations of the dewatering building to handle sludge generated by the Field's Point WWTF until short-term improvements can be implemented. At NBC's discretion, these improvements may be implemented by a 3rd-party contract operator.

2. **Short-term Improvements**: Upgrade the dewatering facility at Field's Point WWTF. The facility will include redundancy and provide flexibility for effective and efficient operations. Equipment will be sized to support current and potential future loadings, including the capacity to receive and process merchant sludge. The short-term phase should also replace necessary dewatering process equipment at Bucklin Point in-kind.

3. **Future Improvements**: Improve the overall biosolids management processes at Field's Point to reduce the volume of sludge produced and improve the quality of biosolids generated. This will optimize potential outlets for disposal and minimize risk. Considerations for consolidating NBC biosolids management at the Field's Point WWTF will be included.

The following sections review the evaluated alternatives and key evaluation criteria used to recommend improvements for each phase. These evaluations considered the objectives of subsequent phases, to enable their future implementation. Based on the existing Field's Point dewatering building's poor condition, as noted in Section 4, new dewatering equipment is required to bring the facility to a state of good repair. Several dewatering technologies were evaluated to identify the best equipment for short-term and future dewatering improvements. These alternative evaluations were conducted to address the three phases of improvements mentioned above. Section 6.1 discusses the dewatering equipment technology evaluation comparing centrifuges, screw presses, and BFPs, Section 6.2 discusses the recommendations for the Short-Term Improvements, and Section 6.3 discusses the recommendations for the Future Improvements.

Immediate improvements include the installation of temporary equipment at the Field's Point WWTF while the short-term improvements are being implemented. Temporary equipment at the Field's Point WWTF will include centrifuges or BFPs with a capacity equivalent to existing equipment. This temporary equipment could serve as a backup to failing existing equipment, or be the primary units to enable construction phasing while short-term improvements are being implemented. It is also possible that the Immediate improvements are handled by the current third-party contract operator. For these reasons, this FPA does not discuss immediate improvements in detail.

It is also recommended that, during the Field's Point short-term improvements project, essentially all dewatering process equipment at the Bucklin Point WWTF be replaced in-kind. The upgrades at Bucklin Point are generally considered to be an asset-management maintenance activity, rather than a true improvement. As such, this FPA will not discuss Bucklin Point WWTF improvements further. The estimated cost of these in-kind replacements at Bucklin Point are $12 million, and it is recommended and in the best interest of NBC and its ratepayers that they be coupled with the short-term dewatering improvements at Field's Point.

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6.1 Dewatering Equipment Technology Alternatives

Three shortlisted dewatering technologies were evaluated during the preliminary screening phase:

1. Centrifuges
2. Screw Presses
3. BFPs

Each alternative was evaluated in terms of equipment performance, operational complexity, footprint, and the following additional factors:

- Improved dewatering performance, including achieving drier cake which will result in decreased hauling and disposal costs
- Low-energy demand equipment (although improved dewatering performance was prioritized over energy consumption)
- Adequate redundancy and dewatering operational flexibility for future facility upgrades
- Integration with the future biosolids management strategy
- Ability to fit in the available footprint within the existing dewatering building
- New dewatering equipment that is reliable, user-friendly, and simple to operate and maintain
- Compatibility with existing auxiliary equipment and operations
- Lower polymer consumption to reduce annual operating costs related to polymer usage

Evaluation criteria were defined to quantify each alternative's ability to meet these objectives. The monetary and nonmonetary evaluation criteria were then used to select the best dewatering technology to meet NBC's short-term and future goals.

6.1.1 Centrifuges

Centrifugal dewatering separates sludge solids from the liquid, using centrifugal forces generated by a rapidly rotating cylindrical bowl. A representative diagram of the technology configuration is shown in Figure 6-1.

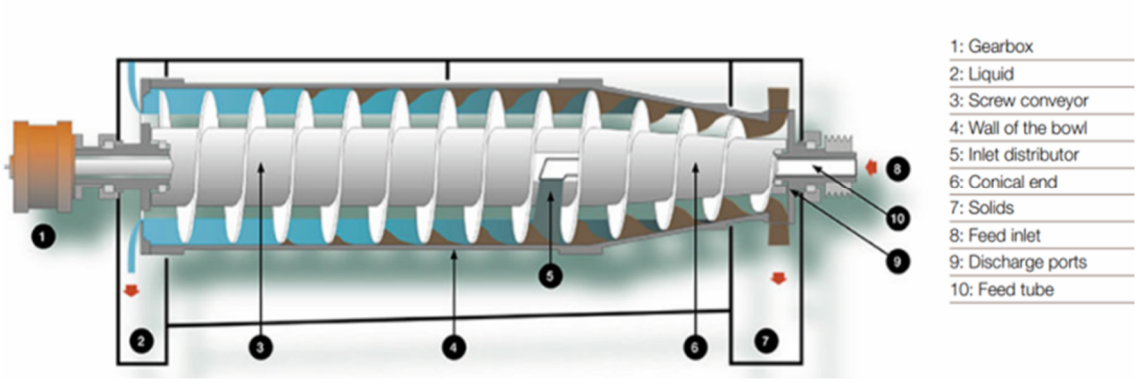


Figure 6-1 Dewatering Centrifuge (courtesy of Alfa-Laval)

When liquid sludge enters the centrifuge, it is forced against the bowl's interior walls, where density differences cause sludge solids and liquid to separate into two distinct layers. Sludge solids and liquid are

then discharged separately from the machine. For large dewatering centrifuges, the bowl generally rotates at 2,500 to 3,000 revolutions per minute; obtaining forces ranging from 2,800 to 3,200 g (where g is gravity force). Sludge cake is discharged from the bowl by a central screw conveyor or scroll. The bowl has a cylindrical section and a conical end piece. One motor drives the bowl, while a second motor connected to a differential gearbox drives the central screw conveyor at a slightly different rotation rate (differential speed) to convey settled solids to the solids discharge. Polymer is required to achieve good solids capture and centrate quality. Centrifuges may produce a typical cake solids value between 15 and 26%, and potentially more than 30% using high torque centrifuges (TR-16).

6.1.2 Screw Presses

Dewatering screw presses are a filtration process that separates solids from liquids to achieve dry cake. A representative diagram of the technology configuration is shown in Figure 6-2.

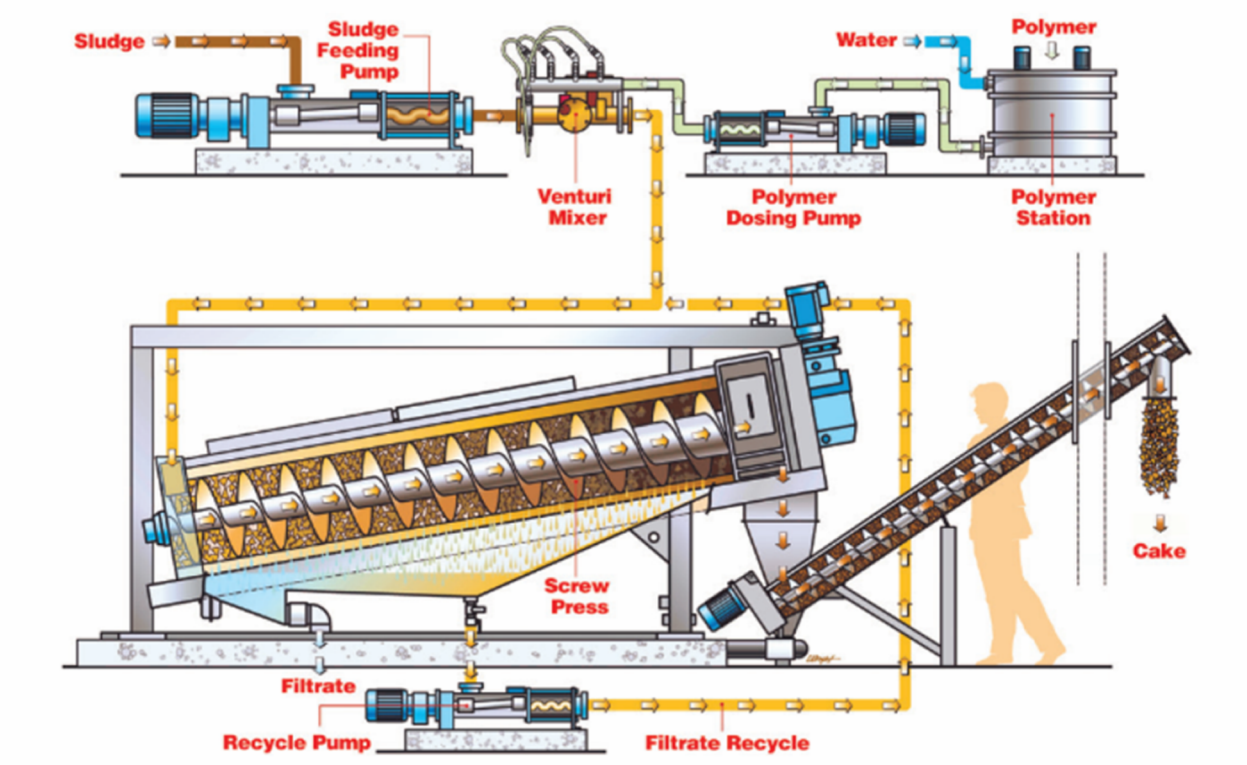


Figure 6-2. Dewatering Inclined Screw Press Configuration (courtesy of BDP Industries)

Sludge is pumped to the interior of a custom-designed cylinder with a hollow shaft, surrounded by a perforated steel screen. Polymer-conditioned sludge is fed to an open feed box on top of the screw. Solids dewater first by gravity drainage out through the bottom while moving slowly down and into the screw flights. Because of the slow rotational speed of the screw, the units experience minor wear and have relatively minimal maintenance. The central screw conveyor progressively moves the sludge toward the dewatered sludge discharge end. The screw flights and hollow shaft increase in pitch, and taper to reduce the available volume containing solids. Screw flights spin against the cylinder. This creates internal pressure and forces water to drain out through the perforated screen surrounding the screw. A control valve is used to set a pressure that is consistent with the desired solids cake concentration. The typical retention time is approximately 3 to 4 hours. Typically, more floor space is required for screw presses than BFPs or centrifuges due to the need for more units to achieve similar hydraulic throughput.

Screw press technologies typically do not achieve significantly drier cake concentrations than BFPs. For a standard screw press dewatering an anaerobically digested blend of primary sludge (PS) and WAS, the cake solids' concentration is approximately between 18 to 19%, and for a sludge blend of PS and WAS, similar to what is produced at the Field's Point WWTF, it is approximately between 24% and 24%.

6.1.3 Belt Filter Presses

BFP systems use porous moving belts to continuously dewater solids through a combination of polymer conditioning, gravity drainage, and compression. A representative diagram of the technology configuration is shown in Figure 6-3.

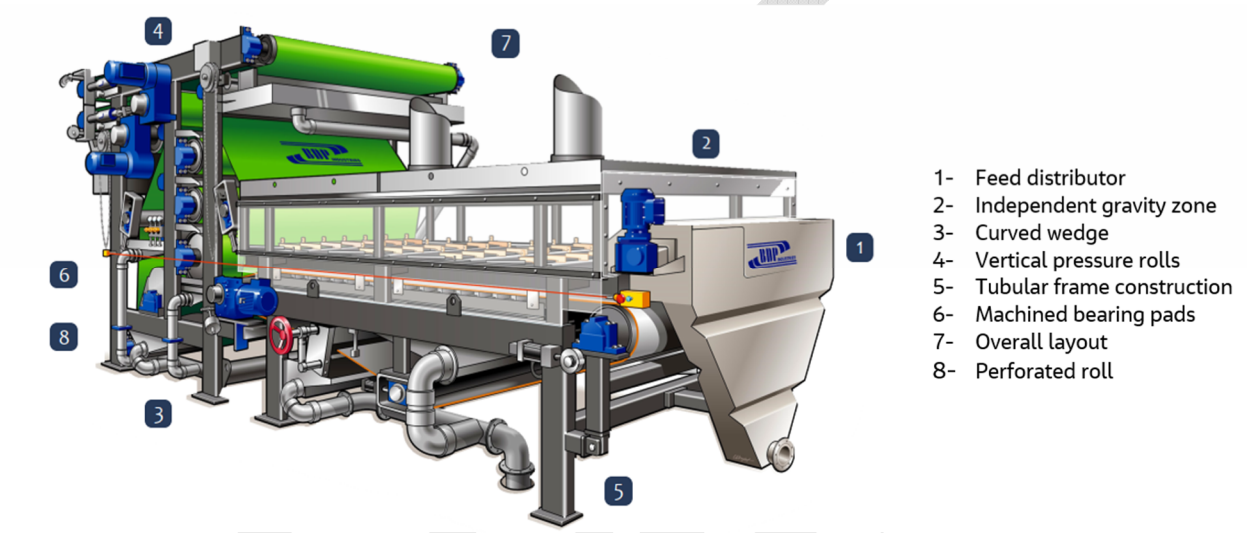


Figure 6-3. Dewatering Belt Filter Presses (courtesy of BDP Industries)

Conditioned sludge is first introduced in a flocculation zone, where gentle mixing encourages floc formation. This conditioned mixture is applied to a gravity drainage section of a moving, porous, fabric belt, where water drains through cloth, and the sludge thickens. Most of the free water is removed by gravity. Following gravity drainage, pressure is applied in a low-pressure section where sludge is squeezed between opposing porous cloth belts. The low-pressure section is followed by a high-pressure stage, where the sludge is subjected to shearing forces as the belts pass through a series of rollers. BFPs can be provided with 6 to 14 pressure rollers. The squeezing and shearing forces induce the release of additional quantities of water from the sludge. Filtrate and belt wash water used for belt cleaning is collected below the BFP and returned to the liquid process for treatment. The combined return flow rate is typically between 1 and 1.5 times the incoming sludge flow rate. The final dewatered sludge cake is removed from belts by scraper blades.

The performance of BFPs can vary, depending on sludge characteristics, type of polymer conditioning, pressures developed between the belts, machine configuration, and belt speed. For a standard BFP dewatering an anaerobically digested blend of PS and WAS, the cake solids concentration is approximately between 16% and 19%, and for a sludge blend of PS and WAS, similar to what is produced at the Field's Point WWTF, it is approximately between 22% and 24%. The polymer dosage for BFPs is generally between 28 to 36 pounds per dry ton of solids, and the solids capture rates are greater than 95%.

6.1.4 Cost-benefit Comparison of Explored Dewatering Technologies

To select the best dewatering technology for Field's Point WWTF, both non-monetary and monetary evaluations took place. The non-monetary evaluation compared the dewatering technologies based on selected criteria that was independent of any costs. The monetary evaluation compared the dewatering technologies based on both capital costs and lifetime O&M costs to develop a comparative lifecycle cost.

6.1.4.1 Non-monetary Evaluation

The non-monetary criteria were identified, defined and established based on NBC's particular requirements and operations of their facility. Each of these criteria were then weighted based on their relative importance to the Field's Point WWTF.

Figure 6-4 shows the non-monetary criteria utilized in the dewatering equipment evaluation and each criteria's respective weighted value. Equipment performance and reliability were determined, by NBC, to carry the highest weighted scale, followed by level of maintenance complexity, building space requirement, and level of operational complexity. The non-monetary evaluation was conducted for the three dewatering technologies: centrifuges, screw presses, and BFPs. Centrifuges had a higher total weighted benefit score than screw presses and BFPs. Figure 6-5 shows the relative scores of each alternative for each criterion.

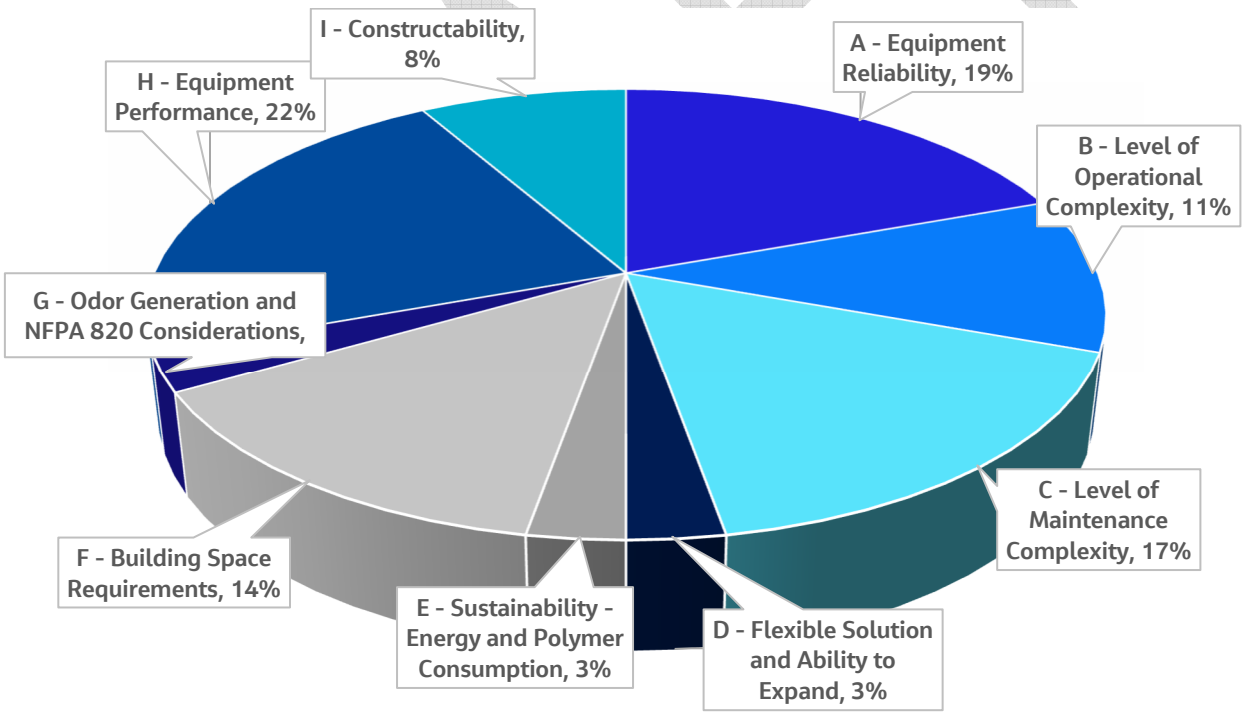


Figure 6-4. Dewatering Non-monetary Criteria Weighting

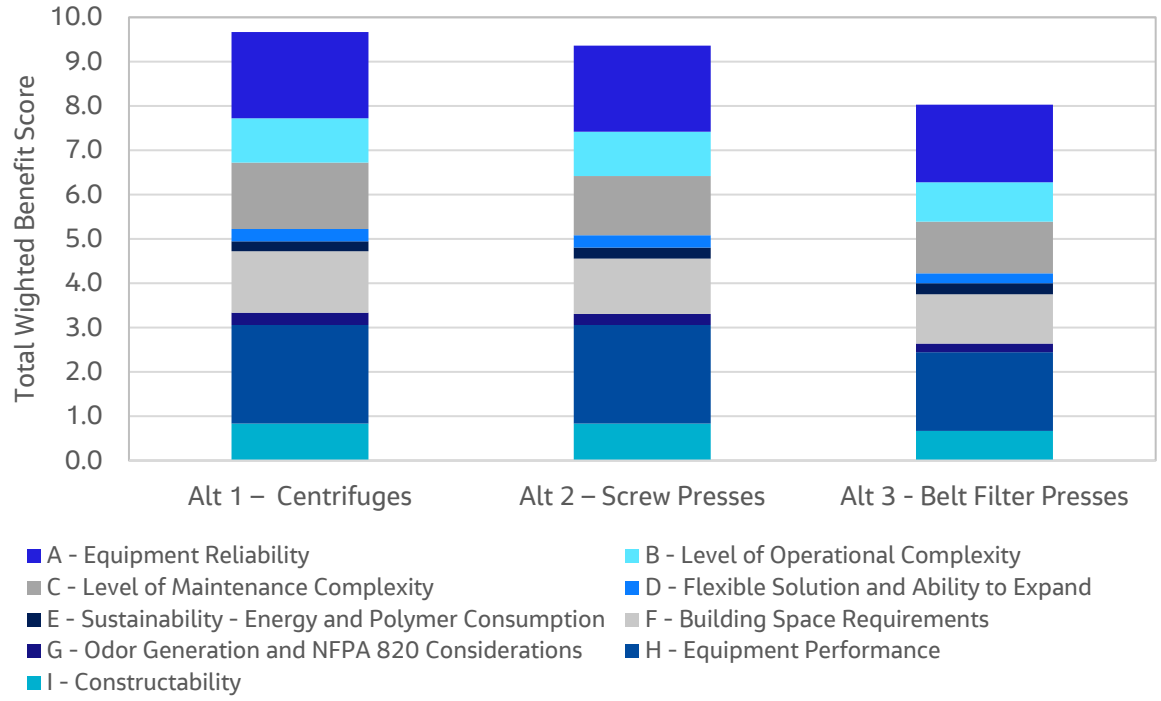


Figure 6-5. Dewatering Technology Assessment Non-Monetary Scoring Results

Estimated capital, annual O&M, and total lifecycle costs were prepared for the three explored dewatering technologies. Each alternative assumed full redundancy of the dewatering equipment during normal operations for the feed dewatering flows and loads described.

Lifecycle costs were developed using a combination of dewatering equipment vendor quotes and capital and O&M cost assumptions. These preliminary cost estimates should be considered to have an accuracy of plus 100% to minus 50%, consistent with a planning-level estimate as defined by Association for the Advancement of Cost Engineering (AACE).

Capital and O&M costs were combined to determine a lifecycle cost for each alternative by calculating the present worth of capital costs and annual O&M costs. The centrifuge dewatering option had a lower overall lifecycle cost of approximately $119 million compared to the screw press cost of approximately $140 million and the BFP cost of approximately $129 million. Table 6-1 compares the lifecycle costs for each alternative

Table 6-1. Field's Point Estimated Lifecycle Cost

Description	Centrifuges	Screw Presses	BFPs
Present Worth Capital Cost	$13,370,000	$20,499,000	$13,426,000
Present Worth O&M Cost	$105,654,000	$119,386,000	$115,598,000
Lifecycle Cost	**$119,024,000**	**$139,885,000**	**$129,024,000**
Ratio Relative to Lowest Lifecycle Cost	**1.00**	**1.18**	**1.08**

6.1.5 Conclusions and Recommended Technology

Non-monetary evaluation results and the estimated total lifecycle costs for dewatering equipment at Field's Point WWTF were plotted on a benefit to cost graph (Figure 6-6). Dewatering alternatives at the top left-most corner of the graph represent the best alternatives due to higher nonmonetary benefits and LCCs. The centrifuge dewatering alternative had the highest weighted benefit score and lowest lifecycle cost, followed by the screw presses with a slightly lower weighted benefit score and more expensive LCC cost due to the need for more units. BFPs had the lowest weighted benefit score and more expensive LCC than centrifuges due to wetter cake solids production.

Accordingly, centrifuges are recommended for short-term and future dewatering improvements at the Field's Point WWTF. Three centrifuges are recommended to be installed, sized to process 28 DT/day annual average and 38 DT/day max month conditions, without liquid sludge loads from outside sources (merchant sludge). To accommodate this capacity, 2 duty and one standby unit are recommended. The actual unit sizes may vary depending on the selected manufacturer. If merchant sludge is to be received, the centrifuge will need to be sized for an additional 12 DT/day AA and 16 DT/day MM loading. Under this condition, 2 duty and 1 standby centrifuge will still be required. While not the focus of this FPA, centrifuges were also recommended to be maintained as the dewatering technology for the in-kind equipment replacements at Bucklin Point, and a similar evaluation was conducted for the Bucklin Point facility.

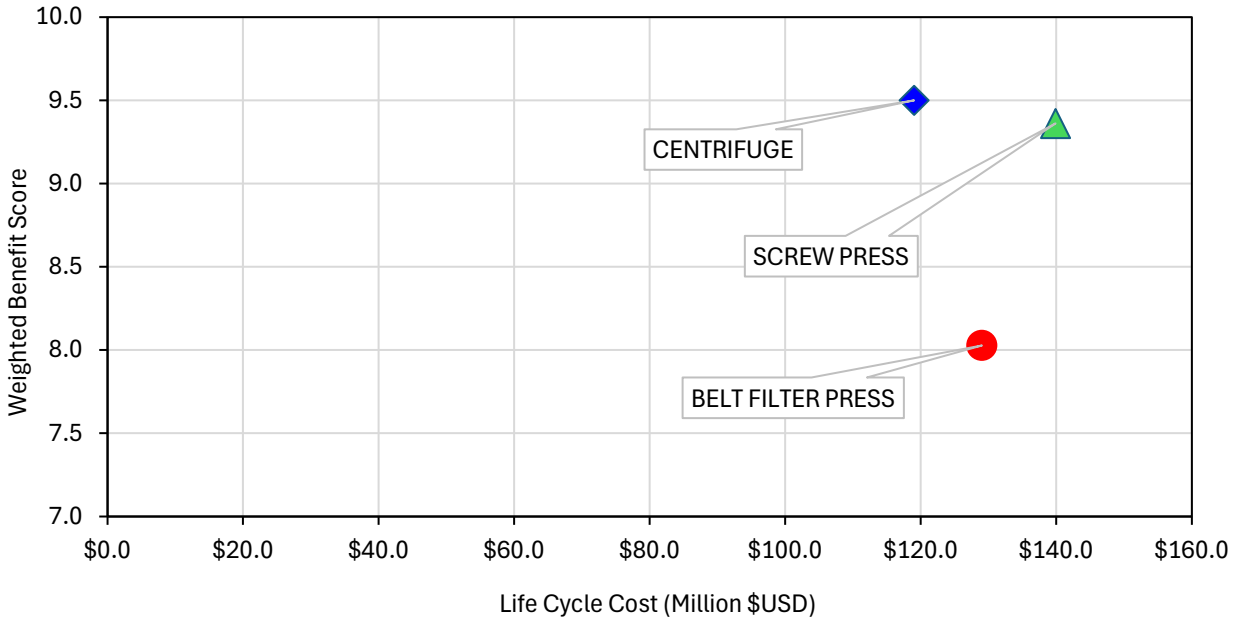


Figure 6-6. Field's Point WWTF Dewatering Alternatives Nonmonetary Benefits vs. Lifecycle Cost

6.1.6 Design Basis for Dewatering Equipment

Dewatering centrifuge equipment is sized based on operating and design parameters including sludge production and solids-loading rates to achieve cake quality and performance criteria. This section reviews the general design criteria for the selected technology.

The new dewatering facility will include three centrifuges, two duty units and one standby, to dewater thickened sludge from between 2.7-3.5% total solids (TS) up to 20-25% TS, with solids capture of 95%.

These parameters describe the solids content in the cake product from the centrifuge, and are selected based on downstream processing or disposal as well as operational energy and polymer costs. The individual unit sizes will be determined based on the selected manufacturer, however the system design criteria will be used to size two operational duty units. A standby unit will be furnished to provide system redundancy that will decrease the risk of operational challenges and capacity restrictions currently experienced at the existing facility. The unit capacity of each centrifuge will be sized to accommodate the recommended operating schedule, where the dewatering system will be operated intermittently 16 hours per day, and 6 days per week.

Preliminary system design criteria for the dewatering centrifuge equipment is summarized in Table 6-2. Additional dewatering capacity beyond that proposed below could be accommodated by the existing Field's Point secondary treatment process before the 5 mg/L TN effluent limit is exceeded if liquid merchant sludge is processed at Field's Point, as discussed in Section 4.2.4. The centrifuges and the dewatering system would need to be sized to accommodate an additional 12 DT/day AA and 16 DT/day MM of blended sludge, maintaining the two-duty, one-standby configuration within the footprint of the new dewatering building. The impact on the design conditions as a result of merchant sludge characteristics would be determined as additional data becomes available.

Sludge storage tanks will be provided to accommodate thickened sludge from Field's Point and future merchant sludge receiving, with sufficient volume to accommodate approximately two days of sludge production at max month conditions. Sludge storage for Bucklin Point is not included here, but future storage considerations are discussed in Section 6.3.5. The unit sizes and volume of sludge storage tanks will be revisited if the liquid merchant sludge projections change. The following liquid sludge volumes were used for storage tank sizing based on scrubbed Field's Point data from January 2022, through April 2025 and the Survey of Potential Participants in Regional Liquid Sludge from Appendix C:

- Field's Point MM sludge flows of 405,000 gpd
- Merchant sludge MM flows of 109,000 gpd

As discussed under Section 4.2.3, two 500,000-gallon storage tanks will provide sufficient storage to maintain operation 6 days a week under max month design conditions without risking accumulation beyond design capacity. The 345,000 GT converted to a sludge storage tank will provide additional thickened sludge storage and the 3 operational GTs can be utilized for storage if needed per TR-16.

Table 6-2 Field's Point Dewatering Centrifuge System Design Criteria

Component/Parameter	Units	Criteria	
		AA	MM
Centrifuges			
No. Duty Units	-	2	
No. Standby Units	-	1	
Operating Schedule	Days/week	6	
	Hrs/day	16	
Field's Point Solids	DT/d	28	38
Field's Point + Merchant Solids	DT/d	40	54
Feed Solids Concentration (TS)	%	2.7 - 3.5	

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Component/Parameter	Units	Criteria	
		AA	MM
Solids Capture Efficiency	%	95	
Dewatered Cake Solids (TS)	%	20-25	
Sludge Storage Tanks			
No. Tanks	-	2	
Operating Volume per Tank	gallons	500,000	
SWD	Feet	20	

6.2 Short-Term Improvements

Two alternatives were considered to address short-term deficiencies:

1. Rehabilitation of the existing dewatering building
2. Construction of a new dewatering building

The No-build/Status Quo alternative was not considered an option, based on the deficiencies identified in Section 4. Under all alternatives, final disposal would be handled offsite by a third party. The key elements considered were equipment installation, operational efficiency, NBC goals and facility location. Several ancillary associated processes (e.g., Sludge Thickening and Scum Handling) were evaluated as potential future improvements with brief discussion provided on each in Section 6.3.6.

6.2.1 Alternative 1: Rehabilitate Existing Dewatering Building

The existing dewatering building could be rehabilitated, which would include replacing the dewatering equipment, flow meters, solids analyzers, polymer system, and bridge crane, as well as a range of ancillary building upgrades to address deficiencies noted in Section 0. The thickener repurposed as a sludge storage tank also requires new mixing systems to prevent solids settling. The new dewatering equipment would replace the existing deficient equipment. Equipment would be adequately sized for current and future loads from the Field's Point WWTF, with additional capacity for receiving liquid merchant sludge from outside sources. Dewatering capacity would remain within the range of projected sludge volumes accepted in the 1997 FPA. In general, most other process equipment and ancillary support systems would be replaced in-kind.

New dewatering equipment would include 3 centrifuges (2 duty and 1 standby). While new centrifuge equipment could be sized to fit within the existing building, there is insufficient space for proper operation and maintenance within the existing footprint, nor is there space for future equipment upgrades if increased dewatering capacity is required after the timeframe of this FPA.

6.2.2 Alternative 2: Construct New Dewatering Building

For the second alternative, an entirely new dewatering facility could be constructed on NBC-owned property immediately adjacent to the Field's Point WWTF. This property is accessible via an existing heavy trucking route on Terminal Road, which provides convenient truck access without requiring entry into the WWTF. The building would include all new dewatering equipment and cake storage components. Truck loading for cake disposal and truck unloading for potential liquid merchant sludge receiving would be

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included, along with the required external sludge storage. New equipment would be adequately sized for loads described in Section 4.2. In general, most other process equipment and ancillary support systems would be upgraded in-kind but sized appropriately for the new facility with additional equipment provided for redundancy. The existing dewatering building would be decommissioned as part of the dewatering facility upgrades and would be repurposed by NBC as a Future Improvement.

6.2.3 Cost-Benefit Comparison of Alternatives

An AACE International Class IV cost estimate was prepared for installing new dewatering equipment and bringing the existing facility to a state of good repair (Table 6-3).

Table 6-3. Cost Estimate for Refurbishing Existing Dewatering Building at Field's Point WWTF

Description	Estimated Cost	
Dewatering Equipment & Process Mechanical[a]		$5,600,000
Electrical		$1,100,000
HVAC		$500,000
Odor Control		$700,000
Instrumentation & Controls		$600,000
Structural		$100,000
Temporary Facilities		$1,000,000
Subtotal		**$9,600,000**
Subcontractor Overhead & Profit		$2,200,000
General Conditions		$1,800,000
Mobilization/Demobilization		$400,000
Subtotal Indirect Costs		**$14,000,000**
Prime Contractor Overhead		$1,000,000
Prime Contractor Profit		$1,100,000
Bonds & Insurance		$500,000
Total Construction Costs Without Contingency		**$16,600,000**
Design Contingency	30%	$5,000,000
Escalation	5%	$1,100,000
Total Estimated Construction Cost		**$22,700,000[b]**

[a]New dewatering equipment (centrifuges), flow meters, sludge storage tank, mixing, solids analyzers and polymer system, with piping and conveyance replaced within the existing footprint.

[b]This AACE International Class IV cost estimate is considered accurate to +50% to -30%

It is expected to cost approximately $23 million to bring the existing facility to a state of good repair, but it could cost up to $34 million, because there is a level of uncertainty in a Class IV estimate. These costs do not include the necessary improvements for merchant sludge receiving (such as truck scales, truck unloading, and sludge storage) and associated costs for site civil work to construct them. The existing

building also lacks sludge cake storage, which is recommended to improve O&M. The cost estimate includes $1 million for temporary equipment for necessary immediate improvements.

An AACE International Class IV cost estimate was prepared for constructing a new dewatering building (Table 6-4).

Table 6-4. Cost Estimate for Constructing a New Dewatering Building at Field's Point WWTF

Description	Estimated Cost	
Sitework		$2,900,000
Dewatering Equipment & Process Mechanical[a]		$9,700,000
Electrical		$3,700,000
HVAC		$1,200,000
Odor Control		$1,000,000
Instrumentation & Controls		$1,700,000
Structural		$8,800,000
Temporary Facilities		$1,000,000
Subtotal		**$30,000,000**
Subcontractor Overhead & Profit		$6,800,000
General Conditions		$5,500,000
Mobilization/Demobilization		$1,100,000
Subtotal Indirect Costs		**$43,400,000**
Prime Contractor Overhead		$3,000,000
Prime Contractor Profit		$3,500,000
Bonds & Insurance		$1,500,000
Total Construction Costs without Contingency		**$51,400,000**
Design Contingency	30%	$15,400,000
Escalation	5%	$3,300,000
Total estimated New Field's Point Dewatering Building Construction Cost		**$70,100,000[b]**
Estimated Sludge Storage Tank Construction Cost		**$14,000,000[b]**

[a]Includes redundant cake storage hoppers, redundant cake conveyance equipment, optimized receiving and unloading infrastructure and redundant piping systems for storage and cross connector conveyors.

[b]This AACE International Class IV cost estimate is considered accurate to +50% to -30%

A new building is expected to cost approximately $70 million, but it could cost between $49 and $105 million, because there is a level of uncertainty in a planning-level Class IV estimate. While more expensive than repurposing the existing building, there are some important non-cost benefits over the existing structure that should be noted:

- There would be two enclosed truck bays with odor control: one for sludge cake loading and disposal and one for liquid merchant sludge receiving.
- The truck bays would permit trucks to drive through, unlike the existing structure that requires roll-off containers for sludge cake storage.
- Redundant sludge cake hoppers would be provided to improve operations with redundant conveyance options. This additional equipment is why the process mechanical costs increase for a new building.
- The new facility would be two stories instead of one, providing the recommended space for centrifuge maintenance, which the existing facility does not have.
- The facility would include a bridge crane with an access hatch over the merchant sludge receiving truck bay, to permit the centrifuge scrolls to be hauled to the manufacturer for future maintenance and balancing.
- This estimate includes the necessary improvements needed for merchant sludge receiving including truck scales and truck unloading.

The cost estimate includes $1 million for temporary equipment for necessary immediate improvements. Most of the disciplines cost more for the new building, because everything is being built from the ground up. Sitework is not required for the existing structure, and bringing new electrical service to the site adds to the electrical costs. Odor control and HVAC will be more expensive, because the new building is larger than the existing building. Structural costs increase with the construction of a new building. Aside from structural costs, the greatest cost increase is process mechanical. This is due to the redundant conveyors, cake pumps, and sludge cake hoppers, which the existing facility lacks. However, NBC may elect to have a 3rd-party contract operator implement and/or operate these temporary facilities.

Neither cost estimate includes the liquid sludge storage required to receive merchant sludge. The plant currently uses a gravity thickener that has been repurposed for sludge storage. This tank only provides 1 day of storage under maximum week conditions. New tanks will be sized to receive approximately 109,000 gallons/day (16 DT/d) of liquid merchant sludge in addition to sludge produced at Field's Point. They will be sized provide 2 days of storage under maximum month conditions. These tanks will cost approximately $14 million and could cost up to $22 million. This includes the cost of odor control for the enclosed tanks, which will be installed adjacent to the new dewatering building on the transfer station property. Because retrofitting the existing dewatering building (Alternative 1) does not have any site work included, these tanks would cost significantly more under this alternative. This is because the new building (Alternative 2) cost estimate includes sitework improvements for tank construction.

Figure 6-7 shows an image of the proposed location for the new building and sludge storage tanks.

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Figure 6-7. Proposed Location for New Dewatering Facilities (Alternative 2)

6.2.4 Discussion of Evaluated Alternatives and Recommendations

The alternatives were evaluated on both a qualitative and quantitative basis. While the new building costs more than the existing facility, there are many reasons it is preferrable to refurbishing the existing structure (Table 6-5).

Table 6-5. Considerations for Dewatering Building at Field's Point WWTF

Criteria	Alternative 1: Existing Building	Alternative 2: New Building
Land/Space Requirement	Inadequate space for process equipment O&M (too tight)	Space optimized for equipment O&M with new bridge crane for maintenance
Consideration for Pipelines	Existing pipelines do not provide redundancy (a line out of service reduces dewatering capacity)	New pipelines designed for complete redundancy (a line out of service will not affect capacity)
Truck Loading Accessibility	Access doors too low for standard truck trailers	Doors properly sized to accommodate standard truck trailers
Optimized Design for Sludge Conveyor	Sludge conveyor is too low for standard truck trailers	Building height designed to accommodate proper conveyor height
Ability to Receive Merchant Sludge	Existing facility not compatible for receiving merchant sludge	New building and storage designed for receiving merchant sludge
Sludge Storage Considerations	Does not have ideal sludge storage/blending	Sludge storage and blending tanks will be provided to accommodate additional merchant sludge
Equipment Redundancy	Only 1 sludge cake loading conveyor (no redundancy)	New building will have redundant equipment to enable maintenance

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Criteria	Alternative 1: Existing Building	Alternative 2: New Building
Sludge Cake Storage	Rolloff containers used for sludge cake storage	Truck bays will have redundant sludge cake hoppers and allow trucks to drive through, improving operations
Truck Access	Trucks forced to use Ernest St. and drive through center of plant	Trucks can use Terminal Rd. and will not disrupt plant operations

6.2.5 Short-term Conclusions and Recommendation

The existing dewatering building is not sized properly for the desired equipment, it has inadequate space for maintenance, cannot meet NBC's short-term and future goals, and would be difficult to retrofit into compliance with existing TR-16 design guidance. The facility does not provide enclosed, odor-controlled cake storage and does not have redundant conveyors for O&M. The facility also does not have a drive through truck loading bay, which inhibits cake loading efficiency. Furthermore, the existing building is not suitable for receiving merchant sludge. The existing facilities are inadequate to meet NBC's goals, and the cost benefits of refurbishing will be lost, because NBC will continue to have inadequate facilities that are more difficult to operate. For these reasons, a new dewatering building constructed on existing NBC property along Terminal Road is the recommended alternative (Alternative 2).

This alternative will not have any adverse impact to the Field's Point treatment process, as discussed in Section 4.2.

The new dewatering building will be sized to properly operate and maintain 3 centrifuges (2 duty and 1 standby). Space for future equipment upgrades will also be provided to meet increased dewatering capacity after the timeframe of this FPA. This will be accomplished by adding space for either a fourth centrifuge or the installation of larger centrifuges with increased solids loading capacity. The 3 centrifuges cannot be installed with space for proper maintenance and operation in the existing building, which is a major reason why a new building is required.

6.3 Future Improvements

This section includes a high-level summary of the planning evaluation of future improvements for coordination with the short-term improvements recommended at Field's Point by this FPA. As such, these future biosolids management considerations discussed here are being developed in parallel with the design for short-term improvements.

This FPA considered long-term biosolids management alternatives that provide the ability to address market and regulatory uncertainties. Each of these alternatives maintain a recommendation for final disposal by a third party, and as such, other disposal technologies (such as incineration, pyrolysis, etc.) are not being considered at Field's Point at this time.

During the preliminary screening phase, six alternatives were evaluated for future biosolids management at the Field's Point WWTF, to include the following combinations of dewatering, mesophilic anaerobic digestion (MAD), thermal drying, and thermal hydrolysis process (THP):

- Base Case: no build alternative
- Add Digestion at Field's Point WWTF
- Add Drying at Field's Point WWTF

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- Add Digestion and Drying at Field's Point WWTF
- Add THP with Digestion at Field's Point WWTF
- Add THP with Digestion and Drying at Field's Point WWTF

Thermal drying was considered in the long-list of alternatives, to be implemented in combination with dewatering and digestion to reduce the moisture content. However, the relative cost benefits are not currently beneficial to NBC nor its ratepayers as a result of high capital and operational costs, therefore thermal drying was not carried forward for consideration in this evaluation. Thermal drying should, however, be considered for integration in the future, and reevaluated for benefits after the improvements recommended in this section have been implemented. Under all explored alternatives, a third-party service provider would still handle final disposal offsite.

From the initial six alternatives, the following three solutions were selected for further evaluation:

1. No-build status quo (provides basis of comparison)
2. The addition of anaerobic digestion at Field's Point WWTF (Class B)
3. The addition of anaerobic digestion in combination with Thermal Hydrolysis Process (THP) (Class A)

Alternatives were evaluated based on the following criteria:

- Beneficial use and product marketability
- Compatibility with existing systems and land use
- Operational complexity, maintainability, and serviceability
- Energy use and climate impacts
- Potential public impacts
- Ability to increase treatment capacity in the future
- Maturity and proven use of the technology
- Flexibility and diversity of potential outlets for solids management

The alternatives were evaluated using a total weighted score approach, which combined financial considerations with qualitative factors. This approach ranks the relative costs of an alternative to achieve the benefits prioritized by NBC in the nonmonetary criteria. This section presents the evaluation results, including a breakdown of benefits in terms of the criteria and cost benefits. In addition to the major technologies considered for Future Improvements as listed above, ancillary associated processes (e.g., Sludge Thickening and Scum handling) were also preliminarily evaluated for potential improvements.

6.3.1 Alternative 0: No-build Alternative (Status Quo)

The No-build alternative represents a base case scenario, where short-term improvements recommended in Section 6.2 are constructed with no additional biosolids management infrastructure improvements. A new dewatering building, along with new sludge storage tanks, will be constructed at Field's Point WWTF. Merchant sludge from regional facilities could be received and mixed with Field's Point WWTF liquid sludge for centrifuge dewatering.

This alternative generates a larger volume of biosolids requiring disposal than Alternatives 1 and 2. The dewatered cake does not meet the requirements for classified biosolids, is more odorous than Alternatives 1 and 2, and has limited disposal outlets. This alternative does not meet NBC's objectives to decrease sludge

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volume and improve the quality of dewatered product in the future to increase disposal options, and is therefore not considered a viable long-term approach to managing Field's Points sludge. This alternative introduces elevated long-term risk to NBC based on the volatility and uncertainty in the New England biosolids management market. For these reasons, the No-build alternative might not be in NBC and its ratepayers best interest, but is carried as a baseline condition for comparative evaluation. It is important to acknowledge that even if the No-build alternative is selected at Field's Point, during the planning period of this FPA NBC would still need replace the digestion complex at Bucklin Point which a prior NBC study estimated to cost upwards of $140-million.

6.3.2 Alternative 1: Adding Digestions at Field's Point WWTF

Under Alternative 1, a new anaerobic digestion facility would be constructed at Field's Point WWTF to add an additional treatment step following sludge thickening. The dewatering building and storage tanks constructed under the recommended short-term improvements (Section 6.2) will continue to dewater final digested sludge. This alternative produces a reduced volume of Class B biosolids by including digestion. This is an improvement over the No-build alternative, because the Class B product will have reduced pathogens and odor. However, the dewatered cake produced will be less than 25% TS and the outlets for beneficial use of the Class B biosolids remain limited in New England, both of which would ultimately increase biosolids management cost for NBC.

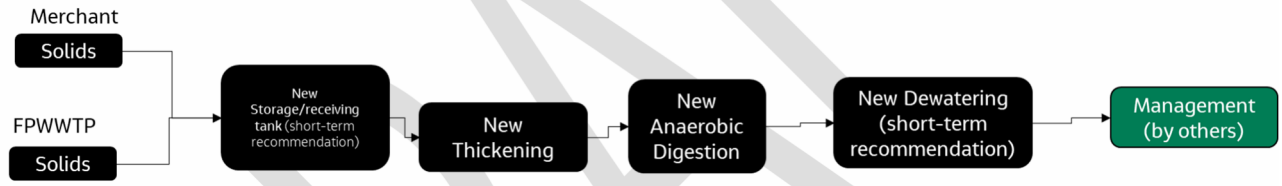


Figure 6-8 Alternative 1 addition of anaerobic digestion at Field's Point WWTF (Class B) Simplified Process Flow Diagram

6.3.3 Alternative 2: Adding Digestion and THP at Field's Point WWTF

In addition to improvements constructed under Alternative 1, this alternative includes new centrifuge pre-dewatering and a THP facility upstream of the digesters. THP pretreatment is a heat and high-pressure process that pairs with anaerobic digestion to improve digestion performance and the dryness of the final Class A product through advanced digestion. The dewatering building and storage tanks constructed under the short-term improvements recommended by this FPA will be used to dewater digested sludge. Regional merchant sludge from other facilities can be received and mixed with Field's Point liquid sludge. This alternative produces Class A biosolids with further reduction in pathogens and odor compared to Alternative 1.

The addition of THP reduces required digestion volume, increases solids reduction, increases biogas production and improves cake dryness compared to the other alternatives. A major benefit of this alternative is the diversity of market outlets for the final dewatered product and market resilience in the face of industry or regulatory shifts.

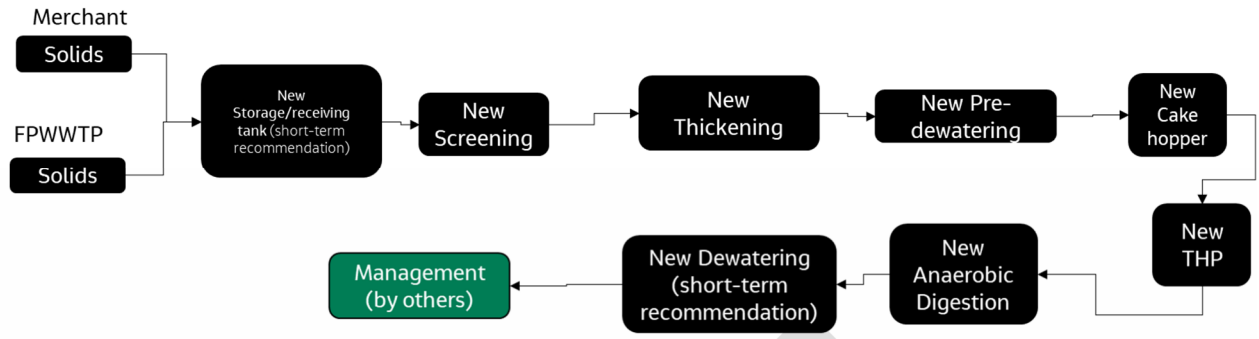


Figure 6-9 Alternative 2 addition of anaerobic digestion in combination with Thermal Hydrolysis Process (THP) (Class A) Simplified Process Flow Diagram

6.3.4 Cost-benefit Comparison of Alternatives

Alternatives were evaluated based on monetary and nonmonetary criteria. These analyses included consolidated processing of Bucklin Point and regional merchant sludge receiving at Field's Point. A nonmonetary evaluation of the alternatives used weighted criteria (Figure 6-10), where Figure 6-11 shows the results of the weighted score for each alternative. Alternative 2, which involves adding THP and digestion at Field's Point WWTF was the higher-scoring alternative based on the weighted nonmonetary criteria.

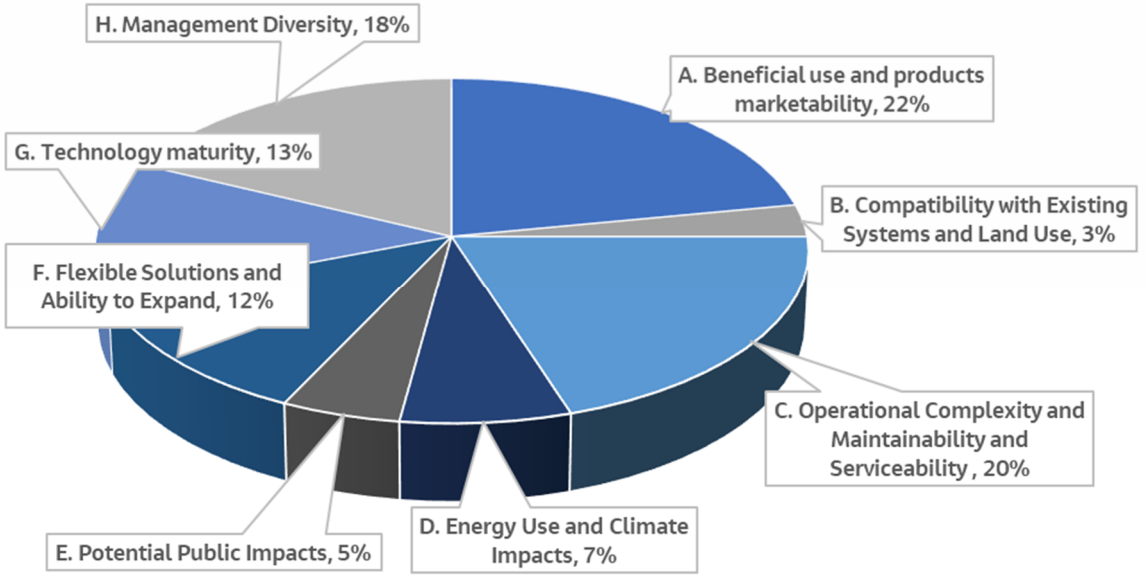


Figure 6-10. Nonmonetary Criteria Weighting for Future Biosolids Strategies

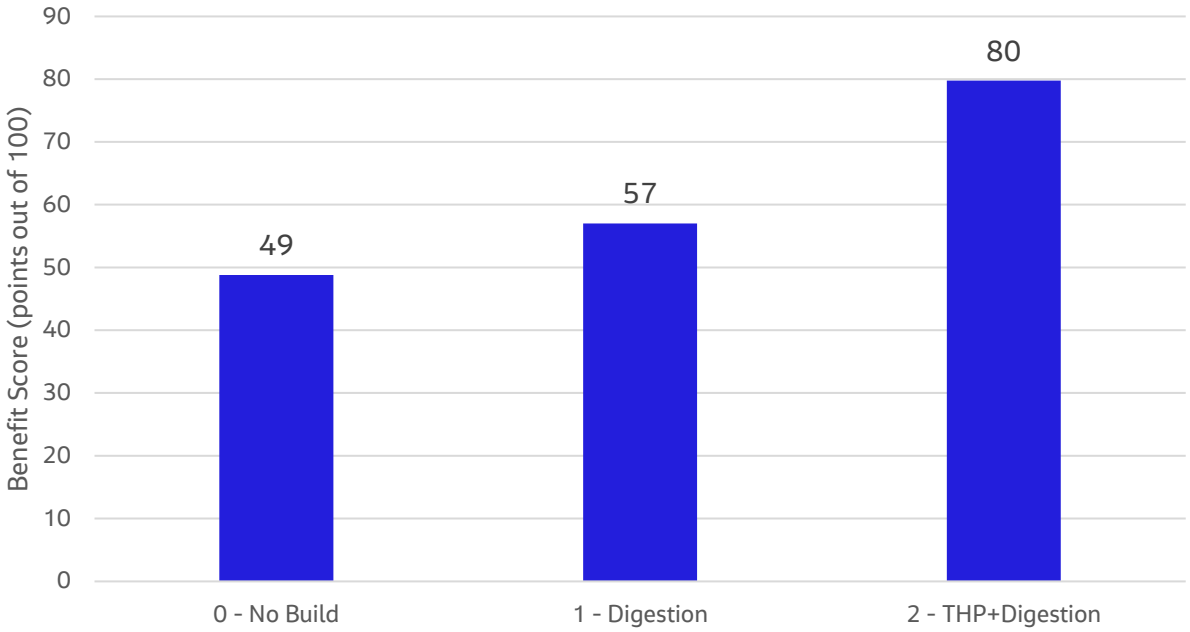


Figure 6-11. Benefit Scoring Results for Future Biosolids Strategies

A cost-benefit analysis was applied to each shortlisted alternative. Financial considerations (capital, lifecycle, and O&M cost estimates) were combined with qualitative factors to assign a weighted score. The cost-benefit value was calculated by dividing the total estimated project cost by the nonmonetary criteria score. Lower scores indicate a more favorable selection.

Figure 6-12 shows the final cost-benefit scores for each alternative. Because of a relatively low cost-benefit score for Alternative 2, the addition of anaerobic digestion and THP at Field's Point WWTF, is the recommended alternative. Consolidation of biosolids management from the Bucklin Point WWTF would reduce costs associated with constructing and maintaining THP systems in multiple locations.

Process modeling was conducted to confirm centrate from dewatering under Alternative 2 will not overload the existing Field's Point secondary treatment or cause the plant to exceed effluent permit requirements. This is a concern for Alternative 2 as during digestion and THP organic matter is broken down releasing soluble nutrients such as ammonia-nitrogen. Process modeling showed that, with the addition of supplemental or fermented carbon, digested THP sludge for the proposed future processing capacity (Table 4-2) can be dewatered, without dedicated sidestream treatment, while maintaining a 5-mg/L TN effluent limit. The existing supplemental carbon system at Field's Point would require upgrades at this time to meet this proposed demand, however, additional digested sludge beyond those proposed in Table 4-2 could be dewatered if dedicated sidestream treatment was implemented. If dedicated sidestream treatment was determined to be needed, NBC would complete a separate FPA at a later date to evaluate the best technology alternatives at the time of implementation.

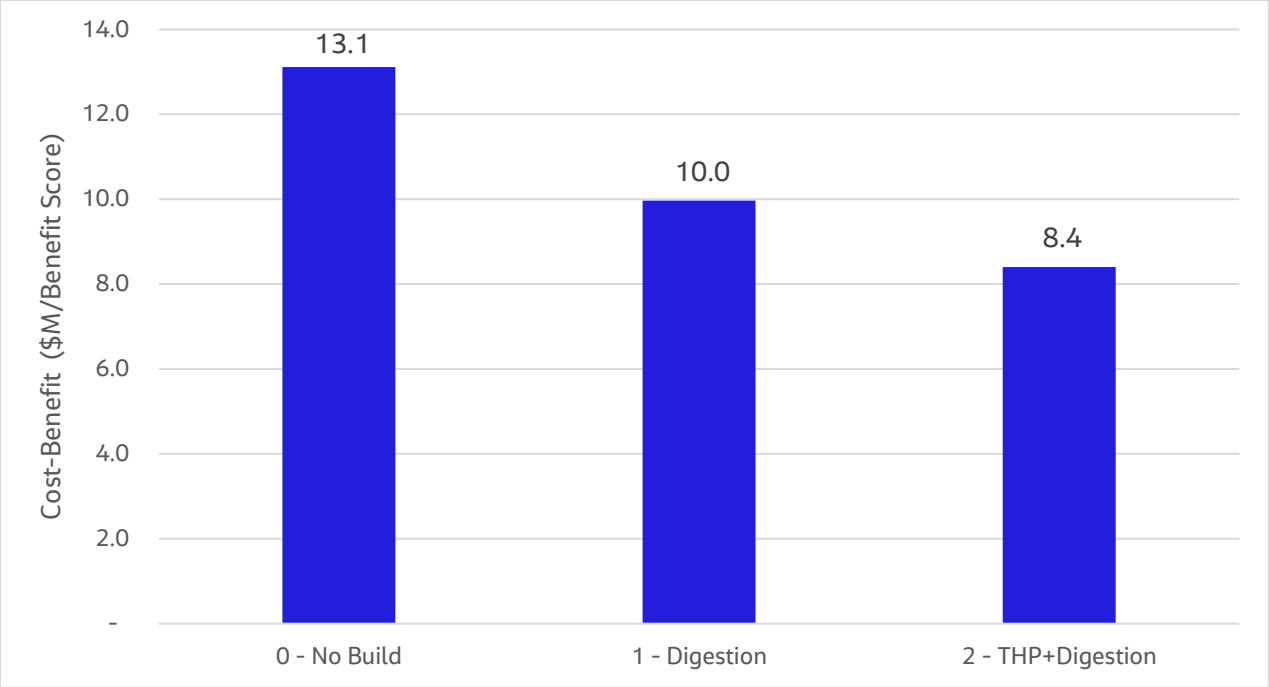


Figure 6-12. Cost-benefit Score for Future Biosolids Strategy (Lower is Better)

6.3.5 Consolidation Considerations

For each of the concept alternatives presented in Sections 6.3.1 to 6.3.4, merchant sludge from other WWTFs could still be received and mixed with Field's Point WWTF liquid sludge, and Bucklin Point WWTF sludge can be transferred to Field's Point WWTF for processing in the future, in line with existing planning objectives, per the 1997 Bucklin Point FPA. If sludge consolidation were to occur at Field's Point, there are two long-term options (A and B) for managing Bucklin Point WWTF sludge under Alternative 1:

A. Replace the existing Bucklin Point digestion complex in-kind, whose useful life expires within the planning period of this FPA. A prior NBC study estimated this to cost $140-million.

B. Abandon digestion at the Bucklin Point WWTF at the end of the digesters useful life, and consolidate all sludge management at the Field's Point WWTF.

To implement consolidation at Field's Point, an additional sludge storage tank could be constructed if Bucklin Point WWTF sludge is transferred to the Field's Point WWTF, or adequate sludge storage could be constructed at Bucklin Point. Under Alternative 1, Option A, both WWTFs would generate a Class B solids, yet the dewatered cake from both will be less than 25% TS. Under Alternative 2, Option B, the process would generate Class A biosolids from all NBC facilities.

Another positive aspect of these consolidation options is the potential reduction in future capital and O&M costs to replace the aging Bucklin Point digesters, while more efficiently focuses resources on one location. Further, an analysis of the impacts on the liquids treatment process and effluent Total Nitrogen from the Bucklin Point WWTF's loads into Field's Point WWTF showed that, although the IFAS system would be able to accommodate the additional loadings with carbon addition, there are advantages of implementing side stream treatment for nitrogen removal; it would ease pressure on operation of the IFAS system, reduce O&M cost from the reduction in carbon addition to meet seasonal effluent TN limits, and to

maintain the ability to import merchant sludge at the 12 DT/day AA and 16 DT/day MM considered in the sizing of the recommended short-term improvements.

6.3.6 Future Facility Recommendations

The recommended implementation for future biosolids processing improvements includes the following:

1. Conversion of the existing dewatering building at Field's Point to a mechanical WAS thickening facility, following the completion of the short-term recommendations and full operation of the new dewatering facility.
2. Construction of Alternative 2 on existing NBC property, including a new anaerobic digester complex with a new pre-dewatering facility and THP pre-treatment.
3. Upgrading of the existing supplemental carbon facility, retrofitting of the existing gravity thickeners to sludge fermenters, and/or construction of dedicated sidestream treatment, should any of these be needed if Bucklin Point Sludge is transferred to Field's Point for consolidation.

Further description of the recommended long-term plan is included in Section 7.1.2.

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7. Recommended Plan

This section identifies and further conceptualizes the selected plan from the alternative evaluation.

7.1 Description of Recommended Plan

The description of the Recommended Plan is broken into the Short-Term and Long-Term plan, consistent with the evaluations and implementation schedules discussed throughout this FPA. Sections 7.1.1 and 7.1.2 provide the details of each of these phases of the overall recommended plan.

7.1.1 Short-Term Recommended Plan

The existing dewatering equipment at Field's Point WWTF has reached the end of its operational lifespan and should be replaced. The current equipment does not offer redundancy to allow normal operations while equipment is out of service for maintenance.

To address these limitations, a new dewatering building will be constructed to house the dewatering equipment and its ancillary systems. The dewatering building will include a liquid sludge truck unloading bay to process merchant sludge. Merchant sludge will be pumped to the sludge storage tanks, where it will be blended with Field's Point thickened sludge. Blended sludge will be pumped from the liquid sludge storage tanks to the centrifuges. Immediately prior to entering the centrifuge, the sludge will be conditioned with polymer as a flocculant. Centrifuges will separate the solids and liquids to produce dewatered cake (solids) and centrate (liquids). This equipment will be sized to provide redundancy and operational flexibility. Centrate will return to the liquid treatment processes, likely to the existing centrate discharge point upstream of primary clarification. While centrate will likely return by gravity, a centrate pump station will be constructed if deemed necessary. Dewatered cake will fall into a cake pump or conveyor system by gravity and will be conveyed to a sludge cake hopper for storage until a truck can offload the cake. A second truck loading bay will be provided for trucks hauling cake offsite.

The recommended plan can be categorized into the following general process areas:

- Dewatering Feed – Three centrifuge feed pumps will convey sludge from the sludge storage tanks to the centrifuges. During normal operations, each centrifuge will have a dedicated feed pump. Centrifuge feed piping will be cross-valved to allow feed pumps to supply sludge to alternate centrifuges when pumps are out of service for maintenance. Positive displacement pumps will be provided to accommodate the sludge's rheology. Each centrifuge will be equipped with a flow meter to enable flow pacing so the centrifuges will not be hydraulically overloaded.
- Polymer Feed System – Polymer functions as a flocculant to promote sludge dewatering. Emulsion polymer will be delivered to site as a neat solution and will be stored in two bulk polymer storage tanks until it is ready for activation. Two polymer blending units will be used to activate and dilute the emulsion polymer for use. The polymer blending units use high-energy forces to blend the neat polymer with water and unfurl the polymer chains, activating the polymer for use. The polymer blending units will pump the activated polymer to a pair of polymer aging tanks. In the polymer aging tanks, the polymer molecules receive additional time to unfurl and provide more active sites for binding with the sludge. From the polymer aging tanks, the activated polymer will be delivered into the sludge feed line immediately upstream of the centrifuge by means of polymer metering pumps. Under normal operations, each polymer metering pump will be dedicated to a centrifuge, but cross-piping and valving will allow for an alternative centrifuge feed in case a pump is out of service.

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- Dewatering Equipment – Three dewatering centrifuges will be provided for sludge dewatering. Feed sludge will enter the centrifuge and be injected into the center of the assembly. Once solids are inside the assembly, they will settle to the outside the bowl, while the liquids will remain toward the center of the assembly. The scroll will convey the solids to the cake discharge. Operators will be able to adjust the bowl and scroll speeds to provide the desired centrifuge performance. Larger equipment will be installed to provide operational flexibility during non-peak flow periods.
- Cake Conveyance – Dewatered cake will fall by gravity from the centrifuge into a cake pump or conveyor. Redundant conveyance mechanisms will be provided to permit operations during maintenance. Sludge cake will be conveyed to redundant cake storage hoppers until it is ready for loading into trucks.
- HVAC – Ventilation will be provided in the new dewatering building to meet National Fire Protection Association 820 requirements, and to provide the required air changes per hour. The centrifuges are completely enclosed, minimizing any gas escape from the equipment.
- Odor Control – An odor control system will be provided to eliminate nuisance odors. The system will be sized to accommodate required building ventilation, headspace above liquid sludge storage tanks, and both sludge cake loading and liquid municipal sludge receiving truck bays.
- Electrical - The existing dewatering building is not currently equipped with dedicated standby power, however, consideration should be given to a dedicated exterior engine-driven electrical generator to provide standby power to the entire dewatering building.
- Controls and Automation – The dewatering system will be automated to facilitate operations. This automation will standardize repetitive operations and assist the operator with information and operation. Startup and shutdown procedures, polymer dosing, and sludge feed will be automated to provide consistent performance from the equipment. Automated truck loading from the cake hoppers will also be evaluated during detailed design, for benefits to the facility and operational impacts of receiving merchant sludge. Instrumentation from the field will be displayed for the operator to provide flow rates, tank levels, and motor run status. Automation will be accessed through a human-machine interface that allows the operator to view and control the overall dewatering process. Operators will also be able to run the equipment in manual when they are training new staff or during maintenance activities.

7.1.2 Long-Term Recommended Plan

The recommended implementation for future biosolids processing improvements is summarized as follows:

- Following the short-term recommendations (Section 6.2.5), convert the existing dewatering building at Field's Point to a mechanical WAS thickening facility, using either gravity belt thickeners or centrifuges. WAS from Field's Point, and outside merchant sludge if necessary, would be thickened at this facility. Co-thickening of primary sludge and WAS in gravity thickeners is not recommended, if possible. WAS and primary sludge have different settling characteristics and co-thickening in a gravity thickener reduces efficiency. As noted in WEF MOP8, Chapter 21 Section 2.1, gravity thickening of WAS results in lower solids capture and thickened sludge concentration. Mechanical thickening of WAS is recommended and will provide better solids capture and thickening.

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- Primary sludge from Field's Point would continue to be thickened in the existing gravity thickeners. Thickened sludge from the gravity thickeners and WAS thickening facility can be temporarily stored in a thickened sludge holding tank before pre-dewatering and digestion. This will reduce the required digestion volume. Since primary clarifier scum is currently stored at the existing dewatering building for off-site disposal, a new scum handling facility would need to be constructed, likely located at or near the primary sludge pump station near the scum concentrator. The preliminary capital cost of these improvements is estimated to be in the order of $30 million.
- Construct Alternative 2 on existing NBC property consisting of a new anaerobic digester complex with a new pre-dewatering facility and THP pre-treatment. Thickened sludge from the thickened sludge holding tank can pre-dewatered using centrifuges to increase the total solids content, as required for THP. Hydrolyzed sludge will go to the digesters for volatile solids reduction followed by final dewatering in the short-term dewatering building. The preliminary capital cost of these upgrades is estimated to be in the order of $230 million. However, this improvement offers the ability to significantly offset capital cost by reducing the amount of sludge to dispose and recovering energy from biogas generation.
- Once the construction of the digester complex is completed, the newly-constructed dewatering building at the Field's Point WWTF would likely have sufficient excess capacity to dewater additional sludge from the Bucklin Point WWTF or additional regional merchant sludge. With the digesters constructed, Field's Point scum could be introduced into the digester complex, eliminating the need for separate off-site scum disposal.
- If Bucklin Point sludge is transferred to Field's Point for consolidation, and modelling deems necessary, either (i) upgrade the existing supplemental carbon facility, (ii) retrofit the existing gravity thickeners as sludge fermenters, and/or (iii) constructed dedicated sidestream treatment to decrease the loading from the digested centrate from final dewatering.

Figure 7-1 shows the proposed location for the recommended future improvements.

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Figure 7-1. Proposed Site Layout for Future Facility Upgrades

7.2 Conceptual Design

The proposed design will incorporate operational flexibility and process redundancy. Two duty units will be provided, with a standby unit available for redundancy. Multiple duty units provide operational flexibility by allowing a unit to be taken offline during low flows to provide reduced capacity, instead of operating the equipment at significant turndown ratios. Units may be sized with capacity to accommodate merchant sludge processing and permitting operations 16 hours per day, 6 days per week, instead of operating 24 hours per day, 7 days per week. This will decrease wear on equipment, provide operational flexibility, and improve maintenance.

Figure 7-2 shows a conceptual design layout. Centrifuges and cake hoppers will be on the second level, to take advantage of gravity when they are discharging cake. Polymer aging tanks will be upstairs with the centrifuges, to provide convenient visual inspections of the polymer level while supervising centrifuge operation. Truck loading and unloading bays will be provided indoors to protect operators and cake from weather conditions and contain odors. All equipment will be provided with access around the equipment for inspection and maintenance. Centrifuges will have enough open space to remove the bowl and scroll assembly with laydown area on the upper level, if needed. An access hatch will be provided from the upper level to the lower-level truck bay, to facilitate the removal of equipment or parts for maintenance. An area for a future bulk polymer storage tank will be available to provide capacity for future expansion.

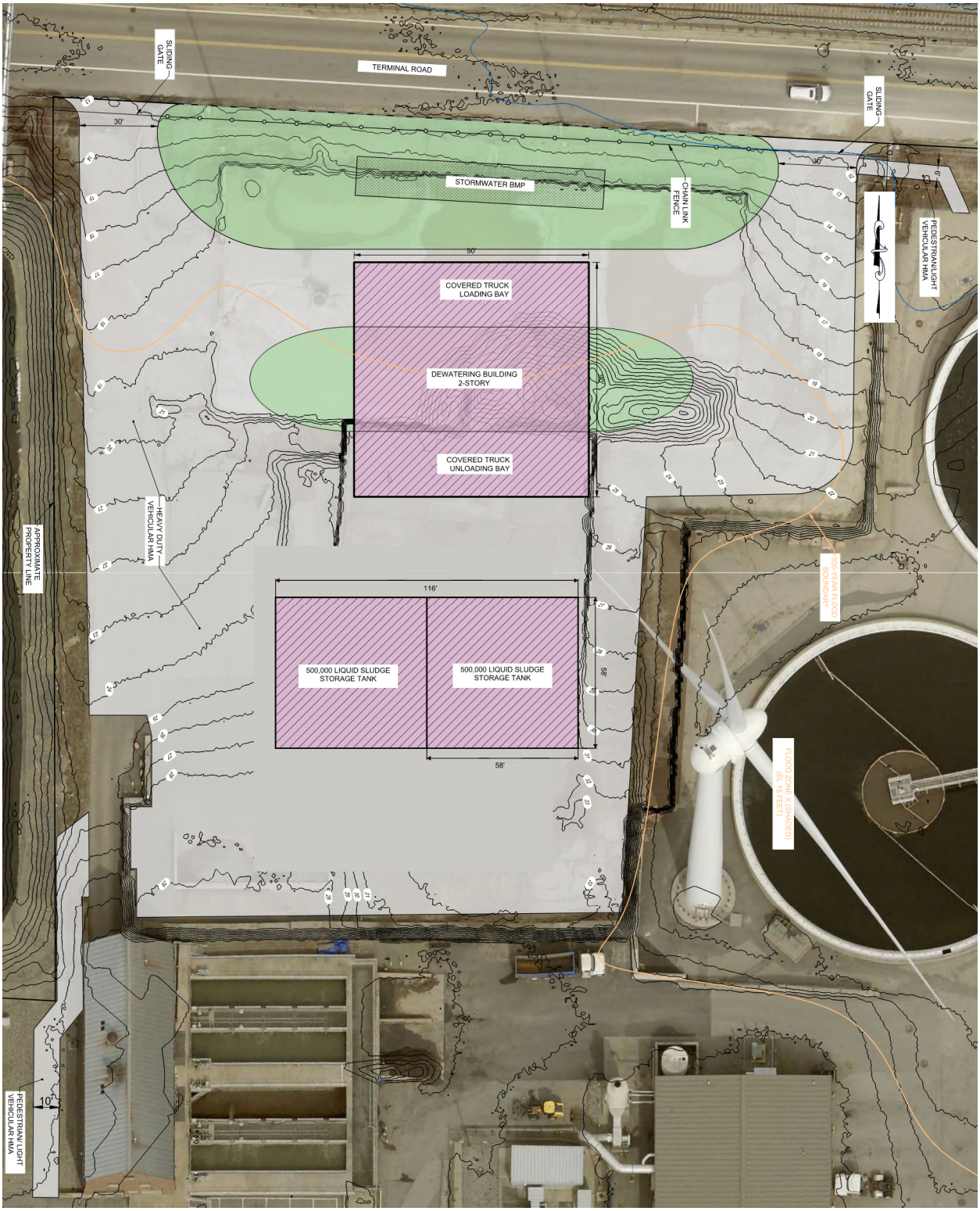


Figure 7-2. Conceptual Site Plan Layout

7.3 Environmental Assessment

This section discusses the environmental conditions around the project area, the potential for direct and indirect environmental impacts, and the measures that will be used to mitigate the identified impacts associated with the proposed Field's Point WWTF improvements.

Direct environmental impacts identified in this assessment can occur temporarily during construction or permanently as a result of the project. Direct impacts of concern typically include the potential for 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 improve water quality in Narragansett Bay and its tributaries. The upgrades proposed to the Field's Point WWTF will establish reliable sludge dewatering and biosolids management operations.

7.3.1 Previous Environmental Assessments

There have not been previous Environmental Assessments (EAs) specifically associated with the current improvements planned at the Field's Point WWTF. However, evaluations have taken place during past upgrades to the Field's Point WWTF, portions of which were associated with sludge dewatering processes.

Prior EAs took place for BNR improvements within the 2007 and 2011 FPAs. The purpose of the EAs was to determine the best alternative for removing nitrogen to meet the RIDEM 5-mg/L effluent discharge permit limit monthly average on a seasonal basis, and to confirm the performance of the upgrades.

Before then, the 1997 FPA was approved, which included an EA that explored improvements to the dewatering and incineration facilities at the Field's Point WWTF. This precedent documented study pertains to the sludge dewatering and biosolids processing facilities.

7.3.2 Summary of Potential Direct Environmental Impacts

Few direct environmental impacts are expected to result from the short-term recommendations associated with this project. The direct impacts identified by the EA are generally limited to the active construction of the project, and in most cases can be effectively mitigated during construction. Long-term impacts are not anticipated. Rather, this project will result in long-term environmental benefits, helping to continue to improve water quality in Narragansett Bay and its tributaries.

No disruptions of traffic, business, or other daily activities are anticipated from this project. There will be no damage to historic, archaeological, or cultural resources; natural heritage areas; wetland or coastal resources; or recreational areas. According to available RIGIS land use data, there is no U.S. Department of Agriculture-regulated farmland near or surrounding the project areas. No businesses, households, or services will be displaced as a result of the proposed project. The following sections discuss other potential direct impacts, and how they will be mitigated.

7.3.3 Summary of Potential Indirect Environmental Impacts

No indirect impacts are anticipated as part of this project. New equipment will be adequately sized for current and future loads from the Field's Point WWTF, with additional capacity to receive combined sludge from outside sources, within the range of projected sludge volumes proposed and accepted in previous FPAs. This

project will not impact offsite uses and is not 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.

7.3.4 Socioeconomic Considerations

This project is not expected to impact local businesses, because work will be entirely on the Field's Point WWTF site and NBC-owned land, and away from existing businesses and commerce. Existing adjacent industrial and commercial facilities are not expected be impacted. However, if the design process identifies potential impacts, NBC will work with adjacent facilities to limit those impacts. Strategies could include staging construction during certain times of the day and providing traffic control measures for the adjacent road to maintain existing access to all industrial facilities that use Terminal Road.

Aside from the business impacted by the improvements, the construction phase of this project can be expected to benefit the local economy through increased local construction employment, material supplies, etc. Where possible, NBC will use local construction firms for this project. Much of the construction work required for the Field's Point WWTF upgrades could likely be completed by construction firms that currently work in the local market.

7.3.5 Historical, Archaeological, and Cultural Resources

The proposed work is north of the chemical feed building and sludge press house, two buildings designated as historic by the HPHC. The proposed Field's Point WWTF upgrades are not anticipated to disturb historical, archaeological, or cultural resources given the project's location away from the identified historical buildings.

NBC and the HPHC will coordinate the limits of defined work and stipulations by RI HPHC to protect the existing designated Historic Buildings at the site. Coordination with RI HPHC will occur during the project's design phase, as necessary, to ensure that the limits of defined work will not impact the identified historical structures either directly or indirectly. This will include careful site planning for contractor equipment and materials storage areas, truck routes, staging and rigging locations, and all other relevant construction activities.

7.3.6 Land Use

The project is proposed entirely within the Field's Point WWTF site, and construction will not impact offsite land uses.

7.3.7 Recreation

There are no parks or recreational areas within the Field's Point WWTF site or near the site. Therefore, the proposed upgrades to the existing Field's Point WWTF site are not anticipated to impact recreational facilities.

7.3.8 Traffic and Access Considerations

This project will be constructed entirely within the Field's Point WWTF site and adjacent to Terminal Road and its right-of-way, which is currently used by both NBC and the adjacent industrial facilities. Construction vehicle traffic is anticipated to be minimal, limited to the movement of personnel and material deliveries over access roadways NBC currently uses. Future deliveries of material from the proposed improvements will travel westbound on Terminal Road toward Allen Ave. Historically, the site has been a waste transfer station, as well as a salt storage area for the City of Providence. Each facility type required truck traffic

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along Terminal Road to deliver and remove material from the facility. The proposed project will require a similar traffic pattern. As such, no significant short-term or long-term traffic impacts are anticipated as a result of this project.

7.3.9 Noise and Odor Impacts

Excavation and general construction activities will take place 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 result from this project will be temporary, during construction activity. The site is a WWTF within a highly industrialized section of Providence that has existing noise generation from traffic and land use. These construction-related impacts are short-term in nature and will be mitigated through proper controls.

7.3.10 Visual Impact / Aesthetics

The project is proposed entirely within the existing Field's Point WWTF site. Existing abandoned structures, foundation walls, and deteriorating surfaces within the project limits will be demolished and removed from the site. The proposed dewatering building and sludge storage tank facilities will be constructed above grade with a maximum height of approximately two stories. This is consistent with other existing facilities on the Field's Point WWTF campus. The outward appearance and architecture of the new facilities will resemble and complement existing Field's Point WWTF facilities to match the surrounding environment. The site will be restored when construction is complete.

7.3.11 Soil Disturbance

Soil will be disturbed during project construction. According to the Soil Survey of Rhode Island (accessed via the Natural Resources Conservation Service Online Web Soil Survey), the project is within UD. Soil erosion and sedimentation are always a possible consequence of soil disturbance and earth work activities. Contaminated soil may also be encountered during construction.

Geotechnical investigations will evaluate subsurface conditions and identify potential geotechnical and environmental constraints. Those investigations will field-screen in situ soils and groundwater. They may include sampling and laboratory analysis to identify the presence of oil and/or hazardous materials in the subsurface, if applicable. During geotechnical investigations and throughout construction, appropriate project personnel will be aware of obvious signs of hazardous materials in soils and groundwater through visual, olfactory, and photoionization detector field screening. Subsurface samples will be collected for laboratory analysis, as appropriate, based on field screening, past site uses, or other information. If contaminated soil is encountered during the subsurface investigation or construction, RIDEM will be notified and appropriate remediation measures will be implemented, in accordance with RIDEM Remediation Regulations.

Erosion and sedimentation controls will be used throughout construction, and disturbed areas will be restored.

7.3.12 Coastal Zone Management

This project is adjacent to the Providence River, but it is outside the 200-foot contiguous area, managed by the Rhode Island CRMC. Therefore, it will not require an Assent from CRMC. No impact to freshwater

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wetlands is anticipated. All work is proposed within the existing Field's Point WWTF site, and no impacts to coastal zones or barrier resources are anticipated during, or as a result of, project construction.

7.3.13 Floodplains

The proposed dewatering building and sludge storage facilities will not be within a Zone AE floodplain. Portions of the parcel within the limits of the improvements could be subject to potential storm surge from a coastal storm that would worsen with sea level rise (SLR). From the 2019 NBC resiliency plan, the Field's Point BFE is set at 12.0 ft NAVD88 (12.8 ft NGVD29) and the DFE is 15.0 ft NAVD88 (15.8ft (NGVD29)).

The preliminary layout of the proposed facility does not indicate that proposed buildings and tank structures will be located within the DFE. As the design progresses, the location of the proposed components will be finalized, and placed outside the limits of the DFE to the maximum extent practicable. Critical components will be designed at or above these elevations to satisfy the requirements outlined in the RIDEM approved plan.

No other direct or indirect impacts to floodplains are expected as a result of this project.

7.3.14 Air Quality Impacts

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 odor impacts are anticipated during construction activities. The proposed dewatering building and sludge storage facilities will employ a permanent odor control operation consisting of fans, exhaust systems, and odor-reducing technology such as containment, biofilters, or carbon adsorption systems.

No long-term impacts to air quality or from excessive noise are anticipated as a result of this project.

7.3.15 Water Quality Impacts

7.3.15.1 Surface Water

Effluent from the Field's Point WWTF discharges to the Providence River. The proposed Field's Point WWTF upgrades will maintain treatment capacity and improve the NBC's ability to adequately manage and dispose of sludge and biosolids. No permanent or long-term impacts to surface water are anticipated.

7.3.15.2 Groundwater

Some subsurface construction may be within the existing groundwater zone; however, appropriate construction procedures will be used to discharge or recharge groundwater, as required. The quality and quantity of groundwater is anticipated remain substantially unchanged as a result of this project.

7.3.15.3 Erosion and Sedimentation

With the construction of the new dewatering building and sludge storage facilities, erosion and sedimentation resulting from construction could impact the Providence River if proper controls are not in place. As such, standard construction phase environmental protection controls will be used. Surface waters will be protected from sedimentation and other pollutant discharges using compost catch basin sedimentation inserts, compost

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wattles/silt socks, 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 disturbances will be minimized where possible, and disturbed surfaces will be restored when project conditions allow. The ongoing monitoring, maintenance, and repair of erosion controls will be required throughout construction to ensure the 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.

7.3.16 Water Supply

Water supply concerns do not apply to this project. Some potable water will be used during the construction process (for dust control and concrete mixing). This water use will be minor and short-term. During construction, potable water will be obtained from onsite sources, and appropriate backflow prevention will be used, so no impacts to water supply systems are anticipated.

7.3.17 Energy Considerations

Additional electrical services are required to operate the proposed dewatering building and sludge holding tank facility. The site is within a highly industrial area of Providence, and as design progresses, electrical demands will be determined and anticipated improvements required will be incorporated into the design.

During construction, existing overhead electric power lines will be either shielded or relocated, as necessary, to facilitate the construction of the planned improvements.

7.3.18 Utilities

Public utilities are not anticipated to be impacted. Requirements regarding connections to, and the relocation of, utilities will be analyzed and provided during the project design phase. Existing utilities within the Field's Point WWTF site will be marked in advance, and a plan for temporary or permanent replacement will be developed during the design project, if required.

All utility relocations, if required, will be designed based on the latest guidance from coordination with the individual utility companies, including but not limited to Rhode Island Energy, Verizon, City of Providence Water Supply Board, and City of Providence DPW.

7.3.19 Solids Waste

Solid waste will be generated during construction, much of which will consist of debris typical of construction activity. 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 will be generated, either because it is displaced during the construction of permanent facilities or because it is unsuitable for reuse. 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 must 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.

Contaminated soil could be encountered during construction, because of the amount of earthwork required. Throughout construction, appropriate project personnel will be aware of obvious signs of oils or hazardous materials in soils and other types of solid waste through visual and olfactory observations. Subsurface soil samples will be collected for laboratory analysis, as appropriate, based on field screening, past site use, or other information. If contaminated soil is encountered during a subsurface investigation or construction,

RIDEM will be notified and appropriate remediation measures will be implemented, in accordance with RIDEM Remediation Regulations. If required, excess contaminated soil may require disposal at a solid waste landfill or other disposal facility in accordance with the project's soils management plan.

7.3.20 Safety

Construction safety will be a top priority, and the project will comply with pertinent Occupational Safety and Health Administration requirements. Construction contractors will be required to provide a project-specific health and safety plan that describes the safety risks of each project component and the necessary measures to avoid them.

The Field's Point WWTF upgrades are proposed entirely within the existing site, and the plant is anticipated to 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 plant personnel onsite.

This project is not near residences, businesses, and the general public; additional safety precautions are not anticipated to be required. The Field's Point WWTF site is not open to the public, but access to the construction site will be restricted by using temporary fences and construction signage.

7.3.21 Agency Review and Compliance

Several agencies will be contacted as part of this EA. Each agency will be provided a conceptual site plan and sketch showing the proposed improvements, as well as a cover letter describing these modifications. The following agencies will be contacted:

- Rhode Island CRMC
- Rhode Island Department of Environmental Management-Division of Fish and Wildlife
- RIDEM – Office of Technical and Customer Assistance
- Rhode Island Division of Planning
- Narragansett Tribal Historic Preservation Office
- National Oceanographic and Atmospheric Administration Fisheries Greater Atlantic Regional Fisheries Office
- U.S. Department of Agriculture Natural Resources Conservation District
- Rhode Island HPHC
- Rhode Island Department of Transportation.

Letters will be distributed by certified mailings, and review comments will be requested from each agency within 30 calendar days of their receipt of the letter.

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8. Plan Implementation

This section discusses construction phasing and operations and maintenance. Following the approval of this FPA, the Biosolids Upgrades Dewatering Facility project will commence preliminary design for the short-term improvements. Detailed and final design for the short-term improvements are expected to occur over 18 months, followed by a contractor bidding and award period and an estimated 2-year construction contract to complete the proposed works. Figure 8-1 below illustrates the tentative project schedule for the short-term improvements. The long-term improvements concepts will be developed during the design of the short-term improvements. An implementation timeline will be developed separately for the detailed design and construction of the long-term strategy improvements.

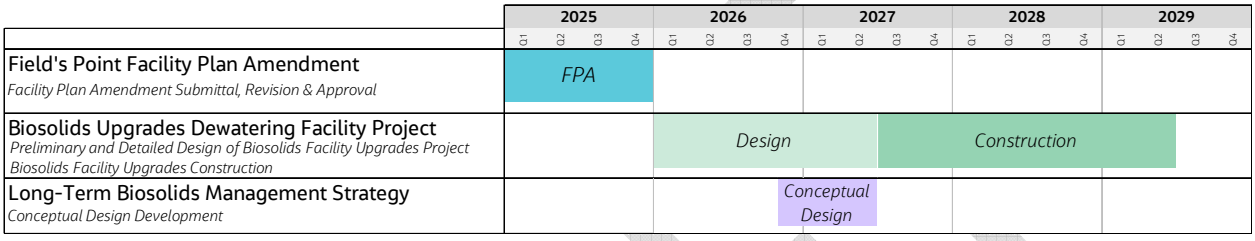


Figure 8-1. Tentative Delivery Schedule for Biosolids Upgrades Short-Term Improvements

8.1 Construction Phasing

The recommended improvements at Field's Point WWTF, which are all in the best interest of NBC and its ratepayers, should all be implemented in phases to provide biosolids management flexibility now and in the long-term. Phasing plans were developed to integrate immediate, short-term and future needs. These plans also considered how to minimize costs while meeting NBC's goals. Construction phasing can be implemented as follows:

- Immediate Improvements
  - Temporary equipment may be installed in a tent or temporary structure outside the existing dewatering building, to keep the facility operational while short-term improvements are implemented. This is necessary because existing equipment has exceeded its expected lifespan and requires replacement. Existing equipment will only serve as a backup or to enable construction phasing while short-term improvements are implemented. NBC may, at its discretion, elect to have the immediate improvements implemented and/or operated by a 3rd-party.
- Short-term Improvements
  - Construct a new dewatering building with centrifuges, sludge storage, odor control, and all necessary ancillary facilities along with capabilities to receive regional merchant sludge at the Field's Point WWTF.
  - Replace all dewatering process equipment in-kind at Bucklin Point as asset-management.
  - Once the new dewatering building is constructed and operational, Field's Point WWTF can start accepting external merchant sludge.
- Future Planning Improvements
  - NBC should improve the existing sludge thickening process by converting the existing dewatering building at Field's Point WWTF to a mechanical WAS thickening facility utilizing gravity belt thickeners or centrifuges. WAS from the Field's Point WWTF and merchant sludge from other Rhode

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Island municipalities can be thickened at this facility, if necessary. PS from the Field's Point WWTP can be thickened with the existing gravity thickeners. Thickened sludge from the gravity thickeners and thickening facility can be temporarily stored in a thickened sludge holding tank before pre-dewatering and digestion. The thickened sludge holding tank could either be constructed new or a converted excess gravity thickener tank. This will reduce the sludge volume to digestion. Since primary clarifier scum is currently stored at the existing dewatering building, a new scum handling facility would need to be constructed, likely located at or near the primary sludge pump station near the scum concentrator.

- NBC should build a digester complex to include a new pre-dewatering centrifuge facility, THP, and MAD. Thickened sludge from the thickened sludge holding tank can be pre-dewatered using centrifuges to increase total solids content as required for THP. Treated sludge after THP will go to the MAD and dewatering.
- Once the construction of the digester complex is completed, the dewatering building at the Field's Point WWTF could increase capacity to dewater additional sludge from the Bucklin Point WWTF and/or additional regional merchant sludge.
- If Bucklin Point sludge is transferred to Field's Point for consolidation, and modelling conducted after the Short-Term improvements deems necessary, either (i) upgrade the existing supplemental carbon facility, (ii) retrofit the gravity thickeners as sludge fermenters, and/or (iii) construct dedicated sidestream treatment to decrease the loading from the digested centrate from dewatering.

8.2 Operations & Maintenance

The existing dewatering centrifuges at the Field's Point WWTF are sized to operate 24 hours per day, 7 days per week. New equipment will be sized so dewatering can take place 16 hours per day, 6 days per week. This will reduce labor costs, decrease maintenance requirements and provide operational flexibility. The larger centrifuges will be able to process undigested Bucklin Point WWTF sludge if dewatering is consolidated in the future (as approved in the 1997 FPA), by operating 24 hours per day, 7 days per week.

NBC should anticipate staffing the facility 16 hours per day for 6 days per week with one operator. This may require approximately 2.4 full-time equivalents (FTEs), depending on existing facility staffing levels and needs. Typical operator duties would include:

- Managing the raw sludge volume in the sludge storage tanks
- Adjusting the centrifuge feed rates
- Dosing polymer for sludge conditioning and optimization, including jar testing and sample collection for raw sludge feed and cake concentrations
- Coordinating the disposal of sludge cake and scum
- These positions may be integrated with the current NBC staff but should be full-time at the dewatering building.

Maintenance staffing should be integrated with the current NBC staff and maintenance management system. Based on industrial standard preventative and predictive maintenance procedures, the estimated maintenance staff would be equivalent to 1 FTE, but would require several different disciplines, such as mechanical, electrical, and instrumentation and control technicians.

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Training will be required before new dewatering building transitions to operations. Job duties will need to be defined in coordination with the NBC staff union. Standard O&M procedures will be developed for these processes, to ensure the safety of staff as well as proper O&M of the equipment.

During the design and construction period, NBC should have at least one dedicated staff member to work with the design and construction companies, to understand the processes and provide operator input. Procurement documents for equipment will include operator manuals and standard operation and maintenance procedures for all equipment, as well as vendor training for O&M staff. In addition to vendor training, NBC operations staff should work with dewatering subject matter experts who are familiar with the type of equipment being used for the upgrades for 2 to 3 months. This additional training will provide NBC staff with better insight into the holistic operations and optimization of the processes and assist in the development of operational procedures.

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9. Public Participation

This section discusses the public participation program.

9.1 Public Participation Program

In accordance with RIDEM requirements, NBC conducted a Public Meeting/Workshop on June 25, 2025 to present the alternatives discussed in this FPA and provide the public an opportunity to comment on the alternatives. A copy of the materials presented during this public meeting is included in Appendix B. Additionally, a sign-in sheet for the workshop is included in Appendix B documenting all workshop attendees. There were no public questions or comments during this workshop.

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10. Intergovernmental Review

This section discusses the intergovernmental review.

10.1 Record of Field's Point Intergovernmental Review

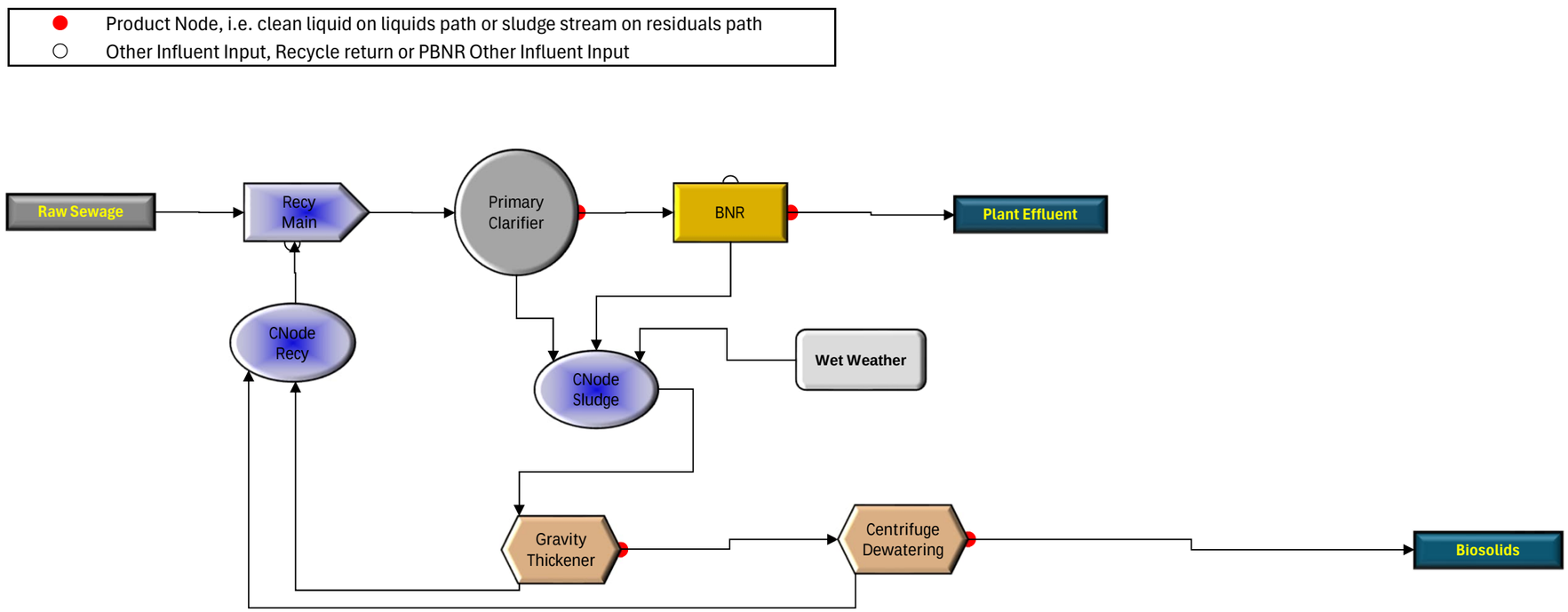
To conduct Intergovernmental Review, printed copies of the FPA Executive Summary and Environmental Assessment were sent to all required local, state, and federal agencies via USPS Certified Mail on September 19, 2025. Copies of the Cover Letters and Certified Mailing Receipts are provided in Appendix E, Attachments 1 and 2. In some instances, digital follow-ups via email were used, as necessary, to confirm receipt of the FPA where USPS tracking was not available. All Intergovernmental agencies were allowed a 30-day response period ending October 19, 2025. Any responses from Intergovernmental Agencies received by the October 19, 2025 deadline are provided in Appendix E, Attachment 3. This FPA was updated, as needed, to address the comments received during the Intergovernmental Review process.

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Appendix A
Modeling Data

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Current Field's Point MM Loading PFD

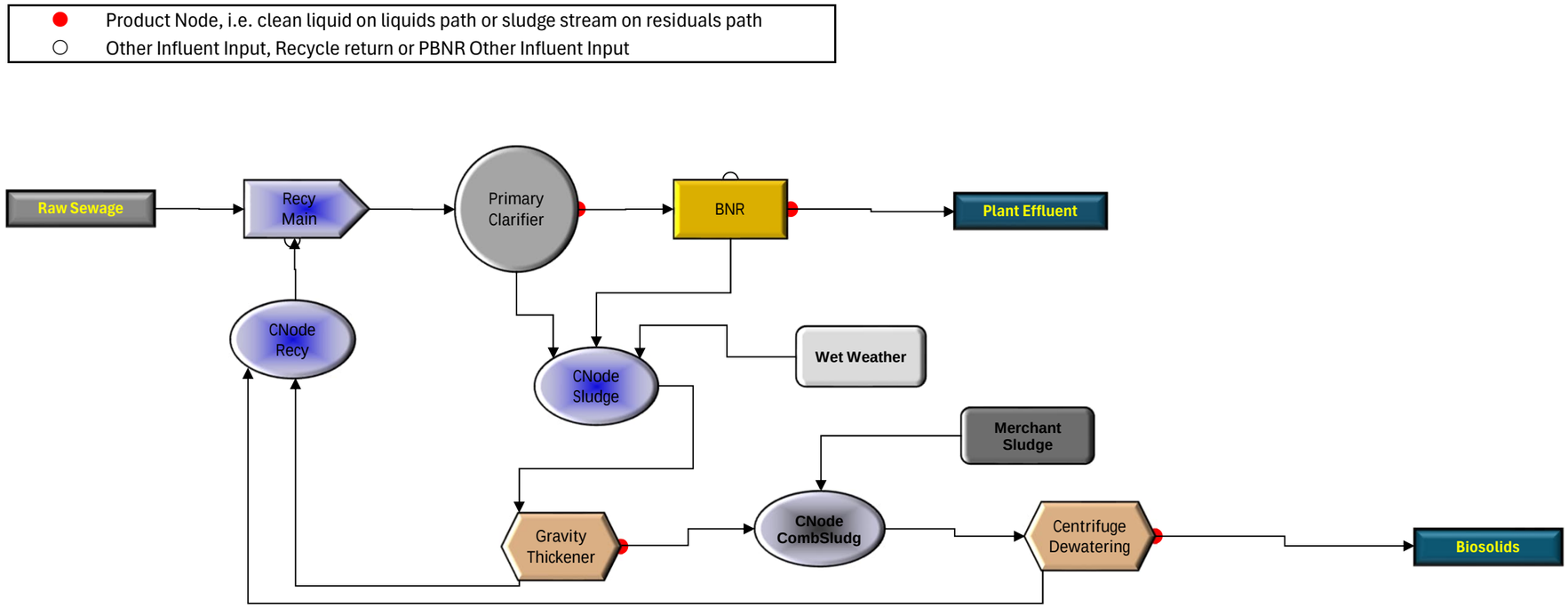


Current Field's Point MM Loading Mass Balance

Mass Balance for Max Month Flow Conditions

Constituent	Raw Wastewater (RW)	Main Recycle Influent (Recyl)	Main Recycled Steam (Recycle)	Main Combined Recycle Effluent (RecyE)	Main Primary Influent (PI)	Main Primary Effluent (PE)	Main Bioreactor Influent (BI)	Main Secondary Clarifier Influent (SI)	Main Secondary Clarifier Effluent (SE)	Plant Effluent (PLE)	Main Primary Sludge (PSD)	Main WAS	WetWeather Influent (OInf)	Sludge Combined Discharge	Gravity Thickener Influent (PSTI)	Gravity Thickened Sludge (PST)	Centrifuge Dewatering Influent (DWI)	Centrifuge Dewatered Sludge (DWE)	Biosolids to Disposal	Gravity Thickening Recycle (PSTR)	Centrifuge Dewatering Recycle (DWR)	Recy Combined Discharge
Flow (gallons/day)	72,919,653	72,919,653	1,092,045	74,049,427	74,049,427	73,488,257	73,488,257	102,883,959	73,037,583	73,037,583	561,170	451,073	115,209	1,127,452	1,127,452	319,331	319,331	35,407	35,407	808,121	283,924	1,092,045
Carbonaceous BOD5 (lbs/day)	77,734	77,734	8,724	86,492	86,492	53,862	53,862	1,387,914	4,184	4,184	32,610	20,913	212	53,734	53,734	45,554	45,554	45,036	45,036	8,206	518	8,724
Particulate	45,033	45,033	4,938	49,979	49,979	20,015	20,015	70,413	178	178	29,964	1,061	129	31,155	31,155	26,481	26,481	26,216	26,216	4,673	265	4,938
Heterotrophs	0	0	3,172	3,260	3,260	1,305	1,305	1,192,457	3,016	3,016	1,954	17,976	66	19,997	19,997	17,011	17,011	16,841	16,841	3,002	170	3,172
Methanol Degraders	109	109	18	127	127	51	51	2,670	7	7	76	40	0	117	117	99	99	98	98	17	1	18
AOBs	101	101	167	270	270	108	108	58,663	148	148	162	884	5	1,051	1,051	894	894	885	885	158	9	167
NOBs	101	101	11	112	112	45	45	0	0	0	67	0	0	67	67	57	57	56	56	10	1	11
PAOs	126	126	171	233	233	85	85	61,721	156	156	128	930	11	1,069	1,069	917	917	908	908	162	9	171
PHA	16	16	4	19	19	8	8	1,039	3	3	11	16	0	27	27	23	23	23	23	4	0	4
Filtrate	32,248	32,248	243	32,491	32,491	32,245	32,245	952	676	676	246	4	1	251	251	71	71	8	8	180	63	243
COD (lbs/day)	165,290	165,290	18,249	183,494	183,494	115,906	115,906	2,920,239	16,888	16,888	67,589	43,879	586	112,053	112,053	94,903	94,903	93,804	93,804	17,150	1,099	18,249
Particulate Bio	81,781	81,781	8,967	90,763	90,763	36,347	36,347	127,872	323	323	54,416	1,928	231	56,575	56,575	48,089	48,089	47,608	47,608	8,486	481	8,967
Particulate Non-Bio	11,808	11,808	2,093	13,897	13,897	5,565	5,565	316,112	800	800	8,332	4,765	107	13,204	13,204	11,223	11,223	11,111	11,111	1,981	112	2,093
Decay Prod Aer/Anx	0	0	1,620	1,525	1,525	611	611	611,527	1,547	1,547	914	9,219	91	10,224	10,224	8,690	8,690	8,603	8,603	1,534	87	1,620
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0
Heterotrophs	0	0	4,442	4,565	4,565	1,828	1,828	1,669,770	4,224	4,224	2,737	25,172	116	28,024	28,024	23,821	23,821	23,582	23,582	4,204	238	4,442
Methanol Degraders	152	152	26	178	178	71	71	3,739	9	9	107	56	0	163	163	139	139	137	137	24	1	26
AOBs	152	152	251	406	406	163	163	88,144	223	223	243	1,329	8	1,581	1,581	1,344	1,344	1,330	1,330	237	13	251
NOBs	152	152	16	168	168	67	67	0	0	0	101	0	0	101	101	86	86	85	85	15	1	16
PAOs	152	152	245	305	305	122	122	88,489	224	224	183	1,334	30	1,547	1,547	1,315	1,315	1,302	1,302	232	13	245
PHA	18	18	5	21	21	8	8	1,154	3	3	13	17	0	30	30	26	26	25	25	5	0	5
Soluble Bio	25,851	25,851	197	26,049	26,049	25,852	25,852	1,195	849	849	197	5	1	203	203	58	58	6	6	146	51	197
VFA	8,529	8,529	64	8,593	8,593	8,528	8,528	194	138	138	65	1	0	66	66	19	19	2	2	47	17	64
Colloidal Bio	24,165	24,165	181	24,346	24,346	24,162	24,162	338	240	240	185	1	0	186	186	53	53	6	6	134	47	181
Soluble Non-Bio	8,265	8,265	111	8,381	8,381	8,318	8,318	11,644	8,266	8,266	64	51	0	115	115	33	33	4	4	82	29	111
Colloidal Non-Bio	4,264	4,264	32	4,296	4,296	4,264	4,264	60	42	42	33	0	0	33	33	9	9	1	1	24	8	32
TSS (lbs/day)	64,459	64,459	13,914	78,054	78,054	31,222	31,222	2,409,626	6,095	6,095	46,833	36,325	4,852	88,009	88,009	74,619	74,619	73,873	73,873	13,168	746	13,914
Biodegradable	51,866	51,866	5,906	57,719	57,719	23,114	23,114	82,617	209	209	34,605	1,245	1,414	37,265	37,265	31,675	31,675	31,358	31,358	5,590	317	5,906
Non-Biodegradable	9,241	9,241	1,773	10,973	10,973	4,394	4,394	249,613	631	631	6,579	3,763	842	11,184	11,184	9,507	9,507	9,411	9,411	1,678	95	1,773
Inorganic Particles	2,828	2,828	632	3,425	3,425	1,336	1,336	75,860	192	192	2,089	1,144	754	3,987	3,987	3,389	3,389	3,355	3,355	598	34	632
Decay Prod Aer/Anx	0	0	1,354	1,254	1,254	502	502	478,503	1,210	1,210	752	7,213	577	8,542	8,542	7,260	7,260	7,188	7,188	1,281	73	1,354
Decay Prod Anaerobic	0	0	1	1	1	0	0	0	0	0	0	0	6	6	6	5	5	5	5	1	0	1
Metal Hydroxide	2	2	8	8	8	3	3	159	0	0	5	2	43	50	50	43	43	42	42	8	0	8
Metal Absorbed Phosphate	0	0	3	3	3	1	1	205	1	1	2	3	4	9	9	16	16	16	16	3	0	3
Heterotrophs	0	0	3,585	3,649	3,649	1,461	1,461	1,306,549	3,305	3,305	2,188	19,696	735	22,619	22,619	19,226	19,226	19,034	19,034	3,393	192	3,585
Methanol Degraders	119	119	20	139	139	56	56	2,925	7	7	84	44	1	128	128	109	109	108	108	19	1	20
AOBs	119	119	204	323	323	129	129	68,970	174	174	194	1,040	54	1,287	1,287	1,094	1,094	1,083	1,083	193	11	204
NOBs	119	119	13	132	132	53	53	0	0	0	79	0	0	79	79	67	67	67	67	12	1	13
PAOs	119	119	220	259	259	104	104	69,240	175	175	155	1,044	190	1,389	1,389	1,181	1,181	1,169	1,169	208	12	220
PHA	11	11	3	13	13	5	5	692	2	2	8	10	0	18	18	16	16	15	15	3	0	3
Poly-P	35	35	192	157	157	63	63	74,291	188	188	94	1,120	232	1,446	1,446	1,032	1,032	1,022	1,022	182	10	192
VSS (lbs/day)	55,434	55,434	11,515	66,829	66,829	26,762	26,762	2,033,324	5,143	5,143	40,067	30,652	1,929	72,648	72,648	61,751	61,751	61,134	61,134	10,897	618	11,515
Biodegradable	46,679	46,679	5,221	51,878	51,878	20,775	20,775	74,355	188	188	31,103	1,121	714	32,937	32,937	27,997	27,997	27,717	27,717	4,941	280	5,221
Non-Biodegradable	8,315	8,315	1,538	9,832	9,832	3,937	3,937	224,652	568	568	5,895	3,387	420	9,701	9,701	8,246	8,246	8,163	8,163	1,455	82	1,538
Decay Prod Aer/Anx	0	0	1,180	1,100	1,100	440	440	430,653	1,089	1,089	659	6,492	291	7,443	7,443	6,326	6,326	6,263	6,263	1,116	63	1,180
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	0	0	0
Metal Hydroxide	1	1	2	2	2	1	1	55	0	0	2	1	7	10	10	8	8	8	8	1	0	2
Heterotrophs	0	0	3,177	3,248	3,248	1,301	1,301	1,175,894	2,975	2,975	1,947	17,727	371	20,045	20,045	17,038	17,038	16,868	16,868	3,007	170	3,177
Methanol Degraders	107	107	18	125	125	50	50	2,633	7	7	75	40	0	115	115	98	98	97	97	17	1	18
AOBs	107	107	180	288	288	115	115	62,073	157	157	173	936	27	1,136	1,136	965	965	956	956	170	10	180
NOBs	107	107	11	118	118	47	47	0	0	0	71	0	0	71	71	60	60	60	60	11	1	11
PAOs	107	107	185	224	224	90	90	62,316	158	158	134	939	96	1,169	1,169	994	994	984	984	175	10	185
PHA	11	11	3	13	13	5	5	692	2	2	8	10	0	18	18	16	16	15	15	3	0	3
TKN (lbs/day)	14,382	14,382	850	15,230	15,230	12,823	12,823	165,400	1,638	1,638	2,407	2,475	0	4,882	4,882	4,097	4,097	4,032	4,032	785	64	850
NH3-N (lbs-N/day)	8,862	8,862	69	8,931	8,931	8,864	8,864	798	567	567	68	3	0	71	71	20	20	2	2	51	18	69
Particulate Bio Org N	2,690	2,690	294	2,984	2,984	1,195	1,195	4,205	11	11	1,789	63	0	1,853	1,853	1,575	1,575	1,559	1,559	278	16	294
Non-Bio Part Org N	388	388	68	457	457	183	183	10,384	26	26	274	157	0	430	430	366	366	362	362	65	4	68
Decay Prod Aer/Anx	0	0	97	91	91	37	37	37,036	94	94	55	558	0	613	613	521	521	516	516	92	5	97
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrophs	0	0	268	275	275	110	110	101,127	256	256	165	1,524	0	1,690	1,690	1,436	1,436	1,422	1,422	253	14	268
Methanol Degraders	9	9	2	11	11	4	4	226	1	1	6	3	0	10	10	8	8	8	8	1	0	2
AOBs	9	9	15	25	25	10	10	5,338	14	14	15	80	0	95	95	81	81	80	80	14	1	15
NOBs	9	9	1	10	10	4	4	0	0	0	6	0	0	6	6	5	5	5	5	1	0	1
PAOs	9	9	15	18	18	7	7	5,359	14	14	11	81	0	92	92	78	78	77	77	14	1	15
Non-Bio Soluble Org. N	620	620	8	629	629	624	624	873	620	620	5	4	0	9	9	2	2	0	0	6	2	8
Non-Bio Colloidal Org. N	140	140	1	141	141	140	140	2	1	1	1	0	0	1	1	0	0	0	0	1	0	1
Soluble Bio Org N	850	850	6	857	857	850	850	39	28	28	6	0	0	7	7	2	2	0	0	5	2	6
Colloidal Bio Org N	795	795	6	801	801	795	795	11	8	8	6	0	0	6	6	2	2	0	0	4	2	6
NO2-N (lbs-N/day)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO3-N (lbs-N/day)	0	0	7	12	12	12	12	1,735	1,232	1,232	0	8	0	8	8	2	2	0	0	6	2	7
Total Nitrogen (lbs-N/day)	14,382	14,382	857	15,242	15,242	12,835	12,835	167,135	2,870	2,870	2,407	2,483	0	4,890	4,890	4,099	4,099	4,033	4,033	791	66	857
TP (lbs-P/day)	1,891	1,891	264	2,134	2,134	1,640	1,640	75,384	508	508	494	1,132	0	1,625	1,625	1,377	1,377	1,362	1,362	248	16	264
Bio Particulate	467	467	50	517	517	207	207	410	1	1	310	6	0	316	316	269	269	266	266	47	3	50
Non-Bio Particulate	83	83	15	98	98	39	39	2,223	6	6	59	34	0	92	92	78	78	78	78	14	1	15
Decay Prod Aer/Anx	0	0	32	30	30	12	12	12,231	31	31	18	184	0	202	202	172	172	170	170	30	2	32
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metal Absorbed	0	0	1	1	1	0	0	67	0	0	1	1	0	2	2	5	5	5	5	1	0	1
Heterotrophs	0	0	88	91	91	36	36	33,395	84	84	55	503	0	558	558	474	474	470	470	84	5	88
Methanol Degraders	3	3	1	4	4	1	1	75	0	0	2	1	0	3	3	3	3	3	3	0	0	1
AOBs	3	3	5	8	8	3	3	1,763	4	4	5	27	0	31	31	27	27	26	26	5	0	5
NOBs	3	3	0	3	3	1	1	0	0	0	2	0	0	2	2	2	2	2	2	0	0	0
PAOs	3	3	5	6	6	2	2	1,770	4	4	4	27	0	30	30	26	26	25	25	5	0	5
Poly-P	11	11	60	49	49	19	19	23,000	58	58	29	347	0	376	376	320	320	316	316	56	3	60
Ortho-PO4	1,318	1,318	7	1,327	1,327	1,317	1,317	449	319	319	10	2	0	12	12	2	2	0	0	5	2	7
Alkalinity (lbs/day as CaCO3)	79,107	79,107	907	80,037	80,037	79,430	79,430	75,337	53,482	53,482	607	330	0	937	937	265	265	29	29	671	236	907
HZS (lbs/day)	3,651	3,651	27	3,678	3,678	3,650	3,650	0	0	0	28	0	0	28	28	8	8	1	1	20	7	27
Temperature (oC)	15	15	16	15	15	15	15	15	15	15	15	15	20	16	16	16	16	16	16	16	16	16
BOD5 (mg/L)	128	128	957	140	140	88	88	1,616	7	7	6,963	5,555	220	5,711	5,711	17,093	17,093	152,408	152,408	1,217	219	957
COD (mg/L)	272	272	2,002	297	297	189	189	3,401	28	28	14,432	11,656	609	11,909	11,909	35,611	35,611	317,449	317,449	2,543	464	2,002
TSS (mg/L)	106	106	1,527	126	126	51	51	2,806	10	10	10,000	9,650	4,997	9,349	9,349	28,000	28,000	250,000	250,000	1,953	315	1,527
VSS (mg/L)	91	91	1,263	108	108	44	44	2,368	8	8	8,555	8,143	1,999	7,721	7,721	23,171	23,171	206,887	206,887	1,616	261	1,263
TKN (mg-N/L)	24	24	93	25	25	21	21	193	3	2.7	514	657	0	519	519	1,537	1,537	13,646	13,646	116	27	93
NH3-N (mg-N/L)	15	15	8	14	14	14	14	1	1	0.9	14	1	0	8	8	8	8	8	8	8	8	8
NO2-N (mg/L)	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
NO3-N (mg-N/L)	0	0	1	0	0	0	0	2	2	2.0	0	2	0	1	1	1	1	1	1	1	1	1
Total Nitrogen (mg/L)	24	24	94	25	25	21	21	195	5	4.7	514	659	0	520	520	1,538	1,538	13,647	13,647	117	28	94
Orthophosphate, (mg-P/L)	2.17	2.17	0.78	2.15	2.15	2.15	2.15	0.52	0.52	0.52	2.15	0.52	0.00	1.28	1.28	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Total Phosphorus (mg-P/L)	3.1	3.1	28.9	3.5	3.5	2.7	2.7	87.8	0.8	0.83	105	301	0	173	173	517	517	4,608	4,608	37	7	29
Alkalinity (mg/L as CaCO3)	130	130	100	130	130	130	130	88	88	88	130	88	0	100	100	100	100	100	100	100	100	100
HZS (mg/L)	6	6	3	6	6	6	6	0	0	0	6	0	0	3	3	3	3	3	3	3	3	3

Current Field's Point + Merchant Sludge MM Loading PFD

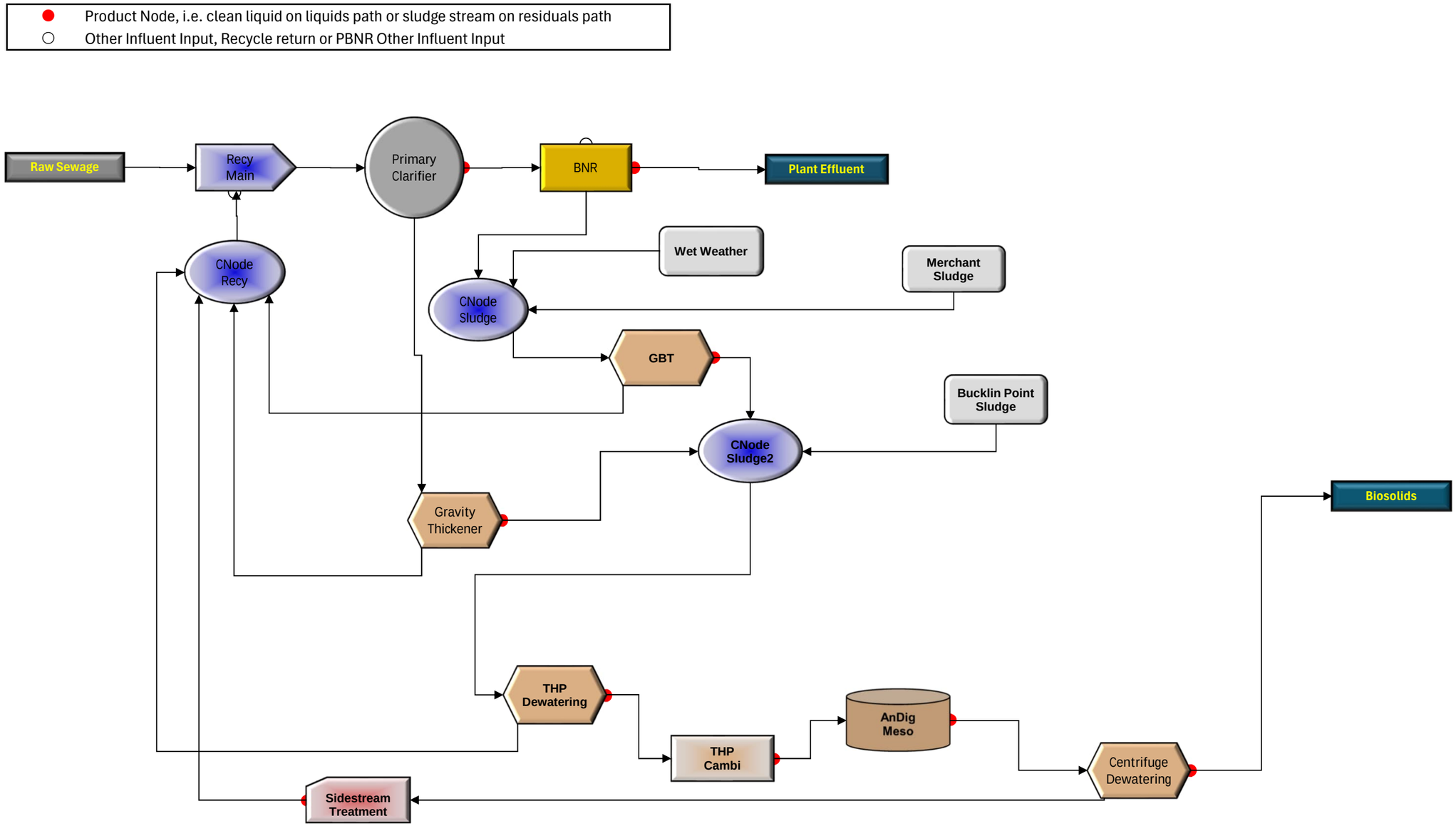


Current Field's Point + Merchant Sludge MM Loading Mass Balance

Mass Balance for Max Month Flow Conditions

Constituent	Raw Wastewater (RW)	Main Recycle Influent (Recyl)	Main Recycled Stream (Recycle)	Main Combined Recycle Effluent (RecyE)	Main Primary Influent (PI)	Main Primary Effluent (PE)	Main Bioreactor Influent (BI)	Main Secondary Clarifier Influent (SI)	Main Secondary Clarifier Effluent (SE)	Plant Effluent (PLE)	Main Primary Sludge (PSD)	Main WAS	WetWeather Influent (Olnf)	Sludge Combined Discharge	Gravity Thickener Influent (PST)	Gravity Thickened Sludge (PST)	Merchant Sludge (Olnf)	CombSludge Combined Discharge	Centrifuge Dewatering Influent (DWI)	Centrifuge Dewatered Sludge (DWE)	Biosolids to Disposal	Gravity Thickening Recycle (PSTR)	Centrifuge Dewatering Recycle (DWR)	Recy Combined Discharge
Flow (gallons/day)	64,530,667	64,530,667	1,605,714	66,136,355	66,136,355	65,500,018	65,500,018	91,700,525	64,977,393	64,977,393	636,336	523,125	101,988	1,261,450	1,261,450	315,948	421,951	737,899	737,899	77,686	77,686	945,501	660,213	1,605,714
Carbonaceous BOD5 (lbs/day)	68,791	68,791	16,080	84,870	84,870	56,624	56,624	1,288,235	3,763	3,763	28,229	25,144	187	53,560	53,560	43,777	58,464	102,241	102,241	95,967	95,967	9,807	6,273	16,080
Particulate	39,852	39,852	7,417	47,269	47,269	23,657	23,657	72,959	175	175	23,613	1,425	114	25,152	25,152	20,623	27,543	48,166	48,166	45,276	45,276	4,527	2,890	7,417
Heterotrophs	0	0	6,754	6,754	6,754	3,380	3,380	996,244	2,390	2,390	3,374	19,455	58	22,888	22,888	18,780	25,081	43,861	43,861	41,229	41,229	4,122	2,632	6,754
Methanol Degraders	96	96	35	132	132	66	66	2,775	7	7	66	54	0	120	120	98	131	230	230	216	216	22	14	35
AOBs	90	90	377	466	466	233	233	53,255	128	128	233	1,040	4	1,277	1,277	1,048	1,400	2,448	2,448	2,301	2,301	230	147	377
NOBs	90	90	15	105	105	53	53	0	0	0	52	0	0	53	53	43	58	101	101	95	95	9	6	15
PAOs	111	111	1,096	1,206	1,206	595	595	158,942	381	381	594	3,104	10	3,707	3,707	3,047	4,070	7,117	7,117	6,690	6,690	669	427	1,096
PHA	14	14	23	38	38	19	19	3,108	7	7	19	61	0	80	80	65	87	152	152	143	143	14	9	23
Filtrate	28,538	28,538	362	28,899	28,899	28,621	28,621	952	675	675	278	5	1	284	284	71	95	166	166	17	17	213	149	362
COD (lbs/day)	146,275	146,275	33,573	179,847	179,847	121,249	121,249	2,694,689	15,049	15,049	58,598	52,456	519	111,572	111,572	91,100	121,664	212,764	212,764	199,664	199,664	20,473	13,100	33,573
Particulate Bio	72,373	72,373	13,469	85,842	85,842	42,961	42,961	132,495	318	318	42,881	2,587	205	45,673	45,673	37,452	50,017	87,469	87,469	82,221	82,221	8,221	5,248	13,469
Particulate Non-Bio	10,450	10,450	4,078	14,528	14,528	7,271	7,271	331,582	796	796	7,257	6,475	95	13,827	13,827	11,338	15,143	26,481	26,481	24,892	24,892	2,489	1,589	4,078
Decay Prod Aer/Anx	0	0	3,460	3,460	3,460	1,732	1,732	508,208	1,219	1,219	1,728	9,925	80	11,733	11,733	9,621	12,849	22,471	22,471	21,122	21,122	2,112	1,348	3,460
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	0	0	0
Heterotrophs	0	0	9,458	9,458	9,458	4,733	4,733	1,395,017	3,347	3,347	4,724	27,243	102	32,070	32,070	26,297	35,120	61,417	61,417	57,732	57,732	5,773	3,685	9,458
Methanol Degraders	135	135	50	184	184	92	92	3,886	9	9	92	76	0	168	168	138	184	322	322	302	302	30	19	50
AOBs	135	135	566	701	701	351	351	80,019	192	192	350	1,563	7	1,920	1,920	1,575	2,103	3,678	3,678	3,457	3,457	346	221	566
NOBs	135	135	23	158	158	79	79	0	0	0	79	0	0	79	79	65	86	151	151	142	142	14	9	23
PAOs	135	135	1,571	1,704	1,704	853	853	227,873	547	547	851	4,450	26	5,328	5,328	4,369	5,835	10,204	10,204	9,592	9,592	959	612	1,571
PHA	16	16	26	42	42	21	21	3,454	8	8	21	67	0	88	88	73	97	169	169	159	159	16	10	26
Soluble Bio	22,877	22,877	294	23,171	23,171	22,948	22,948	1,285	911	911	223	7	0	231	231	58	77	135	135	14	14	173	121	294
VFA	7,548	7,548	95	7,643	7,643	7,569	7,569	143	102	102	74	1	0	75	75	19	25	44	44	5	5	56	39	95
Colloidal Bio	21,385	21,385	268	21,653	21,653	21,445	21,445	300	213	213	208	2	0	210	210	53	70	123	123	13	13	158	110	268
Soluble Non-Bio	7,314	7,314	167	7,481	7,481	7,409	7,409	10,373	7,350	7,350	72	59	0	131	131	33	44	77	77	8	8	99	69	167
Colloidal Non-Bio	3,774	3,774	47	3,821	3,821	3,784	3,784	53	38	38	37	0	0	37	37	9	12	22	22	2	2	28	19	47
TSS (lbs/day)	57,047	57,047	26,552	83,598	83,598	41,799	41,799	2,260,108	5,423	5,423	41,799	44,137	4,295	90,232	90,232	73,829	98,599	172,428	172,428	162,082	162,082	16,206	10,346	26,552
Biodegradable	45,902	45,902	8,943	54,846	54,846	27,449	27,449	85,854	206	206	27,397	1,677	1,252	30,326	30,326	24,867	33,210	58,077	58,077	54,593	54,593	5,459	3,485	8,943
Non-Biodegradable	8,179	8,179	3,466	11,645	11,645	5,828	5,828	265,777	638	638	5,817	5,190	746	11,753	11,753	9,637	12,871	22,508	22,508	21,158	21,158	2,116	1,350	3,466
Inorganic Particles	2,503	2,503	1,242	3,745	3,745	1,835	1,835	83,704	201	201	1,910	1,635	667	4,212	4,212	3,454	4,613	8,067	8,067	7,583	7,583	758	484	1,242
Decay Prod Aer/Anx	0	0	2,862	2,862	2,862	1,432	1,432	397,659	954	954	1,430	7,766	510	9,706	9,706	7,959	10,629	18,588	18,588	17,473	17,473	1,747	1,115	2,862
Decay Prod Anaerobic	0	0	2	2	2	1	1	0	0	0	1	0	5	6	6	5	6	11	11	11	11	1	1	2
Metal Hydroxide	2	2	16	18	18	9	9	406	1	1	9	8	38	55	55	45	60	105	105	99	99	10	6	16
Metal Adsorbed Phosphate	0	0	8	8	8	4	(BI)	500	1	1	4	10	4	17	17	22	29	51	51	48	48	5	3	8
Heterotrophs	0	0	7,598	7,598	7,598	3,802	3,802	1,091,563	2,619	2,619	3,795	21,317	651	25,763	25,763	21,126	28,213	49,339	49,339	46,379	46,379	4,637	2,960	7,598
Methanol Degraders	105	105	39	144	144	72	72	3,041	7	7	72	59	1	132	132	108	145	253	253	238	238	24	15	39
AOBs	105	105	457	563	563	282	282	62,613	150	150	281	1,223	47	1,551	1,551	1,272	1,699	2,971	2,971	2,793	2,793	279	178	457
NOBs	105	105	18	124	124	62	62	0	0	0	62	0	0	62	62	51	68	119	119	112	112	11	7	18
PAOs	105	105	1,281	1,385	1,385	693	693	178,305	428	428	692	3,482	168	4,342	4,342	3,560	4,755	8,316	8,316	7,817	7,817	782	499	1,281
PHA	9	9	16	25	25	13	13	2,072	5	5	13	40	0	53	53	44	58	102	102	96	96	10	6	16
Poly-P	31	31	604	635	635	318	318	88,614	213	213	317	1,731	205	2,253	2,253	1,679	2,242	3,921	3,921	3,686	3,686	369	235	604
VSS (lbs/day)	49,061	49,061	21,755	70,815	70,815	35,441	35,441	1,878,543	4,507	4,507	35,375	36,686	1,708	73,768	73,768	60,490	80,785	141,275	141,275	132,798	132,798	13,278	8,476	21,755
Biodegradable	41,312	41,312	7,878	49,190	49,190	24,618	24,618	77,269	185	185	24,572	1,509	632	26,713	26,713	21,904	29,254	51,158	51,158	48,089	48,089	4,808	3,069	7,878
Non-Biodegradable	7,359	7,359	3,016	10,375	10,375	5,192	5,192	239,200	574	574	5,183	4,671	372	10,225	10,225	8,385	11,198	19,583	19,583	18,408	18,408	1,841	1,175	3,016
Decay Prod Aer/Anx	0	0	2,506	2,506	2,506	1,254	1,254	357,893	859	859	1,252	6,989	258	8,499	8,499	6,969	9,307	16,276	16,276	15,299	15,299	1,530	977	2,506
Decay Prod Anaerobic	0	0	1	1	1	0	0	0	0	0	0	0	3	3	3	2	3	6	6	5	5	1	0	1
Metal Hydroxide	1	1	4	4	4	3	3	141	0	0	3	3	6	12	12	10	13	23	23	22	22	2	1	4
Heterotrophs	0	0	6,749	6,749	6,749	3,378	3,378	982,407	2,357	2,357	3,371	19,185	328	22,885	22,885	18,766	25,062	43,827	43,827	41,198	41,198	4,119	2,630	6,749
Methanol Degraders	95	95	35	130	130	65	65	2,737	7	7	65	53	0	119	119	97	130	227	227	213	213	21	14	35
AOBs	95	95	405	500	500	250	250	56,351	135	135	250	1,100	24	1,374	1,374	1,127	1,505	2,632	2,632	2,474	2,474	247	158	405
NOBs	95	95	16	111	111	56	56	0	0	0	56	0	0	56	56	46	61	107	107	100	100	10	6	16
PAOs	95	95	1,129	1,223	1,223	612	612	160,474	385	385	611	3,134	85	3,830	3,830	3,140	4,194	7,335	7,335	6,895	6,895	689	440	1,129
PHA	9	9	16	25	25	13	13	2,072	5	5	13	40	0	53	53	44	58	102	102	96	96	10	6	16
TKN (lbs/day)	12,728	12,728	2,821	15,548	15,548	13,320	13,320	151,132	1,599	1,599	2,228	2,927	0	5,155	5,155	4,160	6,878	11,038	11,038	9,213	9,213	996	1,825	2,821
NH3-N (lbs-N/day)	7,842	7,842	1,302	9,144	9,144	9,056	9,056	920	652	652	88	5	0	93	93	23	1,354	1,377	1,377	145	145	70	1,232	1,302
Particulate Bio Org N	2,380	2,380	441	2,821	2,821	1,412	1,412	4,356	10	10	1,409	85	0	1,494	1,494	1,225	1,636	2,862	2,862	2,690	2,690	269	172	441
Non-Bio Part Org N	344	344	133	477	477	239	239	10,877	26	26	238	212	0	450	450	369	493	863	863	811	811	81	52	133
Decay Prod Aer/Anx	0	0	208	208	208	104	104	30,779	74	74	104	601	0	705	705	578	772	1,350	1,350	1,269	1,269	127	81	208
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrophs	0	0	571	571	571	286	286	84,487	203	203	285	1,650	0	1,935	1,935	1,587	2,119	3,706	3,706	3,483	3,483	348	222	571
Methanol Degraders	8	8	3	11	11	6	6	235	1	1	6	5	0	10	10	8	11	19	19	18	18	2	1	3
AOBs	8	8	34	42	42	21	21	4,846	12	12	21	95	0	116	116	95	127	222	222	208	208	21	13	34
NOBs	8	8	2	10	10	5	5	0	0	0	5	0	0	5	5	4	6	10	10	9	9	1	1	2
PAOs	8	8	95	103	103	51	51	13,801	33	33	51	270	0	321	321	263	351	614	614	578	578	58	37	95
Non-Bio Soluble Org. N	549	549	13	561	561	556	556	778	551	551	5	4	0	10	10	2	3	6	6	1	1	7	5	13
Non-Bio Colloidal Org. N	124	124	2	126	126	124	124	2	1	1	1	0	0	1	1	0	0	1	1	0	0	1	1	2
Soluble Bio Org N	752	752	10	762	762	755	755	42	30	30	7	0	0	8	8	2	3	4	4	0	0	6	4	10
Colloidal Bio Org N	703	703	9	712	712	705	705	10	7	7	7	0	0	7	7	2	2	4	4	0	0	5	4	9
NO2-N (lbs-N/day)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO3-N (lbs-N/day)	0	0	9	9	9	9	9	1,285	911	911	0	7	0	7	7	2	2	4	4	0	0	6	4	9
Total Nitrogen (lbs-N/day)	12,728	12,728	2,830	15,558	15,558	13,329	13,329	152,417	2,510	2,510	2,228	2,935	0	5,163	5,163	4,162	6,881	11,042	11,042	9,214	9,214	1,001	1,829	2,830
TP (lbs-P/day)	1,673	1,673	603	2,277	2,277	1,716	1,716	74,813	257	257	561	1,459	0	2,021	2,021	1,652	2,207	3,859	3,859	3,624	3,624	368	235	603
Bio Particulate	413	413	75	488	488	244	244	476	1	1	244	9	0	253	253	207	277	484	484	455	455	46	29	75
Non-Bio Particulate	74	74	28	102	102	51	51	2,329	6	6	51	45	0	96	96	79	106	185	185	174	174	17	11	28
Decay Prod Aer/Anx	0	0	69	69	69	34	34	10,164	24	24	34	198	0	233	233	191	255	446	446	419	419	42	27	69
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metal Absorbed	0	0	3	3	3	1	1	163	0	0	1	3	0	4	4	7	10	17	17	16	16	2	1	3
Heterotrophs	0	0	188	188	188	94	94	27,900	67	67	94	545	0	639	639	524	700	1,224	1,224	1,150	1,150	115	73	188
Methanol Degraders	3	3	1	4	4	2	2	78	0	0	2	2	0	3	3	3	4	6	6	6	6	1	0	1
AOBs	3	3	11	14	14	7	7	1,600	4	4	7	31	0	38	38	31	42	73	73	69	69	7	4	11
NOBs	3	3	0	3	3	2	2	0	0	0	2	0	0	2	2	1	2	3	3	3	3	0	0	0
PAOs	3	3	31	34	34	17	17	4,557	11	11	17	89	0	106	106	87	116	203	203	191	191	19	12	31
Poly-P	9	9	187	196	196	98	98	27,435	66	66	98	536	0	634	634	520	694	1,214	1,214	1,141	1,141	114	73	187
Ortho-PO4	1,166	1,166	10	1,176	1,176	1,165	1,165	110	78	78	11	1	0	12	12	2	3	5	5	0	0	6	4	10
Alkalinity (lbs/day as CaCO3)	70,006	70,006	1,332	71,338	71,338	70,652	70,652	63,166	44,758	44,758	686	360	0	1,047	1,047	262	350	612	612	64	64	785	548	1,332
H2S (lbs/day)	3,231	3,231	40	3,271	3,271	3,240	3,240	0	0	0	31	0	0	31	31	8	11	18	18	2	2	24	16	40
Temperature (oC)	14	14	16	14	14	14	14	14	14	14	14	14	20	15	15	15	19	17	17	17	17	15	17	16
BOD5 (mg/L)	128	128	1,200	154	154	104	104	1,683	7	7	5,316	5,759	220	5,088	5,088	16,602	16,602	16,602	16,602	148,023	148,023	1,243	1,139	1,200
COD (mg/L)	272	272	2,505	326	326	222	222	3,521	28	28	11,034	12,015	609	10,598	10,598	34,550	34,550	34,550	34,550	307,966	307,966	2,595	2,378	2,505
TSS (mg/L)	106	106	1,981	151	151	76	76	2,953	10	10	7,871	10,110	4,997	8,567	8,567	28,000	28,000	28,000	28,000	250,000	250,000	2,054	1,878	1,981
VSS (mg/L)	91	91	1,623	128	128	65	65	2,455	8	8	6,661	8,403	1,999	7,007	7,007	22,941	22,941	22,941	22,941	204,832	204,832	1,683	1,538	1,623
TKN (mg-N/L)	24	24	210	28	28	24	24	197	3	2.9	420	670	0	490	490	1,578	1,953	1,792	1,792	14,211	14,211	126	331	210
NH3-N (mg-N/L)	15	15	97	17	17	17	17	1	1	1.2	17	1	0	9	9	9	384	224	224	224	224	9	224	97
NO2-N (mg/L)	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO3-N (mg-N/L)	0	0	1	0	0	0	0	2	2	1.7	0	2	0	1	1	1	1	1	1	1	1	1	1	1
Total Nitrogen (mg/L)	24	24	211	28	28	24	24	199	4	4.6	420	672	0	490	490	1,578	1,954	1,793	1,793	14,212	14,212	127	332	211
Orthophosphate, (mg-P/L)	2.17	2.17	0.73	2.13	2.13	2.13	2.13	0.14	0.14	0.14	2.13	0.14	0.00	1.13	1.13	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Total Phosphorus (mg-P/L)	3.1	3.1	45.0	4.1	4.1	3.1	3.1	97.8	0.5	0.47	106	334	0	192	192	627	627	627	627	5,590	5,590	47	43	45
Alkalinity (mg/L as CaCO3)	130	130	99	129	129	129	129	83	83	83	129	83	0	99	99	99	99	99	99	99	99	99	99	99
H2S (mg/L)	6	6	3	6	6	6	6	0	0	0	6	0	0	3	3	3	3	3	3	3	3	3	3	3

Future Field's Point + Bucklin Point + Merchant Sludge MM Loading PFD



Future Field's Point + Bucklin Point + Merchant Sludge MM Loading Mass Balance

Mass Balance for Max Month Flow Conditions

Constituent	Raw Wastewater (RW)	Main Recycle Influent (Recyl)	Main Recycled Stream (Recycle)	Main Combined Recycle Effluent (RecyE)	Main Primary Influent (PI)	Main Primary Effluent (PE)	Main Bioreactor Influent (BI)	Main Secondary Clarifier Influent (SI)	Main Secondary Clarifier Effluent (SE)	Plant Effluent (PLE)	Main Primary Sludge (PSD)	Main WAS	WetWeather Influent (OInf)	Merchant Sludge (OInf)	Sludge Combined Discharge	Gravity Thickener Influent (PSTI)	Gravity Thickened Sludge (PST)	GBT WAS Thickener Influent (TWASI)	GBT Thickened WAS (TWAS)	Bucklin Point Sludge (OInf)	Sludge2 Combined Discharge	THP Dewatering Influent (DWI)	THP Dewatered Sludge (DWE)	Cambi THP Influent (THPI)	Cambi THP Effluent (THPE)	Meso Anaerobic Digester Influent (AnDI)	Meso Anaerobic Digester Effluent (AnDE)	Centrifuge Dewatering Influent (DWI)	Centrifuge Dewatered Sludge (DWE)	Biosolids to Disposal	Gravity Thickening Recycle (PSTR)	GBT WAS Thickening Recycle (TWASR)	THP Dewatering Recycle (DWR)	Centrifuge Dewatering Recycle (DWR)	Sidestream Treatment Influent (Deammoni)	Sidestream Treatment Effluent (DeammonE)	Recy Combined Discharge
Flow (gallons/day)	72,919,653	72,919,653	2,545,852	75,465,453	75,465,453	74,857,927	74,857,927	119,773,683	74,259,061	74,259,061	607,527	599,865	115,209	977,516	1,692,591	607,527	144,268	1,692,591	365,620	207,360	717,248	717,248	151,848	151,848	322,320	322,320	322,320	322,320	322,320	38,964	38,964	463,259	1,326,971	565,400	283,356	283,356	190,223	2,545,852
Carbonaceous BOD5 (lbs/day)	77,734	77,734	13,279	91,013	91,013	55,966	55,966	1,778,572	4,120	4,120	35,027	23,387	212	52,506	76,104	35,027	33,086	76,104	72,139	29,352	134,578	134,578	130,654	130,654	124,772	124,772	31,216	31,216	25,361	25,361	1,940	3,991	7,012	5,855	5,855	335	13,279
Particulate	45,033	45,033	7,079	52,112	52,112	20,895	20,895	89,146	173	173	31,217	1,173	129	30,437	31,739	31,217	29,656	31,739	30,150	16,560	76,366	76,366	73,680	73,680	108,329	108,329	25,127	25,127	24,625	24,625	1,561	1,587	3,878	503	503	53	7,079
Heterotrophs	0	0	4,562	4,562	4,562	1,829	1,829	1,446,589	2,805	2,805	2,733	19,029	66	19,552	38,647	2,733	2,596	38,647	36,730	9,060	48,386	48,386	46,348	46,348	0	0	0	0	0	0	0	137	1,933	2,439	0	0	53	4,562
Methanol Degraders	109	109	26	134	134	54	54	3,334	6	6	81	44	0	114	158	81	76	158	150	49	276	276	263	263	0	0	0	0	0	0	0	4	8	14	0	0	0	26
AOBs	101	101	305	406	406	163	163	77,570	150	150	243	1,020	5	1,026	2,052	243	231	2,052	1,950	323	2,504	2,504	2,687	2,687	0	0	0	0	0	0	0	12	103	141	0	0	49	305
NOBs	101	101	16	117	117	47	47	0	0	0	70	0	0	66	66	70	67	66	63	15	145	145	152	152	0	0	0	0	0	0	0	4	3	8	0	0	1	16
PAOs	126	126	567	693	693	270	270	158,283	307	307	403	2,082	11	1,038	3,131	403	383	3,131	2,984	3,281	6,648	6,648	7,403	7,403	0	0	0	0	0	0	0	20	157	390	0	0	0	567
PHA	16	16	8	24	24	10	10	2,565	5	5	15	34	0	27	60	15	14	60	57	14	85	85	85	85	0	0	0	0	0	0	0	1	3	4	0	0	0	8
Filtrate	32,248	32,248	717	32,964	32,964	32,699	32,699	1,086	673	673	265	5	1	246	252	265	63	252	54	52	169	169	37	37	16,443	16,443	6,089	6,089	736	736	202	197	137	5,353	5,353	180	717
COD (lbs/day)	165,290	165,290	28,992	194,281	194,281	121,506	121,506	3,730,888	17,920	17,920	72,775	48,936	586	109,351	158,873	72,775	68,713	158,873	150,431	65,100	284,243	284,243	269,714	269,714	269,714	269,714	100,067	100,067	87,024	87,024	4,062	8,442	14,530	13,043	13,043	1,958	28,992
Particulate Bio	81,781	81,781	12,838	94,620	94,620	37,939	37,939	161,891	314	314	56,681	2,130	231	55,274	57,635	56,681	53,847	57,635	54,753	32,175	140,775	140,775	133,736	133,736	196,710	196,710	39,355	39,355	38,568	38,568	2,834	2,882	7,039	787	787	84	12,838
Particulate Non-Bio	11,808	11,808	3,089	14,897	14,897	5,973	5,973	395,743	767	767	8,924	5,206	107	12,848	18,161	8,924	8,478	18,161	17,253	7,343	33,074	33,074	31,420	31,420	31,420	31,420	41,583	41,583	40,751	40,751	446	908	1,654	832	832	81	3,089
Decay Prod Aer/Anx	0	0	2,608	2,607	2,607	1,045	1,045	779,336	1,511	1,511	1,562	10,251	91	9,941	20,283	1,562	1,484	20,283	19,269	4,676	25,428	25,428	24,157	24,157	10,163	10,163	0	0	0	0	78	1,014	1,271	0	0	244	2,608
Decay Prod Anaerobic	0	0	16	16	16	7	7	0	0	0	10	0	1	0	1	10	9	1	1	62	72	72	68	68	17	17	6,277	6,277	6,151	6,151	0	0	4	126	126	12	16
Heterotrophs	0	0	6,388	6,388	6,388	2,561	2,561	2,025,626	3,927	3,927	3,826	26,645	116	27,379	54,140	3,826	3,635	54,140	51,433	13,248	68,316	68,316	64,900	64,900	0	0	0	0	0	0	191	2,707	3,416	0	0	74	6,388
Methanol Degraders	152	152	36	188	188	75	75	4,669	9	9	113	61	0	160	222	113	107	222	211	70	387	387	368	368	0	0	0	0	0	0	6	11	19	0	0	0	36
AOBs	152	152	459	611	611	245	245	116,553	226	226	366	1,533	8	1,542	3,084	366	348	3,084	2,930	972	4,249	4,249	4,037	4,037	0	0	0	0	0	0	18	154	212	0	0	74	459
NOBs	152	152	24	176	176	70	70	0	0	0	105	0	0	99	99	105	100	99	94	46	240	240	228	228	0	0	0	0	0	0	5	5	12	0	0	1	24
PAOs	152	152	813	965	965	387	387	226,929	440	440	578	2,985	30	1,488	4,503	578	549	4,503	4,278	6,345	11,172	11,172	10,614	10,614	0	0	0	0	0	0	29	225	559	0	0	0	813
PHA	18	18	9	27	27	11	11	2,850	6	6	16	37	0	30	67	16	15	67	64	20	100	100	95	95	0	0	0	0	0	0	1	3	5	0	0	0	9
Soluble Bio	25,851	25,851	435	26,286	26,286	26,074	26,074	1,388	861	861	212	7	1	199	206	212	50	206	45	43	138	138	29	29	16,355	16,355	85	85	10	10	161	162	109	75	75	3	435
VFA	8,529	8,529	448	8,977	8,977	8,905	8,905	193	119	119	72	1	0	65	66	72	17	66	14	16	47	47	10	10	13,470	13,470	10,312	10,312	1,247	1,247	55	52	37	9,065	9,065	304	448
Colloidal Bio	24,165	24,165	419	24,584	24,584	24,386	24,386	390	242	242	198	2	0	182	185	198	47	185	40	45	131	131	28	28	28	28	658	658	79	79	151	145	104	578	578	19	419
Soluble Non-Bio	8,265	8,265	1,342	9,607	9,607	9,530	9,530	15,251	9,455	9,455	77	76	0	112	189	77	18	189	41	35	94	94	20	20	1,547	1,547	1,798	1,798	217	217	59	148	74	1,581	1,581	1,061	1,342
Colloidal Non-Bio	4,264	4,264	68	4,332	4,332	4,297	4,297	69	43	43	35	0	0	32	33	35	8	33	7	4	20	20	4	4	4	4	0	0	0	0	27	26	16	0	0	0	68
TSS (lb/day)	64,459	64,459	20,063	84,520	84,520	33,808	33,808	3,186,313	6,197	6,197	50,701	42,045	4,852	81,579	128,475	50,701	48,159	128,475	122,051	43,221	213,432	213,432	202,760	202,760	174,845	174,845	82,953	82,953	81,294	81,294	2,535	6,424	10,672	1,659	1,659	433	20,063
Biodegradable	51,866	51,866	7,871	59,737	59,737	23,952	23,952	103,648	201	201	35,785	1,366	1,414	35,170	37,950	35,785	33,995	37,950	36,053	12,664	82,732	82,732	78,596	78,596	132,859	132,859	26,581	26,581	26,049	26,049	1,789	1,896	4,137	532	532	48	7,871
Non-Biodegradable	9,241	9,241	2,495	11,736	11,736	4,706	4,706	311,776	604	604	7,030	4,101	842	10,145	15,089	7,030	6,679	15,089	14,335	5,805	26,818	26,818	25,477	25,477	25,477	25,477	33,168	33,168	32,505	32,505	352	754	1,341	663	663	48	2,495
Inorganic Particles	2,828	2,828	842	3,670	3,670	1,395	1,395	92,392	179	179	2,275	1,215	754	3,171	5,141	2,275	2,161	5,141	4,884	1,460	8,505	8,505	8,079	8,079	8,079	8,079	17,717	17,717	17,363	17,363	114	257	425	354	354	46	842
Decay Prod Aer/Anx	0	0	1,990	1,990	1,990	798	798	609,809	1,182	1,182	1,192	8,021	577	7,814	16,412	1,192	1,132	16,412	15,591	3,659	20,383	20,383	19,364	19,364	8,060	8,060	0	0	0	0	60	821	1,019	0	0	90	1,990
Decay Prod Anaerobic	0	0	11	11	11	4	4	0	0	0	6	0	6	0	6	6	6	6	6	49	60	60	57	57	14	14	4,911	4,911	4,813	4,813	0	0	3	98	98	7	11
Metal Hydroxide	2	2	17	19	19	8	8	506	1	1	12	7	43	7	57	12	11	57	54	208	273	273	260	260	260	260	260	260	254	254	1	3	14	5	5	0	17
Metal Absorbed Phosphate	0	0	7	7	7	-2	-2	731	1	1	-3	10	4	5	19	-3	4	19	18	79	100	100	95	95	95	95	316	316	310	310	0	1	5	6	6	0	7
Heterotrophs	0	0	5,054	5,054	5,054	2,026	2,026	1,584,997	3,073	3,073	3,027	20,849	735	21,468	43,053	3,027	2,876	43,053	40,900	10,366	54,142	54,142	51,435	51,435	0	0	0	0	0	0	151	2,153	2,707	0	0	43	5,054
Methanol Degraders	119	119	28	147	147	59	59	3,653	7	7	88	48	1	125	174	88	84	174	165	56	305	305	290	290	0	0	0	0	0	0	0	4	9	15	0	0	0	28
AOBs	119	119	348	467	467	187	187	91,200	177	177	280	1,200	54	1,210	2,463	280	266	2,463	2,340	761	3,367	3,367	3,199	3,199	0	0	0	0	0	0	14	123	168	0	0	43	348
NOBs	119	119	131	250	250	100	100	0	0	0	150	0	0	77	78	150	142	78	74	37	254	254	241	241	0	0	0	0	0	0	7	4	13	0	0	107	131
PAOs	119	119	654	773	773	310	310	177,566	344	344	463	2,336	190	1,176	3,702	463	440	3,702	3,517	4,965	8,922	8,922	8,476	8,476	0	0	0	0	0	0	23	185	446	0	0	0	654
PHA	11	11	6	16	16	7	7	1,710	3	3	10	22	0	18	41	10	9	41	39	13	60	60	57	57	0	0	0	0	0	0	0	2	3	0	0	0	6
Poly-P	35	35	609	643	643	258	258	218,127	423	423	385	2,869	232	1,191	4,292	385	353	4,292	4,078	3,080	7,510	7,510	7,135	7,135	0	0	0	0	0	0	19	215	376	0	0	0	609
VSS (lbs/day)	55,434	55,434	16,621	72,055	72,055	28,892	28,892	2,596,448	5,034	5,034	43,165	34,154	1,929	69,377	105,460	43,165	41,007	105,460	100,187	34,574	175,767	175,767	166,979	166,979	149,460	149,460	58,258	58,258	57,093	57,093	2,158	5,273	8,788	1,165	1,165	402	16,621
Biodegradable	46,679	46,679	7,037	53,717	53,717	21,538	21,538	93,463	181	181	32,178	1,229	714	31,612	33,555	32,178	30,569	33,555	31,877	11,416	73,863	73,863	70,170	70,170	119,573	119,573	23,923	23,923	23,444	23,444	1,609	1,678	3,693	478	478	58	7,037
Non-Biodegradable	8,315	8,315	2,222	10,537	10,537	4,225	4,225	280,598	544	544	6,312	3,691	420	9,105	13,216	6,312	5,997	13,216	12,555	5,191	23,743	23,743	22,556	22,556	22,556	22,556	29,851	29,851	29,254	29,254	316	661	1,187	597	597	58	2,222
Decay Prod Aer/Anx	0	0	1,861	1,861	1,861	746	746	548,828	1,064	1,064	1,115	7,219	291	7,016	14,526	1,115	1,059	14,526	13,800	3,292	18,151	18,151	17,244	17,244	7,254	7,254	0	0	0	0	56	726	908	0	0	172	1,861
Decay Prod Anaerobic	0	0	12	12	12	5	5	0	0	0	7	0	3	0	3	7	7	3	3	44	54	54	51	51	13	13	4,420	4,420	4,332	4,332	0	0	3	88	88	9	12
Metal Hydroxide	1	1	4	5	5	2	2	175	0	0	4	2	2	12	18	4	4	12	11	52	67	67	64	64	64	64	64	64	63	63	0	1	1	1	1	0	4
Heterotrophs	0	0	4,530	4,530	4,530	1,816	1,816	1,426,497	2,766	2,766	2,714	18,764	371	19,300	38,436	2,714	2,578	38,436	36,514	9,329	48,421	48,421	46,000	46,000	0	0	0	0	0	0	136	1,922	2,421	0	0	52	4,530
Methanol Degraders	107	107	25	133	133	53	53	3,288	6	6	79	43	0	113	156	79	75	156	148	49	273	273	260	260	0	0	0	0	0	0	4	8	14	0	0	0	25
AOBs	107	107	325	432	432	173	173	82,080	159	159	259	1,080	27	1,088	2,194	259	246	2,194	2,085	684	3,014	3,014	2,864	2,864	0	0	0	0	0	0	13	110	151	0	0	52	325
NOBs	107	107	17	124	124	50	50	0	0	0	74	0	0	70	70	74	70	70	66	33	170	170	161	161	0	0	0	0	0	0	4	3	8	0	0	1	17
PAOs	107	107	581	688	688	276	276	159,809	310	310	412	2,102	96	1,053	3,251	412	391	3,251	3,089	4,470	7,950	7,950	7,552	7,552	0	0	0	0	0	0	21	163	397	0	0	0	581
PHA	11	11	6	16	16	7	7	1,710	3	3	10	22	0	18	40	10	9	40	38	13	60	60	57	57	0	0	0	0	0	0	0	2	3	0	0	0	6
TKN (lbs/day)	14,382	14,382	2,219	16,602	16,602	13,968	13,968	211,264	1,726	1,726	2,634	2,762	0	4,789	7,551	2,634	2,431	7,551	7,098	2,272	11,801	11,801	11,163	11,163	11,163	11,163	11,167	11,167	4,942	4,942	203	453	638	6,225	6,225	926	2,219
NH3-N (lbs-N/day)	8,862	8,862	967	9,828	9,828	9,749	9,749	910	564	564	79	5	0	70	74	79	19	74	16	16	50	50	11	11	49	49	6,833	6,833	826	826	60	58	40	6,007	6,007	808	967
Particulate Bio Org N	2,690	2,690	399	3,089	3,089	1,238	1,238	5,298	10	10	1,850	70	0	1,817	1,887	1,850	1,758	1,887	1,793	582	4,133	4,133	3,926	3,926	8,260	8,260	2,031	2,031	1,991	1,991	93	94	207	41	41	5	399
Non-Bio Part Org N	388	388	96	485	485	194	194	12,873	25	25	290	169	0	422	591	290	276	591	562	132	970	970	922	922	922	922	1,770	1,770	1,734	1,734	15	30	49	35	35	4	96
Decay Prod Aer/Anx	0	0	152	152	152	61	61	47,199	92	92	91	621	0	602	1,222	91	87	1,222	1,161	283	1,531	1,531	1,454	1,454	612	612	0	0	0	0	5	61	77	0	0	10	152
Decay Prod Anaerobic	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	1	1	0	0	4	5	5	5	5	1	1	380	380	373	373	0	0	0	8	8	1	1
Heterotrophs	0	0	386	386	386	155	155	122,679	238	238	231	1,614	0	1,658	3,271	231	220	3,271	3,108	802	4,130	4,130	3,923	3,923	0	0	0	0	0	0	12	164	209	0	0	5	386
Methanol Degraders	9	9	2	11	11	5	5	283	1	1	7	4	0	10	13	7	6	13	13	4	23	23	22	22	0	0	0	0	0	0	0	1	1	0	0	0	2
AOBs	9	9	28	37	37	15	15	7,059	14	14	22	93	0	93	186	22	21	186	177	59	257	257	245	245	0	0	0	0	0	0	1	9	13	0	0	5	28
NOBs	9	9	2	11	11	4	4	0	0	0	7	0	0	6	6	7	6	6	6	2	14	14	14	14	0	0	0	0	0	0	0	0	1	0	0	0	2
PAOs	9	9	49	58	58	23	23	13,744	27	27	35	181	0	90	271	35	33	271	257	383	674	674	640	640	0	0	0	0	0	0	2	14	34	0	0	0	49
Non-Bio Soluble Org. N	620	620	110	730	730	724	724	1,159	719	719	6	6	0	8	14	6	1	14	3	3	8	8	2	2	129	129	150	150	18	18	4	11	6	132	132	89	110
Non-Bio Colloidal Org. N	140	140	2	142	142	141	141	2	1	1	1	0	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
Soluble Bio Org N	850	850	13	863	863	857	857	46	28	28	7	0	0	7	7	7	2	7	1	0	3	3	1	1	1	1,189	1,189	3	3	0	0	5	5	2	3	3	0	13
Colloidal Bio Org N	795	795	12	807	807	800	800	13	8	8	6	0	0	6	6	6	2	6	1	0	3	3	1	1	1	1	0	0	0	0	5	5	2	0	0	0	12
NO2-N (lbs-N/day)	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
NO3-N (lbs-N/day)	0	0	440	440	440	437	437	1,860	1,153	1,153	4	9	0	8	17	4	1	17	4	2	6	6	1	1	1	1	0	0	0	0	3	13	5	0	0	419	440
Total Nitrogen (lbs-N/day)	14,382	14,382	2,660	17,043	17,043	14,405	14,405	213,124	2,879	2,879	2,637	2,771	0	4,797	7,568	2,637	2,432	7,568	7,102	2,274	11,807	11,807	11,165	11,165	11,165	11,165	11,167	11,167	4,942	4,942	205	466	643	6,225	6,225	1,346	2,660
TP (lbs-P/day)	1,891	1,891	2,197	4,088	4,088	3,433	3,433	136,469	1,657	1,657	654	1,777	0	1,594	3,371	654	606	3,371	3,186	1,655	5,446	5,446	5,163	5,163	5,163	5,163	5,164	5,164	2,593	2,593	49	185	283	2,571	2,571	1,679	2,197
Bio Particulate	467	467	70	536	536	215	215	525	1	1	321	7	0	310	317	321	305	317	301	114	720	720	684	684	1,465	1,465	550	550	539	539	16	16	36	11	11	2	70
Non-Bio Particulate	83	83	25	108	108	43	43	2,860	6	6	64	38	0	90	128	64	61	128	122	53	236	236	224	224	224	224	1,513	1,513	1,482	1,482	3	6	12	30	30	3	25
Decay Prod Aer/Anx	0	0	50	50	50	20	20	15,587	30	30	30	205	0	199	404	30	29	404	383	93	505	505	480	480	202	202	0	0	0	0	2	20	25	0	0	3	50
Decay Prod Anaerobic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	1	1	126	126	123	123	0	0	0	3	3	0	0
Metal Absorbed	0	0	-1	-1	-1	-1	-1	238	0	0	-1	3	0	2	5	-1	1	5	4	2	31	31	29	29	29	29	103	103	101	101	0	0	2	2	2	-3	-1
Heterotrophs	0	0	128	128	128	51	51	40,513	79	79	76	533	0	547	1,080	76	73	1,080	1,026	264	1,363	1,363	1,295	1,295	0	0	0	0	0	0	4	54	68	0	0	2	128
Methanol Degraders	3	3	1	4	4	1	1	93	0	0	2	1	0	3	4	2	2	4	4	0	7	7	6	6	0	0	0	0	0	0	0	0	0	0	0	0	1
AOBs	3	3	9	12	12	5	5	2,331	5	5	7	31	0	31	61	7	7	61	58	20	86	86	82	82	0	0	0	0	0	0	0	3	4	0	0	2	9
NOBs	3	3	0	3	3	1	1	0	0	0	2	0	0	2	2	2	2	2	2	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
PAOs	3	3	16	19	19	8	8	4,539	9	9	11	60	0	30	89	11	11	89	85	126	222	222	211	211	0	0	0	0	0	0	1	4	11	0	0	0	16
Poly-P	11	11	181	192	192	77	77	67,531	131	131	115	888	0	369	1,257	115	109	1,257	1,194	953	2,256	2,256	2,144	2,144	0	0	0	0	0	0	6	63	113	0	0	0	181
Ortho-PO4	1,318	1,318	1,718	3,036	3,036	3,012

Appendix B
Public Participation Records

DRAFT

Jacobs Challenging today. Reinventing tomorrow.

Field's Point Wastewater Treatment Plant Facility Plan Amendment

Narragansett Bay Commission

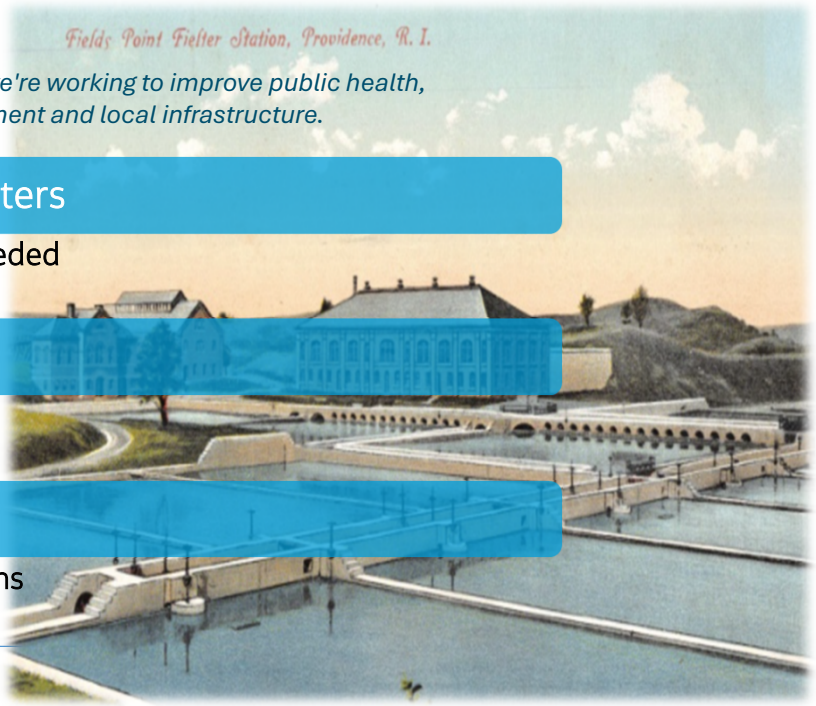


Investing in Clean Water for Our Community

Public Workshop June 25, 2025

Agenda

An overview of how we're working to improve public health, the environment and local infrastructure.



Why This Project Matters

- Why the Upgrade is Needed
- Environmental Impact

How We Got Here

- Project Planning
- Options We Explored

What's Next

- Recommended Solutions
- Next Steps

2

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Narragansett Bay Commission (NBC) owns and operates Rhode Island's two largest wastewater treatment plants (WWTP)

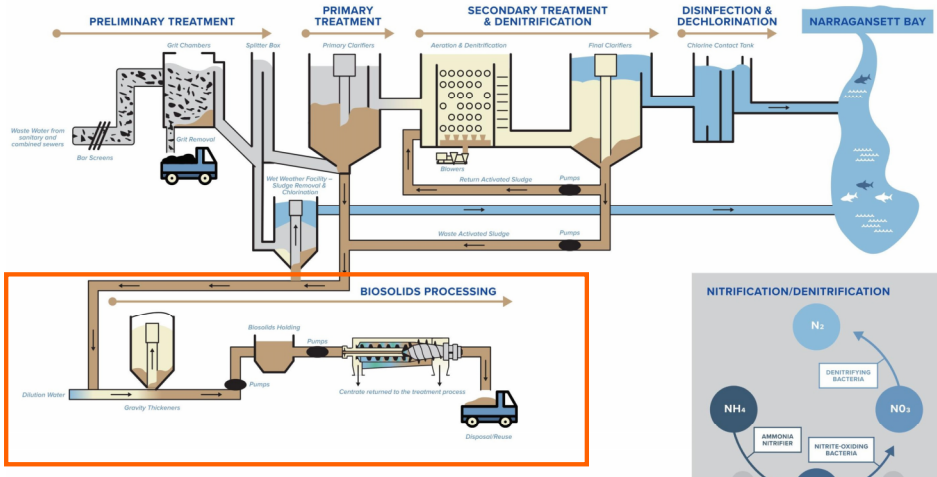
- Field's Point *and*
- Bucklin Point

NBC's service area includes Providence, North Providence, Johnston, Pawtucket, Central Falls, Cumberland, Lincoln and small portions of East Providence, Cranston, and Smithfield.

- 400,000 customers

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Field's Point WWTP Processes



NBC Processes over 23 Dry Tons per Day of Biosolids at Field's Point, equivalent weight to 23 cars

For comparison, Bucklin Point produces 6 Dry Tons per Day

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Project

What are Biosolids?

- Nutrient-rich organic material produced through wastewater treatment processes
  - Multiple methods for biosolids disposal depending on treatment processes and content of the biosolids

This Project focuses on the Dewatering Building at both facilities

- The dewatering facilities remove water from sludge – the leftover material from treating wastewater – so it's easier to handle and safely dispose of

The Dewatering Facilities at both WWTPs are reaching the end of their useful life and need to be replaced or rebuilt

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Project B

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Project Planning

Step One: Condition Assessment and Evaluation of Dewatering Facilities



- **Field's Point**: Equipment is at the end of its useful life, becoming more unreliable and the building is too small for safe operations
- **Bucklin Point**: The building is adequately sized, but equipment is aging and needs replacement. Upgrades and repairs to support systems (like HVAC, electrical, odor control systems) are recommended

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Options We Explored

Short-Term Options Consider

- **Do nothing** and continue with current setup
- **Rehabilitate** the existing dewatering building at Buc
- **Build a brand-new** dewatering building at Field's P

Long-Term Options Consider

- **Keep things** the way they are
- **Add a basic treatment process** that breaks down sludge u
- **Add digestion and drying** to reduce sludge volume and m
- **Add an enhanced process** that uses heat to improve how
- **Use heat and drying together** for the most efficient and a



obs 2025

Dewatering Equipment Alternatives



Alternative 1 – New Centrifuges



Alternative 2 - New Screw Presses



Alternative 3 – New Belt Filter Presses

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Short-term Improvements at Field's Point

- **Field's Point ->** *Near-future upgrades*
  - Build a new dewatering and storage facility
  - Plan for future acceptance of sludge from other Rhode Island treatment plants
  - Off-site 3rd Party Disposal

Benefits of a New Facility at Field's Point

- ✓ **Fully enclosed** building for improved odor control
- ✓ **Reduced truck traffic** on Ernest Street by shifting access to Terminal Road
- ✓ **Decreased noise** from dewatering operations
- ✓ **Increased capacity** to support regional sludge processing



Proposed Location for New Dewatering Facility at Field's Point WWTP

Program Component	Estimated Construction Cost
New Dewatering Building	$68M
Sludge Storage Tanks	$14M
Bucklin Point Improvements	$13M
Total Estimated Cost	**$95M**

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Potential Long-Term Improvements

➢ **Field's Point ->** *Potential Future upgrades*

- Consider build a new digestion and THP facility
- Centralize all dewatering at the Field's Point facility
- Continue Off-site 3rd Party Disposal

Benefits of Long-Term Upgrades

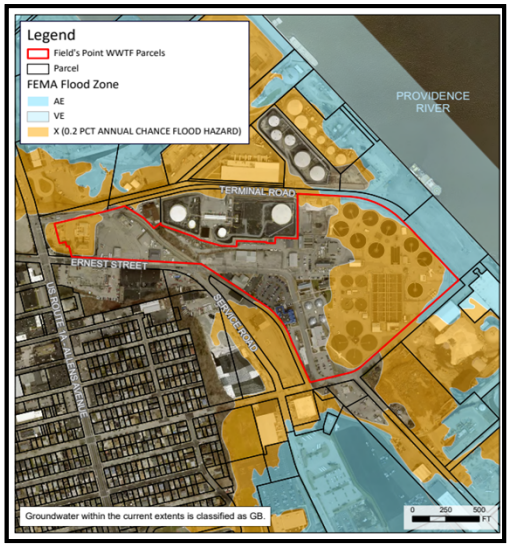
- **All dewatering** handled in one location
- **More reliable and efficient** sludge disposal
- **Flexibility to adapt** to future disposal needs
- **Fewer sludge trucks** due to volume reduction from advanced treatments of the organic matter coming into the plant



Proposed Location for New Digestion & THP Treatment at Field's Point WWTP

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Environmental Evaluation



Proposed site within the 500-year Flood Plain

The project will be designed to stay safe from flooding with features elevated as needed

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Land Uses & Zoning

The new facilities for dewatering will be built next to existing industrial and sewage treatment land-use areas



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Cultural Impacts

Cultural Resource Mapping

✓ The project site is not located within a designated cultural resource location



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Historical Impacts



Historic Site Assessment

- ✓ No historic sites located within proposed project locations
- ✓ Only historic sites within the project area are owned by Narragansett Bay Com

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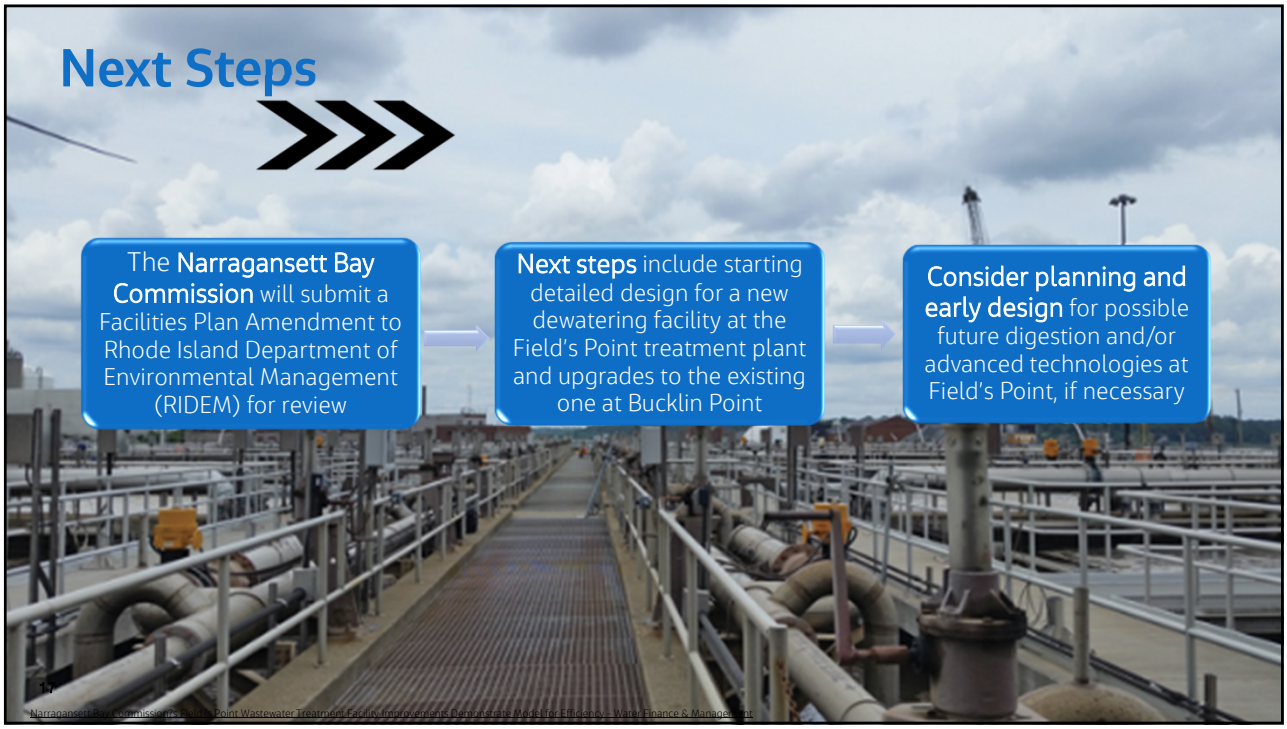
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Proposed Timeline

Facilities Plan Amendment	• Q3 2025
Estimated Approval of Amendment Submittal	• Late 2025
Detailed Design of New Dewatering Facility at Field's Point and Rehabilitation at Bucklin	• Late 2025 – Mid 2027
Preliminary Design of Long-term Plan (Digestion & Thermal Processes)	• Late 2025 – Late 2026
Construction of new Dewatering Facility at Field's Point and Rehabilitation at Bucklin	• Mid 2027 – Mid 2029

16



Thank You!
&
Questions?

The Narragansett Bay Commission

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NBC Field's Point WWTF Facility Plan Amendment Public Workshop - 6/25/2025 11:00AM

Name	Organization OR Town	Email	Phone
CJ Spellman	NBC	cspellman@narrabay.com	401-318-2624
Jacqueline Petrocchi	Green Development	jmp@green-rs.com	908 295 9688
ROBERT BAGLINI	NBC	rbaglini@narrabay.com	401-461-8848
PETER VON ZUECK	JACOBS	PETER.VONZUECK@JACOBS	617-320-2947
Meredith Sullivan	Jacobs	meredith.sullivan@jacobs.com	774-271-0336
Kathryn Kelly	NBC	KKelly@narrabay.com	401.461-8848
David Bowen	NBC	dbowen@narrabay.com	401 374-2056
Holly Ialongo	NBC	hialongo@narrabay.com	461-8848
Jim McCaughey	NBC	jmccaughey@nbnbay.com	"

Appendix C
Survey of Potential Participants in Regional Liquid Sludge Strategy

DRAFT

Request for Information: NBC Regional Sludge Dewatering Facility (Due 6/30/25)

As discussed at a meeting on April 1, as part of a larger biosolids upgrade project, the Narragansett Bay Commission is considering *potentially* adding infrastructure to the Field's Point Wastewater Treatment Facility to receive liquid sludge and serve as a Regional Dewatering Facility for other Rhode Island municipal wastewater treatment facilities who do not have the ability to dewater sludge on site. NBC is currently undergoing the RI DEM Facility Planning process which requires NBC to document any and all potential future external sludge loads. As such, this **Request For Information (RFI)** intends to collect information from facilities that are *potentially* interested in participating in NBC's regional dewatering facility. Please note that this proposed facility would only receive liquid sludge and not dewatered cake, and all material would still need to be shipped off-site by NBC for ultimate disposal. Please note that costs are NOT currently known at this point in the planning process. Responding to this RFI is not legally nor financially binding, nor does it guarantee capacity in any future NBC facility. This RFI is intended to gauge level of interest and accurately determine potential loadings that are required as part of the RI DEM planning process. **ALL RESPONSES MUST BE SUBMITTED BY 4:00PM on JUNE 30, 2025**. Information received after this point in time may not be able to be included in the Facility Plan design loading .

1. Facility City/Town: *

2. Facility Preferred Contact (Name): *

3. Facility Preferred Contact (Email): *

4. Is your facility *potentially* interested in using a future NBC Regional Dewatering Facility? *

   Responses are non-binding and NBC acknowledges that interest is subject to change

   - ◯ Yes, very interested
   - ◯ Maybe, depending on cost or other factors
   - ◯ Not interested at this time, but keep me informed

5. When could your facility possibly begin bringing liquid sludge to a potential Regional Dewatering Facility *

While the schedule is not fully known at this time, NBC does not anticipate being able to receive any liquid sludge prior to July 2027 *at the earliest*, and it is possible that it might be later (2028-2029)

- ◯ Prior to 2027
- ◯ First-half 2027
- ◯ Second-half 2027
- ◯ First-half 2028
- ◯ Second-half 2028
- ◯ 2029 or later

6. What was your facility's reported Annual Dry Tonnage produced in calendar years 2023 and 2024. *

The Dry Tons per Year reported on your facilities EPA Biosolids Annual Report for 2023 and 2024 is acceptable (if applicable)

7. Over the last two calendar years (January 2023 through December 2024), what was your facility's average daily sludge production (Gallons per Day)? *

The value must be a number

8. Over the last two calendar years (January 2023 through December 2024), what was your facilities sludge average solids concentration (% Total Solids)? *

The value must be a number

9. What is the make up of your sludge? *

See dedicated questions related to Scum and Grit below.

- ◯ Blended Secondary WAS & Primary Sludge
- ◯ Secondary WAS Only
- ◯ Primary Sludge Only
- ◯ Other

10. Does your WWTF have dedicated grit removal ahead of primary treatment? *

- ◯ Yes
- ◯ No
- ◯ Other

11. Does your WWTF thicken sludge prior to leaving your facility? *

Thickening may include gravity thickeners, belt thickeners, etc. Please list ANY metal coagulants (ferric, etc.) in the "OTHER" section, if applicable

- ◯ Yes, sludge is thickened
- ◯ No sludge thickening
- ◯ Other

12. Does the sludge leaving your facility contain scum? *

Scum includes all material removed from the top of clarifiers

- ◯ Yes
- ◯ No
- ◯ Other

13. Lasty, as part of the RIDEM Facility Plan, NBC Plans to host an informal Public Meeting the last week of June as part of it's larger Biosolids Facility Upgrades. While details regarding regional sludge receiving may or may not be discussed, would you like to be personally notified when this meeting will be held?

    This meeting is informal and focused on the broader NBC Facility Planning process for RI DEM, and specific details regarding regional sludge receiving may not be discussed at this meeting. Attendance at this meeting is not necessary for potential future participation in the regional facility.

    ◯ Yes, please notify me at the email above

    ◯ No, thank you, but please keep me informed

14. **By checking below, our facility acknowledges that this RFI form is for NBC information-gathering and RI DEM Facility Planning purposes only, and submitting this form is non-binding with NBC in any capacity, nor does responding to this RFI guarantee our facility capacity in any potential future NBC facility:** *

    ◯ **Acknowledged**

This content is neither created nor endorsed by Microsoft. The data you submit will be sent to the form owner.

Microsoft Forms

Appendix D
Environmental Assessment Figures

DRAFT



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AERIAL SITE LOCUS

SCALE: 1" = 500'

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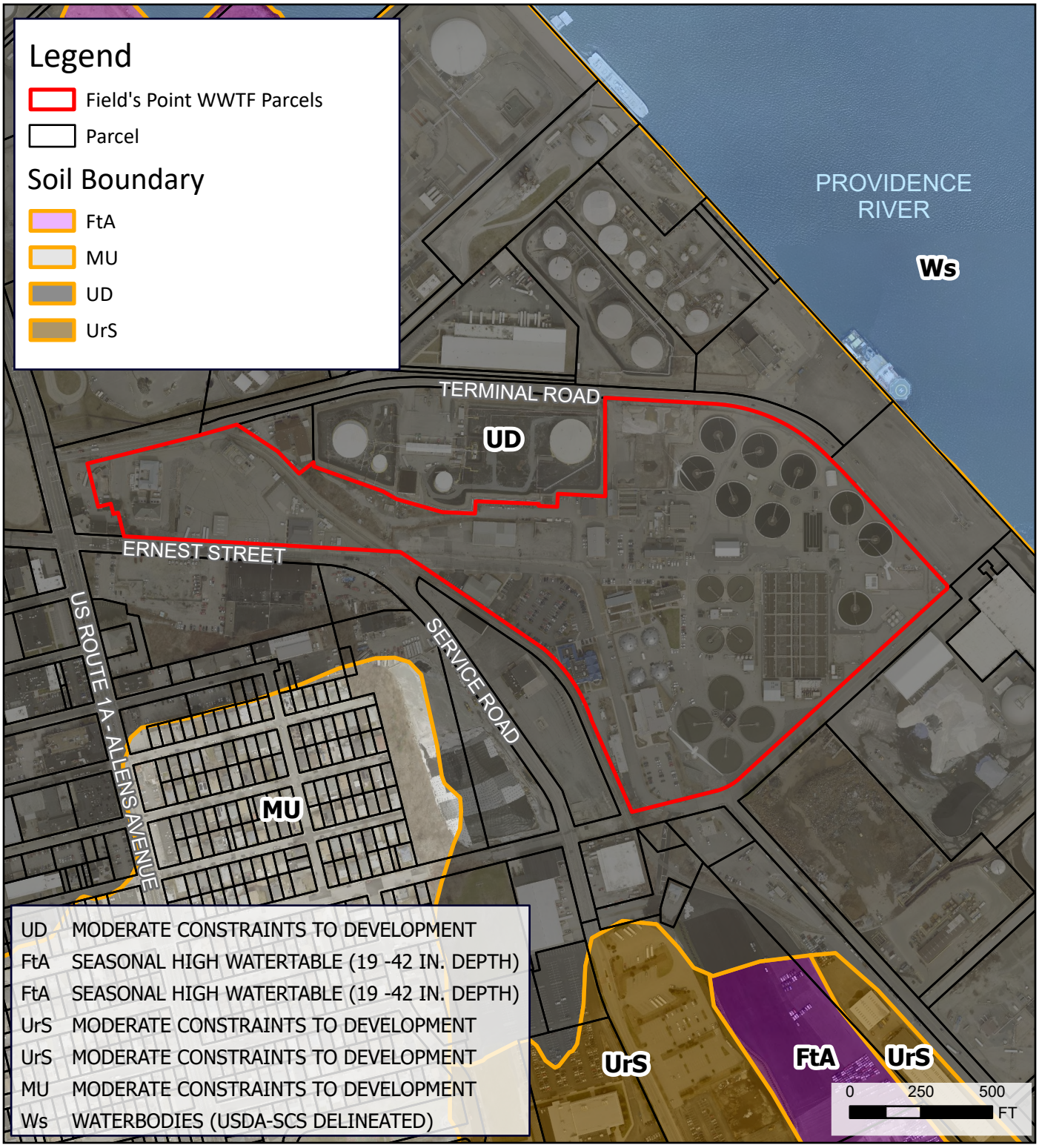
PARE CORPORATION

FIGURE 4-2

FIELD'S POINT WASTEWATER TREATMENT FACILITY
FACILITIES PLAN AMENDMENT
PROVIDENCE, RI

PARE PROJECT No. 24178.00

JULY 2025



RIGIS

FIELD'S POINT WWTF SITE SOILS

SCALE: 1" = 500'

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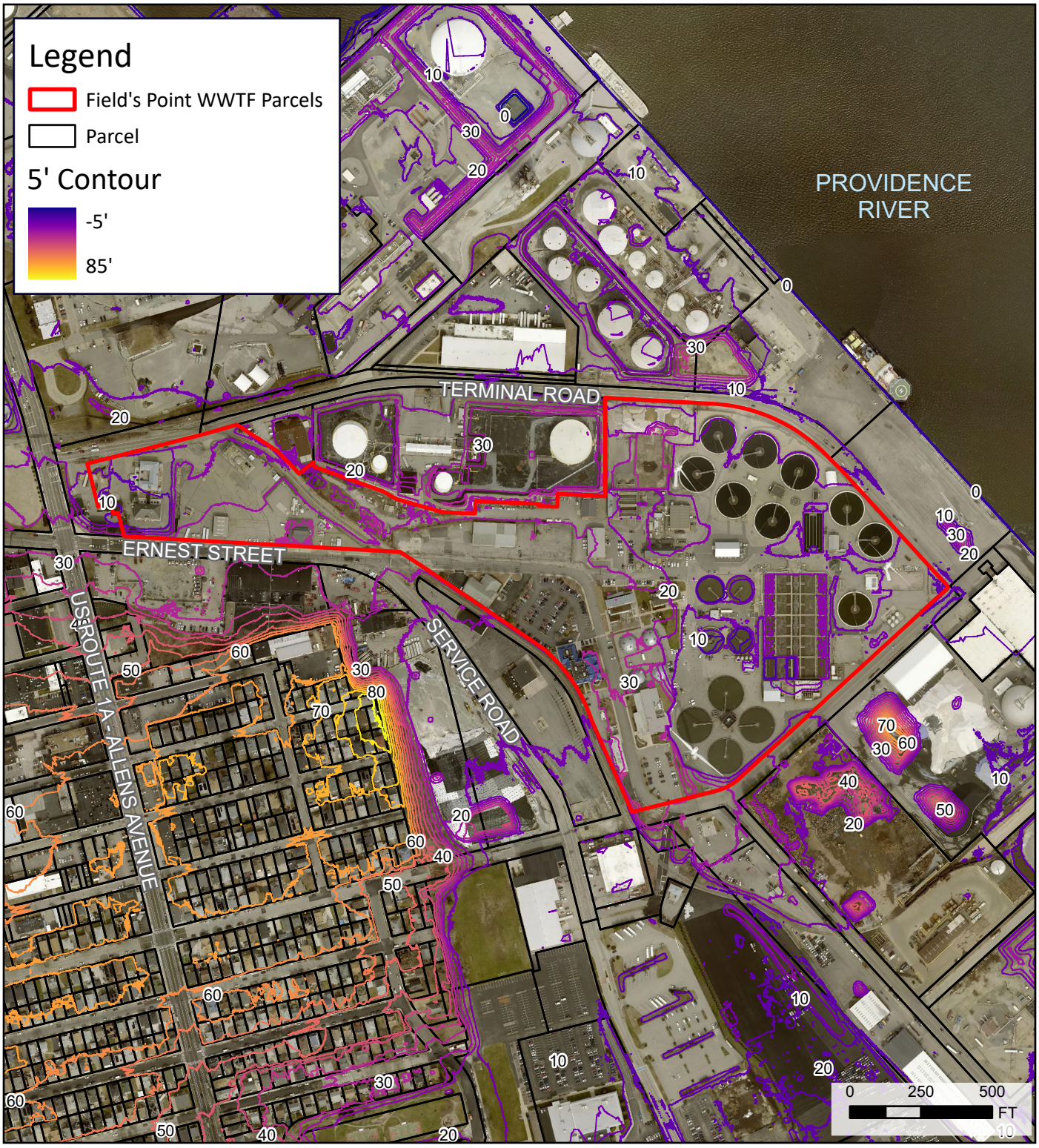
PARE CORPORATION

FIGURE 4-3

FIELD'S POINT WASTEWATER TREATMENT FACILITY
FACILITIES PLAN AMENDMENT
PROVIDENCE, RI

PARE PROJECT No. 24178.00

JULY 2025



RIGIS

SITE TOPOGRAPHY

SCALE: 1" = 500'

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PARE CORPORATION

FIGURE 4-4

FIELD'S POINT WASTEWATER TREATMENT FACILITY
FACILITIES PLAN AMENDMENT
PROVIDENCE, RI

PARE PROJECT No. 24178.00

JULY 2025



RIGIS

HISTORIC RESOURCES

SCALE: 1" = 500'

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FIGURE 4-5

FIELD'S POINT WASTEWATER TREATMENT FACILITY
FACILITIES PLAN AMENDMENT
PROVIDENCE, RI

PARE PROJECT No. 24178.00

JULY 2025



RIGIS

NATURAL RESOURCES

SCALE: 1" = 500'

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The Narragansett Bay Commission

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FIGURE 4-6

FIELD'S POINT WASTEWATER TREATMENT FACILITY
FACILITIES PLAN AMENDMENT
PROVIDENCE, RI

PARE PROJECT No. 24178.00

JULY 2025



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FEMA FLOODPLAIN

SCALE: 1" = 500'

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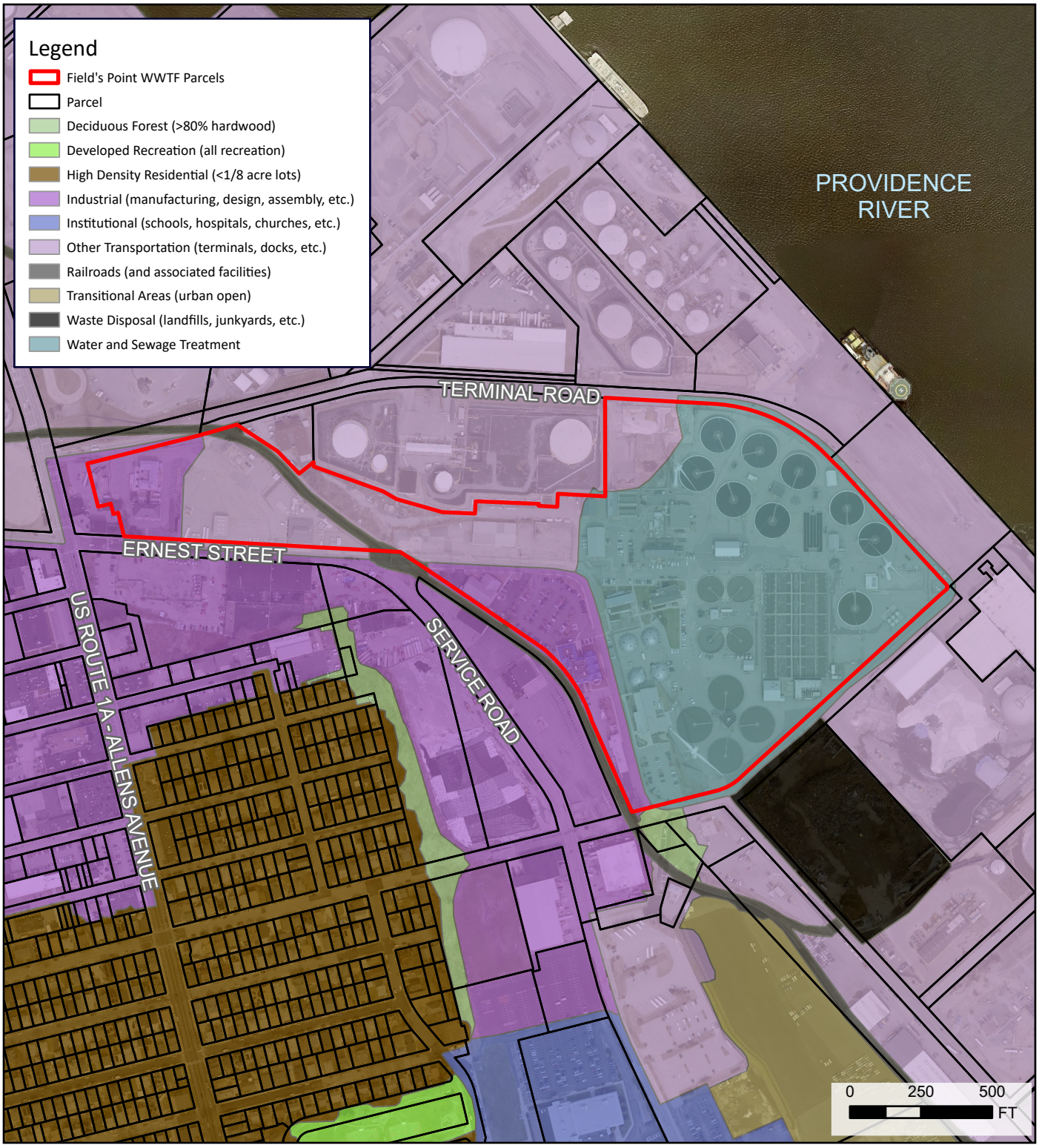
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FIGURE 4-7

FIELD'S POINT WASTEWATER TREATMENT FACILITY
FACILITIES PLAN AMENDMENT
PROVIDENCE, RI

PARE PROJECT No. 24178.00

JULY 2025



RIGIS

LAND USE

SCALE: 1" = 500'

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FIGURE 4-8

FIELD'S POINT WASTEWATER TREATMENT FACILITY
FACILITIES PLAN AMENDMENT
PROVIDENCE, RI

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Appendix E
Intergovernmental Review Documents

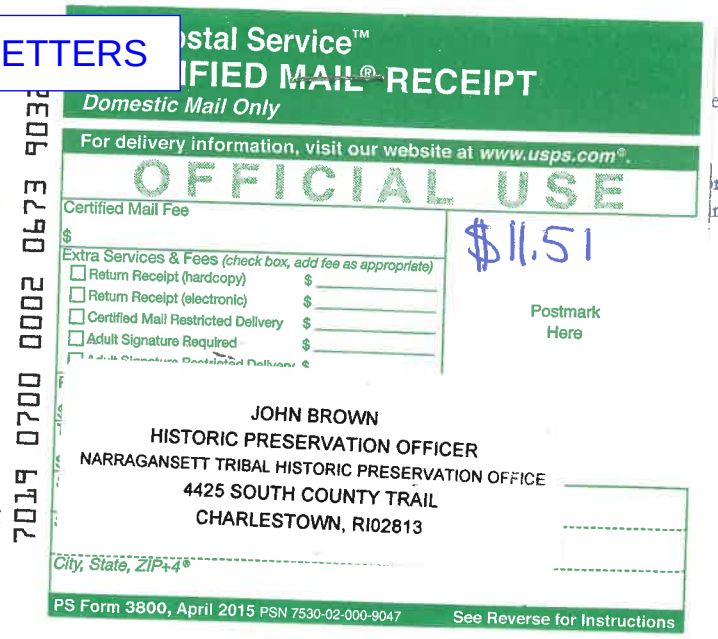
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ATTACHMENT 1 - IGR COVER LETTERS

The Narragansett Bay Commission
One Service Road
Providence, Rhode Island 02905

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401 • 461 • 6540 FAX

http://www.narrabay.com



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September 19, 2025

Mr. John Brown
Historic Preservation Officer
Narragansett Tribal Historic Preservatio
4425 South County Trail
Charlestown, RI 02813

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Brown:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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Comments on the FPA can be provided to the NBC as follows:

Narragansett Bay Commission
One Service Road
Providence, RI 02905
Attn: Mr. CJ Spellman, PhD, P.E.
Tel: (401) 461-8848 x118
Email: cspellman@narrabay.com

Thank you for taking the time to review the enclosed documents. We respectfully request that you submit any comments within 30 days after the date of this letter.

Sincerely,

Laurie Horridge
Executive Director

The Narragansett Bay Commission
One Service Road
Providence, Rhode Island 02905

401 • 461 • 8848
401 • 461 • 6540 FAX

http://www.narrabay.com



October 6, 2025

Mr. John Brown
Historic Preservation Officer
Narragansett Tribal Historic Preservation Office
4425 South County Trail
Charlestown, RI 02813

Subject **Follow Up: Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

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Laurie Horridge
Executive Director

The Narragansett Bay Commission
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October 6, 2025

Mr. John Brown
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CHIEF ENGINEER FOR INFRASTRUCTURE
OFFICE OF THE DIRECTOR
RI DEPART OF TRANSPORTATION RM 366
PROVIDENCE, RI 02903
PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions
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incent J. Mesolella
hairman

aurie A. Horridge
xecutive Director

September 19, 2025

Mr. Robert Rocchio, P.E.-Chief
Office of the Director
Rhode Island Department of Tr
2 Capitol Hill
Providence, RI 02903

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Rocchio:

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Executive Director

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401 • 461 • 6540 FAX

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Vincent J. Mesolella
Chairman

Laurie A. Horridge
Executive Director



September 19, 2025

Mr. Joseph Antonio-Senior E
Rhode Island Department of E
Office of Customer and Techn
235 Promenade Street
Providence, RI 02908

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Antonio:

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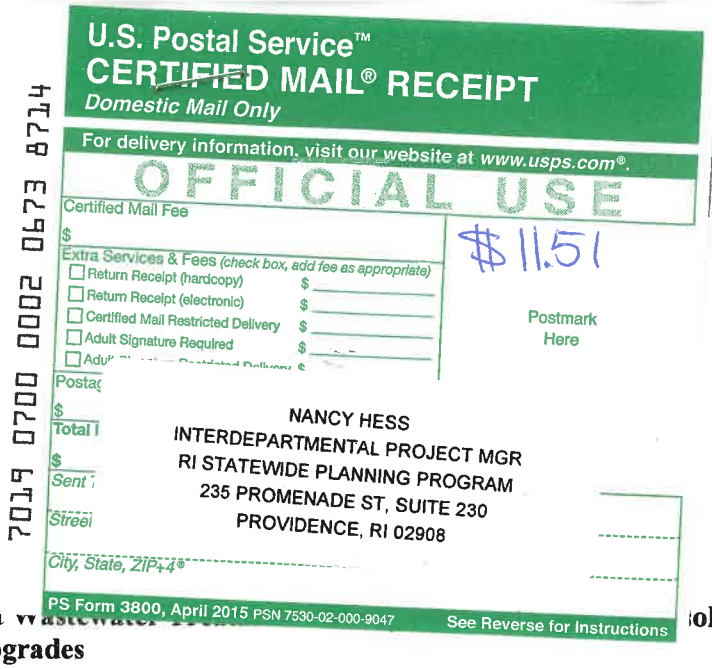
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Laurie A. Horridge
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NANCY HESS
INTERDEPARTMENTAL PROJECT MGR
RI STATEWIDE PLANNING PROGRAM
235 PROMENADE ST, SUITE 230
PROVIDENCE, RI 02908
PS Form 3800, April 2015 PSN 7530-02-000-9047
See Reverse for Instructions

September 19, 2025

Ms. Nancy Hess-Interdepartn
Rhode Island Statewide Plan
235 Promenade Street Suite 2
Providence, RI 02908

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Ms. Hess:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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Comments on the FPA can be provided to the NBC as follows:

Narragansett Bay Commission
One Service Road
Providence, RI 02905
Attn: Mr. CJ Spellman, PhD, P.E.
Tel: (401) 461-8848 x118
Email: cspellman@narrabay.com

Thank you for taking the time to review the enclosed documents. We respectfully request that you submit any comments within 30 days after the date of this letter.

Sincerely,

Laurie Horridge
Executive Director

The Narragansett Bay Commission
One Service Road
Providence, Rhode Island 02905

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401 • 461 • 6540 FAX

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ncent J. Mesolella
hairman

urie A. Horridge
xecutive Director



September 19, 2025

Mr. Jeffrey Emidy-Executive I
State Historic Preservation Of
Rhode Island Historic Preserv
1 Capitol Hill, Suite 201
Providence, RI 02908

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Emidy:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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Laurie Horridge
Executive Director

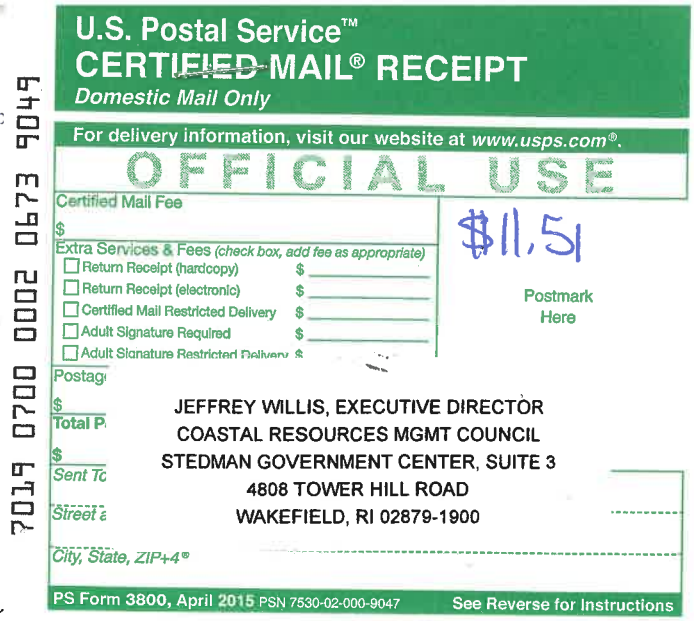
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7019 0700 0002 0673 9049

September 19, 2025

Mr. Jeffrey Willis
Executive Director
Coastal Resources Manag
4808 Tower Hill Road
Wakefield, RI 02879-190(

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Willis:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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Executive Director

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DIVISION OF FISH AND WILDLIFE
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Vincent J. Mesolella
Chairman

Laurie A. Horridge
Executive Director

September 19, 2025

Mr. Phillip Edwards-Chief
Rhode Island Department of
Division of Fish and Wildlif
277 Great Neck Road
West Kingston, RI 02892

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Edwards:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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Vincent J. Mesolella
Chairman

Laurie A. Horridge
Executive Director

September 19, 2025

Mr. David W. Gregg-Executive
Rhode Island Natural History Si
P.O. Box 1858
URI East Farm Building 14
Kingston, RI 02881

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Gregg:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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Executive Director

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September 19, 2025

Ms. Sabrina Pereira
Marine Resources Manageme
Greater Atlantic Regional Fisl
50 Great Republic Drive
Gloucester, MA 01930

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Ms. Pereira:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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ASSISTANT STATE SOIL SCIENTIST
NATURAL RESOURCES CONSERVATION DISTRICT
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Vincent J. Mesolella
Chairman

Laurie A. Horridge
Executive Director

September 19, 2025

Mr. Jim Turenne
Assistant State Soil Scienti
Natural Resources Conserv
60 Quaker Lane, Suite 40
Warwick, RI 02886

Subject **Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades**

Dear Mr. Turenne:

The Narragansett Bay Commission respectfully requests your agency's review and feedback on the enclosed Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades (FPA). This FPA is being prepared in accordance with the Rhode Island Department of Environmental Management's (RIDEM) guidelines. RIDEM requires coordination with state and federal agencies to ensure full compliance with all applicable federal, state and local regulations.

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Executive Director

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Providence, Rhode Island 02905

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Vincent J. Mesolella
Chairman

Laurie A. Horridge
Executive Director

September 19, 2025

Email:
Lauren_Bonatakis
enps.gov
9/19/25 ✓

Ms. Lauren Bonatakis
Natural Resource Specialist
Partnership Wild and Scenic Rivers Pro
National Park Service
Interior Region 1-North Atlantic-Appala

Subject **Field's Point Wastewat** **ids Management Facilities Upgrades**

Dear Ms. Bonatakis:

The Narragansett Bay Commission respect on the enclosed Draft Executive Summary and Environmental As ent Facility Plan Amendment-Biosolids Management Faciliti n accordance with the Rhode Island Department of Environme guidelines. RIDEM requires coordination with state and federal agencies ensure full compliance with all applicable federal, state and local regulations.

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Executive Director

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1. Article Addressed to:

JOSEPH ANTONIO
SENIOR ENVIRONMENTAL SCIENTIST
RI DEPARTMENT OF ENVIRONMENTAL MGMT
OFFICE OF CUSTOMER & TECH ASSISTANCE
235 PROMENADE STREET
PROVIDENCE, RI 02908

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NIT HISTORIC PRESERVATION
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1. Article Addressed to:

SABRINA PEREIRA
MARINE RESOURCES MGMT SPECIALIST
GREATER ATLANTIC REGOINAL FISHERIES OFFICE
55 GREAT REPUBLIC DRIVE
GLOUCESTER, MA 01930

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1. Article Addressed to:

JIM TURENNE
ASSISTANT STATE SOIL SCIENTIST
NATURAL RESOURCES CONSERVATION DISTRICT
60 QUAKER LANE
WARWICK, RI 02886

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JEFFREY WILLIS, EXECUTIVE DIRECTOR
COASTAL RESOURCES MGMT COUNCIL
STEDMAN GOVERNMENT CENTER, SUITE 3
4808 TOWER HILL ROAD
WAKEFIELD, RI 02879-1900

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DIVISION OF FISH AND WILDLIFE
GREAT SWAMP FIELD HQ
277 GREAT NECK ROAD
WEST KINGSTON, RI 02892

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1. Article Addressed to:

JEFFREY EMIDY, EXECUTIVE DIRECTOR
STATE HISTORIC PRESERVATION OFFICER
RI HISTORICAL PRESERVATION & HERITAGE COMMISSION
1 CAPITOL HILL, SUITE 201
PROVIDENCE, RI 02908

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September 21, 2025, 9:27 am

ATTACHMENT 3 - IGR RESPONSES

Outlook

Fields Point Wastewater Treatment upgrades.

From Turenne, Jim - FPAC-NRCS, RI <jim.turenne@usda.gov>
Date Wed 9/24/2025 1:12 PM
To Spellman, CJ <cspellman@narrabay.com>
Cc Spears, Cassius - FPAC-NRCS, RI <cassius.spears@usda.gov>

You don't often get email from jim.turenne@usda.gov. Learn why this is important

[EXTERNAL EMAIL] CAUTION: This email originated from an external sender. Do not click links or open attachments unless you are expecting the email and know the contents is safe.

The RI USDA-NRCS received your mail regarding the upgrades to the Fields Point Treatment Facility and since there are no prime farmlands being impacted, the Farmland Protection Policy Act does not apply to the project, and no further actions is needed for our office.
Thank You for sending the information.

Jim Turenne
RI NRCS, Assistant State Soil Scientist

USDA U.S. DEPARTMENT OF AGRICULTURE
Rhode Island
60 Quaker Ln, Suite 46, Warwick RI 02886
401-828-1300

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Outlook

Re: [EXTERNAL] NBC Environmental Assessment (Draft)-FPWWTF Plan Amendment

From Bonatakis, Lauren E <lauren_bonatakis@nps.gov>
Date Tue 9/23/2025 9:35 AM
To Bonn, Karen <kbonn@narrabay.com>
Cc Spellman, CJ <cspellman@narrabay.com>; Kelly, Kathryn <kkelly@narrabay.com>

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[EXTERNAL EMAIL] CAUTION: This email originated from an external sender. Do not click links or open attachments unless you are expecting the email and know the contents is safe.

Hi Karen,

Thanks for sending. It looks like this project is outside of NPS jurisdiction and does not impact any of the Wild and Scenic Rivers in RI, therefore NPS has no comment.

I appreciate your due diligence and providing the opportunity to review.

Thank you,
Lauren

Lauren Bonatakis
Natural Resource Specialist / River Manager
Partnership Wild and Scenic Rivers Program
National Park Service
Interior Region 1 - North Atlantic-Appalachian
617-599-6802 | lauren_bonatakis@nps.gov
Hours: Monday-Friday 7:30a - 4:00p

PARTNERSHIP WILD & SCENIC RIVERS

www.nps.gov/pwsr

From: Bonn, Karen <kbonn@narrabay.com>
Sent: Friday, September 19, 2025 9:02 AM
To: Bonatakis, Lauren E <lauren_bonatakis@nps.gov>
Cc: Spellman, CJ <cspellman@narrabay.com>; Kelly, Kathryn <kkelly@narrabay.com>; Bonn, Karen <kbonn@narrabay.com>
Subject: [EXTERNAL] NBC Environmental Assessment (Draft)-FPWWTF Plan Amendment

Outlook

RE: Narragansett Bay Commission Intergovernmental Review

From Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>
Date Tue 10/7/2025 9:12 AM
To Spellman, CJ <cspellman@narrabay.com>

[EXTERNAL EMAIL] CAUTION: This email originated from an external sender. Do not click links or open attachments unless you are expecting the email and know the contents is safe.

Hello CJ
Thanks for your follow up. The Certified item did reach me. Our building's snail mail system leaves a lot to be desired so I'm not certain how the item gets logged in for the US PO when it gets to out building. I've scheduled this review for a response to you on or before 10/24/25. It the future we are happy to forego the certified mail procedure and use an email submission for your projects instead. My agency does not require a certified notice.

Nancy

Nancy Hess
Interdepartmental Project Manager
State of RI - Division of Statewide Planning
235 Promenade Street, Suite 230
Providence, RI 02908
www.planning.ri.gov

From: Spellman, CJ <cspellman@narrabay.com>
Sent: Monday, October 6, 2025 11:16 AM
To: Hess, Nancy (DOA) <nancy.hess@doa.ri.gov>
Subject: Narragansett Bay Commission Intergovernmental Review
Importance: High

Hello Ms. Hess,

On September 19, the Narragansett Bay Commission sent a request via USPS Certified Mail to review and provide feedback on the attached Draft Executive Summary and Environmental Assessment for the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades as part of the RIDEM-required intergovernmental review. However, NBC's record with the post office (tracking # 70190700000206738714) indicates that the package was not yet delivered to you and, as such, NBC wanted to ensure a copy of the attached document made it to your agency for review.
If your agency has any feedback, you may contact me directly at 401-461-8848 ext. 118 or by replying to this email.

Thank you,

CJ Spellman, PhD, PE

Outlook

Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management

From David Gregg <dgregg@rinhs.org>
Date Thu 9/25/2025 3:20 PM
To Spellman, CJ <cspellman@narrabay.com>

You don't often get email from dgregg@rinhs.org. Learn why this is important

[EXTERNAL EMAIL] CAUTION: This email originated from an external sender. Do not click links or open attachments unless you are expecting the email and know the contents is safe.

Dear Mr. Spellman,
I am in receipt of your package of details regarding the Field's Point Wastewater Treatment Facility Plan Amendment-Biosolids Management Facilities Upgrades dated September 9, 2025.

I have reviewed the details of the project as you have presented them and compared them to data held by the Rhode Island Natural History Survey on rare and other species and other biological resources. I find that the package of details contains nothing on which the Survey has relevant expertise or data. Therefore, we make no comment on the draft Environmental Assessment.

Data from the Rhode Island Natural Heritage Program are provided to you under a revocable license. You may use these data solely for the purposes stated in your inquiry and subsequent communication with the Rhode Island Natural History Survey. As these data may be time sensitive, you may use these data for one year, after which you agree to destroy or delete them or to request an update if your need for them continues. These data are for the internal use of the requesting party: you agree not to make these data or anything derived from them which substantially reproduces them available to other people, companies, or agencies except in direct pursuit of your original purpose in requesting them. Any breach of these conditions could result in revocation of your license to use these data.

Data consulted are those available to the Rhode Island Natural Heritage Program and considered active or current as of May 2024. These data are compiled over many years from numerous sources of varying quality. Reasonable efforts have been made to evaluate the quality and currency of these data, but these efforts did not necessarily include field verification and they remain limited by their methods of acquisition. There may be other information about rare species in your project area that has not been submitted to the Program and there is no systematic survey of land in Rhode Island so there may be other rare species not yet discovered in your project area. We may be able to provide additional details if those are important to your purposes; however we don't generally provide full details initially because of the danger to certain rare species from poaching.

The Rhode Island Natural History Survey is an independent, 501(c)(3) non-profit with a mission to connect those knowledgeable about Rhode Island's animals, plants, and natural communities with each other and with those who can use that information for research, education, and conservation. The Natural History Survey provides data management and other support for the Rhode Island Natural Heritage Program through an agreement among the Survey, URI, RIDEM, and The Nature Conservancy. The Natural History Survey is non-advocacy and is neither a regulatory authority nor an agent of the State of Rhode Island. The Survey's ability to provide these data is funded by the generosity of its members and by a grant from the Conservation Stewardship Collaborative Fund at the Rhode Island Foundation.

I hope this meets your needs. Let me know if you have any questions or need any more information.
Yours,
David

David W. Gregg, Ph.D., Exec. Dir.
Rhode Island Natural History Survey
URI East Farm, Building 14
P.O. Box 1858, Kingston, RI 02881
401-874-5800
dgregg@rinhs.org / www.rinhs.org
Yours,
David

David W. Gregg, Ph.D., Exec. Dir.
Rhode Island Natural History Survey
14 East Farm Rd.
P.O. Box 1858, Kingston, RI 02881
401-874-5800
dgregg@rinhs.org / www.rinhs.org
www.youtube.com/rinaturalhistory

STATE OF RHODE ISLAND

HISTORICAL PRESERVATION & HERITAGE COMMISSION

Old State House 150 Benefit Street Providence, RI 02903

Telephone 401-222-2678 Fax 401-222-2968
TTY 401-222-3700 www.preservation.ri.gov

October 16, 2025

Via email: cspellman@narrabay.com

Narragansett Bay Commission
Attn: Mr. CJ Spellman, PHD, P.E.
One Service Road
Providence, RI 02905

Re: RIHPHC Project No. 19177
Field's Point Wastewater Treatment Facility Plan Amendment –
Biosolids Management Facilities Upgrades
Terminal Road
Providence, RI

Dear Mr. Spellman:

The Rhode Island Historical Preservation and Heritage Commission (RIHPHC) staff has reviewed the information that you provided for the above-referenced project. The Narragansett Bay Commission is proposing upgrades to the biosolids management process at the Field's Point Wastewater Treatment Facility in Providence, RI. It is anticipated the project will require permits from the RI Department of Environmental Management (RIDEM).

The following historic properties are listed in the National Register of Historic Places and within the vicinity or on the campus: Chemical Building, Return Sludge Pumping Station, and the Ernest Street Sewage Pumping Station. While it appears that the proposed project will not directly impact any historic properties, new construction has the potential to indirectly affect historic properties. In order to understand the effects of the proposed project, an effects assessment should be submitted to this office for review. Please indicate if any federal funds, permits, or licenses will be utilized for this project.

These comments are provided in accordance with Section 106 of the National Historic Preservation Act, the Rhode Island Historic Preservation Act and Rhode Island General Laws. If you have any questions, please contact RIHPHC Project Review Coordinator Elizabeth Totten at 401-222-2671 or elizabeth.totten@preservation.ri.gov.

Sincerely,

Elizabeth Totten
FOR

Jeffrey Emidy
Executive Director
State Historic Preservation Officer

251016.01est

The Narragansett Bay Commission
One Service Road
Providence, Rhode Island 02905

401 • 461 • 8848
401 • 461 • 6540 FAX

http://www.narrabay.com

Vincent J. Mesolella
Chairman

Laurie A. Horridge
Executive Director

October 20, 2025

Rhode Island Historical Preservation & Heritage Commission
ATTN: Elizabeth S. Totten
1 Capitol Hill, Suite 201
Providence, RI 02908
Via email: elizabeth.totten@preservation.ri.gov

RE: RIHPHC Project No. 19177 – Field's Point Facility Plan Amendment

Dear Ms. Totten,

On October 16, 2025 the Narragansett Bay Commission (NBC) electronically received The Rhode Island Historical Preservation and Heritage Commission's (RIHPHC) Intergovernmental Review Response letter related to the Field's Point Biosolids Management Upgrades Facility Plan Amendment (FPA).

As part of preparing the FPA, NBC's professional consultants Jacobs Engineering Group and Pare Corporation completed a Historical and Archaeological Features Evaluation related to this project. The properties identified in RIHPHC's response were identified in Section 4.4.5 of the FPA, which was not originally shared to maintain brevity but has been attached to this letter for reference along with a figure identifying the relevant structures. In the provided FPA Environmental Assessment (Section 7.3), NBC and its consultants determined that this project is not anticipated to disturb or impact, directly or indirectly, historical, archaeological, or cultural resources given the project's location away from the identified historical buildings, as discussed in the provided Section 7.3.5. NBC will confirm and revise this section to ensure that this finding is clear in the FPA. Additionally, NBC will continue to coordinate with RIHPHC during the projects design phase, as necessary, to ensure that the limits of the defined work will not impact the identified historical structures either directly or indirectly. This coordination will include careful site planning for contractor equipment and materials storage areas, truck routes, staging and rigging locations, and all other relevant construction activities.

NBC appreciates the time and due diligence from RIHPHC's staff to review and prepare feedback on the Field's Point FPA. As one of the oldest wastewater treatment facilities in the United States, NBC remains committed to protecting Field's Point's historically-significant structures to the maximum extent practical. Please contact myself with any additional comments or clarifications needed.

Sincerely,

Charles Spellman Jr., PhD, PE
Principal Environmental Engineer
Narragansett Bay Commission
cspellman@narrabay.com
401-461-8848 x118

4.4.3 Topography

The site topography was obtained from a light and detection ranging survey obtained by RIGIS (see Site Topography figure in Appendix D). The existing topography shows that the proposed project area is primarily flat, at an approximate elevation of 20 feet, with localized areas increasing to an elevation of 30 feet. However, the site and surrounding areas to the north, east, and south have been developed, and several lots serve Port Facilities along the Providence River. These facilities, including the Field's Point WWTF, are considered flat as a result of the industrial development the final earthwork requirements will be determined as the design of the recommended plan is developed. There is a residential neighborhood south and west of the facility. It is on a slope with a maximum elevation of approximately 60 feet, upgradient of the treatment facility.

4.4.4 Geology

The surficial geology under the site and the location of the proposed improvements is within artificial fill. Artificial fill is defined as human-transported materials (like soils, rocks, or debris) that have been moved and deposited to alter the natural land surface. In this case, areas were filled in adjacent to the Providence River to support the historical port development adjacent to the river. Adjacent to the site are areas of kame terraces, sand and gravel deposited by meltwater streams, produced by glacial activity.

The bedrock geology beneath the limits of the site is within the Rhode Island Formation. This is defined as greenish gray to black greywacke, conglomerate sandstone, shale, and meta-anthracite material. The depth to bedrock is greater than 6.5 feet.

4.4.5 Historical and Archaeological Features

The site and surrounding areas were researched to determine if they contained any historical or archaeological features, as defined by the Historical Preservation & Heritage Commission (HPHC) and shown in the Historical Resources figure in Appendix D. Existing geographic information system data sets and publications were used, and it was found that several buildings in and around the site were designated as Historic Buildings. The site and the surrounding area were not within a HPHC Historic District Boundary.

The following designated Historic Buildings were identified at the Field's Point WWTF:

- Ernest Street Pump Station, Code: 28108, State Register Individual Property
- Chemical Building (Currently the Field's Point WWTF Maintenance Building), Field's Point, Code: 28109, State Register Individual Property
- Sludge Press House, Code: 28110, State Register Individual Property. The building was demolished, with permission, in 2006.
- Return Sludge Pumping Station, Code: 28111, State Register Individual Property

The following building is south of the site and is considered a Historic Property:

- Washington Park Sewage Pump Station, Code: 28112, State Register Individual Property

DRAFT

project will not impact offsite uses and is not 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.

7.3.4 Socioeconomic Considerations

This project is not expected to impact local businesses, because work will be entirely on the Field's Point WWTF site and NBC-owned land, and away from existing businesses and commerce. Existing adjacent industrial and commercial facilities are not expected be impacted. However, if the design process identifies potential impacts, NBC will work with adjacent facilities to limit those impacts. Strategies could include staging construction during certain times of the day and providing traffic control measures for the adjacent road to maintain existing access to all industrial facilities that use Terminal Road.

Aside from the business impacted by the improvements, the construction phase of this project can be expected to benefit the local economy through increased local construction employment, material supplies, etc. Where possible, NBC will use local construction firms for this project. Much of the construction work required for the Field's Point WWTF upgrades could likely be completed by construction firms that currently work in the local market.

7.3.5 Historical, Archaeological, and Cultural Resources

The proposed work is north of the chemical feed building and sludge press house, two buildings designated as historic by the HPHC. The proposed Field's Point WWTF upgrades are not anticipated to disturb historical, archaeological, or cultural resources given the project's location away from the identified historical buildings.

NBC and the HPHC will coordinate the limits of defined work and stipulations by RI HPHC to protect the existing designated Historic Buildings at the site.

7.3.6 Land Use

The project is proposed entirely within the Field's Point WWTF site, and construction will not impact offsite land uses.

7.3.7 Recreation

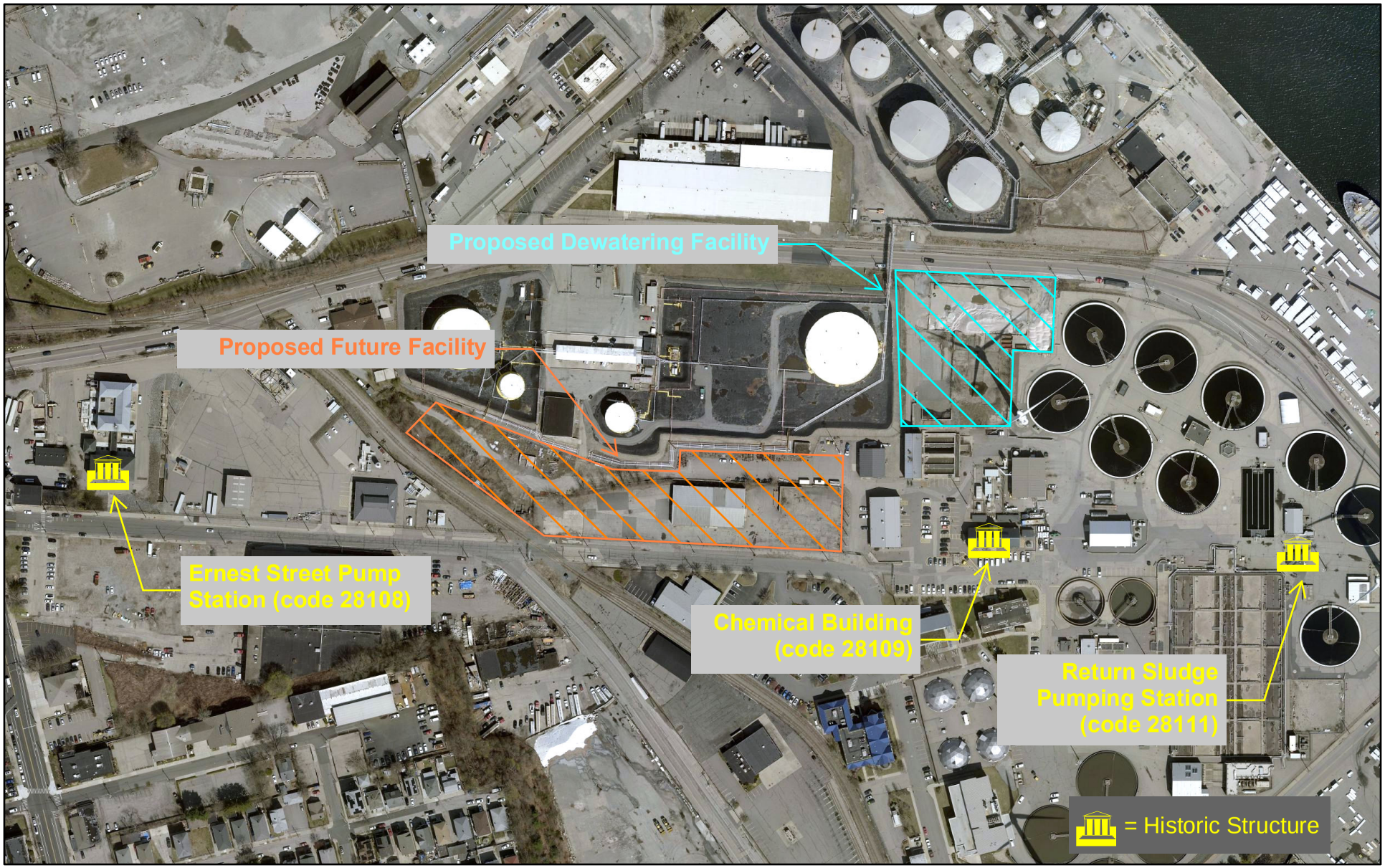
There are no parks or recreational areas within the Field's Point WWTF site or near the site. Therefore, the proposed upgrades to the existing Field's Point WWTF site are not anticipated to impact recreational facilities.

7.3.8 Traffic and Access Considerations

This project will be constructed entirely within the Field's Point WWTF site and adjacent to Terminal Road and its right-of-way, which is currently used by both NBC and the adjacent industrial facilities. Construction vehicle traffic is anticipated to be minimal, limited to the movement of personnel and material deliveries over access roadways NBC currently uses. Future deliveries of material from the proposed improvements will travel westbound on Terminal Road toward Allen Ave. Historically, the site has been a waste transfer station, as well as a salt storage area for the City of Providence. Each facility type required truck traffic along Terminal Road to deliver and remove material from the facility. The proposed project will require a similar traffic pattern. As such, no significant short-term or long-term traffic impacts are anticipated as a result of this project.

DRAFT

FPWWTF FPA Historical Structures



The Narragansett Bay Commission

0 155 310 620 ft
0 45 90 180 m

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

NBC/RIGIS/RIDEM