Jacobs

Challenging today.
Reinventing tomorrow.

Zero to Hero

WTP Startup and Commissioning Best Practices and Lessons Learned from the Houston NEWPP 320 mgd Greenfield WTP

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2024 PNWS-AWWA Conference, Spokane, WA

Thursday, May 2, 2:45pm

Agenda

Startup and Commissioning

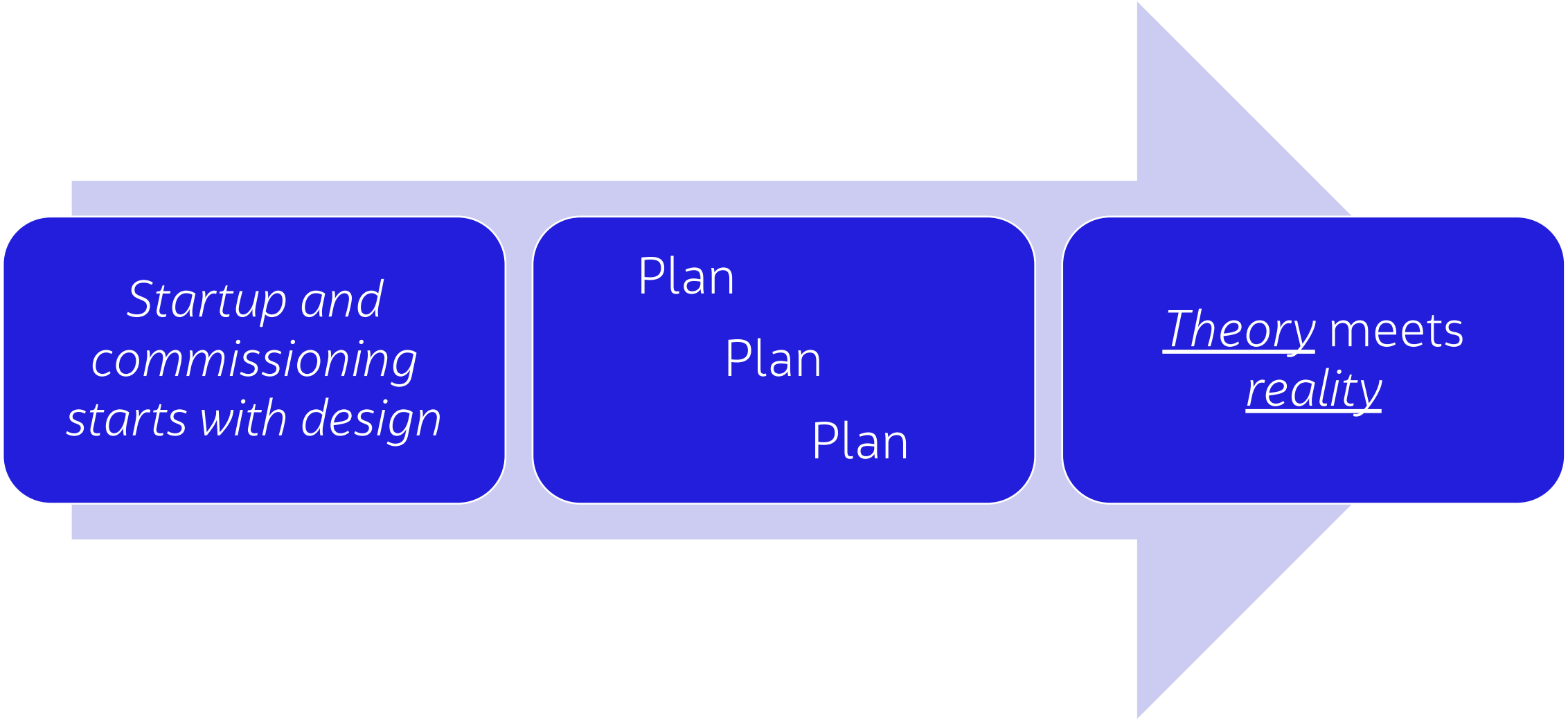
- Overview and Approach
- Typical Challenges and Lessons Learned

Case Study from Northeast Water Purification Plant

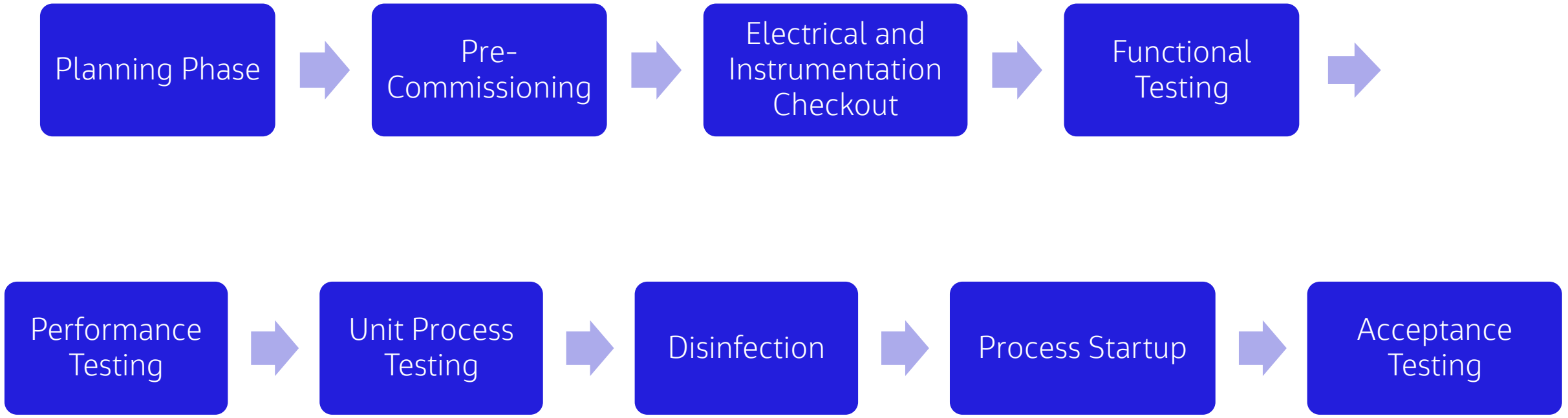
- Project Overview
- Lessons Learned
- Project Update

Startup and Comissioning

Overview and Approach



Overview and Approach



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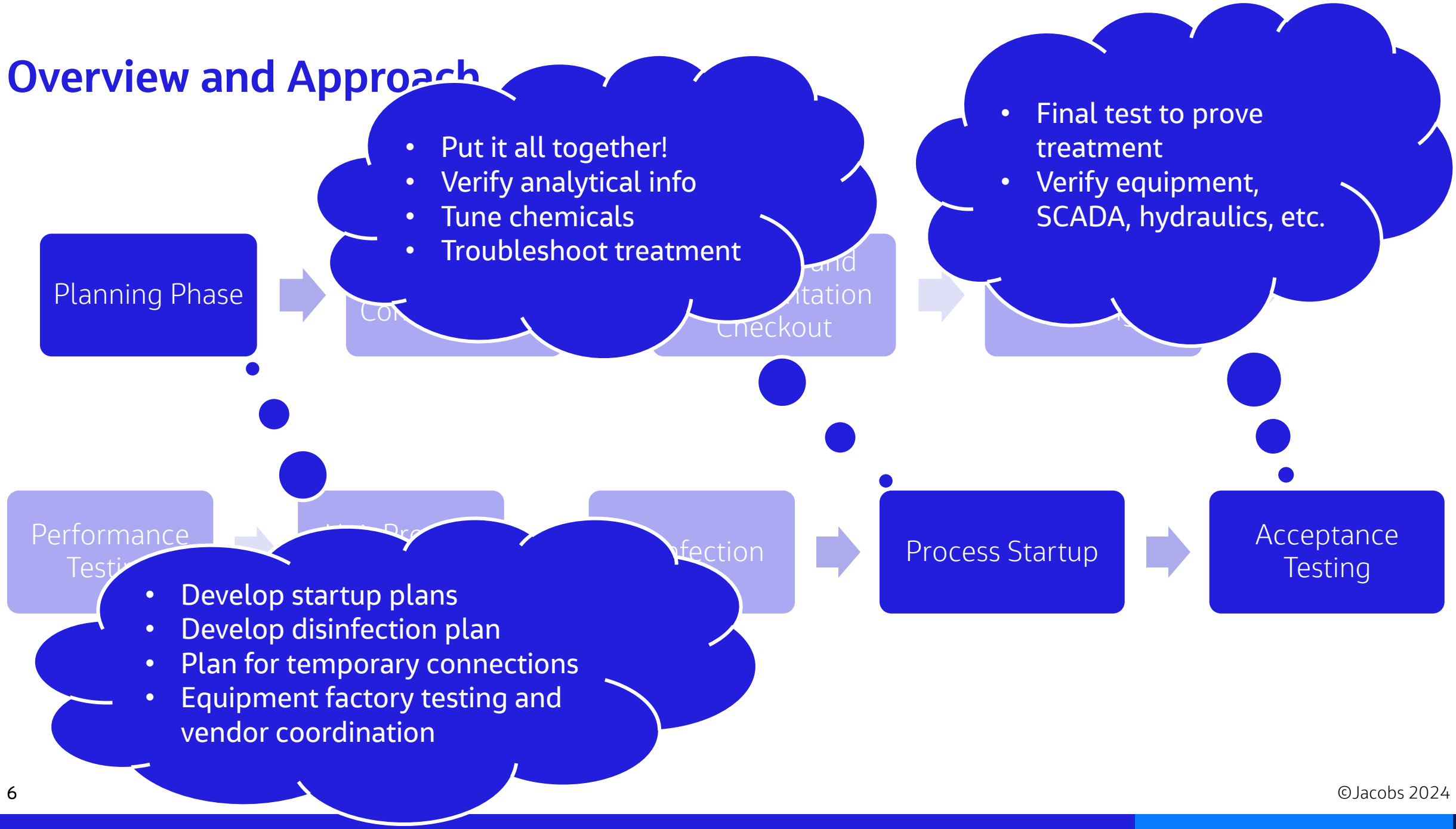


Typical Challenges and Lessons Learned

Equipment failures

Leaky pipes

Water balance during startup

Water quality samples

SCADA integration

Vendor coordination

Keys to Success

- Continuity from design through construction
- Effective management of subcontractors
- Quality control

Startup management

- Change management – *change is inevitable*
- Collaborative approach to problem solving
- *Focus on the end goal*

Collaboration with project owner

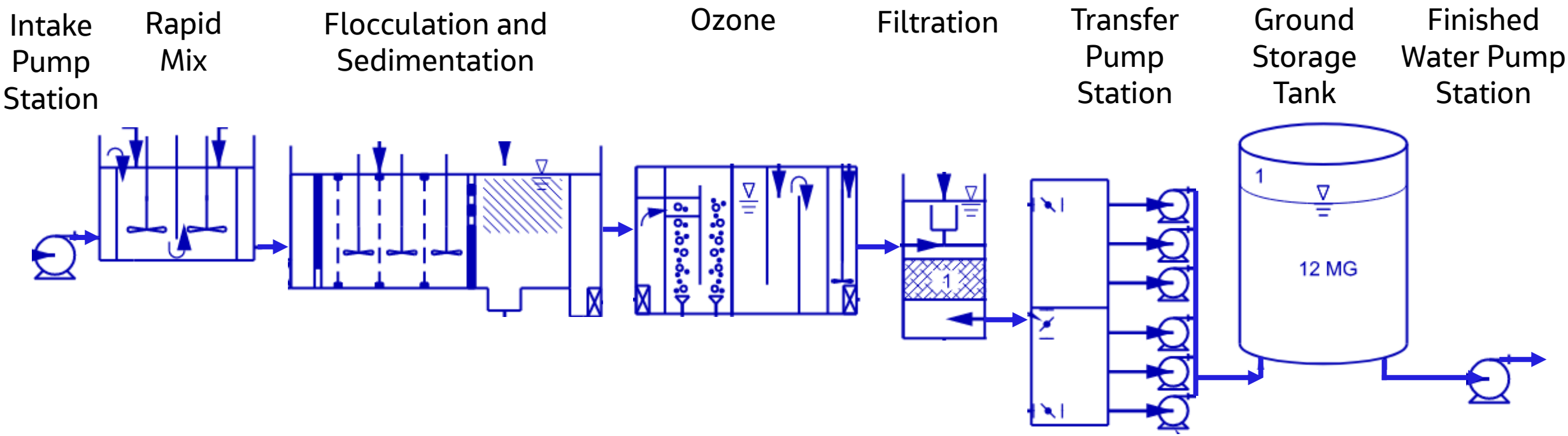
- Operations staff on-site
- Process engineer support
- Practical mechanical knowhow

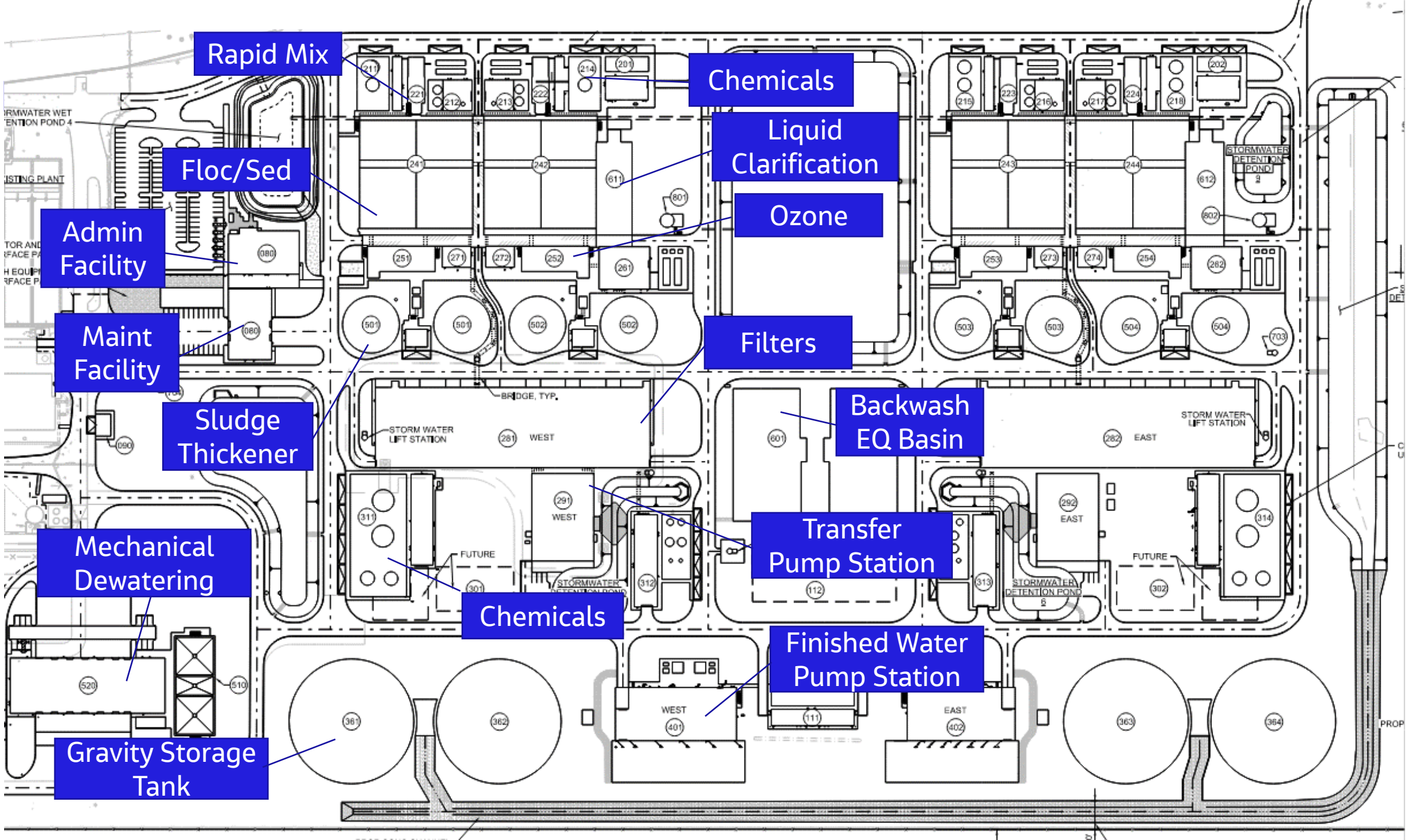
The right commissioning team

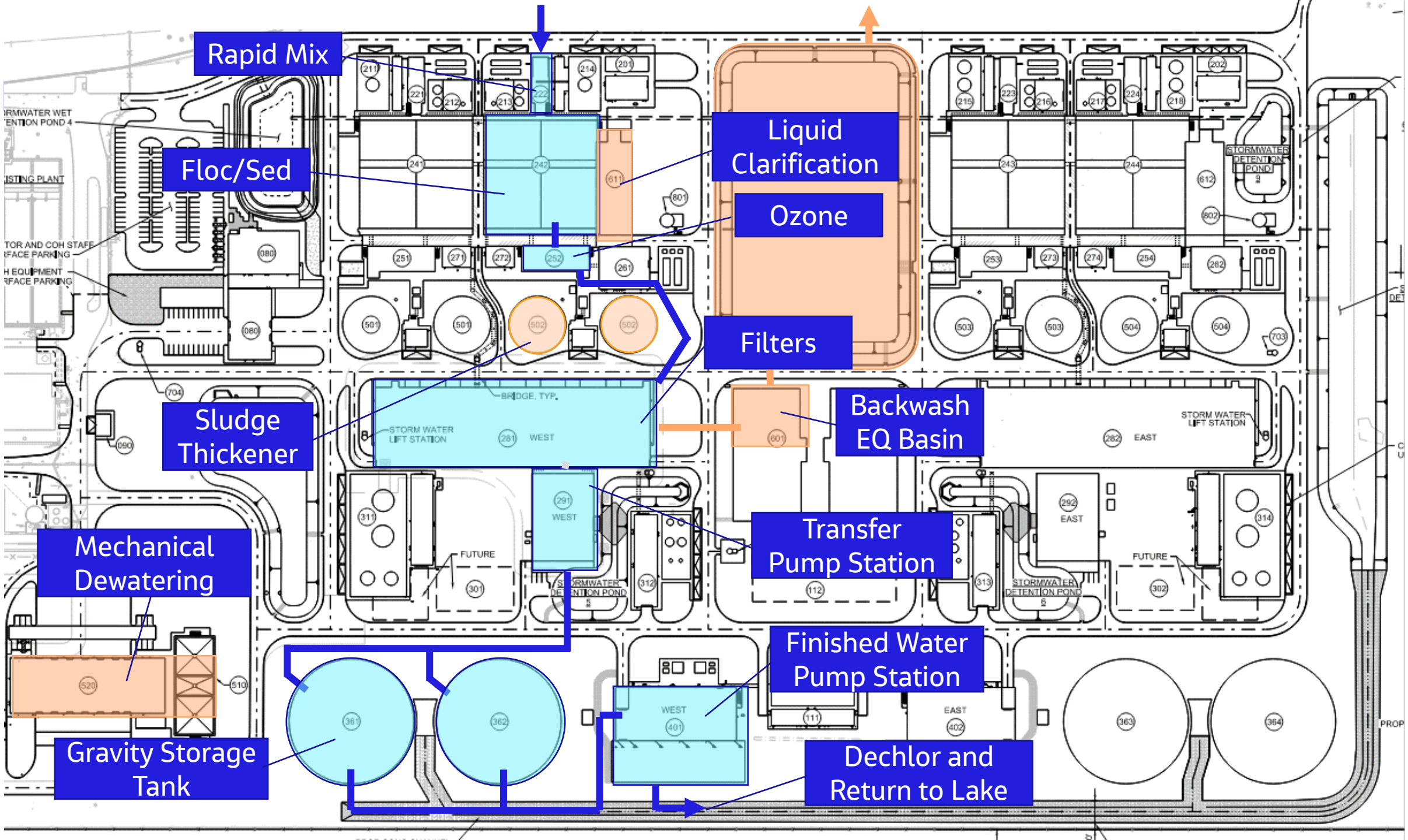
Case Study: Houston Northeast Water Purification Plant

Project Overview

- Capacity: 320 mgd (finished water)
- Source: Lake Houston and Trinity River
- Project driver: Meet growth, reduce reliance on groundwater
- Cost: $1.8 B design/build fee




Rapid Mix
Chemicals
Liquid Clarification
Floc/Sed
Ozone
Admin Facility
Maint Facility
Filters
Backwash EQ Basin
Sludge Thickener
Transfer Pump Station
Mechanical Dewatering
Chemicals
Finished Water Pump Station
Gravity Storage Tank
STORMWATER DETENTION POND 4
STORMWATER DETENTION POND
STORM WATER LIFT STATION
WEST
EAST
FUTURE
BRIDGE, TYP.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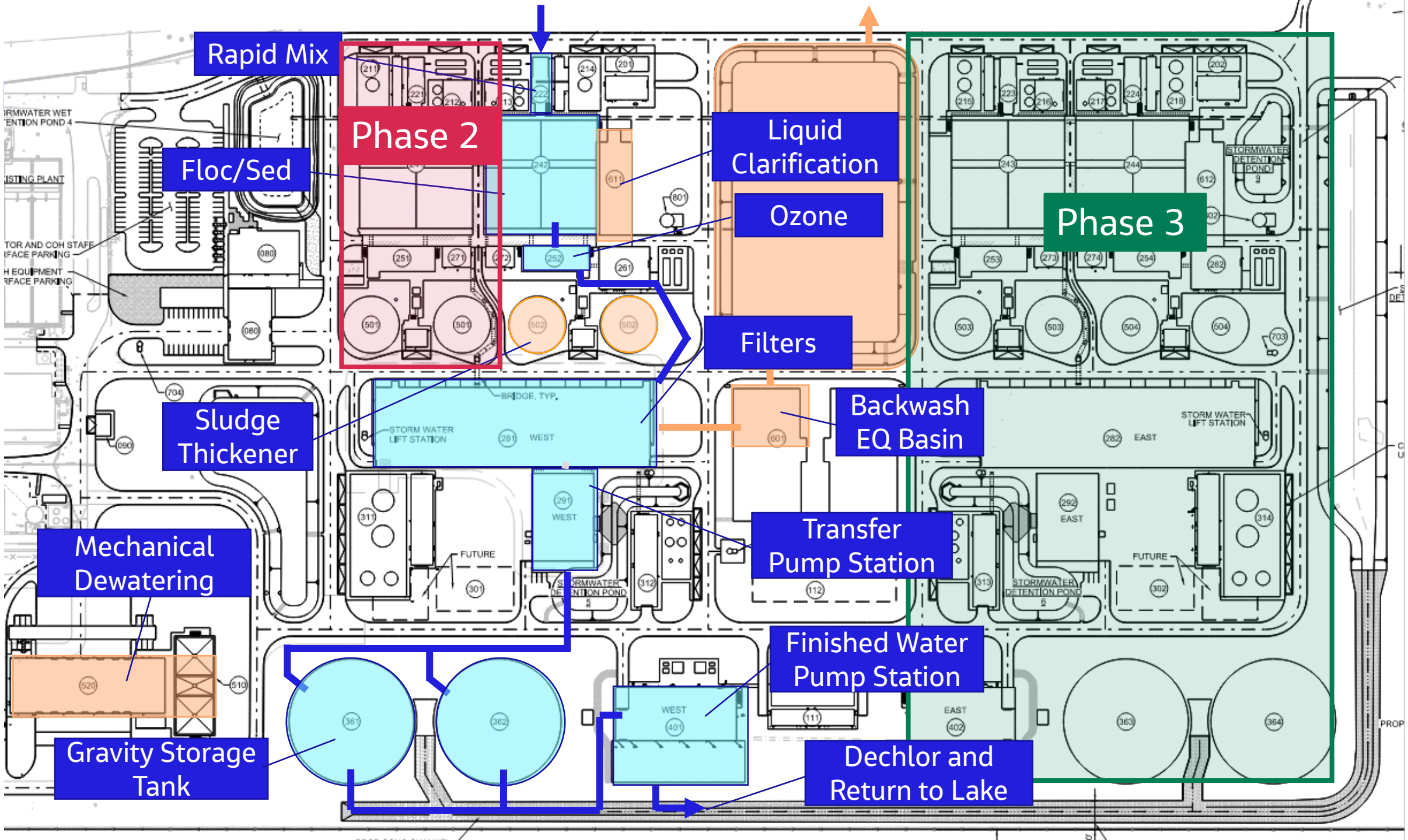
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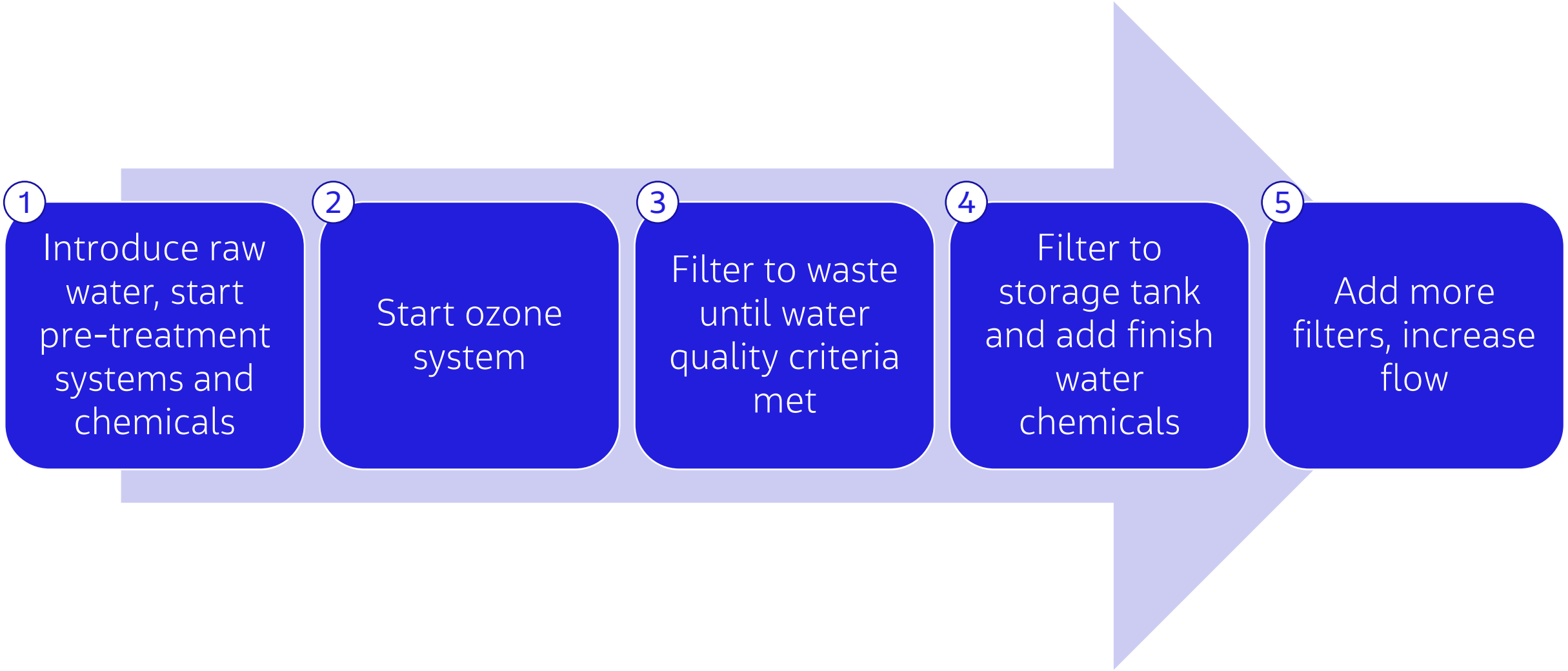
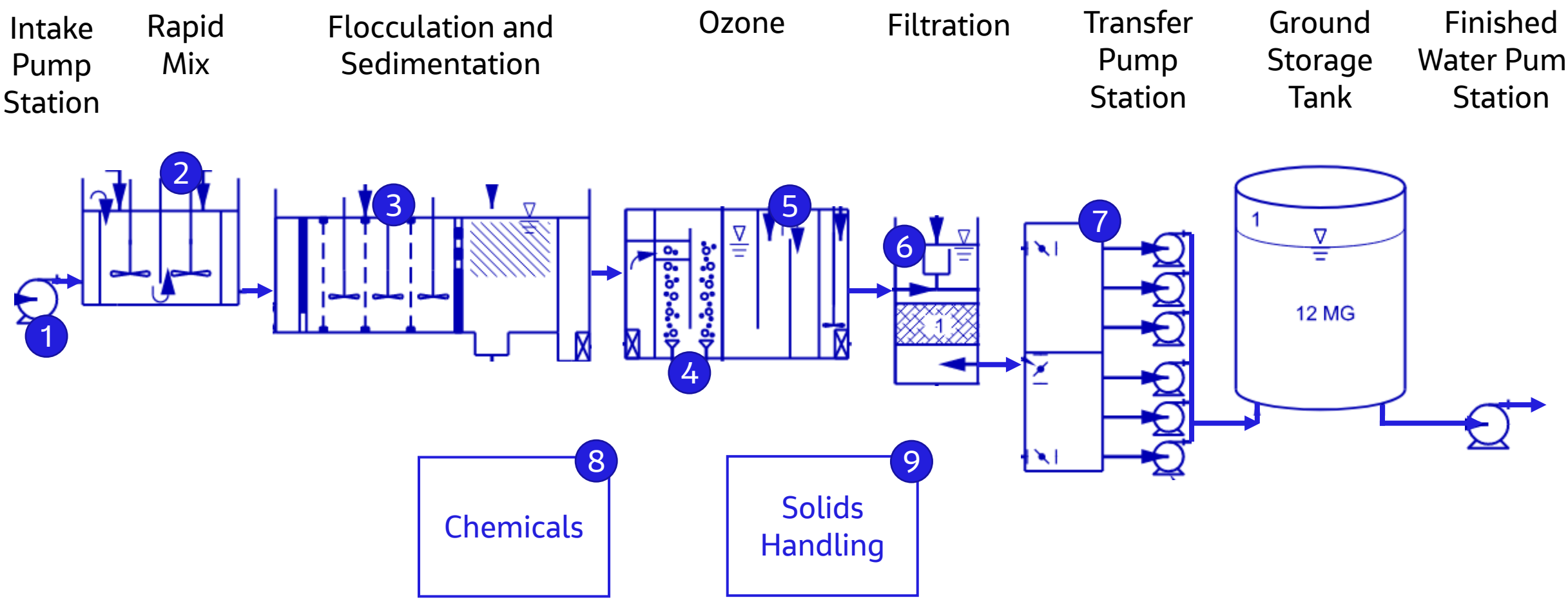
Startup Process

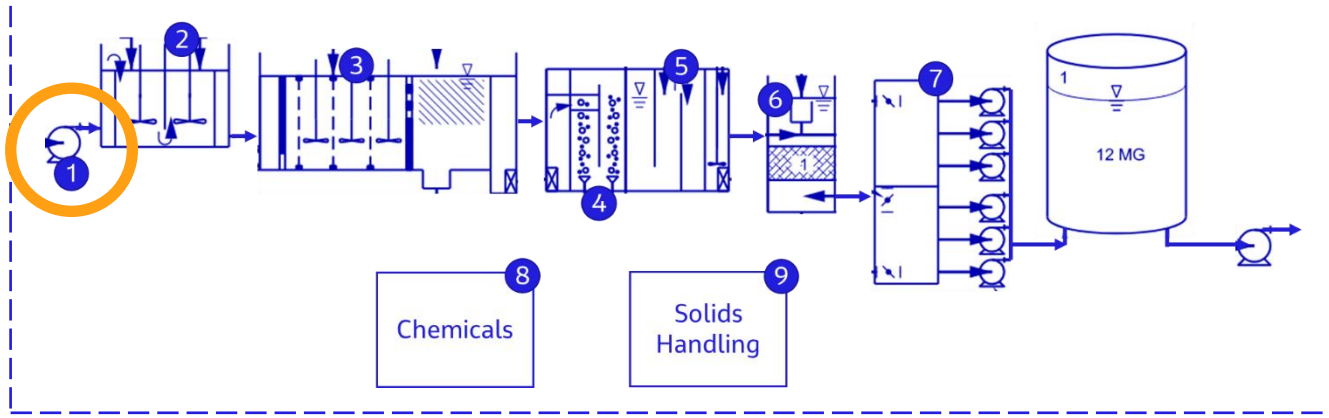


Lessons Learned



Lessons Learned

1. Raw Water Intake: Pump Vibration
   - Issue:
     - Tall pump station
     - Frequent upper bearing vibration alarms
   - Lesson:
     - Coordinate with vendor and HI standards



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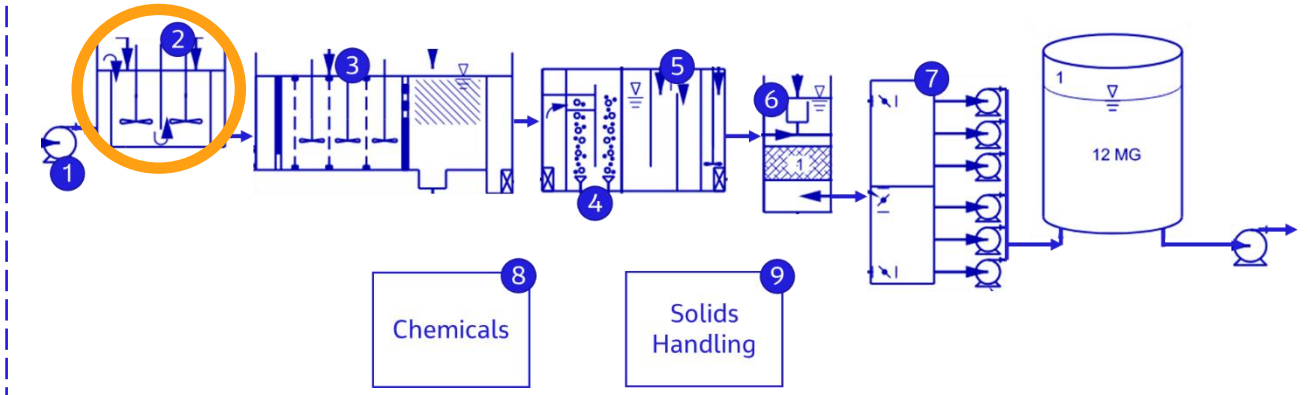
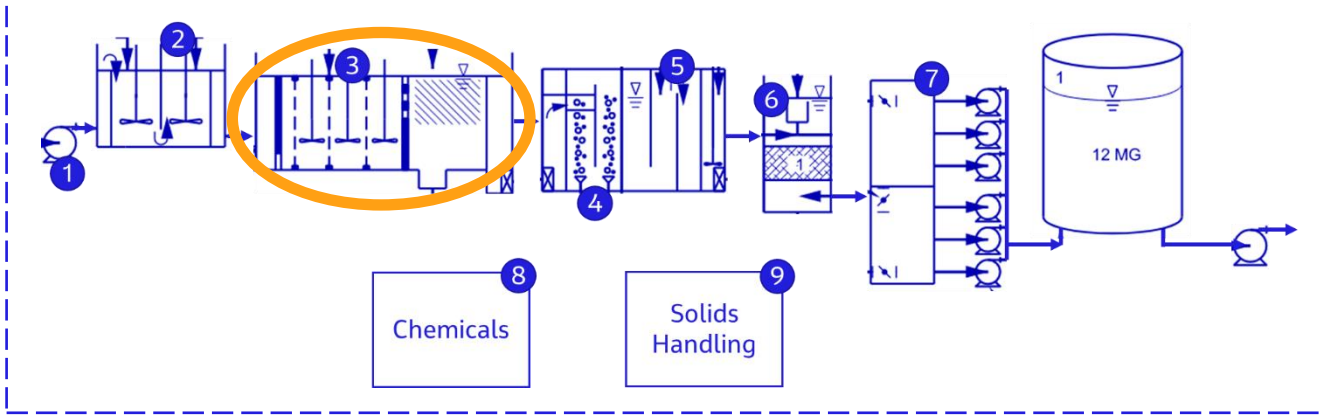
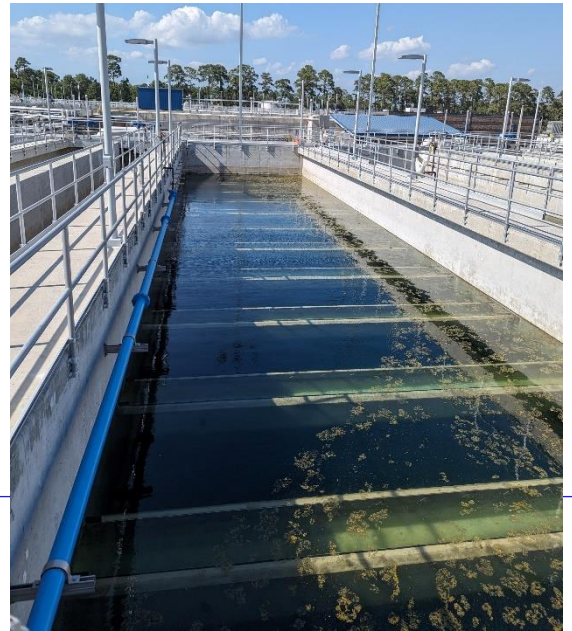


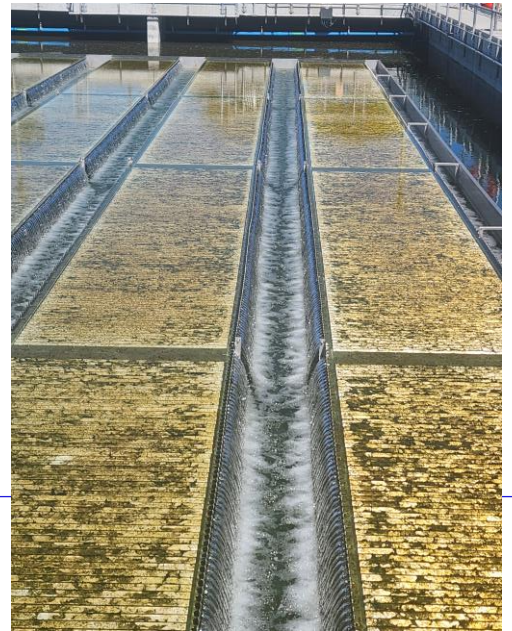
2. Rapid Mix: Chemical injection
   - Issue:
     - CO_2 vendor package difficult to coordinate
     - Lime slurry clogging
   - Lesson:
     - Schedule vendors well in advance
     - Develop lime slurry flushing standard operating procedure (SOP)

Lessons Learned



3. Floc/Sed: Algae Growth
   - Issue:
     - 90-degree water coming from lake
     - No pre-chlorination due to DBP concerns
     - Algae growth in summer/fall
   - Lesson:
     - Proactively maintain and clean your floc/sed basins





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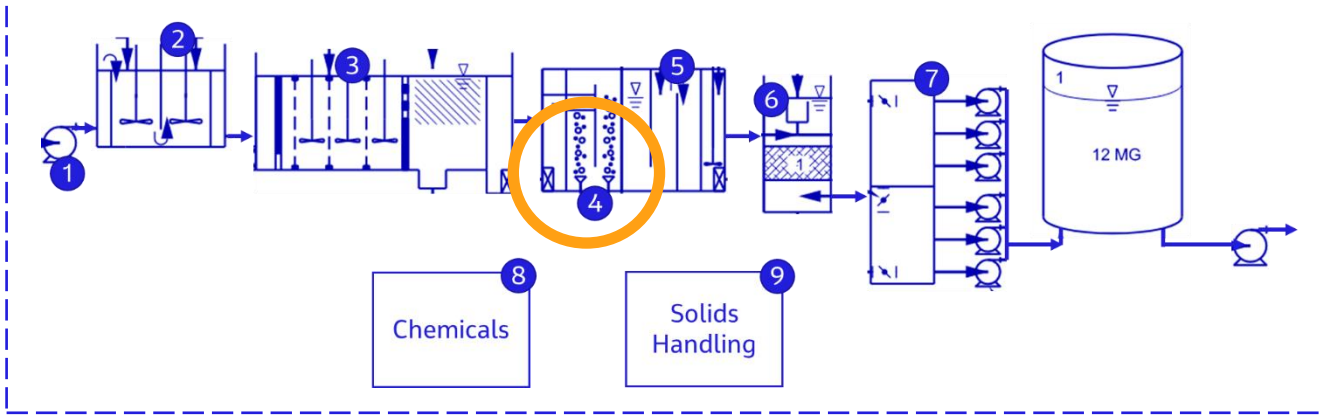
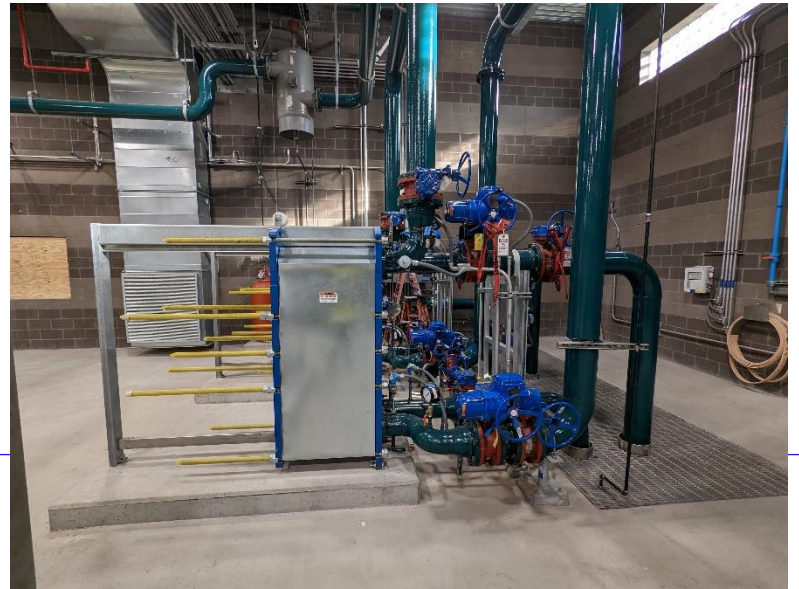
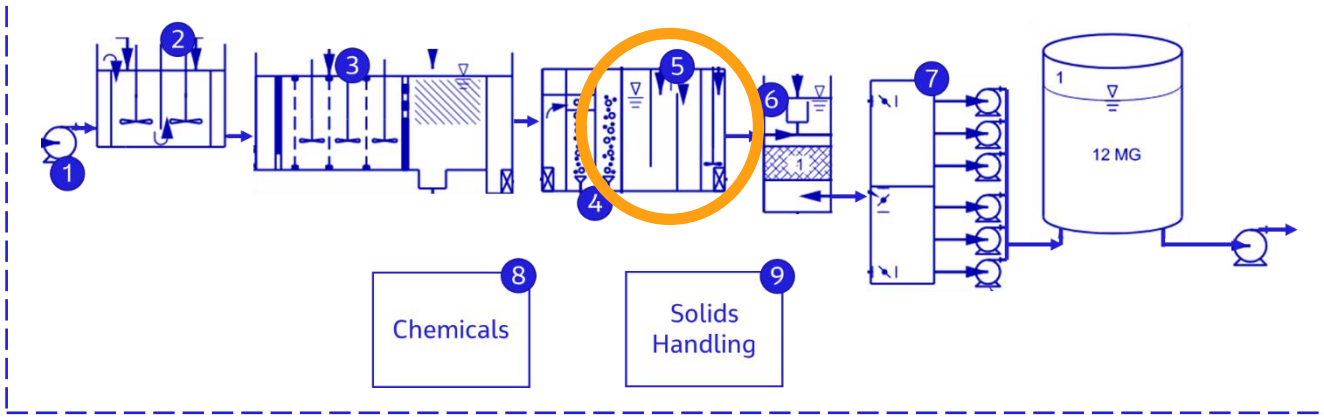


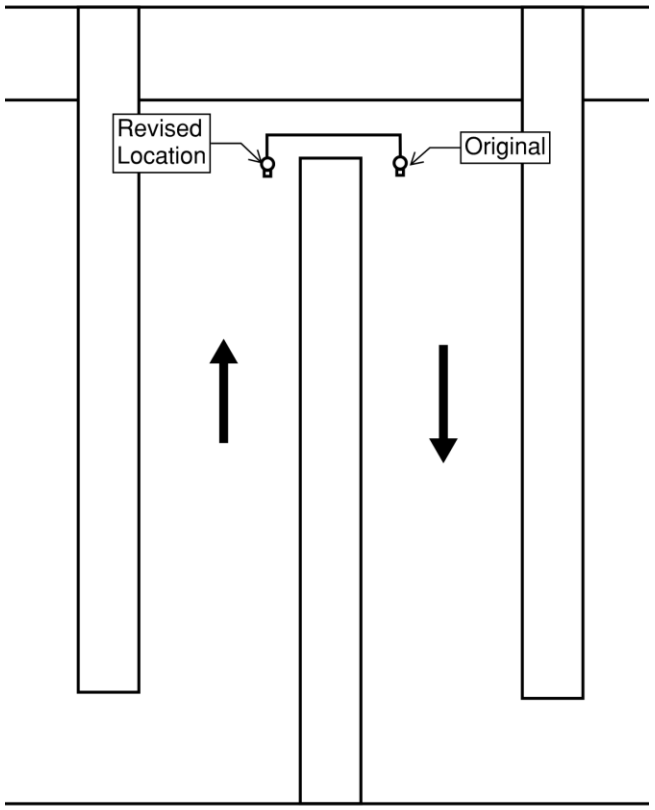
4. Ozone: Cooling Water Issues
   - Issue:
     - 90 degree cooling water
     - High power supply temperature alarms
     - Biological growth within the cooling water loop
   - Lesson:
     - Monitor water quality of cooling water
     - Test cooling water system for proper function



Lessons Learned

5. Ozone: Sample Inaccuracies
   - Issue:
     - Inaccurate dissolved ozone readings
     - Texas gives “direct credit” for first cell, difficult to achieve
     - Overdosing of ozone
   - Lesson:
     - Pay attention to sample locations at under and over baffles!
     - Results in lower ozone dose, less chemical usage





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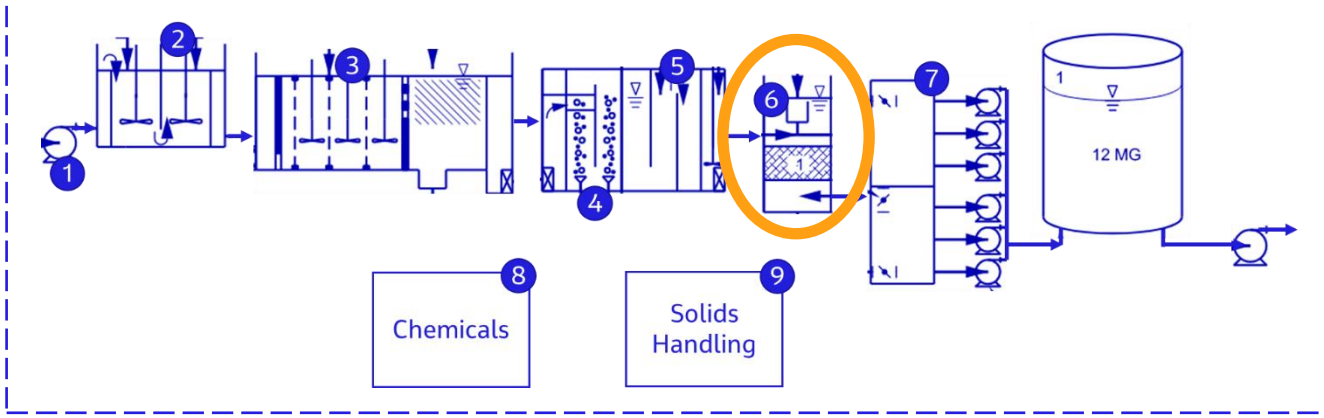
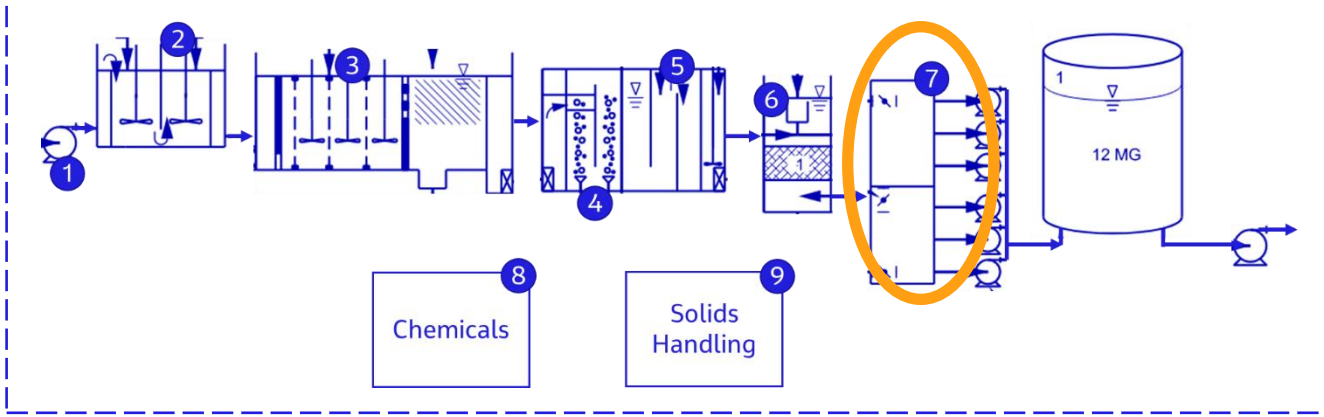


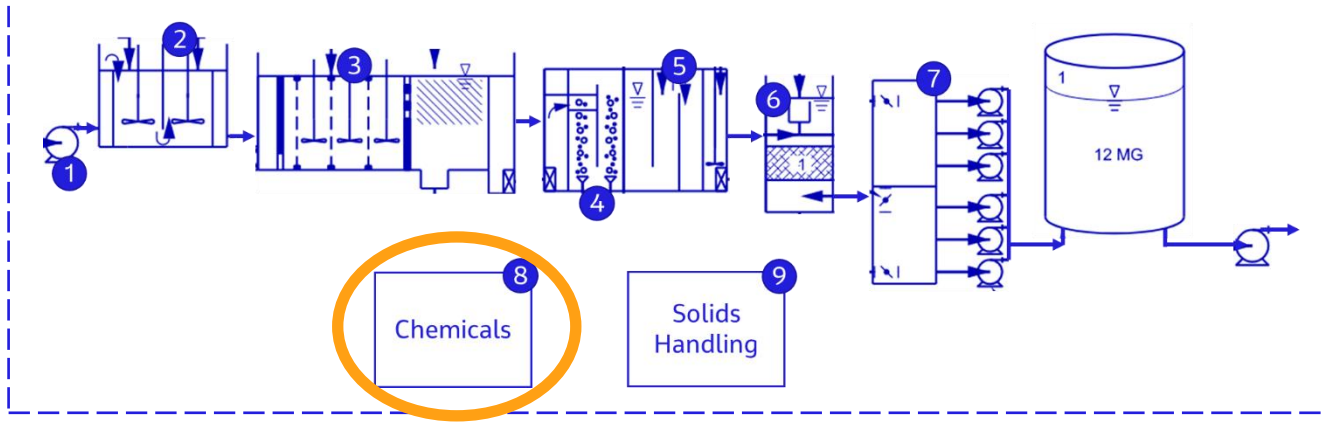
6. Filters: Treatability Issues due to pH
   - Issue:
     - pH adjusted at filter influent
     - Decrease in UFRV and increase in IFE turbidities
   - Lesson:
     - Be wary of large pH adjustments ahead of filtration
     - Monitor zeta potential to ensure proper charge balance

Lessons Learned



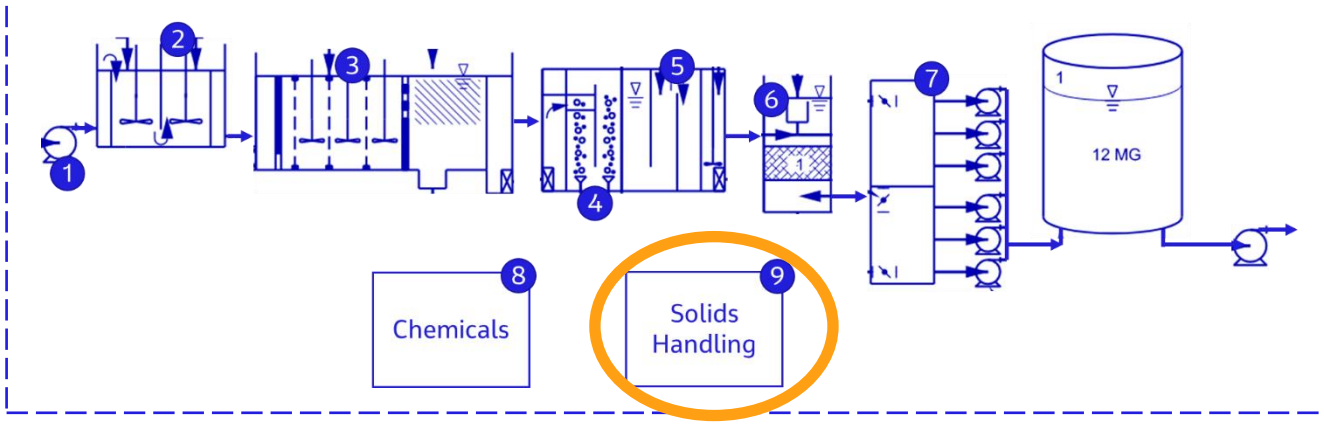
7. Samples and Analyzer Issues
   - Issue:
     - Analyzer panels with poor sample flow
     - A lot of analyzers – a full time job!
   - Lesson:
     - Assign dedicated personnel to analyzer maintenance
     - Provide adequate sample locations during design

Lessons Learned

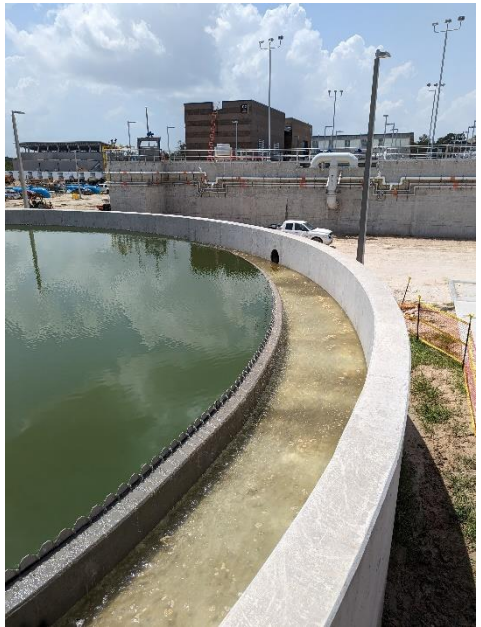


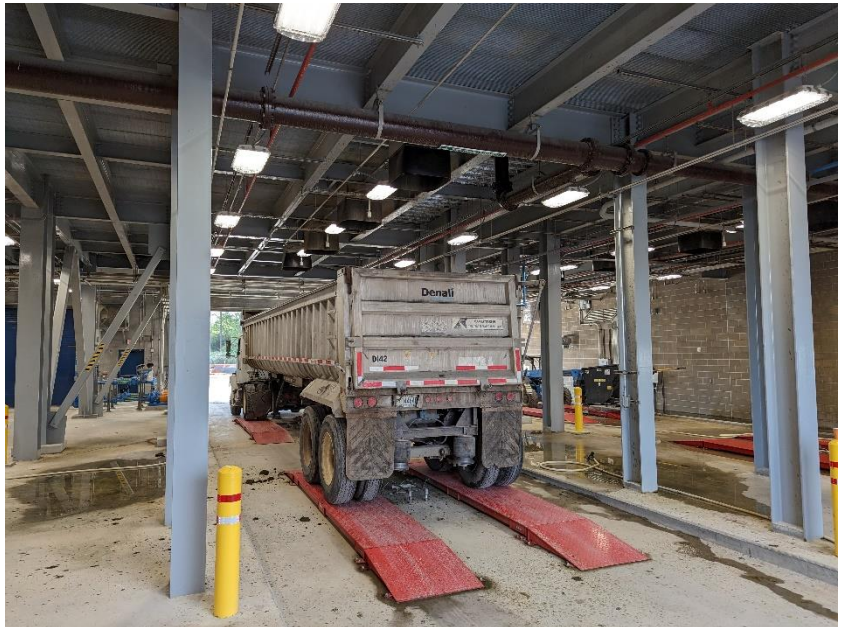
8. Chemical Systems
   - Issue:
     - Polymer flow meter clogging issues
     - Insufficient floc-aid feed would deteriorate settled water quality
   - Lesson:
     - Avoid using flow meters on neat polymer solution
     - Utilize basket strainers to remove impurities

Lessons Learned



9. Solids Handling
   - Issue:
     - Thickened solids turned septic
     - Mechanical equipment issues with centrifuge, thickeners
   - Lesson:
     - Keep solids moving, keep age down
     - Careful vendor selection



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Questions?

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