



# WASTEWATER TREATMENT BY THE NARRAGANSETT BAY COMMISSION

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Narragansett Bay Commission – Providence, Rhode Island, USA  
New England Estuarine Research Society Fall Conference – November 2022

## Acknowledgements:

Thanks to NBC staff Paul Desrosiers, Kerri Houghton, Jim Kelly, Walter Palm, Nicole Skyleson, and Barry Wenskowicz for their help with this poster, and thanks to all of the NBC for their daily dedication to operating these plants and protecting Narragansett Bay.

## NBC WASTEWATER TREATMENT FACILITIES

- RIPDES Permits: RI0100315 (Field's Point) and RI0100072 (Bucklin Point)
- Extensive network of monitoring sensors and sampling to ensure discharges do not exceed permit limits for pollutants.
- Monitoring data available: <https://echo.epa.gov> and annual reports at <http://www.narrabay.com/programs-and-initiatives/environmental-monitoring/>

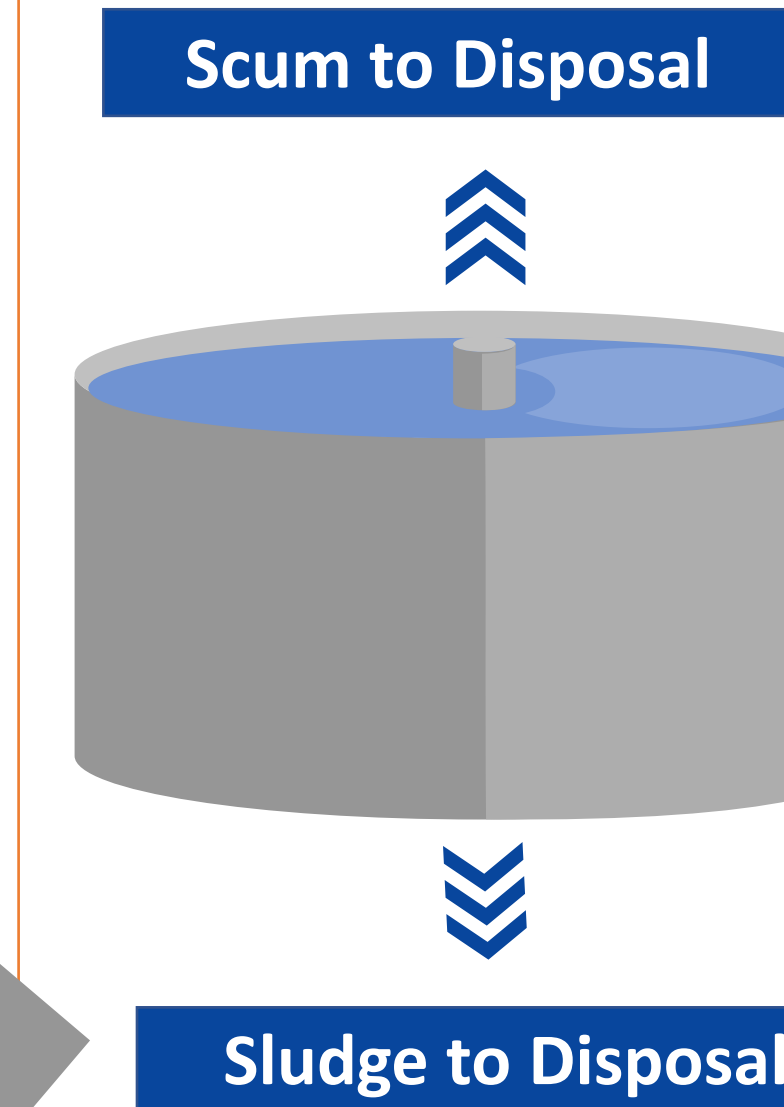


**Field's Point** is in Providence, RI. It has an advanced secondary treatment capacity (dry weather) of 65 MGD. In 2021, influent flows averaged 44 MGD.

**Bucklin Point** is in East Providence, RI. It has an advanced secondary treatment capacity (dry weather) of 36 MGD. In 2021, influent flows averaged 20 MGD.

## WET WEATHER TREATMENT

When flows exceed capacity of Advanced Secondary Treatment, they are diverted to separate wet weather tanks. Flows are allowed to settle and are disinfected prior to discharge to the receiving waters.



**Wet Weather Effluent**

**Field's Point** – 123 MGD capacity. Disinfection by chlorination. 2019-Aug. 2022 0.5 days/mo. with discharge, 9.5 MGD

**Bucklin Point** – 70 MGD capacity. Disinfection by chlorination with dechlorination 2019-Aug. 2022 3.3 days/mo. with discharge, 7.8 MGD

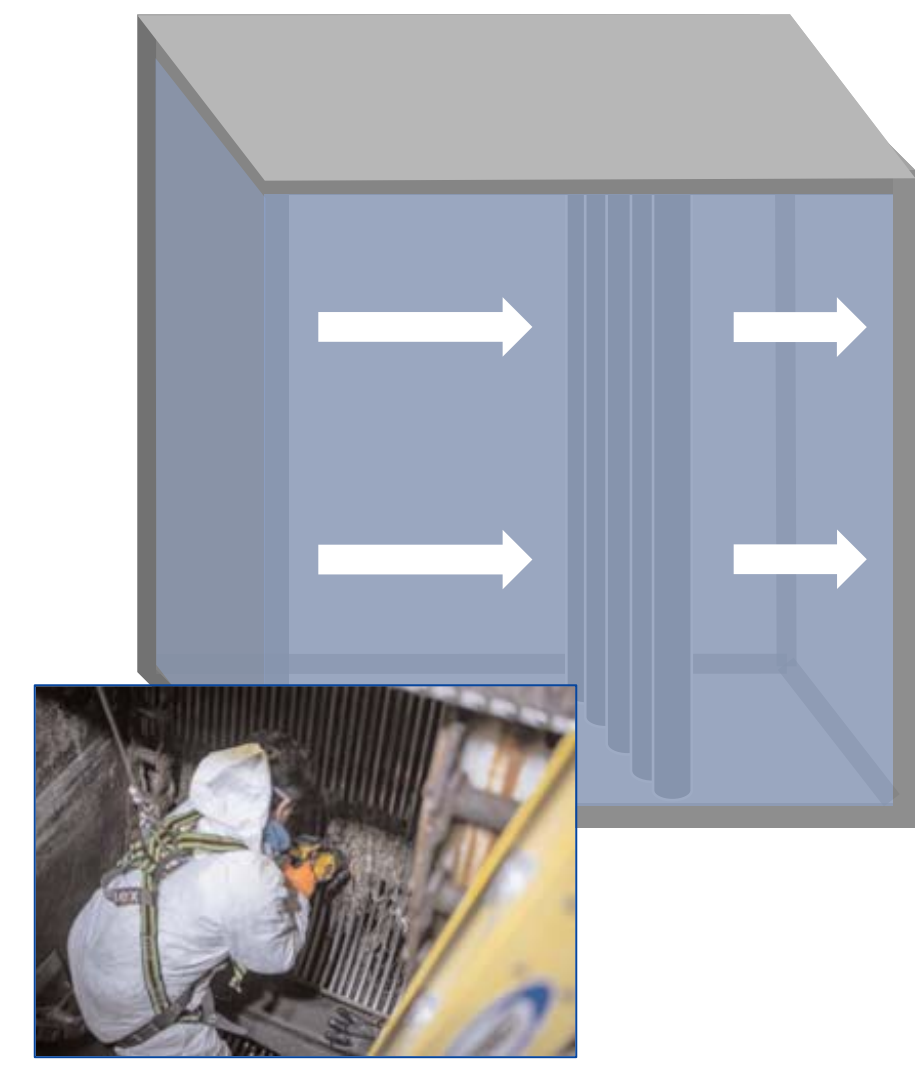


The NBC district includes several communities in the Providence metropolitan area, serving approximately 395,000 people and 9,000 commercial and industrial customers.

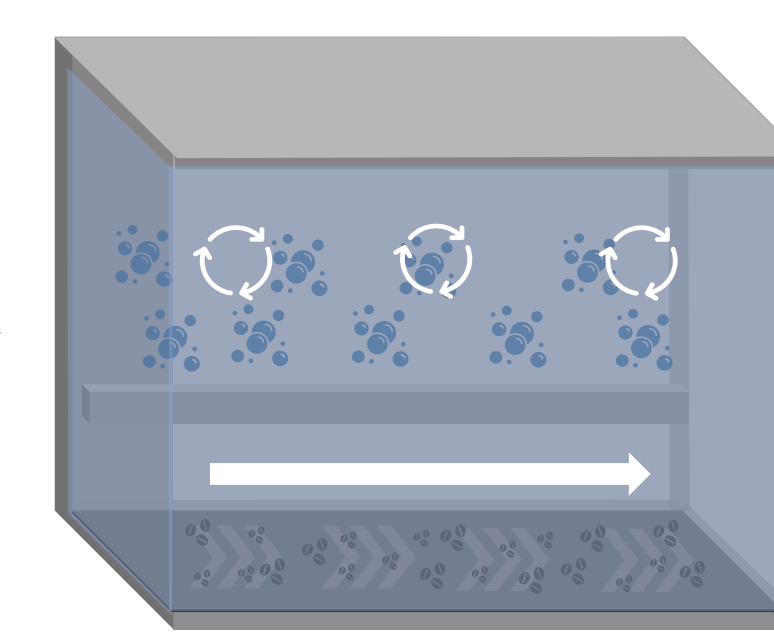
Raw Influent

## PRELIMINARY TREATMENT

**Bar screening:** Large debris is caught, collected, and disposed of in landfill



**Grit Removal:** Field's Point: aeration suspends lighter particles, denser materials (e.g., gravel, coffee grounds) settle and are removed by conveyor belt along tank bottom.

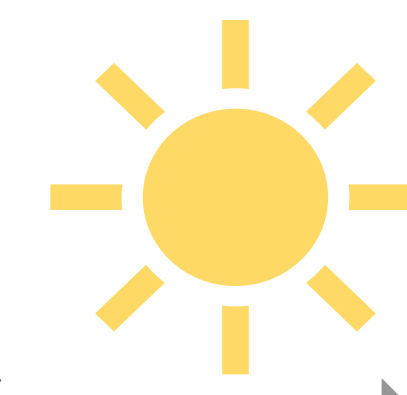


Bucklin Point: vortex separator removes grit like a centrifuge.

Wet Weather Conditions

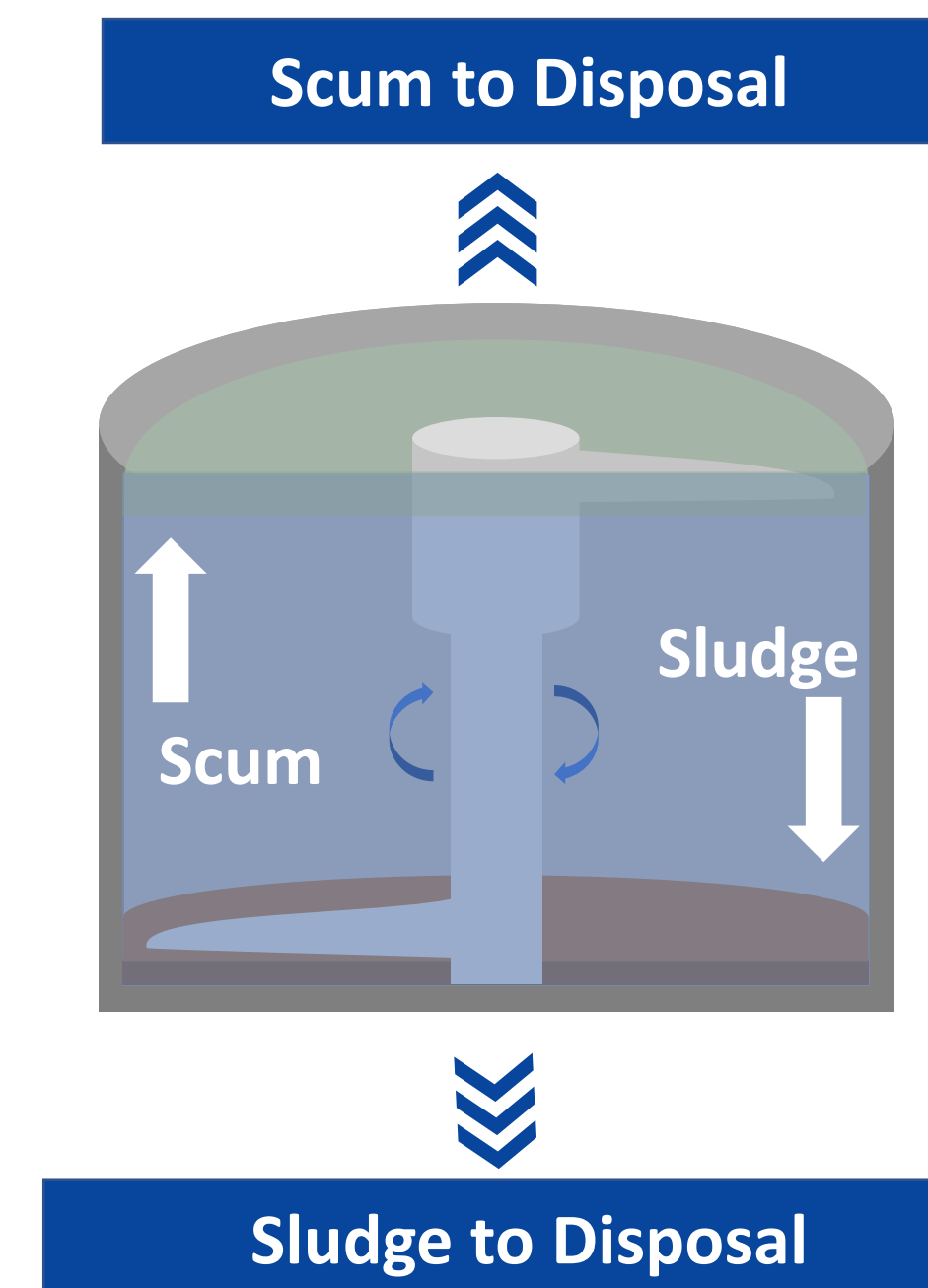


Dry Weather

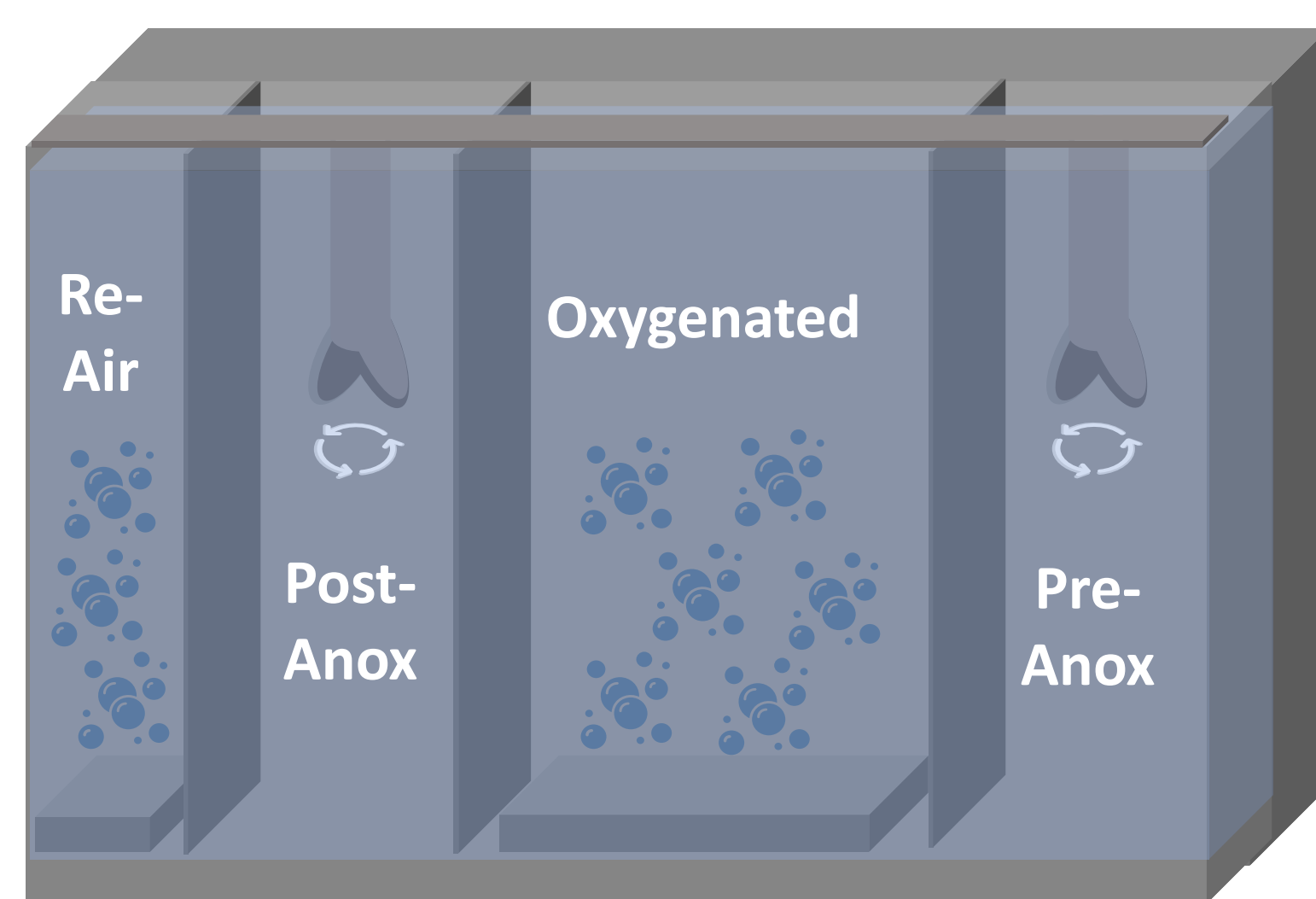


## PRIMARY TREATMENT

**Primary Clarification:** Wastewater is conveyed to the primary clarifiers for removal of the readily settleable solids and floating material. The primary clarifiers provide a quiescent environment which allows the solids that have a specific gravity greater than water to settle out and those that have a specific gravity less than water to rise to the surface. The settled solids are collected and concentrated in the bottom of the clarifier as a slurry called "sludge".



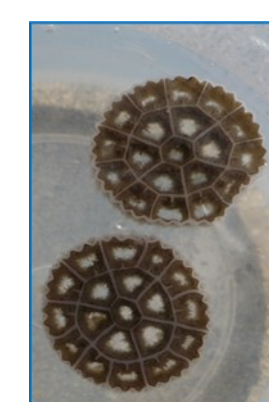
## ADVANCED SECONDARY TREATMENT



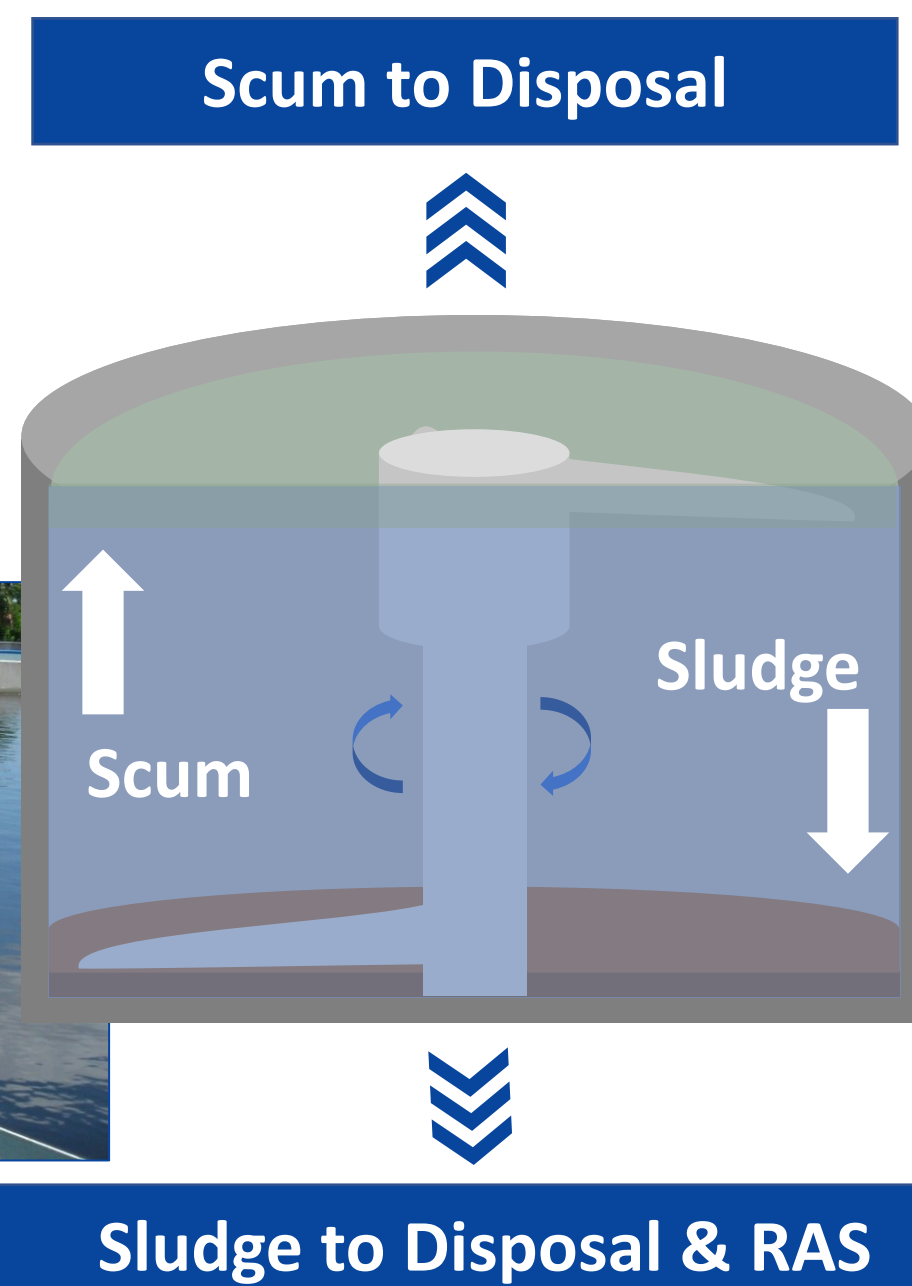
**Biological Nutrient Removal (BNR):** Microbes (bacteria, etc.) in the mixed liquor make up the "activated sludge". Tanks are divided into anoxic and aerated zones to optimize conditions for microbial nitrification and denitrification. Flows are recycled between zones to further increase nitrogen removal.

- Aerobic zones:** nitrification ( $\text{NH}_3 \gg \text{NO}_2$  and  $\text{NO}_3$ )
- Anoxic zones:** de-nitrification ( $\text{NO}_2$  and  $\text{NO}_3 \gg \text{N}_2$  gas) using BOD and added carbon (as needed).  $\text{N}_2$  gas is allowed to disperse to the atmosphere.

**Field's Point:** Integrated Fixed Film Activated Sludge (IFAS) – plastic media in aerated zone allows for a higher concentration of bacteria in the activated sludge, enabling greater removal efficiency in a small footprint.

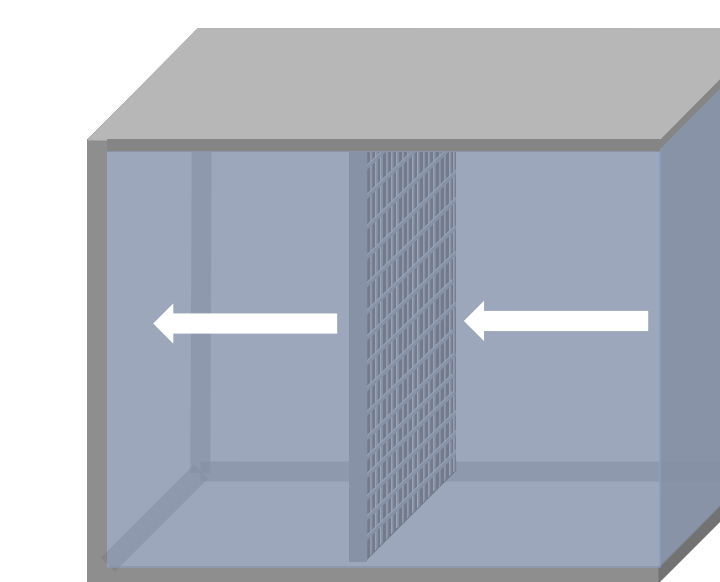


**Bucklin Point:** Four-stage Bardenpho – optimizes nitrogen removal May-October. In the off-season, the tanks are typically changed to a Modified Ludzack-Ettinger (MLE) process.



**Final Clarification:** The microorganisms that settle to the bottom of the clarifiers form a thickened slurry referred to as "activated sludge". This sludge is pumped from the clarifiers back to the BNR system as "return activated sludge" (RAS). The clarified effluent moves on to disinfection.

**Intermediate Screening:** Removes fine particles (6 mm or larger). Material is disposed of at a landfill.



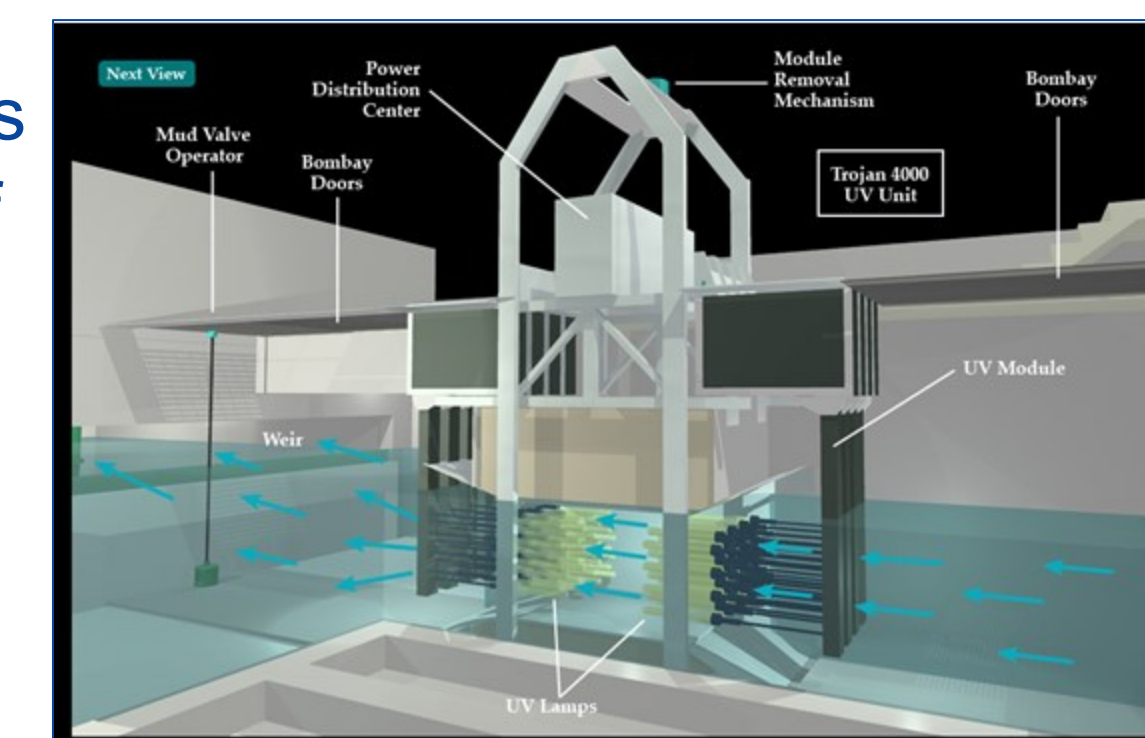
**Sodium Hydroxide (Field's Point) or Soda Ash (Bucklin Point) Addition:** Delivers alkalinity to the BNR System to promote efficient nitrification.

## DISINFECTION

**Field's Point:** Chlorination and Dechlorination: A meandering chlorine contact tank allows sufficient time for sodium hypochlorite to kill pathogens and other microorganisms. Dechlorination occurs at the effluent end of the tank, where sodium bisulfite is injected to remove the residual chlorine prior to discharge.



**Bucklin Point:** Ultraviolet Light: Wastewater flows through banks of UV bulbs of sufficient intensity to kill pathogens and microorganisms.



## DISCHARGE

**Final Effluent**

**Receiving Waters:**  
Field's Point: Providence River Estuary.  
Bucklin Point: Seekonk River Estuary.

## Biosolids Handling and Disposal

Scum and sludge are removed at various stages of the treatment process. They are ultimately disposed of offsite by an NBC Contractor, either through incineration or landfill.



**Field's Point** – Prior to disposal, biosolids are gravity thickened and dewatered via centrifuge.

**Bucklin Point** – Prior to disposal, biosolids are anaerobically digested and dewatered via centrifuge. A Biogas Engine has been built to reclaim energy from the gasses produced by digestion.