



Presented at the 2018  
NEWEA Annual Conference

# Town of Newington, NH WWTF & Pump Station Upgrades

Jeff Mercer, PE | Wright-Pierce

TOWN OF NEWINGTON  
WASTEWATER TREATMENT  
FACILITY  
← MAIN OFFICE SEPTAGE →

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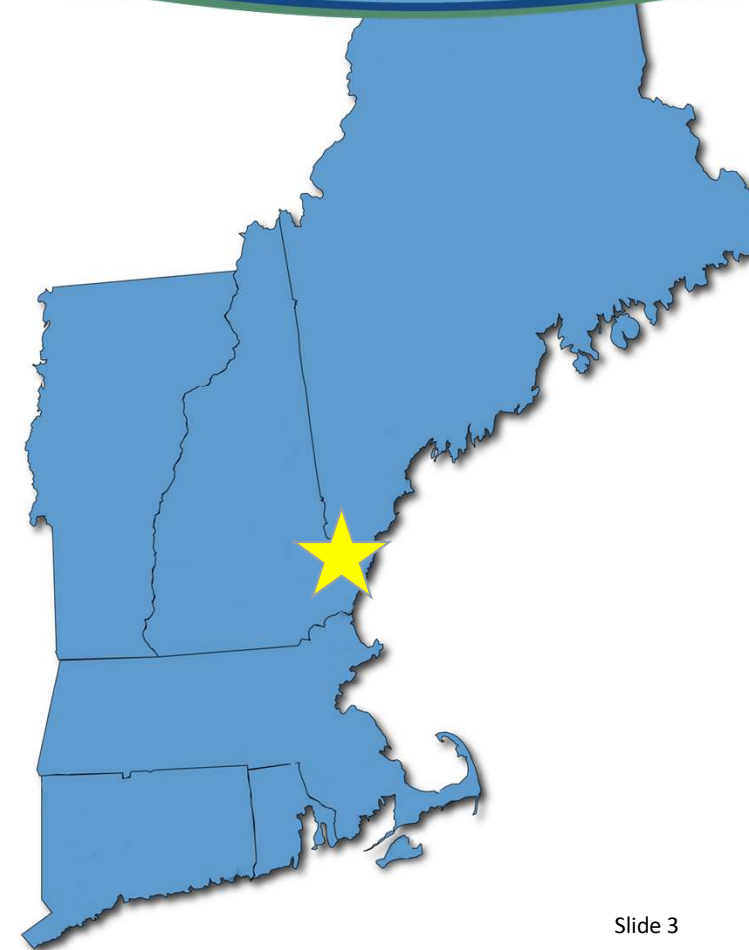
# Presentation Overview

- Newington WWTF Background
- Project Overview
  - Headworks Upgrades
  - Secondary Treatment
  - Pump Stations
- Project Challenges
- Project Results



# Newington WWTF Background

- Influent Flows
  - Average Daily Flow 0.1 MGD
  - 99% of Flow from Commercial/Industrial
- Collection System
  - 2 Pump Stations
  - 11 miles of Separated Sewer
- WWTF
  - Preliminary, extended air, and disinfection
- Effluent Disposal to Piscataqua



# Newington WWTF Background

**Construction of PTUs**  
Original tank converted  
to sludge digester

**Construction of  
Chlorine Contact Tank**

**Conversion of  
PTUs to SBRs**

1960's

1978

1980's

1995

2006

2017

**Construction of Original  
Treatment Unit**

**Collection System  
and Pump Stations**

**New Dewatering  
System**

# Project Drivers

- EPA/NHDES push for TN removal in Great Bay Estuary
- Newington pro-actively initiated project to reduce Nitrogen output and upgrade aging infrastructure

Source: PortsmouthNH.com

## Influent Flows – Basis of Design (MGD)

|                  | Annual Average | Min Month   | Max Month   | Max Day     | Instant Peak |
|------------------|----------------|-------------|-------------|-------------|--------------|
| Current          | <b>0.13</b>    | <b>.09</b>  | <b>0.23</b> | <b>0.31</b> | <b>0.72</b>  |
| Projected (2040) | <b>0.29</b>    | <b>0.19</b> | <b>0.51</b> | <b>0.71</b> | <b>1.19</b>  |

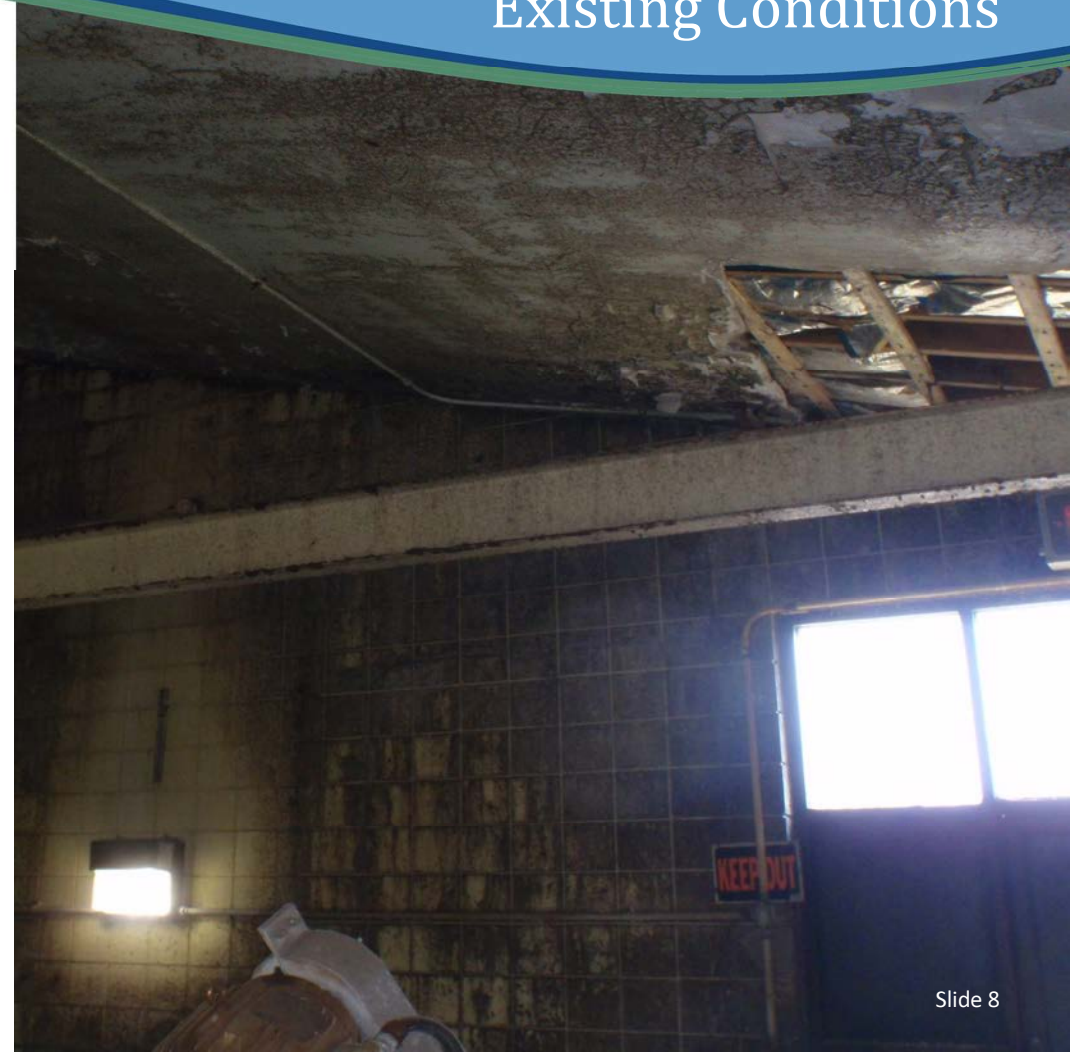
## Influent Loading – Basis of Design (lb/day)

|               | BOD   | TSS   | NH3 | TKN |
|---------------|-------|-------|-----|-----|
| Average       | 625   | 750   | 85  | 100 |
| Maximum Month | 850   | 1,050 | 120 | 140 |
| Maximum Day   | 1,000 | 1,200 | 135 | 160 |

# Headworks

## Existing Conditions

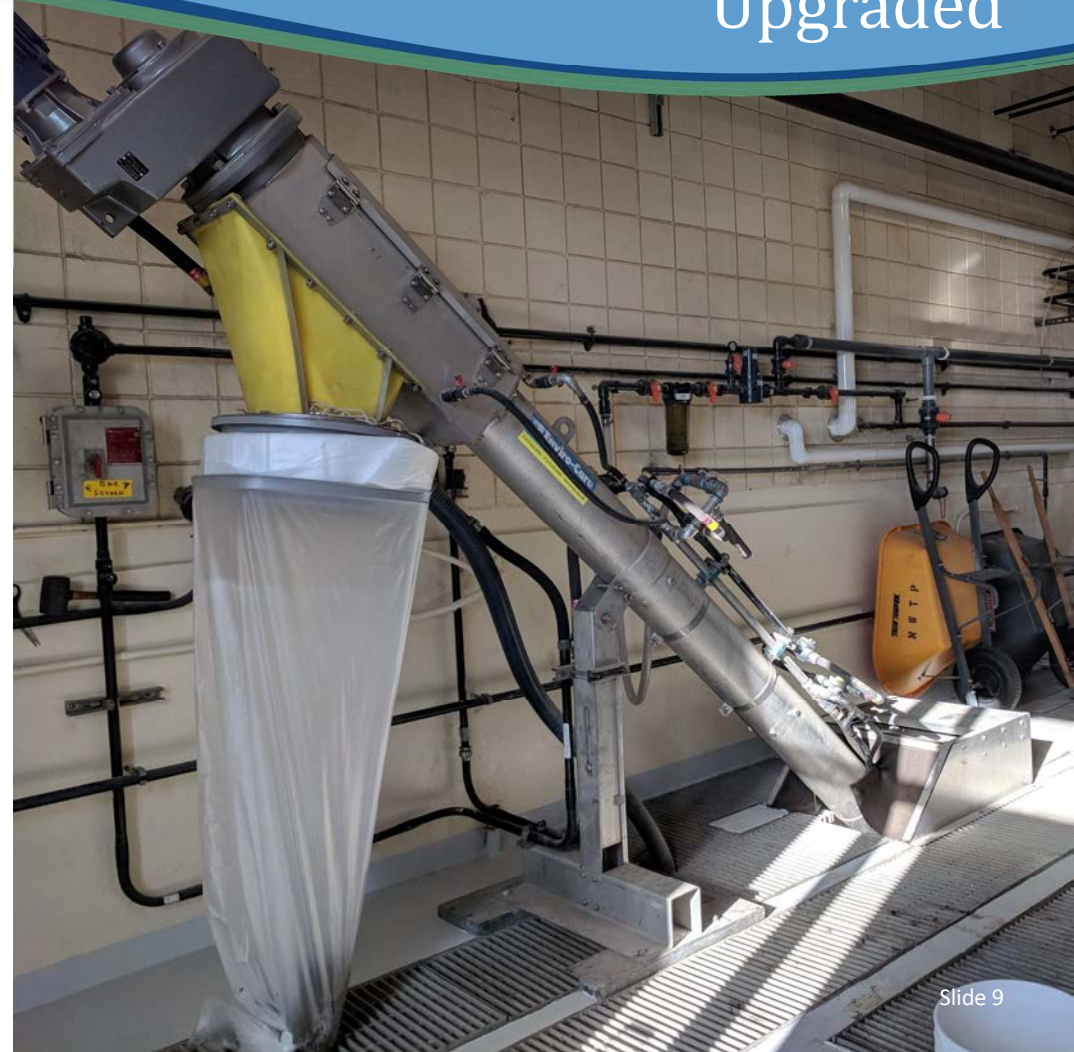
- Interior Space in Poor Condition
- Manual Bar Rack
  - 2 3/8" spaces
- Aerated Grit Chamber
- Channel Grinder





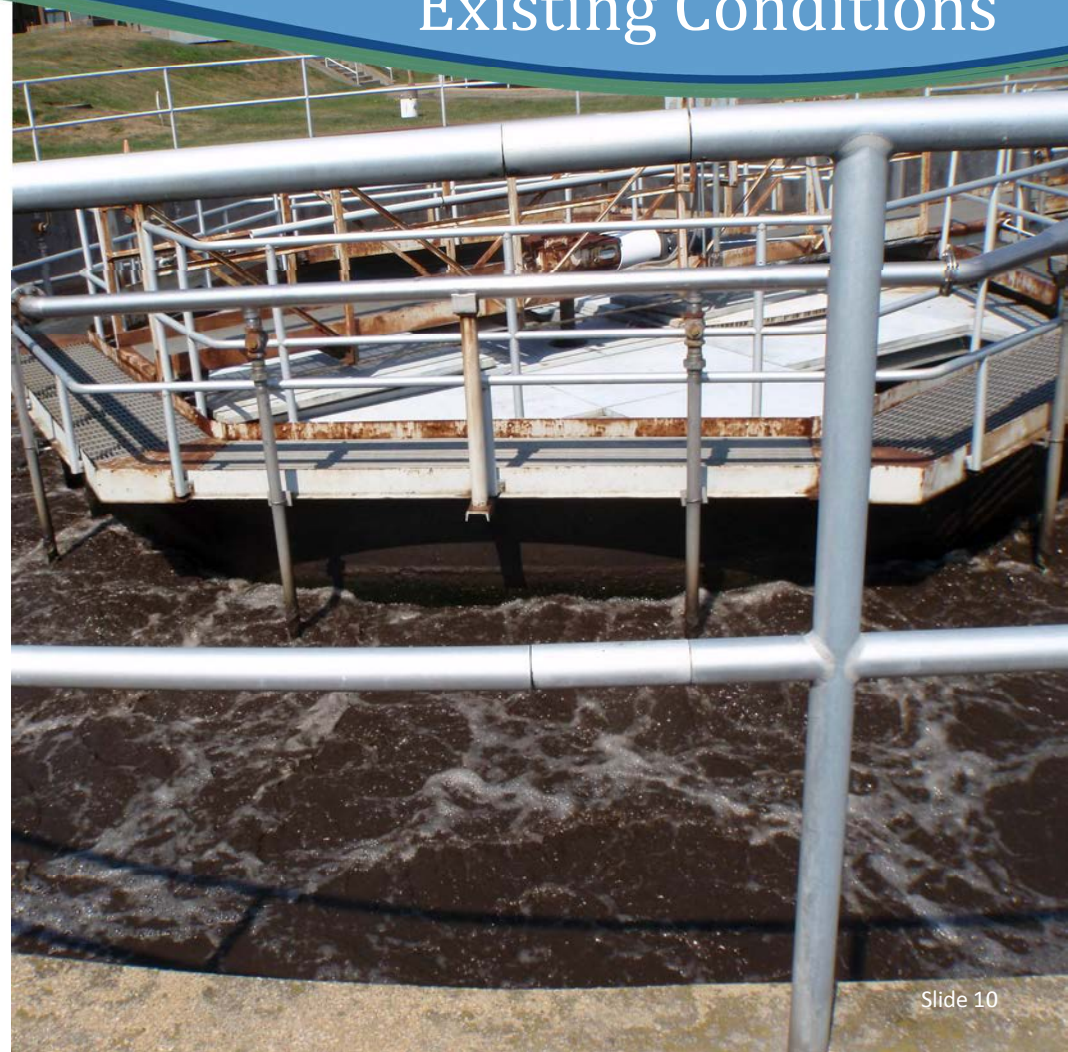
# Headworks Upgraded

- Mechanical Screen
  - 1/4" perforated plate
- Grit removal screw
- Grit blowers
- Septage blowers
- Septage pump
- Replaced HVAC + Electrical
- Replaced ceiling and insulation



## Secondary Treatment Existing Conditions

- Existing PTU
  - Extended Air
  - Coarse bubble diffusers
  - Settling area in center



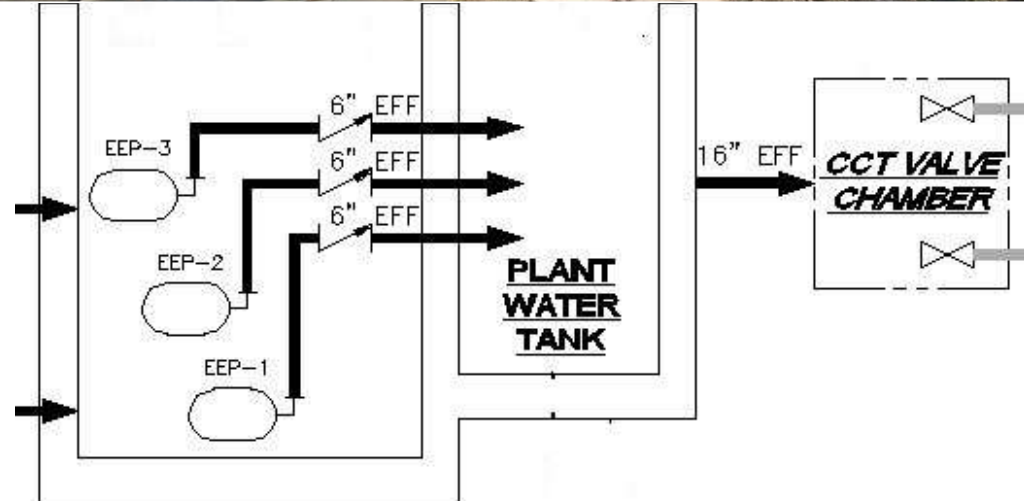
## Secondary Treatment Upgraded

- New SBRs designed for effluent TN removal of 5 mg/l
- Caustic System for pH adjustment



# Secondary Treatment Upgraded

- New Influent and Effluent Valve Vaults
- New Effluent Equalization Tank
- New Plant Water Tank



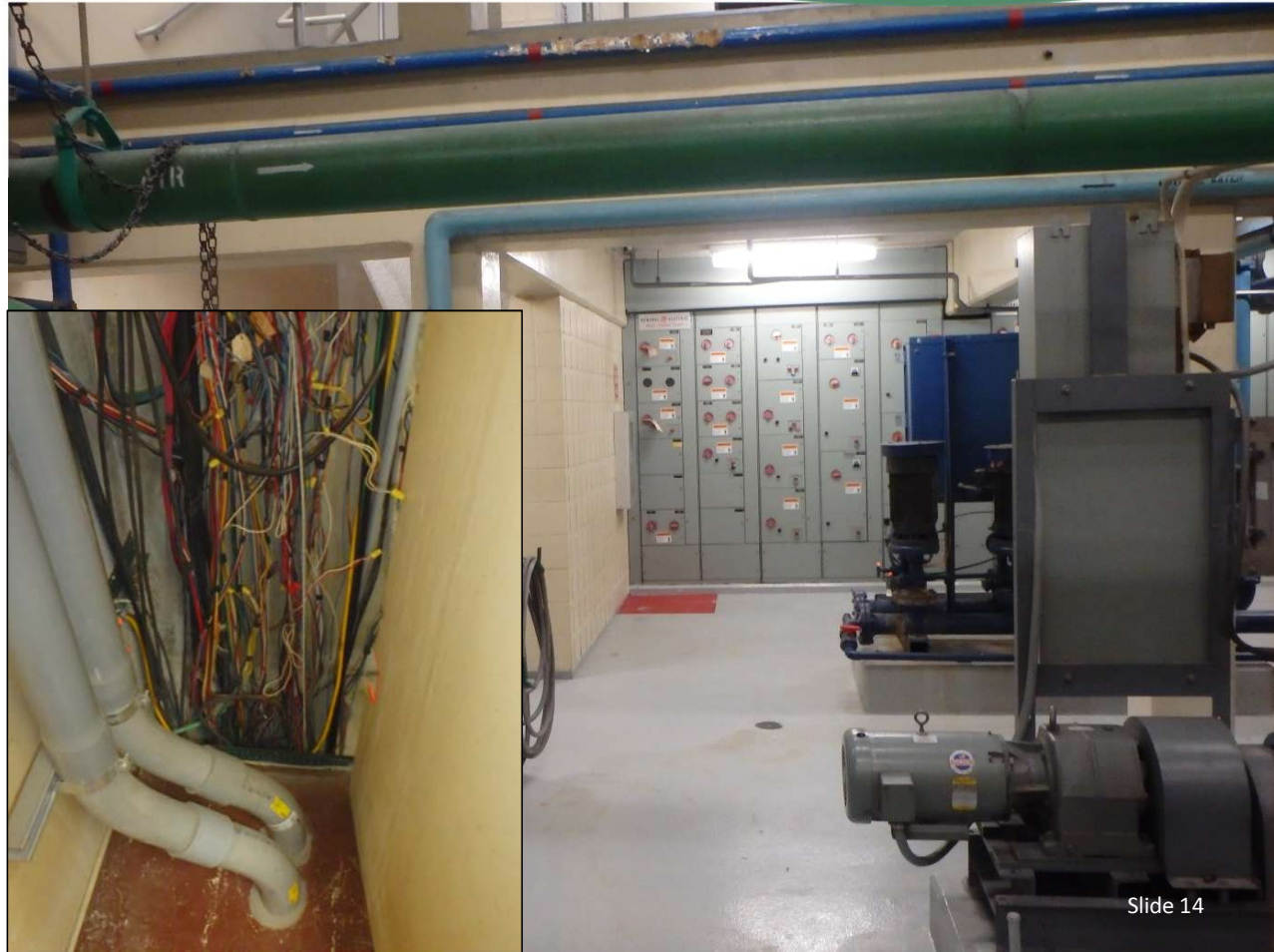
# Sludge Storage Existing Conditions



Steel Tank used as sheeting  
for construction of new tank

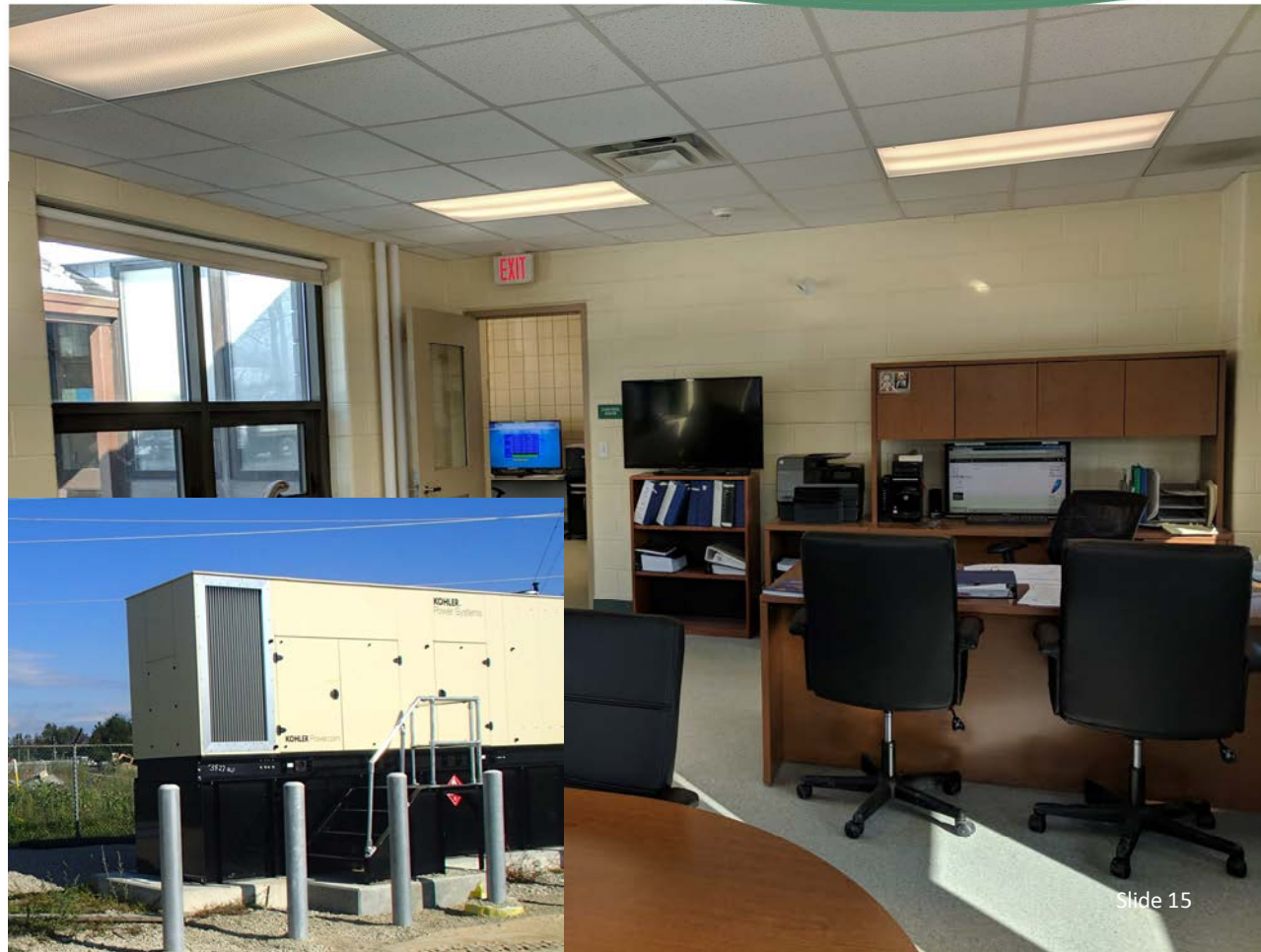
# Building Systems Existing

- Electrical Issues
  - Power, signal, control wire together, unlabeled
  - MCC in basement
- NFPA 820 code issues
- Failed HVAC
- Cramped Office Space

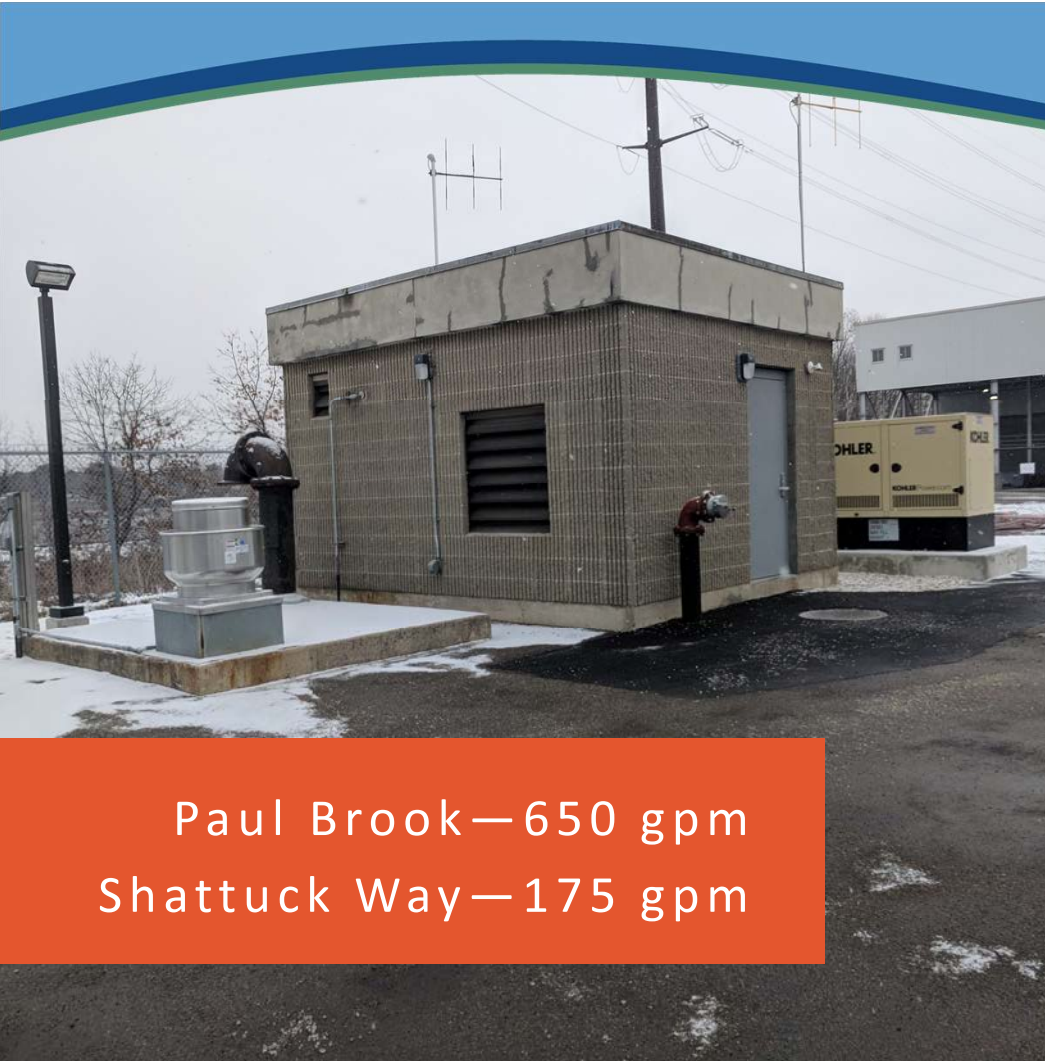


# Building Systems

- New Electrical Service
- Comprehensive Electrical Upgrade
- New Genset
- New HVAC Systems
- New Office Addition
- Added ADA Accessibility



# Collection System Pump Stations



Paul Brook—650 gpm  
Shattuck Way—175 gpm



## Paul Brook FM Breaks

- 2015 and 2017
- Environmental concerns
- NHDOT repaving road
- Highly acidic Soils



# Project Challenges Hydraulics

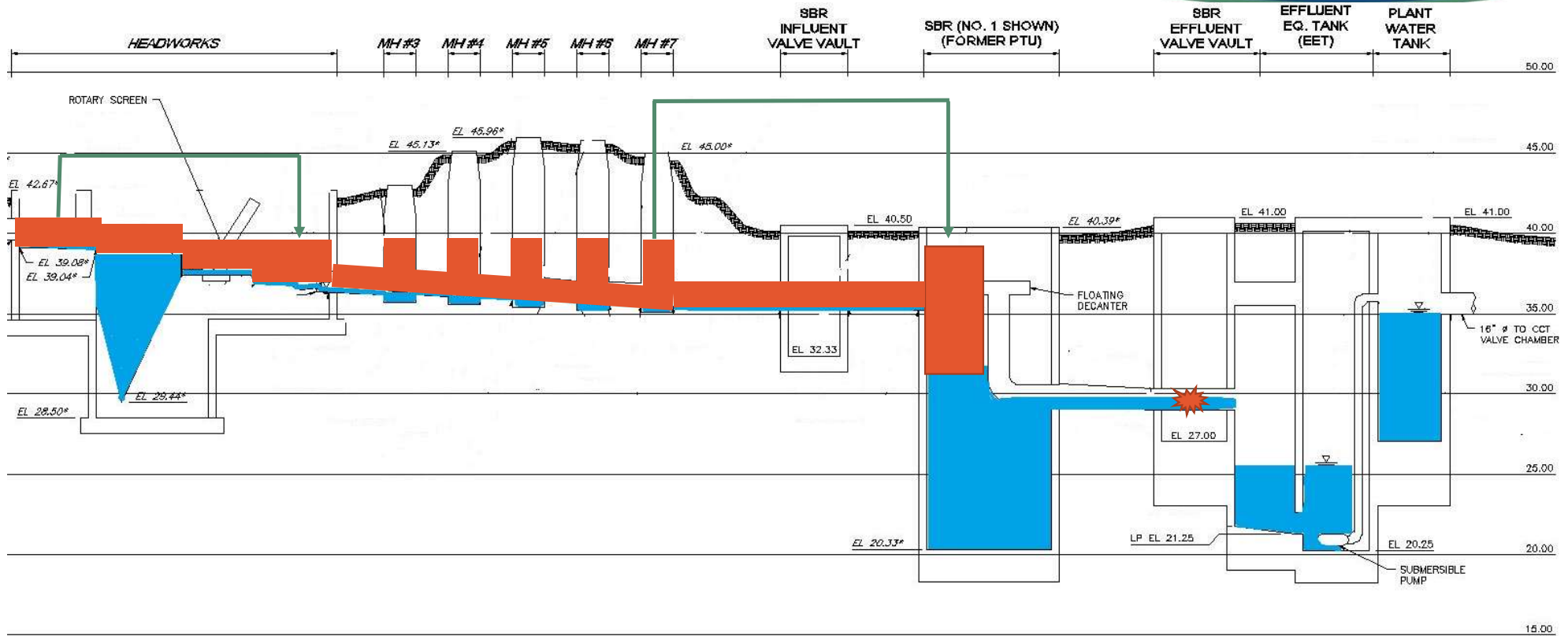
## Hydraulics

- Private sewer just upstream – risk of surcharge
- SBR raised the Maximum Water Elevation by 2.5-ft for TN removal
- Risk of overflows if motor operated valves or decanter failed closed

## Solutions

- Designed several passive overflows
- High Water Alarms throughout

# Project Challenges Hydraulics



# Project Challenges Site Constraints

## Site Constraints

- Under 2 Acres
- EET 21' below grade
- High Pressure gas mains
- High Voltage OH electric
- Existing ledge anchors

## Solutions

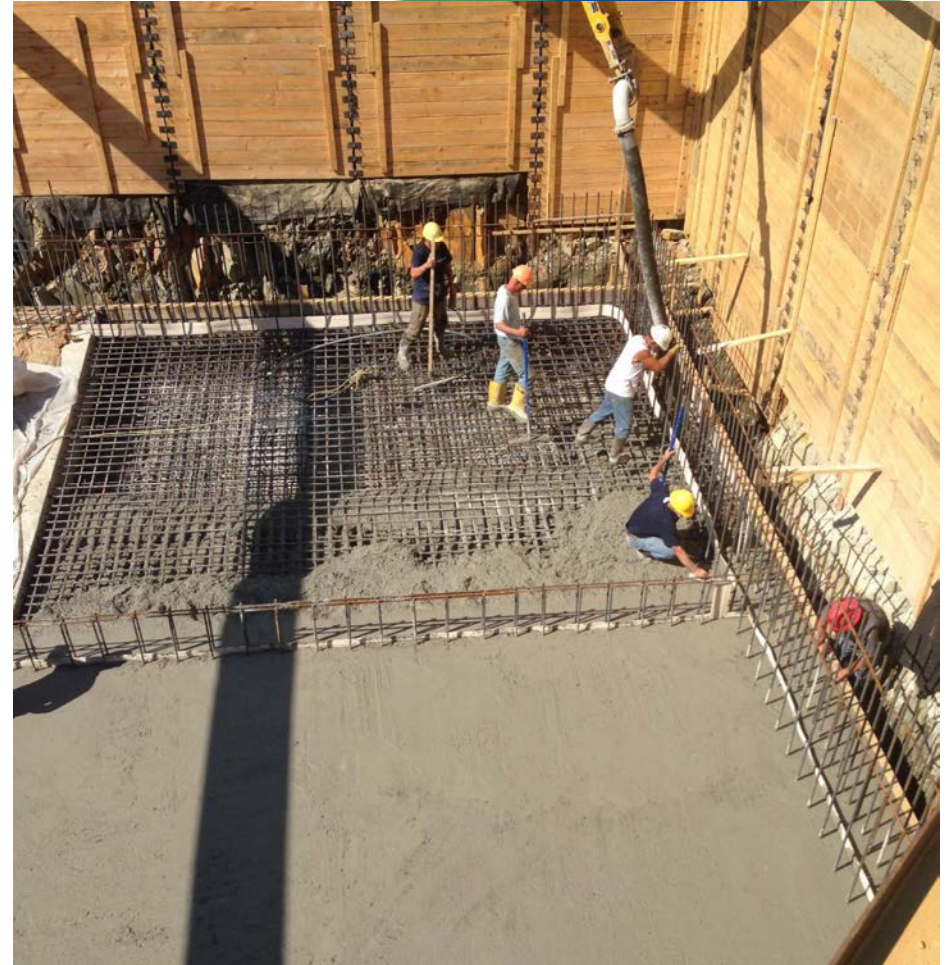
- Specified ledge removal with hoe ram
- Specified excavation support



## Project Challenges Site Constraints



# Project Challenges Site Constraints



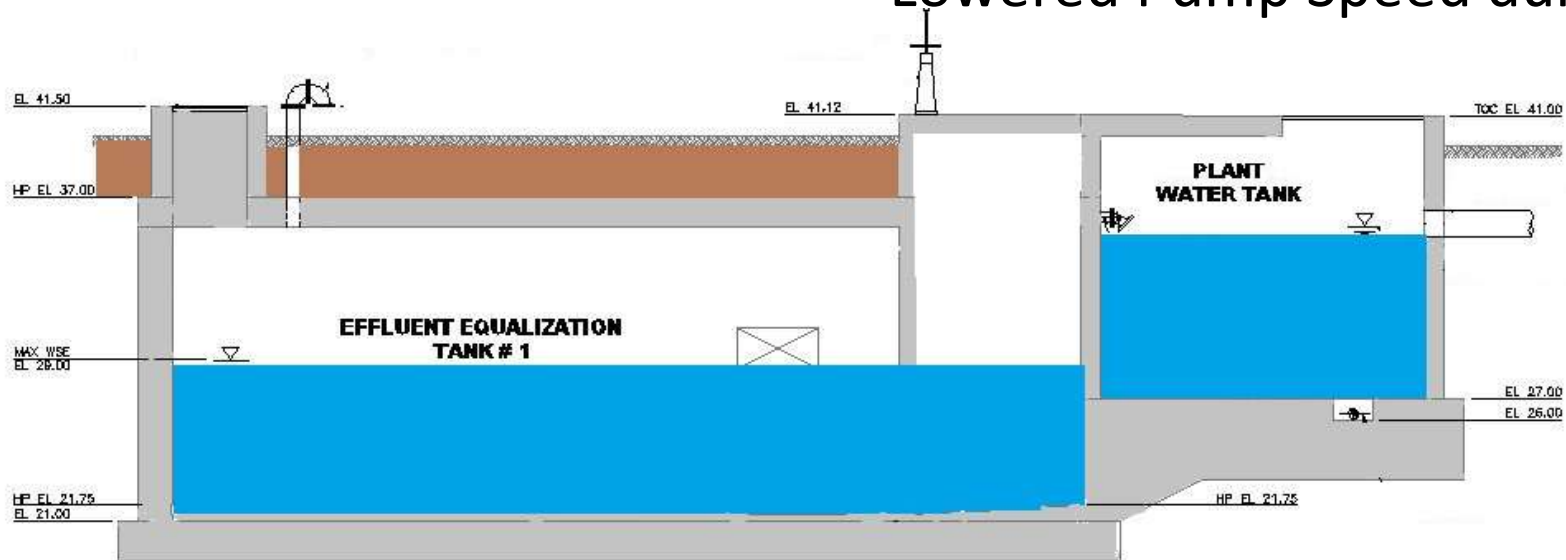
# Project Challenges Plant Water

## Diurnal Flow Variations

- Near zero flow at night – risk of running out of Plant Water

## Solutions

- Designed Plant Water Tank
- Sized EET to Store more effluent
- Lowered Pump Speed during start-up

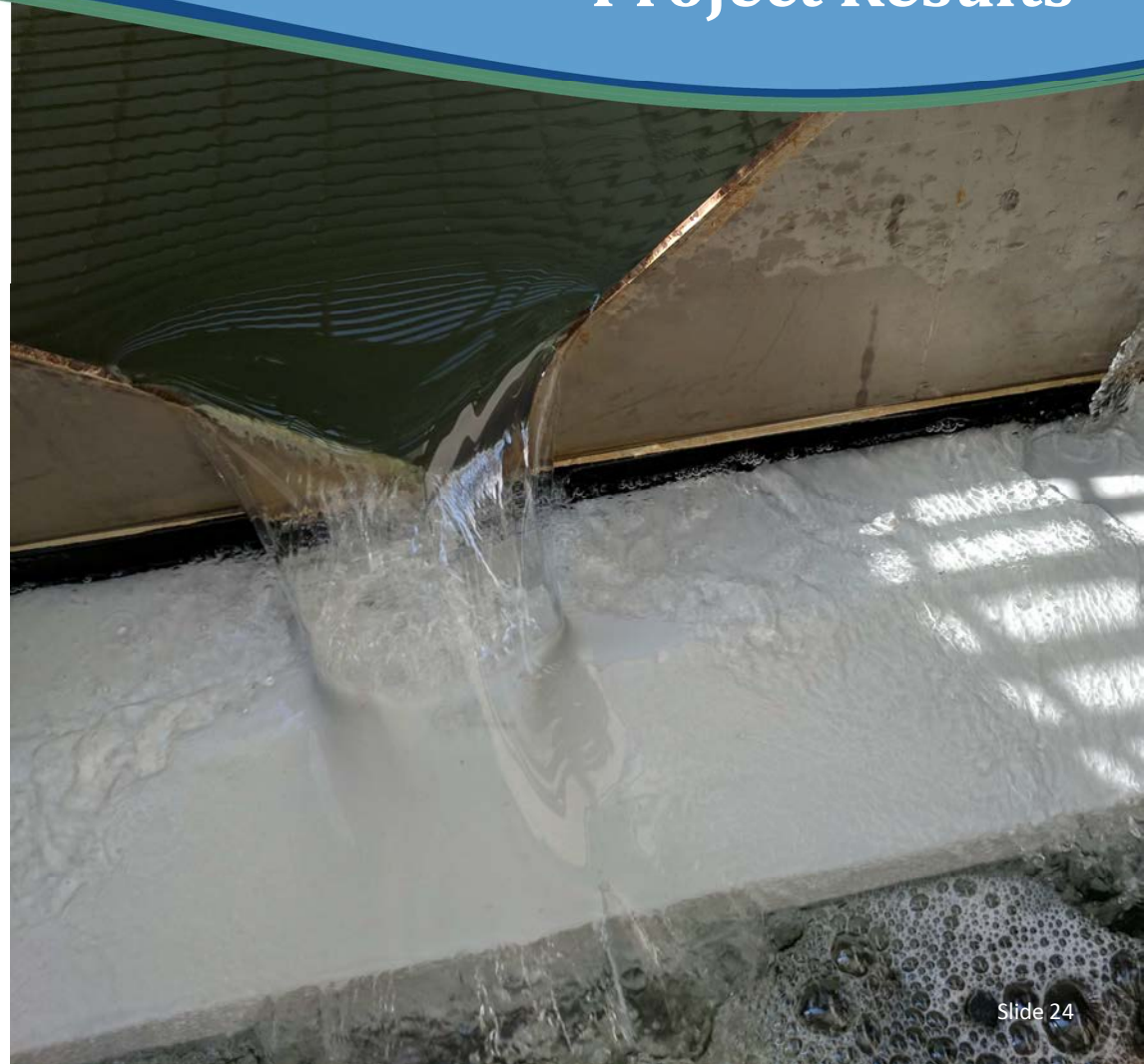


## Effluent Before Upgrade

- BOD~8 mg/l
- TSS~13 mg/l

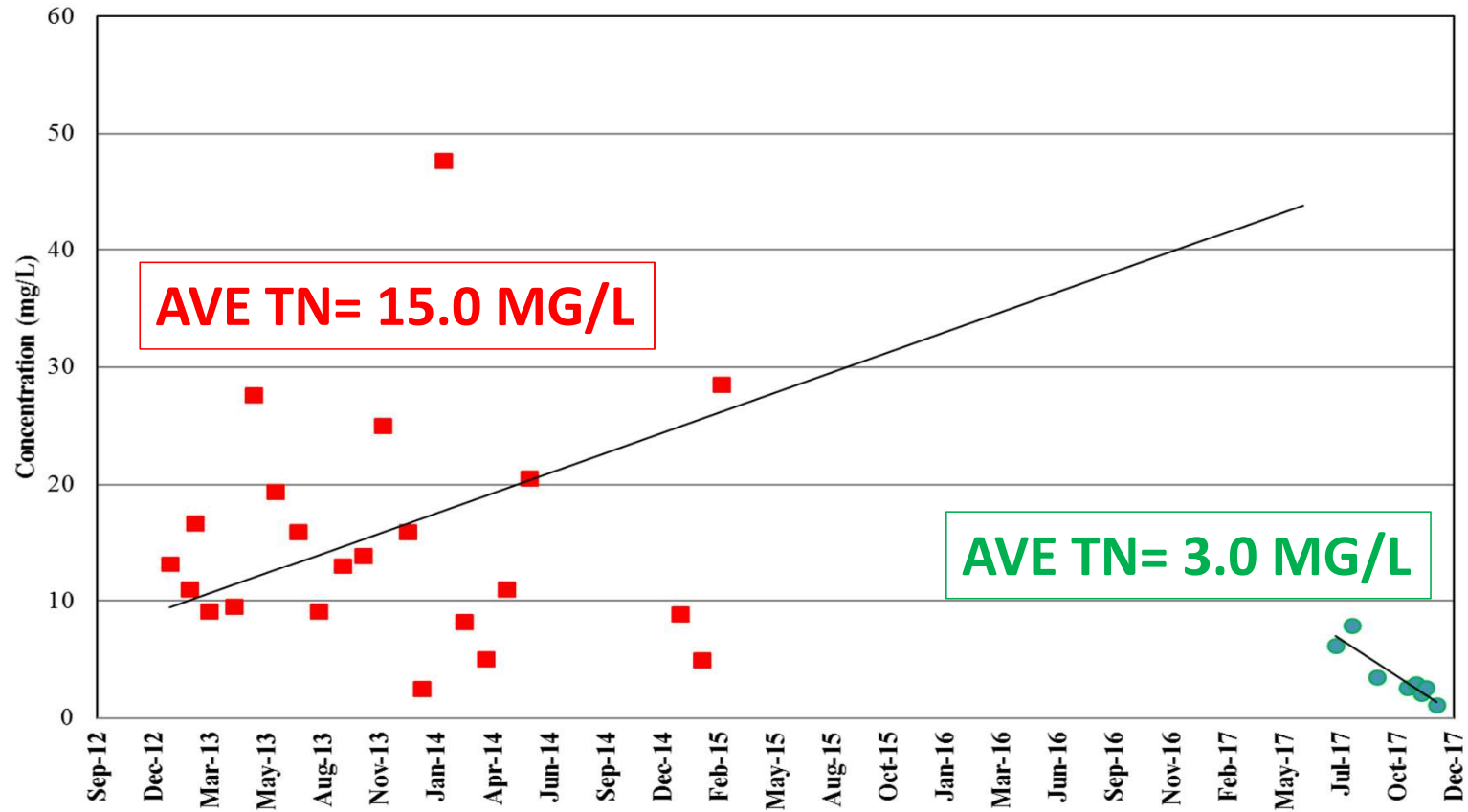
## Effluent After Upgrade

- BOD <5 mg/l
- TSS <5 mg/l





## EFFLUENT TOTAL NITROGEN CONCENTRATIONS PRE AND POST SBR



# Project Overview



## PROJECT COST

- Total Construction Cost \$7.7 M  
( $<1\%$  Change Order Value)
- Total Engineering Cost \$1.5 M
- Total Project Cost \$9.3 M



## PROJECT SCHEDULE

- Notice to Proceed March 16, 2016
- Substantial Completion January 10, 2018
- Final Completion February 19, 2018

# Project Team



## OWNER

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**"Skip" Cole**  
Sewer Commission Chair  
**Tim Field**  
Sewer Commission  
**Rick Stern**  
Sewer Commission  
**Denis Messier**  
WWTF Plant Manager



## GENERAL CONTRACTOR

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**Chuck Boudreau**  
Project Superintendent  
**Jess McMahon**  
Project Superintendent



## ENGINEER

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**Ed Leonard**  
Project Manager - Design  
**Lindsey Shields**  
Project Manager - Construction  
**Jeff Mercer**  
Project Engineer



Thank You



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