2023 ANNUAL
CONFERENCE & EXHIBIT

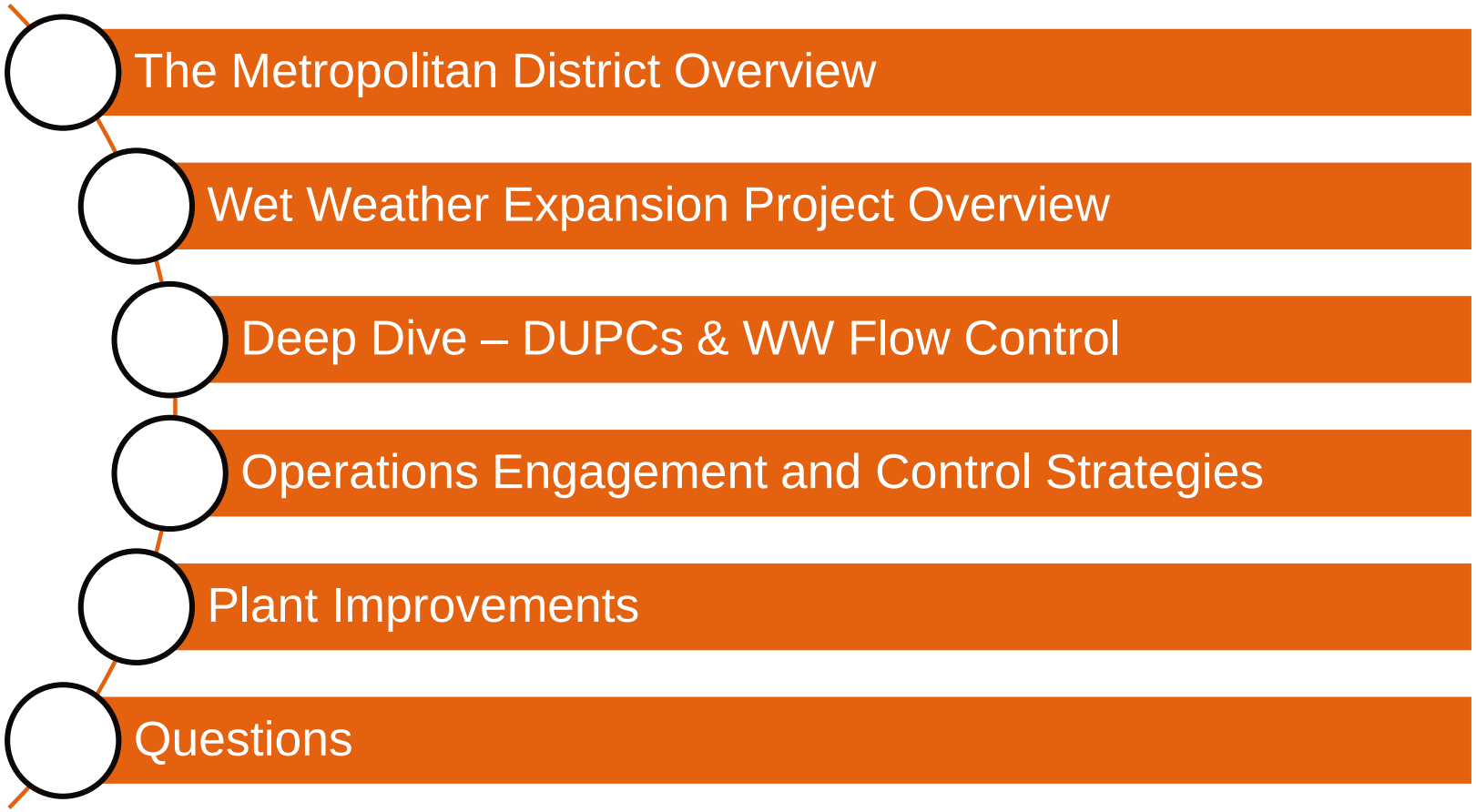
JANUARY 23, 2022

SESSION 9
PLANT OPERATION 1:
TROUBLESHOOTING, ISSUES, AND CREATIVE SOLUTIONS IN FACILITY UPGRADES

# A Tale of Two Processes How the Metropolitan District's Wet Weather Process Expansion Program led to Overall Plant Improvements.

**PRESENTERS –** Jeff Bowers, MDC and Brian McGuire, Arcadis

# Presentation Agenda



# MDC Overview

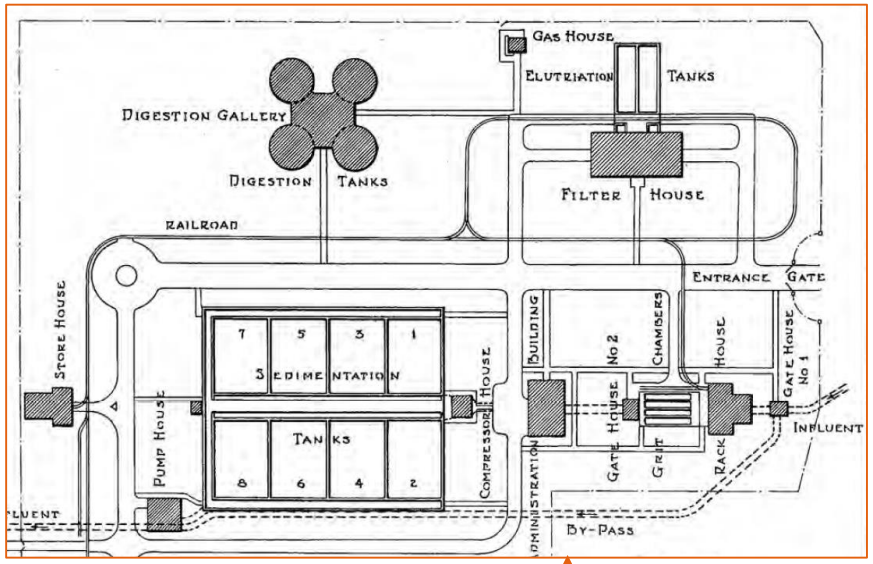
- Established in 1929, first on CT River to provide sewage treatment
- Serve 8 Member Towns
  - Responsible for serving 400,000+ customers
- Full-service utility
  - Water Supply, Water Treatment, Distribution Collection, Wastewater Treatment, All support services
- All WPC facilities operate continuously, 24hrs/day, 365 days/year

# Facility Background

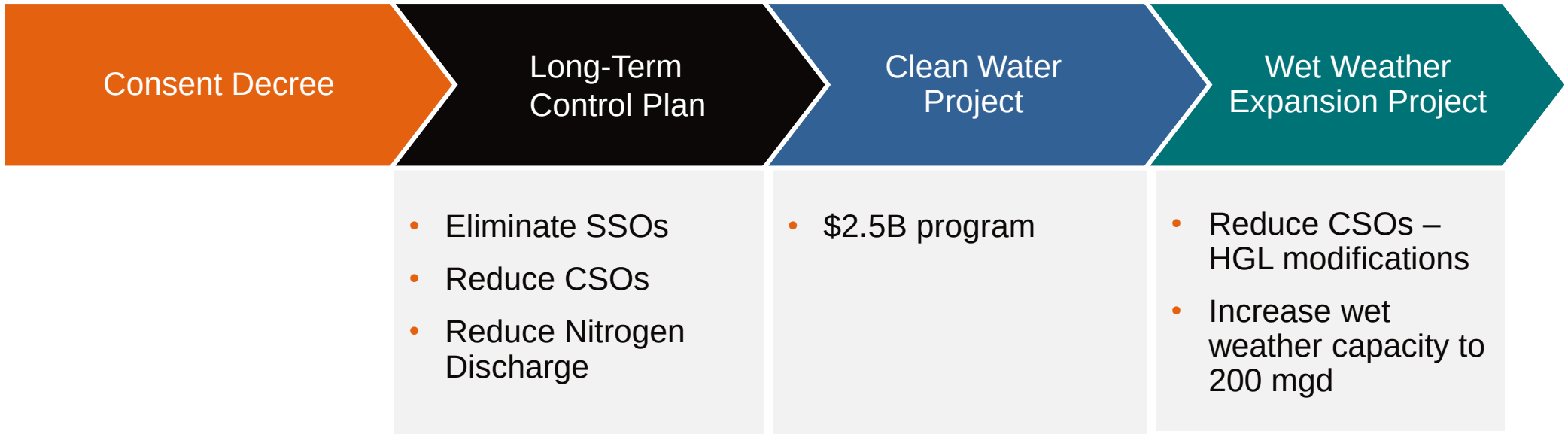
- Hartford Water Pollution Control Facility (HWPCF), in Hartford, CT
- Constructed 1930s, connected to combined sewer system
- Pre WWEP Flows:  60 – 90 – 120 mgd (Average, design, wet weather)

## Process Details:

- Preliminary treatment with screening and grit tanks
- Conventional primary treatment
- Gravity flow through primary treatment
- Activated sludge with denitrification
- Seasonal disinfection
- Wet weather storage basin
- Incineration with heat recovery



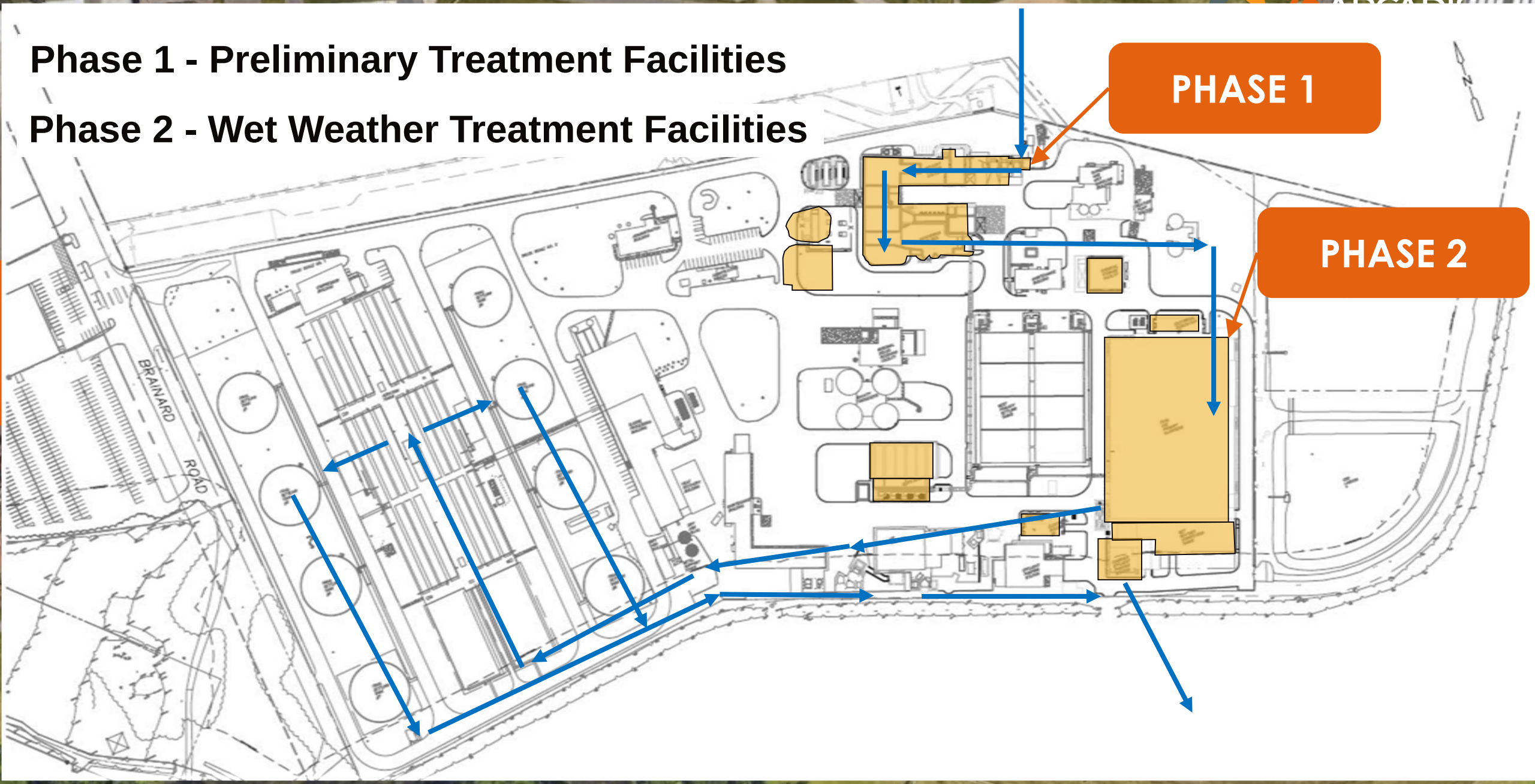

# Project Purpose and Goals



# Hartford Water Pollution Control Facility Overview

## Phase 1 - Preliminary Treatment Facilities

## Phase 2 - Wet Weather Treatment Facilities

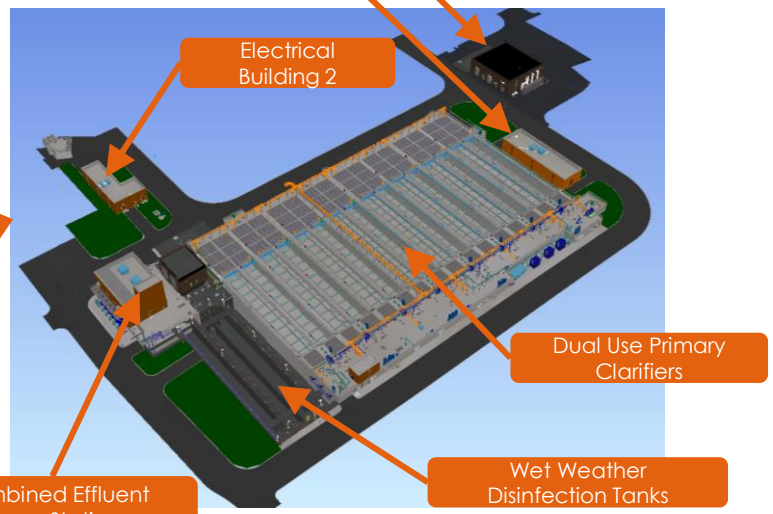


# Phase 1 - Headworks Facility Expansion

- Coarse Bar Rack Facility
- Influent Pump Station
- Fine Screens and Screening Handling
- Grit Removal
- Odor Control

# Phase 2 – Contract 2012-21

- 200 MGD Dual Use Primary Treatment Capacity
- 110 MGD Wet Weather Treatment Capacity
- 200 MGD Combined Plant Effluent / Wet Weather Flow Pumping and Gravity Discharge Capability

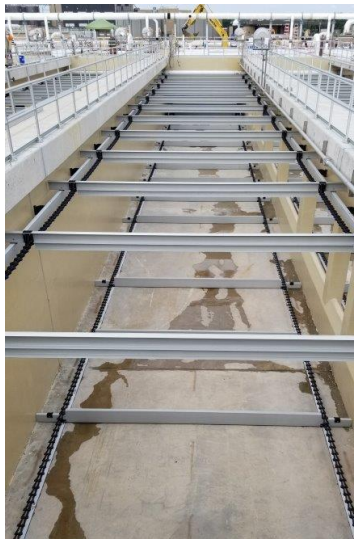


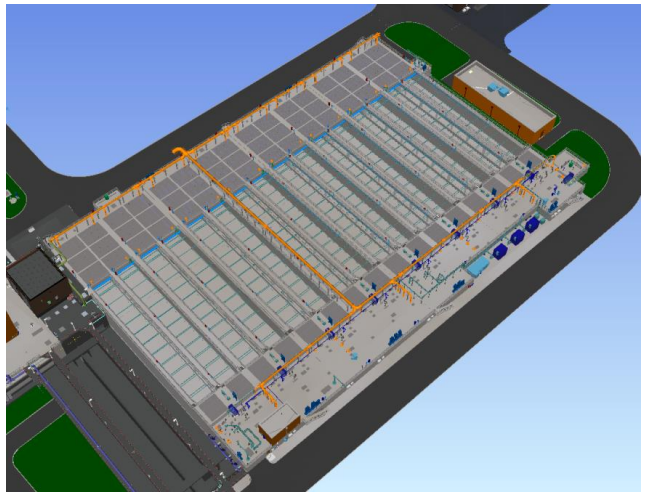

# Dual Use Primary Clarifiers

Dual use refers to the ability for the clarifiers to operate under different modes

- **Mode 1** – Dry Weather
- **Mode 2** – Wet Weather
- **Mode 3** - Chemical Enhanced Primary Treatment (CEPT)
- 8 Primary Rectangular Clarifiers
  - Total Area: 75,000sq ft
  - SOR of 1,200 gpd/sq ft at 90 MGD







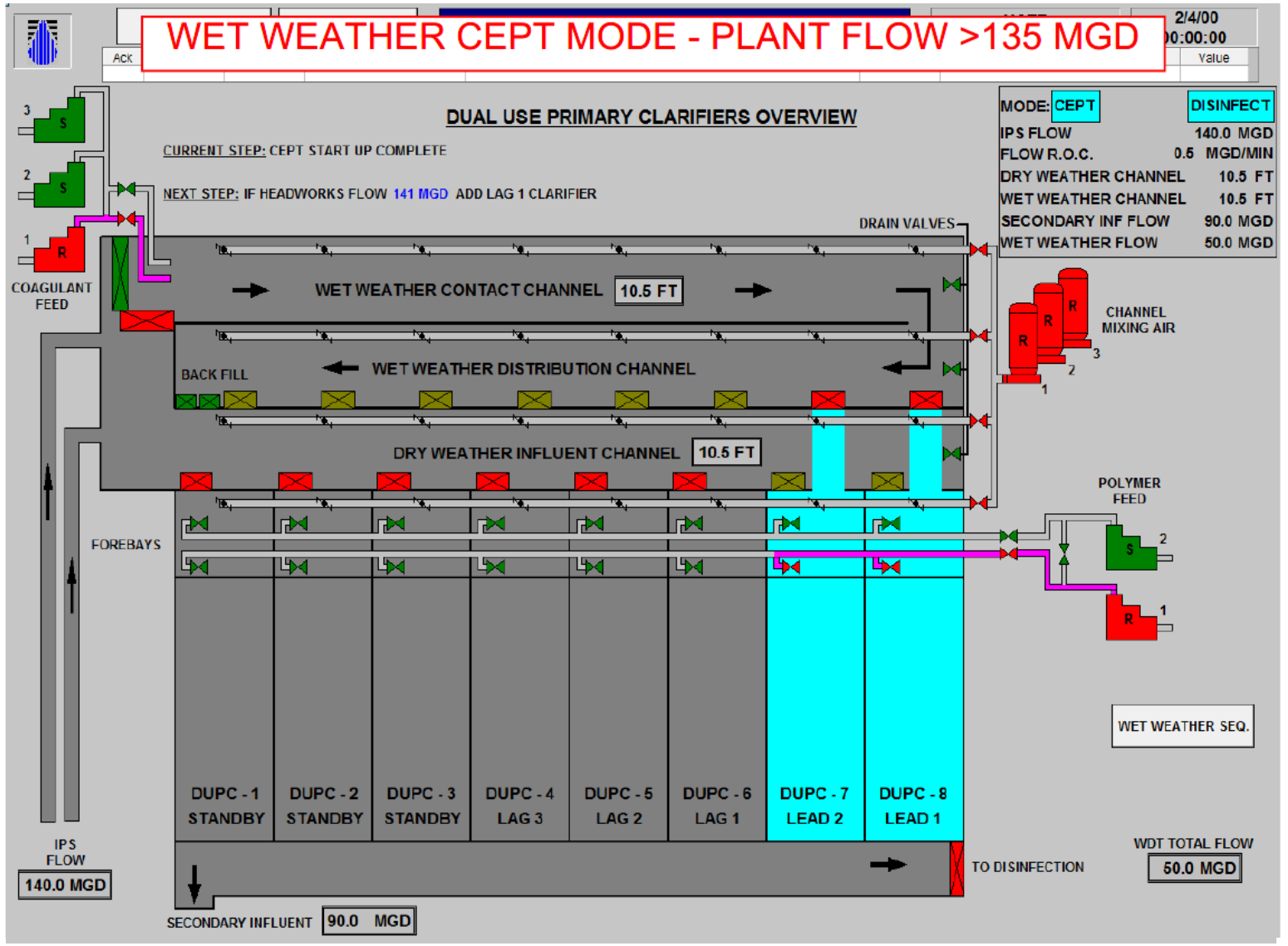
# Dual Use Primary Clarifiers

Dry Weather Mode

Wet Weather Mode

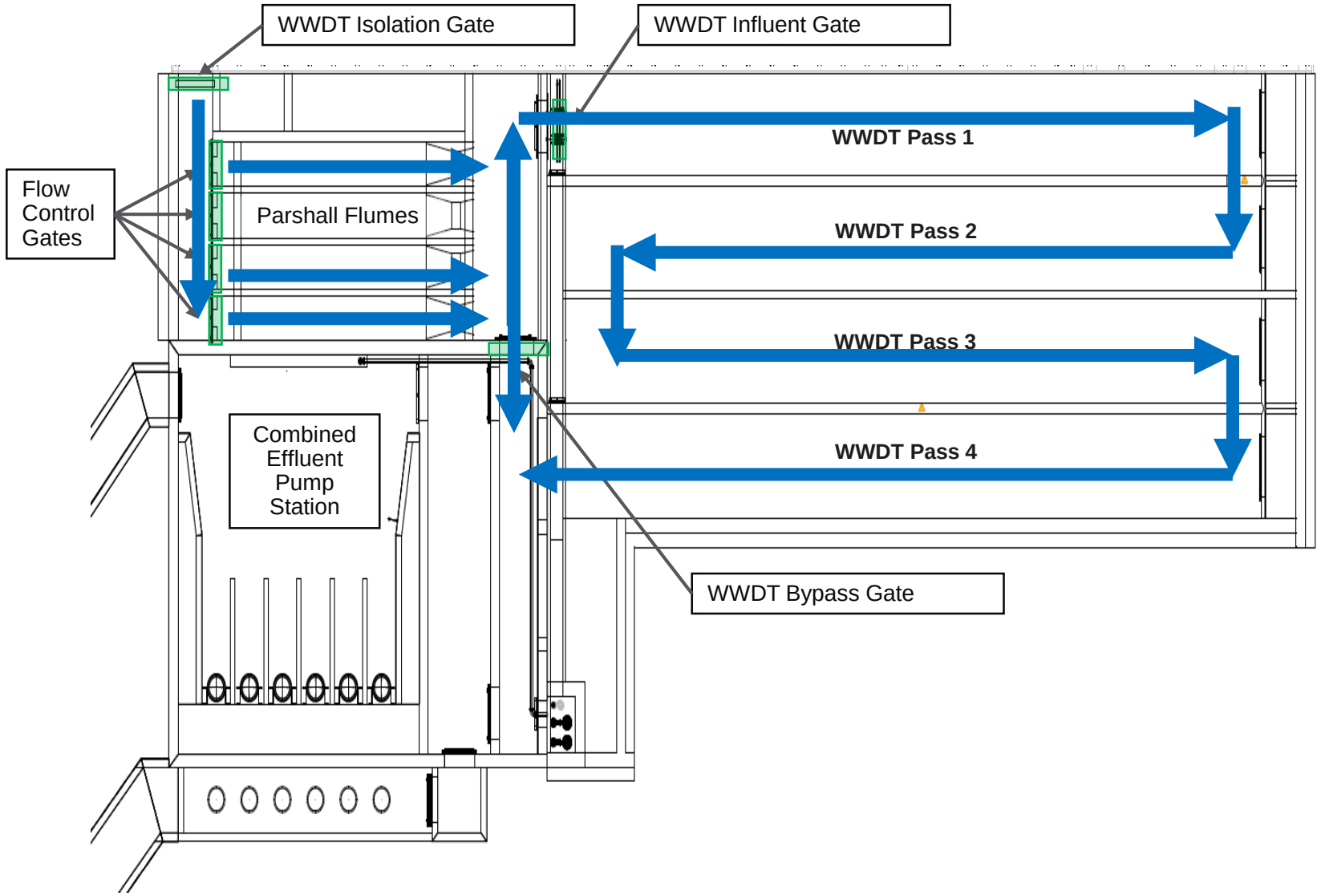
Dual Use Mode

- Addition of Coagulant (ferric or alum) to influent
  - 1 – 2 minute contact time
  - Dose of 20 – 50 mg / L
- Addition of Flocculant (polymer) to forebay
  - Dose of 0.5 – 1.5 mg/L



# Flow Control Gate and Parshall Flumes

- 4 motor operated slide gates
- 4 Parshall Flumes
- 2 Discharge paths based on season
  - Disinfection through WWDT Influent Gate
  - Bypass through WWDT Bypass Gate

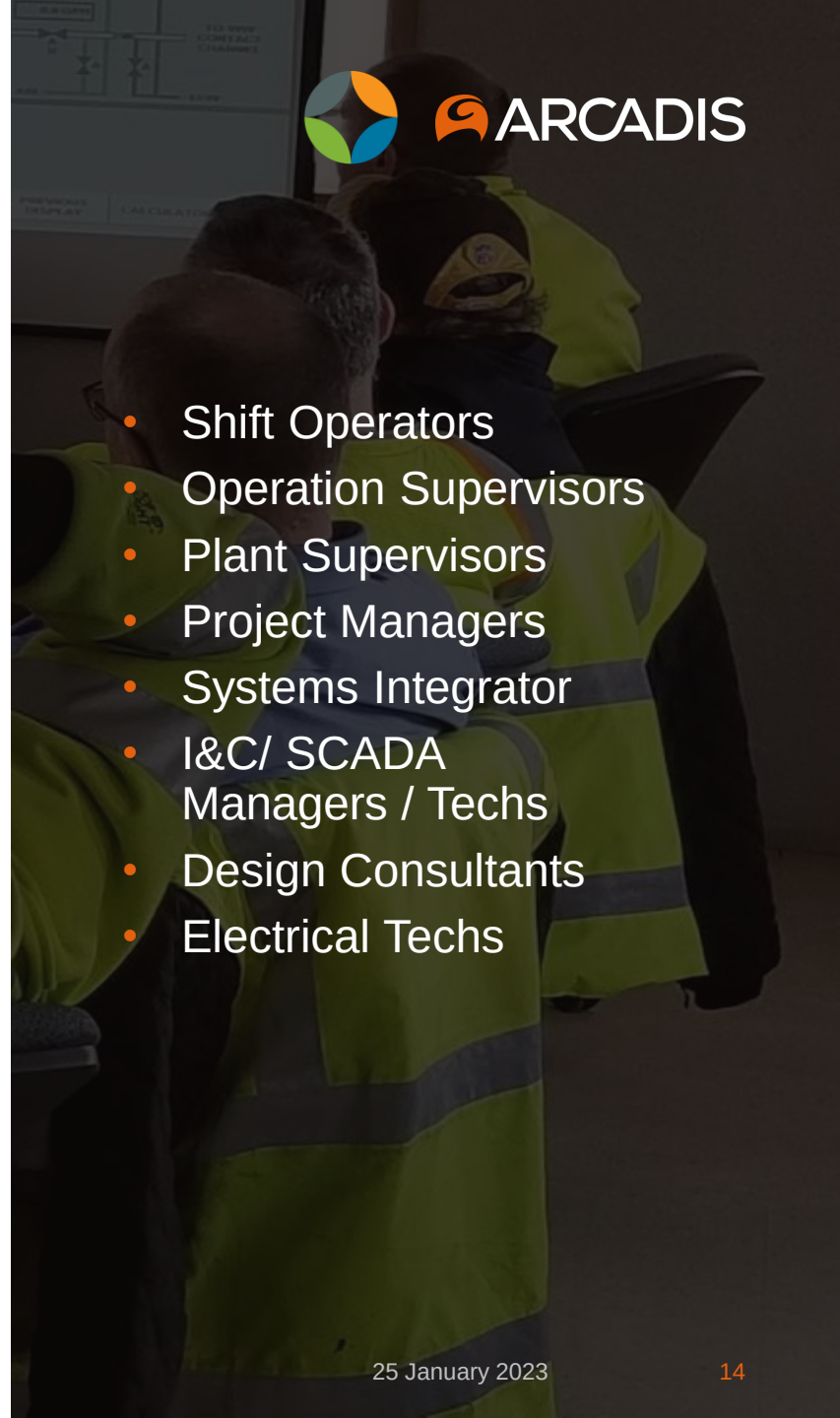


# Operations Engagement and Control Strategies


# Operator Engagement

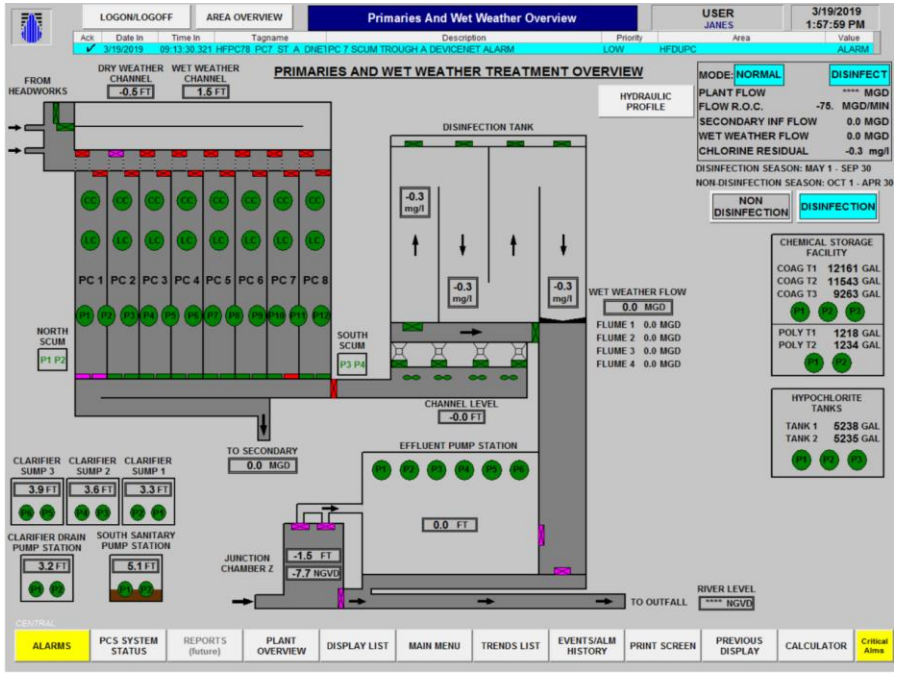
- Bi-weekly operations (AESS) workshops
- HMI Development
- Control Strategy Development
- SCADA Simulation Demonstrations
- Commissioning

Engagement early and often with MDC Operations drove understanding and planning for startup needs.



# SCADA Simulation – WW Weather Master Modes

| | Dry weather | Wet weather | High wet weather flows | |
|---|---|---|---|---|
| **Non-Disinfection Season** | •DUPC Normal<br>•Gravity | •DUPC WW<br>•WWDT Bypass<br>•Gravity | •CEPT treatment<br>•WWDT Bypass<br>•Gravity | **Gravity**<br>Non-disinfection season, or river elevation low (look up table) |
| **Disinfection Season** | •DUPC Normal<br>•Gravity | •DUPC WW<br>•WWDT On<br>•Gravity | •CEPT treatment<br>•WWDT On<br>•Gravity | |
| **Non-Disinfection Season** | •DUPC Normal<br>•CEPS Pumping | •DUPC WW<br>•WWDT Bypass<br>•CEPS Pumping | •CEPT treatment<br>•WWDT Bypass<br>•CEPS Pumping | **Pumping**<br>Disinfection season, or river elevation high (look up table) |
| **Disinfection Season** | •DUPC Normal<br>•CEPS Pumping | •DUPC WW<br>•WWDT On<br>•CEPS Pumping | •CEPT treatment<br>•WWDT On<br>•CEPS Pumping | |




All operational modes were simulated, including the automatic transitions between pumping and gravity operation based on river elevations

# Overall Plant Improvements

# Safety and Maintenance

## Safety:

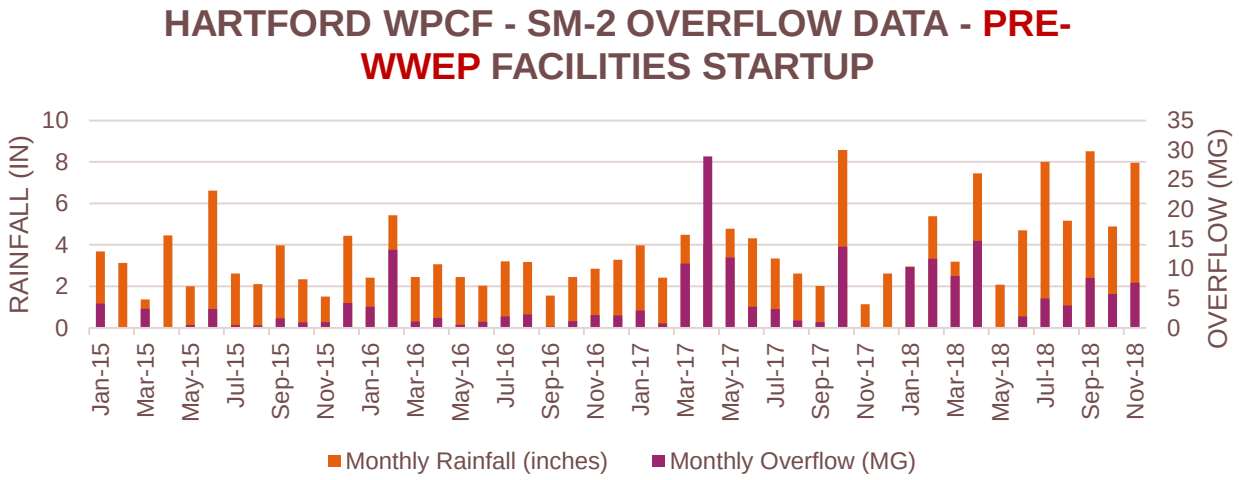
- Ventilation and Ventilation Monitoring
- Lighting and Receptacles
- Draining and de-energizing equipment

## Maintenance:

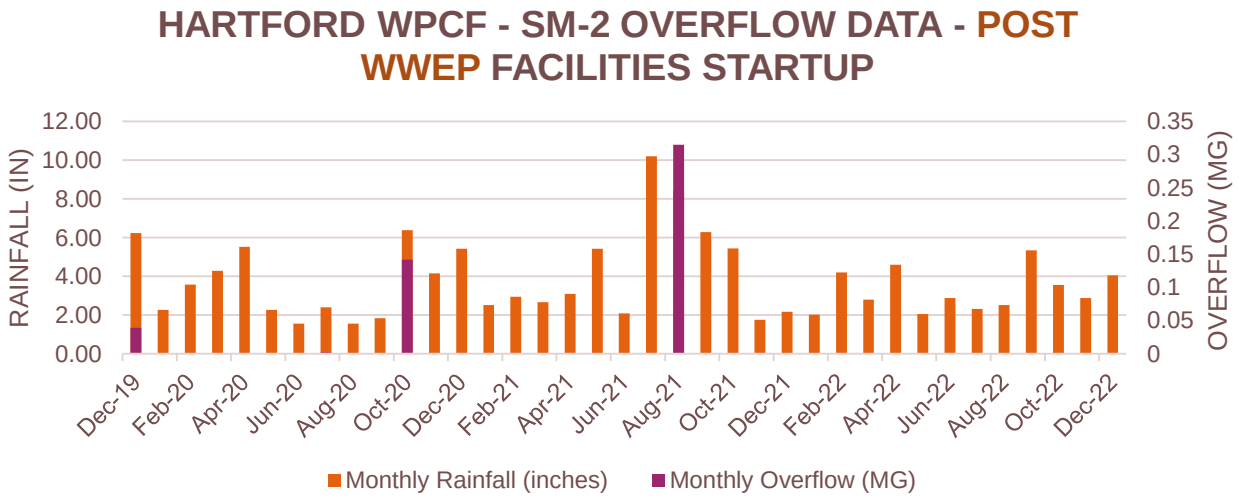
- Easier access
- Lock out / Tag out Procedures
- Automatic flush and purge sequences

# Collections Improvements

- Lower HGL
- **Reduction in CSOs**
- Improved flow in collection system



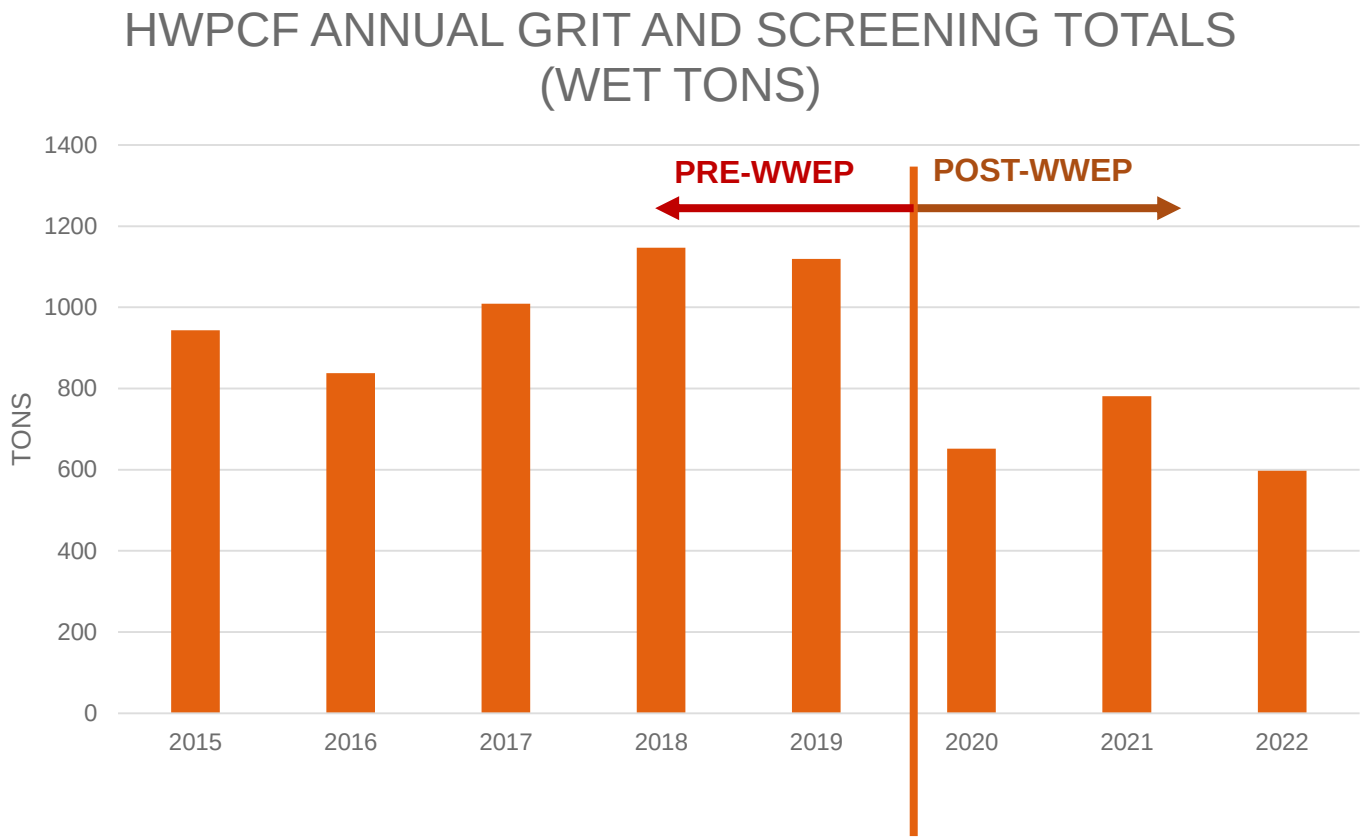

44 out of 47 months with CSO Events




**5** out of 37 months with CSO Events

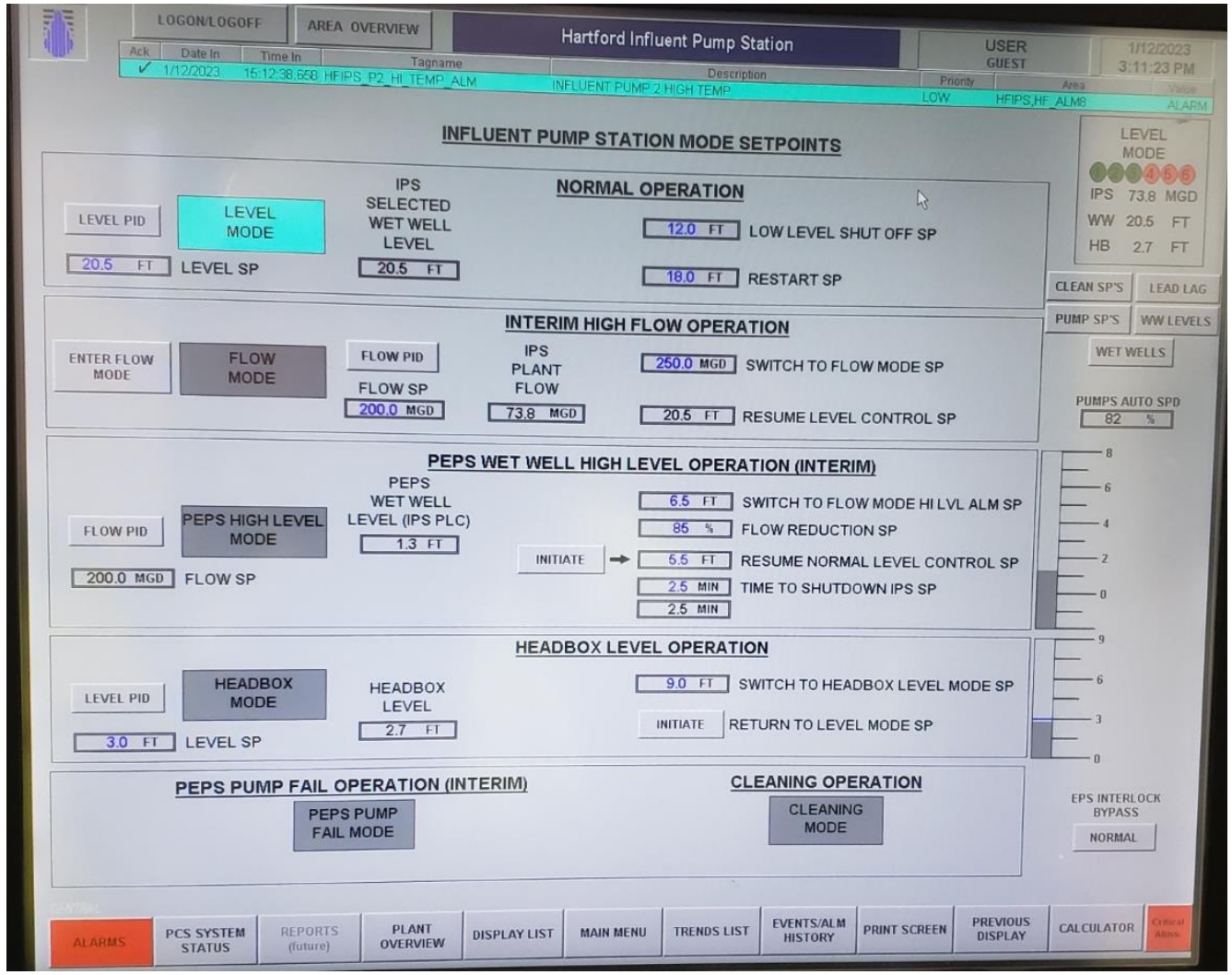
# Headworks Improvements

- Improved Screening Removal
- Improved Grit Removal



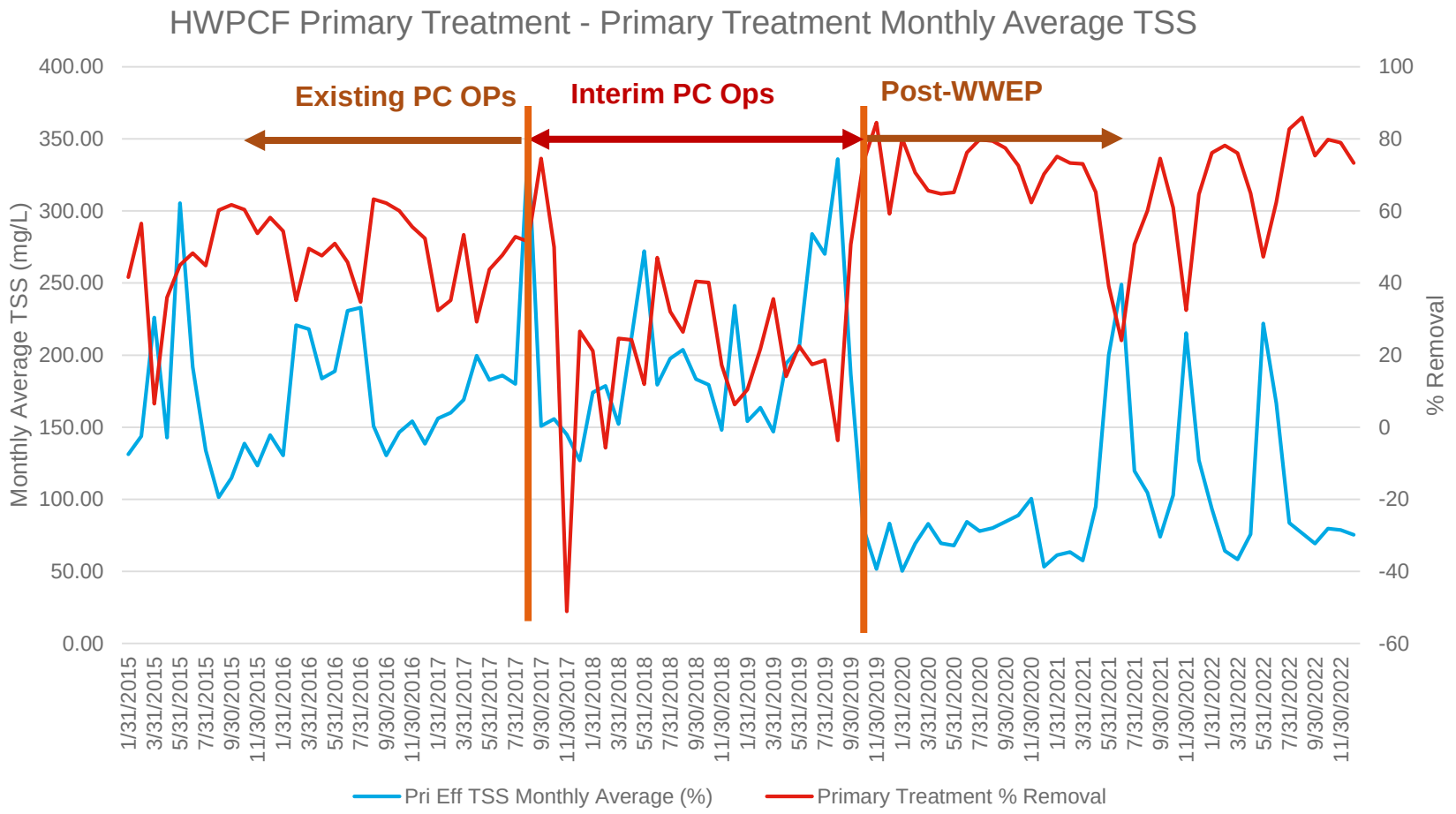
# Headworks Improvements

- Influent Pump Station Control Modes:
- **Flow Mode**



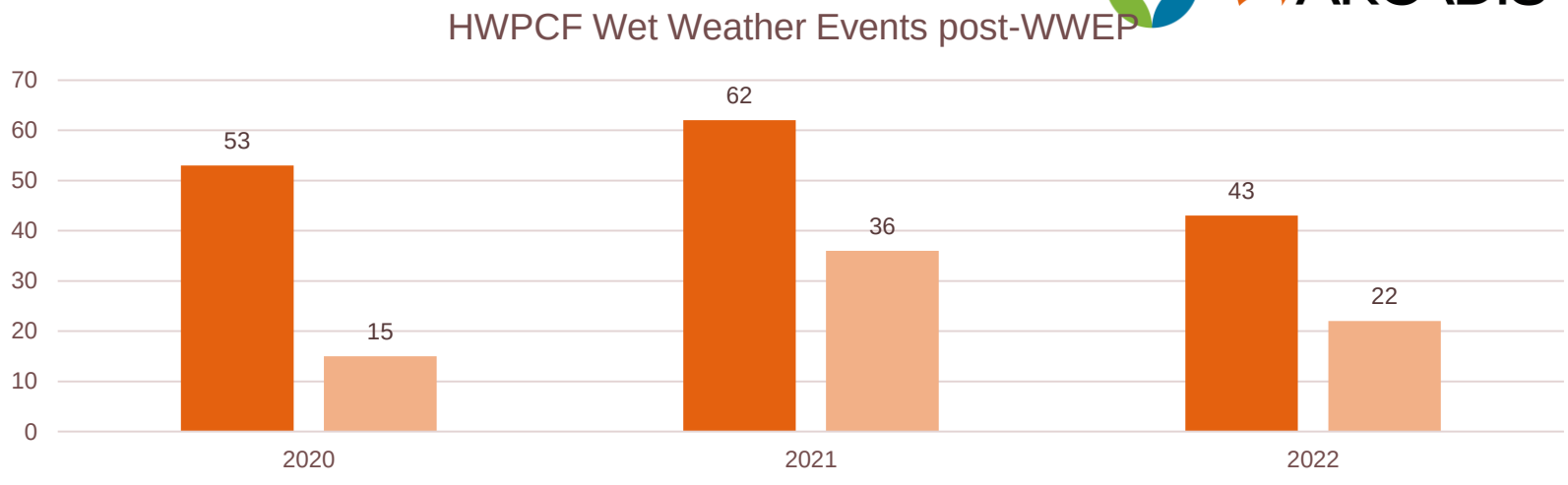
# Primary Treatment Improvements

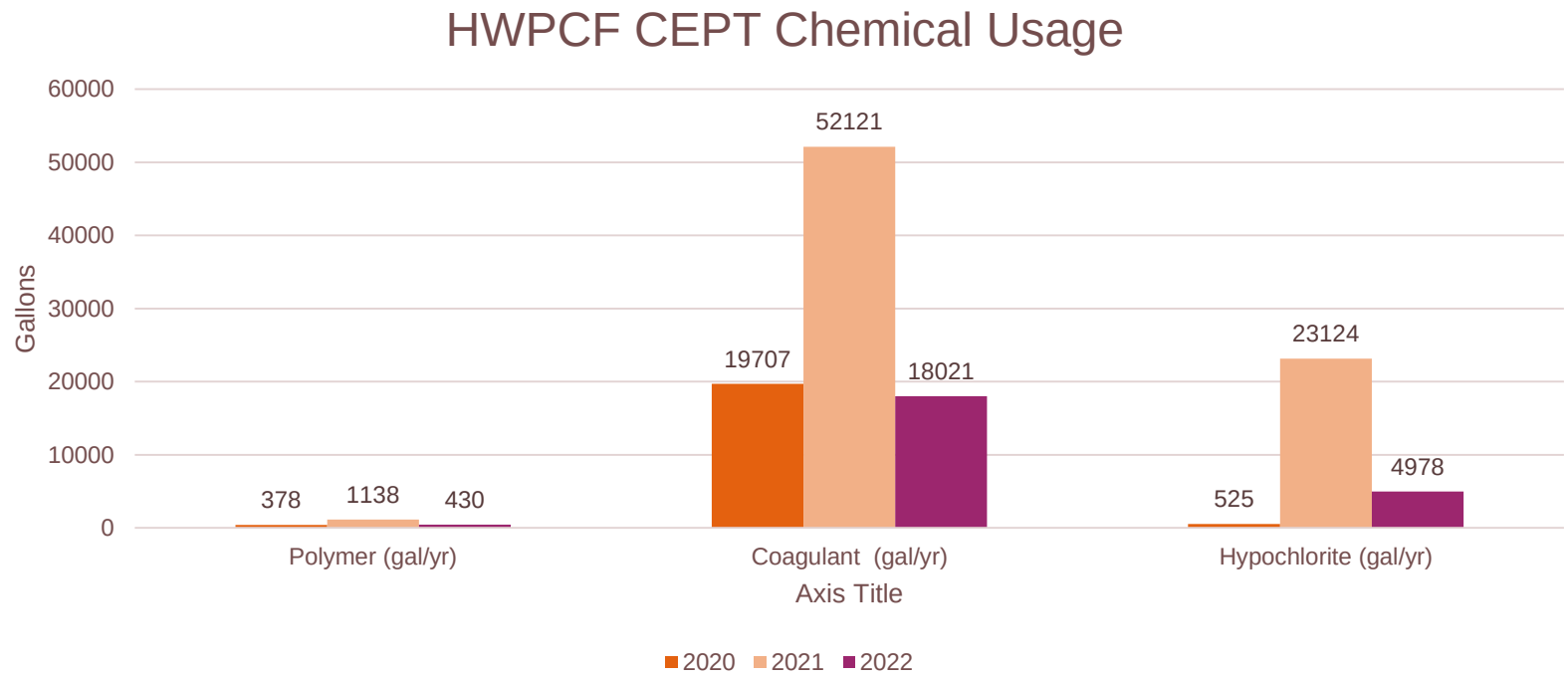
- **Improved TSS Capture**



# Primary Treatment Improvements

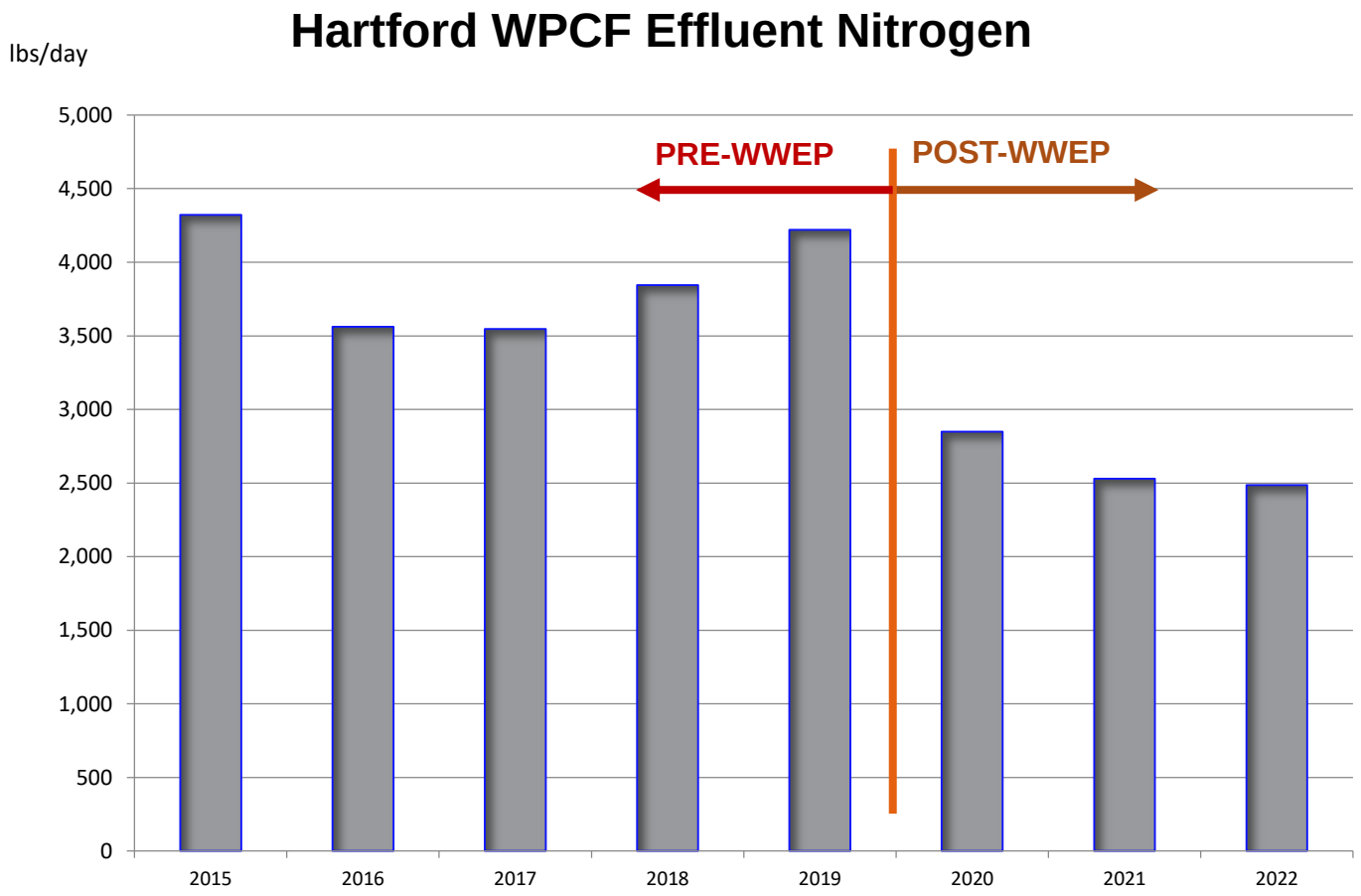
- **CEPT Chemical Usage**



# Secondary Treatment Improvements

- Reduction in Effluent Nitrogen
- Flow Control to Secondary System to maximize treatment
- Increased durations for BNR during wet weather operation
- % Removal in new PC helped to stabilize Plant SRT



# Wet Weather Improvements

- Eliminate need for CSO Storage Lagoon
- Reduce Labor for cleaning and Odors and maintenance
- **Self cleaning disinfection tank**
- Reduce maintenance of additional pumps and lagoon system

# Acknowledgements




# Questions?

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