



Tighe&Bond



DIGESTION, ODOR CONTROL & SHIPPING CAKE ISN'T WHAT IT USED TO BE

THE EVOLUTION OF SOUTHLINGTON'S AGING SOLIDS HANDLING SYSTEM AS
THE PLANT GREW TO TAKE ON NUTRIENT REMOVAL

Fred Mueller, PE; Amy Sowitcky, PE

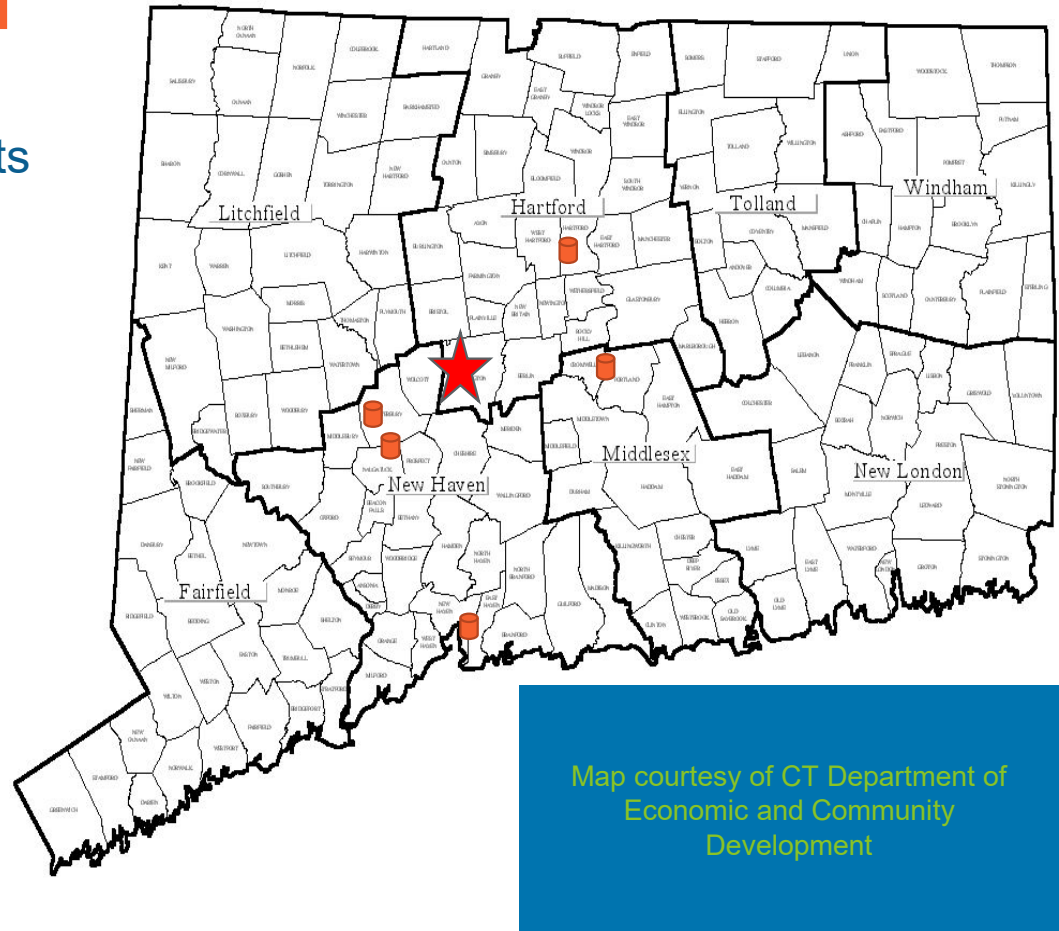
NEBRA CONFERENCE OCTOBER 7, 2021

Tighe&Bond

TREATMENT PLANT LOCATION

Southington WPCF Location: Central CT

- Along Quinnipiac River
- Suburban Town: 55K residents
 - Love to be outdoors
 - Love their youth sports



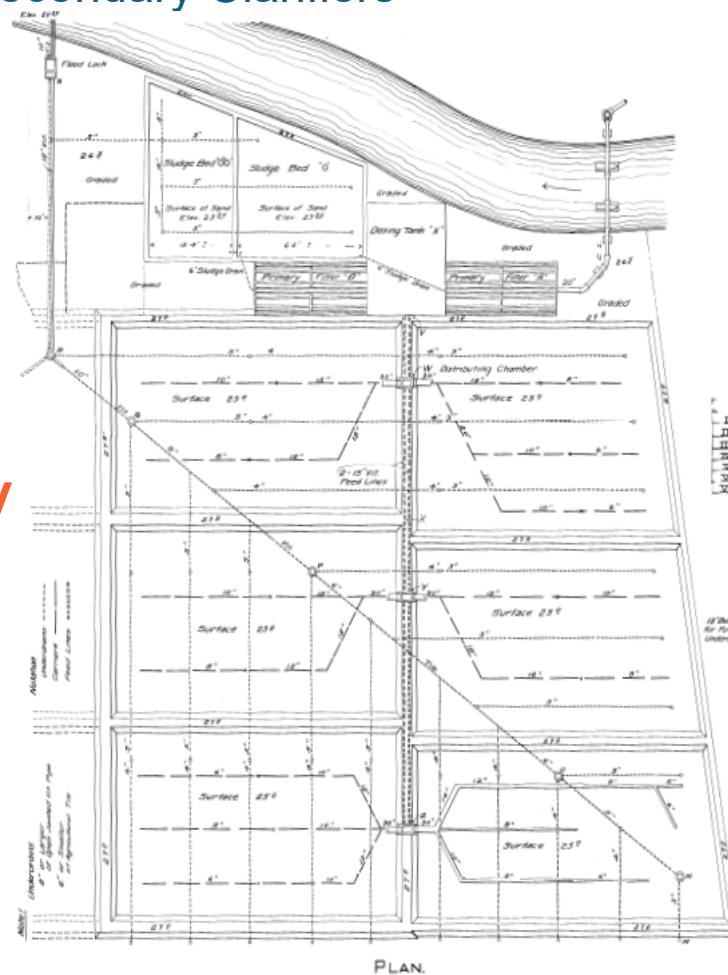
TREATMENT PLANT HISTORY

1958 - Relocated 1914 Plant

- Pump Station, Primaries, Trickling Filters, Secondary Clarifiers
- Two 35' Digesters
 - Covers:
 - One Fixed
 - One floating
- Sludge Drying Beds

1964 Upgraded for Capacity

- Add 2 Trickling Filters
- New 55 foot "Secondary" digester
 - Gas Holder Cover
 - Gas Sparge Mixing



TREATMENT PLANT HISTORY

1980s Upgrade for Nitrification and Capacity

- Expanded Headworks, New Clarifiers (3 Pairs), Intermediate Pumping,
- Nitrification Reactors, Chlorine Contact Tank
- **Sludge Processing Improvements**
- Gravity Sludge Thickener
- Trickling Filter Humus
- Nitrification Reactor WAS
- Fourth “Primary” Digester
 - Floating Cover & Gas Sparge Mixing
- Digester Gas Fuel Boilers
 - Water Heating System for site
- Sludge Dewatering Belt Filter Presses



Plant Odor Management

Belt Presses in Operations Building

- Treated by Permanganate
 - Press Feed & Filtrate

Settling Tank Odors

- Treated by Misting Systems
 - Primary & Intermediate

Waste Sludge Pumped at Night

- TF Humus – 1 Hr
- Nitrification Waste – 1 Hr



Worked OK 25+ years

TREATMENT PLANT HISTORY

1990 UV Disinfection

Located in CCT

2008 Denitrification Filters

N Reduction in LI Sound

Improvements:

- Third Pump Station
- Four Filters
- Methanol Addition



Plant Changes - Odor Management

2008 Filters online

- Mud Well Spilled to Headworks
- Cost Added in Primaries

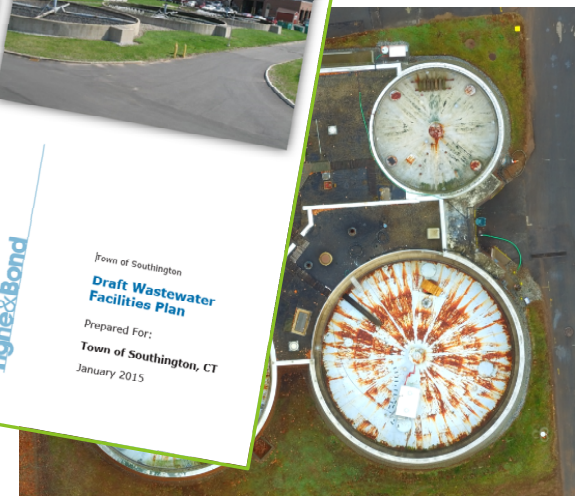
No Odor Issues

2012 Two Digesters “Offline”

- Stopped Heating/Digesting
- Needed “cleaning” (1st time in 10 years)
- Needed \$750,000 repairs/paint
- Started Hauling Primary Sludge @ 3%
- Used Fixed Cover 35' Digester For Storage & Truck

Stopped Digesting =
Noticable Odors

2013 – Facility Planning



Plant Changes

Spring 2013 – Permit Change:

Removing Phosphorus ~ 0.7 mg/l

- Added PACl
- + 450 lbs/day Intermediate Solids

Summer 2013 – Cosettling

- Overnight Loss of Primary Sludge Blanket
- Significant Odors – Primaries/Trickling Filters

Many Odor Complaints & Newspaper Articles



Plant Interim Response to Odors

Public Relations & Neighbor Correspondence

- Hauling Sludge
 - Smaller Blankets
 - 1-2% solids
- Chemical additional for odor control
 - Turned up permanganate
 - Hypochlorite at various locations
- Adjusted wasting schedule
- Temporarily stopped Cosettling



Late Fall

- Odors Better? Fewer Complaints



TREATMENT PLANT FACILITY PLAN PROGRESSING

Plant Design Capacity

- 7.4 MGD Average Day
- 15.7 MGD Peak Hourly Flow
- Currently Running at
 - 25 % of Design Load
 - 55 % of Design Flow

Odor control – Now a major component

- Resident email chain
- Concerns need to be addressed



TREATMENT PLANT FACILITY PLAN FAST TRACKED

Solids Handling Options

1. Continue Disposal at Hartford MDC
 - Haul Liquid
2. Eliminate Cosettling & Odor Control
 - Haul Liquid
3. Thicken & Odor Control
 - Install Rotary Drum Thickeners
 - \$4,000,000 @ 8-10 year payback
4. Upgrade Digesters and Dewatering
 - 20 year payback
 - Digester Recycle: Load high in Ammonia (added Nitrification)
 - Power to nitrify
 - Methanol to denitrify

Town Picked RDT Project

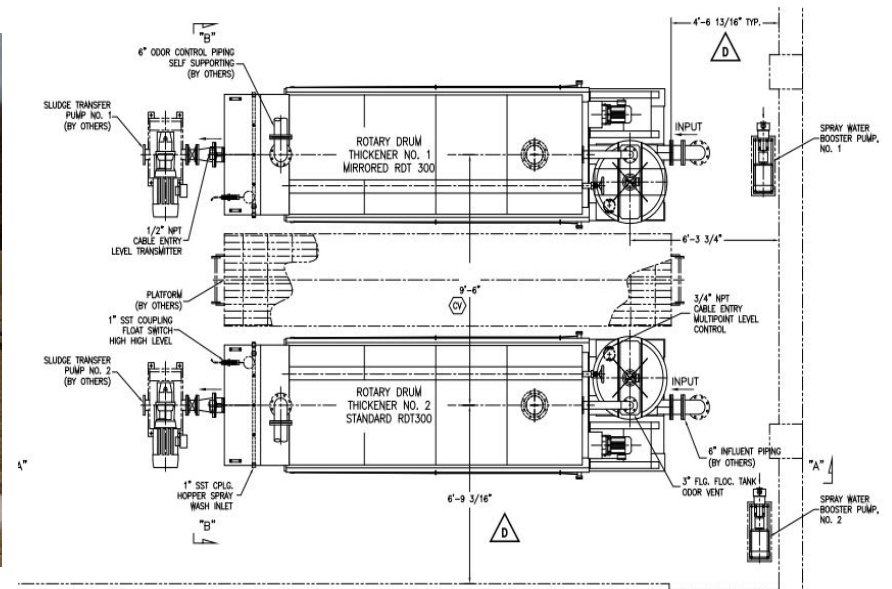


Capital Improvements: Sludge Thickener & Odor Control Project

Designed/Bid/Constructed

- Two 300-gpm RDTs
- “Thickeners” Converted to Mixed Storage Tanks
- Continue to Use Covered 35’ Digester for TWAS
- Covered and Treated Air: Significantly Reduced Odors
- Reducing Hauling Cost

Town Self Funded

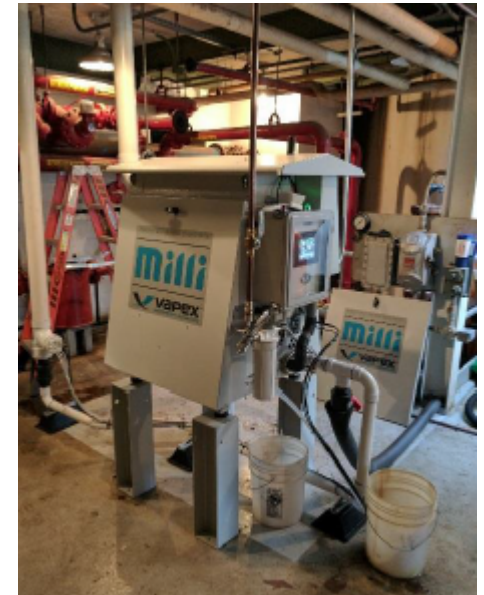


Treatment plant

“Covered” Digester/Storage Tank=Odor Source

New Technology to Destroy H₂S

- Ozone generator and water misting
- Piloted 2016
- Better but Complaints Persisted
 - Needed tank cover modifications and structural repairs
- Town purchased: Vapex and temporary carbon vessel



FACILITY PLAN SOLUTION

TRAP & TREAT THE AIR

Odor Control

1. Covers (Trap)
2. Vapex system
3. Carbon System

Cover Locations:

- Aerated Grit Chamber
- Primary Clarifiers
- Distribution Box & Trickling Filters
- Intermediate Wet Well
- Intermediate clarifier launders
- [Sludge Holding Tanks & Thickened Sludge Storage Tanks]

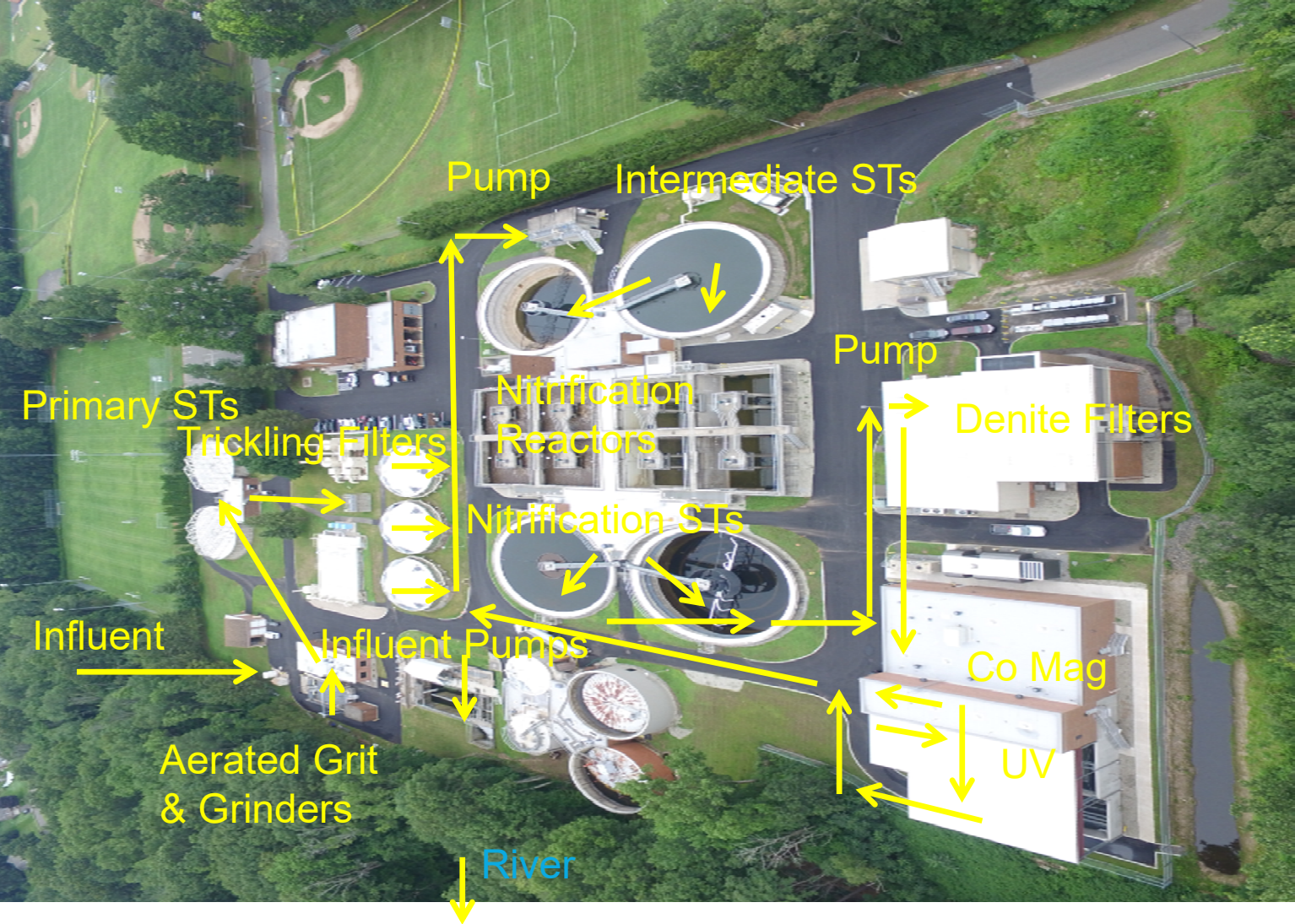


Addressed in \$57M upgrade up for referendum

- Town outreach: Newspaper articles, Commercial, Applefest 2014
- They vote Yes!

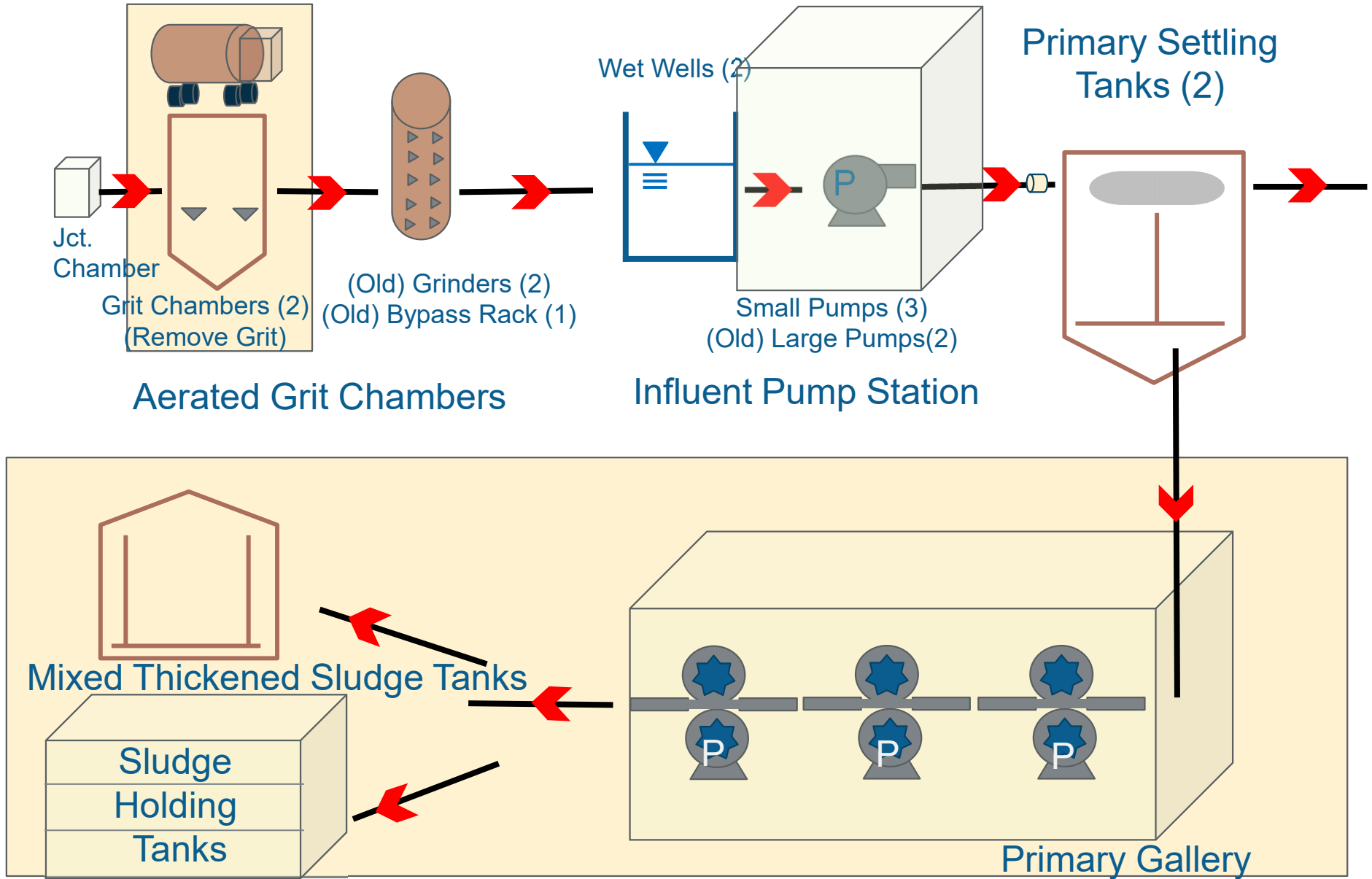
PLANT UPGRADE

LIQUID PROCESS TRAIN



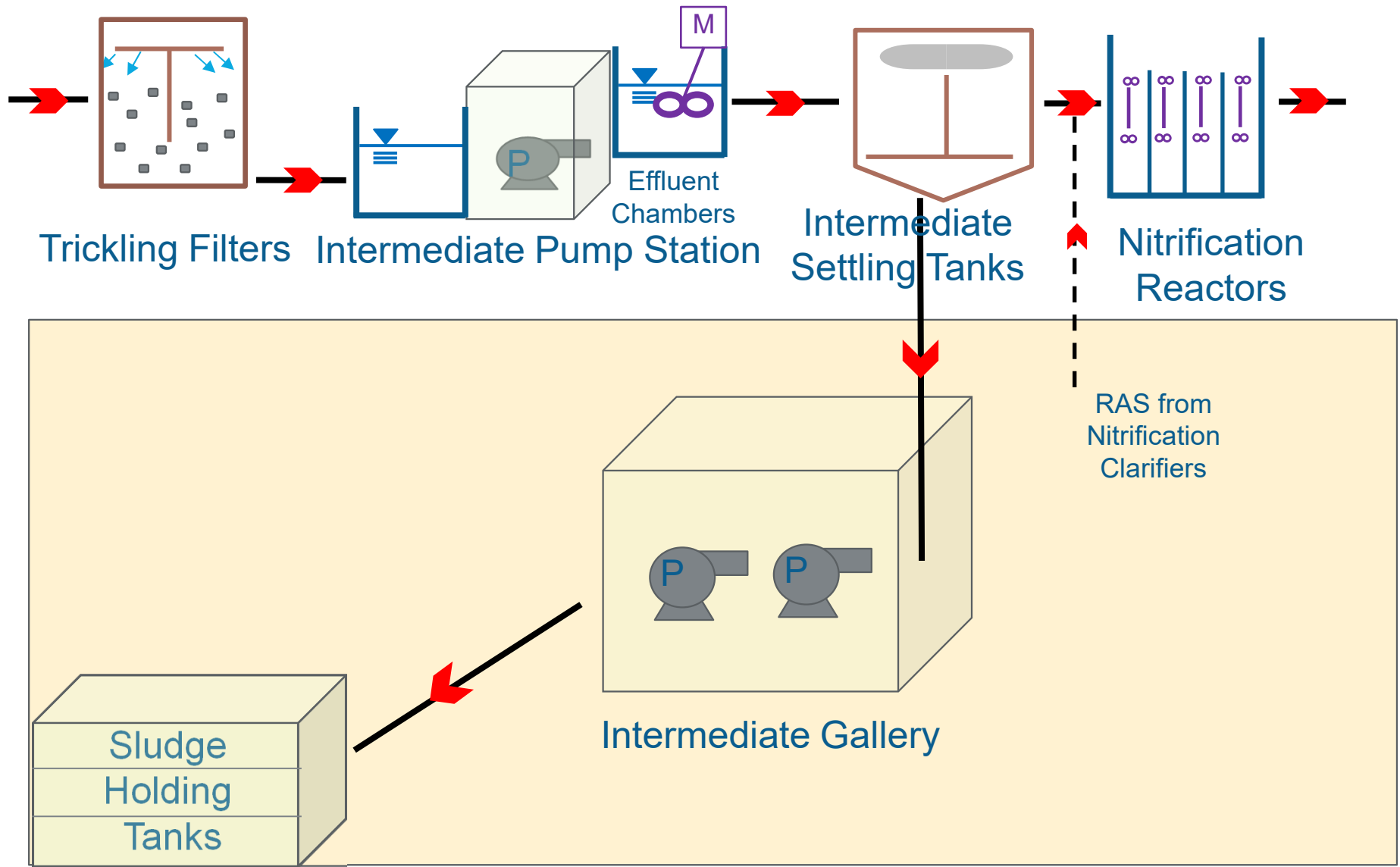
PROCESS OVERVIEW

SOLIDS PROCESS FLOW



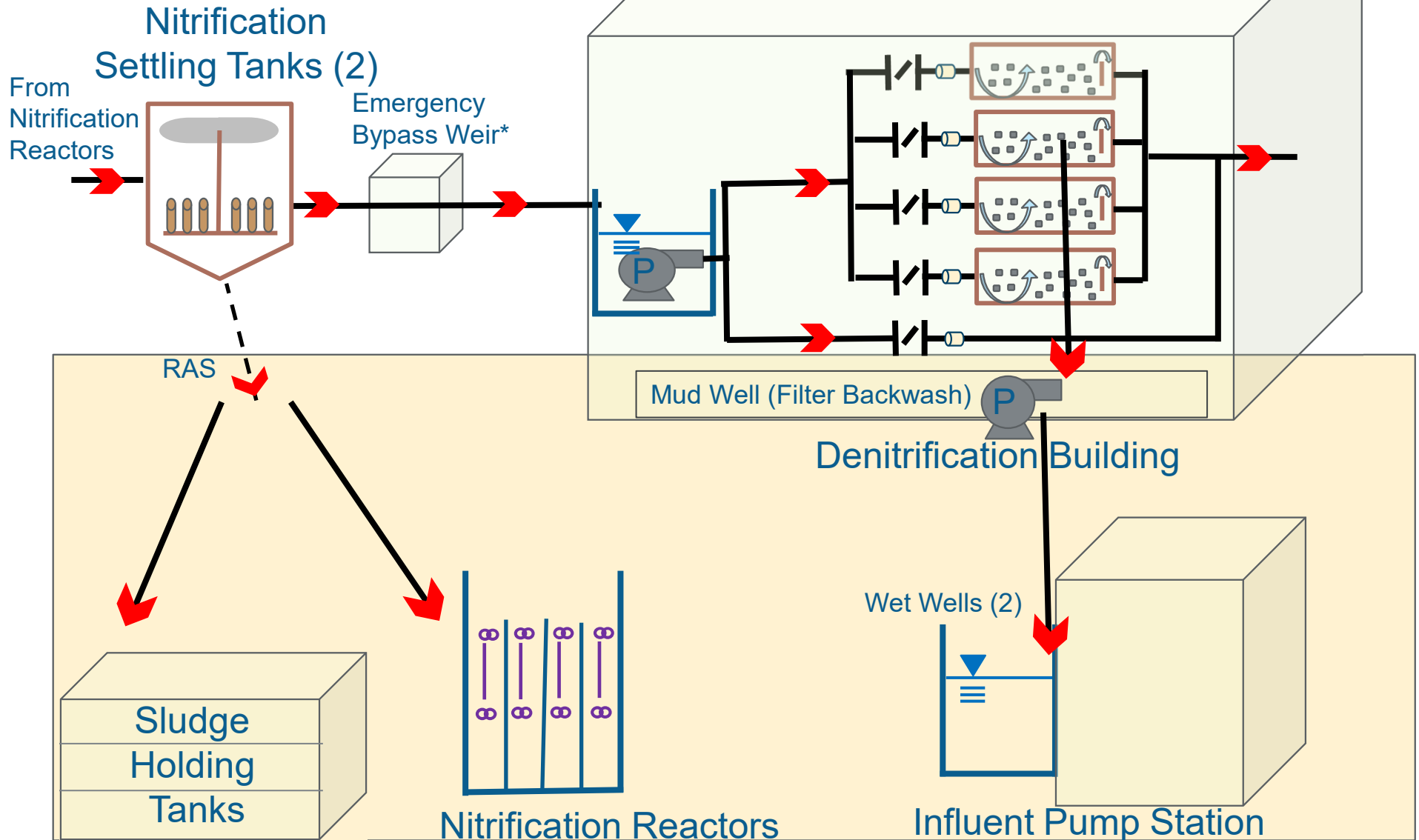
PROCESS OVERVIEW

SOLIDS PROCESS FLOW



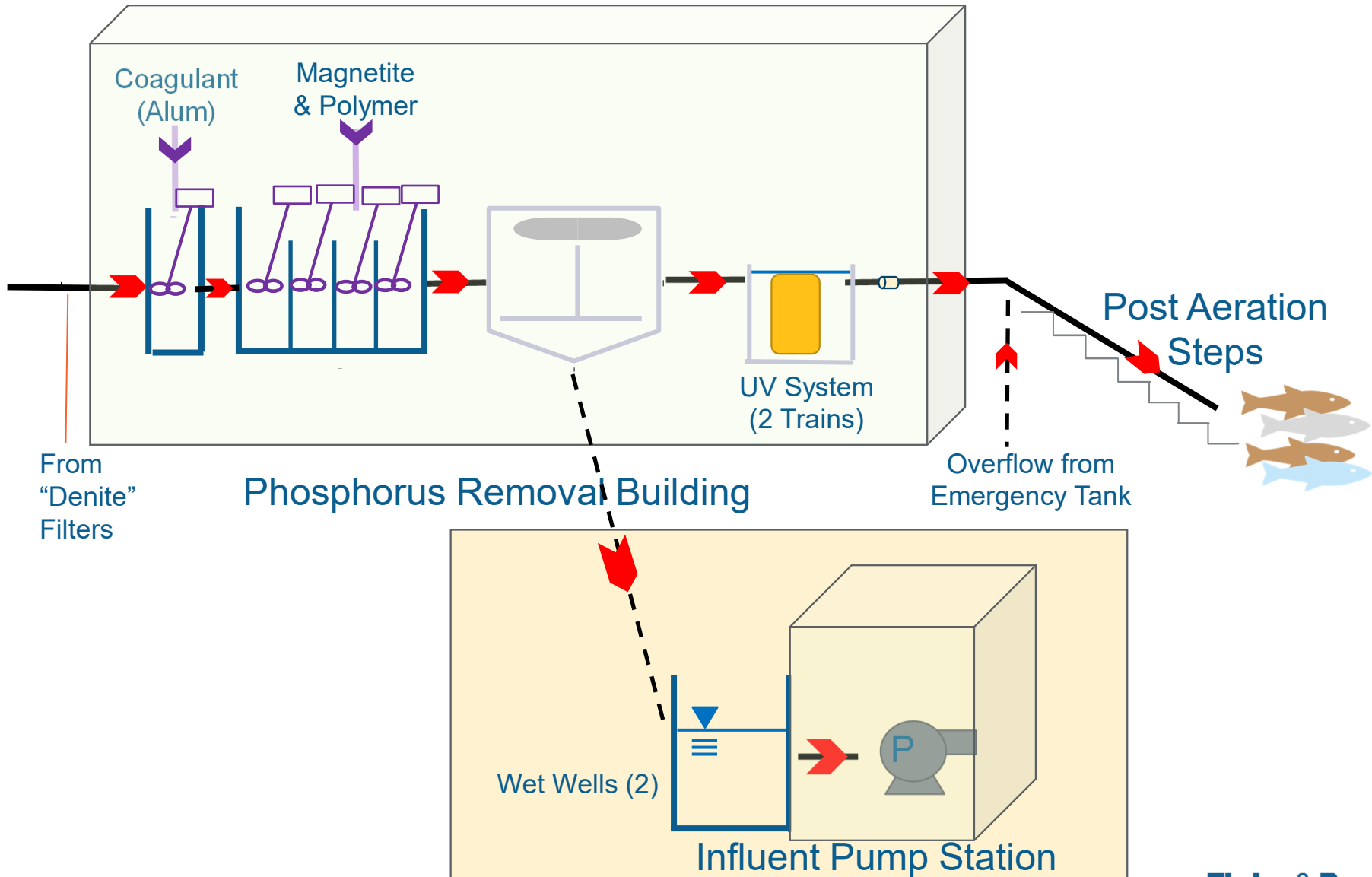
PROCESS OVERVIEW

SLUDGE PROCESS FLOW



PROCESS OVERVIEW

SLUDGE PROCESS FLOW



ODOR CONTROL SYSTEMS

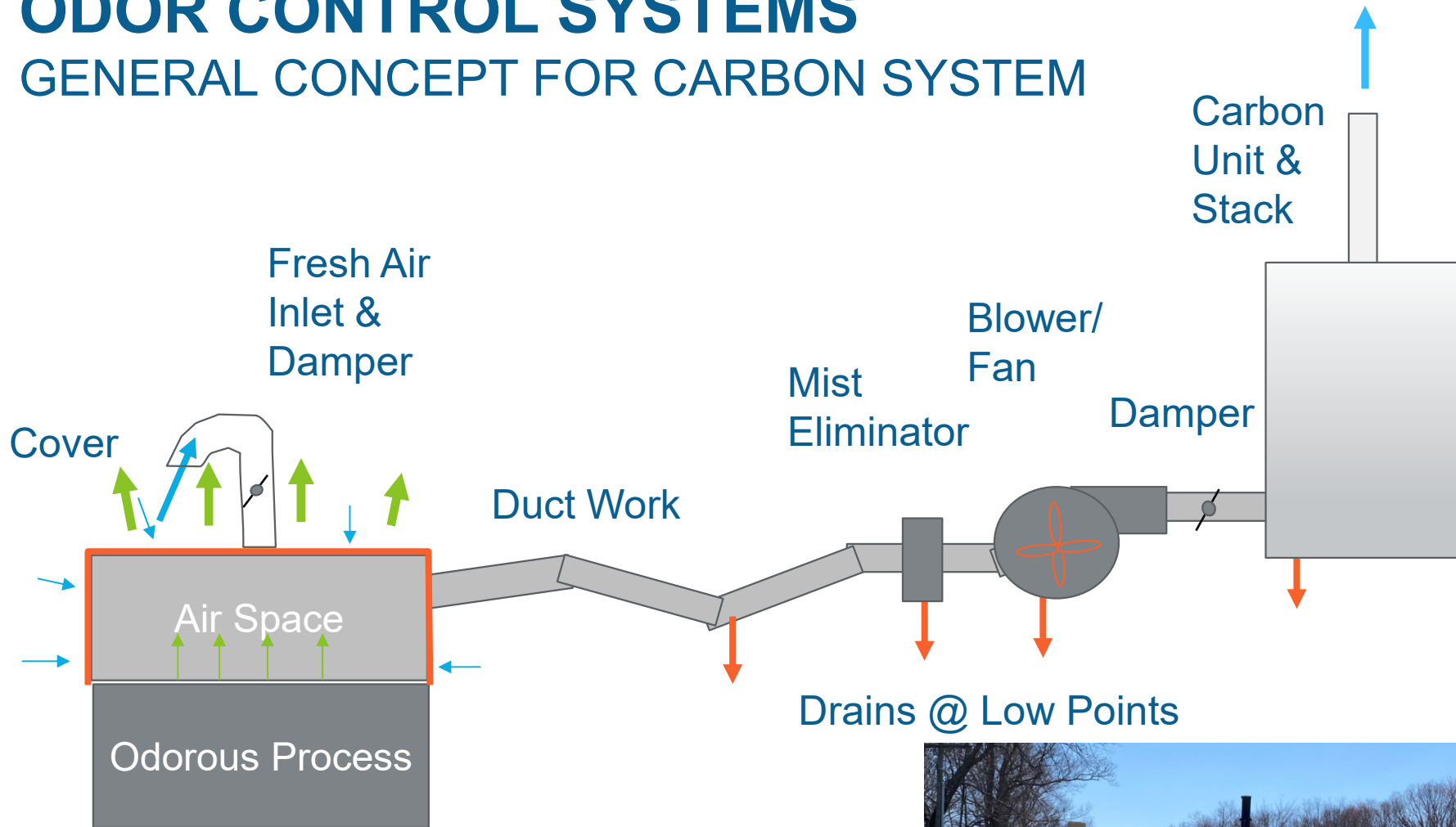
GOALS

- Reduce Offensive Odors
- Prevent/Minimize Corrosion
 - Prevent Buildup of Hydrogen Sulfide (H_2S)
 - Goal – $H_2S < 2-5$ ppm @ Concrete Tank
 - Dilute with Fresh Air – Most Locations
 - Target 6-12 air changes per hour (ACH)
- Destroy H_2S
 - Vapex at Thickened Sludge Storage



ODOR CONTROL SYSTEMS

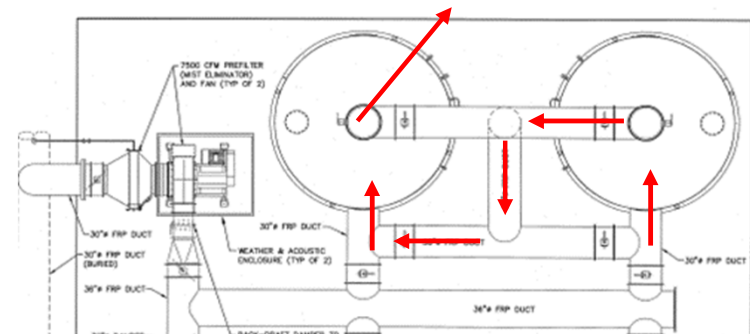
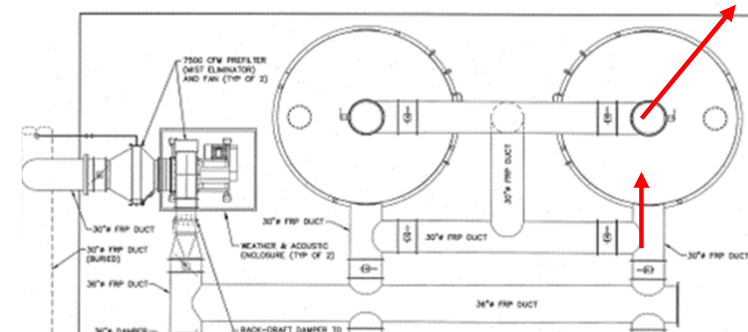
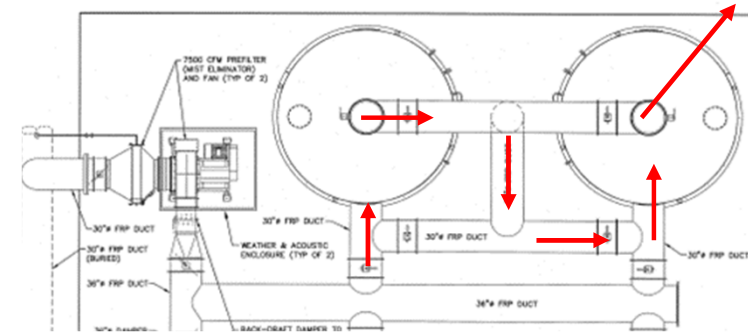
GENERAL CONCEPT FOR CARBON SYSTEM



MAIN ODOR CONTROL SYSTEM

- **Two Trains**

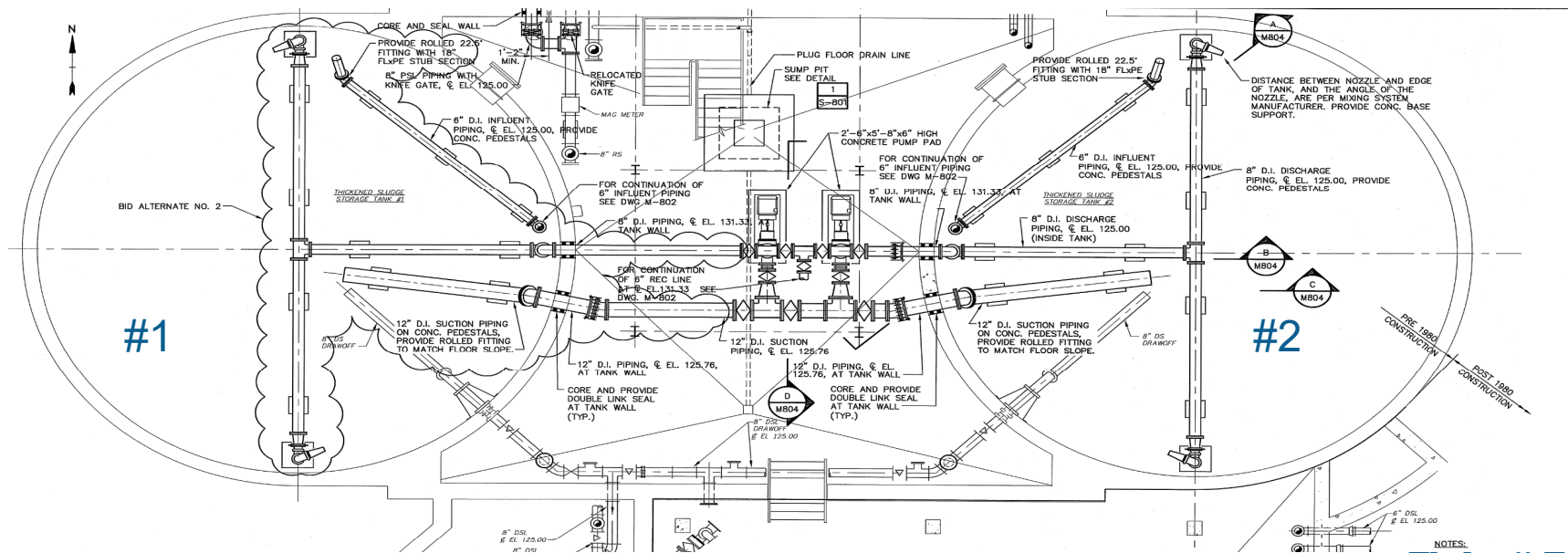
- Higher Level Odors
- Critical Operation
- 7,500 SCFM per Train
- **Run 2 trains at all times**



THICKENED SLUDGE STORAGE TANKS

KEY EQUIPMENT FROM UPGRADE

- **Tanks: Repaired Concrete**
 - 35-ft Diameter; 137,000 gal each
- **Mixing System**
 - 1400 gpm chopper pumps
 - Rotamixers – Air Release Valves
- **Goals**
 - Maintain Solids Composition with even mixing
 - Up to 7% solids



THICKENED SLUDGE STORAGE TANKS

KEY EQUIPMENT

- **New Cover**
 - On Tank #2
- **Vapex System**
 - Odor control
 - Neutralize pH
 - Some FOG break down

Odors persisted so polishing carbon with negative pressure out of the sludge thickened tank



- **Thickened Sludge Storage Tank Carbon Tank**
 - Relies on Existing Vapex (misting) to destroy most H₂S-
Otherwise media will not last long
 - High Humidity
- **Truck Loading**
 - Attach to Trucks & run when loading trucks
 - Capture Aged Sludge Odors



COSTS OF CONSTRUCTION PROJECTS

Project	Description	Completion Date	Construction Capital Cost
Vapex System	Installed by Town: Piloted and Purchased	2017	\$152,400
Sludge Thickening and Odor Control	Kovacs Construction	May 2016	\$3,971,900
Phosphorus Removal Upgrade	Carlin Contracting	April 2021	\$39,916,000
Total:			\$44,040,300
Less than:			\$57,000,000



Success!!!
Zero complaints

KEY TEAM FOR THIS PROJECT COMPONENT

- Amy Sowitcky, PE alsowitcky@tighebond.com
- Fred Mueller, PE famueller@tighebond.com

Steve Seigal, Chris Bone, Cynthia Castellon, Daemian Foster,
Austin Weidner, Matt Romano, Mike Piepergerdes, Roger Ward
and many others!

Town of Southington

Kiari Williams
Jim Grappone, PE
Steve Gregory

Tech Environmental

Mike Lannan, PE

JK Muir

