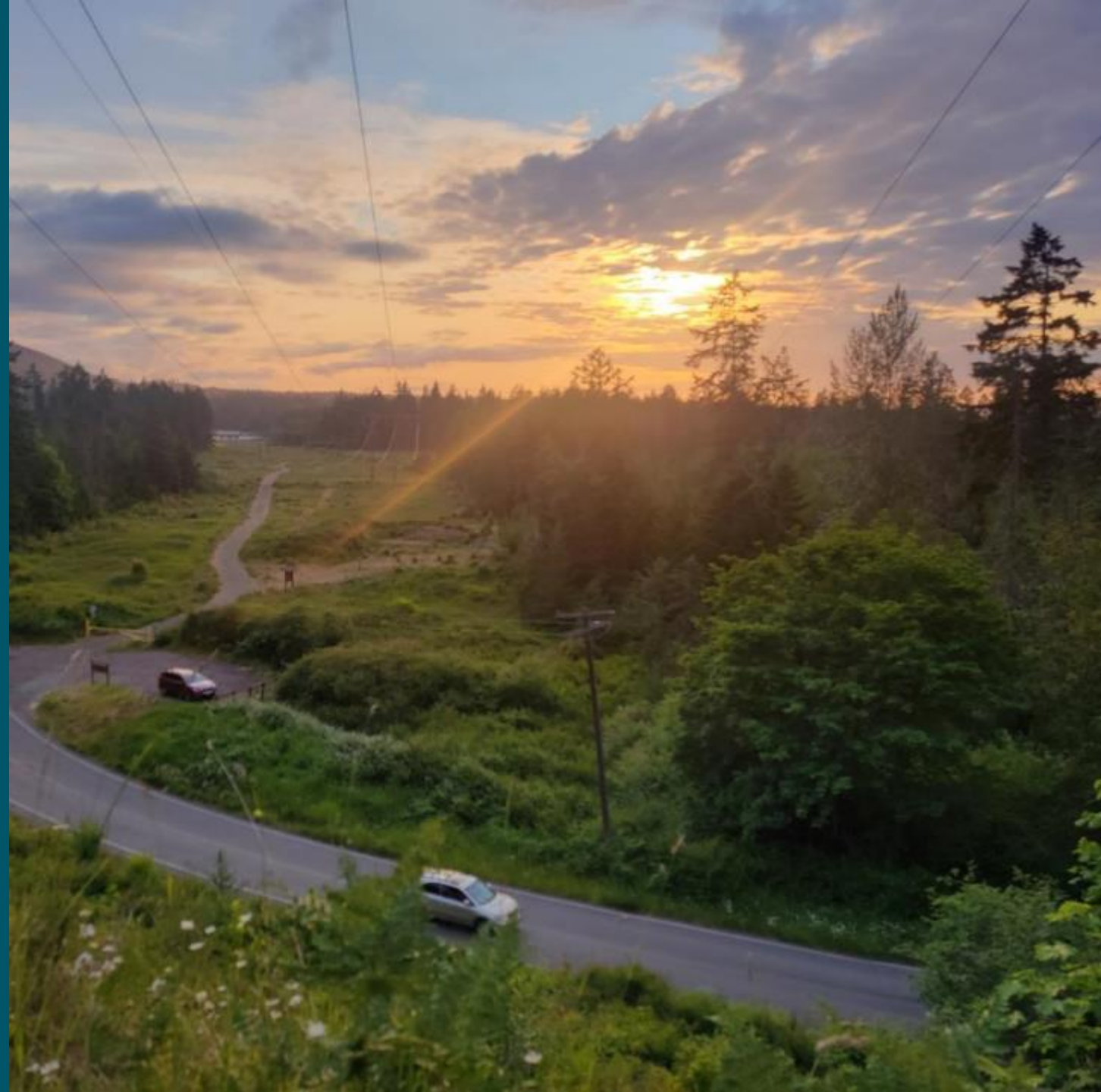
Dungeness Off-Channel Reservoir Project Update

Dungeness River Management Team

April 9, 2025



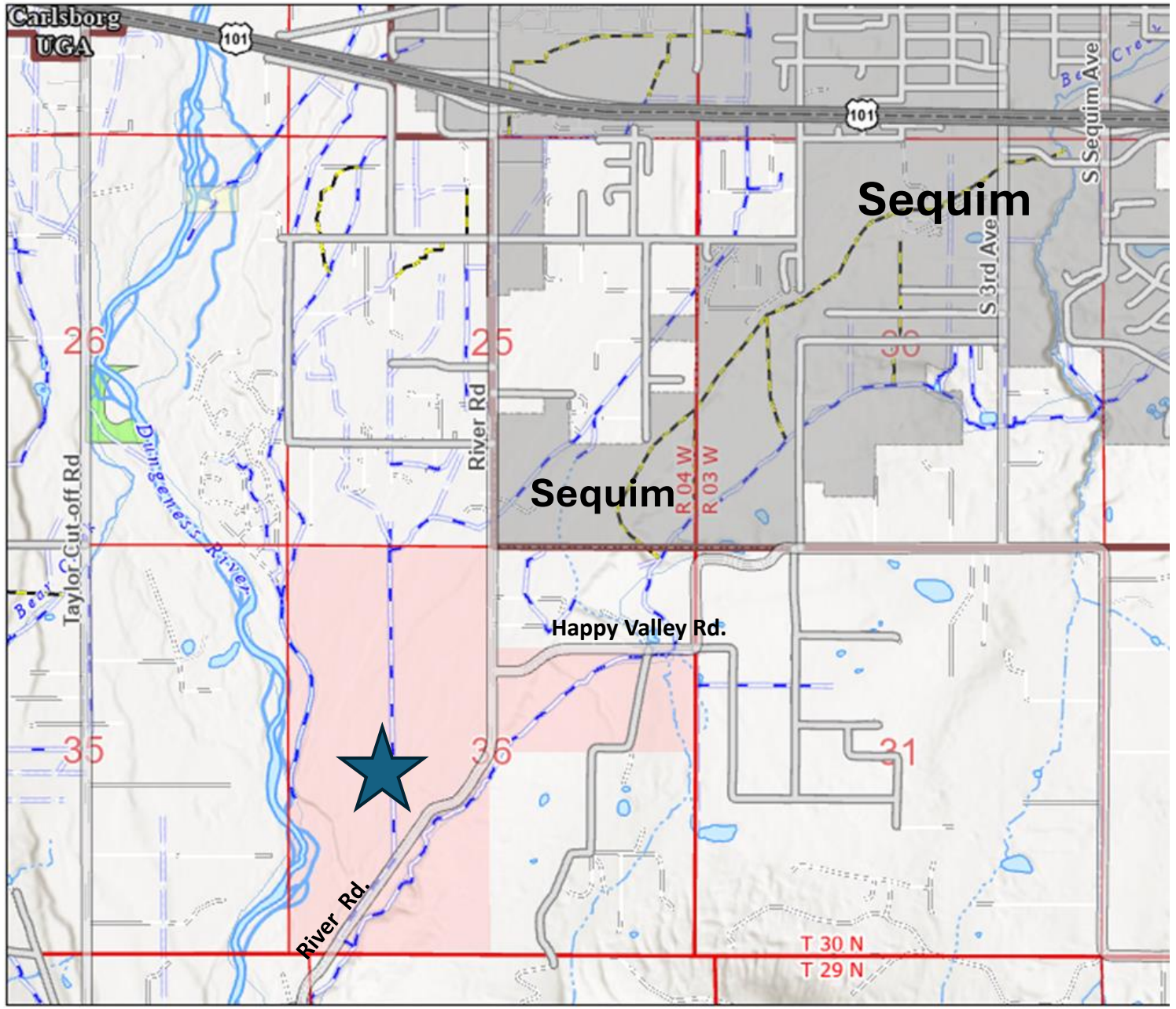
Overview of Presentation

- Update on Project Design Status
- Update on Project Funding Status
- Update on Potential Stormwater Capture and Infiltration Project on County River Rd. property and Relationship to Off-Channel Reservoir
- Water Evaluation and Planning (WEAP) Model (water balance & allocation tool) Results Follow-up
  - Help Provide Decision-Support to Inform Design and Operation of Off-Channel Reservoir to Deliver Targeted Benefits
- Summary of Dungeness Reservoir Work Group (DRWG) Discussion and Focus Areas

Vicinity Map

Oct. 2024: County acquisition of ~ 400 acres from state for Off Channel Reservoir & County Park

- $1,240,100 purchase paid for under state Streamflow Restoration Grant



Why This Property?

- Watershed location upgradient of much of the irrigation demand on east side of Dungeness River
- Ability to fill and release water from reservoir by gravity
- Proximity to existing irrigation infrastructure
- Large enough size.
- Availability of suitable on-site earthen materials for reservoir construction.

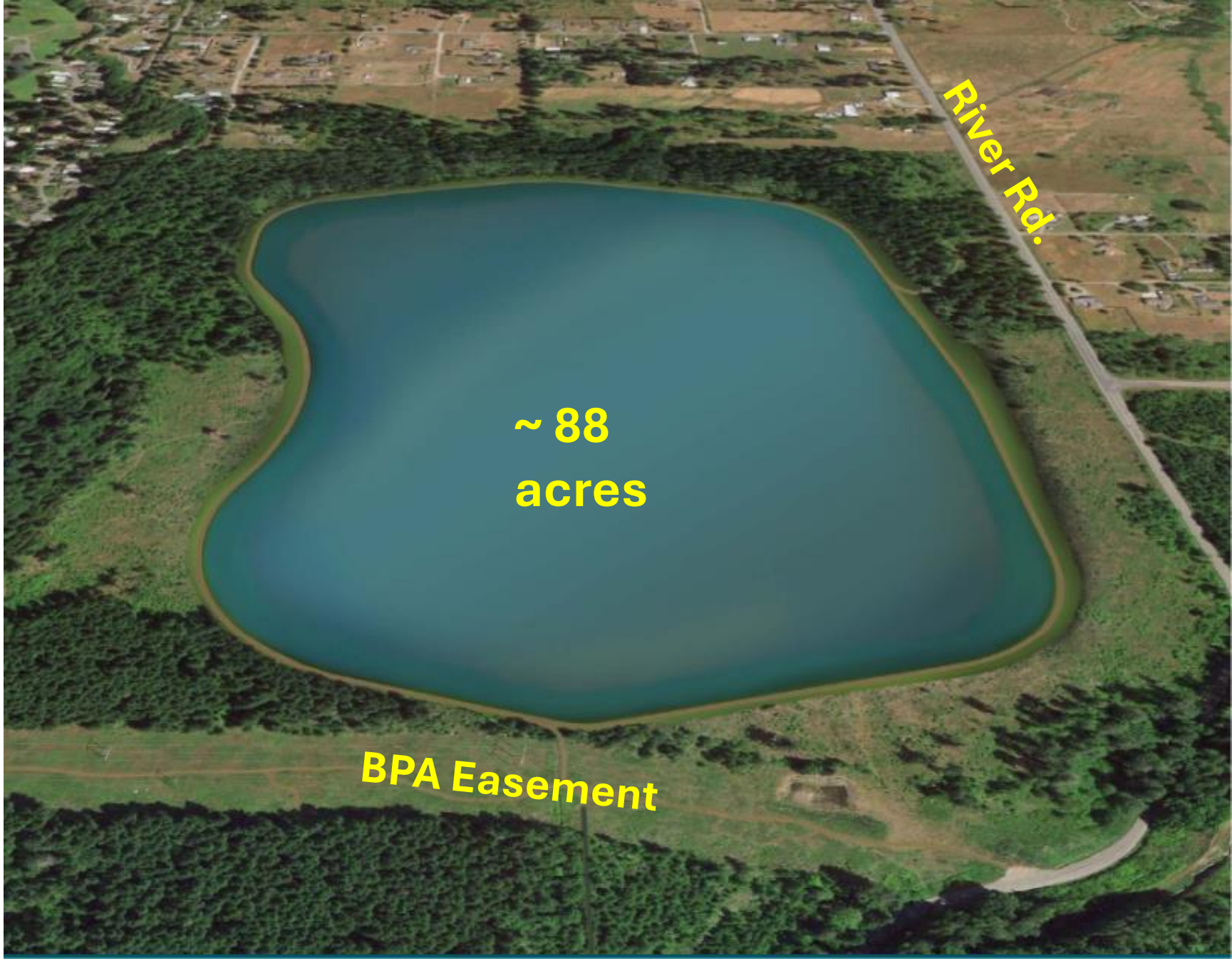
2016 Preliminary Concept

Source: *Executive Summary and Project Proposal – Dungeness Off-Stream Reservoir Project , Anchor QEA, January 2016*

Under direction of:

- Washington Water Trust
- City of Sequim
- Dungeness Water Users Assoc.
- Clallam Conservation District

Introduced to other stakeholders: Clallam County, Jamestown S' Klallam Tribe, & state agencies.

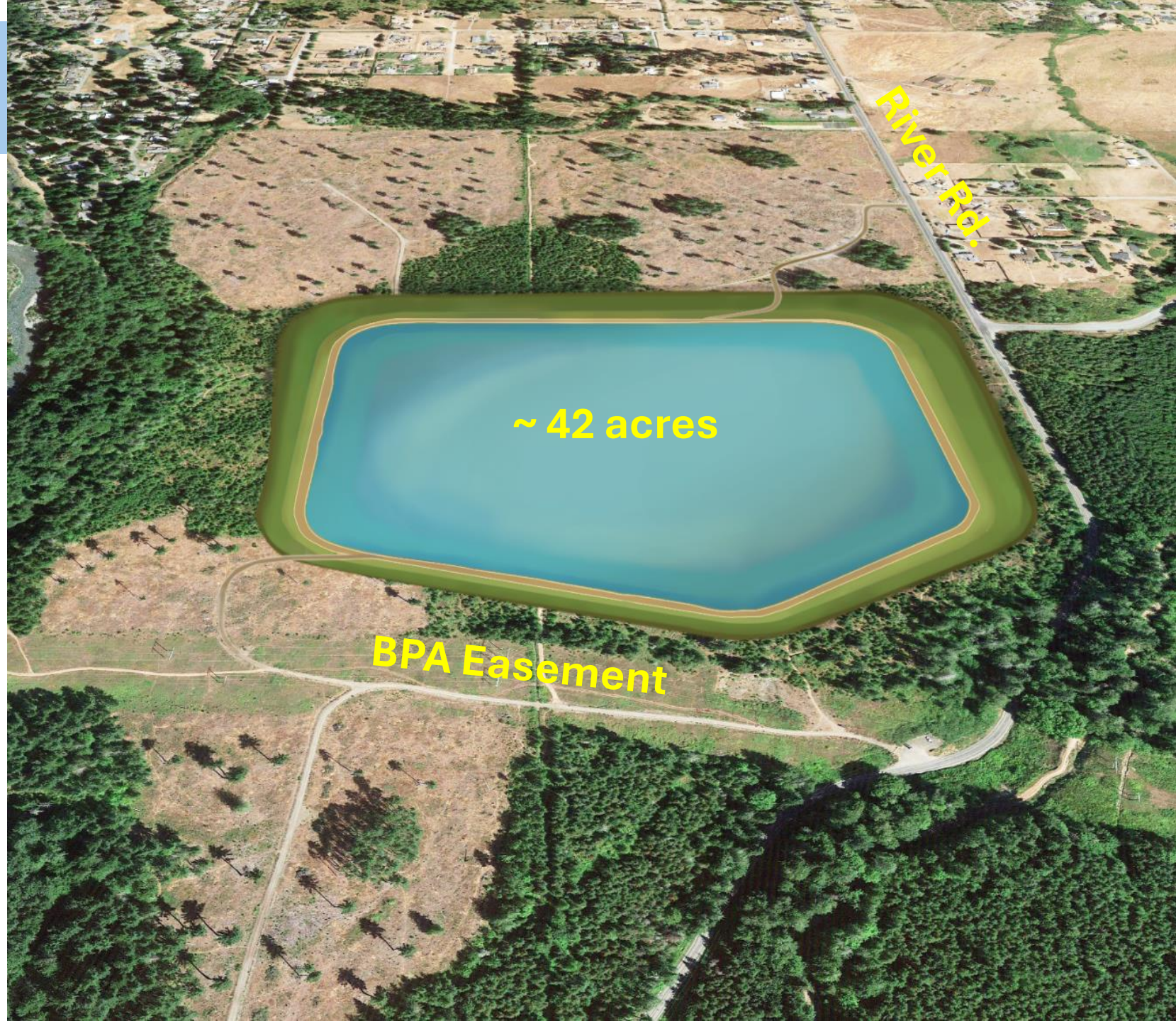


Off-Channel Reservoir (OCR) 2022 Preliminary Design

Other OCR Configurations

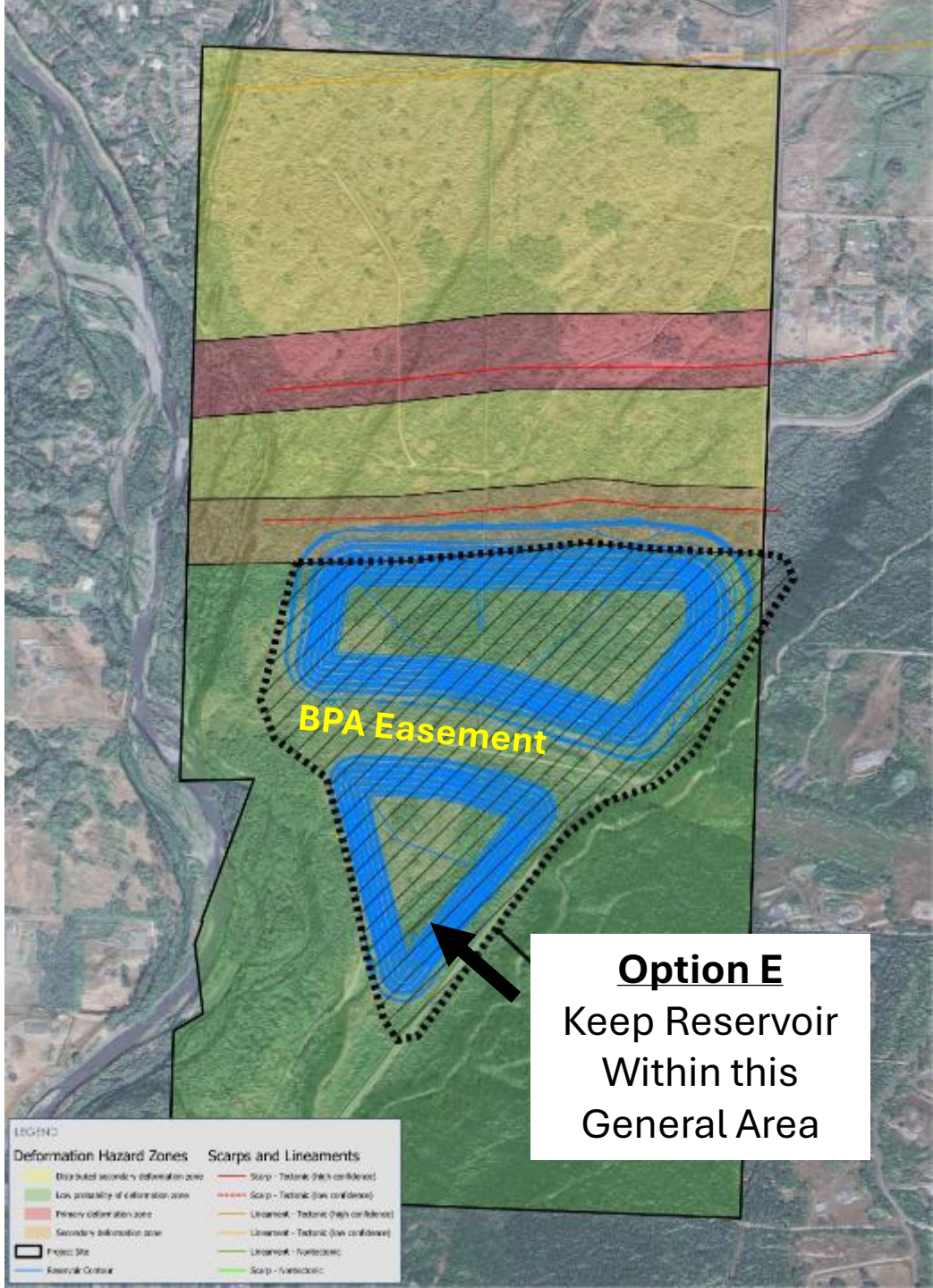
- **2023 OCR Configuration Options A – C:** Various configurations all north of BPA Easement*
- **2023 OCR Option D:** Two cells bordering north & south sides of BPA Easement*
- **2024 OCR E1 – E4:** Various configurations bordering or thru BPA Easement & refined based on additional seismic analysis)*

**All options lower embankment height and store more volume of water below ground compared to the 2022 design.*



Recommended Location

- **Consultant Design Team Recommends Reservoir Location within Option E footprint based on:**
  - Geotechnical Evaluation
  - Seismic Review & Fault Analysis
  - Other Information
- **Considerations**
  - Input from public and stakeholders
    - Option E reduces embankment height and stores more water volume below ground in response to public comments
  - Bonneville Power Administration (BPA) easement impacts on reservoir footprint
  - Funding
  - Others



Option E1

~ 960 to 1,307 Acre-Feet Storage Capacity

Option E4

~ 1,610 Acre-Feet Storage Capacity

Recommendation – Option E1

Why E1?:

- Footprint is outside of BPA Easement.
- Two cell design allows for phased construction.
- Potential thru further design to increase storage capacity from ~ 960 AF to 1,300 AF.
- Does not preclude future expansion.
- Scale still provides opportunity of significant flow benefit during late irrigation season from 15.1 cfs (960 AF Reservoir) to 20.6 cfs (1,300 AF Reservoir).

Why E1? – Cost Considerations:

- Option E4 likely adds an estimated $2 to $3 million and 3 to 4 years for design, env. review and permitting.
- Option E4 estimated to be ~ 15 million or more (includes relocation of BPA infrastructure).

Why E1? - Design & Permitting Considerations:

Remaining grant funding and current timeline of grant supports reset of design efforts to:

- Complete 30% Design Needed to Support Permit Submittals and Process
- Support Phase 2 Geotechnical Site Investigation Work
- Inform 60% design

Option E1—Design & Permitting Cost Estimates

Design & Permitting Costs	Amount	Estimated Remaining Grant Funding	Estimated Funding *(Needed for Final Design/Permitting)*
Design Work Invoiced To Date	$2.24 million	*Previously Grant Funded*	
Estimated Additional Design & Permitting Related Costs	$1.3 to $1.6 million	~ $700,000	$600,000 to $900,000*
TOTALS	**$3.54 to 3.84 million**	**$700,000**	**$600,000 to $900,000***

***Potential Sources for $600K to $900K Funding Gap to Get to Final Design:**

- $150,000 FEMA Hazard Mitigation Grant Proposal. *(Pending Phase 1 Request)*
- Reallocate available funds from other grant tasks. Anticipate $100K to $140K available. *(Requires state approval)*
- Reallocate funding from Ecology 2020 Grant Award (for Construction) to Support Design. *(Requires state approval)*

Off-Channel Reservoir & Appurtenances Construction
Preliminary Cost Estimate Summary

Option E Configuration	Current Cost Estimate	Grant Funding *(Pending)*	Funding Source
Option E1	~ $36.6 million*	~ $33.7 million ***(92% of current cost estimate)****	• $2,275,699: 2020 State Ecology Streamflow Restoration Grant ***(Awarded – Not under Contract)*** • $1,680,000: 2022 State Ecology Streamflow Restoration Grant ***(Awarded – Not under Contract)*** • $29,986,688: Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant ***(Selected project for funding consideration – Phase 1 Funding ($150,000) Under Review)***
Option E4	~ $52.3 million (inc. ~ $2 million for BPA Relocation)*	~ $33.7 million ***(~ 64% of current cost estimate)****	*Same as above*

*Estimates to be refined as design moves forward. Option E1 presents potential to phase construction (i.e., construct only first cell).

**Assumes current pending state and federal construction grant funding will be secured as design is completed.

Upgradient Improvements

- Improvements to Highland Irrigation District (HID) headgate structure
- Improvements to HID fish screens by Washington Department of Fish and Wildlife
- Installation of a settling basin
- Installation of ~6,000 feet of 36-inch pipeline in the upstream end of the Highland Irrigation District main canal
- Flow control structure
- Piping of HID lateral canal to reservoir location.

Dungeness Off-Channel Reservoir (OCR)

Upstream Infrastructure Improvements

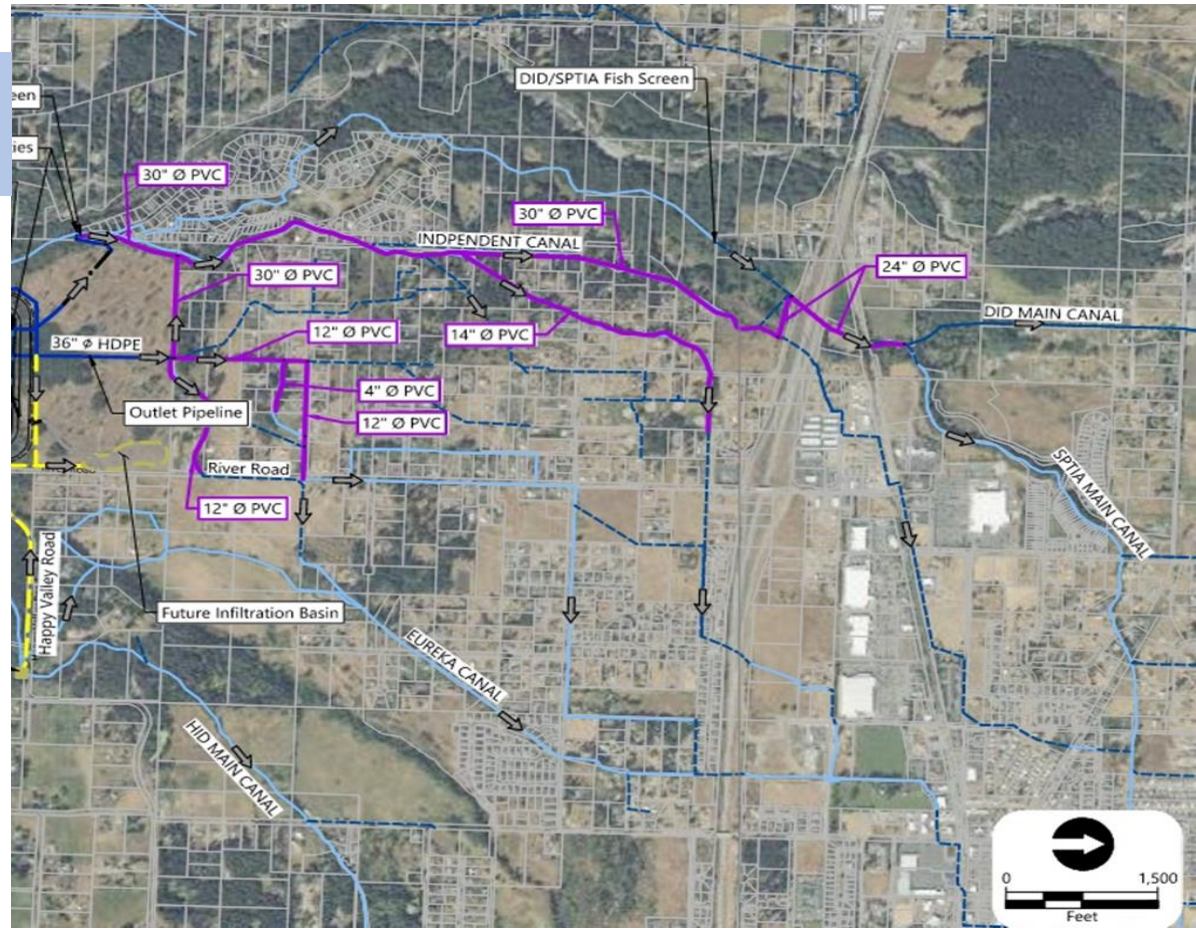
- Preliminary 30% Design Completed
  - Funded by State Grant (2019 Ecology Streamflow Grant)

Construction Estimate and Funding

Funding	Description	Grant Amount	Grant Match	Current Construction Estimate	Comments
Federal Congressional Directed Spending Appropriation	Piping of ~ 6,000 feet of Highland Irrigation Ditch (HID) Main Canal	$2,727,870	None	$2,018,500	• Appropriation administered by USDA–Natural Resources Conservation Service (NRCS) • NRCS project scoping and environmental review underway.
US Bureau of Reclamation (USBOR) WaterSMART Grant	Upgrade HID diversion, flow control upgrades, settling pond, & pipe HID lateral to Reservoir.	$1,813,275 *(Under Contract)*	$604,425	$1,758,900	• Match planned to be covered by awarded state grant.
	TOTALS	**$4,541,145**	**$604,425**	**$3,777,400**	*Adequate funding based on current estimates.*

Downgradient Improvements

- Improvements to irrigation delivery system needed to fully deliver water stored in the Off-Channel Reservoir to irrigated downgradient properties.
- 2021: Completion of 30% Preliminary Design (grant funded) by Clallam Conservation District.



Task	Current Cost Estimate	Funding
Detailed Design & Permitting	~$514,000	No funding identified or applied for yet.
Construction	~ $5.3 million	No funding identified or applied for yet.

Highland Main Canal Stormwater Capture and Infiltration Project and Connection to Off-Channel Reservoir

- Sequim 2019 FEMA Hazard Mitigation Program Grant Award: Phase 1 – Site Evaluation and Design.
- Phase 1 intended to inform decision to proceed to Phase 2 – Final Design and Construction.
- Under Review/Consideration: Full integration of project and FEMA funding with County's reservoir project.
- Convey excess available stored reservoir water to on-site infiltration facility.
  - Evaluate flexibility on use of stored reservoir water during irrigation season.
  - Allows consideration of later season (after mid-July) aquifer recharge.

WEAP Principal Questions

- Can reservoir be reliably filled? Also:
  - Ability to fill using Maximum Allocation Water (MAW) from Nov 16 - July 14 under Dungeness Water Rule vs. need to supplement with Highland Irrigation District (HID) Water Rights currently not used to support irrigation/stock watering demand.
- Estimate water availability to serve irrigation demand
- Estimate water restored instream in the future
  - Impact of Irrigator Turn-Down Rules
- Potential for excess water to identify opportunities for other flow management (not just release during last 30-days of irrigation season).

WEAP Assumptions

- **Modeled historical (observed) data** assumes future flows like the 2007-2022 period continuing.
- **Modeled 2030-2080 climate projection scenarios** are driven by Point No Point Treaty Council (PNPTC) Streamflow Projections
  - Shift in projected Dungeness River hydrology.
  - Assumes RCP 8.5 emissions (represents a continued increase in carbon emissions that reflects historical trends).
  - PNPTC Data Limitations Use, Limitations, and Constraints
- **2012 Memorandum of Agreement (MOA) Irrigator Turn Down Schedule**
  - Start to curtail irrigation diversion when inflow at USGS Gage goes below 120 cfs
  - Fully curtail all irrigation diversion when river below flows of 65 cfs
- **Irrigation Use of Reservoir Stored Water.** Results focus on irrigation east of Dungeness River and downgradient of Off-Channel Reservoir **(***Highland Irrigation District, Sequim Prairie Tri-Irrigation Association, and Dungeness Irrigation District)*
- **Reservoir release period:** Modeled operation scenarios based on the last 30 days (Aug. 15 – Sept. 15) of irrigation season versus other timing and release scenarios.
  - Potential scenarios to use/release excess available water earlier not modeled.

Note: Results do not account for other current or future actions/programs (e.g., dry year leasing) implemented to improve streamflow.

Irrigation Supply WEAP Results

Last 30-days of Irrigation Season (Aug 15-Sept 15)

	2020 Irrigation demand	Future Climate Projection (2030-2060)			Future Climate Projection (2050-2080)			Historical 2007-2022 Climate Projection Continuing		
		No reservoir	Reservoir design E1	Reservoir design E4	No reservoir	Reservoir design E1	Reservoir design E4	No reservoir	Reservoir design E1	Reservoir design E4
Mean Aug 15-Sep 15 supply to reservoir districts[1]	**1,040 AF** ***Target***	240 AF	950 AF	1,040 AF	110 AF	940 AF	1,040 AF	930 AF	1,000 AF	1,040 AF

[1]***Source:*** *Dungeness River WEAP Model Documentation, Dec. 2024. Includes Highland Irrigation District, Sequim Prairie Tri-Irrigation Association, and Dungeness Irrigation District downgradient of Off-Channel Reservoir site.*

Some Takeaways:

- Capacity of reservoir design options meet or substantially meet current irrigation demand in late-summer.
- Modeled 2030-2080 climate projection scenarios driven by PNPTC Streamflow Projections indicate reservoir needed to maintain current irrigation schedule.

Streamflow Restoration WEAP Results

Last 30-days of Irrigation Season (Aug 15-Sept 15)

Climate Projections[1,2]	Aug 15 flow benefit (cfs) By Percentile					Sept 15 flow benefit (cfs) By Percentile				
	5th	25th	50th	75th	95th	5th	25th	50th	75th	95th
2007-2022[1]	7.1	7.1	15.5	15.6	15.6	8.7	12.1	13.0	16.5	16.5
2030-2060[2]	0.0	2.9	8.9	12.4	15.6	0.0	0.0	0.0	1.1	7.8
2050-2080[2]	0.0	0.0	1.2	7.3	15.6	0.0	0.0	0.0	0.0	4.4

Source: *Dungeness River WEAP Model Documentation, Dec. 2024*

[1]Modeled historical (observed) data assumes future flows like the 2007-2022 period continuing.

[2]Modeled for streamflow conditions projected by PNPTC for 10 different Global Climate Model (GCM) projections based on Relative Concentration Pathway (RCP) 8.5 climate change scenario. RCP 8.5 represents a continued increase in carbon emissions that reflects historical trends.

Streamflow Restoration WEAP Results

Last 30-days of Irrigation Season (Aug 15-Sept 15)

- Under existing conditions, the results suggest that a reservoir would offer substantial flow benefit opportunities *(13 to 17 cfs, based on 2007-2022 historical flow data)* during the late summer.
  - Although the flow benefit may change over time, there would be a substantial streamflow benefit that would carry into the future.

- Present a range of direct flow benefits (0 to 17 cfs) from Aug. 15 – Sept. 15 across all modeled streamflow and climate projections.

Streamflow Restoration WEAP Results

Under Future PNPTC Streamflow & Climate Projections Modeled in Relation to 2012 Memorandum of Agreement (Irrigation Turn Down Rules)

- Dungeness River flows hit the low flow threshold of 120 cfs much earlier in the year, on average, and more frequently (almost every year).
- Flows hit the extreme low flow threshold of 65 cfs more frequently.
  - Flows did not dip below 65 cfs during the modeled historical (observed) period of record which assumes future flows like the 2007-2022 period continuing
- Based on PNPTC modeled streamflow and future climate projection scenarios, results suggests Dungeness River flows would:
  - Drop below 65 cfs in early August during driest years; and
  - Drop below 65 cfs by the end of the irrigation season during dry to slightly above average years.
- Currently, if the flows fall below 65 cfs, irrigation divisions would be discontinued, according to the voluntary limits under the 2012 MOA.

Other WEAP Result Highlights

Reservoir Fill

- Reservoir completely fills every year under 100% of modeled simulations. True for both the:
  - Modeled historical (observed: 2007-2022) data; and
  - Modeled 2030-2080 climate projection scenarios driven by PNPTC Streamflow Projections

Excess Fill

- Results show a mean annual excess fill from 2,500-3,100 AF across scenarios modeled. Presents opportunities for use of reservoir water earlier with ability to refill prior to late-summer.

Using Maximum Allocation Water (MAW) vs. HID Water Rights to Fill Reservoir

- Results show that Mean MAW fill accounts for 87-94% of reservoir fill across scenarios modelled.

WEAP Model Limitations

- Significant challenges, uncertainties, and errors are reflected in downscaling Global Climate Model data to fit the Dungeness Watershed, applying that data to the PNPTC projected hydrologic model, and calibrating the model to provide results.

- Calibration results show a consistent model bias towards under predicting late summer flows, which would result in:
  - Overstating the impacts of climate change on Dungeness River flows; AND
  - Understating the potential benefit of the reservoir project would have on Dungeness River flows under the 2030-2060 and 2050-2080 modeled climate change projections.

Recommendations Related to WEAP Results

- View results as a range of potential outcomes, with recognition that flows will be variable over time and that the reservoir will need to be designed and operated so that it can adapt to changing conditions.
- Acknowledge that the benefits of the reservoir project could change over time due to the impacts of climate change, so adaptation will be required.
- Recognize that the reservoir offers flexibility that will be critical to adaptively managing water in the Dungeness River Watershed.
- If additional WEAP analysis conducted in future as a tool for optimizing the design and operation of the reservoir, consider methodology improvements recommended by Anchor QEA in their February 2025 Memorandum.

For More Information on WEAP Model

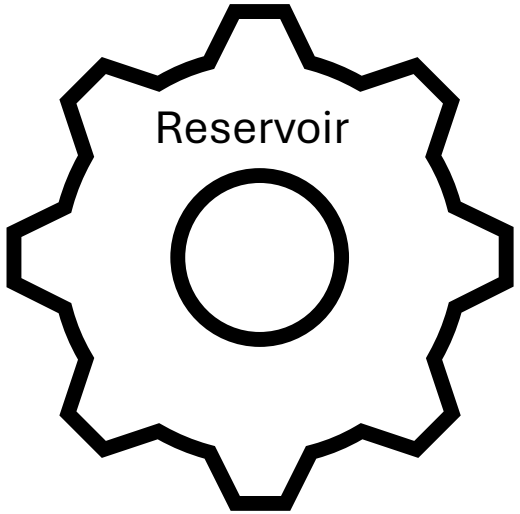
Key Documents on County Dungeness Off-Channel Reservoir Project Web Page:

- **Feb. 2025:** Memorandum-Review of Dungeness Reservoir WEAP Model Inputs and Results, by Anchor QEA for Clallam County.
- **Dec. 2024:** Dungeness River WEAP Model Documentation, by Stockholm Environmental Institute (SEI)
  - Includes Model Overview, Inputs, and Documentation
  - Results for the Operational Scenarios and Climate Projections Evaluated
  - Attachment 1 – Point No Point Treaty Council's Dungeness Streamflow Projections: Data Use and Limitations
- **Dec. 11, 2024:** DRMT presentation on Water Balance Model Results, by SEI and Washington Water Trust
- **Nov. 2024:** Dungeness Off-Channel Reservoir Water Budget Water Modeling Quality Assurance Project Plan *(Approved by State Dept. of Ecology)*

Dungeness Reservoir Work Group

- Draft Water Rights Framework
- Draft O&M Framework
- WEAP Model Projections

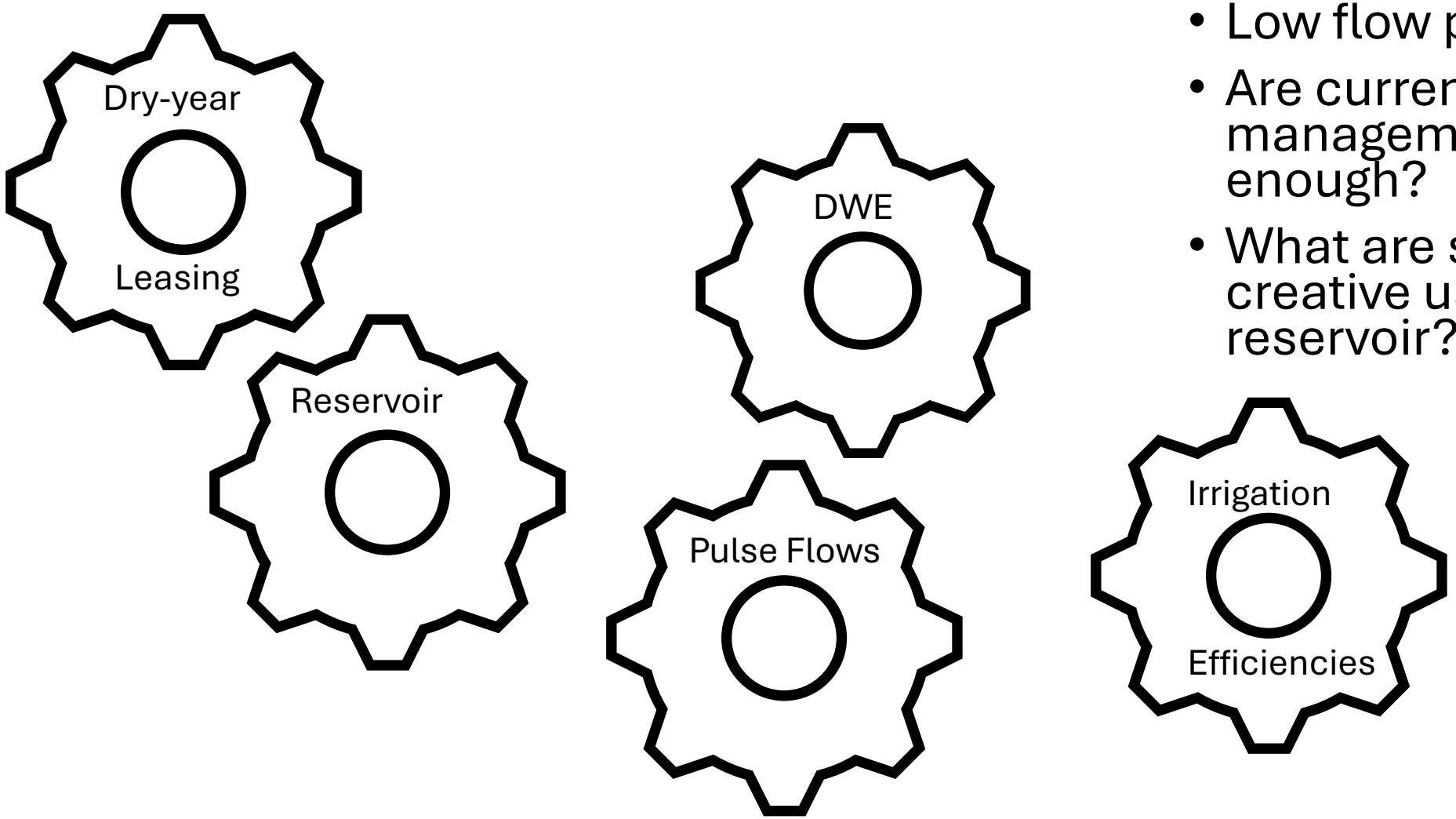
Flow Management



Multiple Benefits

- Streamflow Restoration
- Agricultural Viability
- Expanded Aquifer Recharge

Dungeness Reservoir Work Group: Is the “low-hanging” fruit enough?



- Low flow priority?
- Are current flow management methods enough?
- What are some other creative uses of a reservoir?

Questions???

Dungeness Off-Channel Reservoir Project