Jordan Lake Water Supply Program

May 1, 2024

Western Intake Partnership

Agenda 1:30 – 3:00

- Welcome
- Introductions (around the entire room)
- Western Intake Partnership program overview
  - What's new?
- PER Spotlight: Raw Water Intake, Pump Station and Transmission
- What to expect next
- Q & A
- Networking
- Adjourn

Introductions

Western Intake Partnership program overview

Western Intake Partnership

Western Intake Partnership

CHATHAM COUNTY NORTH CAROLINA

TOWN OF PITTSBORO

CITY OF DURHAM

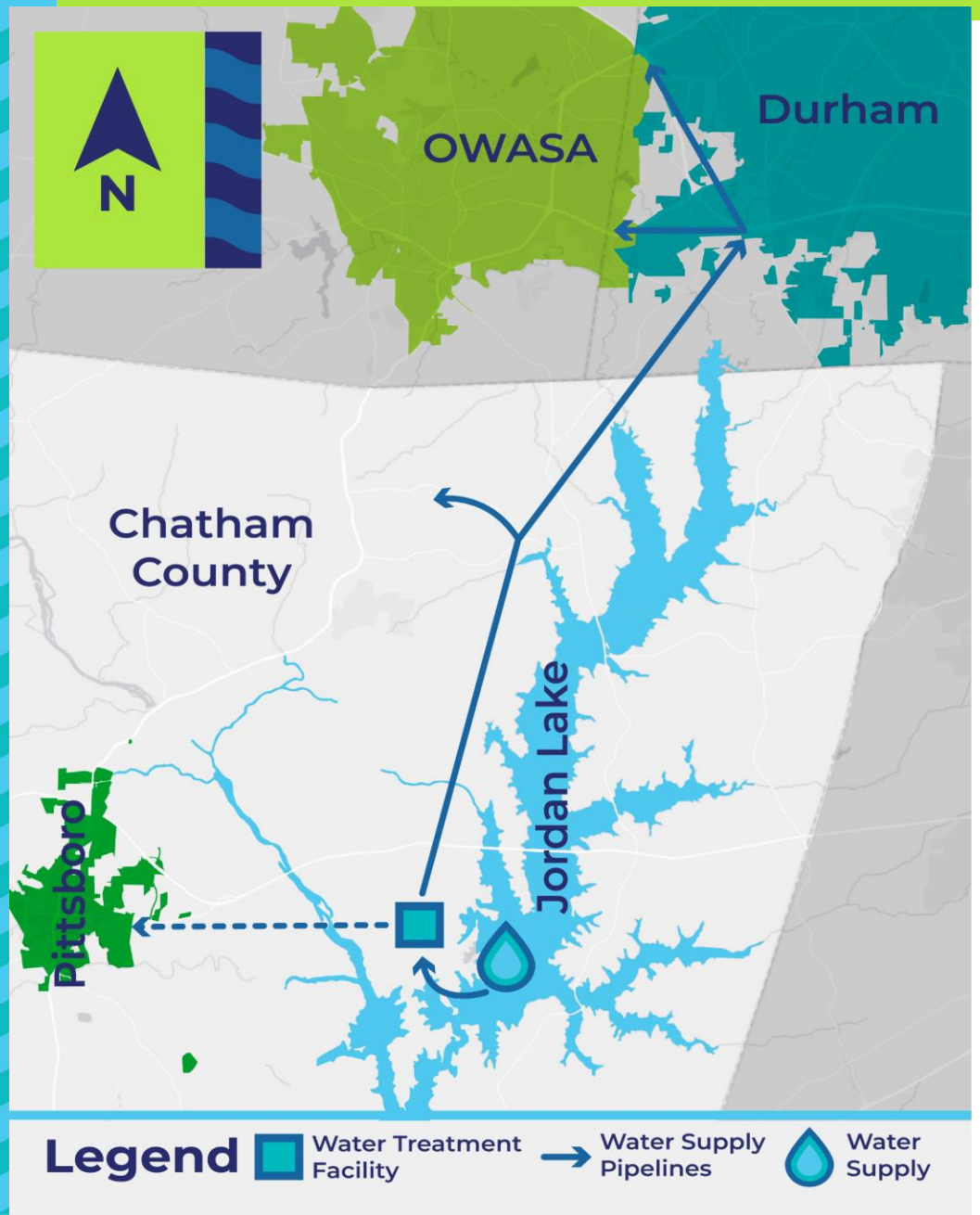
OWASA

- Represents diverse cross section of Triangle communities
- Collaborating on regional water supply solution since 2014
- Formed to ensure sufficient water supply for the Partners' current customers & support long-term growth & resiliency – access Partners' Jordan Lake allocations from state
- Even with development of other supplies, WIP facilities provide needed capacity to support resiliency and growth

Western Intake Partnership

- City of Durham - Contracting Entity
  - Project Manager – Sydney Miller
- HDR - Program Manager
  - Not eligible to be a design engineer on the Program
  - Supports Selection Committees, but not a voting member
- All Meeting and/or Information Requests shall be directed to HDR:
  - Jeff Adkins – jeff.adkins@hdrinc.com
  - Kip Kalisiak – kip.kalisiak@hdrinc.com

Western Intake Partnership Water Supply Project



- Access Partners' Jordan Lake allocations
- Jointly plan, design, construct and operate:
  - *Jordan Lake Intake, Tunneled Raw Water Pipeline (~3/4 mile) & Pump Station*
    - **Progressive Design-Build Opportunity**
  - *Regional Water Treatment Facility (initial capacity 20 mgd, site plan for future expansions to 77 mgd)*
    - **Progressive Design-Build Opportunity**
  - *Finished Water Transmission Pipelines Initial 16 miles to Durham/Chatham; Pittsboro pipeline in future phase*
  - *2 Elevated Water Storage Tanks*
    - **Traditional Design-Bid-Build**

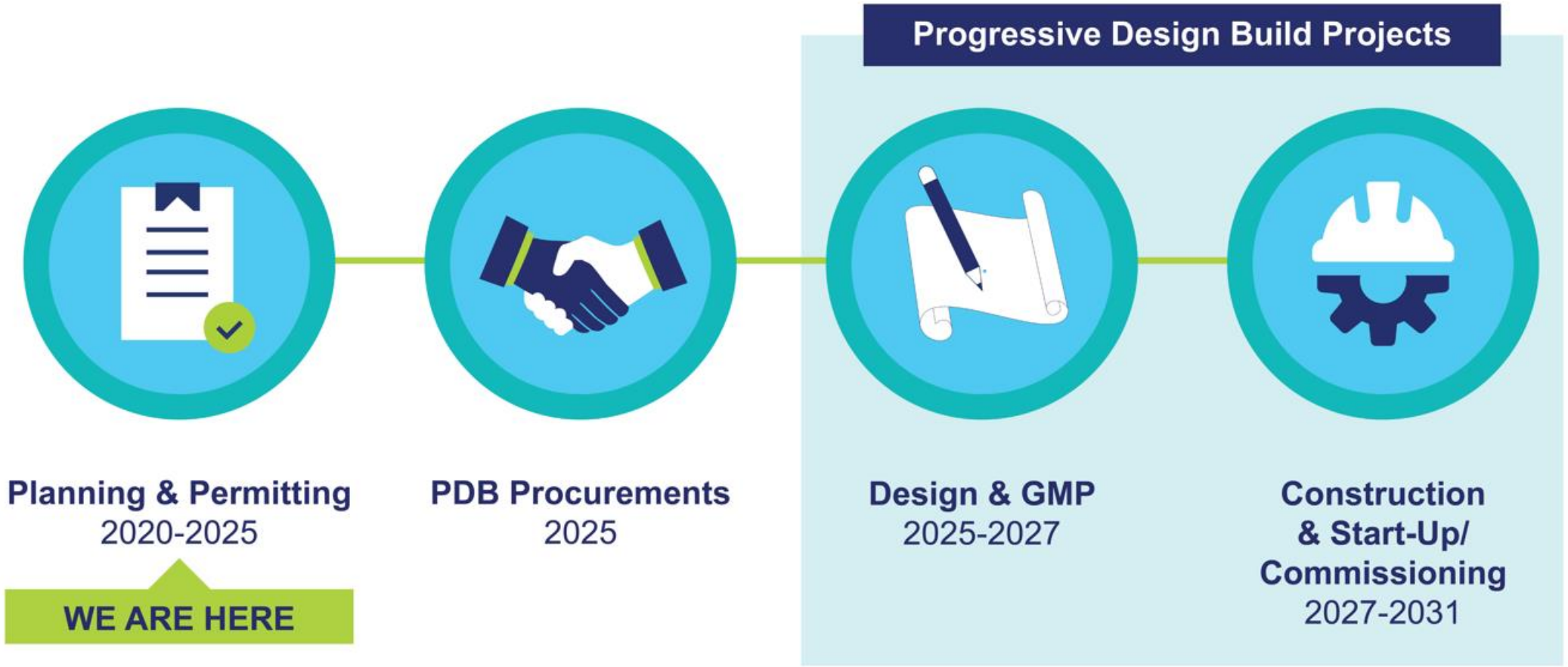

Raw Water Intake
Raw Water Transmission
(Tunnel)
Raw Water PS
Finished Water
Transmission Pipeline
Regional Water
Treatment Facility

Decisions on construction contract delineations and delivery methods

Western Intake Partnership

- Key Decisions that led Partners to PDB:
  - "Reserving" an A-Team Contractor/Engineer; recognize limited resources in the market
  - Collaborative approach
  - Quals-based selection
  - Risk mitigation
- Important Factors to Partners
  - Locally-based project leadership
  - Consistency with project leadership team
  - Need to show separate teams if pursuing multiple contracts
  - Contractor capacity to self-perform significant portion of work

Program Schedule



What's new since WIP May 2023 Outreach Event?

- Clearer picture of Partner participation and capacity allocations
- Decisions on construction contract delineations and delivery methods
- Preliminary Engineering Reports nearing completion
  - Surveys and Geotech investigations
  - Raw Water Intake, Pump Station and Transmission PER – submitted for final review
  - Regional Water Treatment Facility PER – expected June
  - Finished Water Transmission – PER nearly complete
    - Final work to identify intermediate & northern elevated storage tank locations
- Fieldwork for Environmental Assessment (wetlands, streams, species surveys, cultural & historic resources)
  - EA prepared for submittal to USACE and DEQ

Current Preliminary Construction Cost Estimate

Western Intake Partnership

PDB Program Element	Preliminary Estimate ($M)
Intake, Raw Water Pumping & Transmission	$117M
Regional Water Treatment Facility	$460M

DBB Program Element	Preliminary Estimate ($M)
Finished Water Transmission to Durham	$152M (36-in) $190M (42-in)
Two Elevated Storage Tanks	$21M

Total Program Preliminary Estimate (PDB + DBB Elements) = $750M-$788M

Construction Costs only, excluding Design, Permitting & Administration
Costs in 2024 dollars

Jordan Lake as a Water Source

Western Intake Partnership

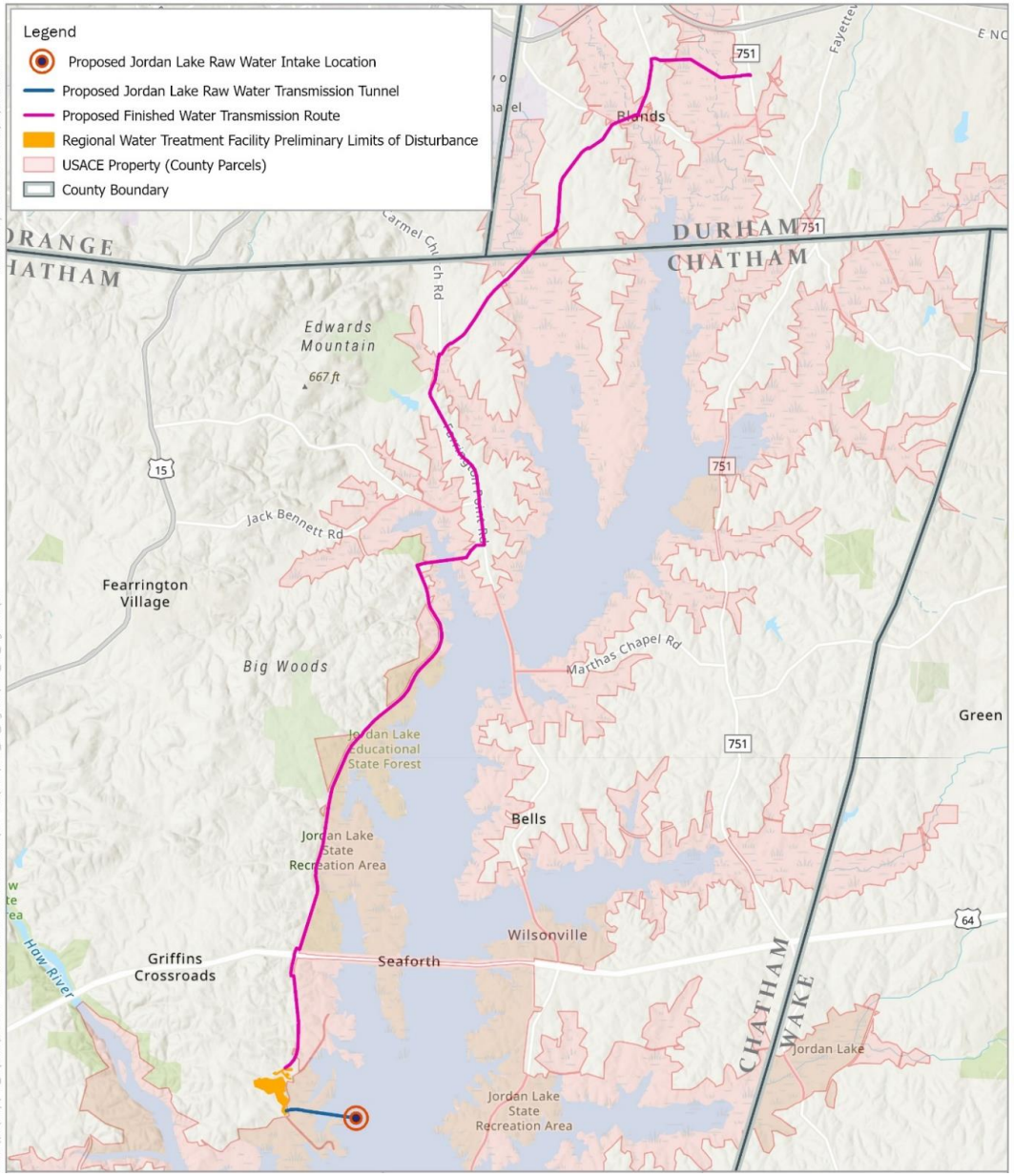
- Lake eutrophic from the beginning
- Seasonal taste & odor issues (MIB, Geosmin)
- Nutrient Management
  - Jordan Lake Rules
  - NC Collaboratory study late 2019
- Emerging contaminants (PFAS, 1,4-dioxane, Bromide)
- Intake WQ analysis 2021-present
  - WQ data will be shared
- Proposed intake
  - Near Vista Point State Rec Area
  - Historic New Hope Creek

Proposed Raw Water Design Conditions

Parameter	Normal	Challenging
Turbidity, NTU	8.4	>20
Tot Manganese, mg/L	0.12	>1
Tot Iron, mg/L	0.23	>0.3
Bromide, µg/L	138.5	>200
MIB, ng/L	9.7	>150
Geosmin, ng/L	14.3	>100
1,4-Dioxane, µg/L	1.15	1.5
Tot Microcystins, µg/L	0.25	>1.2
PFOA, ng/L	6.6	7.4*
PFOS, ng/L	9.5	10.5*
PFBS, ng/L	5.8	6.3*

* 75th percentile of historic data

Finished Water Transmission Pipelines to Partners



- Traditional Delivery project
- Transmission pipelines along roadways from Treatment Facility
- 16-mile transmission pipeline from Treatment Facility to Durham and Chatham Co. water distribution systems
  - Chatham County interconnect location TBD
  - OWASA receives WIP water through existing Durham interconnects, emergencies only during initial phase
  - Future parallel pipeline
- Future 6-mile transmission pipeline to Pittsboro

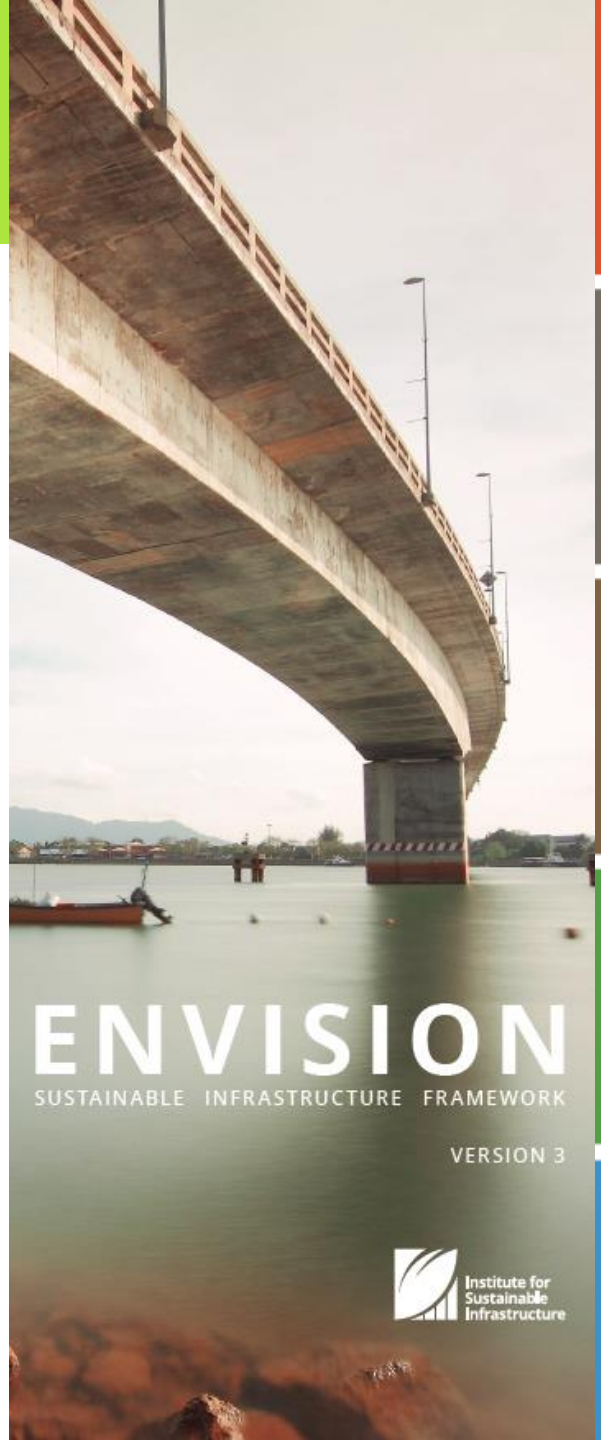
WIP is using Envision to encourage Sustainability

ENVISION

Tools to plan, design, construct, operate and rate civil infrastructure

- Framework to help project teams identify sustainable approaches
- Self-assessment checklist
- Project verification & recognition program

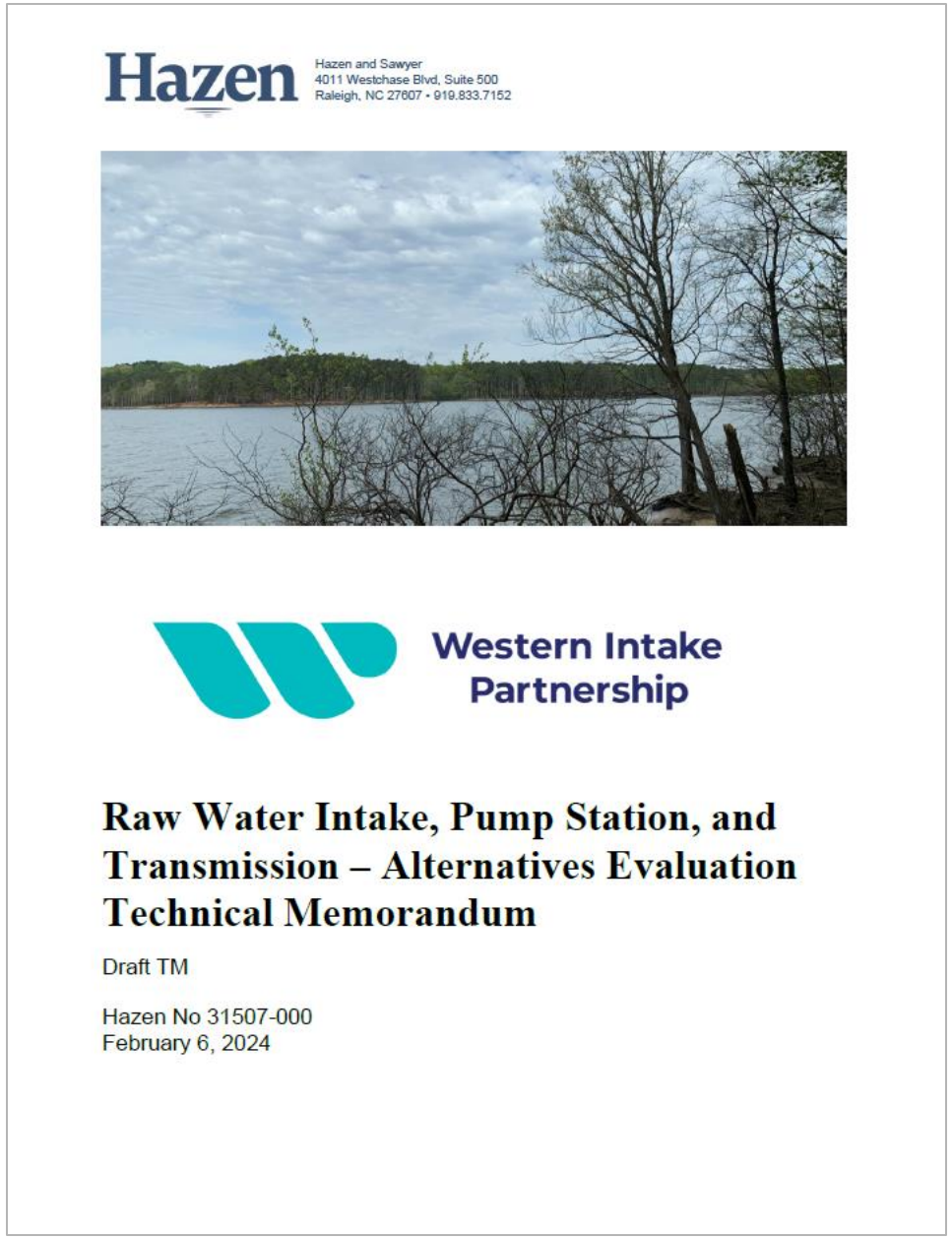
Speaks to triple bottom line: social, economic & environmental goals



PER Spotlight

Raw Water Intake, Pump Station and Transmission

Raw Water Intake, Pump Station and Transmission PER Overview



- One of 3 Hazen PER Tech Memos
  - Others are related to Finished Water Transmission program element
  - Draft final Memo submitted late April
- Final version will be available for review on request later this month
- WTF PER to be finalized ~September
- Expect similar overview and availability on request

Raw Water Intake, Pump Station and Transmission PER Overview

Western Intake Partnership

Alternatives analysis for new Raw Water facilities

Goal: Convey water from west side of Jordan Lake to Partners' new Water Treatment Facility

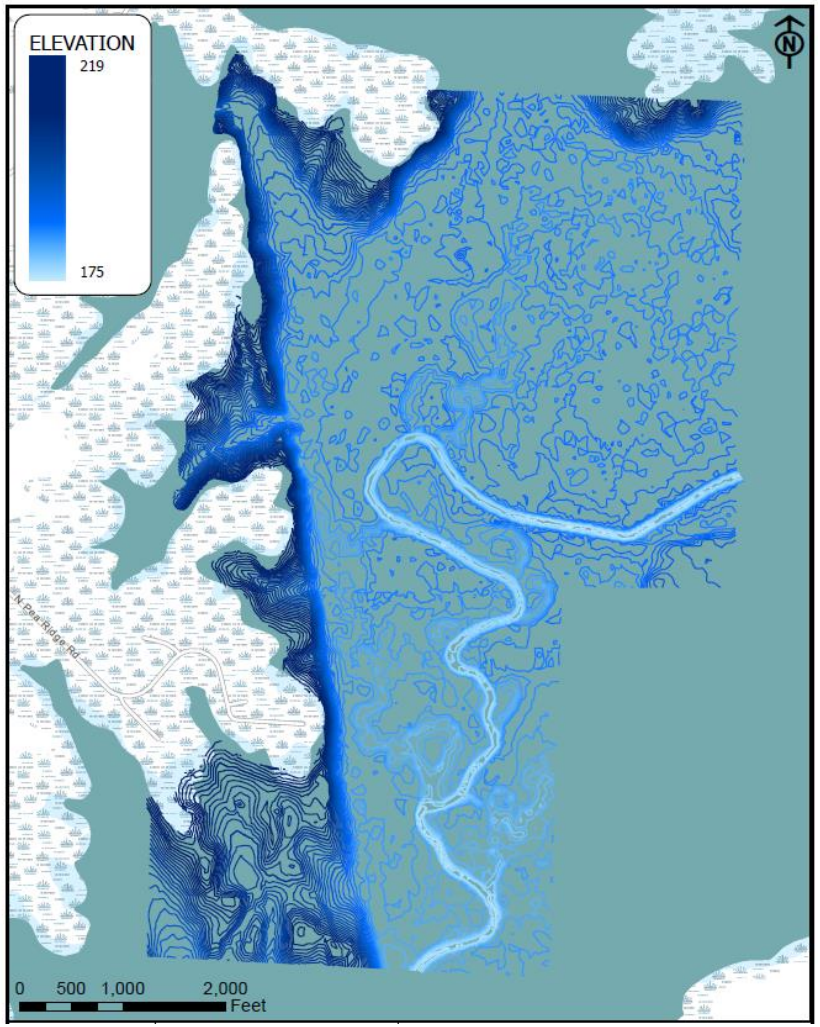
Sections:

- Introduction & Background
- In-Situ and Modeling Investigations
- Location Alternatives for Raw Water Intake & Pump Station
- Raw Water Intake Alternatives
  - Screen Type
  - Configuration (Tower/Submerged)
- Intake Piping Trenchless Alternatives
- Recommended Raw Water Intake & Piping Configuration
- Raw Water Pump Station Configuration
- Raw Water Intake Alternatives
- Raw Water Transmission Configuration
- Construction Cost Estimate

Raw Water Intake, Pump Station and Transmission PER Overview

Guiding Design Principles for Raw Water Infrastructure

- Thalweg Access – resilient to severe drought
  - Vicinity bathymetric survey completed
- Sustainable pumping operation above flood elevation, including access to station during flood event
- Intake capable of multi-level withdrawals as needed for seasonal WQ challenges
  - Changing intake elevation is infrequent
  - In-lake modeling built on 2018 *Jordan Lake Nutrient Management Report* models
- Minimize disturbance to Vista Point Rec Area



Raw Water Intake and Pump Station Location

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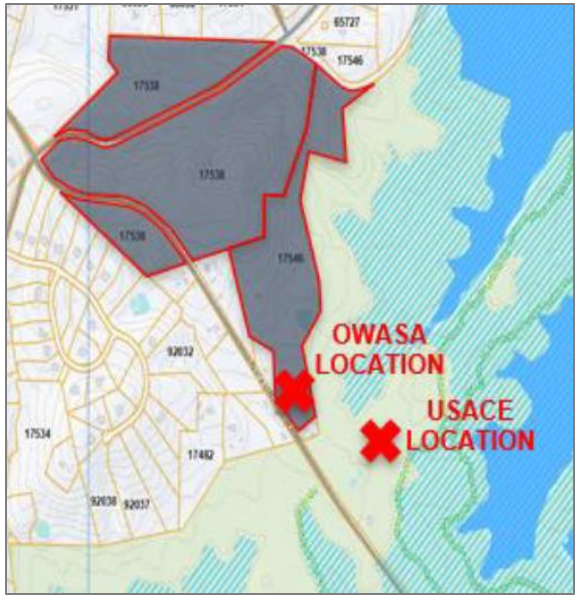
Intake Location

- Initially evaluated 1991
- WIP evaluated 3 in-lake intake locations
  - Bells Landing, 2 areas off Vista Point
- Preferred location – north of Vista Point

Raw Water Pump Station Location

- Consideration limited to locations not impacted by flood conditions
- Preferred location – SE corner of property owned by OWASA
- Fewer issues with access, easements



View from Vista Point Sailboat Launch toward Proposed Intake Location

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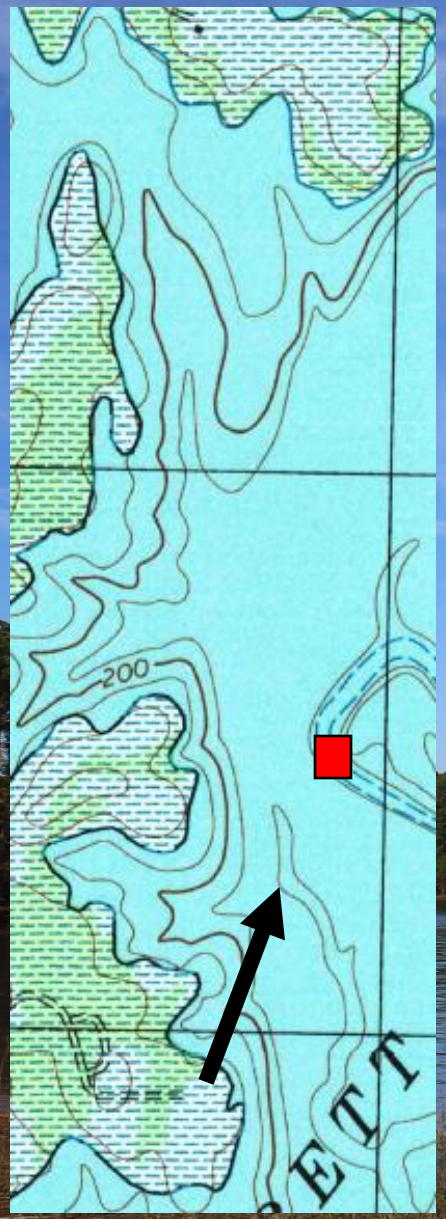

Raw Water Intake Configuration Alternatives

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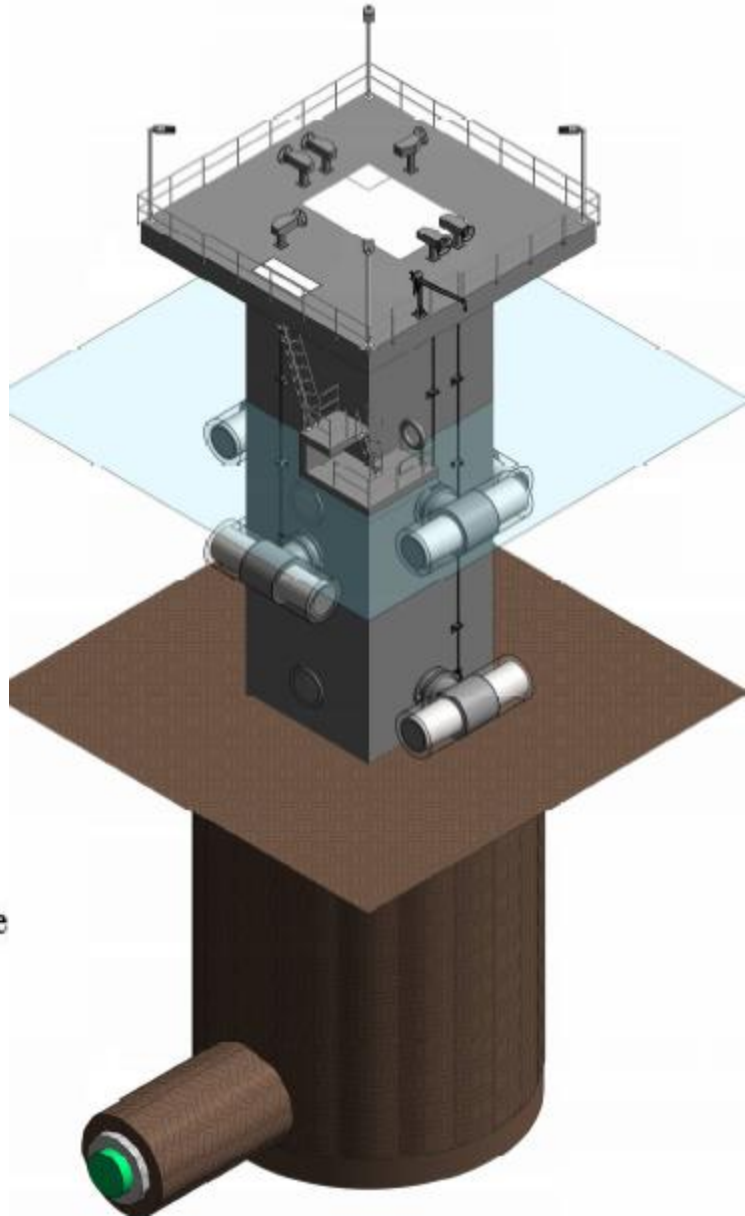
Evaluated two intake configurations:

- In-lake Tower Style Intake w/ integral gates for intake level control
- Submerged Screen Style Intake with onshore gates

Tee



Preferred option:

Concrete In-Lake Tower

Tee Barrel Screens

3 Withdrawal Elevations

ultimate 86 MGD capacity

Considerations & Consequences for Intake Selection

- Local Reservoir Intake Examples
- Agency input during 2023 important to intake style selection

  NC Parks, NC Wildlife Resources Commission, NC Div. of Water Resources

  - Construction impacts to Park in either option
  - Submerged intake structure requires on-land gate structure
  - Concerns operating/maintaining permanent WIP structures in Park
  - Tower intake presents navigational hazard challenges; requires lighting and buoys
  - Potential security concerns similar to Falls Lake

- Intake will be accessed by boat for O&M
- Not practical to run power to Intake to operate gates, provide lighting
- Public safety, security, lighting important design considerations
- Vista Point Recreation Area must be closed during construction

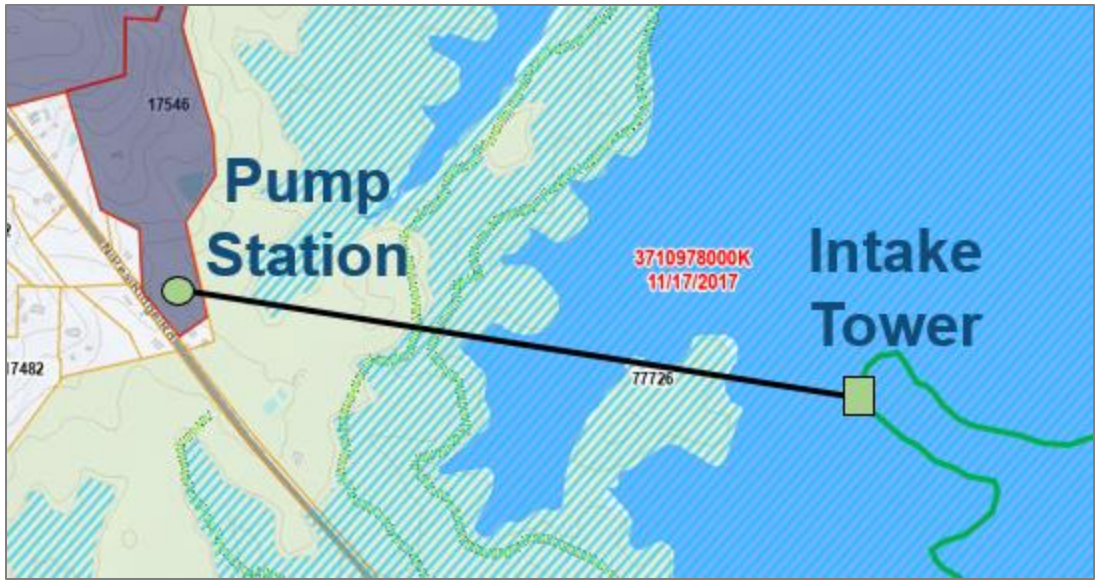
Raw Water Intake Piping Alternatives

Western Intake Partnership

Both *open-cut* and *tunnel* raw water intake pipeline construction initially discussed ….

…but early <u>determined tunnel would be needed</u> to address intake depth + USACE, NC Parks concerns

- Geotechnical investigation to assess subsurface conditions, characterize rock along tunnel alignment
- Seismic Risk Index low



Geotechnical Investigation Report – TM Appendix A

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Soil Borings – 10 along two potential tunnel routes

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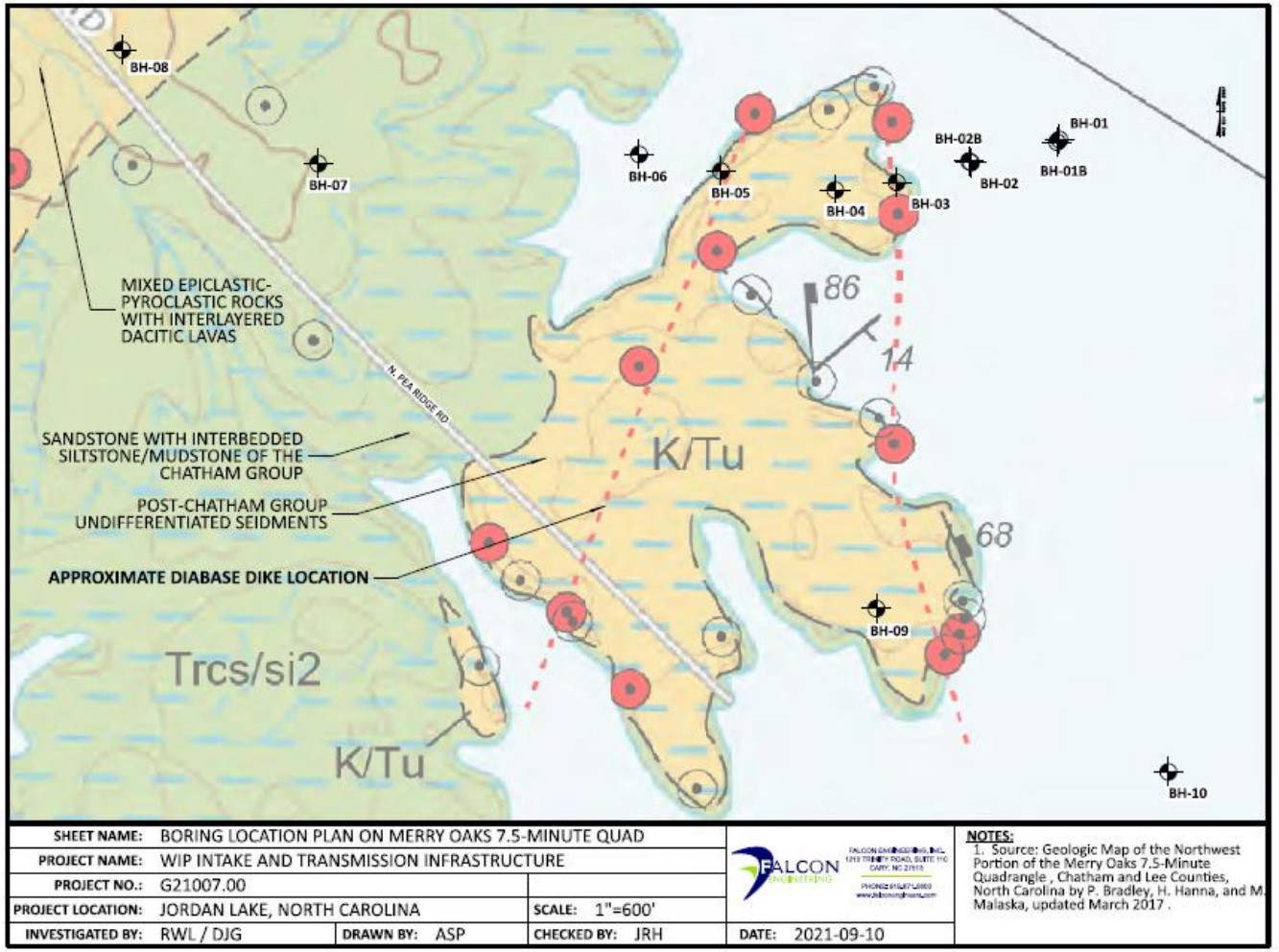

Boring Location Plan/Profile

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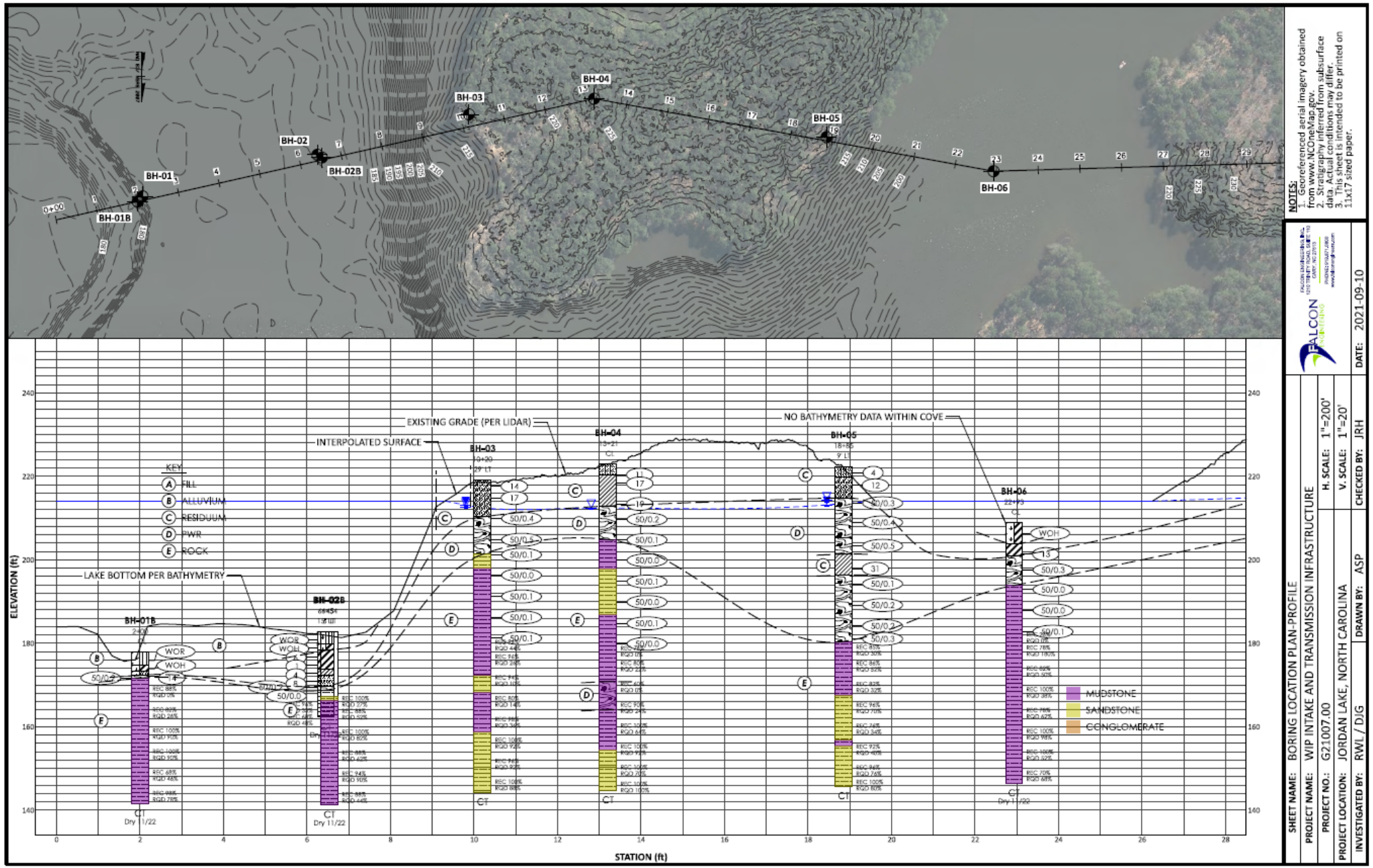
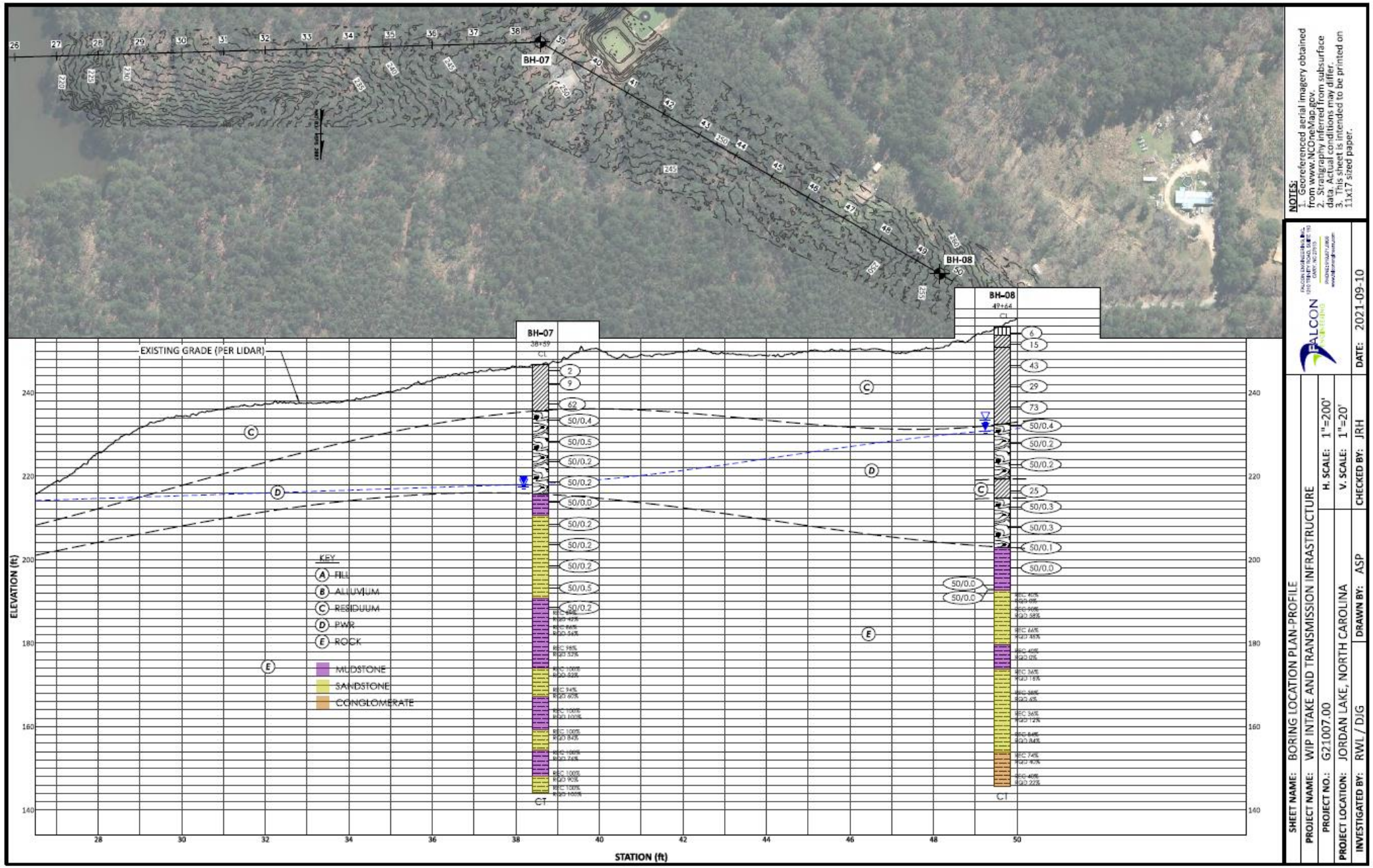
North

NAD 83 / NSRS 2007



Boring Location Plan/Profile



North

NAD 83 / NSRS 2007

Raw Water Pipeline Trenchless Alternatives

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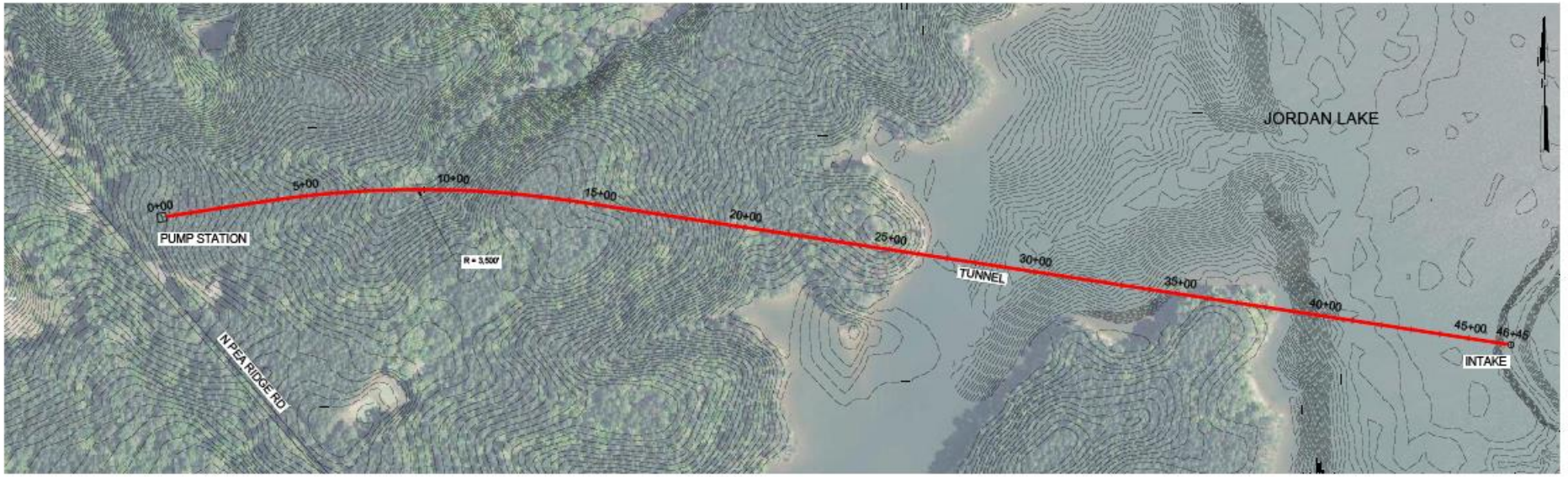
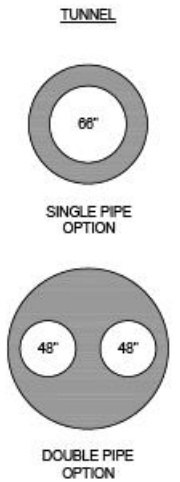
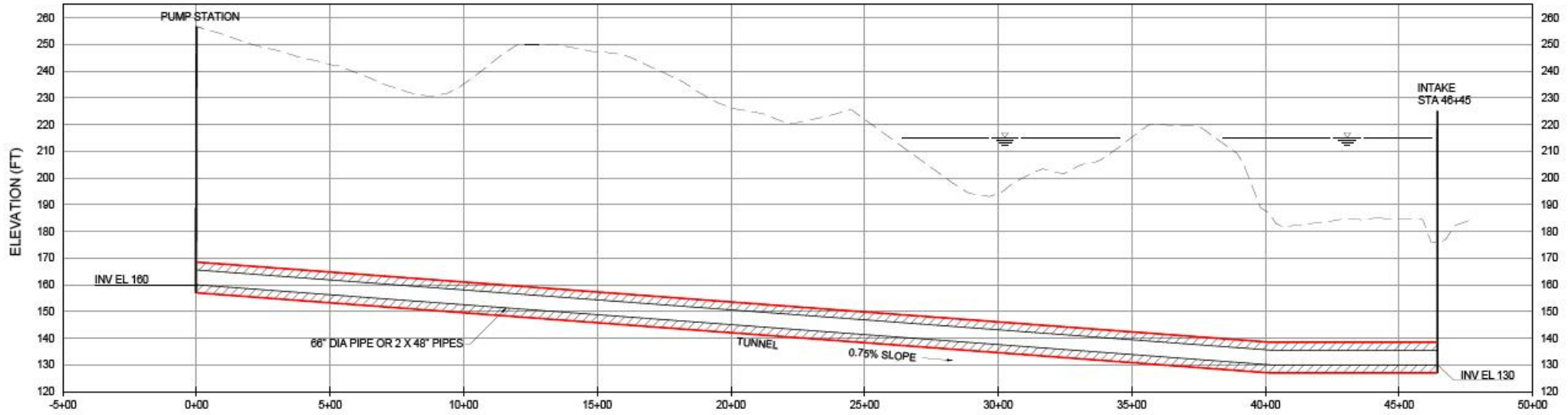


PLAN
SCALE: 1" = 200'





PROFILE
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 2'

Raw Water Intake and Piping Configuration

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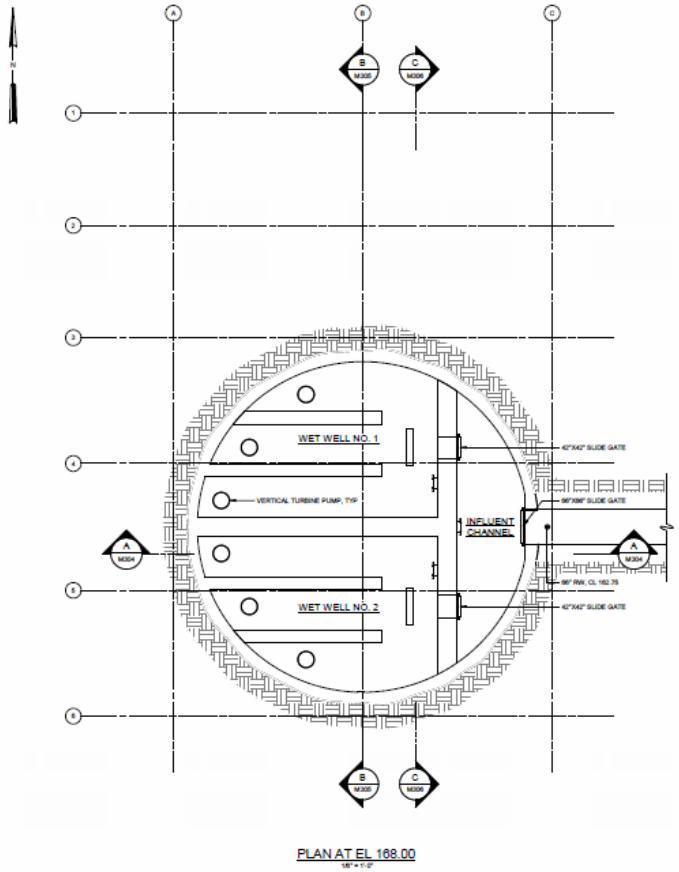
- Preliminarily, Partners may consider alternate Tunnel options, leverage PDB Team input on most cost-effective
- Recognize contractor & TBM equipment availability are factors

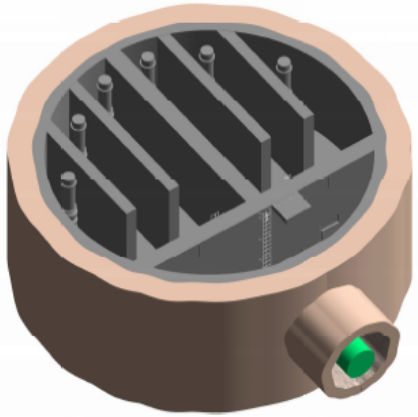
Table 7-1: Recommended Intake and Piping Configuration

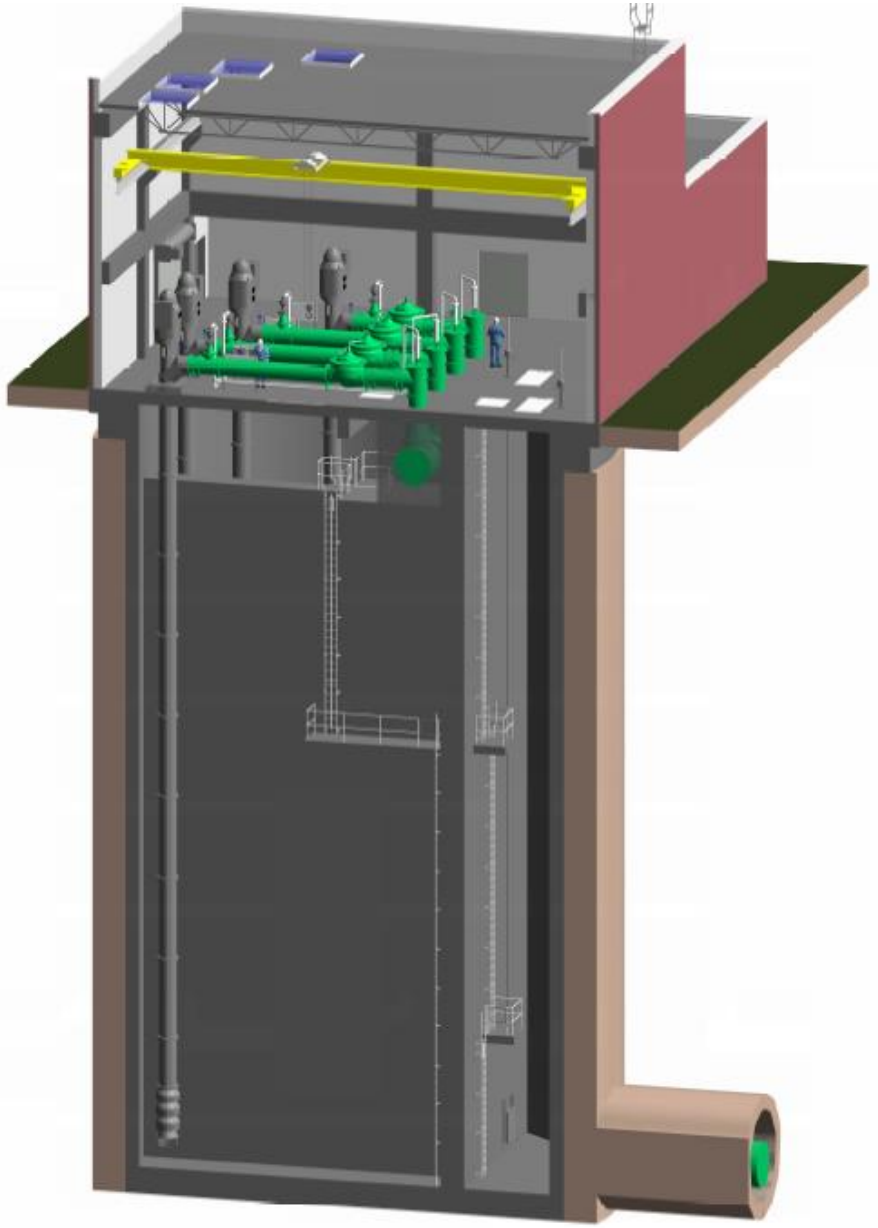
Design Feature	Selection	
Intake Location	Vista Point – Area 1[1]	
Pump Station Location	OWASA-owned Seaforth Property	
Intake Design		
Configuration	Tower	
Screen Technology	Tee-Style Barrel Screens	
Screen Barrel / Outlet Diameter	60 inches / 48 inches	
Slot Size	1/8-inch	
Screen Capacity	~23 mgd	
Screen Isolation	48-inch Butterfly Valve	
Withdrawal Elevations	3 – EL 207.00, EL 200.50, EL 182.50	
Screen Quantity per Withdrawal Elevation	2 (Initial Construction), 4 (Build-Out)	
Trenchless Technology	TBM	
Tunnel / Piping Design[2]	**Option 1**	**Option 2**
Tunnel Diameter	8 feet	12 feet
Intake Piping Quantity / Diameter	1 / 66 inches	2 / 48 inches

Raw Water Pump Station Configuration

- Pump Station wet well is launch point for tunnel construction
- 22 MGD initial pumping capacity







Raw Water Pump Station Features

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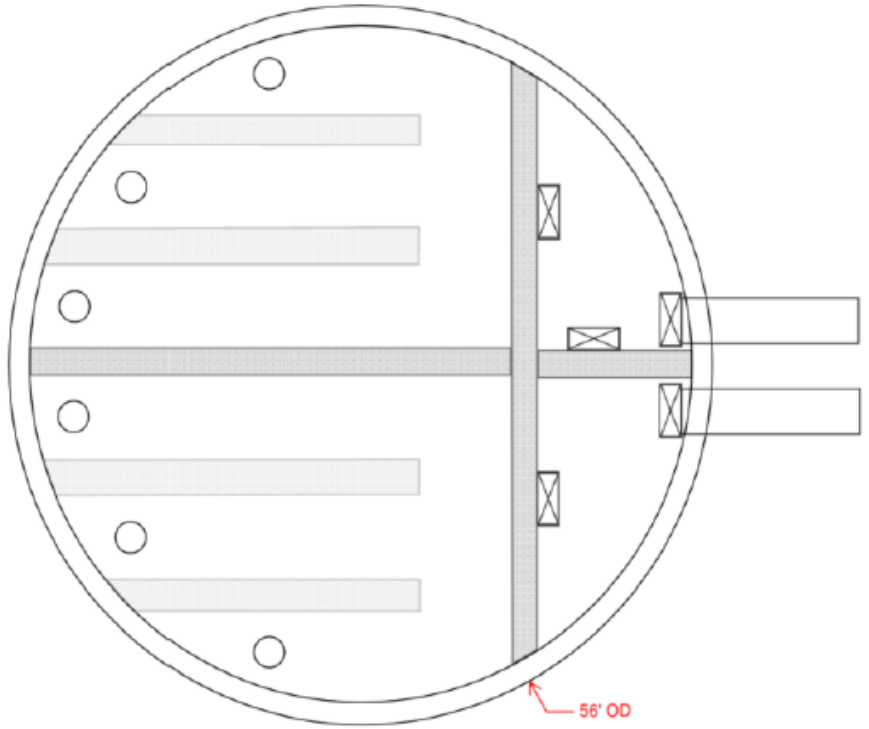
Table 8-1: Capacity Requirements

Planning Horizon	Capacity, mgd
Initial	20 (Finished Water) / 22 (Raw Water)
2050	26 (Finished Water) / 29 (Raw Water)
2070	40 (Finished Water) / 44 (Raw Water)
Build-Out	86 (Raw Water)

- Ultimate build-out capacity based on max demand corresponding to remaining Jordan Lake allocations not accessed at Cary-Apex
- Initial pumping & above-ground piping based on 2050 demand
- Initial 4 vertical turbine pumps (2x7 mgd, 2x10 mgd)
- 56-ft circular wet well, Hydraulics Institute
- Electrical room

Figure 8-3: Circular Wet Well Configuration – Iteration 2



Raw Water Pump Station Features

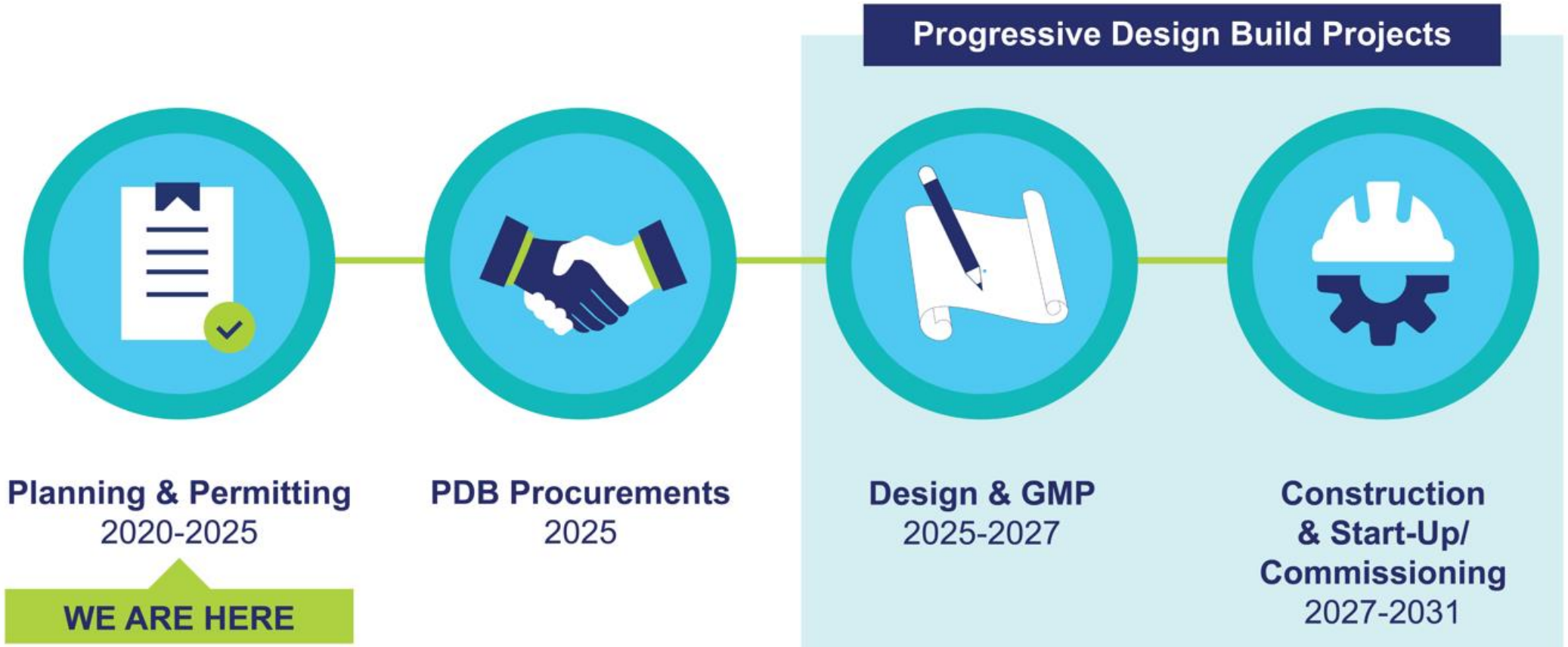
- Zoning requires 100-ft vegetated buffer
- Chemical storage & feed facilities for WTF will also provide for RW facilities
- Raw water pumped to WTF's raw water reservoirs

Accessing PER information

- WIP PERs will be available to interested engineers and contractors
  - Final *Raw Water Intake, Pump Station & Transmission PER* ready in May
  - *Water Treatment Facility PER* – draft submitted in June, final August-September; available when final
- Contact Jeff Adkins/HDR to request
- Other useful information and links for WIP projects available at
  - WIP website www.westernintakepartnership.com
  - Chatham County website www.chathamcountync.gov , 2024 rezoning page

What to expect next

PDB Delivery Schedule



Next 12 Months

Western Intake Partnership

By Late Summer

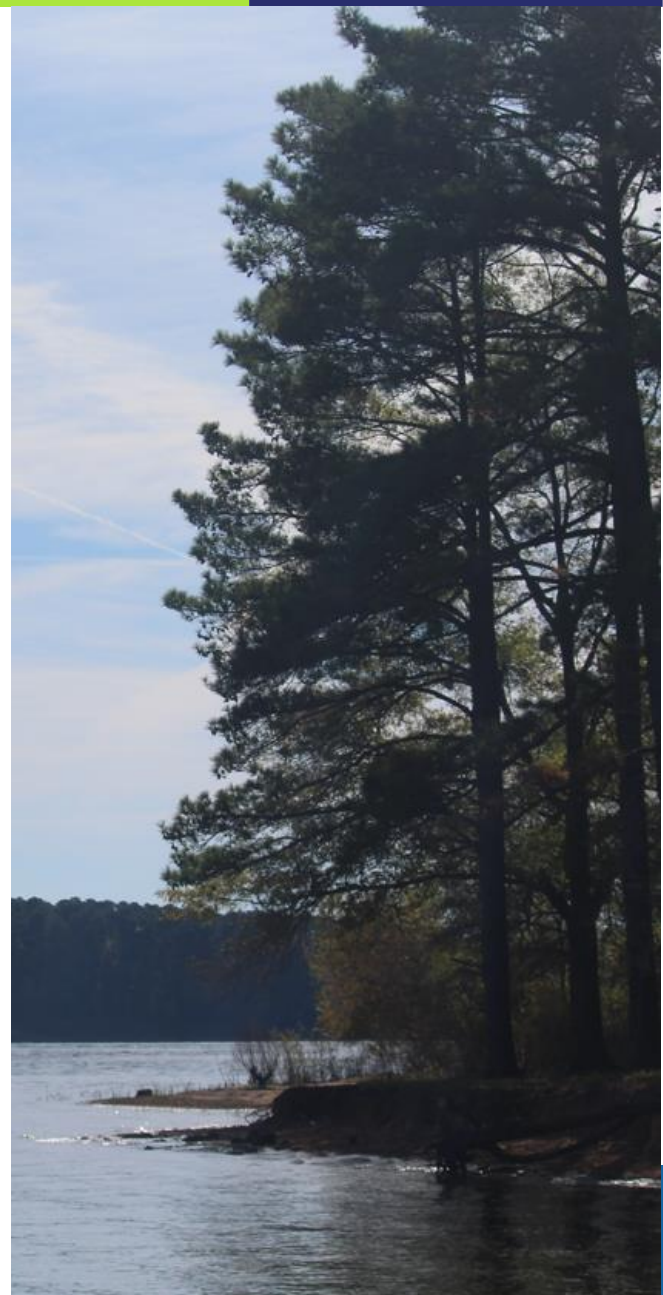
- Preliminary Engineering TMs complete
- PDB Teams can schedule presentations with WIP
- Expect Non-Recreational Outgrant applications submitted to USACE
- Interlocal Agreement ready for Partners approval

By end of 2024

- Finished Water Transmission survey, easement requirements
- Outgrant applications prompt Agency EA review & opportunity for public input

Early 2025

- 1st PDB RFQ



Progressive Design Build Procurements

- Working on DB contract documents and RFQs
- City of Durham is WIP's Contracting Agent
- Planning solicitations for PDB Contracts in 2025
  - 1st RFQ – Water Treatment Facility (Contract 2) – March/April
  - 2nd RFQ – Intake & Raw Water Facilities (Contract 1) – June/July
- Not planning to issue 2nd RFQ until selection made on 1st RFQ
- 2-stage selection – SOQ, Interviews
  - Structured evaluation – criteria will be in RFQ

Traditional Delivery Project – 16-mile Finished Water Transmission Pipeline – Hazen to continue to final design, anticipate bidding 2027

City of Durham UBE Requirements

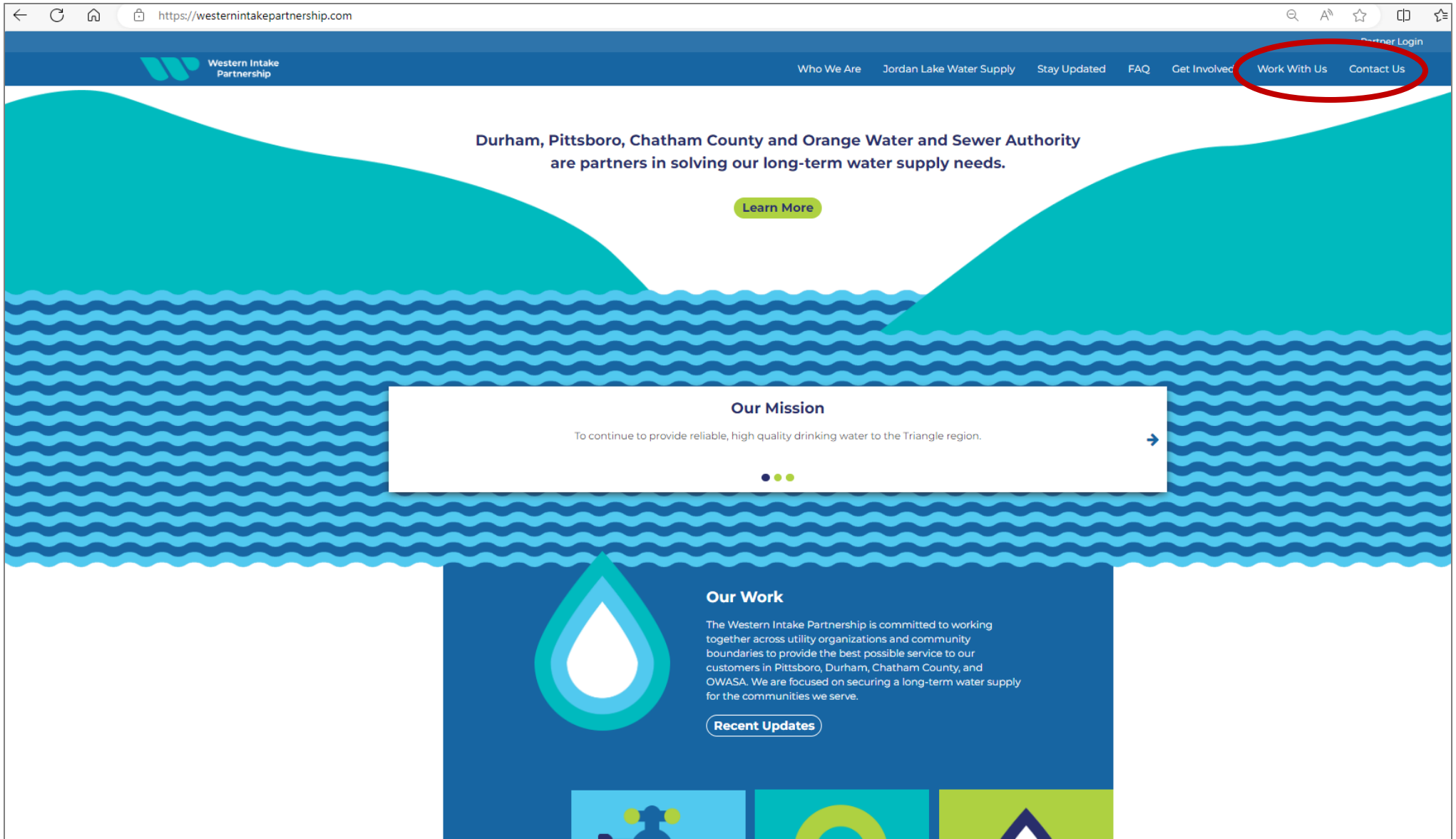
- All construction projects – PDB and Traditional - will have goals for Underutilized Business Enterprise (UBE) participation
  - % Minority-owned and % Women-owned UBE firms
- Underutilized Business Enterprise Compliance Division in Finance Department; requirements at City's website https://www.durhamnc.gov/4091/Underutilized-Business-Compliance-Divisi

  email: ubcfinance@durhamnc.gov
- RFQ will explain UBE requirements with forms all proposers are required to complete
  - UBE Participation Documentation
  - Consultant Workforce Diversity Questionnaire
  - Letter(s) of Intent to Perform as a Sub-Consultant

Partnership Website – sign up for updates & newsletter

Western Intake Partnership

westernintakepartnership.com



Opportunity - PDB Team Summer 2024 Meetings with WIP

Western Intake Partnership

August - September: WIP Partner Staff & HDR representatives available to meet with PDB Teams

Framework:

- 1.5 hr slots
- 8 time slots, first-come first-served
- PDB Teams – not engineers or contractors individually
- Separate meetings for each PDB opportunity, or meet jointly
- Sign-up with Jeff Adkins/HDR
- Structured framework
  - Introductions
  - Overview
  - PDB Team approach to project delivery
  - PDB Lessons learned
  - Market conditions affecting WIP
  - Questions (submit ahead)

August WIP Construction Industry Outreach Event – Updates & WTF Prelim. Engineering Report Overview

Western Intake Partnership

Meeting and/or Information Requests

Jeff Adkins – jeff.adkins@hdrinc.com

Kip Kalisiak – kip.kalisiak@hdrinc.com

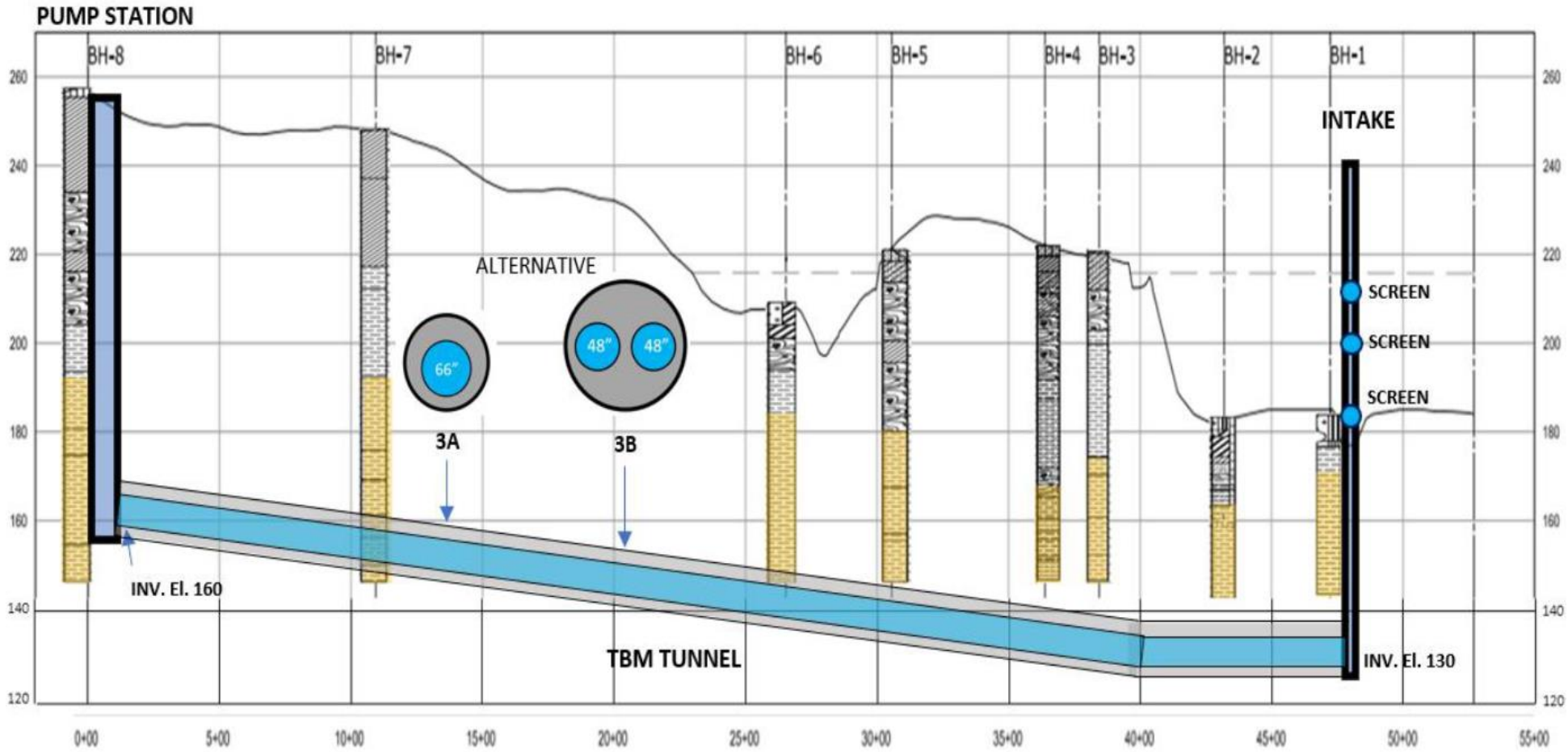
Q & A

Networking

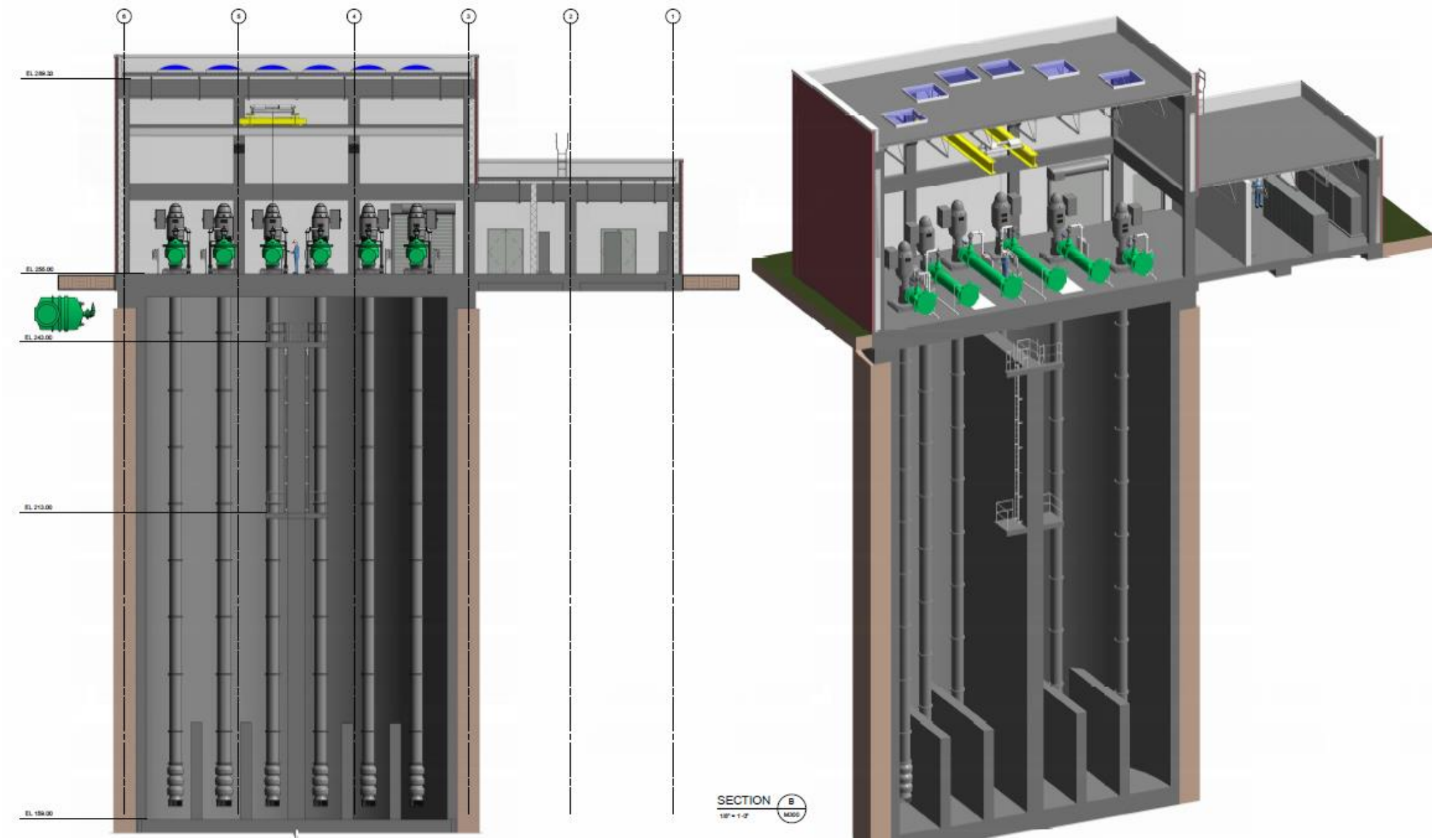
Extra Slides for Q&A

Raw Water Pipeline Trenchless Alternatives

- 6 trenchless alternatives considered
- After initial screening & decision for In-Lake Intake Tower, 2 alternatives remained



Raw Water Pump Station Configuration



WIP Preliminary Projects Schedule 2021-2024

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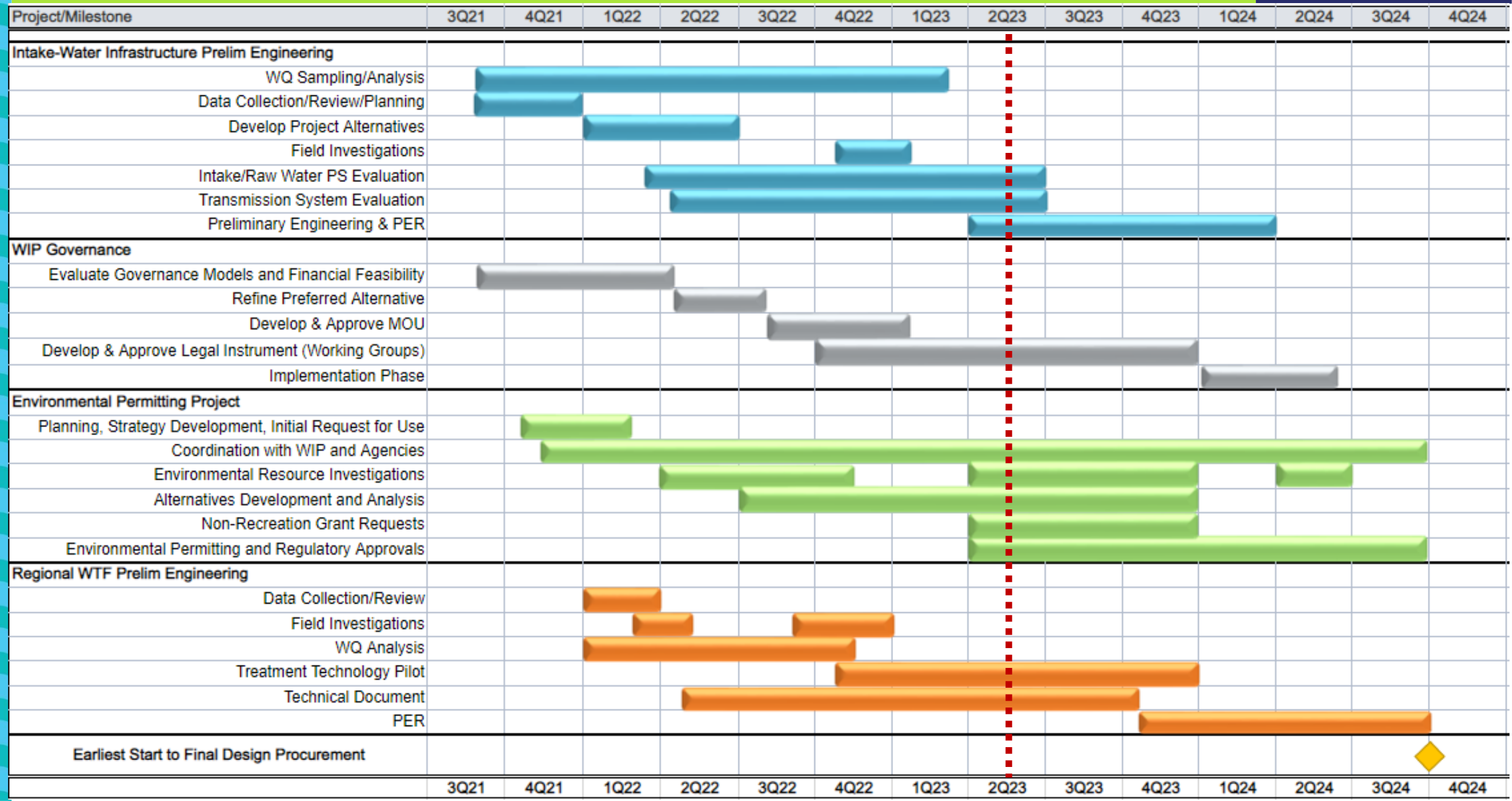
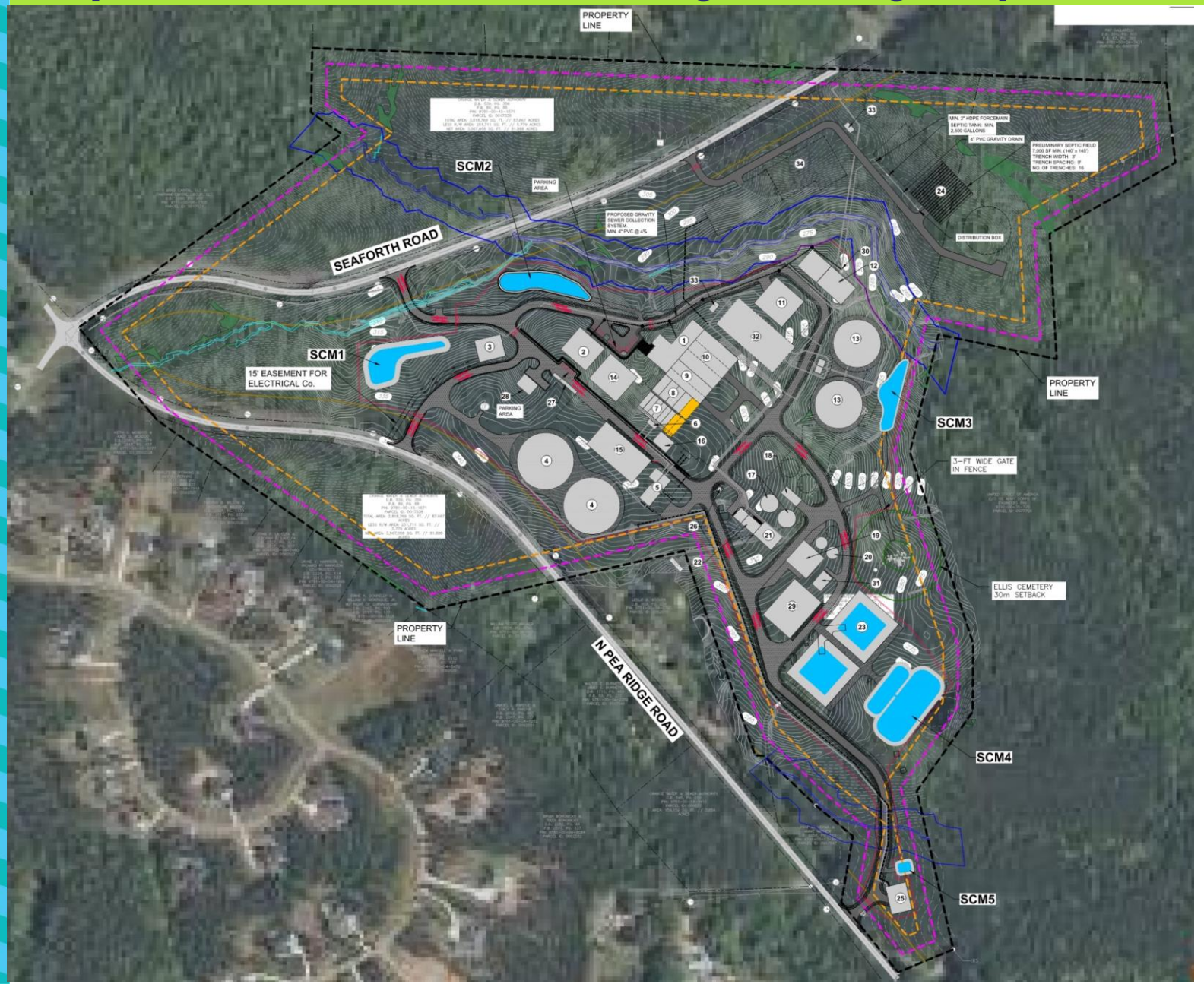


August WIP Construction Industry Outreach Event – Updates & WTF Prelim. Engineering Report Overview

Western Intake Partnership



KEY:

1. ADMIN/ OPERATIONS BUILDING (227'x51')
2. MAINTENANCE BUILDING (110'x98')
3. SUBSTATION / TRANSFORMERS (90'x75')
4. 7.5MG RAW WATER STORAGE TANK (2 No. 190' DIA.)
5. RAW WATER OZONE INJECTION BUILDING AND CONTACTORS (66'x40')
6. RAPID MIX (37'x16')
7. FLOCCULATION (6 No. 62'x19')
8. SEDIMENTATION BASINS WITH PLATE SETTLERS (4 No. 70'x30')
9. OZONE GENERATORS AND SETTLED WATER CONTACTORS (152'x66')
10. FILTERS (152'x130')
11. GAC (123'x114')
12. HSPS (195.5'x75')
13. 5MG CLEARWELL (2 No. 160' DIA.)
14. ELECTRICAL / GENERATORS BLDG (120'x110')
15. CHEMICAL BLDG (200'x100')
16. LOX STORAGE (60'x45')
17. GRAVITY THICKENER (2 No. 62' DIA.)
18. THICKENED SOLIDS PS (70'x30')
19. DEWATERING BLDG (92'x92')
20. THICKENED SOLIDS STORAGE (2 No. 42' DIA.)
21. BW EQ BASIN (80'x60')
22. BW PLATE SETTLERS AND RECYCLE PS (90'x40')
23. RECLAMATION BASINS (2 No. 175'x175')
24. SEPTIC DRAINAGE FIELD (150'x150')
25. RAW WATER PUMP STATION (95'x70')
26. PAC SILO (14' DIA.)
27. OPTIONAL WEIGH STATION (100'x12')
28. FUEL STORAGE FOR STANDBY GENERATORS (60'x45')
29. CAKE STORAGE (160'x120')
30. DUPLEX SEPTIC PS (12'x6') AND VALVE BOX (3'x3')
31. ELECTRICAL BUILDING (60'x40')
32. POSSIBLE IX (250'x105')
33. SURGE TANKS (35'x20')
34. FUTURE RO OR GAC/IX

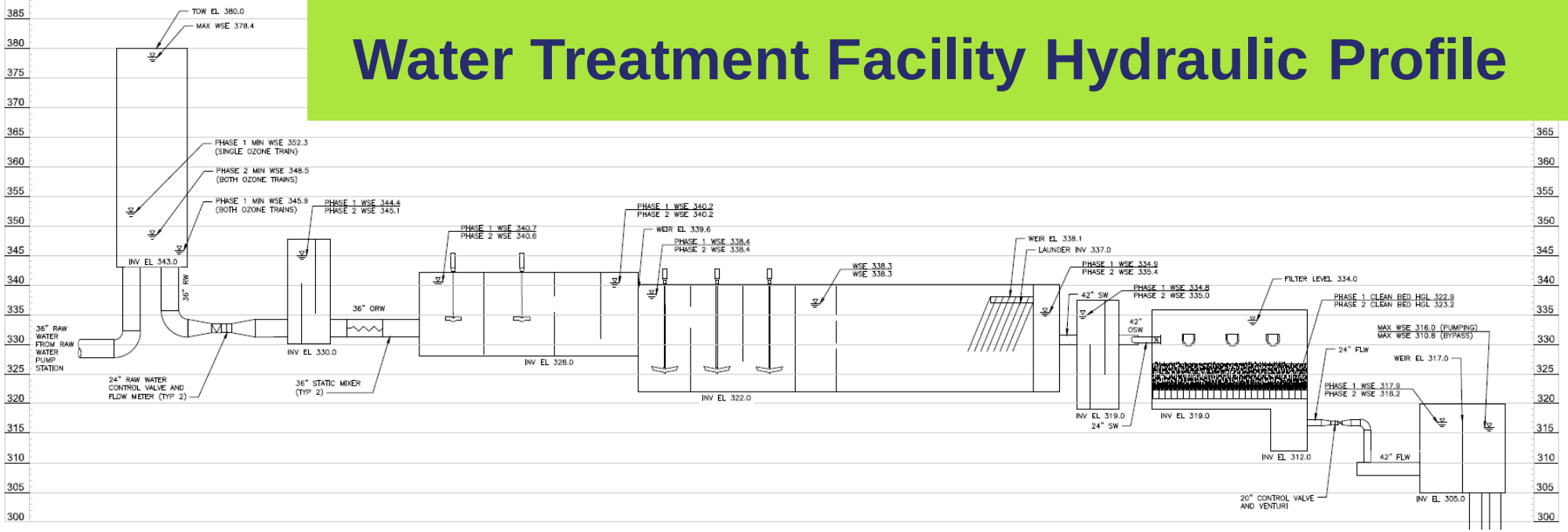
LEGEND:

- PROPOSED FACILITY - 30 MGD (PHASE 1- 2031)
- POSSIBLE FUTURE FACILITIES - 40 MGD (PHASE 2)
- POSSIBLE FUTURE FACILITIES TO BUILDOUT (PHASE 3)
- ASPHALT ROAD
- CONCRETE PAVEMENT
- GRAVEL ROAD
- WETLAND
- OPEN WATER
- APPROXIMATE LOCATION OF EXISTING CEMETERY (TO BE REVISED FOLLOWING DETERMINATION OF CEMETERY BOUNDARY)
- STORMWATER CONTROL MEASURE (SCM)
- EPHEMERAL STREAM
- INTERMITTENT STREAM
- 60' SETBACK FROM INTERMITTENT STREAM
- WIP RWTF
- 50' SETBACK FROM PROPERTY LINE
- 100' SETBACK FROM PROPERTY LINE
- 100' SETBACK FROM ROADS
- PERIMETER FENCE

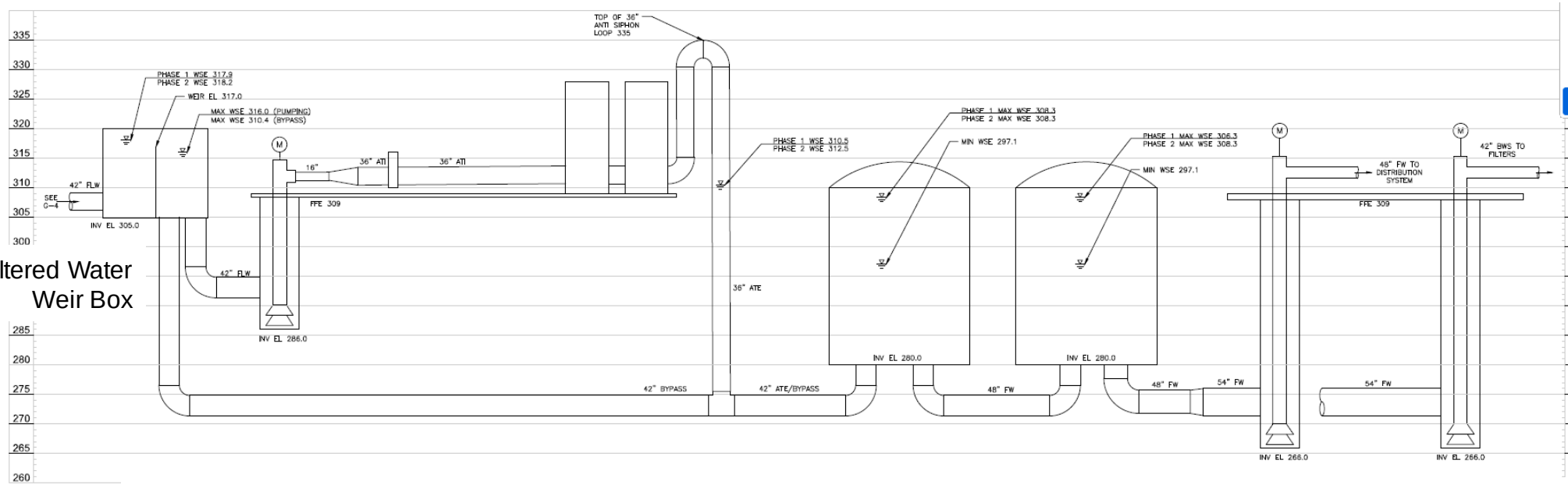
Water Treatment Facility Operations Building – Rendering of Preliminary Concept

Western Intake Partnership

Water Treatment Facility Hydraulic Profile



Raw Water Tanks | Raw Water Ozone | Rapid Mix Basins | Flocculation Basins | Sedimentation Basins | Settled Water Ozone | Filters | Filtered Water Weir Box



Filtered Water Weir Box

Adv Treatment Feed / Cart Filters / Adv Treatment Vessels | Finished Water Clearwells | Finished Water PS