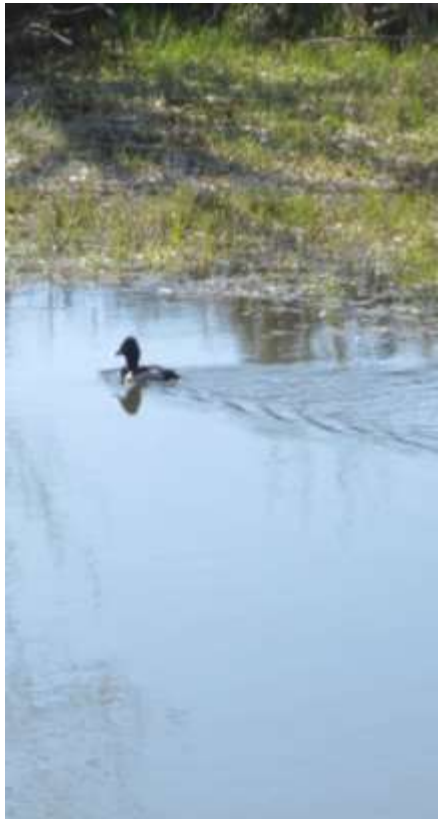
Clark Public Utilities – Salmon Creek Crossing

What do you mean we can't do HDD?

Presented by Matt Hickey, PE | Murray, Smith & Associates, Inc.
and Russ Knutson, PE | Clark Public Utilities



Project Team

- Clark Public Utilities – Russ Knutson, PE and Barry Lovingood, PE
- Prime Consultant – Murray, Smith & Associates, Inc.
- Trenchless Specialist – Stahali Trenchless Consultants
- Geotechnical Engineer – GRI
- Environmental Specialist – ELS

Salmon Creek Crossing

- Background
- Project Description
- Preliminary Analysis
- Alternatives Assessment
- Recommended Approach
- Design Challenges
- Conclusion/Q&A

Background

33,000 customers in rural Clark County

223 Square Miles

25 satellite water systems

System Description

- 41 wells
- Main treatment plant
- 47 pump stations
- 55 pressure zones
- ~ 900 miles of waterline
- 25 storage tanks

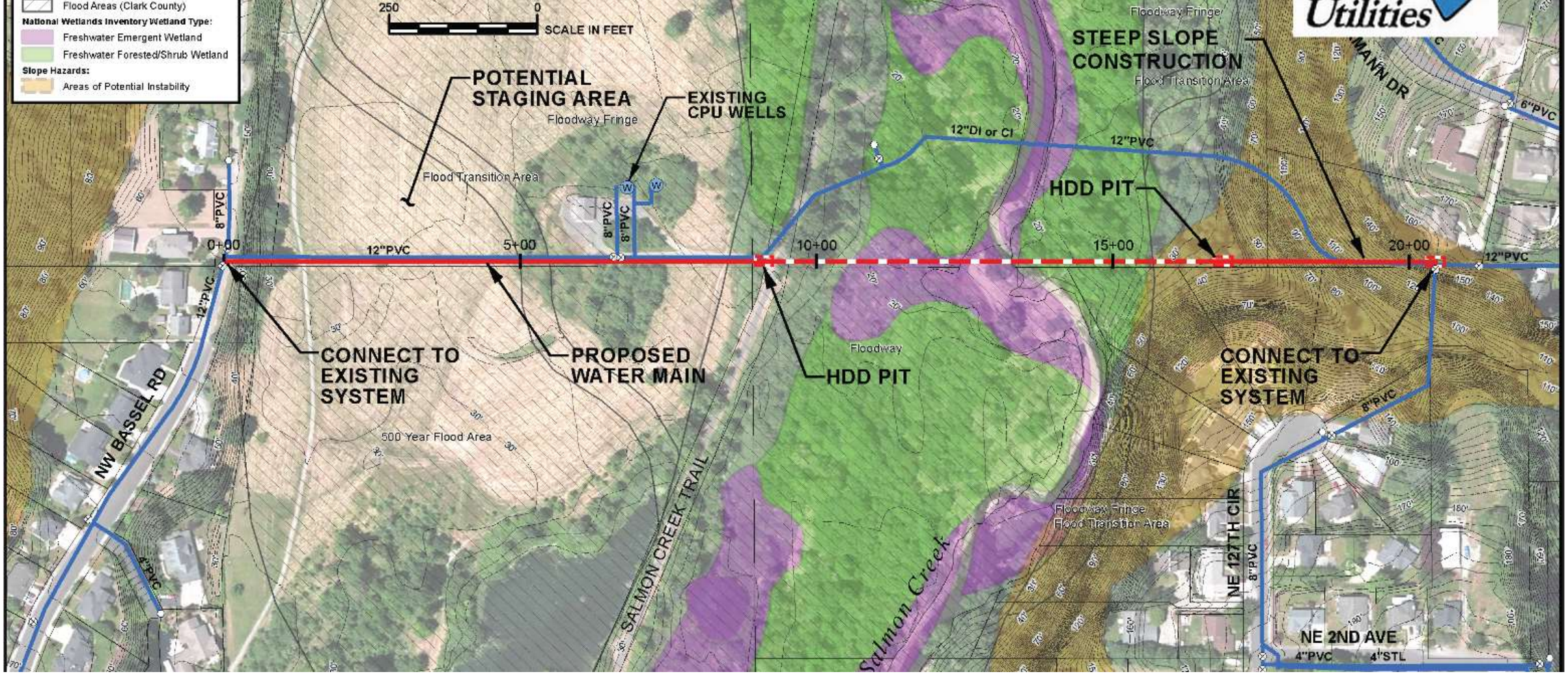
Background

- 2 wells, (No. 19 & 21) in Salmon Creek Park
- Pump from elevation of 30 to 165 feet
- 960 gpm capacity
- Working pressures 160psi

Background

Existing Facilities

- PR 200 PVC pipe
- Class 52 DI pipe under creek
- Troubles with leaks in PVC pipe
- Waterline traverses steep hillside
- Critical waterline



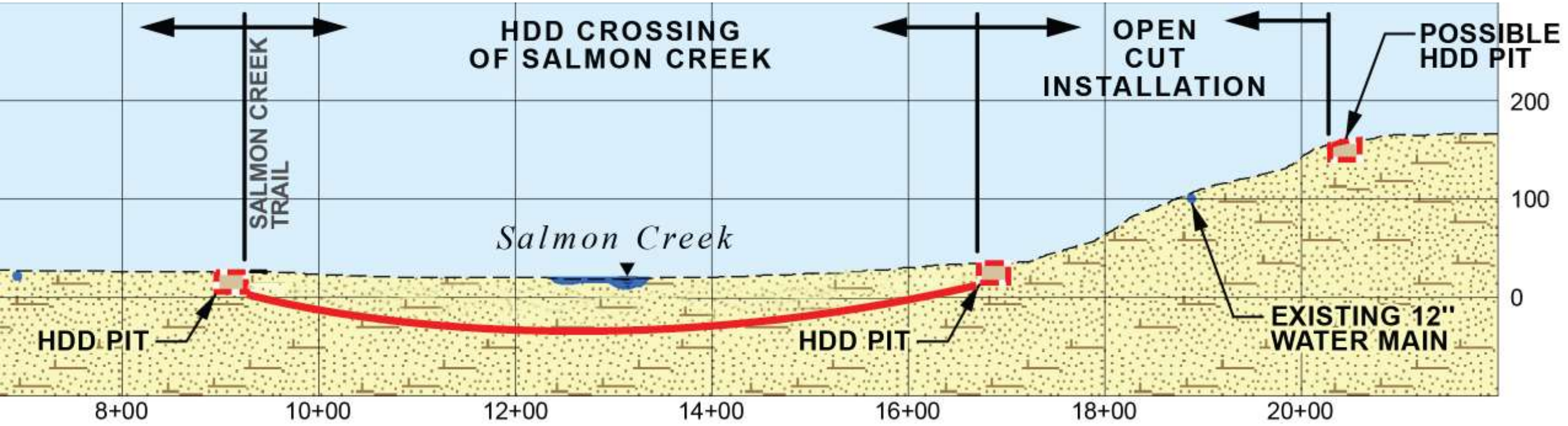
Project Description

- Preliminary Evaluations
- How did the original line get there?
- Open trench methods “hay bales in the creek”

Salmon Creek

Project Description

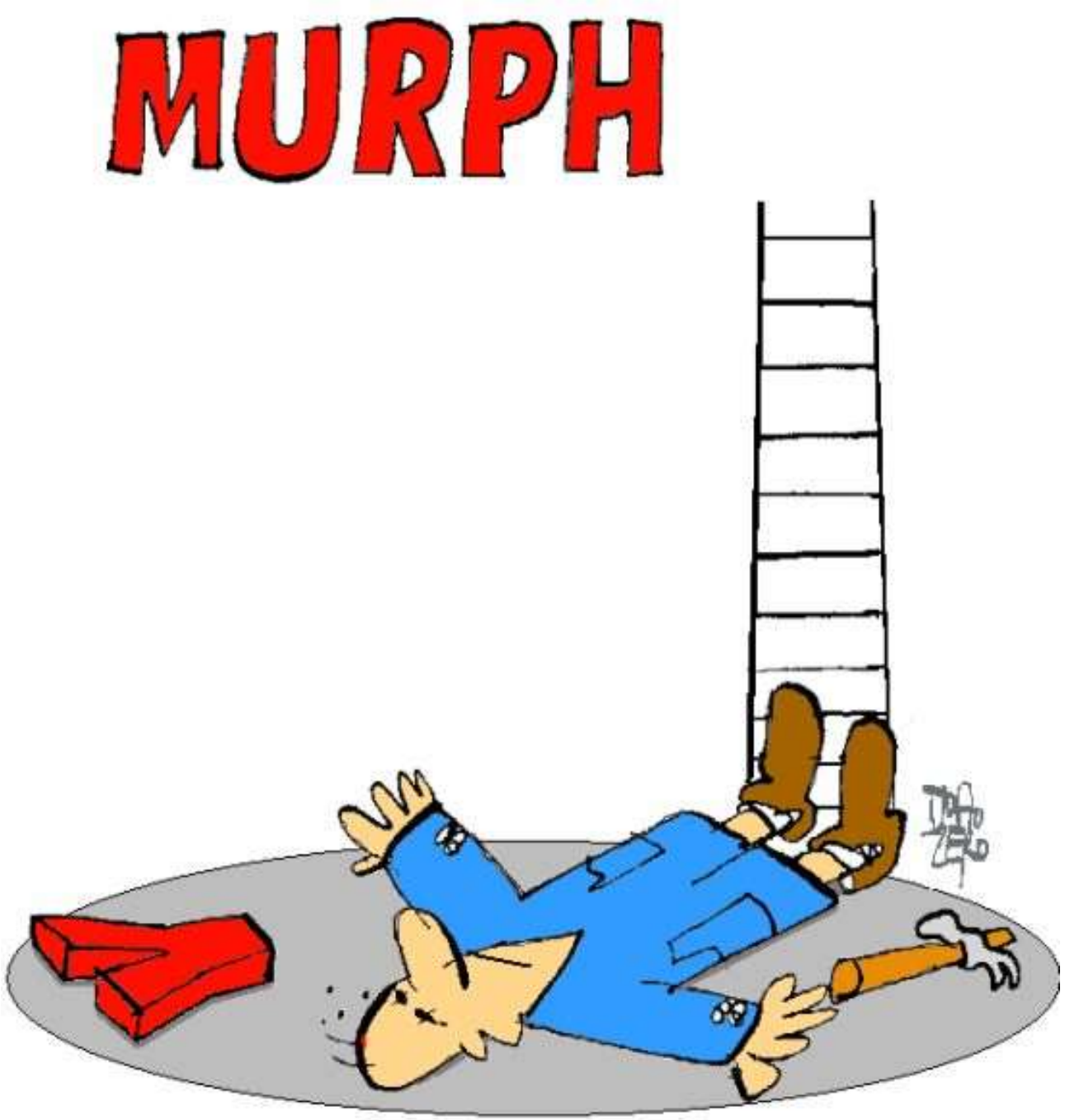
- Permits: JARPA, SEPA, County, USCOE, Shoreline Review, etc.
- A fish bearing stream
- Park trail impacts



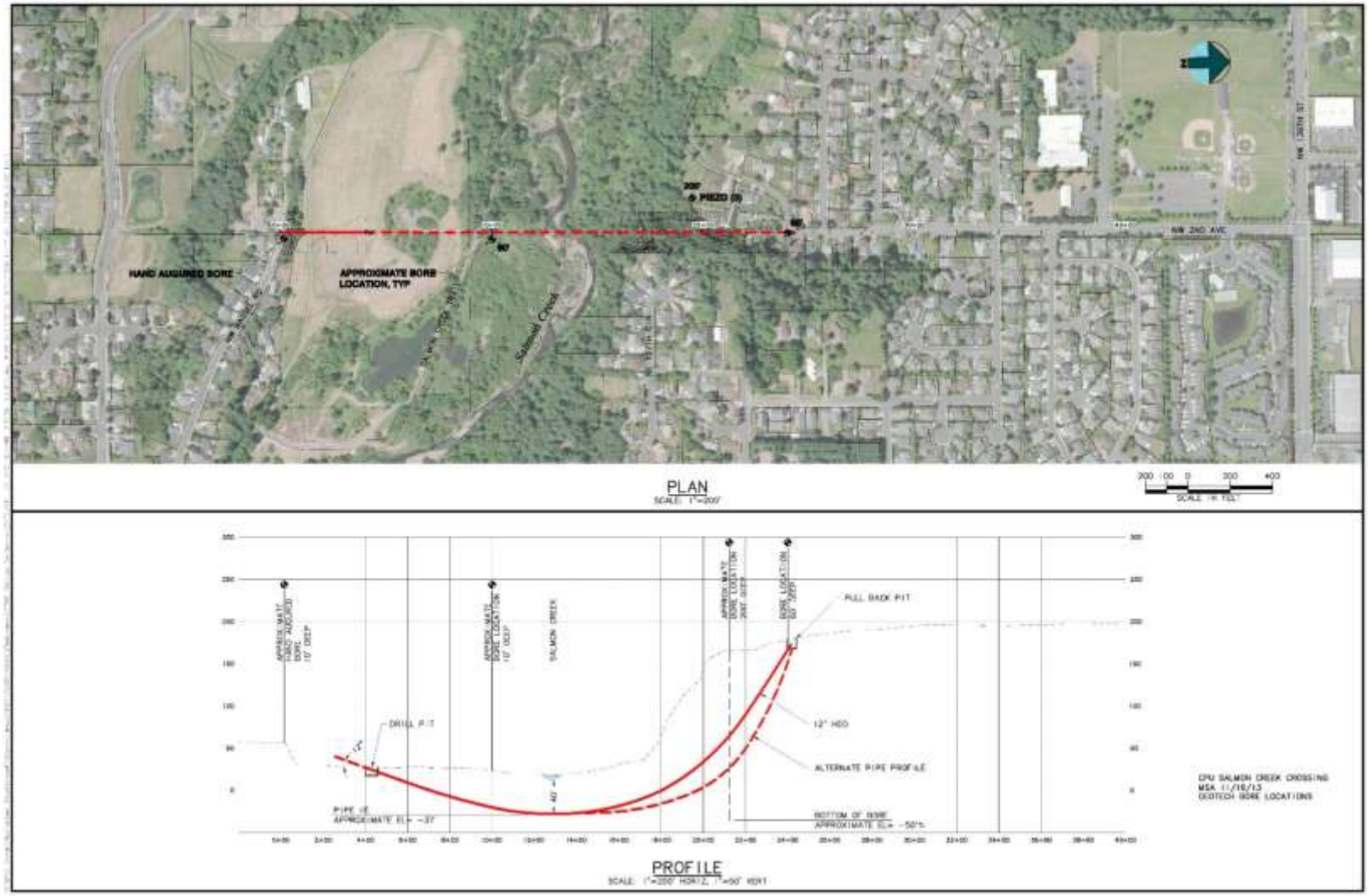
Preliminary Analysis and Alternatives Assessment

- HDD appeared to be the preferred option
- 900 linear feet
- Minimized system shut down; permitting and environmental impact
- Conduct initial geotechnical investigations

Simple. Right!?!

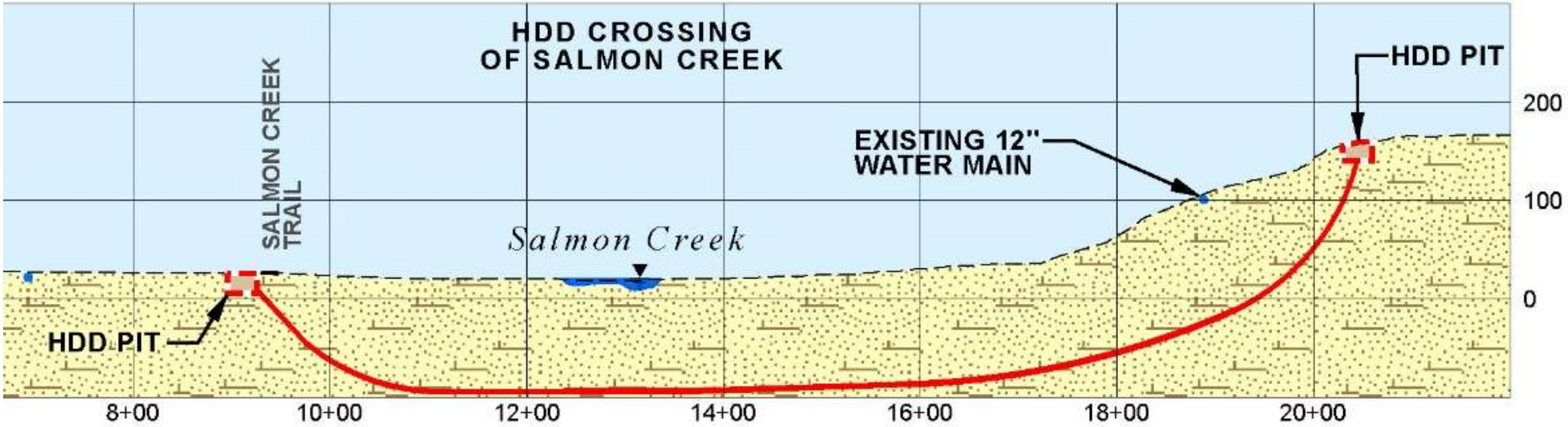


Project Challenges



HDD Alignment Analysis

- Insertion angle
- Depth below river
- Drilling mud pressures
- Frac out risk under the river
- 2,200-foot HDD Length



HDD Alignment Analysis

- Proper insertion angle
- Adequate depth under river
- Allowable curve radius of drilling rods

Pipe Material Assessment

- High pressures
- Pulling forces
- Pipe capacity
- Corrosion

Pipe Materials Evaluation

- HDPE
- PVC

Pipe Materials Evaluation

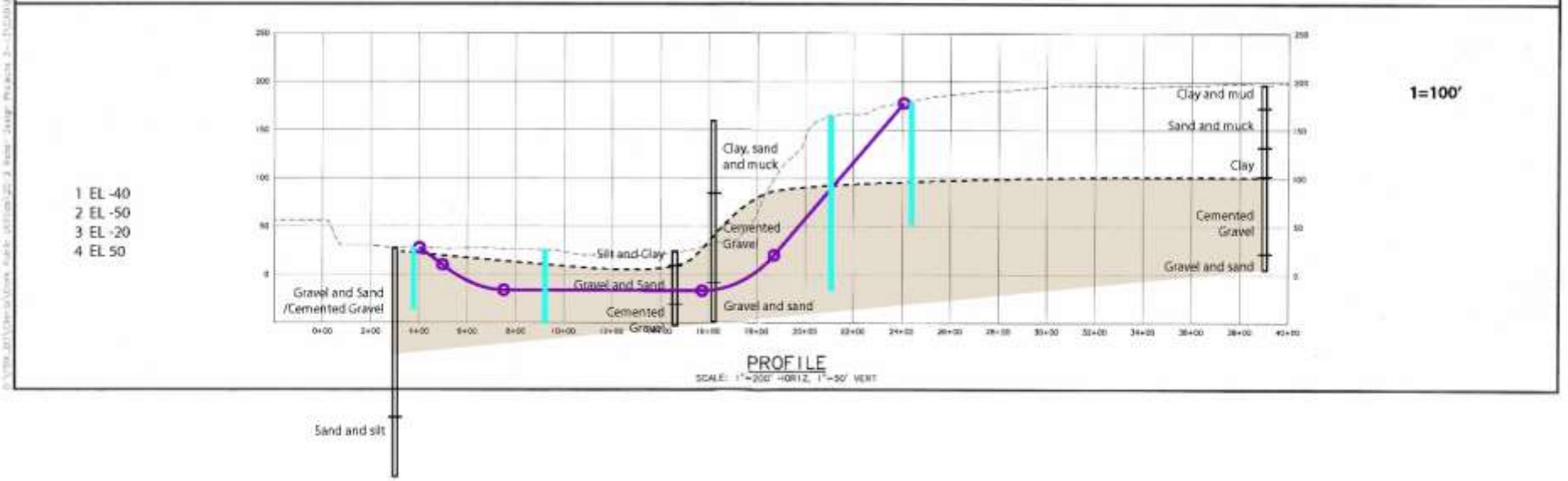
- Steel
- Ductile Iron

Pipe Materials Evaluation

- Optimize hydraulic capacity
- Bid alternate materials

Revised Geotechnical Investigations

- Based on new HDD alignment
- Deeper bores
- Revised bore locations
- Mud rotary drilling
- Installation of piezometer



Results of Geotechnical Explorations

- Clay and mud…then sand and more clay…
- Cemented gravels
- Loose gravels, cobbles and sand
- Loss of drilling mud
- Drill hole caved
- Sonic drilling

Feasibility of HDD Revisited

Challenges

- Drilling through cobbles
- Hole collapse during drilling
- Loss of drilling mud
- Risk of frac-out
- Higher costs
- Long conductor casings add cost

Alternative Creek Crossing Methods

- Criteria
  - Cost-effective construction
  - Minimize permitting
- Continuous VE throughout
- Ongoing constructability review

Alternative Methods: Bore and Jack

- Challenges
  - Collapsing hole
  - Limited length
  - Bore pit in water table
  - High cost

Pipe Ramming

Photo credit: Oregon State University

Alternative Methods:

Pipe Ramming

- Addresses collapsing hole
- Challenges
  - Limited length
  - Pits in water table
  - High cost

Direct Pipe

- Addresses hole stability
- Very high cost

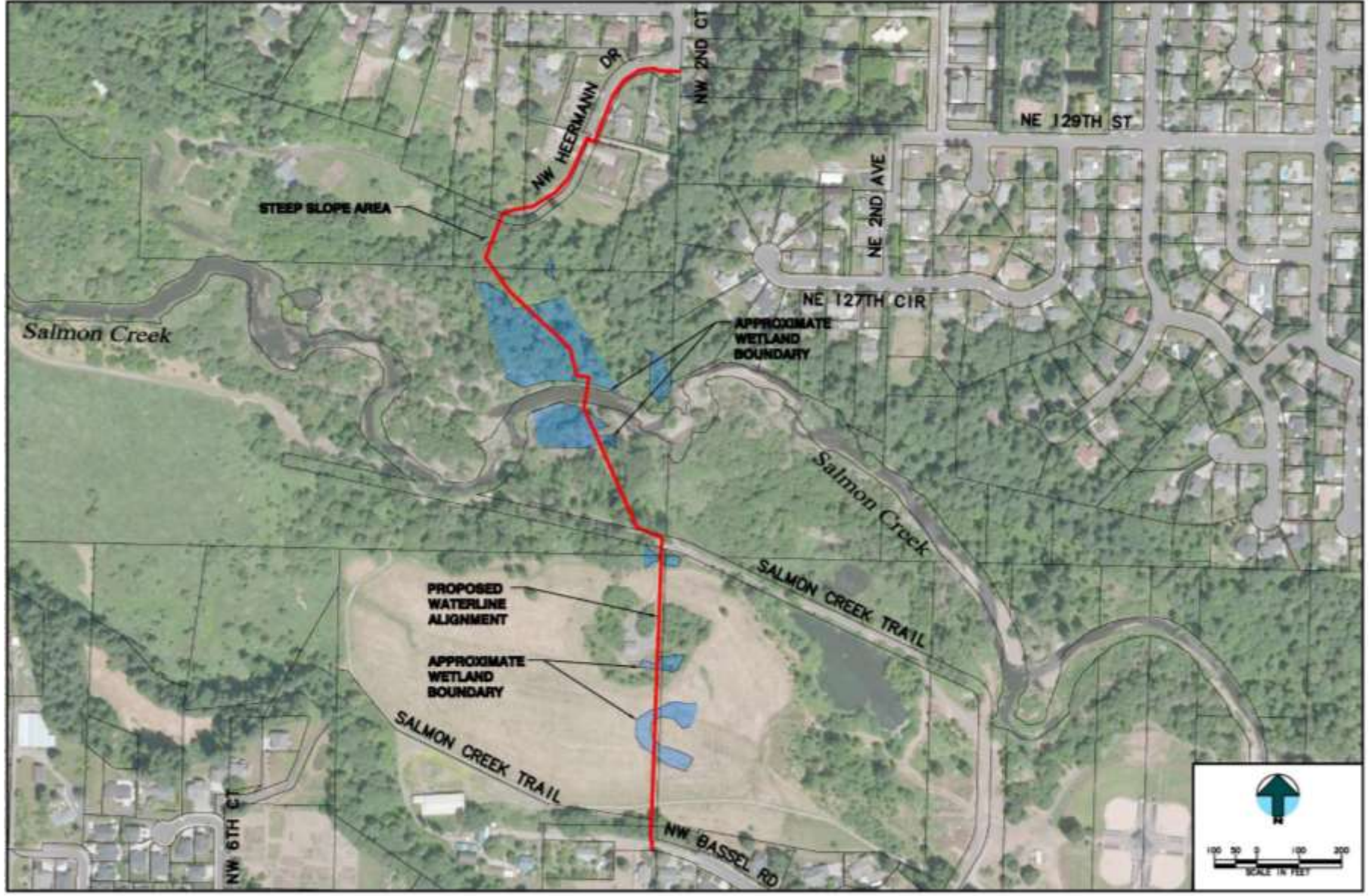
Alternative Methods:

Pipe Bursting

- Benefits
- Challenges

Challenges Navigating the North Hill

- Steep grades
- Trees
- Slides
- Private property

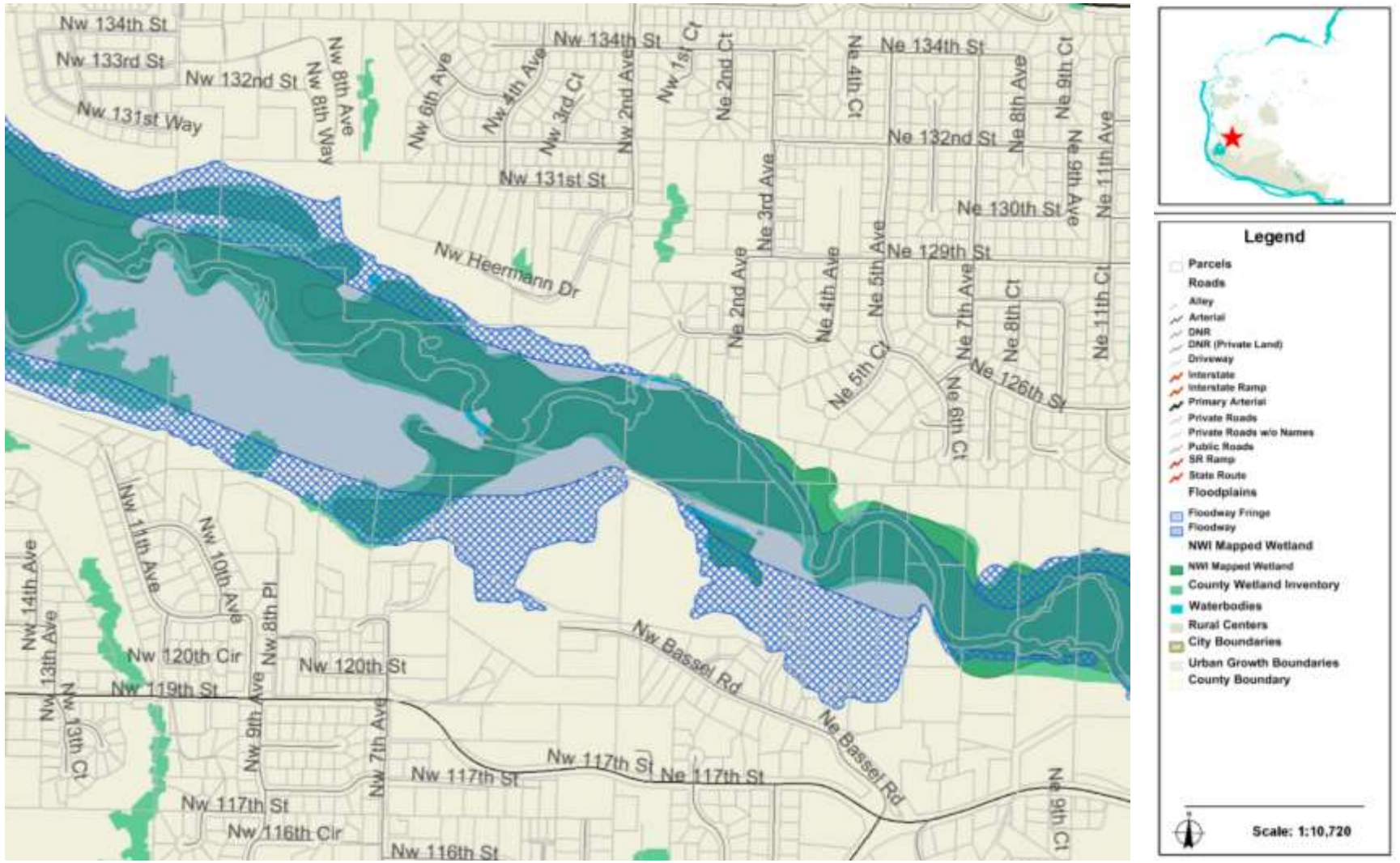


Revised Plan "Plan D"

- Open trench
- Use existing pipe under creek

Revised Alignment

- Shortest run on steep grade
- Some slide concerns
- Pipe through wetland
- Utilities
- Easements
- Cost-effective approach

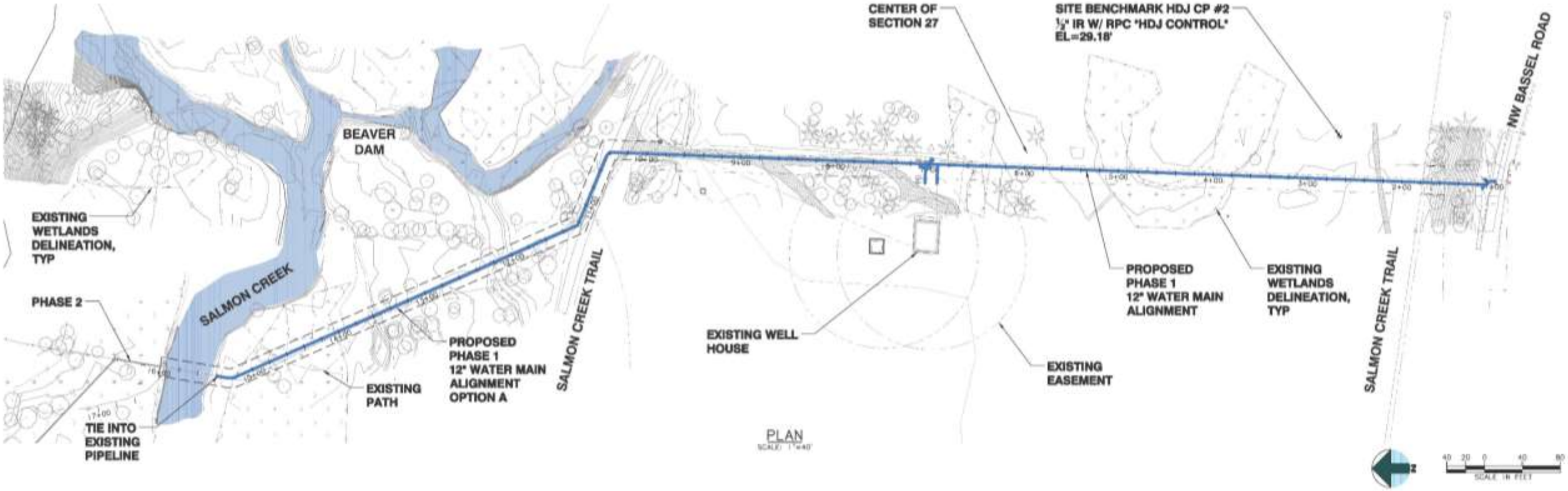


Permitting Challenges

- Wetlands
- Trees
- Eagle nest
- In-water work window

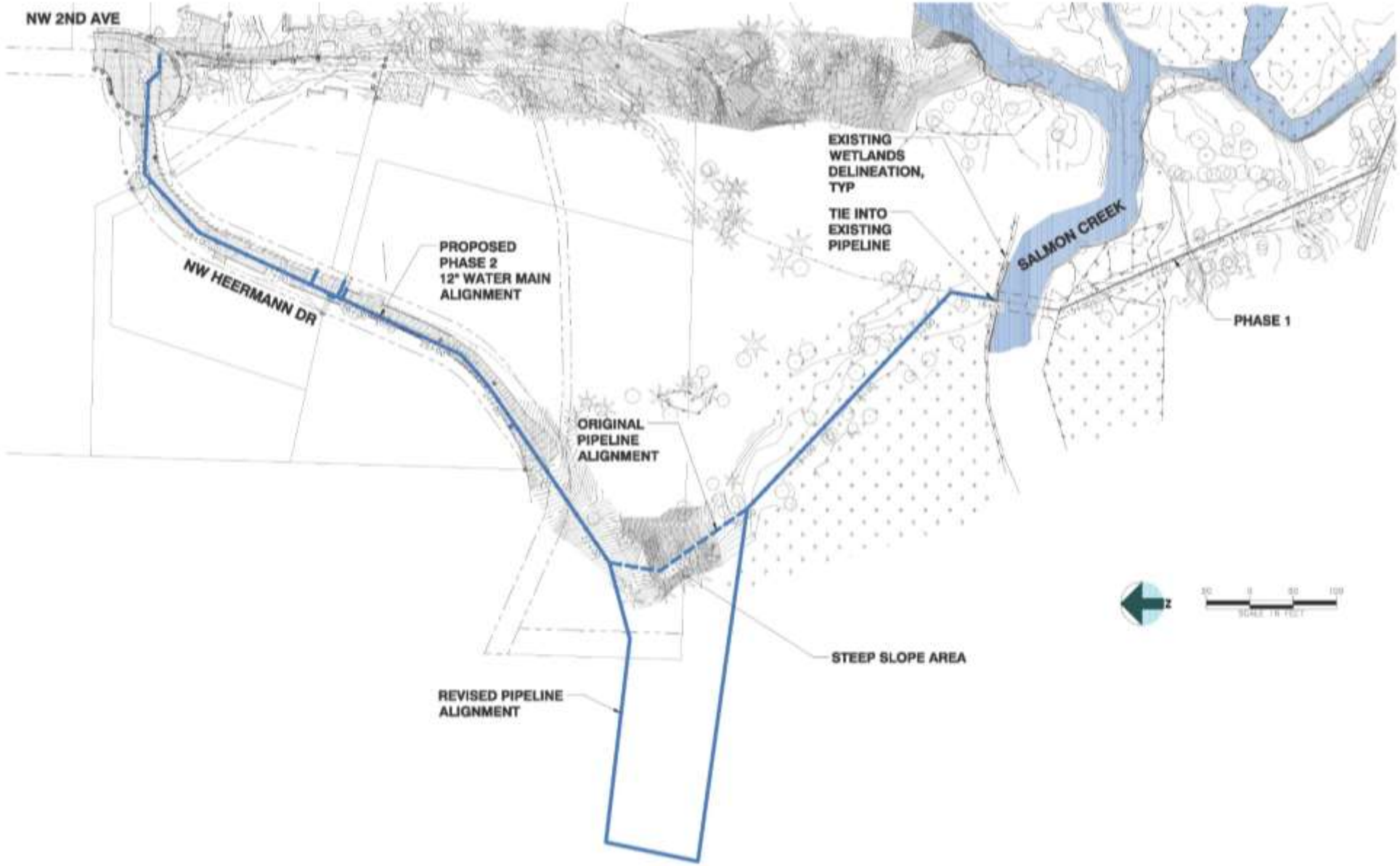
- County permits
- USACE
- State

Anticipated Challenges during Construction



Current Plan for the Project

Phase 1 – Summer 2015



Current Plan for the Project

Phase 2 – Summer 2016

Conclusion…

- HDD and other trenchless methods – effective tools
- May not always be practical
- Thorough alternatives analysis, cost and constructability, and risk analysis are critical
- Challenges during construction
- Coordination was essential

Questions?