

# Dungeness Reservoir Progress Update to Clallam County Board of Commissioners

Presented by:

David Rice, PE – Anchor QEA

July 1, 2024



# Overview of Presentation

- Summary of work completed since last presentation to the County Board of Commissioners (August 2023)
- Overview of Phase 1 Seismic Fault Investigation Study
- Overview of additional reservoir configurations evaluated
- Recommended next steps

# Summary of Work Completed

August 2023 – June 2024

# Public Comment and Response

- Meeting with Dungeness Meadows Homeowner's Association (HOA)
  - November 1, 2023
  - Hosted at Dungeness Meadows HOA club house
  - Included other neighbors of the reservoir site
- Frequently Asked Questions Document Updates
  - Original version was completed early in 2023
  - Some of the information has changed
  - Currently working to update the document
- Additional Public Meetings
  - County staff planning to coordinate a public meeting during the summer of 2024

# Coordination with Dungeness Reservoir Work Group

- Meetings with Dungeness River Work Group
  - Monthly, or as often as required
  - Presentation to Work Group on June 20, 2024
- Coordination with County Board of Commissioners
  - Staff continue to brief the County Board of Commissioners on key issues
  - This presentation includes the information presented to the Work Group last week

# Other Work Completed or Underway

- Phase 1 Seismic Fault Investigation Study
- Completion of a QAPP for surface water sampling
- Coordination with DNR for property acquisition
- Review of additional “Option E” reservoir configurations
- Preparation for site cleanup
- Preliminary designs for elements upstream of reservoir (HID headgate structure upgrades, screening facility upgrades, settling basin, pipeline to replace HID Main Canal, flow control structure)
- Review of diversion/pipeline capacity, drought pumping, and flow benefit
- County working with Washington Water Trust on water rights and reservoir water balance model

# Phase 1 Seismic Fault Investigation

# Seismic Review – Prior to Preliminary Design

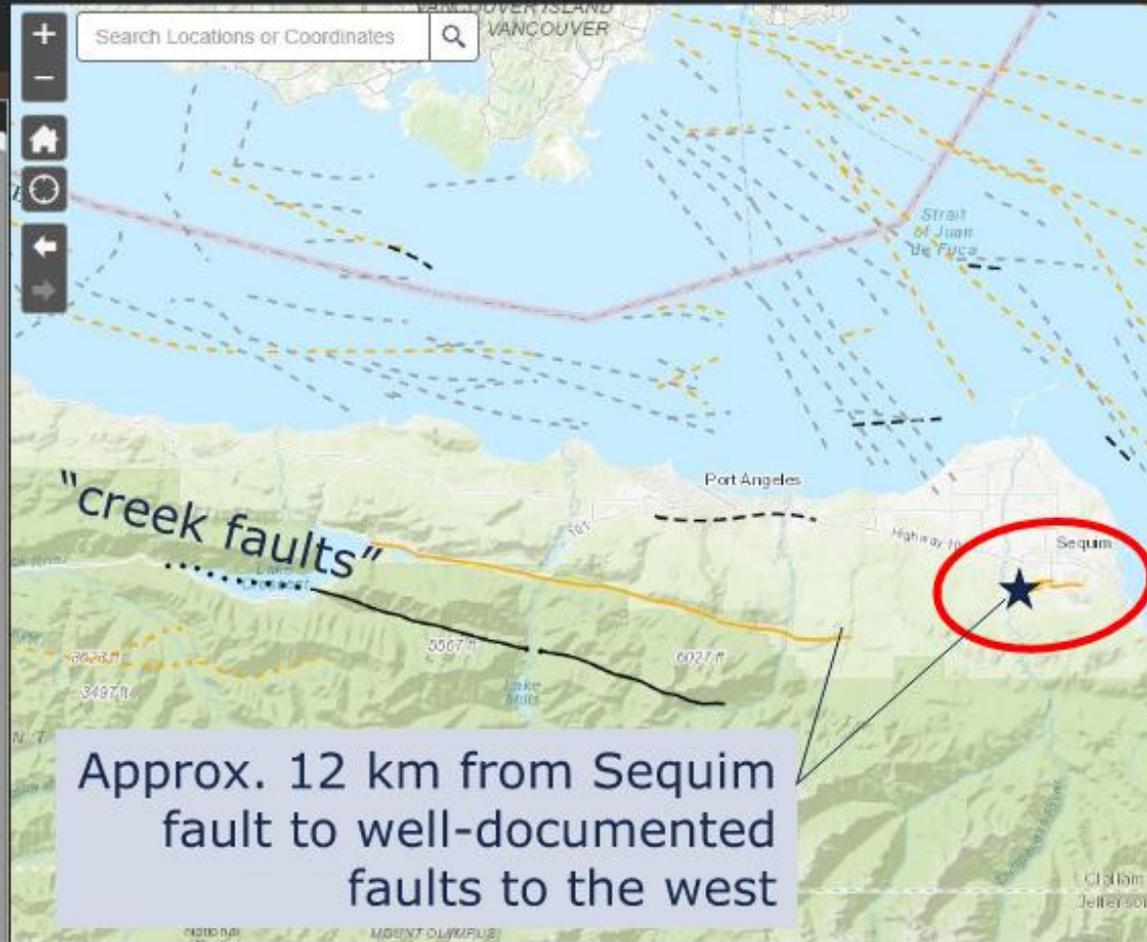
- 2007 USGS Study
  - Fault line mapped at site, referred to as “Sequim Fault”
  - Study did not provide explanation or basis for mapping
- 2020 PanGEO Report
  - County contracted with PanGEO to complete feasibility review
  - Review of available geologic information
  - Site review with geologists from USGS
  - Initial geologic map and LiDAR topographic data review
  - Found no explanation of mapping of “Sequim Fault”
  - Found “no identifiable evidence of faulting in the project area”
  - Recommended review of excavations for any “soil anomalies”

**Legend**

**Qfaults**

National Database

- Historic (< 150 years), well constrained location
- Historic (< 150 years), moderately constrained location
- Historic (< 150 years), inferred location
- Latest Quaternary (<15,000 years), well constrained location
- Latest Quaternary (<15,000 years), moderately constrained location
- Latest Quaternary (<15,000 years), inferred location
- Late Quaternary (< 130,000 years), well constrained location
- Late Quaternary (< 130,000 years), moderately constrained location
- Late Quaternary (< 130,000 years), inferred location
- Middle and late Quaternary (< 750,000 years), well constrained location
- Middle and late Quaternary (< 750,000 years), moderately constrained location
- Middle and late Quaternary (< 750,000 years), inferred location
- Undifferentiated Quaternary (< 1.6 million years), well constrained location
- Undifferentiated Quaternary (< 1.6 million years), moderately constrained location
- Undifferentiated Quaternary (< 1.6 million years), inferred location
- Unspecified age, well constrained location
- Unspecified age, moderately constrained

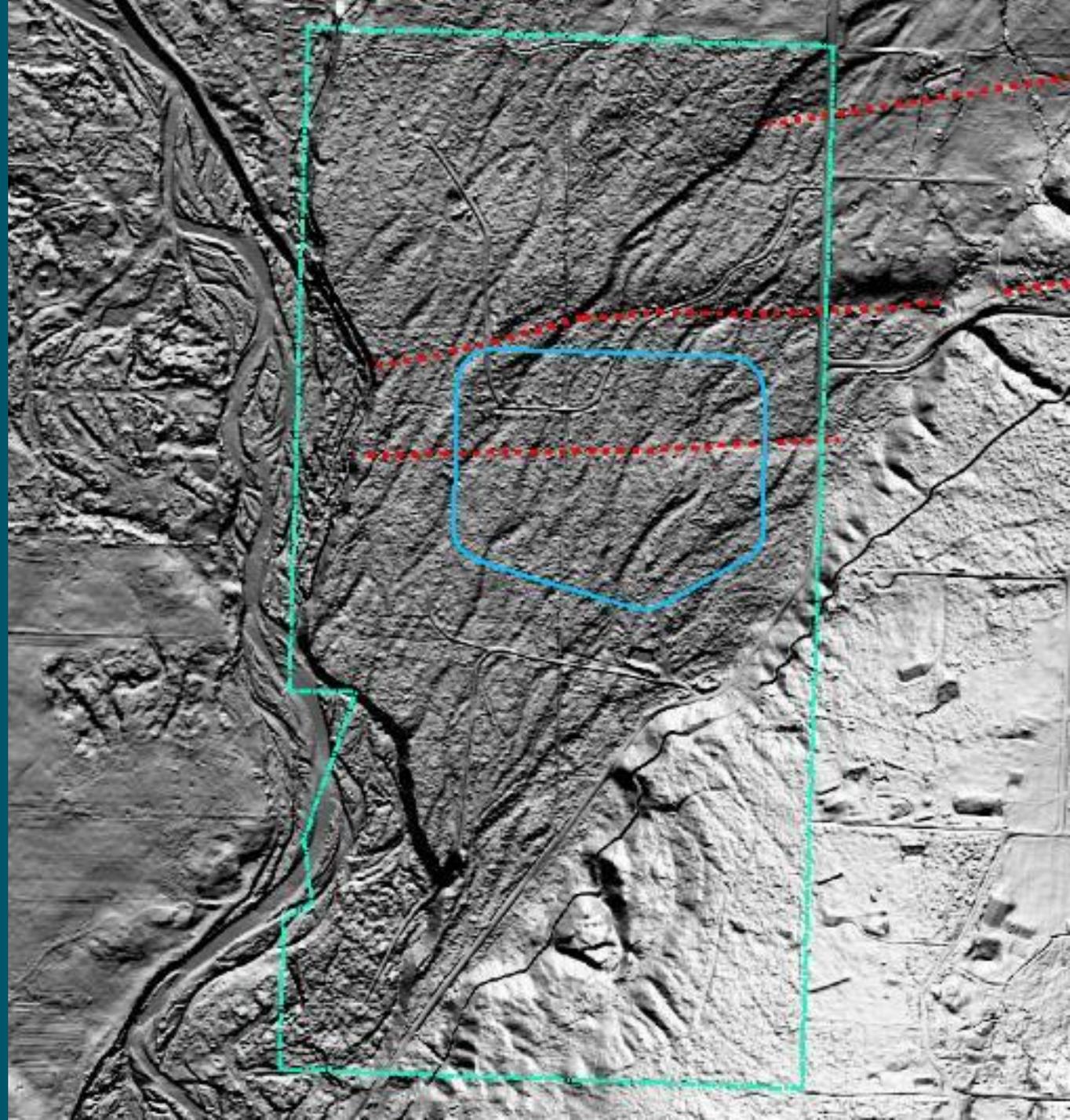


Nelson and others, 2007



# April 2023 Review by Shannon & Wilson

- Initial desktop review, including analysis and interpretation of LiDAR topographic data for potential surface deformation
- Site review
- Identified subtle linear topographic features (lineaments) that suggest presence of faults



## Detailed Seismic Investigation – Step 1

1. Present Results of Seismic Geologic Reconnaissance

2. Detailed Desktop Review and Reporting

LiDAR point cloud processing for higher resolution

Additional research into Sequim Fault and related studies

Review of geologic mapping within the Dungeness River valley

Extension of lineament mapping to east and west

Detailed LiDAR analyses

Research of paleochannels and geochronology

Review of regional geologic and glacial history

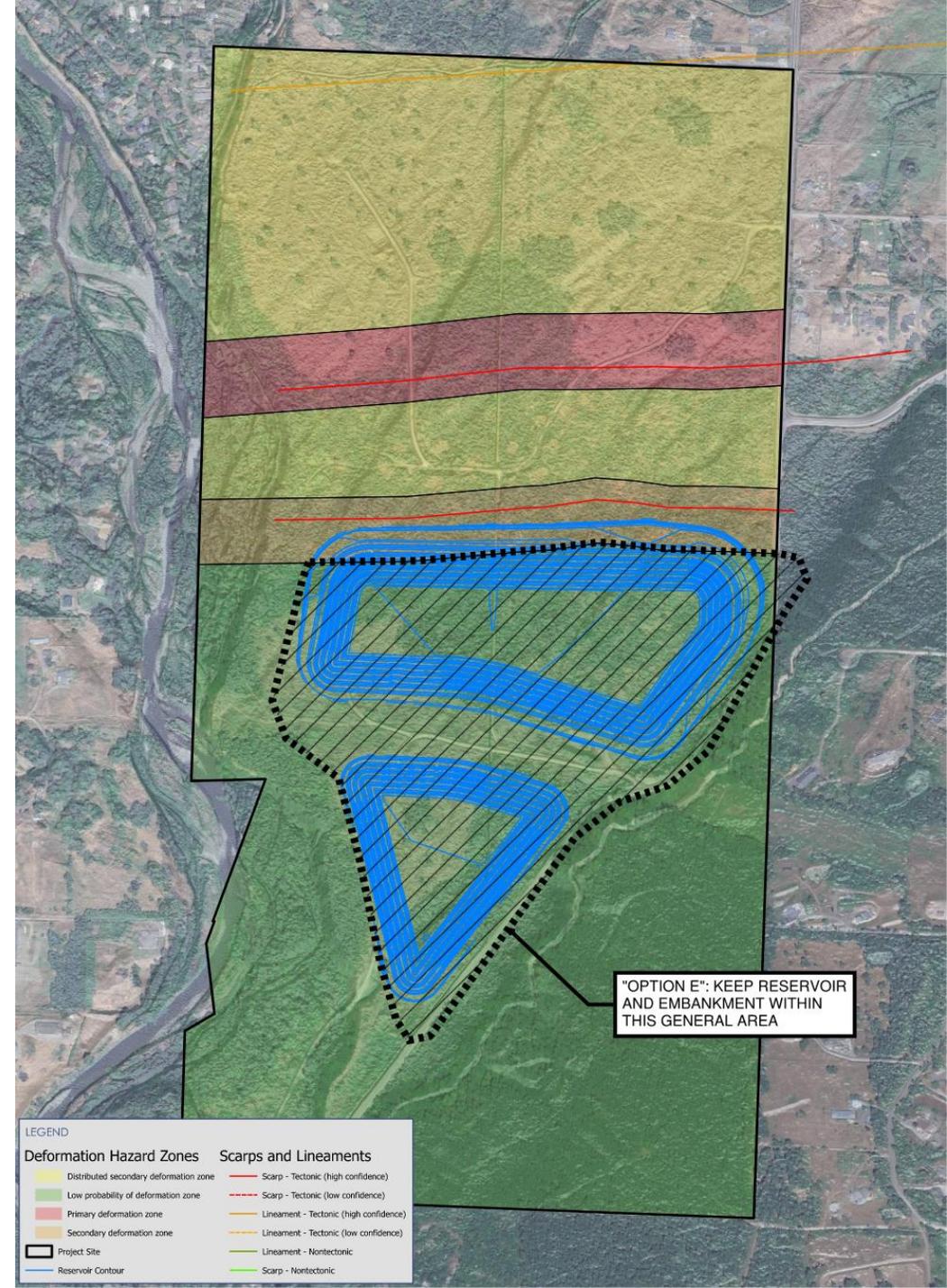
Report Development

# Key Findings

- Findings support the hypothesis that an active fault zone crosses the proposed reservoir site
- Primary, secondary, distributed secondary deformation zones identified, where findings suggest that fault rupture could cause deformation
- Low probability deformation zone identified where no evidence was found of past surface deformation
- Preliminary displacement estimates provided for primary, secondary, distributed secondary deformation zones

# Recommendations

- If possible, shift reservoir south so that primary structural embankment and reservoir are within the low probability deformation zone
- Perform additional seismic hazard analyses to support the design
- Excavation slopes should be observed during reservoir construction by a Licensed Geologist



# “Option E” Reservoir Configurations

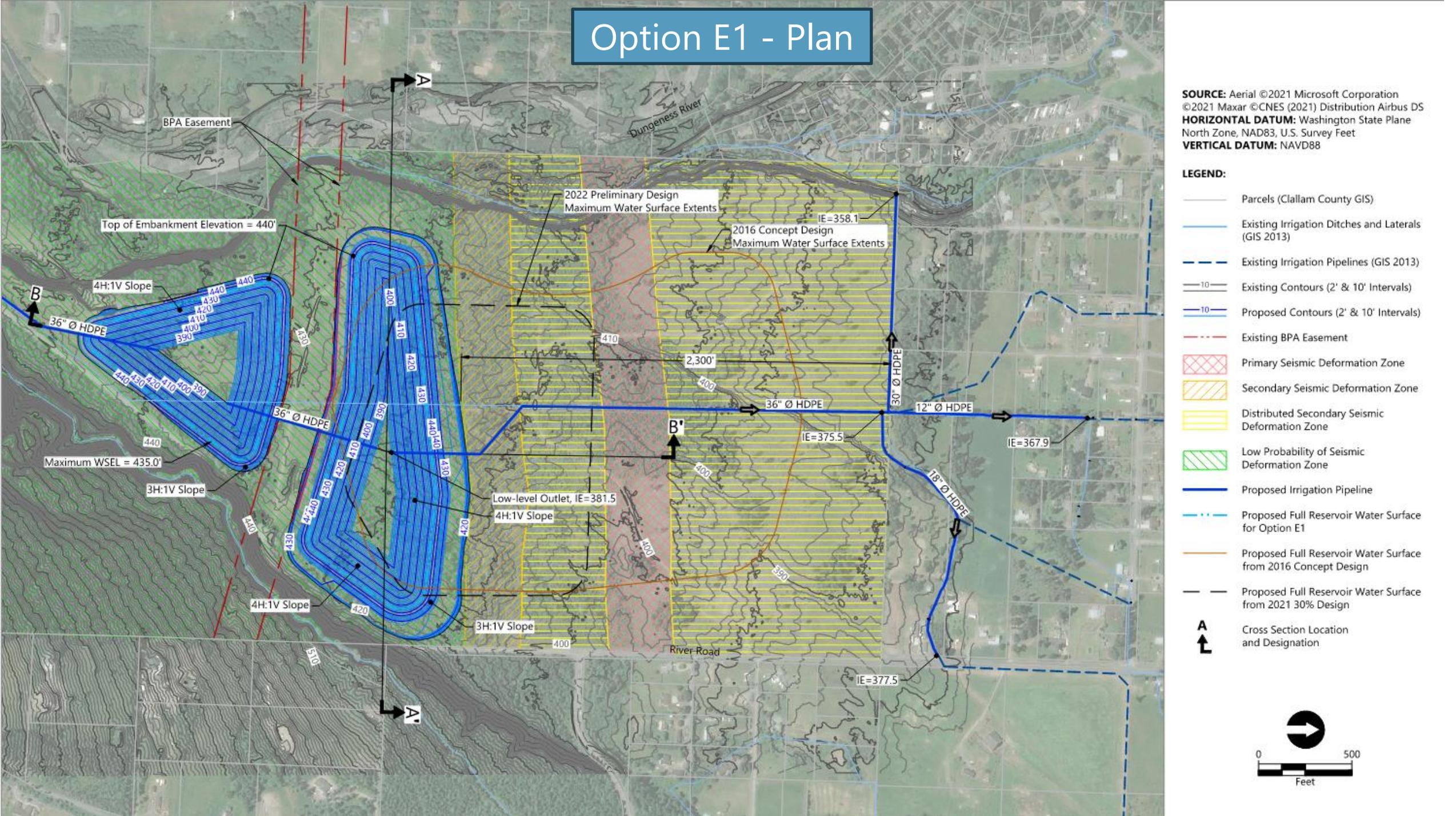
# Prior Reservoir Configurations Considered

- Preliminary Design
- Options A – C Reservoir Configurations
  - Designed to be responsive to public comment about height of embankment and volume of water stored above-ground
- Option D Reservoir Configuration
  - Completed after seismic reconnaissance to look at potential for shifting reservoir south to avoid overlap with fault zone mapped by Shannon & Wilson
  - Also designed to be responsive to public comment about height of embankment and volume of water stored above-ground
  - Configured to minimize impact on BPA easement

# “Option E” Reservoir Configurations

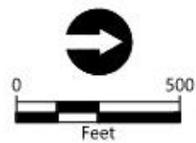
- Four additional reservoir configurations considered
- Intended to be responsive to recommendations of Phase 1 Seismic Fault Investigation Study
  - If possible, shift reservoir south so that primary structural embankment and reservoir are within the low probability deformation zone
- Also intended to be responsive to public comment about height of embankment and volume of water stored above-ground

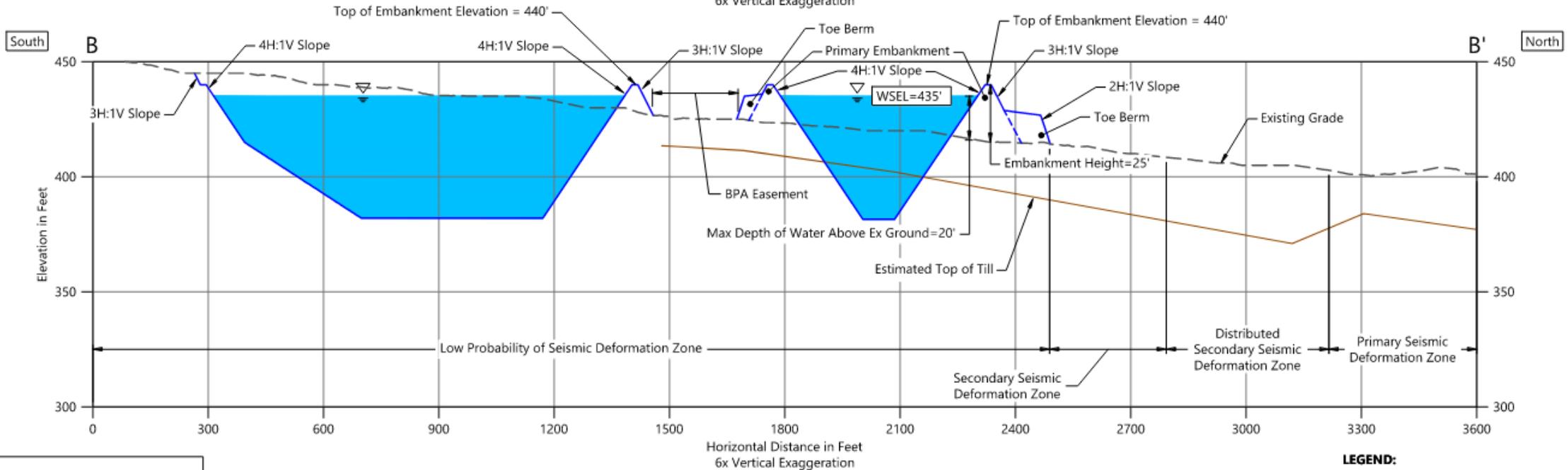
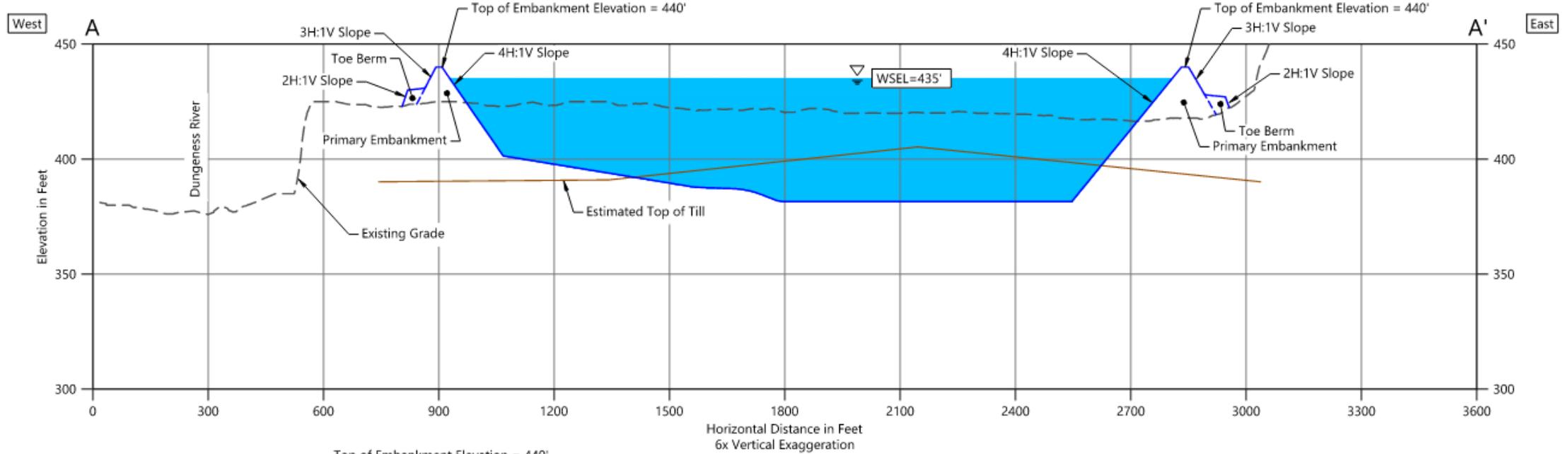
# Option E1 - Plan



**SOURCE:** Aerial ©2021 Microsoft Corporation  
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**HORIZONTAL DATUM:** Washington State Plane  
 North Zone, NAD83, U.S. Survey Feet  
**VERTICAL DATUM:** NAVD88

- LEGEND:**
- Parcels (Clallam County GIS)
  - Existing Irrigation Ditches and Laterals (GIS 2013)
  - Existing Irrigation Pipelines (GIS 2013)
  - Existing Contours (2' & 10' Intervals)
  - Proposed Contours (2' & 10' Intervals)
  - Existing BPA Easement
  - Primary Seismic Deformation Zone
  - Secondary Seismic Deformation Zone
  - Distributed Secondary Seismic Deformation Zone
  - Low Probability of Seismic Deformation Zone
  - Proposed Irrigation Pipeline
  - Proposed Full Reservoir Water Surface for Option E1
  - Proposed Full Reservoir Water Surface from 2016 Concept Design
  - Proposed Full Reservoir Water Surface from 2021 30% Design
  - Cross Section Location and Designation



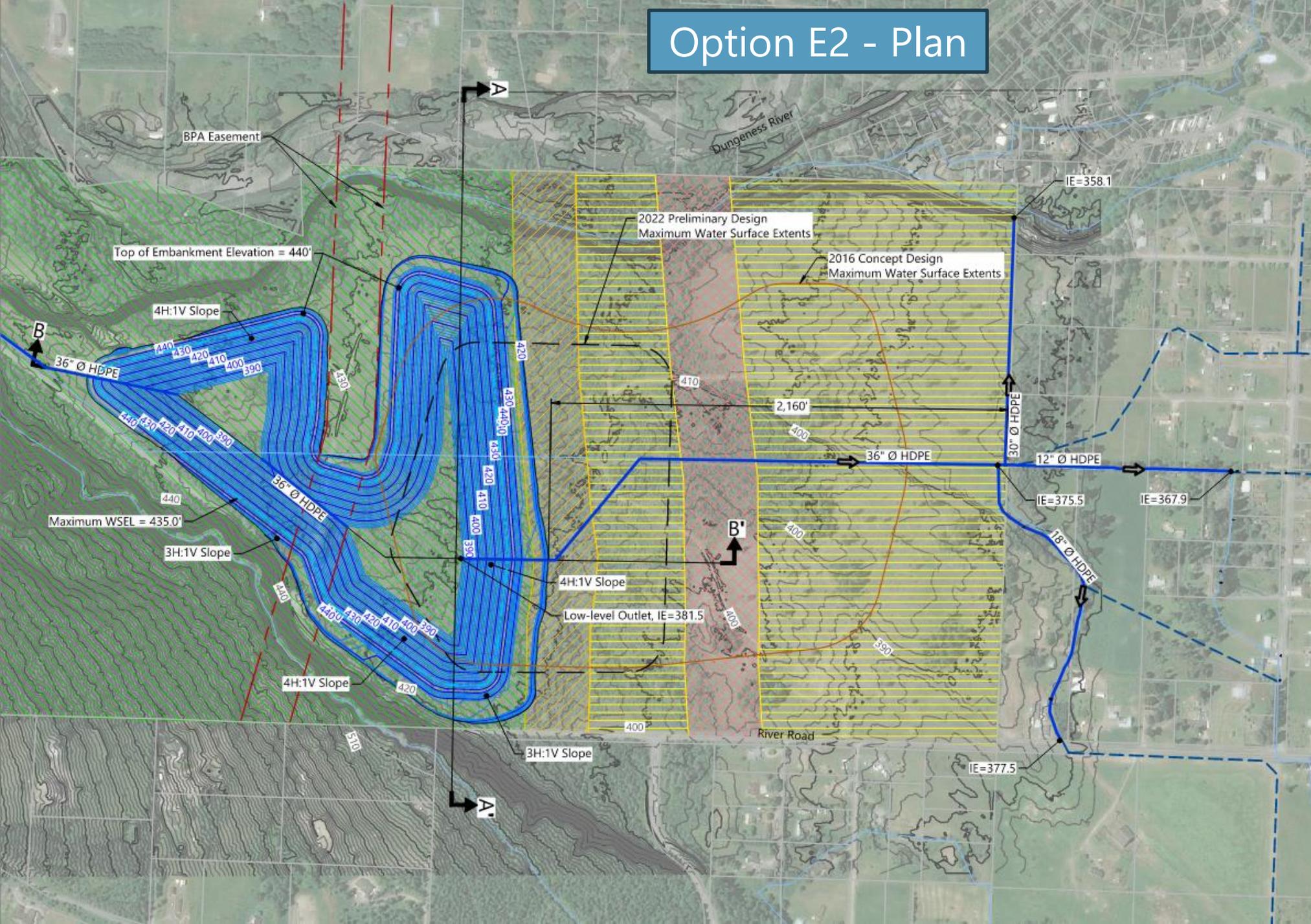


**NOTE:**  
Vertical scales on all sections have been exaggerated 6x larger than the horizontal scale to allow the sections to fit within the dimensions of the page. The slopes appear steeper and heights appear larger than they would if the vertical and horizontal scales were equal.

# Option E1 - Sections

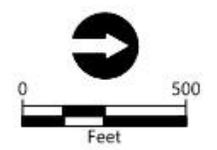
- LEGEND:**
- Existing Grade
  - Proposed Grade
  - ▽ Proposed Water Surface Elevation
  - Estimated Till

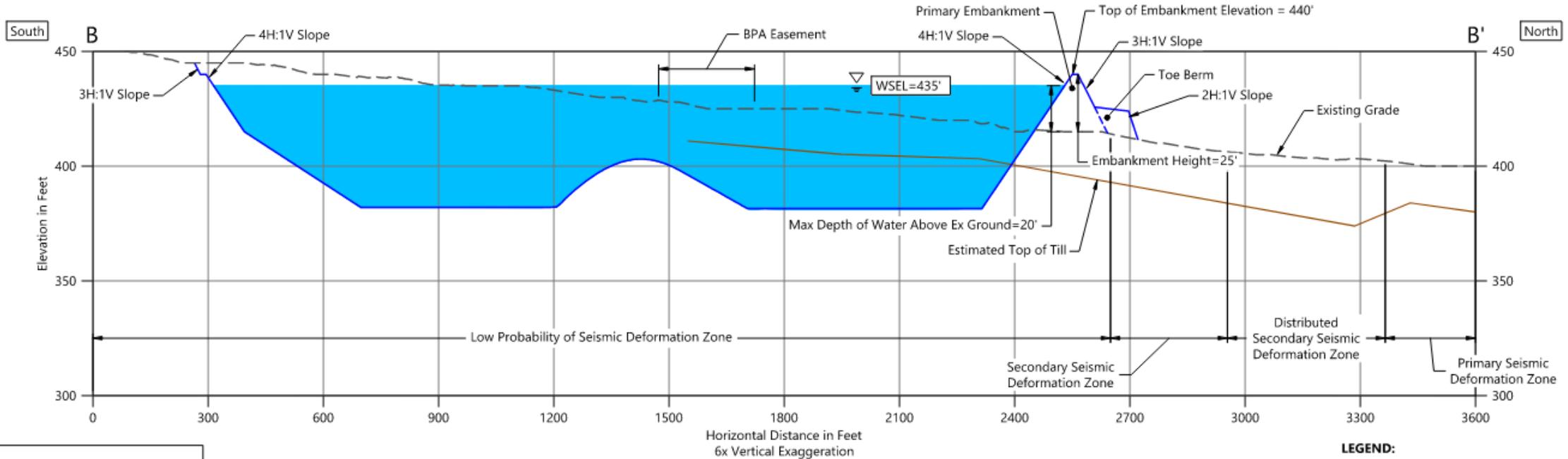
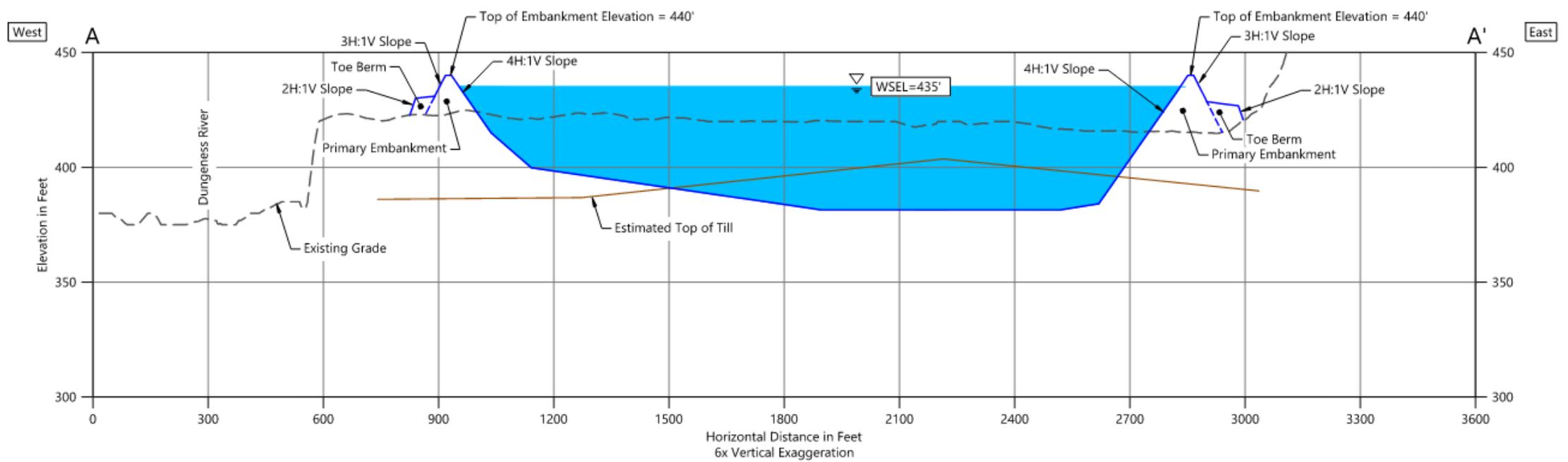
# Option E2 - Plan



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  - Existing BPA Easement
  - Primary Seismic Deformation Zone
  - Secondary Seismic Deformation Zone
  - Distributed Secondary Seismic Deformation Zone
  - Low Probability of Seismic Deformation Zone
  - Proposed Irrigation Pipeline
  - Proposed Full Reservoir Water Surface for Option E2
  - Proposed Full Reservoir Water Surface from 2016 Concept Design
  - Proposed Full Reservoir Water Surface from 2021 30% Design
  - Cross Section Location and Designation



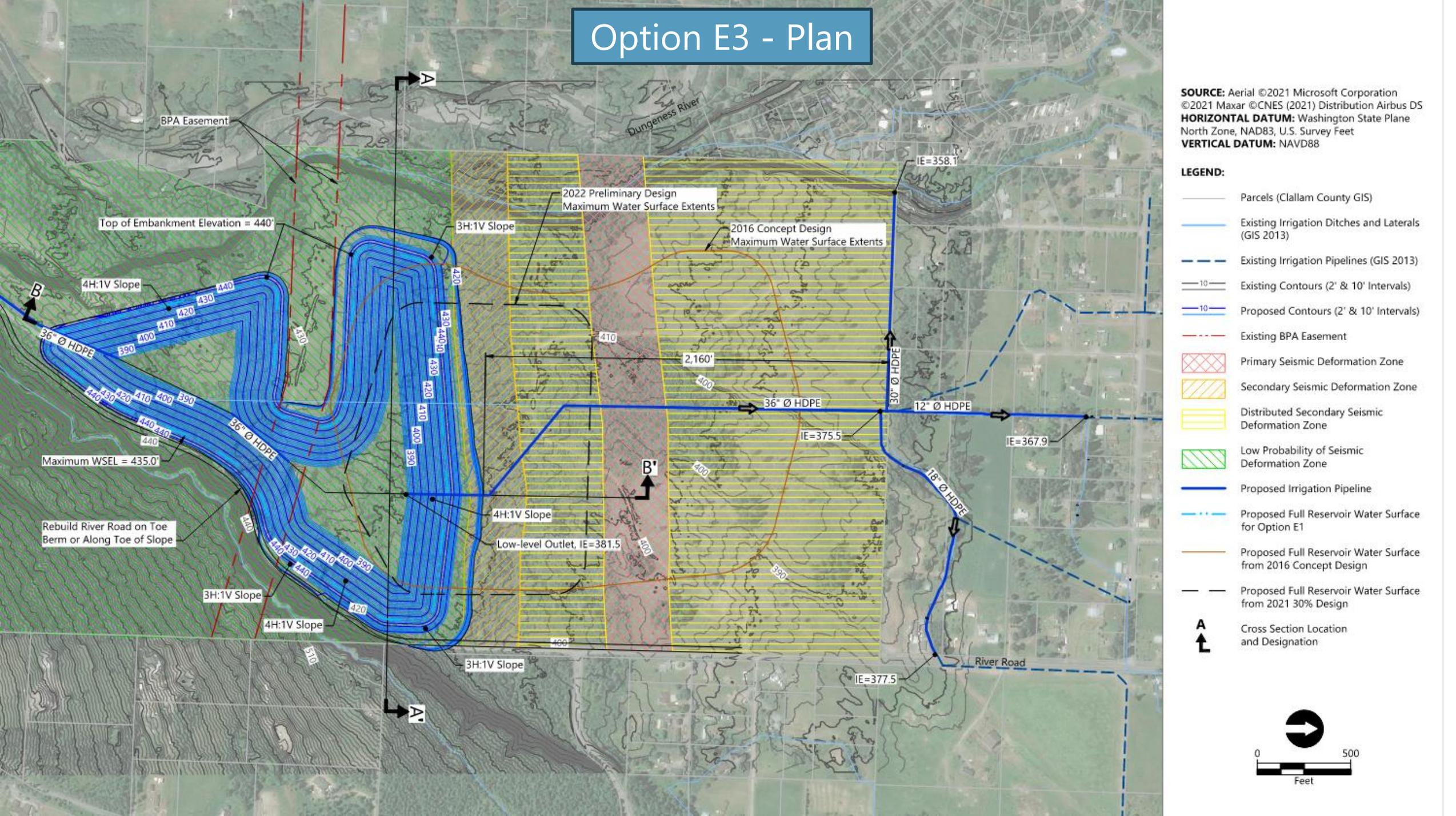


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# Option E2 - Sections

- LEGEND:**
- Existing Grade
  - Proposed Grade
  - ▽ Proposed Water Surface Elevation
  - Estimated Till

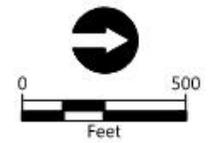
# Option E3 - Plan



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  - Existing Contours (2' & 10' Intervals)
  - Proposed Contours (2' & 10' Intervals)
  - Existing BPA Easement
  - ▨ Primary Seismic Deformation Zone
  - ▨ Secondary Seismic Deformation Zone
  - ▨ Distributed Secondary Seismic Deformation Zone
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  - Proposed Irrigation Pipeline
  - Proposed Full Reservoir Water Surface for Option E1
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  - Proposed Full Reservoir Water Surface from 2021 30% Design

**A**  
 ↑  
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 →  
 Cross Section Location and Designation



BPA Easement

Dungeness River

Top of Embankment Elevation = 440'

2022 Preliminary Design  
 Maximum Water Surface Extents

2016 Concept Design  
 Maximum Water Surface Extents

IE=358.1

4H:1V Slope

3H:1V Slope

Maximum WSEL = 435.0'

Rebuild River Road on Toe  
 Berm or Along Toe of Slope

2,160'

IE=375.5

IE=367.9

4H:1V Slope

Low-level Outlet, IE=381.5

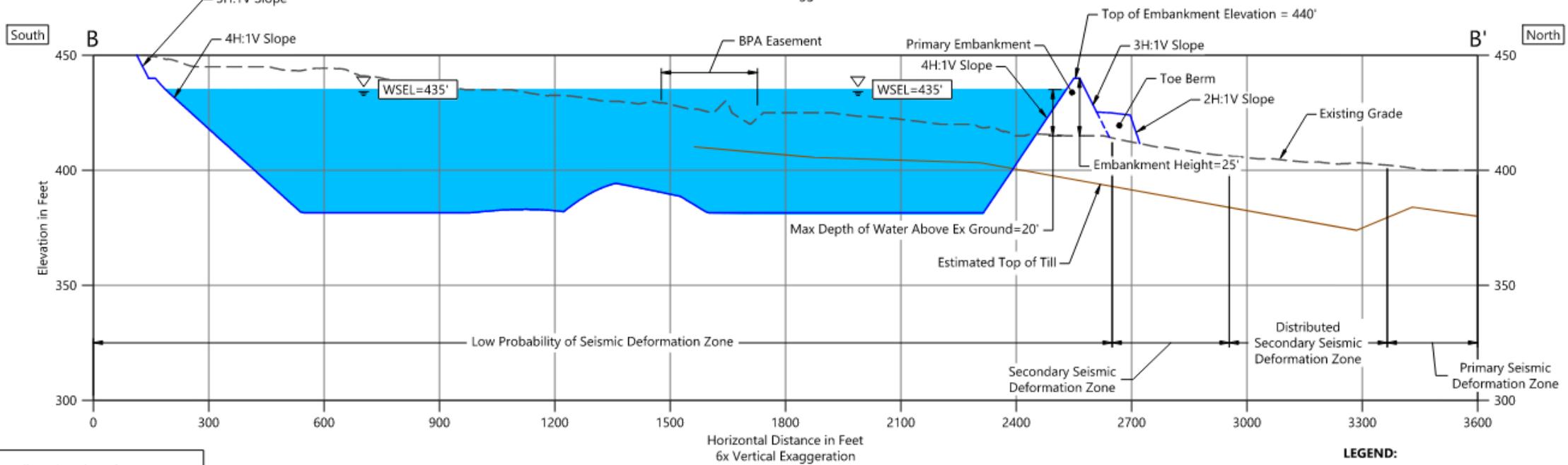
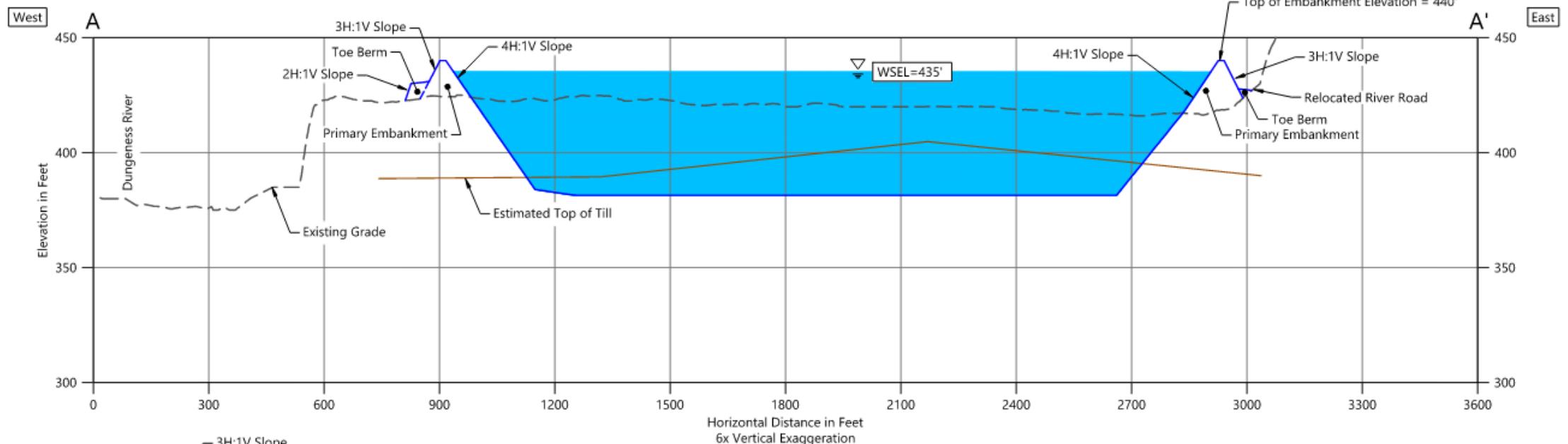
3H:1V Slope

4H:1V Slope

3H:1V Slope

IE=377.5

River Road

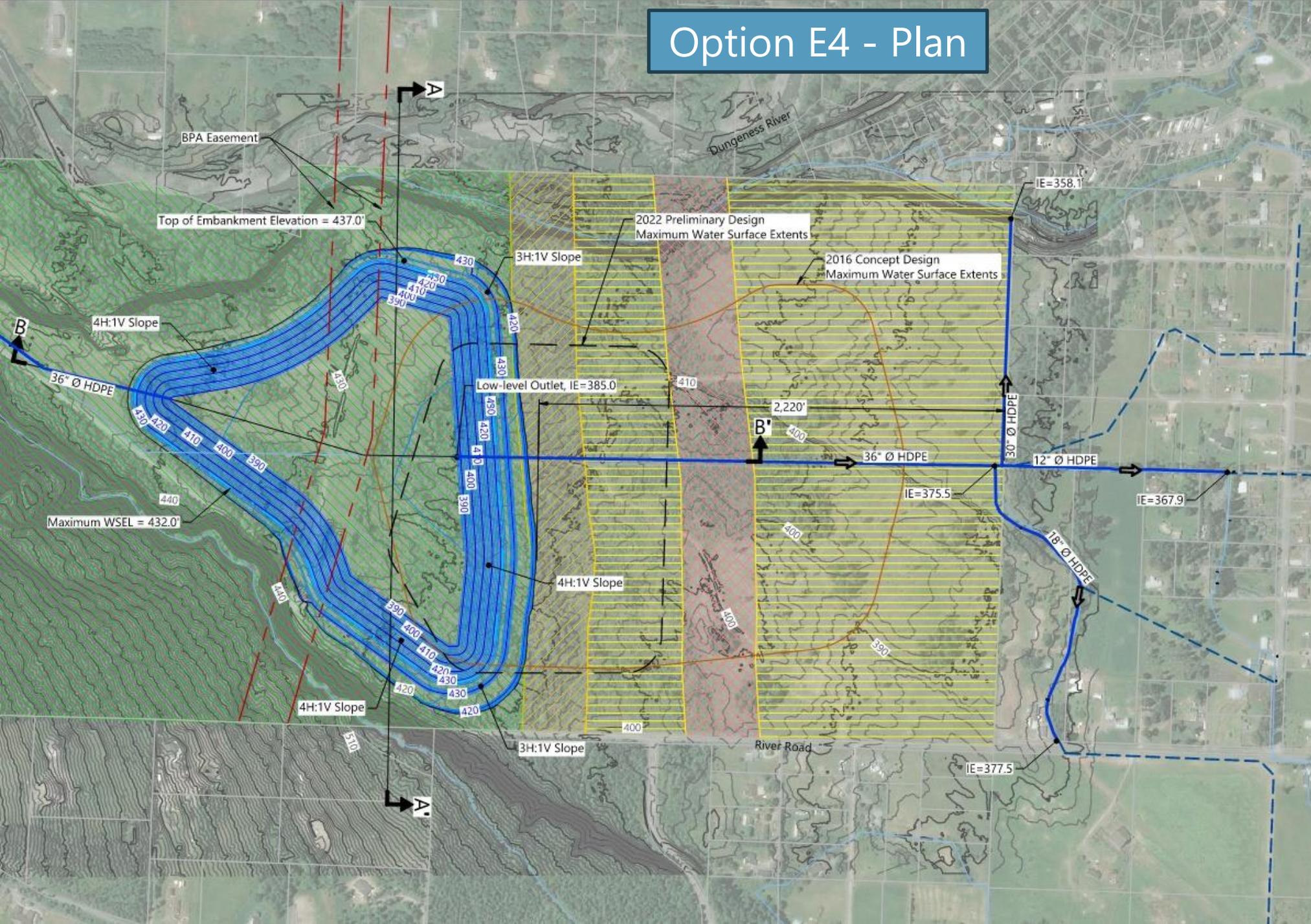


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# Option E3 - Sections

- LEGEND:**
- Existing Grade
  - Proposed Grade
  - ▽ Proposed Water Surface Elevation
  - Estimated Till

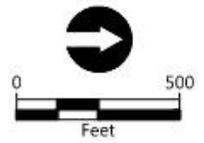
# Option E4 - Plan

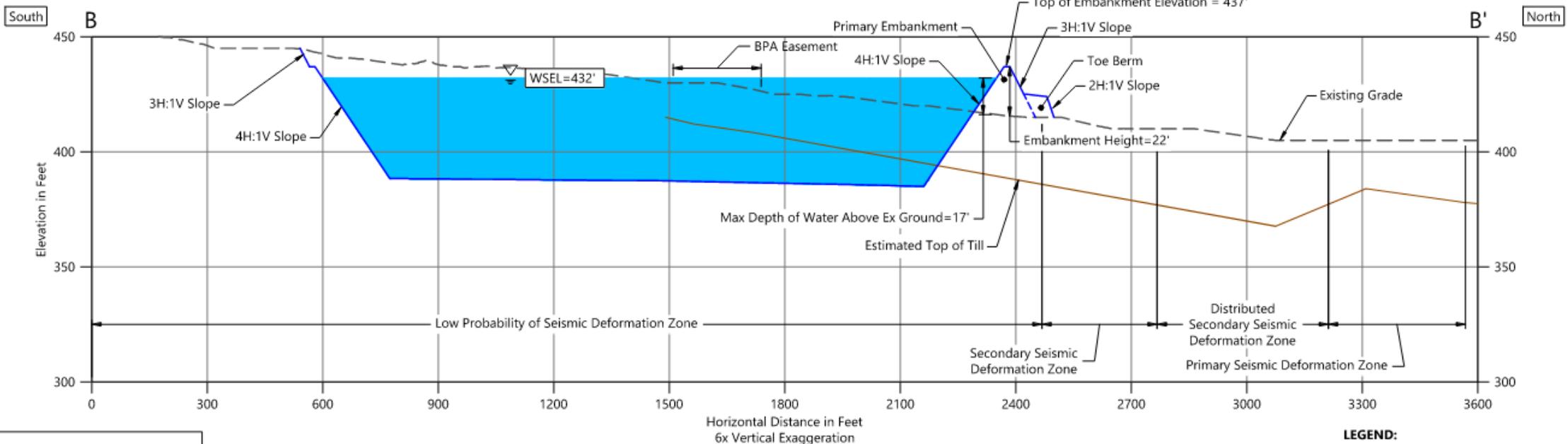
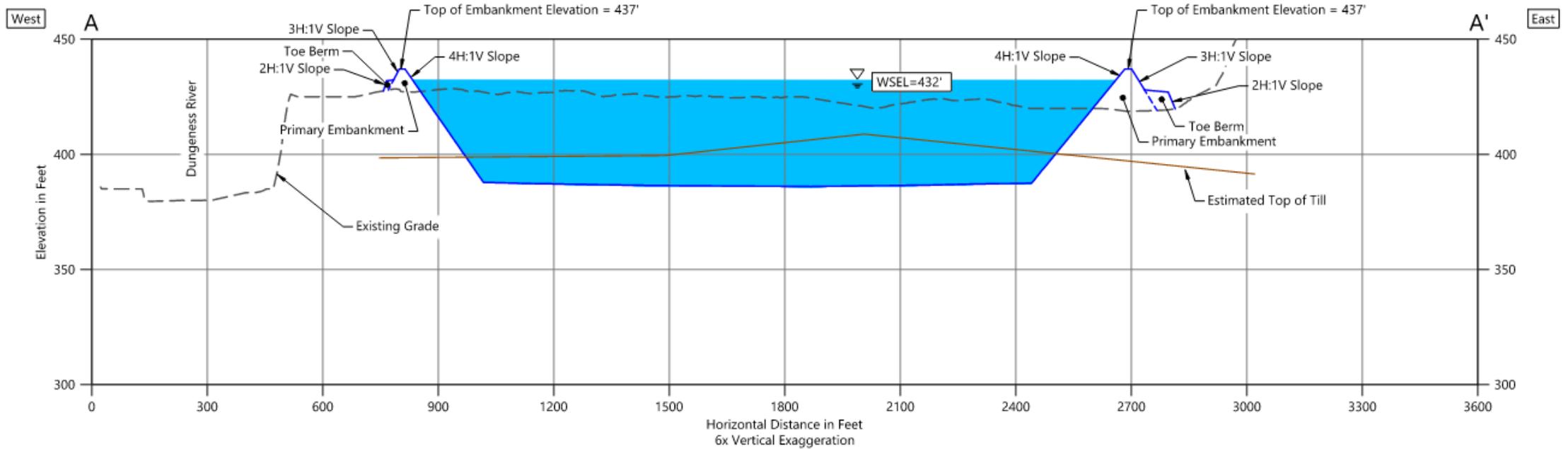


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**A**  
 Cross Section Location and Designation





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# Option E4 - Sections

- LEGEND:**
- Existing Grade
  - Proposed Grade
  - Proposed Water Surface Elevation
  - Estimated Till

# Limitations and Additional Work Required

- Coordination with BPA to understand constraints and limitations of work in and adjacent to the BPA easement
- Review with funding partners
- Public meeting and outreach
- Additional analyses
  - Geotechnical site investigations
  - Seismic analyses
  - Updated hydrologic and hydraulic analyses

# Summary of "Option E" Reservoir Configurations

Design Variable	Option E1	Option E2	Option E3	Option E4
Max. WSEL	435 feet	435 feet	435 feet	432 feet
Storage Capacity	959 Acre-feet	1,236 Acre-feet	1,465 Acre-feet	1,610 Acre-feet
Max. Flow Benefit (Days at 25-cfs release)	19.3 days	24.9 days	29.5 days	32.5 days
Max. Flow Benefit (Flow over 32-day release)	15.1 cfs	19.5 cfs	23.1 cfs	25.4 cfs
Max. Height of N Embankment	25 feet±	25 feet±	25 feet±	22 feet±
Max. Depth of Water Above Ex Ground	20 feet±	20 feet±	20 feet±	17 feet±
% Storage Capacity Below Ex Ground	67% (North) 77% (South)	76%	79%	85%
Total Excavation	1,107,452 CY	1,513,551 CY	1,875,689 CY	2,215,977 CY
Total Fill Required	395,657 CY	420,620 CY	408,010 CY	257,931 CY
Distance from N Property Boundary	2,390 feet	2,320 feet	2,320 feet	2,320 feet

Notes:

CY: Cubic Yard

Ex: Existing

Max.: Maximum

N: North

WSEL: Water Surface Elevation

# Summary of "Option E" Reservoir Configurations

Design Variable	Option E1	Option E2	Option E3	Option E4
<b><i>Reservoir and Appurtenances:</i></b>				
Opinion of Probable Construction Costs <sup>1</sup>	\$33.3 Million	\$36.7 Million	\$41.2 Million	\$40.8 Million
Other Costs Not Already Contracted <sup>2</sup>	\$3.0 to \$4.0 Million	\$3.4 to \$4.4 Million	\$3.7 to \$4.8 Million	\$3.7 to \$4.8 Million
Total	\$36.3 to \$37.3 Million	\$40.1 to \$41.1 Million	\$44.9 to \$46.0 Million	\$44.5 to \$45.6 Million
<b><i>Intake, Settling Basin, Inlet Pipelines:</i></b>				
Opinion of Probable Construction Costs <sup>1</sup>	\$3.8 Million	\$3.8 Million	\$3.8 Million	\$3.8 Million
Other Costs Not Already Contracted <sup>2</sup>	\$0.3 to \$0.4 Million			
Total	\$4.1 to \$4.2 Million			
<b><i>Downstream Irrigation Pipelines:</i></b>				
Opinion of Probable Construction Costs <sup>1</sup>	\$4.8 Million	\$4.8 Million	\$4.8 Million	\$4.8 Million
Other Costs Not Already Contracted <sup>2</sup>	\$0.9 to \$1.0 Million			
Total	\$5.7 to \$5.8 Million			

Notes:

1) Opinion of probable construction costs inflated to June 2024.

2) Other costs include additional design costs that have not been contracted and an allowance for construction administration.

# Summary of Construction Funding Secured or Pending

<b>Funding Source</b>	<b>Amount</b>
Ecology Streamflow Restoration (for Reservoir and Appurtenances)	\$3,955,699
FEMA Hazard Mitigation (for Reservoir and Appurtenances)	\$29,986,688
U.S. Bureau of Reclamation WaterSMART (for Intake, Screen, Settling Basin, Inlet Pipeline)	\$2,427,700
Natural Resources Conservation Service (for HID Main Canal Pipeline)	\$2,727,870
<b>Total Construction Funding for Reservoir and Appurtenances</b>	<b>\$33,942,387</b>
<b>Total Construction Funding for Intake, Screen, Settling Basin, Inlet Pipelines</b>	<b>\$5,145,570</b>
<b>Total Construction Funding for Downstream Irrigation Pipelines</b>	<b>\$0</b>

# Next Steps

# Recommended Next Steps and Timeline

- **July 2024:** Meet with BPA to confirm constraints on working in BPA easement
- **July 2024:** Finish updating Frequently Asked Questions document
- **July 2024:** Complete preliminary designs for elements upstream of reservoir (HID Headgate Structure Upgrades, HID Screen Facility Upgrades, Settling Basin, Pipeline to Replace HID Main Canal, Flow Control Structure)
- **July 2024:** Finalize memorandums on pipeline capacity and flow rates used for design
- **July 2024:** Meet with Jamestown S’Klallam Tribe and Dungeness Water Users Association to discuss intake and screening facility upgrades, pipeline capacity and design, drought pumping, flow benefit, etc.
- **August 2024:** Select preferred reservoir configuration based on BPA limitations and recommendations from the Dungeness Reservoir Work Group
- **August-September 2024:** Hold Public Meeting

# Recommended Next Steps

- **August-September 2024:** Update geotechnical site exploration plan based on preferred reservoir configuration
- **August-October 2024:** Update preliminary designs to reflect preferred reservoir configuration
- **August-October 2024:** Complete water rights framework, water balance work
- **September-October 2024:** Complete cleanup of old “Sequim Dump” site
- **September-November 2024:** Schedule and initiate geotechnical field work
- **December 2024:** Initiate environmental permitting using updated preliminary designs
- **Ongoing:** Continue to meet monthly, or as needed, with the Dungeness Reservoir Work Group
- **December 2024-December 2025:** Complete detailed design and permitting



# Questions and Discussion