STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775 • Olympia, WA 98504-7775 • 360-407-6300

May 5, 2025

Warren Snyder
Senior Manager, Environmental Engineering
Rayonier Advanced Materials
1301 Riverplace Blvd., Suite 2300
Jacksonville, FL 32207
Warren.snyder@rayonieram.com

Re: Port Angeles Rayonier Mill Site - Coastal Conceptual Site Model and Hydrodynamic Modeling Action Plan (August 2, 2024) and Draft Pre-Remedial Design Work Plan Under-Dock and Nearshore Areas (August 30, 2024)

Site name:	Port Angeles Rayonier Mill Site
Site address:	700 N Ennis, Port Angeles, Clallam County, WA 98362
Facility/Site ID:	19
Cleanup Site ID:	2270

Dear Warren Snyder:

The Washington State Department of Ecology (Ecology) received the Coastal Conceptual Site Model and Hydrodynamic Modeling Action Plan (Modeling Memo) on August 2, 2024, and the Draft Pre-Remedial Design Work Plan Under-Dock and Nearshore Areas (PRDWP) on August 30, 2024. These documents were submitted under the second amendment to Agreed Order No. DE 6815 (AO amendment). The AO amendment required Rayonier A.M. Properties LLC (RAMP) to prepare a Work Plan that details the hydrodynamic modeling and sampling approach to meet the sediment data needs identified in the Draft Interim Action Plan (IAP) and the Under-dock and Nearshore Areas Pre-Remedial Design Analysis and Decision Framework (Decision Framework) attached to the AO amendment. We appreciate the timely submittal of these reports, and your patience in waiting for Ecology's review and comments, which we were developing while also finalizing the IAP and a proposed Consent Decree and alternative Enforcement Order.

Modeling Memo

The Decision Framework specifies that a conceptual site model (CSM) for project site physical processes (nearshore coastal geomorphology) needs to be developed for both the existing and the post modification (e.g., removal of dock and jetty) conditions. At a minimum, a

comprehensive CSM must: review and identify likely directions of littoral (or "longshore") sediment transport at the Site; interpret how such sediment transport will change as a result of the remedy and removal of the dock and jetty; and provide for contingencies to account for such changes.

Based on our review, Ecology found the CSM to be cursory and often neglecting or contradicting prior reports produced for the Rayonier Mill project. The CSM section provides a summary of nearshore processes and climate change but does not state how or why they are relevant to any proposed actions. In some cases, the discussion of longshore processes seems more intended to justify preservation of existing degraded shoreline conditions – such as retention of the jetty – than to develop an appropriate contingent remedy. Further development of the CSM is needed before developing a final modeling approach. Enclosed is a memorandum, RAMP August 2024 Modeling Memo Review and Comments (Moffatt & Nichol, March 27, 2025), providing detailed, specific comments that must be addressed and incorporated into a final CSM.

PRDWP and IDP

Because the Modeling Memo is Appendix A to the PRDWP – and the sampling to be performed under it is a prerequisite to development of a contingent remedy under the PRDWP – our substantial comments on the Modeling Memo constitute comments on the PRDWP as well. In addition, we note that the PRDWP needs to shift some of the sampling locations under the dock to achieve better spatial coverage, as depicted in the enclosed Figure 3 (although captioned as Figure 3 for purposes of an Ecology consultant report, this Figure should replace Figure 5 of the PRDWP).

In addition, Appendix E to the PRDWP is an Inadvertent Discovery Plan (IDP) initially developed as part of a USACE permitting process in 2019. The USACE permit was needed for in-water sampling in the vicinity of the dock, as part of an eventual lease close-out process with DNR. The IDP noted that this activity was not part of the cleanup and thus outside the scope of a 1999 Memorandum of Agreement (MOA), the parties to which "included" Rayonier, Inc., Ecology, and the Lower Elwha Klallam Tribe. RAMP has now submitted the 2019 IDP without modification for purposes of the PRDWP and subsequent cleanup activities. The IDP seems to imply that the 1999 MOA would at most apply to upland soil sampling and not to other ground-disturbing activities, including in-water sampling under the PRDWP, that could affect tribal cultural resources or human remains. Ecology and the Tribe believe that there are two 1999 Agreements that apply to in-water sampling under the PRDWP as well as to subsequent ground-disturbing activities in the cleanup. These 1999 agreements, in particular the Preliminary Agreement between Ecology and the Tribe, provide that the Tribe shall approve any archaeological monitor at the site and may have its own monitor present to act as a liaison. Ecology expects to work with RAMP and the Tribe to ensure that there will be archaeological monitoring acceptable to the Tribe and Ecology for all ground-disturbing activities under the PRDWP and subsequent cleanup, and that the IDP will be revised as necessary.

Next Steps

As a next step, Ecology, RAMP, and technical teams should meet to go over these comments and develop a schedule for moving through the proposed milestones and next steps in the enclosed memorandum. Ecology anticipates that some of these milestones will be incorporated into performance under either the proposed Consent Decree or Enforcement Order, as set forth in our correspondence of April 16, 2025.

If you have any questions, please contact me at 360-489-4569 or marian.abbett@ecy.wa.gov.

Sincerely,

Marian L. Abbett

Marian L. Abbett, PE
Section Manager
Southwest Region Office
Toxics Cleanup Program
State of Washington

Enclosure: Memorandum – RAMP August 2024 Modeling Memo Review and Comments
Figure 3 – Proposed Data Gaps Sampling Locations

cc by email (w/ enclosure):
Matt Beirne, Lower Elwha Klallam Tribe, matt.beirne@elwha.org
Connie Groven, Ecology, connie.groven@ecy.wa.gov
Ecology Site File

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Enclosure

Memorandum – RAMP August 2024 Modeling Memo Review and Comments, March 27, 2025

MEMORANDUM

To:	Washington Department of Ecology
From:	Kyle Landon, PE Shane Phillips, PE
Date:	March 27, 2025
Subject:	RAMP August 2024 Modeling Memo Review and Comments
M&N Job No.:	212998

1 Purpose

The purpose of this memorandum (memo) is to provide feedback on the August 2, 2024 memo provided by Rayonier A.M. Properties, LLC ("RAMP") titled "Coastal Conceptual Site Model and Hydrodynamic Modeling Action Plan Rayonier Mill Site Port Angeles, Washington – Interim Action Plan" ("Modeling Memo"), which serves as Appendix A to the Draft Pre-Remedial Design Work Plan Under-Dock and Nearshore Areas (August 2024) ("Draft PRD Work Plan"). Both of these draft documents are required as part of Task 1 under the Second Amendment to Agreed Order No. DE 6815 (3 June 2024)(AO Amendment). The AO Amendment in turn was developed to incorporate the requirements of Ecology's Decision Framework (March 2024)(DF). The feedback that follows is a summary of review comments from the Washington (WA) Department of Ecology ("Ecology"), the Lower Elwha Klallam Tribe ("Tribe"), Washington Sea Grant, and consultants of the Tribe and Ecology. The focus of this present memo is on the need for a comprehensive CSM. Without the conceptual site model (CSM) in place, the reviewers cannot comment in detail on the proposed actions and modeling plan.

2 Background

Primary documents setting out the requirements for the Work Plan and Modeling Memo are:

- Second Amendment to the Agreed Order ("AO amendment") No. DE 6815 (3 June 2024).
- "Port Angeles Rayonier Site: Under-dock and Nearshore Areas Pre-Remedial Design Analysis and Decision Framework" (DF) Memo by Ecology (March 2024)(incorporated into the requirements of the AO Amendment).

Section 6.0 of the DF is captioned "Filling Identified Pre-Remedial Design Data Needs," the final paragraph of which is most relevant to the review of the Modeling Memo, stating as follows:

> *Development of modeling criteria to occur as part of a multi-step process as follows:*
>
> *Step 1. Develop summary conceptual site model using combination of the following:*
>
> - *Conduct site visit technical meeting.*
> - *Summarize and describe all prior analysis, modeling and data collection pertaining to nearshore processes and modeling work relative to the remedial design alternative.*

> - *Relate conceptual site model conclusions to the decision framework and outline data and analysis gaps for development of remedial action concept.*
>
> *Step 2. Technical meeting to discuss results and comments on conceptual site model conclusions developed in Step 1.*
>
> *Step 3. Develop criteria and associated modeling and analysis scenarios to finalize the interim action plan preferred design concept based on the results of Steps 1 and 2.*
>
> *Step 4. Conduct additional data collection, analysis, and modeling needed for the remedial design as outlined at the conclusion of Step 3.*

It is important to be clear at the outset on the necessary elements of the CSM (Steps 1 and 2) prior to initiating detailed numerical modeling work and approach thereof.

3 Understanding of Current Status

The purpose of the RAMP Modeling Memo is to address requirements in the DF. The first section of the Modeling Memo states that it "meets two requests included in the DF":

> - *Develop a summary conceptual site model (CSM) for the MSA based on a review of prior analyses and an on-site technical meeting, with a specific focus on relating potential remedial and restorative actions to the coastal and littoral processes that occur at the Site.*
> - *Propose an action plan that identifies data gaps and summarizes modeling tasks needed to arrive at a final conceptual remedy for the under-dock and nearshore areas of the Site.*

The Modeling Memo, as attached as Appendix A to the Draft PRD Work Plan, consists of the following main sections: a CSM, two sections which attempt to apply the CSM and propose remedies and remedial action, and a Hydrodynamic Modeling Action Plan (HMAP). The complete outline is as follows:

1. Introduction and Purpose
2. Port Angeles Rayonier Mill Site Coastal Conceptual Site Model
   - 2.1. General Site Description – Geography and Hydrology
   - 2.2. Nearshore Dynamics and Sediment Transport Processes
   - 2.3. Climate Change
3. Considerations for Proposed Remedies
   - 3.1. Removal of the Pier
   - 3.2. Removal or Modification of the Jetty
   - 3.3. Reconfiguration of the Northern Mill Shoreline
   - 3.4. Restoration of the Lower Ennis Creek Estuary
4. Conceptual Remedial Action Process
   - 4.1. Pre-Remedial design Phase
   - 4.2. Remedial Design Phase
   - 4.3. Construction Phase
5. Hydrodynamic Modeling Action Plan
   - 5.1. General Hydrodynamic Modeling Approach
   - 5.2. Task 1: Pre-Remedial Design Bed Mobility Modeling

5.3. Task 2: Remedial Design Bed Shear Stress Modeling
5.4. Task 3: Remedial Design Geomorphological Modeling
5.5. Task 4: Construction-Phase Suspension Calculations

6. Outstanding Data Needs
7. Conclusions and Next Step

Note that the Modeling Memo does not provide numbers for these sections, but the present memo is assigning the above numbering for convenience of discussion.

Three data needs are identified in Modeling Memo Section 6, as follows: Sitewide Bathymetric Survey (including Under-Dock areas), Under-Dock and Near-Shore Sediment Grain-Size Analyses, and Estimation of Ennis Creek Sediment Loading. The first two data needs were proposed to be collected in the pre-remedial design phase.

4 General CSM Requirements

Ecology requires that RAMP submit a CSM report that meets the requirements spelled out in this section.

As a whole, the CSM presented in Modeling Memo Section 2 was found to be cursory and often neglects or contradicts prior reports produced for the project. The CSM section provides a summary of nearshore processes and climate change but does not state how or why they are relevant to any proposed actions. Further development of the CSM is thus needed before developing a final modeling approach. As stated in the DF, the CSM is Step 1 in developing the modeling criteria and must be completed before advancing to DF Step 3 (the HMAP in Modeling Memo Section 5). The purpose of a comprehensive CSM is to understand the interconnected, complex elements of the site geomorphic processes and proposed modifications of or impacts to those processes that could result from contingent remedy alternatives. Furthermore, the purpose of the CSM is to evaluate their relative importance to each other and sensitivity to the outcome or decision framework. If the interconnected aspects are missing, it is unduly challenging to develop a plan for modeling work that connects to a broader picture.

Components of a comprehensive CSM report shall include, but are not limited to:

A) Detailed presentation of **Metocean Conditions** (winds, waves, currents, water levels, sea level rise). Document typical and extreme conditions.

B) A **coastal geomorphology analysis** consisting of a review of historic aerials, surveys, dredging records and other sources to assess bed change, sediment transport rates, sediment sources, sediment sinks, depth of closure, erosional patterns and other aspects of the littoral system. See section 6.2.2 of the DF. Address the variability of the site conditions using a combination of empirical analysis and review of historical data, prior modeling work, and site observations.

C) Based on the prior two bullets, **define the Site** and divide it into subareas which exhibit similar metocean and geomorphic conditions.

D) Use the subareas to develop the **Existing CSM**. Document historic changes and current challenges. See the CSM subareas example in Figure 3 of this document.

E) Develop an **Altered Shoreline CSM(s).** Use the Existing CSM to provide a **qualitative assessment** of how proposed modifications to the site (or proposed preservation of any status quo conditions in certain subareas) might affect the subareas in light of what is known about the Site's metocean conditions and geomorphology. See section 6.2.2 of the DF.
The Altered Shoreline CSM work will need to outline the cause-effect of actions, risks, and assumptions and then (see step F immediately below) how new data collection and detailed modeling would address those potential variables.
⇨ Continue to update the **Altered Shoreline CSM** as the proposed design alternatives develop.

F) **Identify need**, areas of concern, and aspects which require further study and modeling. This directly ties into Step 3 of the DF. Outline the questions or conclusions that require more detailed analysis to

validate or investigate the complex nature of the proposed change in coastal processes as they relate to the proposed remedies. This step lays the groundwork for the new **HMAP**.

G) **Identify potential contingencies** to address risks and vulnerabilities.

Given the extensive number of studies conducted for the project over its history, documentation of metocean conditions may not require significant technical work or data collection. However, as it currently stands, documentation of the Metocean conditions is scattered over numerous reports and needs to be collected into a single definitive source.

A comprehensive CSM will support the modeling work as it documents the modeling inputs and provides vital context to modeling results. Without context of the CSM, it is difficult to assess the validity of the modeling results. For some aspects of the site and the proposed actions, the CSM will provide the hypothesis, and the modeling work will assess whether that hypothesis is true and to what extent.

5 Rayonier Site-Specific CSM Comments Summary

The following are comments that need to be addressed in the CSM as part of the work conducted and then described in the Modeling Memo under Sections 2 and 3.

- Ecology will provide intermediate review following the definition of the site and subareas and will review and approve the final CSM before any modeling is undertaken (see Section 8 of the present document below).
- There are inconsistencies among and between prior studies of longshore sediment transport that must be resolved.
    - Counterclockwise sediment movement driven by dominant NE wind waves; but observations of sediment under the pier and near Ennis Creek indicate sediment transport in both directions. If the sediment transport is more event-driven or episodic, explain how and why. How does this get resolved in the CSM and then what does that means for the decision framework? Provide additional analysis documentation.
    - Modeling Memo Section 2.2 includes discussion that the longshore sediment transport is to the east at the site. This is contradictory to the statements in Modeling Memo Section 3.3 that sediment transport is westward. Review historical data, provide additional documentation, and present a clear interpretation of longshore sediment transport at the site.
- As it is, the Modeling Memo tends to advocate for elements of a remedy that are contrary to the goals of the DF, including retention of the jetty groin. Ecology rejects retention of the jetty groin as contrary to the intent of the DF and the expectations and requirements of the lessor DNR. Discussion of retention of the jetty groin shall be removed from the Modeling Memo and Draft PRD Work Plan.
- Modeling Memo also provides some commentary on the separate negotiations with the Trustees regarding Ennis Creek restoration, asserting that those negotiations have overlooked the potential for restoration to trap sediment to the detriment of shoreline stability west of the creek mouth. If such potential sediment trapping is in fact a legitimate concern, the function of the Modeling Memo and Draft PRD Work Plan, consistent with the purpose of the DF, should be to develop a contingent remedy that would replace any sediment that might be temporarily lost. The commentary on the restoration negotiations must be removed.
- Ennis Creek was noted as a potential sediment source for the shoreline to the west of the creek mouth, and potential restoration of its estuary was noted as an obstacle to developing a CSM or restored site in Modeling Memo Sections 3.4 and 4.2. While it is inappropriate for the Modeling Memo to have commented on negotiations involving third parties, development of a comprehensive CSM can best assess the importance of the Creek's sediment input on the decision framework process. If necessary, the remedy should address that contingency.

  - The CSM can potentially identify synergies between the Rayonier Shoreline restoration and the Ennis Creek restoration. For example, a preconstructed bar in the creek delta fan or beach nourishments could feed the Rayonier shoreline while creek restoration reaches an equilibrium.
  - Modeling Memo Section 3.4 mentions impacts to fish habitat due to barriers. Culverts at E. Ennis Creek Road and US 101 are scheduled for removal.
  - The 2005 Elwha-Dungeness Watershed Plan states that landslides appear to be the dominant source of sediment into the creek.

- The two studies used to support Modeling Memo longshore sediment transport conclusions (USEPA, 1974; Ebbesmeyer et al., 1979) in fact did not evaluate longshore sediment transport within the Harbor, but rather focused primarily on the distribution and dispersion of effluent in suspension from the Rayonier Mill deepwater outfall. In addition, Herrera, 2011, Appendix I (Geomorphic Report) to Ecology, 2012, Harbor-wide Sediment Investigation Report (SIR) concluded that nearshore transport in the Harbor is westward. Herrera at p. 44 ("Nearshore sediment transport, occurring in areas shallower than the closure depth of 55 feet, is predominantly clockwise within the harbor.")
- Numerous reviewers suggest that sediment transport occurs deeper than -15ft MLLW and are interested in seeing the results of the analysis leading to that conclusion. Additional documentation is required to justify the conclusion.
- Examine tidal and wind-driven currents separately from wave-driven currents.
- Further discuss climate change in-depth; including various projections, likelihoods, and emission scenarios. Discuss potential changes to storm intensity and frequency. Provide professional commentary on how these could impact the geomorphologic processes present and proposed through modification work. For example, the accumulative effect of more frequent storms over a long duration of time on geomorphologic processes at the site.
- CSM should address historical changes observed at the site through the various modifications as an element of calibrating the analysis leading to conclusions. This would include connecting the coastal processes (waves, currents, sediment transport) to the observed changes from shoreline modifications (pier, jetty, dredged berths, beach nourishment programs, etc.). See Figure 4.
- CSM should address current and potential proposed remedy activities (pier removal, jetty removal, natural recovery, shoreline cutback, etc.) and consideration of climate change to help inform the decision matrix process.
- Suggested references as part of the CSM update:

  - "The Geomorphology of Puget Sound Beaches," Oct. 2006 by David Finlayson
  - "Assessing Coastal Landscape Change for Archaeological Purposes: Integrating Shallow Geophysics, Historical Archives and Geomorphology at Port Angeles, Washington, USA", Sept 2012 by Wegmann et al.
  - "Assessing Coastal Vulnerability to Storm Surge and Wave Impacts with Projected Sea Level Rise within the Salish Sea" 2019, Thesis by VanArendonk
  - "Projected Sea Level Rise for Washington State – A 2018 Assessment." July 2019, Miller et al. https://wacoastalnetwork.com/research-and-tools/slr-visualization/
  - "Elwha-Dungeness Watershed Plan," 2005.
    Specifically, Section 2.05 "Port Angeles Urban Independent Drainages"
    https://www.clallamcountywa.gov/812/Elwha-Dungeness-Watershed-Plan.
  - Port Angeles Harbor Supplemental Data Evaluation to the Sediment Investigation Report (SIR) "Summary Report", prepared by NewFields for Ecology, Dec 2012
    - Specifically, see section 5.2
  - "Port Angeles Harbor – Rayonier Marine Area Sediment Transport" Memo prepared by NewFields for Ecology, September 2012.
  - Interim Action Report Volume III, Appendix C, "Hydrodynamics and Sediment Transport", prepared by Integral, 2019

- Interim Action Report Volume II, Appendix C, “Conceptual Site Model”, prepared by SEI & Windward, 2021
- Port Angeles Harbor-wide Sediment Investigation Report (SIR) Appendix I: “Geomorphic Report”, prepared by Herrera for Ecology & Environmental, Inc and Ecology, Feb 2011.
  - As noted above, this Appendix concluded that nearshore transport in the Harbor is westward. It also includes some historical background that should be useful in developing a CSM, along with some additional references.

6 Summary of Comments on Modeling

- The CSM should identify the site processes and corresponding anticipated post-project erosional/accretional patterns to describe the baseline for conducting modeling work.
- The final modeling approach should be developed once a final CSM is approved based on Ecology’s determination of site processes affecting the site and proposed remedies. Without a comprehensive CSM in place, the reviewers cannot fully comment on future efforts proposed in the Work Plan.
- If some aspects of the Pre-Remedial design phase do not necessitate modeling, the CSM will help justify that conclusion.
- The purpose of the modeling work needs to be defined relative to what questions are being answered and at what specific subareas. Modeling is not the answer to the question for what to do, but rather it should be used as a tool to validate the CSM in specific locations.
- What calibration will be done to allow for the model to be a good predictive tool?
- Clearly define your modeling scenarios. The “No-Action” alternative mentioned in Section 4.1 has led to confusion among the reviewers. How would the “No-Action” differ from an existing condition? The same generally applies to other sections: what are the “before” and “after” conditions being analyzed (e.g., waves with and without a Jetty? Waves with and without a pier?)
- Once the project has advanced to the modeling stage, selection of long and short-term events to be modeled will need to be reviewed in detail. A CSM with a comprehensive Metocean section should make the task of model input selection more straightforward and transparent.
- Reviewers commented on the need to examine multiple water levels and wind waves generated from both the NW and NE.

7 Suggested Milestones and Next Steps

The following milestones and check-in meetings are proposed. The milestone may have two meetings each, one to hand off and present the submittal, and a second to provide the review. The early submittals will be sections or drafts of the living CSM report rather than standalone reports or memos.

1. **CSM – CSM kick-off / comment review**
   - Purpose:
     - Review provided comments on the RAMP Modeling Memo and next steps. Develop Schedule.
   - Submittals:
     - None
2. **CSM – Data Collection & Metocean and Analysis Approach Review**
   - Purpose:
     - Review the inputs to the CSM
   - Submittals:

- RAMP to provide metocean and data gaps report summarizing the metocean conditions (waves, currents, tides, SLR…etc), creek hydrology, inputs to the geomorphic analysis (surveys, aerials, maps, prior studies…etc), and data gaps. Item A and the framework & inputs for B from Section 4 of this document.

3. **CSM – Review CSM definition**
    - Purpose:
        - Review the CSM sub-regions and interpretation of sediment transport
    - Submittals:
        - Geomorphic analysis and definition of CSM sub-regions/cells (Items A through C from Section 4 of this document). The Geomorphic analysis should include estimated sediment pathways, sediment sinks, and sediment sources.
4. **CSM – Review of draft CSM Report**
    - Purpose:
        - Review a draft of the complete CSM report. Discuss additional need (modeling) and potential design contingencies.
    - Submittals:
        - Draft CSM report (Items A through D from Section 4, above, should be complete). Some ideas and groundwork should be laid out for F and G in Section 4 of this document.
5. **CSM – Review of final draft CSM Report and draft HMAP**
    - Purpose:
        - Review the final draft of the CSM.
    - Submittals:
        - Draft CSM report (Items A through G from Section 4)
        - Draft HMAP (builds upon F in Section 4, of this document; also see Section 6, above).
6. **CSM – Review of final CSM Report and final HMAP**
    - Purpose:
        - Receive the Final Report and revised Modeling Memo
    - Submittals:
        - Final CSM report (Items A through G from Section 4, of this document)
        - Final HMAP (builds upon F in Section 4, of this document; also see Section 6, above).

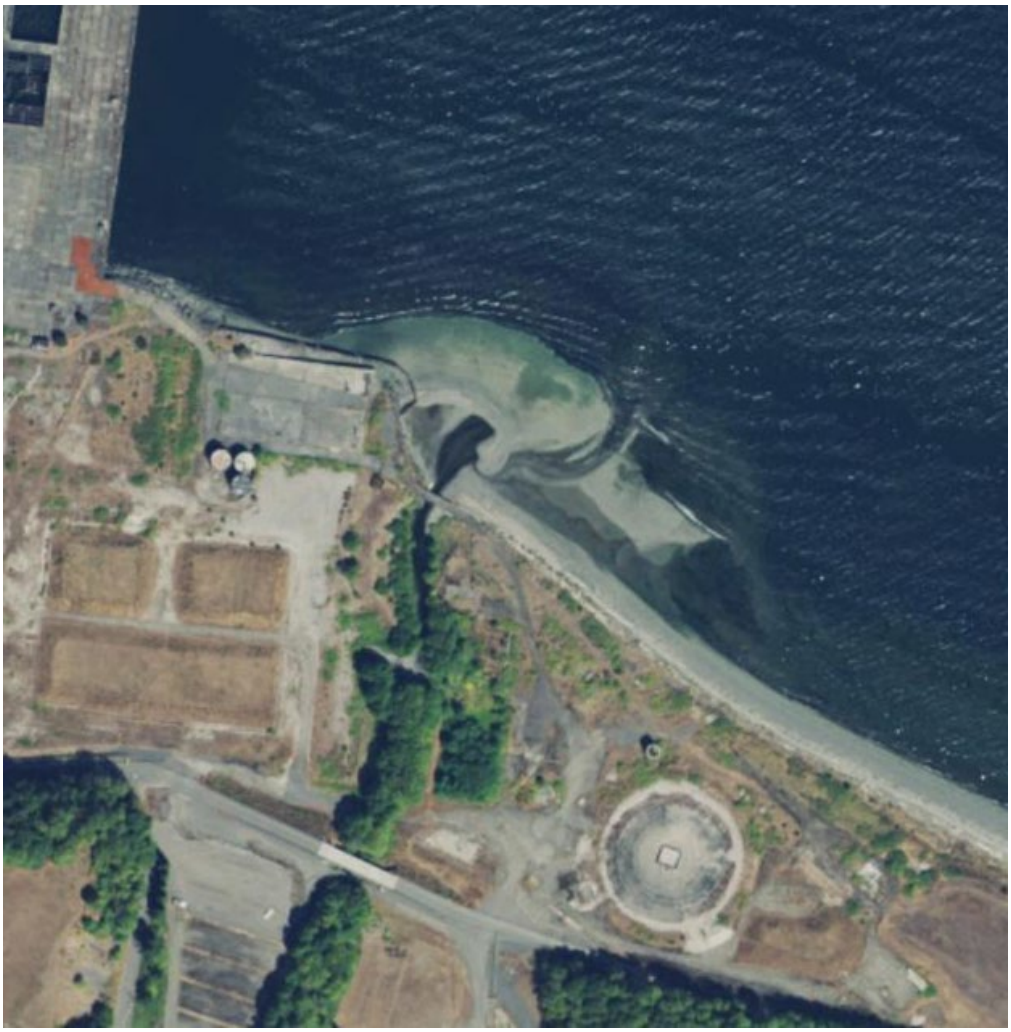

Figure 1: Ennis Creek. USDA NAIP 8/21/2017

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Figure 2: Shoreline Oblique, 06/27/2006. WA Dept of Ecology

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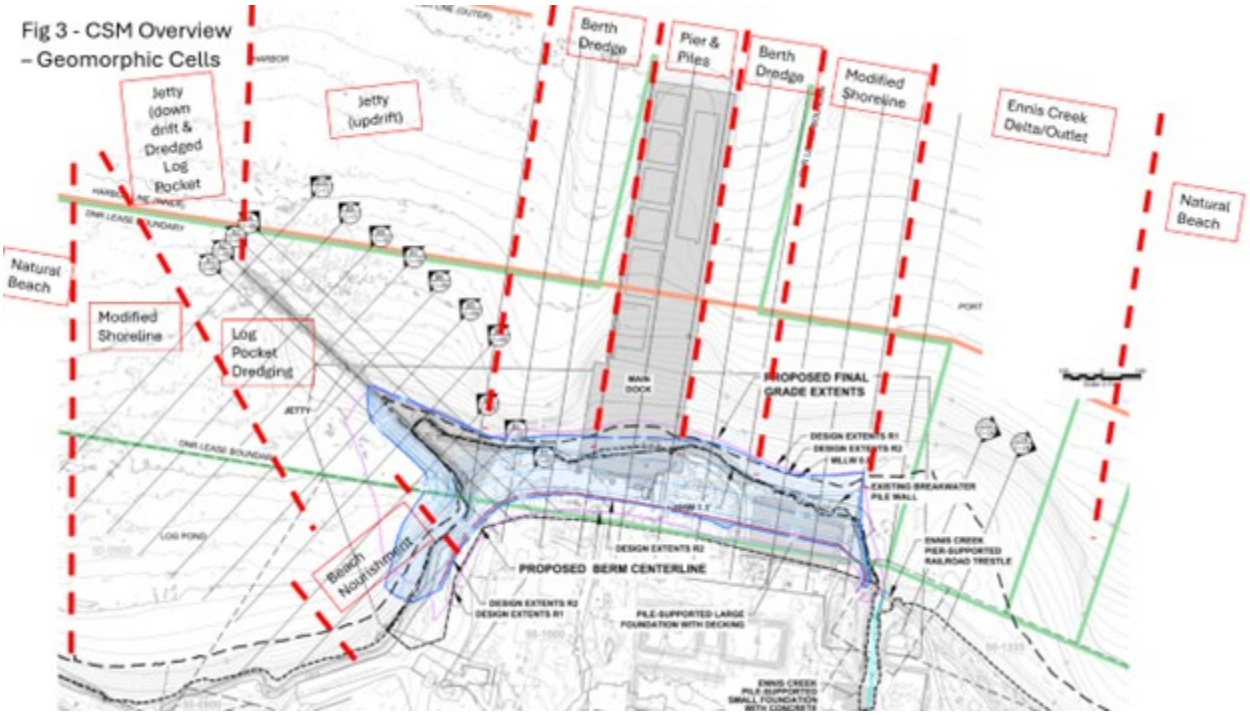

Figure 3: CSM Cells Example Graphic

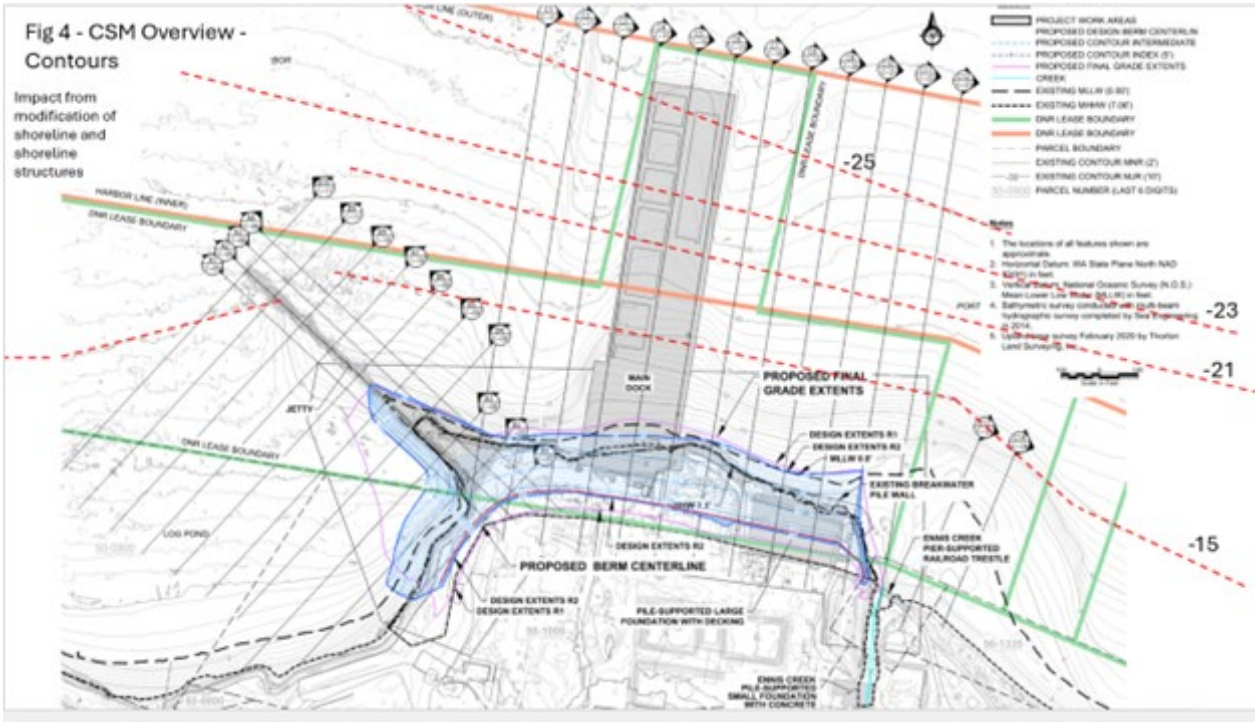

Figure 4: CSM (Contour shifts relative to geomorphic changes responding to shoreline modification). Note the impact on the -15' contour and areas deeper within the pier and jetty areas.

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Enclosure

Figure 3 – Proposed Data Gaps Sampling Locations

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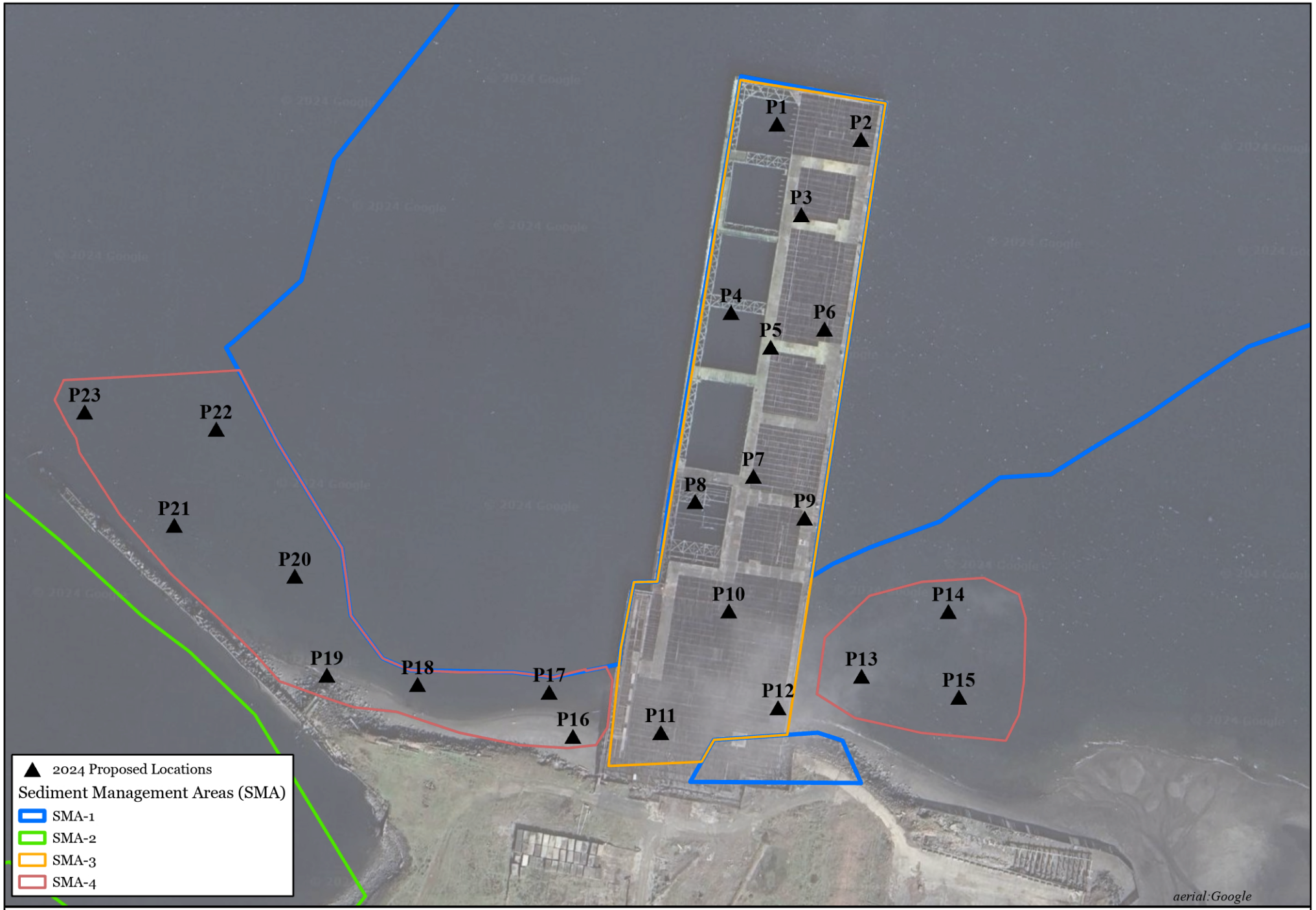

Figure 3 - Proposed Data Gaps Sampling Locations

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