MILLER NASH LLP
**William L. Rasmussen**
william.rasmussen@millernash.com
503.205.2308 (direct)

September 30, 2026

**BY CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

Allison Mangini
Coastal Region Administrative Specialist
Oregon Parks and Recreation Department
PO Box 2139
Waldport, OR 97394

Subject: Sun Oceanside Beachfront RV LLC
Application for Shoreline Protection Structure for Property at
90281 Cape Arago Hwy, Coos Bay, OR 97420

Dear Allison:

Enclosed is a complete, updated application package for the above-referenced shoreline protection structure. This package updates the materials that were sent on August 7, 2026. Only the Certerra Geotechnical Design Report (item 3 below) has been revised.

1. Application form
2. Application narrative
3. Certerra Geotechnical Design Report (revised September 18, 2026)
4. Ocean Shores Construction Impacts, Staging, and Public Safety Plan
   - 4.1 Map for Ocean Shores Construction Impacts, Staging, and Public Safety Plan Guidelines
5. DLCD - Guidebook on Erosion Control Practices of the Oregon Coast
6. OPRD Guidelines to Ocean Shores Construction Impacts, Staging, and Public Safety Plan

7. Construction, Design, and Maintenance Cost documents:

   7.1 Investigations, surveys, and assessments (Certerra)

   7.2 Construction activities (Clean Rivers Erosion Control, Inc.)

8. Coos County conditional use permit approval

We would appreciate confirmation of your receipt of the updated application package. Please contact me if you have any questions or need additional information regarding the application.

Very truly yours,

[redacted]

William L. Rasmussen

cc via email: Tyler Blanchette (w/encl. via ShareFile link)
tyler.blanchette@oprd.oregon.gov

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# OREGON PARKS AND RECREATION DEPARTMENT
# OCEAN SHORE PERMIT APPLICATION AND INSTRUCTIONS

## *SHORELINE PROTECTION STRUCTURE*

**In accordance with ORS 390.640, 390.715, and 390.725, no person shall make an alteration, or construct a pipeline, cable line or conduit or remove any natural product on any property that is within the ocean shore, without first obtaining a permit to do so from the Department.**

### Permit Instructions

An application is considered complete only when all required materials are received. This includes a completed Ocean Shore Permit Application and all additional required supporting documents, reports, drawings, affidavits, and fees. Incomplete applications will not be processed and will be returned to the applicant.

An Ocean Shore Permit Application and City/County Planning Department Affidavit shall be submitted for each individual tax lot and project.

To assist in submitting a complete application, please follow these step-by-step instructions:

### Section 1. Proposed Project

Check appropriate box for the type of project. If the type of alteration project is not listed, provide a brief description on the line next to "Other."

Provide a brief description of the project in the box provided.

Provide estimated start and completion dates.

### Section 2. Applicant Information

**Owner:** Provide the name, mailing address, phone number, fax number, and email address of the person who legally owns the property.

**Agent:** An agent is a person who is authorized by the owner to represent their interest during the permitting process with Oregon Parks and Recreation Department (OPRD). Examples of an agent may be another property owner, consultant, attorney or contractor. *Agents are optional.*

**Primary Contact:** If the legal owner has chosen to include an agent, indicate which party will act as the primary contact; owner or agent. This is the person OPRD will contact for any application questions or concerns.

### Section 3. Property Location and Information

Provide situs address (physical address) of property. Provide the township, range, section, subsection, and tax lot number. (Do not list multiple tax lots in this section, as each individual tax lot requires a separate Ocean Shore Permit Application.)

Check the appropriate box to indicate the current use of the property.

Provide the zoning designation, the year in which the main structure was built.

Provide all lot dimensions and setbacks from property lines.

Provide the names, situs and mailing addresses of oceanfront landowners with property boundaries common to those of the property described in the application. For projects involving multiple tax lots, the most northern and southern oceanfront landowners of the entire project are all that is required.

If you do not know this information, it may be obtained from the county tax assessor's office and/or local planning office.

## Section 4. Project Justification and Impacts

There shall be adequate justification for the proposed project to occur and alter the ocean shore area.

Provide a detailed description of the hazard and the threat it poses to the property to justify your request for alteration of the ocean shore area.

Describe all potential impacts this project may have in the short and long-term to neighboring properties, to recreation, scenic, safety, and natural resources of the ocean shore.

List the measures that will be taken to minimize those potential impacts. All projects will have some impact on the ocean shore; a "no impact" conclusion is not an appropriate answer.

## Section 5. Project Details

Provide the total for the entire project, (this will include totals for all properties if the project includes multiple tax lots). Total length, height, width and slope specifics, and the total volume of all material and average rock size.

Your contractor or geologist should assist you with the specifics of all project materials, type, source, size, and amount.

## Section 6. Analysis Of Hazard Avoidance

The application shall be accompanied by an analysis of hazard avoidance alternatives, including the relocation of existing buildings or other infrastructure. This analysis shall also describe why potential hazard avoidance alternatives are not feasible, or if tried why they were not successful. Relevant factors may include topographic limitations, the limitations of the area for relocation, or the cost. If the cost of moving a building or infrastructure is listed as a factor, the report shall include a cost estimate(s) from a licensed contractor specializing in building relocation.

## Section 7. Geologic Report

Projects greater than 50 feet in length require a geologic report from a registered professional geologist experienced in coastal processes. This report should include:

- The potential impacts from the proposed project on sand source, supply, and movement on the affected beach as well as within the same littoral cell;
- The bank or bluff stability and erosion rates on the subject property and adjacent properties and the potential impacts of the proposed project on bluff stability and erosion rates on the subject and adjacent properties;
- A review of potential non-structural solutions, including, but not limited to, vegetative stabilization, non-structural dynamic revetments, and foredune enhancement. The review shall describe reasons why non-structural solutions were unsuccessful, if tried, or why they were considered unfeasible;
- The known or suspected geologic and seismic hazards in the project area and how the proposed project may affect or be impacted by those geologic and seismic hazards.

## Section 8. Additional Permit Requirements

List any additional necessary permits and/or authorizations required by local, state, or federal agencies. Additional agencies may include city/county planning departments, Oregon Department of State Lands and/or U. S. Army Corps of Engineers.

## Section 9. Signature Requirement

The owner's signature is required for acknowledgment and completion of the application. If an agent has been included, check the box authorizing the agent to act on your behalf with OPRD.

If an agent has been authorized, the agent's signature is also required for acknowledgment and completion of the application.

## Section 10. Required Drawings

The application shall include a plot plan and a cross-section of the project, drawn to scale. Drawings shall be clear and concise and follow the format specifications outlined.

## Section 11. Application Fees and Calculation Worksheet

Each application filed under ORS 390.640, for an alteration on the ocean shore shall be accompanied by a processing fee for the purpose of partial recovery to the department of its administrative costs.

The fee shall be determined according to the construction value of the project. Evidence the Department may consider in establishing the construction value of a project shall include: Itemized estimates from licensed, bonded, contractors; construction values accepted by the county or city for purposes of issuing local permits; itemized costs of equipment rental and other such charges if the project is completed by the property owner; estimates that reflect unit costs typically associated with the type, quality and standards of construction proposed in the application.

Complete the calculation worksheet based on construction value.

Additionally, the Department may require a cash bond, or other security acceptable to the Department, to ensure that the permittee complies with the terms of the permit.

## City/County Planning Department Affidavit

**Applicant and Property Details:** The applicant shall complete all information in this section before submitting the affidavit to the appropriate city or county planning department for review and signature.

**Planning Department Certification:** This section is to be taken to the appropriate city or county Planning Department for completion and signature.

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# OREGON PARKS AND RECREATION DEPARTMENT
# OCEAN SHORE PERMIT APPLICATION
## *SHORELINE PROTECTION STRUCTURES*

**FOR OFFICIAL USE ONLY**

| | |
|---|---|
| OPRD PERMIT #: | 3136-26 |
| APPLICATION DATE: | 10/22/26 |
| DATE POSTED: | 10/30/26 |
| COORDINATOR: | Blanchette |
| 60 DAY DUE DATE: | 1/20/27 |

## Section 1. Proposed Project

**Project type:**

| | |
|---|---|
| ☐ Riprap Revetment | ☐ Vegetative Stabilization |
| ☐ Seawall | ☒ Other Hybrid, non-structural shoreline stabilization system |

*Provide a brief description of the project:*

A nonstructural, hybrid shoreline stabilization system consisting of a vegetated sand berm, 200-feet in length, transitioning seaward into a cobblestone dynamic revetment, which is necessary to protect critical sewer infrastructure.

| | |
|---|---|
| Estimated project start date 4/1/2027 | Estimated project completion date 4/30/2027 |

## Section 2. Applicant Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Owner | Sun Oceanside Beachfront RV LLC | | | Agent | William L. Rasmussen, Miller Nash LLP | | |
| Mailing Address | 27777 Franklin Rd, Ste 300 | | | Mailing Address | 1140 SW Washington St, Ste 700 | | |
| City | Southfield | State | MI Zip 48034 | City | Portland | State | OR Zip 97205 |
| Phone | (541) 888-2598 | Fax | | Phone | (503) 224-5858 | Fax | (503) 224-0155 |
| Email | NDiBella@suncommunities.com | | | Email | william.rasmussen@millernash.com | | |

Primary Contact ☐ Owner ☒ Agent

## Section 3. Property Location and Information

| | | | | | |
|---|---|---|---|---|---|
| Situs Address | 90281 Cape Arago Hwy | | | | |
| City/Town | Coos Bay | | County | Coos | |
| Township 26S | Range 14W | Section 03 | Subsection C | Tax Lot 1200 | |

**Current Use**

| | | |
|---|---|---|
| ☐ Residential | ☐ Commercial/Industrial | ☐ Public |
| ☐ Vacant (unbuilt) | ☒ Other (explain) RV Park | |

| | |
|---|---|
| City/County Zoning Designation Recreation (REC) | Year main structure was built 2014 |

**Lot Dimensions**

| | |
|---|---|
| Lot Size 15.49 acres | Oceanfront footage (in feet) Approx. 600 feet |
| Street front footage (in feet) Approx. 610 feet | East-West footage (in feet) Approx. 850 feet |

**Setbacks**

| | |
|---|---|
| Distance from eastern (or landward) property line to nearest building (in feet) | ~ 100' to RV spots/hookups |
| Distance from seaward dune crest or bluff edge to nearest building (in feet) | ~ 50' to sewer system infrastructure |
| Approximate height of oceanfront bluff, dune or escarpment (in feet) | 6 to 8 feet |

List the names, situs and mailing addresses of oceanfront landowners with property boundaries common to those of the property or properties described in the application.

| Name | Property situs address | Mailing address |
|---|---|---|
| Coos County Parks Department | 63379 Bastendorf Beach Rd, Coos Bay, OR | Coos County Parks, 250 N Baxter St, Coquille, OR 97423 |
| Bureau of Land Management | Coos Bay Dist BLM Coastlands, Cape Arago Hwy, Coos Bay, OR | BLM, Coos Bay District Office 1300 Airport Ln, North Bend, OR 97459 |
| State of Oregon Parks and Recreation Dept. | [Western boundary of subject property--Pacific Ocean] | 775 Summer St NE, Ste 100 Salem, OR 97301 |
| Veronica Simmons | 63266 Bastendorf Beach Rd, Coos Bay, OR 97420 | 63266 Bastendorf Beach Rd, Coos Bay, OR 97420 |

## Section 4. Project Justification and Impacts

*Provide a detailed explanation of the hazards and threat to property:*
See Narrative and Geotechincal Design Report

***(Include documented supporting evidence, i.e. photographs, and/or chronology of bank retreat)***
***Attach additional pages as necessary***

*Describe all potential impacts:*
See Narrative and Geotechnical Report

***Attach additional pages as necessary***

*Describe measures that will be taken to minimize the impacts identified above:*
See Narrative and Geotechnical Report

***Attach additional pages as necessary***

## Section 5. Project Details

| | |
|---|---|
| Total Length along shoreline (in feet) 200' | Height (in feet) 2'-3' |
| Total width of project (in feet) 50' | |
| Slope (ratio-horizontal to vertical) 6H:1V (cobble) 2Hl:1V (berm) | Total volume of all material(s) (cubic yards) Est. 800-1,200 |

**Riprap Specifications:**

| | |
|---|---|
| Armor stone type N/A | Armor stone source |
| Diameter of armor stone (in feet) | Amount of armor stone (cubic yards) |
| Type of filter fabric | Type of backing fill material |
| The amount of backing fill material (cubic yards) | Will toe be keyed into bedrock? ☐ Yes ☐ No |
| Elevation of toe trench | Depth of toe trench |

## Section 6. Analysis Of Hazard Avoidance

Please verify that the attached hazard avoidance analysis includes:

| | |
|---|---|
| ☒ A list of hazard avoidance alternatives | |
| ☒ A description of why hazard avoidance alternatives are not feasible | ☒ If an alternative was tried, explain why it did not succeed |

☐ Is the relocation cost estimate included? ***(If the cost of moving the building is listed as an unfeasible factor.)***

## Section 7. Geologic Report

**Please provide the following information:**

| | | | |
|---|---|---|---|
| Date of Report 7/14/26 | | Company Certerra Earth Engineers | |
| Geologist Name Kenneth Andrieu | | Geologist Certifications R.G., C.E.G. | |
| Mailing Address 2411 SE 8th Ave | | | |
| City Camas | State WA | Zip 98607 | |
| Phone (360) 567-1806 | Fax | Email address kandrieu@certerra.com | |

**Please verify your geologic report contains all of the following information:**

| | |
|---|---|
| ☒ The potential impacts from the proposed project on the sand source, supply, and movement on the affected beach as well as within the same littoral cell. | ☒ A review of potential non-structural solutions, including, but not limited to: vegetative stabilization; non-structural dynamic revetments and foredune enhancement. |
| ☒ The known or suspected geologic and seismic hazards in the project area and how the proposed project may affect or be impacted by those geologic and seismic hazards. | ☒ The bank or bluff stability and erosion rates on the subject property and adjacent properties. |

## Section 8. Additional Permit Requirements

*List the agency and type of permit required:*

Conditional Use, Coos County (approved on March 6, 2026).

☐ **No additional agency permit required**

## Section 9. Signature Requirement

The application is hereby made for the ocean shore alteration described within this application. I certify that I am familiar with the information contained in this application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed alteration.

I understand that the granting of an OPRD permit does not release me from obtaining any additional permits from any/all local, state, and/or federal agencies that may be required before commencing the project.

I understand that the payment of required OPRD processing fee does not guarantee the issuance of an approved permit.

Signed by: [redacted] 7/31/2026

Owner Signature Date

☒ *I (Owner) authorize the Agent included in this application to act on my behalf during this application process.*

[redacted] 07.24.26

Agent Signature Date

## Section 10. Required Drawings

The submitted application shall be accompanied by a plan view and a cross-section of the proposed project. Neatness and accuracy are important in order for those reviewing the application to clearly understand the proposal. Copies of county assessor's maps may not be used as site plan maps.

***For consistency and quality please follow these format specifications:***

- **All Drawings shall be:**
  - On 8.5 X 11 inch white paper
  - In black ink or clear legible photocopy of plan(s)
  - Printed or typed (no cursive) minimum size 10 point font
  - Drawn with a straight-edge and not freehanded.
  - Drawn accurately to scale
  - Be labeled appropriately

- **Plan view drawing shall include:**
  - Scale of drawing and north arrow
  - All lot lines with dimensions
  - Existing structures
  - Roads, driveways, etc. (existing, proposed, or temporary access roads)
  - Setback distance from nearest structure or infrastructure to upper edge of bluff or dune edge
  - Location of proposed improvements in relation to Statutory Vegetation Line and Actual Vegetation Line
  - Location of proposed project in relation to all property lines
  - Location of the proposed project in relation to the top of the bluff or dune and the existing toe of bluff or dune

- **Cross-section (side view) drawing shall include:**
  - Scale of drawing
  - Location of the existing base of bluff or dune
  - Location of top of bluff or dune
  - Location of proposed project in relation to base and top of bluff or dune
  - Approximate length, in feet, the project will occupy beyond the existing toe of bluff or dune, include buried toe of proposed shoreline protection structure.
  - Depth of toe trench or footing
  - Slope of the project (width/height ratio (i.e. 2:1))
  - Overall height of the project from bottom of buried toe to the top
  - Armor stone layer with rock size accurately depicted
  - Thickness of armor stone
  - Backing fill layer with thickness accurately depicted
  - Type of filter fabric, if applicable

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# OCEAN SHORE ALTERATION APPLICATION FEE WORKSHEET

## Section 11. Application Fees and Calculation Worksheet

Instructions for fees

- OPRD recommends fees be submitted once an application is verified complete. Refund options are outlined in OAR 736-020-0004.
- Once construction value has been verified by staff, applicants will be provided instruction on how to pay the fee (Online if under $10,000).
- Under each heading below include a description of the project related activities or items included in the costs for that heading.
- Add in the total cost for each heading. Similar or associated items may be lumped, so long as the documentation clearly supports the cost.
- Attach documentation behind this form and add to application packet as a separate appendix. Once documentation is attached, check the box for "Documentation included". Acceptable evidence of construction value may be found in OAR 736-020-0004.
- Construction Value "means the costs of labor, equipment, materials, and all contractor fees, where those costs are incurred by the applicant or the applicant's agent(s)" (OAR 736-020-0002).
- If you are a public agency looking for a reduced fee, check the appropriate box(s) on lines 13 and 14 and enter the amount on line 13.

| Line # | Describe itemized cost. (Briefly list item, vendor, and describe scope of cost) | Total Cost | Documentation included |
|---|---|---|---|
| 1 | Investigations, surveys, and assessments | | |
| | | $ 9,790.00 | ☑ |
| 2 | Consulting and design | | |
| | | $ 0.00 | ☐ |
| 3 | Construction Activities | | |
| | | $ 197,850.00 | ☑ |
| 4 | Site revegetation and rehabilitation | | |
| | | $ 0.00 | ☐ |
| 5 | Monitoring and Maintenance of vegetation and rehabilitation | | |
| | | $ 0.00 | ☐ |
| 6 | Other: | | |
| | | $ 0.00 | ☐ |
| 7 | Total construction value (Auto calculates total of sections 1 through 6 above) | $ 207,640.00 | |
| 8 | Base construction value | $2,500 | |
| 9 | Net construction value (Auto calculates. If line 7 is greater than $2,500, subtract line 8 from line 7) | $ 205,140.00 | |
| 10 | Construction value fee (Auto calculates. If line 9 is greater than $0, multiply line 9 by 0.03) | $ 6,154.20 | |
| 11 | Base Application Fee | $400 | |
| 12 | TOTAL APPLICATION FEE (Auto calculates total of lines 10 and 11) | 6,554.20 | |
| STOP, lines 13 and 14 are only for public body or tribal agency undertaking actions to benefit the ocean shore. | | | |
| 13 | A fee reduction may be available if all three of these are met:<br>☐ You are a public body or Tribal Agency.<br>☐ One of the scenarios below applies to this project (check appropriate box in line 14)<br>☐ You have verified with OPRD Ocean Shore staff that a fee reduction will be provided.<br>Enter amount of fee reduction agreed to by OPRD to the right. | | |
| 14 | Scenarios (select appropriate box)<br>☐ Restoring, conserving or protecting the natural, resource, scenic, recreational, cultural or economic values of the ocean shore.<br>☐ Restoring native beach or dune habitat contributing to the recovery of sensitive species, including state and federally listed threatened or endangered species.<br>☐ Improving native biological values of the ocean shore.<br>☐ Improving, maintaining, repairing, or replacing public access. | | |

# CITY/COUNTY PLANNING DEPARTMENT AFFIDAVIT

**Applicant**

| Last | Rasmussen | First | William | MI | L. |
|---|---|---|---|---|---|

**Property Details**

| Township | 26S | Range | 14W | Section | 03 | Subsection | C |
|---|---|---|---|---|---|---|---|

Tax Lot 1200

**County**

☐ Clatsop ☐ Tillamook ☐ Lincoln ☐ Lane
☐ Douglas ☒ Coos ☐ Curry

**Project Type**

☒ Shorefront Protection ☐ Access/Other Misc. ☐ Sand Alteration
☐ Pipeline/Cable/Conduit ☐ Natural Product Removal

## Planning Department Certification

***(To be completed by local planning official)***

**Part I**

**In accordance with Statewide Planning Goal #18, Beaches and Dunes alteration permits for beachfront protective structures may be issued only where development existed on January 1, 1977, or where an exception to this Goal 18 implementation requirement has been approved by the appropriate local jurisdiction. For the purpose of this requirement, the definition of "development" means houses, commercial and industrial buildings, and vacant subdivision lots which are physically improved through the construction of streets and provisions of utilities to the lot.**

Above property meets Goal 18 Eligibility? ☒ Yes ☐ No ☐ Not Applicable

**Part II**

*I have reviewed the proposed project application and have determined that:*

☐ This project is not regulated by the local comprehensive plan and zoning ordinances.

☐ This project has been reviewed and **is consistent** with the local comprehensive plan and zoning ordinance.

☐ This project has been reviewed and **is not consistent** with the local comprehensive plan and zoning ordinance.

☒ The consistency of this project with the local planning ordinance cannot be determined until the following local approvals are obtained:

☒ Conditional Use Approval ☐ Zone Change ☐ Plan Amendment
☐ Development Permit ☒ Other (Specify) Flood Plain Hazard Review

Comments:
Applicants have submitted the required applications, and the proposal been approved through ACU-25-040 & FP-26-006.

Local Planning Official Name (Please Print) Title Permit Specialist
Maria Hill

Signature [redacted] Date 7-24-26

***The completed/signed form shall be submitted with the completed Ocean Shore Permit Application***

MILLER NASH LLP

**Application Narrative**

Ocean Shore Permit Application for an Ocean Shore Alteration Permit
90281 Cape Arago Hwy, Coos Bay, OR 97420

This narrative is submitted in support of the application by Sun Oceanside Beachfront RV LLC ("Applicant") to the Oregon Parks and Recreation Department ("OPRD") for an ocean shore alteration permit authorizing construction of a nonstructural, hybrid shoreline stabilization system consisting of a reinforced vegetated berm transitioning seaward into a cobblestone dynamic revetment.

These proposed improvements are necessary to protect critical infrastructure at Sun Outdoors Coos Bay RV Park (the "Property")[1] from active foredune erosion and retreat, seasonal dune migration, storm-wave runup and overtopping, and coastal flooding. Those interacting hazards have reduced the width and continuity of the dune buffer separating the Pacific Ocean from the Property's sanitary sewer system and related RV-park improvements.

This narrative is supported by the exhibits cited throughout, including the Geotechnical Investigation and Design Report (the Geotechnical Report") by Certerra Northwest, LLC ("Certerra"), as well as an Ocean Shores Construction Impacts, Staging, and Public Safety Plan ("Construction Impacts Plan").

This site-specific expert analysis and the other materials submitted with the Application demonstrate that the Project satisfies the applicable approval criteria because:

- The Property's foredune is experiencing documented and accelerating erosion.
- Continued dune retreat and storm-wave overtopping will eliminate the protective buffer between the ocean and the Property's critical infrastructure, including the sanitary sewer system located landward of the dune.

[1] 90281 Cape Arago Highway in Coos Bay, Coos County, Oregon.

- Certerra evaluated the full range of shoreline protection alternatives and concluded that the proposed hybrid system is the least intrusive alternative capable of providing reasonable long-term protection.

- The proposed system is a nature-based, nonstructural solution that will not substantially interrupt littoral sediment transport, nor cause increased erosion or flooding of adjacent properties.

- Construction impacts will be temporary and minimized: all equipment and material access will be from the Property and staging will occur in an upland parking lot.

Accordingly, Applicant respectfully requests that OPRD approve the Application and issue the requested ocean shore alteration permit.

## I. PROPERTY OVERVIEW

The Property is a 15.49-acre oceanfront parcel on Bastendorff Beach, west of Charleston, in unincorporated Coos County. The Pacific Ocean and beach adjoin the northern boundary; Cape Arago Highway provides access along the southern boundary; and largely undeveloped coastal lands with native vegetation adjoin the eastern and western sides. The Property has approximately 600 linear feet of ocean frontage.[2]



[2] Geotechnical Report at 1.




*Figure 1: Satellite Imagery of Property*[3]

The shoreline is a low-lying, dune-backed coast underlain by unconsolidated beach and dune sands. A vegetated foredune generally separates the beach from the developed RV park. The dune is generally six to eight feet high, but recent erosion has formed localized scarps approximately two to five feet high, with exposed sand and roots, undercut vegetation, sloughing, and loss of vegetative cover. These loose, permeable sands are inherently susceptible to wind, wave, and storm erosion.[4]

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[3] https://cooscounty.maps.arcgis.com/apps/mapviewer/index.html.

[4] Geotechnical Report at 5-10, 21-23.




*Figure 2: Foredune fronting Property (Photo from Geotechnical Report)*

As shown in the marked-up satellite image below, the eroding foredune is the only natural buffer between the Pacific Ocean and the Property's critical sewer system that serves the entire RV park.[5]

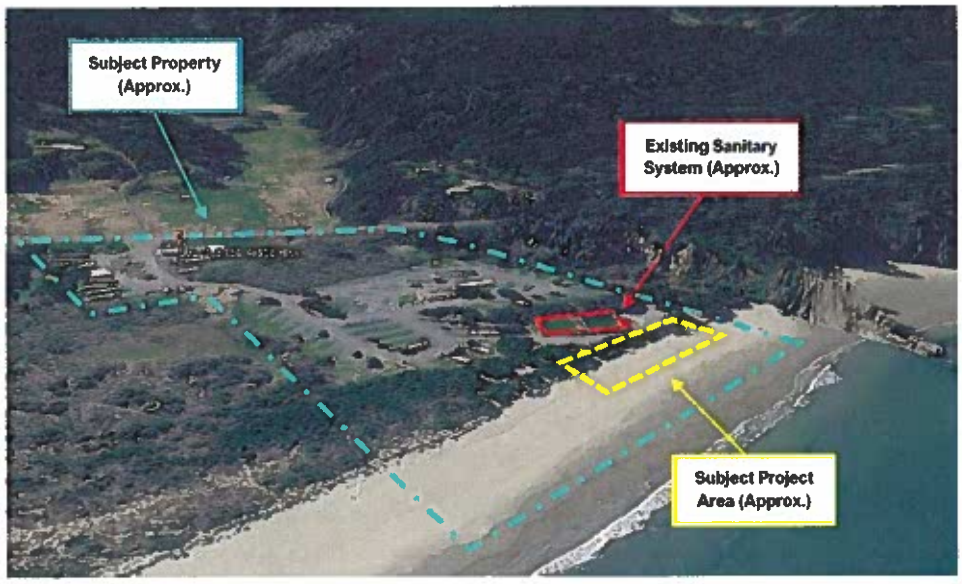



*Figure 3: Image from Geotechnical Report (Fig. 1)*

[5] Geotechnical Report at 5, 13.

## II. APPLICATION SECTION 4—PROJECT JUSTIFICATION AND IMPACTS

### A. Detailed explanation of the hazards and threat to the Property.

Section 4 of OPRD's Shoreline Protection Structure application requires applicants to provide a detailed description of the hazards at issue and the related threats to property that justify the proposed alteration of the ocean shore.

Here, the need for the Project arises from the combined effects of active foredune erosion, episodic storm retreat, wave runup and overtopping, coastal flooding, and the Property's low elevation and exposed shoreline position. The hazards reinforce one another: erosion narrows and lowers the protective dune buffer, while a diminished buffer permits storm waves and floodwater to reach farther landward.

The loss of the foredune buffer and increasing flooding risk threatens the Property's septic facilities.[6] Damage to or failure of the force main that is protected by the foredune would disrupt sanitary service for the entire park and would risk the release of untreated sewage adjacent to a public beach.[7]

#### 1. The Property's foredune is actively eroding and retreating.

As set out in the Geotechnical Report, the Property's shoreline area is undergoing active coastal erosion and continued foredune retreat should be expected going forward if stabilization measures are not implemented.[8] Certerra reached this conclusion based on its site investigation, review of historical aerial imagery, published shoreline-change studies, available geologic and hazard mapping, and other sources of relevant information.[9]

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[6] Floodplain Letter for Sun Communities, SHN Consulting Engineers (Aug. 29, 2025) ("SHN Floodplain Letter") at 1; *see also* Geotechnical Report at 13 (continued dune retreat "would reduce the separation between active coastal processes and this critical utility infrastructure").

[7] Geotechnical Report at 1-2, 5-6, 21-23, 33-36.

[8] Geotechnical Report at 3, 6-8, 10-13, 21.

[9] Geotechnical Report at 3, 10-13.

Certerra specifically found that the foredune shoreline has retreated (based on location) up to 12 feet between May 2019 and March 2026.[10] Its field investigation documented additional evidence of ongoing erosion, including fresh two- to five-foot erosion scarps, exposed roots, undercut vegetation, localized sloughing, and continued loss of the vegetated dune face.[11]

Moreover, as set out in the Geotechnical Report, coastal erosion is episodic. A multi-year average does not capture the amount of landward retreat that may occur during a single winter storm event, an El Niño season, or a period when the seasonal beach profile is low. Certerra explains that local coastal processes—offshore reefs, headlands, nearshore bathymetry, rip embayments, and localized scour—can focus wave energy onto specific shoreline reaches, resulting in periodic dune scarping, overwash, and redistribution of beach sand.[12] The precise timing and magnitude of the next acute episode cannot be predicted, but increasing erosion, dune retreat, and coastal flooding will occur in the absence of a stabilization intervention.[13]

This erosion and dune retreat directly threatens the Property's critical infrastructure. As dune width and elevation are lost, the sanitary sewer system and associated infrastructure become more exposed to wave attack, saturation, scour, debris impact, settlement, and service interruption. The Project is therefore directed to preserving the existing dune buffer before erosion reaches the infrastructure itself.[14]

### 2. The Property is subject to severe coastal flood hazards.

The sewer system infrastructure is also threatened by coastal flooding. As shown below, much of the Property is designated as being within a high-flood-hazard zone. Specifically, the Property's western, seaward portion—including the existing foredune, the proposed improvements, and portions of

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[10] Geotechnical Report at 33-34.

[11] *Id.*

[12] Geotechnical Report at 11-12.

[13] Geotechnical Report at 10-13, 21-23, 33-36.

[14] Geotechnical Report at 1-2, 21-23, 33-36.

the sanitary sewer system—is within FEMA's most severe coastal flood-hazard designation, Zone VE. The center of the Property is within Zone AE.[15]




*Figure 4: Images from FEMA National Flood Hazard Layer Viewer*[16]

While Zones AE and VE are both subject to the one-percent-annual-chance flood, Zone VE areas are particularly susceptible to damage because of anticipated wave height and velocity.[17] As explained by Certerra:

> "Flood Zone VE identifies coastal areas subject to inundation by the 1-percent annual chance flood that are also exposed to additional hazards associated

[15] Geotechnical Report at 14 (citing FEMA Flood Insurance Rate Map Panel 41011C0305E, effective June 20, 2018).

[16] https://www.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

[17] FEMA website, *Features of Flood Insurance Rate Maps in Coastal Areas, available at* https://www.fema.gov/flood-maps/coastal/insurance-rate-maps, accessed June 10, 2026.

> with high-velocity wave action, wave runup, and storm surge. Unlike inland flood hazard zones, the VE designation recognizes the increased destructive potential associated with breaking waves, moving water, debris transport, and localized scour during coastal storm events."[18]

This flood hazard compounds the erosion threat to the Property's infrastructure. The mapped Base Flood Elevation is above the existing dune crest, meaning the dune can be overtopped during the 1-percent-annual-chance event.[19] Storm-wave runup erodes the dune face, reduces dune elevation and width, and transports sediment landward. Continued erosion of the foredune would in turn increase the frequency, inland extent, and severity of wave overtopping and flooding—a self-reinforcing cycle.

During Certerra's May 2026 reconnaissance, driftwood and other storm-deposited debris were observed along the foredune, indicating that wave runup already periodically reaches the dune during high-water events.[20] Continued loss of dune volume would increase the frequency and landward reach of overtopping and could expose the sanitary sewer system and park improvements to wave forces, floating debris, scour, and floodwater.[21]

### 3. The dune erosion and concomitant ocean flooding will increase at an accelerating rate because of climate change impacts.

As discussed in the Geotechnical Report,[22] the dune erosion and flooding occurring on the Property are expected to increase as climate change results in greater storm activity, substantial growth of wave intensity/size, more frequent El Niño systems, and rising sea levels.[23]

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[18] Geotechnical Report at 14.

[19] Geotechnical Report at 6, 14.

[20] Geotechnical Report at 14, 22, 34.

[21] Geotechnical Report at 14, 34.

[22] Geotechnical Report at 11, 35.

[23] *Id.*

The existence of these changes and their significant impact on coastal erosion and ocean flooding has been widely documented in numerous scientific studies and governmental reports. For example, the 2010 report titled "Impacts of Climate Change on Oregon's Coasts and Estuaries," found that there is a "long-term trend [of] increasing storm intensities and the heights of the waves they generate[,]" and that these storms and extreme waves are the "dominant factor responsible for episodes of erosion and flooding along this coast."[24] Similarly, in a 2008 study,[25] Dr. Peter Ruggiero of Oregon State University concluded that the "decadal-scale increases in storm intensity (wave height)" combined with more frequent El Niño events and future sea-level rise could increase erosion and flood frequency by as much as a factor of ten on the Oregon coast.

These types of findings and forecasts have been consistently echoed by subsequent research and adopted in state planning documents, including 2020 Oregon Natural Hazards Mitigation Plan, updated in 2025,[26] and Oregon's *2021 State Agency Climate Change Adaptation Framework*.[27]

**4. The proposed hybrid shoreline stabilization system will address the erosion and flooding threats while remaining compatible with the natural coastal environment.**

The documented erosion and flood hazards described above will not abate on their own; absent intervention, continued foredune retreat will progressively

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[24] Peter Ruggiero et al., *Impacts of Climate Change on Oregon's Coasts and Estuaries* (2010), at 209, 223, published as a chapter in the *Oregon Climate Assessment Report*, Washington, DC, EPA/600/R-10/184 (2011), funded by the U.S. Environmental Protection Agency.

[25] Peter Ruggiero, *Impacts of Climate Change on Coastal Erosion and Flood Probability in the US Pacific Northwest* (2008).

[26] https://www.oregon.gov/oem/Documents/2025-2030_Oregon_Natural_Hazards_Mitigation_All-Chapters.pdf.

[27] This report was collectively prepared by more than two dozen state agencies, which found that the "[i]ncidence of stormy weather is likely to increase along the coast, causing flooding from storm surge, coastal erosion, landslides, and severe wind events[,]" and that this damage will be exacerbated by the rising sea levels. *2021 State Agency Climate Change Adaptation Framework* at 1, *available at* https://www.oregon.gov/lcd/CL/Documents/2021_CLIMATE_CHANGE_ADAPTATION_FRAMEWORKandBlueprint.pdf.

increase the potential for damage to the sanitary sewer system and other park infrastructure.[28]

Before recommending the proposed improvements, Certerra evaluated the full range of shoreline protection alternatives described in the Oregon Department of Land Conservation and Development's Guidebook on Erosion Control Practices of the Oregon Coast (the "DLCD Guidebook").[29] Based on that analysis, Certerra concluded that the combined reinforced vegetated berm and small-scale dynamic revetment is the least intrusive alternative capable of providing reasonable long-term protection while preserving natural shoreline functions to the greatest practicable extent.[30]

The proposed system combines two complementary, nature-based components. The landward component is a reinforced vegetated berm that reconstructs and raises the existing foredune.[31] The seaward component is a small-scale dynamic revetment of rounded cobbles and coarse gravel with an overall length of approximately 34 feet, including approximately eight feet of overlap with the lower portion of the berm.[32] The two components are designed to operate together: the berm restores elevation, volume, and native vegetation, while the mobile cobble face dissipates waves and reduces erosion at the berm toe.[33] As native vegetation establishes and natural sand accretion occurs, the vegetated berm is expected to function like a natural foredune by trapping wind-blown sand and providing an additional buffer against storm-wave impacts.[34]

Certerra concludes that the proposed improvements are expected to reduce the rate and severity of shoreline erosion and foredune retreat, maintain the protective buffer between the Pacific Ocean and the sanitary sewer system, and improve shoreline resilience against coastal flooding—while functioning

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[28] Geotechnical Report at 11-13, 23, 32-33.

[29] Geotechnical Report at 30-33; Hailey Bond, *Guidebook on Erosion Control Practices of the Oregon Coast, Oregon Department of Land Conservation & Development* (2021).

[30] Geotechnical Report at 1-3, 23, 30-33.

[31] Geotechnical Report at 23-25.

[32] Geotechnical Report at 26.

[33] Geotechnical Report at 2, 23-26.

[34] Geotechnical Report at 13, 25.

in a manner compatible with natural shoreline processes and sediment transport.[35]

### B. Potential impacts and measures to minimize.

The second and third parts of Section 4 of the application form require the applicant to "[d]escribe all potential impacts" and "[d]escribe measures that will be taken to minimize the impacts identified above[.]" The potential impacts and mitigation measures for the revetment and construction activities are addressed separately below.

#### 1. Potential impacts from the proposed revetment and measures to minimize.

Potential effects from a shoreline protection measure include disturbance of existing vegetation, reduction of sand supply, interruption of littoral processes, and redirection of wave energy on the surrounding shoreline.

Certerra evaluated these effects and concluded that the Project is not expected to substantially interrupt littoral sand transport, measurably reduce the sand supply available to adjacent shoreline reaches, redirect wave energy, or increase erosion or flood hazards on neighboring properties.[36]

The Geotechnical Report explains that the berm functions as an extension of the existing foredune, the revetment dissipates (rather than reflects) wave energy through controlled redistribution of cobbles,[37] and the 200-foot project footprint represents only a very small portion of the overall Coos littoral cell—approximately 200 feet of more than 50 miles of shoreline. For these reasons, Certerra concludes the Project "is not expected to substantially interrupt littoral sediment transport or result in measurable reductions in

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[35] Geotechnical Report at 23-26, 33-34.

[36] Geotechnical Report at 30, 34-36.

[37] The selected design has materially lower potential for adverse shoreline effects than rigid armoring. A conventional riprap revetment or seawall fixes the shoreline, reflects wave energy, requires larger armor stone and excavation, and creates a permanent hard footprint. By contrast, the Project rebuilds the dune with sand and native vegetation and uses cobble that can adjust to changing beach conditions. The DLCD Guidebook identifies dynamic revetments as nature-based, nonfixed treatments with a more natural appearance and lower wave-reflection potential than hard structures.

sediment supply to adjacent shorelines."[38] Given the limited length of the system and its dynamic, permeable, nature-based design, Certerra further concludes that the Project "will not measurably alter regional sand supply, sediment transport pathways, or shoreline change patterns within the Coos littoral cell."[39]

With respect to adjacent properties, the Project does not abut adjacent properties. Also, because the system is short, dynamic, and nature-based, and does not significantly modify shoreline alignment, interrupt regional sediment transport, or redirect wave energy, Certerra concludes that the Project "will not measurably alter regional sand supply, sediment movement, shoreline change patterns, erosion rates, or bluff stability within the Coos littoral cell" and "is not expected to increase erosion potential or adversely affect bluff or foredune stability on adjacent properties." Certerra further concludes that construction of the improvements "will not increase coastal flooding, wave overtopping, flood-related erosion, or associated flood hazards on the subject property or adjacent properties relative to existing conditions."[40]

Design measures further reduce potential impacts. The revetment overlaps the lower berm rather than standing as a separate wall; its shallow face and porous materials promote energy dissipation and drainage; the toe is embedded to reduce undermining; biodegradable filter materials and a graded aggregate layer limit migration of underlying sand; and the berm will be covered with at least two feet of sand and planted with native vegetation.[41]

The design incorporates specific measures directed at each potential impact. The revetment toe will be embedded approximately two feet below existing beach grade, and the berm core keyed into a trench at the dune base, so that the system integrates into the existing beach profile rather than projecting above it.[42] A continuous filter system—biodegradable jute or coir fabric overlain by well-graded filter aggregate—will minimize migration of sand

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[38] Geotechnical Report at 30.

[39] *Id.*

[40] Geotechnical Report at 34.

[41] Geotechnical Report at 23-26

[42] Geotechnical Report at 25-26.

into the revetment while maintaining drainage and sediment continuity between the dune and beach.[43] The berm core's natural-fiber sand bags will decompose as vegetation becomes established, leaving a vegetated sand dune; the berm will be promptly revegetated with native dune vegetation following final grading.[44]

### 2. Potential impacts during construction of the revetment and measures to minimize.

The construction of shoreline improvements can have temporary detrimental impacts on the surrounding beach. Unless properly mitigated, these impacts can include temporary disruption of public access, interference with public recreation opportunities, creation of hazards to public safety, and harm to surrounding ecosystems.

Here, the potential construction impacts are minimal because construction access to the beach will be from the Property, and all staging, material storage, and equipment parking will occur upland, off the beach.

Public usage of this segment of the beach is naturally limited. The developed public access to Bastendorff Beach—including the Bastendorff Beach County Park campground and its parking and beach access—is located up the beach to the northeast of the Property, and public beach visitation is concentrated there; the stretch of beach directly fronting the Property is used primarily by guests of the RV park.[45]

Construction activities will likewise not impede passage along the beach beyond the Property because the rocky headland immediately southwest of the Property juts into the ocean and terminates the sandy beach at that end.

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[43] Geotechnical Report at 26.

[44] Geotechnical Report at 25, 29.

[45] *See* Figure 1, above.



*Figure 5: Satellite Imagery from Google Earth*[46]

These limited potential impacts are addressed in greater detail in Applicant's comprehensive Construction Impacts Plan, which is submitted together with a Construction Staging and Access Site Plan. These materials demonstrate that the temporary impacts associated with the proposed construction and staging activities have been carefully evaluated and minimized through appropriate construction methods, staging limitations, access controls, and public-safety measures.

## III. APPLICATION SECTION 6—ANALYSIS OF HAZARD AVOIDANCE ALTERNATIVES

Section 6 of the application form requires analysis of alternative mitigation measures and explanation of why they are not feasible for addressing the hazard at issue. The underlying regulation for this section, however, only applies to "ocean front protective structures." OAR 736-020-0003(2)(b). The elements of the proposed stabilization system are specifically identified in the

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[46] https://earth.google.com/web/@43.34119627,-124.35647753,5.41351235a,555.36453079d,35y,172.84686584h,60.62190526t,0r/data=CgRCAggBOgMKATBCAggASg0I ARAA?hl=en_US&authuser=0.

same administrative rule as being "non-structural solutions." OAR 736-020-0003(2)(c)(C).

Nevertheless, Certerra evaluated each category of alternative identified in the DLCD Guidebook and explained why each, standing alone, would not adequately address the hazard.[47] As explained in the Geotechnical Report:

- ***Vegetative stabilization alone.*** Vegetative stabilization provides some shoreline protection and ecological benefits, but vegetation alone "generally does not provide sufficient resistance to direct storm-wave attack in high-wave-energy coastal environments," and severe storms can rapidly erode newly placed sand before vegetation establishes. Accordingly, vegetative stabilization is proposed as only one element of the hybrid stabilization method.[48]

- ***Dynamic cobble revetment alone.*** A dynamic revetment alone would improve wave-energy dissipation but would not restore dune elevation or volume, nor provide space for establishing native dune vegetation. Thus, it would provide less overall protection to the sanitary sewer system than the combined dune-restoration approach.[49]

- ***Sand alteration and/or nourishment alone.*** Sand alterations on their own provide little protection as the placed sand is rapidly redistributed in high-energy-wave environments. Accordingly, the Project involves the placement of sand as only one part of the larger stabilization system.[50]

- ***Rigid structural armoring.*** A conventional riprap revetment, seawall, bulkhead, or concrete structure could provide localized resistance, but would require larger armor, deeper excavation, and a permanent fixed footprint. It would also carry greater potential for wave reflection, scour, visual change, and interference with natural beach response. Certerra concluded that those impacts are not

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[47] Geotechnical Report at 30-33.

[48] Geotechnical Report at 31.

[49] Geotechnical Report at 31.

[50] Geotechnical Report at 31-32.

warranted where the hybrid system can provide reasonable protection.[51]

Certerra also specifically considered relocation of the existing sanitary sewer system and concluded that it is not a practical or effective hazard avoidance measure.[52] Relocation would require substantial reconstruction of existing utility infrastructure within the developed RV park, service interruptions, and associated environmental disturbance. Accordingly, Certerra concluded that relocation would "result[] in costs disproportionate to the level of hazard reduction achieved."[53]

More fundamentally, relocation "would not eliminate the underlying coastal erosion affecting the shoreline"[54] because the foredune would continue to retreat, progressively reducing the buffer protecting a relocated sewer system and the remainder of the park's infrastructure and improvements. Relocation is also not reasonably feasible because of the required setbacks from other existing infrastructure imposed by Oregon Department of Environmental Quality regulations.[55]

Ultimately, the feasibility of relocating the sewer infrastructure is irrelevant because the proposed stabilization system is nonstructural in nature.[56]

## IV. SATISFACTION OF APPROVAL CRITERIA

In addition to satisfying the requirements in OPRD's shoreline protection structure application form, Applicant's proposal satisfies all applicable standards in OAR Chapter 736, Division 20.

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[51] Geotechnical Report at 32.

[52] Geotechnical Report at 32-33.

[53] Geotechnical Report at 33.

[54] Geotechnical Report at 33.

[55] OAR 340-071-0220(1)(j); OAR 340-071-0800, Table 1.

[56] OAR 736-020-0003(2)(b) (imposing alternatives analysis requirement—including consideration of relocation—on only oceanfront protective *structures*); OAR 736-020-0003(2)(c)(C) (describing the elements of the proposed stabilization system as "non-structural solutions.").

### A. General Standards (OAR 736-020-0010).

#### 1. Project Need—There shall be adequate justification for a project to occur on and alter the ocean shore area.

The justification for the Project need is set out in detail in Section II(A) above. In short, the evidence demonstrates that:

- The Project reach has experienced approximately two to 12 feet of measured foredune retreat since 2019 and presently exhibits active scarps, undercut vegetation, exposed roots, sloughing, and loss of dune cover;
- The Project area is within FEMA Zone VE and is exposed to storm-wave runup, overtopping, debris transport, and scour;
- The foredune is the principal buffer between the ocean shore and an existing sanitary sewer system and other RV-park improvements;
- Erosion is expected to increase if no stabilization is installed; and
- The selected hybrid restores dune elevation and volume, protects the toe, and can be inspected, maintained, and adapted as shoreline conditions change.

These facts provide adequate, site-specific justification for the proposed nonstructural alteration of the ocean shore. This criterion is satisfied.[57]

#### 2. Protection of Public Rights—Public ownership of or use-easement rights on the ocean shore shall be adequately protected.

The proposed revetment will not meaningfully interfere with the public's use of the adjacent beach. The Project will not create a barrier across or obstruction on the beach. Its permanent surface will remain a sloping landform of sand, native vegetation, and loose cobble.

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[57] OAR 736-020-0010(1); Geotechnical Report at 11-15, 21-27, 33-36.

Moreover, the system was specifically designed to minimize its presence on the beach: the total footprint is limited to approximately 200 feet of the Property's roughly 600 feet of frontage; the revetment has an overall length of approximately 34 feet—including approximately eight feet of overlap with the lower portion of the berm—at a gentle 6H:1V slope, with its toe embedded approximately two feet below existing beach grade; and the berm ties landward into the existing foredune.[58]

The public's ability to use the beach seaward of and across the project area will be preserved: the completed system presents no vertical faces, walls, or fences—only a gently sloped cobble surface of the kind that occurs naturally on Oregon beaches, transitioning to a vegetated sand dune.[59] The broad, sandy beach seaward of the revetment toe remains fully available for public use, and because the revetment is dynamic and integrated into the beach profile.[60]

As discussed above and in the Construction Plan, construction activities will also not meaningfully impact public recreation for several reasons, including:

- All construction access will be through the Property from Cape Arago Highway—no vehicular traffic will occur on the beach;[61]
- All staging, material storage, and equipment parking will occur upland in the Property's southwest parking lot, demarcated with signage and construction fencing;[62]
- The work area will be fenced and signed, the revetment will be constructed in sections to limit the disturbed area at any one time, and

[58] Geotechnical Report at 23-26.

[59] Geotechnical Report at 25-26; DLCD Guidebook at 39 (cobble beaches exist naturally on the Oregon coast).

[60] Geotechnical Report at 6–7 (Photo 1, showing the broad, sandy beach fronting the Property), 30; DLCD Guidebook at 2.

[61] Construction Impacts Plan at 1.

[62] *Id.*

approximately 180 feet of shoreline will remain open to pedestrians throughout construction[63]; and

- Upon completion, the staging area will be fully restored, with no lasting sign of the staging or work areas, and disturbed soils and sands will be graded and planted with erosion-resistant vegetation.[64]

### 3. Public Laws—The applicant shall comply with federal, state, and local laws and regulations affecting the project.

Coos County has approved the proposed improvements. On March 6, 2026, the Coos County Planning Director approved Administrative Conditional Use application ACU-25-040 and Floodplain Permit FP-25-006 for the Project, with conditions.[65] The County found that the vegetated cobble berm "is considered a nonstructural stabilization measure" under the County's zoning ordinance because it "relies on natural materials and vegetative stabilization rather than engineered structural armoring";[66] that the proposal is consistent with the Beaches and Dunes policy requirements of Coos County Zoning and Land Development Ordinance Section 4.11.129 and Statewide Planning Goal 18;[67] and that it is consistent with the County's Coastal Shorelands policies and Statewide Planning Goal 17, including the County's express preference for nonstructural erosion control within coastal shorelands.[68]

Accordingly, the Coos County Community Development Department has executed the enclosed zoning affidavit confirming that the proposed Project has been reviewed and is consistent with the local comprehensive plan and zoning ordinance. Because the proposed system is nonstructural, Goal 18's eligibility limitation on beachfront protective structures—addressed in Part I of the affidavit form—does not apply to this project.

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[63] Construction Impacts Plan at 1–2.

[64] Construction Impacts Plan at 2.

[65] County Approval at 1–5.

[66] County Approval at 12.

[67] County Approval at 21–23.

[68] County Approval at 28–29.

The proposed Project is also in compliance with federal and state law. The Oregon Department of State Lands (DSL) has confirmed that the Project area falls within the Ocean Shore designation managed by OPRD and that the proposed work does not require a removal-fill permit under DSL's jurisdiction.[69] The proposed improvements likewise do not require a permit from the U.S. Army Corps of Engineers.

**4. Alterations and Project Modifications—There are no reasonable alternatives to the proposed activity or project modifications that would better protect the public rights, reduce or eliminate the detrimental affects on the ocean shore, or avoid long-term cost to the public.**

As set out in Section III above, Certerra evaluated all feasible alternatives to the proposed improvements. Each of those alternatives was determined to be infeasible and/or ineffective for protection of the Property's foredune and critical infrastructure. Moreover, as explained above, relocation of the critical infrastructure at issue is not feasible because it would require substantial reconstruction of utility infrastructure within the developed park, would cause service interruptions and environmental disturbance, and—most fundamentally—would not eliminate the underlying erosion hazard, which would continue to advance on the remaining park improvements.[70]

The proposed hybrid shoreline stabilization system was also specifically designed to minimize impacts to the public beach. As described in the Geotechnical Report, the system's limited 200-foot length and approximately 50-foot overall footprint, embedded toe, gentle revetment slope, biodegradable core and filter materials, and native revegetation were all selected so the system integrates into—and functions as part of—the existing beach and dune profile, maintaining sediment continuity between the dune and beach.[71]

Finally, as discussed throughout this narrative, the proposed stabilization system has been designed to avoid impairing public rights, causing

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[69] County Approval at 7 (describing DSL's wetland land use response).

[70] Geotechnical Report at 32-33.

[71] Geotechnical Report at 23-26, 30.

detrimental effects to the ocean shore, or creating long-term costs to the public. Because the Project does not result in those impacts, there are no reasonable project modifications or alternatives that would further reduce or eliminate them. Accordingly, the Project satisfies this criterion.

5. **Public Costs—There are no reasonable special measures which might reduce or eliminate significant public costs. Prior to submission of the application, the applicant shall consider alternatives such as nonstructural solutions, provision for ultimate removal responsibility for structures when no longer needed, reclamation of excavation pits, mitigation of project damages to public interests, or a time limit on project life to allow for changes in public interest.**

There will be no public cost associated with the proposed improvements because they will be built entirely on the Applicant's private property and maintained solely by Applicant and its successors, in accordance with the inspection and maintenance program recommended in the Geotechnical Report and required by the County's conditions of approval.[72]

Further, there will also be no cost to the public from the construction of the improvements, as the staging areas and equipment beach access will be exclusively located on the Property. The staging area requires no excavation or alteration to be usable and will be fully restored upon completion, leaving no lasting sign of construction; and consistent with this standard's preference, the Project itself is a nonstructural solution composed of natural and biodegradable materials that can be removed or allowed to integrate into the natural beach system if no longer needed.[73]

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[72] Geotechnical Report at 27; County Approval at 5 (Condition 8, requiring maintenance of the stabilization feature).

[73] Construction Impacts Plan at 2; Geotechnical Report at 25-26.

### 6. Compliance with LCDC Goals—The proposed project shall be evaluated against the applicable criteria included within Statewide Planning Goals administered by the Department of Land Conservation and Development.

In its conditional use decision, the County determined that the Project is consistent with its comprehensive plan and land use regulations, including the Beaches/Dunes - Limited overlay, coastal-shoreland provisions, floodplain standards, and all other relevant local standards.[74]

The Project also complies with Goal 18, specifically Implementation Requirement 5. This provision limits the placement of "beachfront protective structures" to only those locations where development existed on January 1, 1977. The proposed stabilization system here is nonstructural.

As explained in the Geotechnical Report, "[t]he proposed vegetated berm is intended to function as a nature-based shoreline stabilization feature that reinforces the existing foredune while maintaining a natural dune profile."[75] Because the berm is "intended to function as a nature-based shoreline stabilization feature[,]" the proposed system does not include any "permanent rigid structural elements."[76] Rather, "[a]s vegetation becomes established and natural sand accretion occurs, the berm is expected to function in a manner similar to a natural foredune by trapping wind-blown sand, reducing surface erosion, and providing an additional buffer against storm-wave impacts."[77]

This type of vegetative stabilization and sand alteration, and the proposed dynamic cobblestone beach component, are designated as being nonstructural erosion control measures by OPRD's regulations[78] and the DLCD Guidebook.[79] The County reached the same conclusion, finding the proposal

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[74] County Approval at 22-23, 41.

[75] Geotechnical Report at 25.

[76] *Id.*

[77] *Id.*

[78] OAR 736-020-0003(2)(c)(C) (describing the elements of the proposed stabilization system as "non-structural solutions.").

[79] DLCD Guidebook at 35, 39.

"is considered a nonstructural stabilization measure" and approving it as consistent with Goal 18, subject to a condition limiting the project to "solely the non-structural vegetated cobble berm stabilization method."[80]

Because the proposed system is not a beachfront protective structure, Goal 18's eligibility restriction does not apply, and the Project—which restores dune form, adds native vegetation, and preserves natural sediment processes—affirmatively advances Goal 18's purposes of conserving and protecting beach and dune resources and reducing hazard exposure.[81]

### B. Scenic Standards (OAR 736-020-0015): Projects on the ocean shore shall be designed to minimize damage to the scenic attraction of the ocean shore area.

#### 1. Natural Features—The project shall retain the scenic attraction of key natural features, for example, beaches, headlands cliffs, sea stacks, streams, tide pools, bedrock formations, fossil beds and ancient forest remains.

The proposed improvements will not impact the scenic attraction of key natural features. The Project is confined to the beach sands and eroding foredune directly fronting the Property and does not alter any headland, cliff, sea stack, stream, tide pool, bedrock formation, fossil bed, or ancient forest remains; the nearest key natural feature, the rocky headland southwest of the Property, is outside the project area and will not be touched.[82] Moreover, the improvements are composed of the same materials that make up the surrounding shoreline: rounded cobbles of the kind that occur naturally on Oregon beaches, beach-compatible sand, and native dune vegetation, so the completed system will read as a cobble beach transitioning to a vegetated foredune—the natural condition of a dune-backed Oregon shoreline.[83]

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[80] County Approval at 4 (Condition 2), 12, 21–23.

[81] DLCD Guidebook at 2, 17; Geotechnical Report at 30, 33.

[82] Geotechnical Report at 5–6, 10 (project area underlain by unconsolidated beach and dune sands); see Figure 1, above.

[83] Geotechnical Report at 25-26; DLCD Guidebook at 35–36, 39–40.

Accordingly, the proposed Project will not meaningfully diminish the scenic attraction or visual character of the surrounding shoreline and complies with this standard.

**2. Shoreline Vegetation—The project shall retain or restore existing vegetation on the ocean shore when vital to scenic values.**

Existing shoreline vegetation on the Property's shoreline is under active assault from erosion. Although the foredune is vegetated primarily with beach grass, shrubs, and scattered trees, the seaward dune face exhibits areas of exposed sand, root exposure, undercut vegetation, and localized loss of beach grass resulting from ongoing wave attack, wind erosion, and storm events.[84]

The proposed Project will substantially improve this condition. Following construction, the new sand berm will be planted with native shoreline vegetation designed to stabilize the berm and provide a natural vegetated appearance. Accordingly, the Project will restore and increase vegetative cover along the shoreline rather than reduce it.

**3. View Obstruction—The project shall avoid or minimize obstruction of existing views of the ocean and beaches from adjacent properties.**

The proposed improvements will not obstruct ocean views. The finished berm crest is designed at approximately elevation 24 feet NAVD 88, only about two to three feet above the existing dune crest of approximately elevation 21 to 22 feet. The Project has a low, sloping profile and no vertical wall, railing, building, or above-grade mechanical equipment. The gradual sand-and-cobble form therefore minimizes potential view obstruction from adjacent uplands and will read as an extension of the existing foredune rather than a separate structure.[85]

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[84] Geotechnical Report at 6, 13.

[85] Geotechnical Report at 6, 23-26.

Further, the adjacent lands to the east and west are undeveloped native coastal vegetation and dune habitat, so there are no neighboring residences, viewpoints, or development whose ocean views could be affected.[86]

**4. Compatibility with Surroundings—The project shall blend in with the existing shoreline scenery (type of construction, color, etc.).**

The stabilization system will blend with the existing shoreline scenery because the visible components are constructed of only natural rounded cobble, sand, and native dune vegetation. Cobble beaches occur naturally on the Oregon coast, and constructed dynamic revetments are "more compatible with the natural environment than other erosion control options."[87] The berm is designed to function and appear as a natural foredune—trapping wind-blown sand and supporting native vegetation—and its biodegradable core will be fully encapsulated beneath a sand blanket and planted surface, so no artificial materials will be visible; as DLCD observes of comparable vegetated stabilization projects, once vegetation establishes they are "nearly indistinguishable from a natural slope."[88]

Any temporary visual impacts during construction will likewise be minimal because construction activities will occur over a short duration and equipment and materials will be staged upland rather than on the beach. This will have a similar impact to any other upland construction in the area.

**C. Recreation Use Standards (OAR 736-020-0020): The following recreation use standards shall be applied, where applicable, to each application for an ocean shore permit.**

**1. Recreation Use—The project shall not be a detriment to public recreation use opportunities within the ocean shore area except in those cases where it is determined necessary to protect sensitive biological resources such as state or federally listed species.**

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[86] Geotechnical Report at 5.

[87] DLCD Guidebook at 39–40.

[88] Geotechnical Report at 25; DLCD Guidebook at 35–36.

The proposed improvements will not be a detriment to public recreation use opportunities. The completed Project will preserve ordinary beach recreation opportunities. It does not close the beach, create a vertical barrier, reserve the shore for private use, or introduce a permanent fenced area. The seaward surface remains a sloping mixture of sand and loose cobble comparable to naturally occurring gravel beaches.

Further, the Project occupies only approximately 200 feet of shoreline at the southwestern end of Bastendorff Beach, in a segment used primarily by guests of the RV park. Also, by maintaining the dune buffer and reducing the likelihood of exposed utilities or emergency work, the Project also supports continued safe recreational use of the surrounding shore.[89]

As set out in detail in the Construction Plan, construction activities likewise have been specifically timed and designed to minimize temporary impacts on beach use. Construction will occur over a short duration, outside the peak visitor season, with staging and most work activities occurring upland rather than on the beach.

**2. Recreation Access—The project shall avoid blocking off or obstructing public access routes within the ocean shore area except in those cases where it is determined necessary to protect sensitive biological resources such as state or federally listed species.**

The proposed improvements will not block or obstruct any public access route. No public access route to or along the ocean shore crosses the project area: the developed public access to Bastendorff Beach is located up the beach to the northeast at the Bastendorff Beach County Park, and it will be unaffected by the Project.[90]

Lateral passage along the shore in front of the Property will remain open—the revetment's toe is embedded below beach grade and the broad, sandy beach remains seaward of the improvements—and the shoreline southwest of

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[89] OAR 736-020-0020(1); Geotechnical Report at 23-27, 33-36.

[90] OPRD Ocean Shore Permit Application, § 3; *see* Figure 1, above.

the Property terminates at the rocky headland, so the project area is not a required passage to beach segments beyond it.[91]

In addition, as discussed in detail in the Construction Plan, the proposed construction methods and logistics have been specifically designed to minimize temporary impacts on beach access during construction. Equipment access will occur directly from the Property and adjacent undeveloped right-of-way; staging and material storage will occur upland; and multiple nearby public access points will remain available throughout construction activities. Any temporary restrictions near the immediate work area will be limited in duration and necessary only to ensure public safety during active construction operations.

**D. Safety Standards (OAR 736-020-0025): "The project shall be designed to avoid or minimize safety hazards to the public and shoreline properties. The following safety standards shall be applied, where applicable, to each application for an ocean shore permit."**

**1. Structural Safety—The project shall not be a safety hazard to the public due to inadequate structural foundations, lack of bank stability, or the use of weak materials subject to rapid ocean damage.**

The proposed improvements are nonstructural and present none of the issues this standard addresses. There are no structural foundations to fail: the berm contains no permanent rigid structural elements, and the revetment is designed to redistribute under wave loading.[92] Nor does the Project rely on structural materials that could be weakened by ocean waves. Rather, the system consists only of cobblestones, biodegradable bags that are temporary in nature and fully encapsulated beneath a natural sand berm, and a vegetated surface.[93]

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[91] Geotechnical Report at 6-7, 26; *see* Figure 1, above.

[92] Geotechnical Report at 25-26; DLCD Guidebook at 39–40.

[93] Geotechnical Report at 25-26.

Bank stability is improved, not compromised: the system reduces toe erosion—the primary mechanism driving the localized sloughing and instability of the existing dune face.[94]

**2. Obstructional Hazards—The project shall minimize obstructions to pedestrians or vehicles going onto or along the ocean shore area.**

The proposed improvements will not obstruct pedestrians or vehicles going onto or along the ocean shore. The system's footprint onto the beach is limited—the revetment has an overall length of approximately 34 feet (including approximately eight feet of overlap with the berm), at a gentle 6H:1V slope with an embedded toe—and both the cobble surface and the vegetated sand berm can be walked across, presenting no wall, fence, or vertical face.[95] The broad, sandy beach remains open seaward of the improvements, and because the shoreline terminates at the rocky headland immediately southwest of the Property, the project area is not a thoroughfare to further beach segments.[96]

In addition, as set out in detail in the Construction Plan, construction activities have been specifically timed and designed to minimize temporary impacts on public use of the beach during the short construction period. Construction will occur over a limited duration, primarily outside the peak visitor season, with upland staging and controlled access measures that will maintain safe public passage along the shoreline.

**3. Neighboring Properties—The project shall be designed to avoid or minimize ocean erosion or safety problems for neighboring properties.**

The proposed improvements will not create erosion or safety problems for neighboring properties, which are undeveloped coastal-dune habitat.[97] Because the system is dynamic and nature-based—designed to dissipate

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[94] Geotechnical Report at 27-28, 34-35.

[95] Geotechnical Report at 25-26.

[96] Geotechnical Report at 6–7; see Figure 1, above.

[97] Geotechnical Report at 5.

rather than reflect or redirect wave energy—and does not significantly modify shoreline alignment, Certerra concludes that the Project will not alter regional sand supply, sediment movement, or erosion rates, or cause ocean flooding on adjacent properties or within the Coos littoral cell generally.[98] There is also physical space between the Project and abutting properties due to the size of the subject property.

Construction of the revetment will likewise result in only minor and temporary impacts to neighboring properties, primarily limited to short-term construction noise and limited use of small portions of the beach during active work periods. As described in the Construction Plan, these temporary impacts will be minimized through the use of upland staging areas, controlled construction access, limited construction duration, and other mitigation and public-safety measures.

**4. Property Protection—Beachfront property protection projects shall be designed to accomplish a reasonable degree of increased safety for the on-shore property to be protected.**

The expert engineering analysis submitted with the Application demonstrates that the proposed improvements will materially increase safety for the Property by rebuilding dune elevation and sand volume, stabilizing the dune with native vegetation and biodegradable reinforcement, dissipating wave energy at the seaward face, and protecting the toe from continued scarping.

Certerra expects the system to reduce the rate and severity of localized erosion and retreat, maintain the dune buffer, and reduce the exposure of the sanitary sewer system and other improvements to wave attack, overtopping, debris, and scour.[99]

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[98] Geotechnical Report at 33-36.

[99] OAR 736-020-0025(4); Geotechnical Report at 23-27, 33-36.

### E. Natural and Cultural Resource Standards (OAR 736-020-0030): "Projects on the ocean shore shall avoid or minimize damage to the following natural resources, habitat, or ocean shore conditions, and where applicable, shall not violate state standards:"

#### 1. Fish and wildlife resources including rare, threatened or endangered species and fish and wildlife habitats.

The proposed Project will not adversely affect fish or wildlife resources. All work will occur on the upper beach and eroding foredune—an environment of unconsolidated, shifting sands subject to ongoing wave attack—with no in-water work.[100] The Project will restore and expand native dune vegetation, improving habitat conditions relative to the actively eroding existing dune face.[101] No rare, threatened, or endangered species or associated habitat has been identified at the project site.

As part of the review process, the Oregon Department of Fish and Wildlife will receive notice of the Application and will have the opportunity to confirm the absence of impacts to rare, threatened, or endangered species and associated habitat resources at the project site.

#### 2. Estuarine values and navigation interests.

The Project is not adjacent to an estuary and does not affect navigable water on the ocean.

#### 3. Historic, cultural and archeological sites.

No historic structures or recorded cultural or archaeological resources have been identified within the project area, although the Property carries the County's Archaeological Areas (ARC) special development consideration, and the County's ordinance requires consultation with the appropriate local Tribe

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[100] Geotechnical Report at 6, 10; County Approval at 7.

[101] Geotechnical Report at 25, 29.

before ground-disturbing activity in mapped archaeologically sensitive areas.[102]

Applicant understands that the requested ocean shore alteration permit will be subject to a condition that this standard is met throughout the Project, in case archaeological resources are discovered during construction. During the application review, notice and opportunity for comment will be provided to the appropriate federally recognized Tribes, including the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians, and the Coquille Indian Tribe. Applicant will respond to any cultural issues that may be raised throughout this process.

**4. Natural areas (vegetation or aquatic features).**

The proposed improvements will not damage natural areas. The project footprint is confined to the actively eroding seaward dune face and adjacent beach sands. No streams, tide pools, wetlands, or other discrete aquatic features are present within the project area, and the work will not encroach into the undeveloped dune habitat east or west of the Property.[103] The net effect on natural areas is positive: the Project restores dune form and reestablishes native vegetation on a dune face that is currently eroding and shedding vegetation.[104]

Construction activities likewise will not meaningfully impact natural areas. Construction and staging activities will occur primarily upland, disturbance will be confined to the immediate project area, and the duration of construction will be short.

**5. Air and water quality of the ocean shore area.**

The proposed improvements will not impact the air or water quality of the ocean shore area. The completed system consists entirely of inert natural materials—clean sand, durable rock, natural-fiber fabrics, and native plants—and generates no discharge, runoff, or emissions.[105] Indeed, by

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[102] County Approval at 1 (ARC overlay), 36–38.

[103] Geotechnical Report at 5–6, 10; County Approval at 7 (DSL response).

[104] Geotechnical Report at 25, 29.

[105] Geotechnical Report at 25-26.

protecting the sanitary sewer system from erosion-induced damage, the Project reduces the risk of a wastewater release affecting ocean shore water quality.[106]

The construction of the revetment will likewise not impact the air and water quality of the ocean shore because all staging and equipment parking/maintenance will occur off the beach on the upland Property.

**6. Areas of geologic interest, fossil beds, ancient forest remnants.**

The work is shallow and located in unconsolidated beach and dune deposits; the submitted geotechnical materials do not identify a bedrock exposure, fossil bed, ancient forest remnant, or other designated geologic feature within the project footprint. Because subsurface discovery cannot be ruled out categorically, the contractor will stop work and notify OPRD and the appropriate resource agency if an unexpected fossil, ancient wood deposit, or feature of potential geologic interest is encountered.[107]

**7. When necessary to protect native plant communities or fish and wildlife habitat on the subject or adjacent properties, only native, non-invasive, plant species shall be used for revegetation.**

Only native, noninvasive species approved for the site will be used to revegetate the berm and other disturbed areas. The final planting plan will identify species, spacing, establishment methods, monitoring, and replacement criteria. Any generic reference in contractor materials to "willows" or other plants will be conformed to the final Certerra- and agency-approved native dune palette before construction.[108]

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[106] Geotechnical Report at 13, 22, 33-34.

[107] OAR 736-020-0030(1)(f); Geotechnical Report at 9-10.

[108] OAR 736-020-0030(2); Geotechnical Report at 25, 27-29.

## V. CONCLUSION

As set out above and in the Geotechnical Report, there is a documented and continuing need to protect the Property's sewer system and other existing improvements from foredune erosion, storm-wave attack, overtopping, and coastal flooding.

Certerra evaluated the available alternatives and designed a limited, hybrid, nonstructural system that restores dune elevation, sand volume, and native vegetation; dissipates wave energy with a mobile cobble face; avoids a fixed seawall or conventional riprap revetment; and can be monitored and adaptively maintained.

The design and construction measures protect public rights, preserve recreation and access, minimize scenic and natural-resource effects, avoid transferring hazards to neighboring properties, and provide a reasonable degree of increased safety for the Property. Accordingly, Applicant respectfully requests that OPRD approve the Application and issue the requested ocean shore alteration permit.

CERTERRA
EARTH ENGINEERS

Materially Better™

**Sun Outdoors, a Division of Sun, Inc.**
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July 14, 2026
Revised September 18, 2026
Report No. 10-242216-03-R1

**Subject:** **Geotechnical Design Report**
**Proposed Shoreline Stabilization System**
**Sun Outdoors Coos Bay RV Park**
**90281 Cape Arago Highway**
**Coos Bay, Coos County, Oregon**

**Dear James:**

**Certerra Northwest, LLC ("Certerra"),** formerly Earth Engineers, is pleased to transmit our revised report for the above referenced project. The attached report presents our evaluation of site-specific geotechnical and geologic conditions relevant to the proposed shoreline stabilization system. The report includes a discussion of coastal hazards and shoreline processes, an evaluation of shoreline stabilization alternatives, design recommendations for the proposed improvements, and conceptual plan and cross-section figures prepared to support the permitting process.

We appreciate the opportunity to assist with this project and look forward to continuing to support the design, permitting, and potential construction phases. If you have any questions regarding this report or if we may be of further service, please contact our office.

**Sincerely,**

**Certerra Northwest, LLC**

[redacted]

| | | |
|---|---|---|
| Jacqui Boyer | Tyler Pierce, P.E. | Kenneth Andrieu, R.G., C.E.G. |
| Geotechnical Project Manager | Associate Geotechnical Engineer | Senior Engineering Geologist |

Attachment: Geotechnical Design Report

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Steven Liday, Miller Nash LLP (steven.liday@millernash.com)

CERTERRA
EARTH ENGINEERS

# GEOTECHNICAL DESIGN REPORT

for the

**Proposed Shoreline Stabilization System**
**90281 Cape Arago Highway**
**Coos Bay, Coos County, Oregon**

Prepared for

**Sun Outdoors, a Division of Sun, Inc.**
**27777 Franklin Road, Suite 300**
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Prepared by

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**Telephone (360) 567-1806**

**Certerra Report No. 10-242216-03-R1**

**July 14, 2026**
**Revised September 18, 2026**



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CERTERRA
EARTH ENGINEERS

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# 1.0 PROJECT INFORMATION

## 1.1 Project Authorization

Certerra Northwest, LLC ("Certerra"), formerly Earth Engineers ("EE"), has prepared this Geotechnical Design Report for the proposed hybrid shoreline stabilization system at Sun Outdoors Coos Bay RV Park, located at 90281 Cape Arago Highway in Coos Bay, Coos County, Oregon. This report was prepared as an amendment to our previous services performed for the project. Our services were authorized by Jim Dawson with Sun Outdoors, a Division of Sun, Inc., via e-mail on April 6, 2026, providing approval of Certerra Proposal No. 10-242216-P-A2 dated April 1, 2026.

## 1.2 Project Description

Our understanding of the project is based on our involvement as Engineering Geologist of Record for the project to date. This has included preparation of the Engineering Geologic Report for the subject site (Certerra Report No. 10-242216-02, dated September 4, 2025). The Engineering Geologic Report focused on the identification and evaluation of existing geologic hazards and did not include detailed topographic surveying, engineering design, or preparation of plan and cross-sectional figures depicting existing and proposed site conditions. Based on that report, Coos County approved a Land Use decision for the project on March 6, 2026.

Since completion of the Engineering Geologic Report, we have been requested to prepare this Geotechnical Design Report for the proposed shoreline stabilization improvements. The purpose of this report is to provide design recommendations for the proposed hybrid shoreline stabilization system, together with supporting figures and technical documentation required for the Ocean Shores permitting process.

The subject property is located at Sun Outdoors Coos Bay RV Park and includes approximately 600 linear feet of ocean frontage along a dune-backed shoreline. Existing infrastructure at the subject property includes RV park facilities, access roads, utilities, and a sanitary sewer system that parallels the shoreline.

The project area consists primarily of beach and dune deposits that are subject to ongoing coastal processes, including seasonal erosion, dune migration, storm-wave impacts, and fluctuations in beach elevation. Portions of the foredune have experienced erosion and retreat that have reduced the separation between the shoreline and existing infrastructure. If left unmitigated, continued erosion has the potential to impact park improvements and the existing sanitary sewer system. Accordingly, Sun Outdoors is pursuing shoreline stabilization measures intended to reduce the rate and severity of shoreline erosion while maintaining compatibility with the natural coastal environment.

Prior to developing design recommendations, we evaluated a range of shoreline stabilization alternatives. Our assessment considered both non-structural and structural approaches, progressing from the least intrusive measures to more engineered solutions. Alternatives considered included vegetation-based stabilization, dynamic cobble revetments, and hard-armoring approaches. The objective of this evaluation was to identify the



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least intrusive alternative capable of providing effective, long-term protection of existing infrastructure while maintaining natural shoreline functions to the greatest extent practicable.

Based on our review of site conditions, coastal processes, and applicable shoreline protection guidance, we developed a hybrid shoreline stabilization design consisting of a vegetated sand section and dynamic cobble berm (also referred to herein as the "shoreline stabilization system"). The shoreline stabilization system is proposed to extend approximately 200 feet along the shoreline adjacent to the existing sewer system. See Figure 1 below.

In our professional opinion, the proposed hybrid shoreline stabilization system represents an appropriate nature-based shoreline stabilization measure for the site. The proposed improvements are intended to dissipate wave energy, reduce erosion potential, and provide additional protection for existing upland improvements while maintaining compatibility with the dynamic coastal environment.

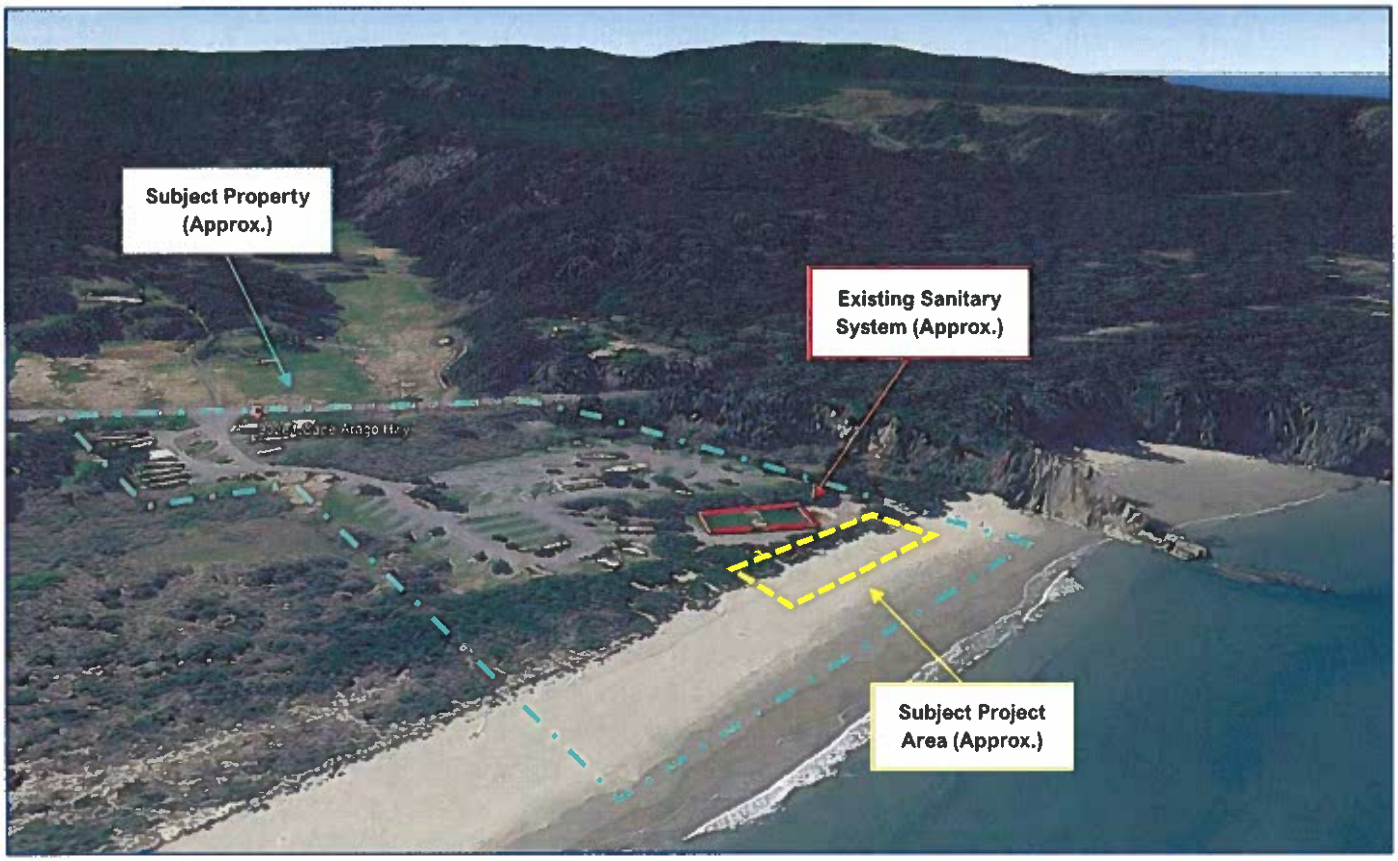



**Figure 1:** Aerial view of the project site at Sun Outdoors Coos Bay RV Park, looking generally southeast. The figure shows the developed RV park, shoreline frontage, and surrounding coastal terrain. The subject property is outlined in blue, the existing sanitary system is outlined in red, and the proposed project area is outlined in yellow. Base image source: Google Earth.



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### 1.3 Purpose and Scope of Services

The purpose of our services was to evaluate shoreline stabilization alternatives for the subject property and provide geotechnical and engineering geologic design recommendations for the proposed shoreline stabilization system. This report was prepared to support the Ocean Shores permitting process and to supplement the findings and recommendations presented in our previously completed Engineering Geologic Report.

We reviewed available project information, aerial imagery, topographic data, and shoreline stabilization guidance applicable to the Oregon Coast. We also performed a site reconnaissance to observe current shoreline conditions, including geomorphology, vegetation, and evidence of recent erosion. During the site visit, we evaluated whether current conditions were generally consistent with observations from our October 2024 site visit. Site conditions were documented through field notes and photographs.

Topographic surveying of the project area was performed by SHN to provide the horizontal and vertical control necessary for preparation of the existing and proposed conditions figures included in this report. The survey information was incorporated into the conceptual design and supporting figures prepared as part of this evaluation.

This report presents available project information, summarizes relevant site conditions and coastal processes, and provides recommendations regarding the following:

- A summary of site conditions, project background, and the coastal setting within the project area.
- An updated evaluation of coastal, geologic, and seismic hazards based on current site conditions and available information, including discussion of how the proposed shoreline stabilization improvements may affect or be affected by those hazards.
- An evaluation of the potential effects of the proposed shoreline stabilization improvements on sand source, supply, and movement within the affected beach and littoral system.
- A description and evaluation of the proposed vegetated sand section and dynamic cobble berm as a shoreline stabilization measure, including an alternatives analysis to evaluate whether other shoreline protection approaches with potentially lower impacts may be appropriate for the site.
- Design recommendations for the proposed shoreline stabilization improvements, including conceptual geometry, materials, configuration, anticipated performance, and construction considerations.
- Preparation of supporting figures required for permitting, including existing and proposed conditions plans and representative cross-sections depicting the proposed shoreline stabilization improvements.

The recommendations and figures presented in this report are intended to support regulatory review and permitting of the proposed shoreline stabilization improvements. Modifications to the conceptual design may be warranted based on agency comments, permit conditions, or site conditions encountered during implementation.



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It should be noted that our scope of services did not include subsurface exploration or geotechnical field investigation, as it was not considered necessary given the nature of the proposed shoreline stabilization improvements and the information obtained during preparation of the Engineering Geologic Report.

In addition, our scope of services did not include preparation of a Construction, Staging, and Safety Plan, which may be required as part of the permitting process and is typically prepared by the contractor.

Our currently authorized scope of services concludes with preparation of this Geotechnical Design Report. Additional services that may be required to support permitting, regulatory coordination, agency meetings, responses to review comments, design modifications, construction-phase services, or post-construction certification are not included in the current scope of work but can be provided upon request.

# 2.0 SITE CONDITIONS

## 2.1 Site Location and Description

The subject property is situated along the southern Oregon coast adjacent to the Pacific Ocean and is located at 90281 Cape Arago Highway in Coos Bay, Coos County, Oregon. The property is identified in the Coos County Assessor's records as Tax Lot 26S14W03C 200 and encompasses approximately 15.49 acres. The southern boundary of the property is adjacent to Cape Arago Highway, which provides primary access to the site. The eastern and western portions of the property are bordered by undeveloped lands consisting primarily of native coastal vegetation and dune habitat. Figure 2 shows the project vicinity.




**Figure 2:** Project vicinity map showing the subject property (outlined in blue) and approximate extent of the proposed shoreline stabilization improvements. Base map source: Coos County GIS.

The subject property is developed as a recreational vehicle park and includes internal roadways, utility infrastructure, recreational sites, and associated amenities. An existing sanitary sewer force main generally parallels the shoreline east of the dune and serves as critical infrastructure for the RV park development. The proposed project is intended to reduce erosion potential and maintain a buffer between the shoreline and this existing utility infrastructure, as required. Figure 1 above shows the proximity of the developed portions of the RV park to the existing dune.

The site is generally low-lying and gently sloping toward the Pacific Ocean. The project area is situated within a coastal dune environment along the southern Oregon coast and consists of a vegetated foredune separating the active beach from the developed portions of the RV park. At the time of our site reconnaissance, the dune was vegetated primarily with beach grass, shrubs, and scattered trees. The dune transitions seaward to unconsolidated beach sands and landward to the developed RV park roadway and utility corridor. It is our understanding that no substantive riprap, revetments, seawalls, dune grading, or other engineered shoreline stabilization measures have previously been constructed within the project area.

The existing dune on the subject property ranges in height from approximately 6 to 8 feet. Localized erosion scarps ranging from approximately 2 to 5 feet in height were observed along portions of the seaward dune face. Areas of exposed sand, root exposure, undercut vegetation, and minor sloughing were also present, indicating ongoing erosion of the foredune associated with wave attack, wind erosion, and seasonal storm events.

Unless otherwise noted, all elevations presented in this report are expressed in feet and referenced to the North American Vertical Datum of 1988 (NAVD 88). Based on the site-specific survey, the existing dune has a crest elevation ranging from approximately El. 21 to El. 22, with the seaward dune toe at approximately El. 15 and the landward dune toe at approximately El. 18.

The site's coastal setting results in exposure to a range of marine and atmospheric processes, including persistent winds, wave runup, seasonal fluctuations in beach elevation, and storm-induced erosion. Over time, these processes contribute to dune retreat, surface erosion, and localized instability along the seaward face of the foredune. The observed erosion features are consistent with the dynamic nature of the southern Oregon coastline.

See Photos 1 through 3 for the site conditions at the time of our site reconnaissance on May 1, 2026.



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**Photo 1:** General view of the property's shoreline at the time of our May 2026 site reconnaissance, showing the vegetated dune and broad sandy beach located seaward of the RV park and utility corridor (facing southeast).




**Photo 2:** Localized erosion scarp along the seaward face of the foredune observed during our May 2026 site reconnaissance, showing exposed roots and undercut vegetation resulting from ongoing shoreline erosion and dune retreat (facing southeast).




**Photo 3:** Internal RV park roadway and utility corridor located landward of the foredune showing the existing sanitary sewer system (facing northeast).

## 2.2 Mapped Soils and Geology

The project site is located within a coastal dune and beach environment along the southern Oregon coast adjacent to the Pacific Ocean. The geomorphology of the area has been shaped by long-term marine, aeolian (wind-blown), and coastal depositional processes that have resulted in the formation of extensive beach, dune, and estuarine deposits throughout the project vicinity.

According to the Geologic Map of the Charleston Quadrangle, Coos County, Oregon[1], the northern portion of the property is mapped as Quaternary Sand Deposits (Qs) of Holocene age. These deposits generally consist of well-sorted fine- to medium-grained sand associated with active beaches, foredunes, stabilized dunes, and wind-blown sand sheets. Such materials are typically loose, highly permeable, and susceptible to erosion by wind and wave action. The central and southern portions of the property are mapped as Quaternary Alluvium and Estuarine Deposits (Qal) consisting of interbedded sand, silt, and clay deposited in low-energy coastal and estuarine environments.

The United States Department of Agriculture (USDA) Soil Survey[2] provides detailed information regarding mapped soil units. According to the USDA soil mapping, the northern portion of the property adjacent to the ocean is mapped as Beaches (Unit 3), which consists primarily of stratified sand to gravel associated with beach deposits. The central portion of the property is mapped as Waldport-Dune Land Complex (Unit 60D), characterized by fine sand associated with coastal dune deposits. The southern portion of the property is mapped as Heceta-Waldport Fine Sands (Unit 29B), while localized areas near the southern property boundary are mapped as Langlois Silty Clay Loam (Unit 34).

Based on our site observations, review of available geologic mapping, and the shoreline setting, the proposed project area is interpreted to be underlain primarily by unconsolidated beach and dune sands. These materials are consistent with the observed foredune morphology and active coastal processes present at the site. No subsurface exploration was performed as part of this scope of services; however, the mapped geologic and soil conditions are considered suitable for development of the shoreline stabilization recommendations.

### 2.3 Geologic Hazards

To identify geologic hazards that may affect the subject property and the proposed shoreline stabilization improvements, we reviewed available public geologic hazard mapping and published studies, including information and mapping from the Oregon Department of Geology and Mineral Industries (DOGAMI), the Federal Emergency Management Agency (FEMA), the U.S. Geological Survey (USGS), and other applicable state and federal resources.

Based on our review, the primary geologic hazards applicable to the subject property include coastal erosion, coastal flooding, earthquake ground shaking, tsunami inundation, liquefaction susceptibility, and landslide susceptibility. The following sections discuss the applicable coastal, seismic, flood, tsunami, and landslide hazards in greater detail and evaluate their relevance to the proposed shoreline stabilization improvements.

[1] Madin, I.P., McInelly, G.W., and Kelsey, H.M., 1995, *Geologic Map of the Charleston Quadrangle, Coos County, Oregon*, Oregon Department of Geology and Mineral Industries (DOGAMI), Geological Map Series.

[2] United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), *Web Soil Survey*, Coos County Area, Oregon.

### *2.3.1 Coastal Erosion Hazard*

The primary purpose of this study is to evaluate coastal erosion hazards affecting the subject property and to assess the suitability of the proposed shoreline stabilization improvements. The site is situated within a dynamic coastal dune environment along the Pacific Ocean and is subject to ongoing shoreline change resulting from wave action, storm events, wind erosion, seasonal beach fluctuations, and long-term coastal processes.

We reviewed available mapping through DOGAMI HazVu[3] to evaluate mapped coastal erosion hazard on the subject property, however, the project area is mapped as "No Data". As such, our evaluation of coastal erosion hazard is based on site reconnaissance observations, review of available aerial imagery, published shoreline-change studies, and the findings of our Engineering Geologic Report.

Storm-related coastal erosion periodically affects portions of the Oregon coast, particularly during severe climatic cycles. This trend has been attributed in part to the occurrence of severe climatic cycles, including El Niño and La Niña events, which can result in elevated wave energy, increased storm intensity, and greater beachfront erosion than is typically observed during average conditions. The frequency and severity of extreme coastal storm events may increase in the future, and sea-level rise associated with climate change is expected to further increase coastal vulnerability.

Along the Oregon coast, regional tectonic uplift partially offsets the effects of sea-level rise. However, recent studies indicate that projected sea-level rise is expected to exceed uplift rates in many areas, resulting in a net increase in relative sea level over time. According to NOAA's Global and Regional Sea Level Rise Scenarios for the United States (2022)[4], relative sea level along the Oregon coast is projected to continue rising throughout the century despite regional uplift.

More specifically, Ruggiero et al. (2013)[5] noted that relative sea level in the Coos Bay area has risen at an average rate of approximately 1.62 millimeters per year based on data recorded between 1970 and 2010. Consequently, future coastal erosion impacts may be greater than those observed historically as rising sea levels allow wave action and storm impacts to occur farther landward.

In addition to regional climatic influences, local coastal processes significantly affect erosion rates and shoreline behavior. The configuration of offshore reefs, headlands, nearshore bathymetry, rip embayments, and localized scour can focus wave energy onto specific shoreline reaches, resulting in periodic dune scarping, overwash, wind transport, and redistribution of beach sand. Although portions of the foredune commonly recover during

[3] Oregon Department of Geology and Mineral Industries (DOGAMI). *Oregon HazVu: Statewide Geohazards Viewer*. Available at: https://gis.dogami.oregon.gov/maps/hazvu/

[4] National Oceanic and Atmospheric Administration (NOAA), 2022, *Global and Regional Sea Level Rise Scenarios for the United States, NOAA Technical Report NOS 01.*

[5] Ruggiero, P., Kratzmann, M.G., Himmelstoss, E.A., Reid, D., Allan, J., and Kaminsky, G., 2013, *National Assessment of Shoreline Change: Historical Shoreline Change Along the Pacific Northwest Coast*, U.S. Geological Survey Open-File Report 2012-1007, p. 22.

periods of reduced wave energy through natural beach and dune rebuilding processes, repeated storm impacts may result in a net landward migration of the shoreline over time.

Published shoreline change studies conducted by the U.S. Geological Survey (USGS) indicate that shoreline behavior along the Oregon coast is highly variable, with alternating periods of erosion and accretion occurring both spatially and temporally. Ruggiero et al. (2013)[6] evaluated long-term and short-term shoreline change rates along the Pacific Northwest coast and found that while many littoral cells exhibited stable or accretional long-term trends, several portions of the Oregon coast experienced localized short-term erosion associated with storm activity, climatic cycles, and changing oceanographic conditions.

Within the Coos littoral cell, which encompasses the project area, Ruggiero et al. (2013) reported a long-term net shoreline change rate (approximately 100-year period)[7] of approximately +1.6 feet per year, indicating an overall accretional trend. However, analysis of the short-term shoreline change rate data (approximately 30-year period)[8] showed an average shoreline change rate of approximately +0.1 feet per year, indicating that shoreline accretion has largely diminished in recent decades. The study further reported that approximately 54 percent of shoreline transects within the Coos littoral cell were experiencing erosion during the short-term analysis period, with localized erosion rates of up to approximately -12.8 feet per year.

The long-term accretional trend within the Coos littoral cell has been attributed largely to shoreline progradation following construction of the Coos Bay jetties between the late 1890s and early 1900s, as well as the Umpqua and Siuslaw River jetties during the same general period. As discussed by Ruggiero et al. (2013)[9], these structures altered regional sediment transport patterns and shoreline configuration, resulting in substantial shoreline progradation adjacent to the jetties in much of the twentieth century. Following several decades of shoreline adjustment, however, the regional shoreline has largely reached a new equilibrium. Consequently, average short-term shoreline change rates across the Coos littoral cell are approximately zero, although substantial variability exists among individual shoreline transects, with approximately half exhibiting erosional trends during the short-term analysis period.

The USGS shoreline change assessment provides additional regional context for the project vicinity.[10] The subject property (approximately alongshore kilometer 166) is located near the southern end of the Coos littoral cell, immediately north of Cape Arago. At the project location, the mapped long-term shoreline change rate is approximately +5.9 feet per year, indicating historical shoreline accretion. In contrast, the mapped short-term shoreline change rate is approximately -0.7 feet per year, indicating that the historical accretional trend has reversed to a slight erosional trend in recent decades. The adjacent shoreline transects also exhibit considerable variability, with alternating erosional and accretional trends over relatively short distances.

[6] Ruggiero, P., M.G. Kratzmann, E.A. Himmelstoss, D. Reid, J. Allan, and G. Kaminsky. 2013. National assessment of shoreline change - historical shoreline change along the Pacific Northwest coast. U.S. Geological Survey Open-File Report 2012 – 1007.
[7] *Ibid.*, p. 29.
[8] *Ibid.*, p. 30.
[9] *Ibid.*, p. 35.
[10] *Ibid.*, p. 36

These observations are consistent with the broader findings of Ruggiero et al. (2013)[11] that, although the Coos littoral cell has exhibited an overall long-term accretional trend, localized shoreline retreat and dune erosion remain active processes. Site-specific factors such as storm-wave exposure, sediment transport patterns, beach morphology, and episodic erosion events can result in substantial shoreline retreat even within littoral cells that exhibit stable or accretional average trends.

The subject property has been exposed to the erosion cycles noted above. Based on our review of historical Google Earth aerial imagery, the vegetated foredune within the project area appears to have retreated approximately 2 to 12 feet between May 2019 and March 2026, corresponding to estimated erosion rates ranging from approximately 0.3 to 1.7 feet per year. It should be noted, these estimates are approximate and are based on changes in the apparent position of the foredune scarp observed in available aerial imagery. The estimated site-specific erosion rates fall within the range of localized shoreline retreat reported for the Coos littoral cell by Ruggiero et al. (2013), supporting our conclusion that the project area is experiencing active coastal erosion.

During our May 2026 reconnaissance, we observed evidence of ongoing coastal erosion along portions of the existing foredune. Observed conditions included localized erosion scarps approximately 2 to 5 feet in height, exposed roots, undercut vegetation, minor sloughing of dune sands, and localized loss of beach grass vegetation. These conditions are consistent with periodic wave attack and storm-induced erosion that commonly affect foredunes along the Oregon coast. Representative site conditions are shown in Photos 1 through 3.

The existing foredune currently provides an important buffer between the Pacific Ocean and developed portions of the RV park. Continued erosion of the dune could reduce this protective buffer and increase the potential for exposure or damage to existing infrastructure, including the sanitary sewer system that generally parallels the shoreline landward of the dune. Continued dune retreat would reduce the separation between active coastal processes and this critical utility infrastructure.

Based on our review of available mapping, published shoreline studies, site reconnaissance observations, and existing topographic information, continued erosion of the existing foredune should be anticipated over the design life of the project if no stabilization measures are implemented. In our opinion, implementation of the proposed vegetated sand section and dynamic cobble berm would improve shoreline resilience by reducing the likelihood of storm-induced dune erosion, helping to maintain a protective buffer between the Pacific Ocean and existing RV park infrastructure. The proposed improvements are also intended to function in a manner generally compatible with natural shoreline processes while providing enhanced protection against future erosion.

### *2.3.2 Flood Hazard*

To evaluate potential flood hazards at the site, we reviewed the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM)[12]. Based on this review, the northern portion of the property, including the

[11] *Ibid.*, p. 37.

[12] Federal Emergency Management Agency (FEMA), 2018, *Flood Insurance Rate Map (FIRM) Panel 41011C0305E, Coos County, Oregon and Incorporated Areas*. Effective June 20, 2018.

existing foredune, proposed shoreline stabilization improvements, and portions of the sanitary sewer system, is located within the mapped 1-percent annual chance floodplain (shown on Figure 4 below).

As shown below, the western portion of the property is mapped within Flood Zone VE (referred to as a Coastal High Hazard Area). Flood Zone VE identifies coastal areas subject to inundation by the 1-percent annual chance flood that are also exposed to additional hazards associated with high-velocity wave action, wave runup, and storm surge. Unlike inland flood hazard zones, the VE designation recognizes the increased destructive potential associated with breaking waves, moving water, debris transport, and localized scour during coastal storm events.

The Base Flood Elevation (BFE) mapped for this site is approximately El. 23. This designation underscores the risk of flooding and wave damage at this location. In addition to inundation hazards, FEMA Zone VE conditions also imply increased exposure to wave velocity forces, debris transport, localized scour, and hydrodynamic impacts during coastal storm events.




**Figure 4:** FEMA Flood Insurance Rate Map (FIRM) flood hazard mapping in the project vicinity. The subject property is outlined in red.

The presence of the mapped floodplain indicates that the project area is susceptible to coastal flooding associated with extreme storm events, elevated tides, storm surge, and wave runup. Flooding within this area may result in temporary inundation, localized erosion, sediment deposition, and shoreline change. Because the project is located within an active coastal dune environment, these processes may also contribute to periodic dune scarping and landward migration of the shoreline during severe storm events.

Although the existing foredune currently provides an important natural buffer between the Pacific Ocean and the developed portions of the RV park, continued erosion of the dune could reduce its effectiveness in limiting inland flooding. Progressive loss of dune width and elevation could increase the potential for storm-wave overtopping and expose existing infrastructure (including the sanitary sewer system located landward of the dune) to increased coastal hazards.

The proposed shoreline stabilization improvements are intended primarily to reduce shoreline erosion and maintain the protective function of the existing dune. By helping preserve dune elevation and width, the proposed improvements are also expected to reduce the potential for progressive landward migration of coastal flooding and storm-wave impacts. The project is not intended to eliminate flood hazards associated with extreme coastal events, however, it is intended to improve shoreline resilience and help maintain the existing buffer between the Pacific Ocean and critical infrastructure.

### *2.3.3 Earthquake and Tsunami Hazard*

The subject property is located within a tectonically active region of the Pacific Northwest where seismic hazards are primarily associated with the Cascadia Subduction Zone (CSZ). The CSZ is an active convergent plate boundary located approximately 100 kilometers (60 miles) offshore, where the Juan de Fuca Plate is subducting beneath the North American Plate.[13] This fault system is capable of generating great megathrust earthquakes (moment magnitude Mw 8.5 to 9.5) that may produce prolonged strong ground shaking, regional subsidence, liquefaction, lateral spreading, and tsunami inundation along the Oregon coast. Geologic evidence indicates that the most recent great Cascadia earthquake occurred in A.D. 1700, with recurrence intervals generally estimated to range from approximately 300 to 700 years.[14]

In addition to subduction zone earthquakes, crustal earthquakes associated with upper-plate faults also contribute to the regional seismic hazard. According to the U.S. Geological Survey (USGS) Quaternary Fault and Fold Database[15], the subject property is located within the Cascadia Fold and Fault Belt. The nearest mapped structures include the South Slough thrust and reverse faults located approximately 0.2 to 0.5 mile east of the site and the Sunset Bay - Cape Arago folds and faults located approximately 1 mile west of the site (Figure 5). These structures exhibit relatively low reported slip rates but demonstrate that the project area lies within an active tectonic setting where earthquake ground shaking should be anticipated. Figure 5 below shows the mapped faults and folds in the project vicinity.

[13] U.S. Geological Survey (USGS), 2011, *The Cascadia Subduction Zone*, U.S. Geological Survey Fact Sheet 2011-3020.

[14] Oregon Department of Geology and Mineral Industries (DOGAMI), 2013, *The Cascadia Subduction Zone: Magnitude 9.0 Earthquake Scenario*, Special Paper 41.

[15] U.S. Geological Survey (USGS), *U.S. Quaternary Faults Interactive Map*, U.S. Geological Survey Quaternary Fault and Fold Database, available at:https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf

The Oregon Department of Geology and Mineral Industries (DOGAMI) Oregon HazVu[16] mapping identifies the subject property within areas expected to experience severe to extreme ground shaking during both Cascadia Subduction Zone and crustal earthquakes. In addition, HazVu identifies the project area as having high liquefaction susceptibility and within a moderate to very high liquefaction hazard area (Figures 6 and 7). Because the project area is underlain predominantly by unconsolidated beach and dune sands, seismic shaking could result in liquefaction and localized settlement.

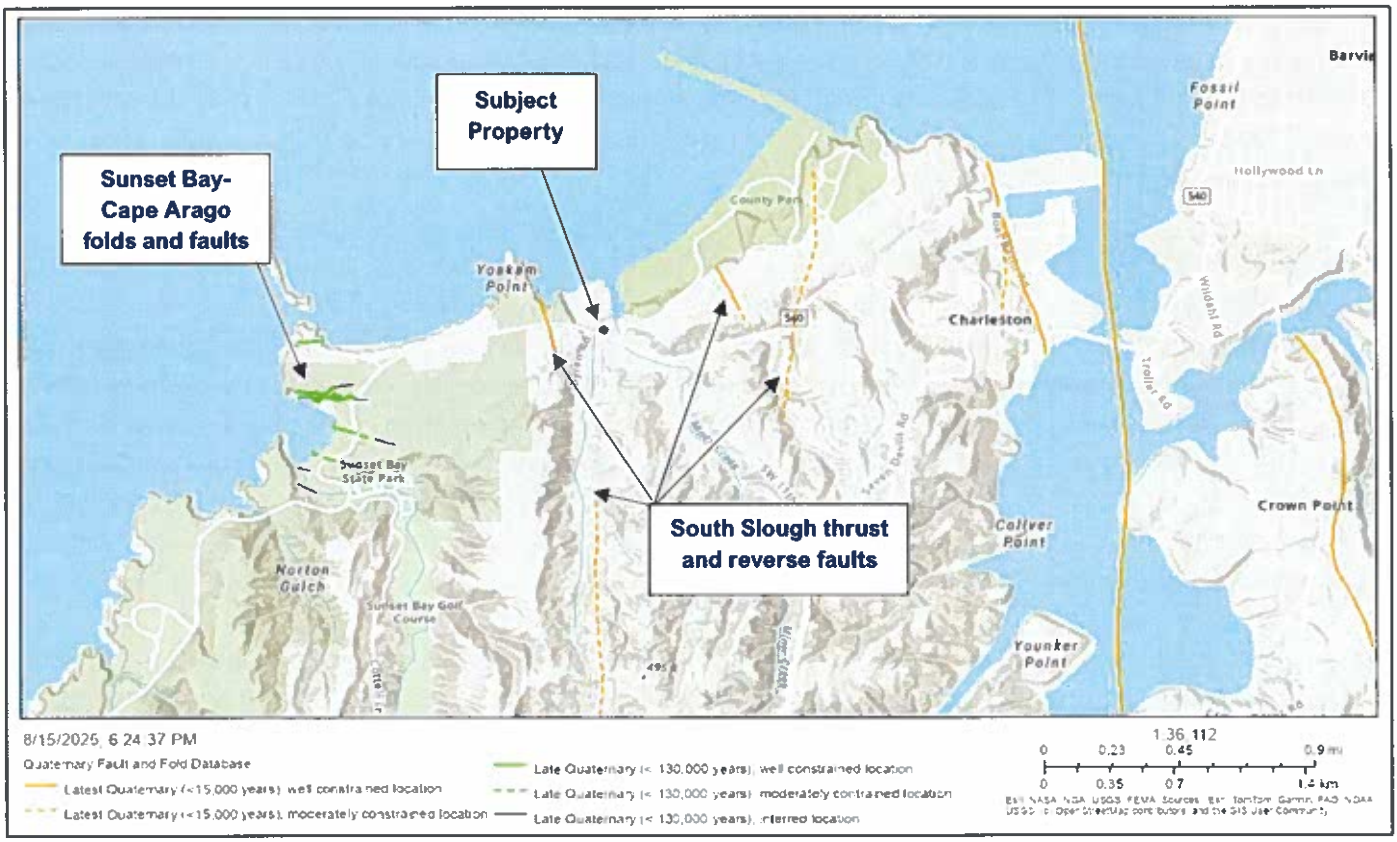



**Figure 5:** US Quaternary Faults Map (source: USGS).

[16] Oregon Department of Geology and Mineral Industries (DOGAMI). *Oregon HazVu: Statewide Geohazards Viewer*. Available at: https://gis.dogami.oregon.gov/maps/hazvu/




**Figure 6:** HazVu map showing extent and degree of Cascadia earthquake hazards. The subject parcel outlined in red.

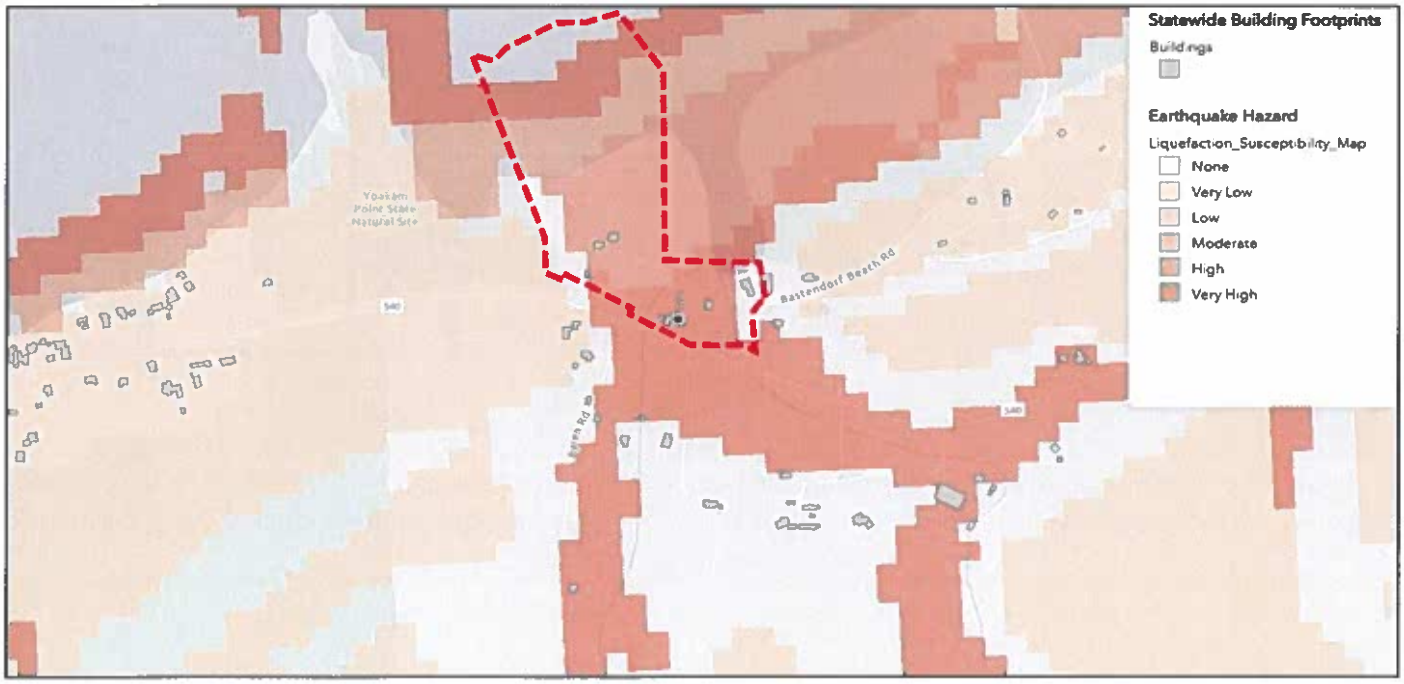



**Figure 7:** HazVu map showing the Liquefaction Susceptibility. The subject parcel outlined in red.

To further evaluate tsunami hazards, we reviewed the DOGAMI Tsunami Inundation Map for Charleston - Cape Arago, Oregon[17]. The mapping indicates that the subject property is located within the modeled tsunami inundation zone for Cascadia Subduction Zone earthquake scenarios (Figure 8). The mapped inundation extents indicate that tsunami-generated flooding could affect the project area following a large offshore earthquake. Although the probability of such events is relatively low on an annual basis, the potential consequences are significant and should be considered when evaluating long-term coastal hazards at the site.

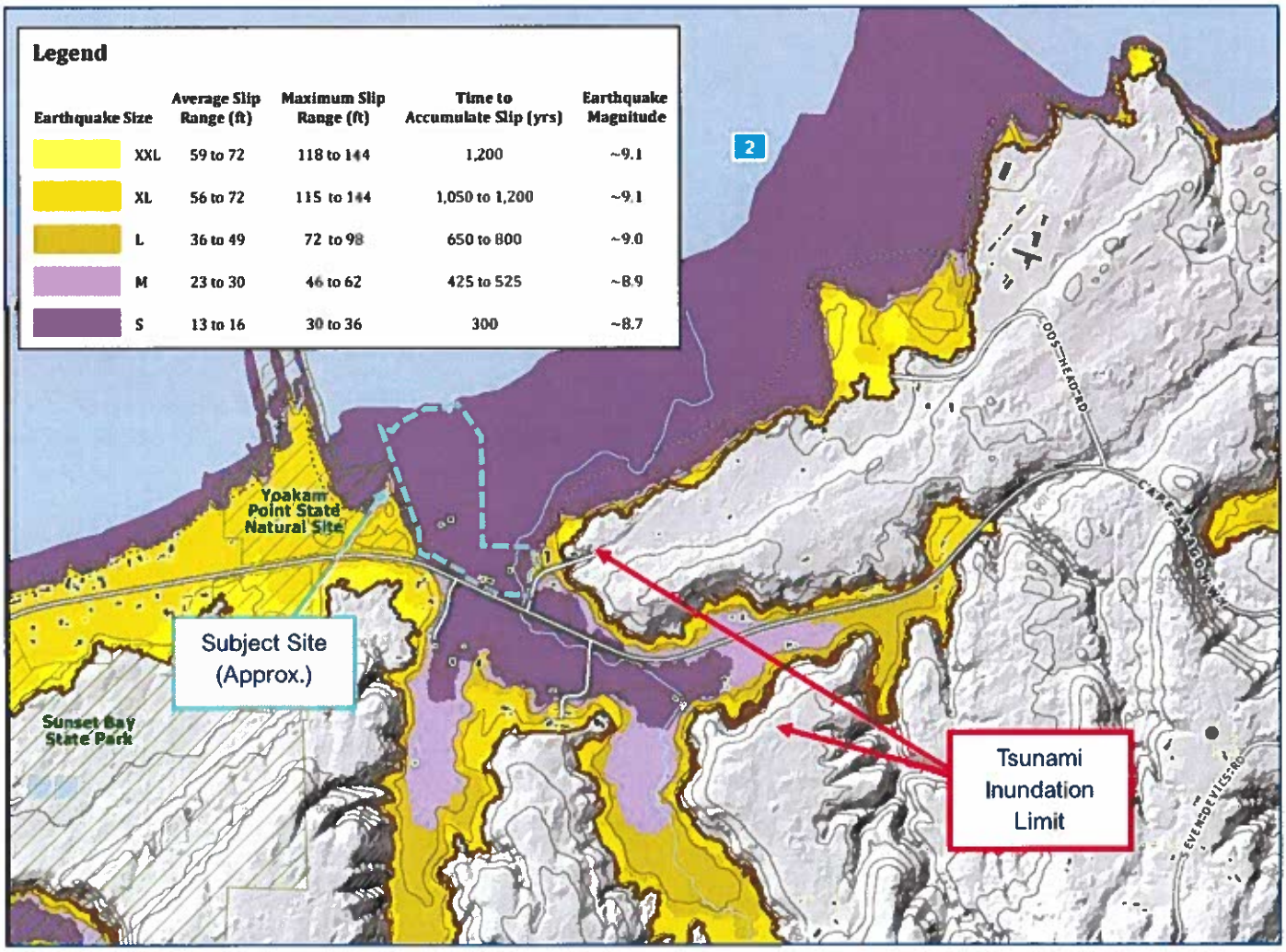



**Figure 8:** Tsunami hazard map for the Charleston-Cape Arago area provided by DOGAMI. The dark purple shading indicates the area expected to be generated by a "small-sized" Cascadia Subduction Zone Earthquake (earthquake magnitude ~8.7).

[17] Zhang, J., 2013, *Local Source (Cascadia Subduction Zone) Tsunami Inundation Map: Charleston–Cape Arago, Oregon*, Oregon Department of Geology and Mineral Industries (DOGAMI), Tsunami Inundation Map TIM-Coos-08, Plate 1, Scale 1:12,000.

It should be noted, the vegetated sand section and dynamic cobble berm are intended to reduce shoreline erosion associated with wave attack and coastal storm events and are not designed to prevent damage resulting from a major earthquake or tsunami.

### *2.3.4 Landslide Hazard*

To evaluate landslide hazards affecting the subject property, we reviewed available mapping from DOGAMI's Oregon HazVu database[18], which indicates that most of the developed portion of the property is located within an area of low landslide susceptibility, while portions of the existing foredune and the western edge of the property are mapped within an area of moderate to high landslide susceptibility (Figure 9). The mapped susceptibility is based on topographic conditions.

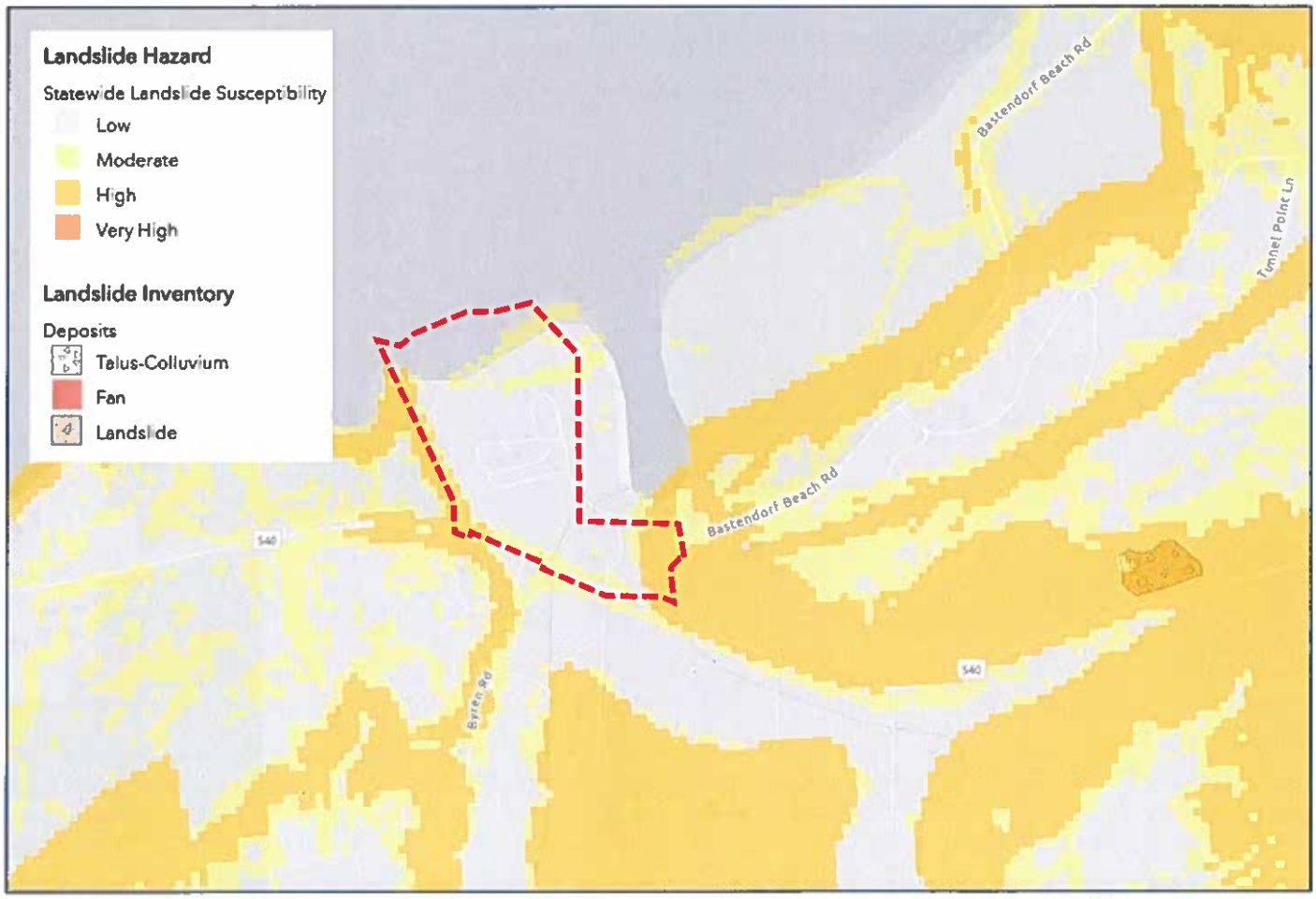



**Figure 9:** HazVu map illustrating areas of mapped landslide susceptibility. The subject parcel outlined in red.

[18] DOGAMI, *Oregon HazVu: Statewide Geohazards Viewer*.

We also reviewed the Statewide Landslide Information Layer for Oregon (SLIDO)[19] to identify previously mapped landslides in the project vicinity. Based on this review, the nearest mapped landslide is located approximately 0.39 miles east of the subject property (SLIDO data overlain on Figure 9 above). No mapped landslides are present within the project area.

Based on our site reconnaissance, the project area is underlain predominantly by unconsolidated beach and dune sands and does not contain evidence of deep-seated landslide activity. While localized sloughing of the dune face was observed, these features are characteristic of active coastal erosion and dune scarping associated with wave attack and wind erosion rather than landslide processes.

In our opinion, the potential for deep-seated landsliding within the project area is relatively low. The primary geologic hazard affecting the site is coastal erosion of the foredune, which is addressed by the proposed shoreline stabilization system described in this report.

[19] Oregon Department of Geology and Mineral Industries (DOGAMI), *Statewide Landslide Information Database for Oregon (SLIDO) Interactive Map*, available at: https://gis.dogami.oregon.gov/maps/slido/.

# 3.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

## 3.1 Geotechnical Discussion

The proposed shoreline stabilization design was developed based on our review of available geologic information, published coastal studies, site reconnaissance observations, topographic survey information, and our understanding of the shoreline processes affecting the project area. The proposed shoreline protection design is intended to reduce shoreline erosion, preserve the protective function of the existing foredune, and maintain an adequate buffer between active coastal processes and existing RV park infrastructure, including the sanitary sewer system located adjacent to the dune.

Based on our evaluation, the primary geotechnical considerations influencing the design include the following:

1. **Coastal Erosion and Dune Retreat** – Coastal erosion is the primary geologic hazard affecting the project area. As discussed in Section 2.3.1, the existing foredune is subject to periodic storm-induced erosion, wave runup, wind erosion, and seasonal fluctuations in beach elevation. During our May 2026 reconnaissance, localized erosion scarps, exposed roots, undercut vegetation, and sloughing of dune sands were observed along portions of the seaward dune face, indicating that active erosion is presently occurring. These observations are consistent with the short-term shoreline change trends identified by the USGS, as well as our evaluation of historical aerial imagery.

   Published shoreline change studies indicate that approximately 54 percent of shoreline transects within the Coos littoral cell experienced erosion during the short-term analysis period, despite the overall long-term accretional trend of the littoral cell. At the project location, the USGS shoreline change assessment indicates that shoreline behavior has transitioned from historical long-term accretion (approximately +5.9 feet per year) to slight short-term erosion (approximately -0.7 feet per year), illustrating the influence of localized coastal processes on shoreline behavior. Consistent with these findings, our review of historical Google Earth aerial imagery indicates that the apparent position of the vegetated foredune scarp retreated approximately 2 to 12 feet between May 2019 and March 2026, corresponding to estimated retreat rates of approximately 0.3 to 1.7 feet per year. Although the measured retreat varies along the shoreline, these observations indicate that localized erosion of the foredune has continued in recent years.

   The proposed hybrid shoreline stabilization system is intended to reduce the rate and severity of shoreline erosion by combining a vegetated sand section with a seaward dynamic cobble berm. Together, these features are intended to dissipate wave energy, reduce storm-induced scour and dune erosion, and maintain a protective buffer between the Pacific Ocean and existing RV park infrastructure while allowing the shoreline to continue functioning as a dynamic coastal environment. The proposed improvements are not intended to stop natural shoreline change, but rather to improve shoreline resilience and reduce the rate and severity of storm-induced erosion while remaining compatible with natural coastal processes.



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It should be noted, although the proposed improvements are expected to reduce erosion potential, coastal processes are inherently dynamic, and periodic maintenance should be anticipated following significant storm events. Inspections should evaluate the condition of the vegetated sand section, dynamic cobble berm, and adjacent shoreline for evidence of scour, settlement, rock displacement, exposure of the underlying filter/transition layer or biodegradable jute-wrapped sand lifts, or vegetation loss. Timely maintenance (e.g. redistribution of rock, localized sand replenishment, regrading, and revegetation where necessary) will help preserve the long-term performance of the shoreline stabilization system.

2. **Flooding and Wave Overtopping** – As discussed in Section 2.3.2, portions of the subject property, including the proposed shoreline stabilization improvements and the existing sanitary sewer system, are located within the FEMA 1-percent annual chance floodplain (100-year floodplain). As such, the project area is subject to periodic coastal flooding associated with elevated tides, storm surge, wave runup, and extreme storm events.

   Although flooding is not currently considered the primary hazard affecting the site, coastal flooding and wave overtopping are closely related to the erosion processes affecting the existing foredune. Storm-wave runup can erode the dune face, reduce dune elevation and width, transport sediment landward, and accelerate retreat of the shoreline. Continued erosion would reduce the natural buffer between the dune and existing RV park infrastructure, including the sanitary sewer system, increasing the potential for flooding, erosion, and damage to site improvements and critical utilities during future storm events.

   During our May 2026 site reconnaissance, driftwood and other storm-deposited debris were observed along the foredune. These observations are consistent with recent wave runup reaching the dune during high-water events and indicate that portions of the dune are periodically influenced by storm-wave overtopping. Continued erosion of the foredune would be expected to further increase the inland extent and potential impacts of wave runup during future storm events.

   The proposed shoreline stabilization system is intended to improve shoreline resilience by reducing storm-induced erosion and maintaining a protective buffer between the dune and existing infrastructure. However, the improvements are not intended to eliminate coastal flooding or prevent inundation during extreme events, including severe storm surge, king tides, tsunamis, or other events exceeding the design basis of the shoreline stabilization system.

3. **Regional Seismic Hazard** – As discussed in Section 2.3.3, the subject property is located within a tectonically active region where seismic hazards are associated with the Cascadia Subduction Zone (CSZ). Because the project area is underlain by unconsolidated beach and dune sands, a major seismic event could result in localized settlement, liquefaction, or lateral ground deformation that may affect both the existing shoreline and the proposed shoreline stabilization improvements. Likewise, tsunami inundation associated with a large offshore earthquake could cause erosion, scour, displacement of rock, or localized damage to the shoreline stabilization system.



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These hazards exist independently of the proposed project and are regional in nature. The proposed vegetated sand section and dynamic cobble berm are intended to reduce shoreline erosion associated with normal coastal processes and storm-wave impacts and are not designed to withstand or mitigate the effects of a major earthquake or tsunami. Following a significant seismic event, the shoreline stabilization improvements should be inspected for evidence of settlement, scour, displacement, or other damage, and repairs should be completed as necessary to maintain long-term performance.

4. **Climate Change** – Climate change represents an important long-term consideration for shoreline management along the Oregon coast. As discussed in Section 2.3.1, projected sea-level rise, changing storm patterns, and increasing wave energy are expected to impact coastal vulnerability over time. Future conditions may include higher water levels, increased wave runup, greater storm-wave erosion, and more frequent overtopping of coastal dunes. These long-term changes are expected to increase the susceptibility of the existing foredune to erosion if no stabilization measures are implemented. The proposed hybrid shoreline stabilization system provides a nature-based approach intended to reduce storm-induced erosion while maintaining shoreline function and allowing the system to adapt to changing coastal conditions.

Given the documented evidence of ongoing coastal erosion, the site's exposure to a high-wave-energy environment, the proximity of the existing sanitary sewer system to the active foredune, and the anticipated effects of climate change, we recommend implementation of permanent shoreline stabilization measures. This recommendation is based on site-specific observations, published shoreline change studies, and the critical nature of the existing utility infrastructure located immediately landward of the shoreline.

The proposed hybrid shoreline stabilization system, consisting of a vegetated sand section transitioning seaward to a dynamic cobble berm, is intended to dissipate wave energy, reduce storm-induced erosion, and maintain the existing foredune as a protective buffer between the Pacific Ocean and the sanitary sewer system while remaining compatible with the surrounding coastal environment.

In our opinion, the proposed improvements represent an appropriate nature-based solution for this site. Without stabilization, continued foredune retreat should be anticipated, progressively increasing the potential for damage to the sanitary sewer system. Periodic inspection and maintenance following major storm events should be incorporated into the long-term management of the shoreline stabilization improvements to preserve their intended performance.

## 3.2 Shoreline Stabilization Recommendations

Based on our evaluation, we recommend construction of a hybrid shoreline stabilization system consisting of a vegetated sand section and dynamic cobble berm. As used herein, the vegetated sand section consists of biodegradable jute-wrapped sand lifts, an overlying sand blanket intended to support establishment of native dune/coastal vegetation, and associated biodegradable jute and filter/transition materials.

The proposed improvements have been conceptually developed to extend approximately 200 feet along the shoreline with an overall footprint of approximately 50 feet measured from the top of bluff seaward to the existing beach level. The shoreline stabilization system will form a continuous approximately 20 percent finish slope across this footprint. The easternmost approximately 15 feet, measured seaward from the top of bluff, will consist of the vegetated sand section, with the remaining seaward portion consisting of the dynamic cobble berm. Beneath the lower portion of the vegetated sand section, an underlying cobble section will extend continuously seaward to connect with the exposed dynamic cobble berm.

A representative cross-section of the proposed shoreline stabilization system is presented in Figure 10 below. Plan views and additional cross-sectional details are provided in Appendices B and C, respectively.

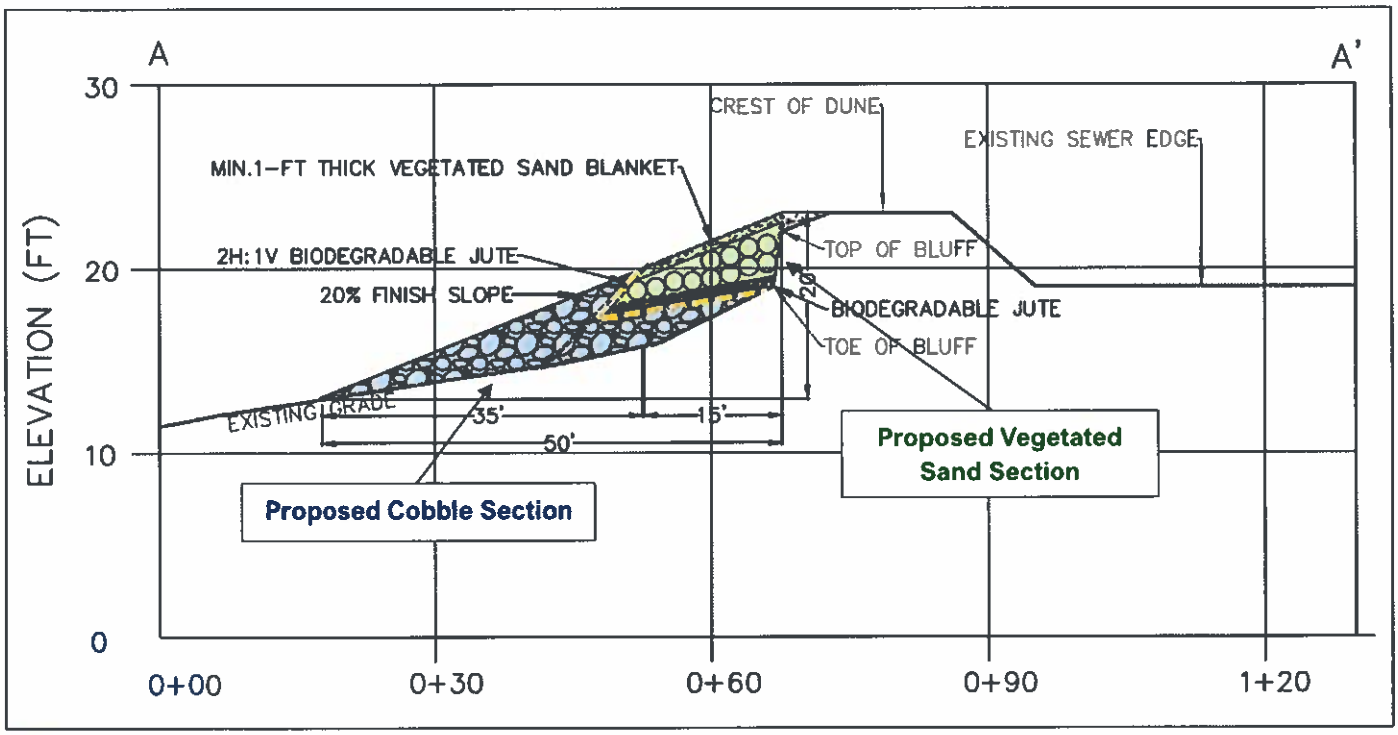



**Figure 10:** Representative configuration of the proposed hybrid system. The proposed vegetated sand section is highlighted in green, and the proposed cobble section is highlighted in blue. The proposed continuous biodegradable jute layer is outlined in orange, and the proposed filter layer is highlighted in red. It should be noted, vertical and horizontal scales are not equal (cross section shown with 2x vertical exaggeration).

The conceptual design presented herein was developed based on site topography, observed shoreline processes, published guidance regarding nature-based shoreline stabilization systems, engineering judgment, and the objective of maintaining compatibility with the surrounding coastal environment. Final construction details, construction sequencing, and material sourcing may be refined during final design provided the recommendations and design intent contained in this report are maintained.

The proposed shoreline stabilization system has been developed as a nature-based shoreline stabilization approach that minimizes the use of permanent structural materials while providing increased resistance to coastal erosion. Consistent with this objective, the design implements biodegradable and natural materials, including biodegradable jute used within the vegetated sand section. Although more conventional structural elements (e.g., permanent synthetic geotextiles or other engineered stabilization components) could increase the structural robustness of certain design elements, they are not recommended because they are inconsistent with the intended nature-based performance of the shoreline stabilization system.

### *3.2.1 Vegetated Sand Section*

The proposed vegetated sand section is intended to provide a nature-based transition between the existing dune and the seaward dynamic cobble berm while maintaining a surface intended to support establishment of native dune/coastal vegetation. The vegetated sand section will extend approximately 200 feet along the shoreline and occupy the easternmost approximately 15 feet of the shoreline stabilization system, measured seaward from the existing top of bluff. The finished surface of the vegetated sand section will follow the continuous approximately 20 percent slope of the overall shoreline stabilization system and will transition directly into the dynamic cobble berm without an abrupt break in grade.

Beneath the lower portion of the vegetated sand section, an underlying cobble section should be provided as described in Section 3.2.2. Continuous biodegradable jute fabric should be placed directly over the underlying cobble, followed by a minimum 12-inch-thick graded granular filter/transition layer. The filter/transition layer is intended to reduce migration of sand into the larger cobble voids and provide a more uniform bearing surface for the overlying sand lifts, while the jute fabric provides separation between the vegetated and cobble components.

Above the filter/transition layer, biodegradable jute-wrapped sand lifts should be stacked to form the vegetated sand section and buried transition geometry shown on Figure 10. Individual wrapped sand lifts should have a nominal filled thickness of approximately 2 feet and should consist of clean, beach-compatible sand enclosed in biodegradable natural-fiber fabric. The lifts should be placed in staggered, offset courses to provide continuous support and minimize significant voids between adjacent lifts.

Following placement of the sand lifts, the same continuous biodegradable jute fabric located beneath the filter/transition layer should be extended upward along the seaward face of the sand lifts to form the separator between the vegetated sand section and the dynamic cobble berm, as shown on Figure 10.

The wrapped sand lifts should then be covered with a minimum 1-foot-thick sand blanket intended to support establishment of native vegetation and extending to the proposed finish grade.

Following final grading, the vegetated sand section should be planted with appropriate native dune/coastal vegetation in an effort to establish vegetative cover and promote long-term surface stability, reduce wind erosion, trap wind-blown sand, and encourage continued dune development. The protective sand blanket should be



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maintained such that the underlying wrapped sand lifts remain fully encapsulated throughout the design life of the project. Exposure of the wrapped sand lifts following storm events would indicate localized erosion of the protective sand cover and should prompt sand replenishment and revegetation as part of routine maintenance.

The proposed vegetated sand section is intended to reinforce the seaward portion of the existing foredune by providing a by providing a sand mass and surface intended to support establishment of native dune/coastal vegetation while remaining compatible with the surrounding coastal landscape. If vegetation becomes established and natural sand accretion occurs, the vegetated sand section is expected to function in a manner similar to a natural foredune by trapping wind-blown sand, reducing surface erosion, and providing an additional buffer against storm-wave impacts. No permanent rigid structural elements are recommended within the vegetated sand section.

The term "vegetated sand section" refers to the intended design condition. Establishment and long-term persistence of vegetation will depend on site conditions, seasonal weather, storm-wave exposure, wind, salt spray, and other coastal processes and cannot be assured.

### *3.2.2 Dynamic Cobble Berm*

The seaward portion of the hybrid system should consist of a dynamic cobble berm constructed of durable rock capable of redistributing under wave loading. We recommend the use of rounded cobbles and coarse gravel with particle diameters generally ranging from 2 to 10 inches, with the majority of the material consisting of 4- to 8-inch cobbles. If suitably sized rounded cobbles are not reasonably available, durable angular quarry rock of similar gradation may be used as an alternative, provided the material is capable of developing a stable cobble berm profile under the anticipated wave conditions. The proposed cobble berm is intended to absorb and dissipate wave energy through controlled redistribution of the rock while maintaining an overall stable profile.

Prior to the placement of the vegetated sand section described above, cobble should be placed to form the underlying cobble section shown on Figure 10. The overlying biodegradable jute fabric, filter/transition layer, and vegetated section materials should be provided as described in Section 3.2.1.

The underlying cobble section should extend continuously seaward from beneath the vegetated sand section and connect directly with the exposed dynamic cobble berm along the remaining seaward portion of the shoreline stabilization system. This configuration is intended to provide a continuous cobble section without a discrete break between the buried and exposed portions of the system.

The exposed dynamic cobble berm should begin at the seaward limit of the approximately 15-foot-wide vegetated sand section and extend across the remaining seaward portion of the approximately 50-foot-wide shoreline stabilization footprint to tie into the existing beach level. The exposed cobble surface should follow the continuous approximately 20 percent finish slope shown on Figure 10. At the lateral limits of the shoreline stabilization system, the cobble section should taper into the adjacent existing shoreline conditions.



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The dynamic cobble berm is intended to function as the primary wave-energy dissipation component of the proposed shoreline stabilization system. By allowing controlled redistribution of the rock under storm-wave loading, the cobble berm is expected to reduce wave energy, minimize localized scour, and protect the vegetated portion of the shoreline profile from erosion. Along with the vegetated sand section, the dynamic cobble berm is intended to reduce storm-induced dune retreat while maintaining a shoreline profile that is generally compatible with the surrounding coastal environment.

### *3.2.3 Maintenance and Performance*

Given the project is located within a dynamic coastal environment, periodic inspection and maintenance should be anticipated over the design life of the shoreline stabilization system. Following construction, baseline shoreline conditions should be documented to facilitate future performance evaluations. Following significant storm events, the shoreline stabilization system should be inspected for evidence of erosion, scour, displacement of the cobble berm, loss of vegetation cover, exposure of the wrapped sand lifts, or exposure or loss of the underlying filter/transition layer.

Periodic beach profile surveys, topographic surveys, drone mapping, or other suitable monitoring methods may be used, as appropriate, to document shoreline change over time, evaluate the performance of the shoreline stabilization system, and identify maintenance needs. Maintenance activities may include redistribution or replacement of cobbles, localized sand replenishment, regrading of the vegetated sand section, revegetation, replacement of filter materials where necessary, and repair of localized erosion features. Vegetation establishment may be variable within the project area, and periodic replanting, sand replenishment, or other adaptive maintenance may be necessary where vegetation does not become established or is lost due to coastal processes.

Although the proposed project footprint is relatively smaller when compared to many dynamic revetment projects, it has been designed to address the project-specific objective of maintaining a protective buffer between the Pacific Ocean and the existing sanitary sewer infrastructure. The shoreline stabilization system has been developed as a hybrid system, with the vegetated sand section and dynamic cobble berm functioning together to improve shoreline resilience while minimizing disturbance to the existing beach and dune system. The proposed design also provides flexibility for future extension of the hybrid system along the subject property, if monitoring indicates that additional shoreline stabilization is warranted.

The proposed shoreline stabilization system is intended to reduce the rate and severity of storm-induced erosion while maintaining a protective buffer between the Pacific Ocean and the existing sanitary sewer system. Although the proposed improvements are expected to significantly reduce erosion potential, they are not intended to eliminate the effects of extreme coastal storms, long-term shoreline evolution, or sea-level rise. Accordingly, periodic monitoring and adaptive maintenance should be incorporated into the long-term management of the shoreline stabilization system to evaluate system performance and inform future maintenance or expansion, as warranted by observed shoreline conditions.



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# 4.0 CONSTRUCTION INSPECTIONS AND CONSIDERATIONS

## 4.1 Recommended Geotechnical Inspections

Certerra should be retained to provide geotechnical observation during construction to verify that the shoreline stabilization improvements are constructed generally in accordance with the recommendations presented in this report. Certerra cannot accept responsibility for conditions that differ from those described herein if construction observations are not performed.

At a minimum, we recommend the following geotechnical observations during construction:

1. Observation of the prepared subgrade prior to placement of the shoreline stabilization materials, including verification of grading, excavation limits, tie-in conditions, and general conformance with the proposed design geometry.

2. Observation of placement of the underlying cobble section beneath the lower portion of the vegetated sand section, including verification of material type, gradation, extent, general geometry, and configuration for subsequent connection with the exposed dynamic cobble berm.

3. Observation of placement the continuous biodegradable jute fabric directly on underlying cobble, followed by the graded granular filter/transition layer over the jute fabric, including verification of material type, thickness, extent, and general conformance with the design configuration.

4. Observation of placement of the biodegradable jute-wrapped sand lifts, including confirmation of sand and wrapping materials, nominal filled lift thickness, stacking configuration, and general conformance with the design geometry.

5. Observation of the extension of the continuous biodegradable jute fabric from beneath the filter/transition layer upward along the seaward face of the sand lifts to form the separator between the vegetated sand section and dynamic cobble berm.

6. Observation of placement of the exposed dynamic cobble berm along the remaining seaward portion of the shoreline stabilization system, including verification of material type, gradation, extent, continuous connection with the underlying cobble section, interface with the vegetated sand section, and conformance with the proposed 20 percent finish slope.

7. Observation of placement and grading of the minimum 1-foot-thick sand blanket intended to support establishment of native vegetation over the wrapped sand lifts, including verification of thickness and continuation of the 20 percent finish slope through the vegetated sand section.

8. Final inspection of the completed shoreline stabilization system, including verification of vegetation planting, transitions to existing grades, and general conformance with the design intent.

In addition, prior to the start of construction, we recommend that a representative of Certerra attend the pre-construction meeting with the contractor and the Oregon Parks and Recreation Department Permit Specialist to confirm alignment between the approved design, permit conditions, and geotechnical recommendations, and to address construction sequencing or site-specific considerations.

### 4.2 Construction Considerations

We are providing the following construction considerations for the subject project:

- **Construction Sequencing** – Construction should generally proceed in the following order:
    1) Prepare and grade the shoreline stabilization footprint and tie-in areas.
    2) Place the underlying cobble section beneath the lower portion of the vegetated sand section, extending seaward to the location of the exposed dynamic cobble berm.
    3) Place continuous biodegradable jute fabric directly over the underlying cobble, followed by the minimum 12-inch-thick graded granular filter/transition layer.
    4) Place and stack the biodegradable jute-wrapped sand lifts. Following placement of the sand lifts, extend the continuous jute fabric upward along the seaward face of the sand lifts to form the separator between the vegetated sand section and dynamic cobble berm.
    5) Complete placement and grading of the exposed dynamic cobble berm along the remaining seaward portion of the system, tying it continuously into the underlying cobble section and establishing the continuous 20 percent finish slope.
    6) Place and grade the minimum 1-foot-thick sand blanket intended to support establishment of native vegetation over the wrapped sand lifts to continue the 20 percent finish slope through the vegetated sand section.
    7) Complete revegetation and final site restoration.
- **Site Access and Equipment Staging** – Construction equipment, materials, and personnel should access the site using routes that minimize disturbance to existing dunes, vegetation, and RV park operations. Equipment staging and material stockpiles should be located outside environmentally sensitive areas whenever practicable.
- **Tidal and Weather Conditions** – Construction activities near the active beach should be scheduled to consider tidal and weather conditions. Tide cycles, wave forecasts, and storm conditions should be monitored throughout construction. Work within the lower beach should be avoided during periods of elevated wave activity or forecast storm events.
- **Protection of Existing Infrastructure** – Construction activities should be coordinated to avoid disturbance of the existing sanitary sewer system and other buried utilities. Utility locations should be field verified prior to excavation.

- **Temporary Erosion Control** – Temporary erosion and sediment control measures should be implemented throughout construction to minimize sediment transport and protect adjacent beach and dune environments. Disturbed areas not immediately incorporated into the shoreline stabilization system should be stabilized as soon as practicable.
- **Revegetation** – Revegetation should occur as soon as practical following final grading. Native dune vegetation should be installed during the appropriate planting season to improve the likelihood of successful establishment and long-term vegetative cover.
- **Environmental Compliance** – All construction activities should be performed in accordance with applicable local, state, and federal permit conditions.

It should be noted, the construction means and methods are ultimately up to the contractor.



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# 5.0 POTENTIAL IMPACTS AND ADDITIONAL CONSIDERATIONS

## 5.1 Impacts to Sand Source, Supply, and Movement

Sand along the Oregon coast is supplied primarily by sediment transported from rivers and streams, erosion of coastal dunes and bluffs, and the continual redistribution of sediment by waves, tides, wind, and currents. These processes operate within littoral cells, where sediment is continually exchanged between the beach, dunes, and nearshore environment. Seasonal fluctuations and episodic storm events, including El Niño conditions, commonly result in periods of erosion followed by gradual recovery as sediment is redistributed within the littoral system.

The proposed shoreline stabilization system has been specifically developed to maintain compatibility with natural sediment transport processes. The vegetated sand section is intended to integrate with the existing foredune by providing additional sand volume and a surface suitable for establishment of native dune vegetation along the upper portion of the shoreline profile, with the intent of promoting wind-blown sand deposition and supporting continued dune development over time. In addition, the cobble berm is designed to dissipate wave energy through controlled redistribution of the rock particles during storm events while minimizing disruption to natural shoreline processes.

The project is not expected to substantially interrupt littoral sediment transport or result in measurable reductions in sediment supply to adjacent shorelines. While stabilization of the existing foredune may reduce localized erosion of dune sediments within the project footprint, the footprint represents only a very small portion of the overall Coos littoral cell (approximately 200 feet of more than 50 miles of shoreline). Published USGS shoreline change studies indicate that shoreline behavior within the Coos littoral cell is governed by regional sediment transport processes operating over tens of miles of coastline. Given the limited length of the proposed shoreline stabilization system and its dynamic, permeable, nature-based design, it is our professional opinion that the project will not measurably alter regional sand supply, sediment transport pathways, or shoreline change patterns within the Coos littoral cell. Instead, the proposed improvements are expected to maintain sediment continuity and function in conjunction with existing coastal processes while reducing localized storm-induced erosion within the project limits.

## 5.2 Analysis of Hazard Avoidance

Prior to developing the recommended shoreline stabilization system, we evaluated a range of shoreline protection alternatives described in the "Guidebook on Erosion Control Practices on the Oregon Coast" (referred to herein as the Guidebook).[20] Alternatives considered included vegetative stabilization, dynamic revetments, sand alteration, and conventional rigid shoreline protection measures. The objective of this evaluation was to identify the least intrusive alternative capable of reducing coastal erosion while maintaining compatibility with the surrounding coastal environment and protecting the existing sanitary sewer system.

[20] Bond, H., 2021, *Guidebook on Erosion Control Practices on the Oregon Coast*, Oregon Department of Land Conservation and Development (DLCD).

### *5.2.1 Vegetative Stabilization Structures*

Vegetative stabilization is one of the primary nature-based shoreline protection approaches identified in the Guidebook. This approach can range from simply planting vegetation along the shoreline to more involved methods such as constructing non-structural bank stabilization features (e.g., "burrito" berms made of sand, clay, or soil wrapped in fabric), which are then planted with native vegetation.

Vegetative stabilization provides important ecological and shoreline resilience benefits by promoting dune development, trapping wind-blown sand, reducing surface erosion, and improving long-term stability of the dune surface. However, vegetation alone generally does not provide sufficient resistance to direct storm-wave attack in high-wave-energy coastal environments. Severe storm events can rapidly erode newly placed sand before vegetation becomes fully established, particularly where repeated wave runup reaches the foredune toe.

Rather than rejecting this approach, the proposed shoreline stabilization system incorporates vegetative stabilization as a principal design element. The vegetated sand section is designed to provide a sand mass and surface suitable for planting native dune vegetation along the landward portion of the shoreline stabilization system, with the intent of establishing vegetative cover while maintaining a shoreline profile compatible with the surrounding coastal environment. Successful establishment and persistence of vegetation will depend on site and coastal conditions. However, because vegetation alone is not expected to adequately resist the anticipated storm-wave conditions, supplemental wave-energy dissipation measures are warranted along the seaward portion of the shoreline profile.

### *5.2.2 Dynamic Cobble Revetment*

Dynamic cobble revetments are another nature-based shoreline stabilization approach described in the Guidebook. Unlike conventional rigid revetments, dynamic cobble revetments consist primarily of rounded cobbles that are intentionally allowed to redistribute during storm events. Wave energy is dissipated through controlled movement of the individual rock particles while maintaining an overall stable profile.

A dynamic cobble revetment alone would provide improved wave-energy dissipation relative to existing conditions. However, it would not provide a suitable medium for establishment of native dune vegetation. Consequently, a dynamic cobble revetment alone would provide less overall protection to the sanitary sewer system than a hybrid shoreline stabilization approach.

Accordingly, the proposed project incorporates a dynamic cobble berm as the seaward component of a hybrid shoreline stabilization system. The cobble berm is intended to dissipate wave energy and reduce storm-induced erosion while working in combination with the vegetated sand section to improve the overall resilience of the shoreline.



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### *5.2.3 Sand Alteration*

Sand alteration, commonly referred to as beach or dune nourishment, involves placement of sand to restore beach width, dune elevations, or sediment supply. These approaches can improve shoreline resilience by increasing dune volume and encouraging natural dune development.

Although beach nourishment can provide temporary erosion reduction, it remains susceptible to continued wave erosion and generally requires periodic replenishment following major storm events. Without additional stabilization measures, newly placed sand may be rapidly redistributed by waves, tides, and wind before long-term equilibrium is established. Accordingly, sand nourishment alone was not considered sufficient to provide reliable long-term protection of the existing sanitary sewer system.

The proposed shoreline stabilization system incorporates compatible beach sand as an integral component of the biodegradable jute-wrapped sand lifts and minimum 1-foot-thick sand blanket intended to support establishment of native vegetation. Sand placement therefore complements, rather than replaces, the other shoreline stabilization measures incorporated into the proposed design.

### *5.2.4 Rigid Structural Shoreline Protection*

Conventional rigid shoreline protection measures, such as riprap revetments, seawalls, bulkheads, and concrete armor systems, were also considered as part of our evaluation. These approaches are generally designed to provide a high level of resistance to direct wave attack by armoring the shoreline with large rock or engineered structural elements. When properly designed and maintained, rigid shoreline protection systems can provide effective long-term erosion protection in high-energy coastal environments.

From a geotechnical perspective, a conventional riprap revetment would likely provide effective long-term protection of the existing sanitary sewer system. However, compared to the proposed hybrid shoreline stabilization system, a riprap revetment would require substantially larger armor stone, greater excavation, and a more extensive permanent structural footprint, resulting in greater alteration of the existing dune environment. Given the project objectives and applicable regulatory considerations, the additional structural footprint was not considered warranted, and the proposed hybrid shoreline stabilization system was identified as the preferred alternative.

The subject property is also subject to Statewide Planning Goal 18 and applicable Coos County shoreline regulations, which generally limit new rigid protective structures and encourage the consideration of non-structural or nature-based shoreline stabilization measures where feasible. Conventional rigid shoreline protection, such as riprap revetments or seawalls, would likely be subject to additional regulatory review under Goal 18. In contrast, the proposed hybrid shoreline stabilization system was specifically developed to utilize nature-based stabilization techniques while minimizing permanent structural armoring and maintaining compatibility with the surrounding coastal environment.

#### *5.2.5 Relocation of Existing Infrastructure*

Relocation of the existing sanitary sewer system was considered as a potential alternative to shoreline stabilization. However, relocation would require substantial reconstruction of existing utility infrastructure within the RV park and would not eliminate the underlying coastal erosion affecting the shoreline. Continued foredune erosion would remain a concern for adjacent park infrastructure and would progressively reduce the available buffer between the shoreline and existing improvements.

Relocation would also require significant utility reconstruction, service interruptions, and associated environmental disturbance, resulting in costs disproportionate to the level of hazard reduction achieved. Accordingly, relocation of the sanitary sewer infrastructure was not considered a practical or effective hazard avoidance measure for this project.

#### *5.2.6 Conclusion*

Based on our evaluation of the available shoreline stabilization alternatives, it is our professional opinion that the proposed hybrid shoreline stabilization system represents the least intrusive alternative capable of providing reasonable long-term protection for the existing infrastructure while maintaining compatibility with the surrounding coastal environment. The recommended design appropriately balances shoreline protection, environmental considerations, and the applicable regulatory framework.

The recommended design combines the principal advantages of the individual alternatives while minimizing their respective limitations. The vegetated sand section provides a sand mass intended to support establishment of native vegetation and reinforce the existing foredune. The cobble berm provides additional protection against storm-wave attack by dissipating wave energy before it reaches the vegetated sand section. Together, these components provide complementary shoreline stabilization functions that improve erosion resistance while maintaining compatibility with natural shoreline processes.

### 5.3 Summary of Hazards and Project Impact

This section summarizes the known and suspected geologic and seismic hazards present within the project area and describes how the proposed shoreline stabilization system may affect, or be affected by, those hazards. This summary is intended to consolidate the hazard evaluations presented elsewhere in this report for clarity and regulatory review and to describe the relationship between existing hazard conditions and the proposed project.

For a more detailed evaluation of the individual hazards and the basis for the conclusions presented herein, refer to Section 2.3 (Geologic Hazards) above. For additional discussion regarding how these hazards influenced development of the proposed shoreline stabilization design, refer to Section 3.1 (Geotechnical Discussion).



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### *5.3.1 Coastal Erosion Hazard*

Coastal erosion represents the primary geologic hazard affecting the project area. As discussed in Section 2.3.1, site reconnaissance documented active erosion of the existing foredune, including localized erosion scarps, exposed roots, undercut vegetation, and sloughing of dune sands. Review of historical aerial imagery indicates that the apparent position of the vegetated foredune scarp retreated approximately 2 to 12 feet between May 2019 and March 2026, corresponding to estimated localized erosion rates ranging from approximately 0.3 to 1.7 feet per year.

These observations are consistent with the U.S. Geological Survey shoreline change assessment (Ruggiero et al., 2013), which indicates that although the Coos littoral cell has exhibited an overall long-term accretional trend, approximately 54 percent of shoreline transects experienced erosion during the short-term analysis period. At the project location, the mapped shoreline change data indicate a transition from historical long-term accretion (approximately +5.9 feet per year) to slight short-term erosion (approximately -0.7 feet per year), supporting our conclusion that the project area is currently experiencing localized shoreline retreat.

Continued erosion of the foredune would reduce the protective buffer between the Pacific Ocean and the existing sanitary sewer system, increasing the potential for damage to existing infrastructure if stabilization measures are not implemented.

The proposed shoreline stabilization system has been specifically developed to reduce the rate and severity of shoreline erosion at the subject property by reinforcing the upper shoreline profile with the vegetated sand section, which incorporates jute-wrapped sand lifts and is intended to support establishment of native vegetation, and dissipating wave energy along the seaward portion of the system with a dynamic cobble berm. The proposed improvements are expected to reduce localized erosion and foredune retreat while maintaining compatibility with natural shoreline processes and sediment transport.

Because the proposed shoreline stabilization system extends only approximately 200 feet and consists of a dynamic, nature-based shoreline stabilization approach intended to function in equilibrium with natural sediment transport processes, it is our professional opinion that the project will not measurably alter regional sand supply, sediment movement, shoreline change patterns, erosion rates, or bluff stability within the Coos littoral cell. Likewise, the proposed project is not expected to increase erosion potential or adversely affect bluff or foredune stability on adjacent properties. Rather, the project addresses an existing site-specific erosion hazard while maintaining compatibility with natural coastal processes.

### *5.3.2 Flood Hazard and Wave Overtopping*

Portions of the subject property, including the footprint of the proposed shoreline stabilization improvements are located within the FEMA 1-percent annual chance floodplain (Flood Zone VE). The project area is therefore subject to periodic coastal flooding associated with elevated tides, storm surge, wave runup, and extreme storm events.

Continued erosion of the foredune would reduce the elevation and width of the natural barrier separating the Pacific Ocean from the upland improvements, increasing the frequency and severity of wave overtopping and localized flooding. Repeated inundation may contribute to erosion of supporting soils, localized scour, and damage to existing infrastructure, including the sanitary sewer system.

The proposed shoreline stabilization system is not intended to eliminate coastal flooding or prevent overtopping during extreme coastal events. However, by reinforcing the seaward portion of the existing dune and reducing continued foredune erosion, the project is expected to improve shoreline resilience and maintain a protective buffer between the Pacific Ocean and existing infrastructure. In our professional opinion, construction of the proposed shoreline stabilization system will not increase coastal flooding, wave overtopping, flood-related erosion, or associated flood hazards on the subject property or adjacent properties relative to existing conditions.

### *5.3.3 Earthquake, Liquefaction and Tsunami Hazards*

The project area is subject to severe ground shaking from Cascadia Subduction Zone (CSZ) and local crustal earthquake, susceptible to liquefaction during strong seismic shaking, and is located within a mapped tsunami inundation zone. Strong seismic shaking could result in localized settlement, liquefaction, lateral spreading, or deformation of underlying soils, potentially causing localized displacement or reshaping of portions of the shoreline stabilization system. Tsunami inundation and associated coastal reconfiguration may also alter beach elevations or redistribute portions of the hybrid stabilization system.

The proposed shoreline stabilization system will not increase seismic, liquefaction, or tsunami hazards and does not influence earthquake occurrence or tsunami generation. Although the proposed improvements are not intended to prevent damage resulting from major seismic or tsunami events, the non-rigid nature of the hybrid system is expected to accommodate localized deformation and material redistribution more effectively than conventional rigid shoreline protection structures. Deformation or redistribution of shoreline materials may occur following a major seismic or tsunami event; however, these hazards already exist under current site conditions and are not increased by the proposed project.

### *5.3.4 Landslide and Bluff Stability Hazard*

Based on our site reconnaissance and review of available geologic information, the potential for deep-seated landsliding at the subject property is considered low. The primary slope hazard consists of localized sloughing and instability of the foredune resulting from ongoing wave attack and toe erosion.

The proposed shoreline stabilization system is expected to improve localized foredune stability by reducing continued toe erosion, which is the principal mechanism driving localized sloughing and retreat. Because the project does not significantly modify shoreline alignment, interrupt regional sediment transport, or redirect wave energy toward adjacent shorelines, it is our professional opinion that the proposed improvements will not adversely affect bluff or foredune stability on neighboring properties.

### *5.3.5 Climate Change and Sea Level Rise*

Projected sea level rise and increasing storm intensity are expected to increase wave runup, inundation frequency, and erosive forces over time, potentially accelerating shoreline retreat relative to historical conditions. These changes will place additional long-term demands on shoreline stabilization measures and increase the importance of periodic inspection, maintenance, and adaptive management.

The proposed shoreline stabilization system does not contribute to climate change or sea level rise but instead represents an adaptive, nature-based response to evolving coastal conditions. The combination of the vegetated sand section and dynamic cobble berm is intended to improve shoreline resilience while remaining compatible with natural shoreline processes. Periodic maintenance should be anticipated throughout the design life of the project to maintain the intended performance of the shoreline stabilization system as coastal conditions continue to evolve.

### *5.3.6 Overall Hazard Interaction and Project Effect*

In our professional opinion, the proposed shoreline stabilization system will not create, worsen, or transfer geologic, coastal, flood, or seismic hazards. Likewise, the proposed project is not expected to measurably alter regional sand supply, sediment transport, shoreline change patterns, erosion rates, or bluff stability within the Coos littoral cell, nor is it expected to adversely affect adjacent properties.

Rather, the proposed project addresses an existing, active coastal erosion hazard by reducing continued foredune retreat, improving localized foredune stability, and maintaining a protective buffer between the Pacific Ocean and existing RV park infrastructure, including the sanitary sewer system. Although the proposed shoreline stabilization system is not intended to eliminate flooding or prevent damage resulting from extreme coastal storms, earthquakes, or tsunami events, it represents a site-appropriate, nature-based shoreline stabilization approach that is expected to improve shoreline resilience while remaining compatible with natural coastal processes. Periodic inspection and maintenance should be anticipated throughout the design life of the project to maintain the intended performance of the shoreline stabilization system.



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## 6.0 REPORT LIMITATIONS

As is standard practice in the geotechnical engineering profession, the conclusions and recommendations presented in this report are based on our review of available project information, site reconnaissance, published geologic data, available topographic information, and our professional interpretation of existing site conditions. The performance of the proposed shoreline stabilization system will depend upon construction in general accordance with the recommendations presented herein, future coastal processes, and continued inspection and maintenance throughout the design life of the improvements. This report has been prepared in accordance with generally accepted geotechnical engineering practices applicable to similar projects in the Pacific Northwest. No other warranty, express or implied, is intended or should be inferred.

Certerra should be retained to perform geotechnical observations during construction to verify that the shoreline stabilization system is constructed in general accordance with the recommendations presented in this report. If Certerra is not retained to perform construction observations, we cannot accept responsibility for conditions that differ from those assumed in this report or for the performance of improvements constructed without our observation. Should another geotechnical consultant perform construction observations, that consultant should assume responsibility for evaluating field conditions and providing any modifications to the recommendations presented herein.

The subject property is located within a dynamic coastal environment subject to wave attack, coastal erosion, seasonal fluctuations in beach elevation, storm surge, flooding, sea-level rise, seismic shaking, and tsunami inundation. These natural processes are inherently variable and cannot be predicted with certainty. Although the proposed hybrid shoreline stabilization system is intended to substantially reduce storm-induced erosion and improve shoreline resilience, no shoreline stabilization measure can eliminate these natural hazards or guarantee protection during extreme events. Periodic inspection, maintenance, and adaptive management should therefore be anticipated throughout the service life of the shoreline stabilization system.

The recommendations presented in this report are based on the available project information. If project conditions, site conditions, proposed improvements, or design assumptions change, Certerra should be notified so that we may evaluate whether revisions to our recommendations are warranted. Certerra cannot be responsible for implementation of these recommendations if changes are made without our knowledge.

This report presents conceptual design recommendations intended to support permitting and preliminary design. Minor adjustments to geometry and material specifications may be appropriate during final design and/or construction provided the engineering intent and recommendations presented herein are maintained.

This report has been prepared exclusively for Sun Outdoors Coos Bay RV Park for use in the planning, permitting, design, and construction of the proposed hybrid shoreline stabilization system at the subject property in Coos Bay, Oregon. The report is intended solely for the project and purpose described herein and should not be relied upon for other projects or by third parties without the prior written authorization of Certerra Northwest, LLC.



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# APPENDICES

# Appendix A – Site Location Plan

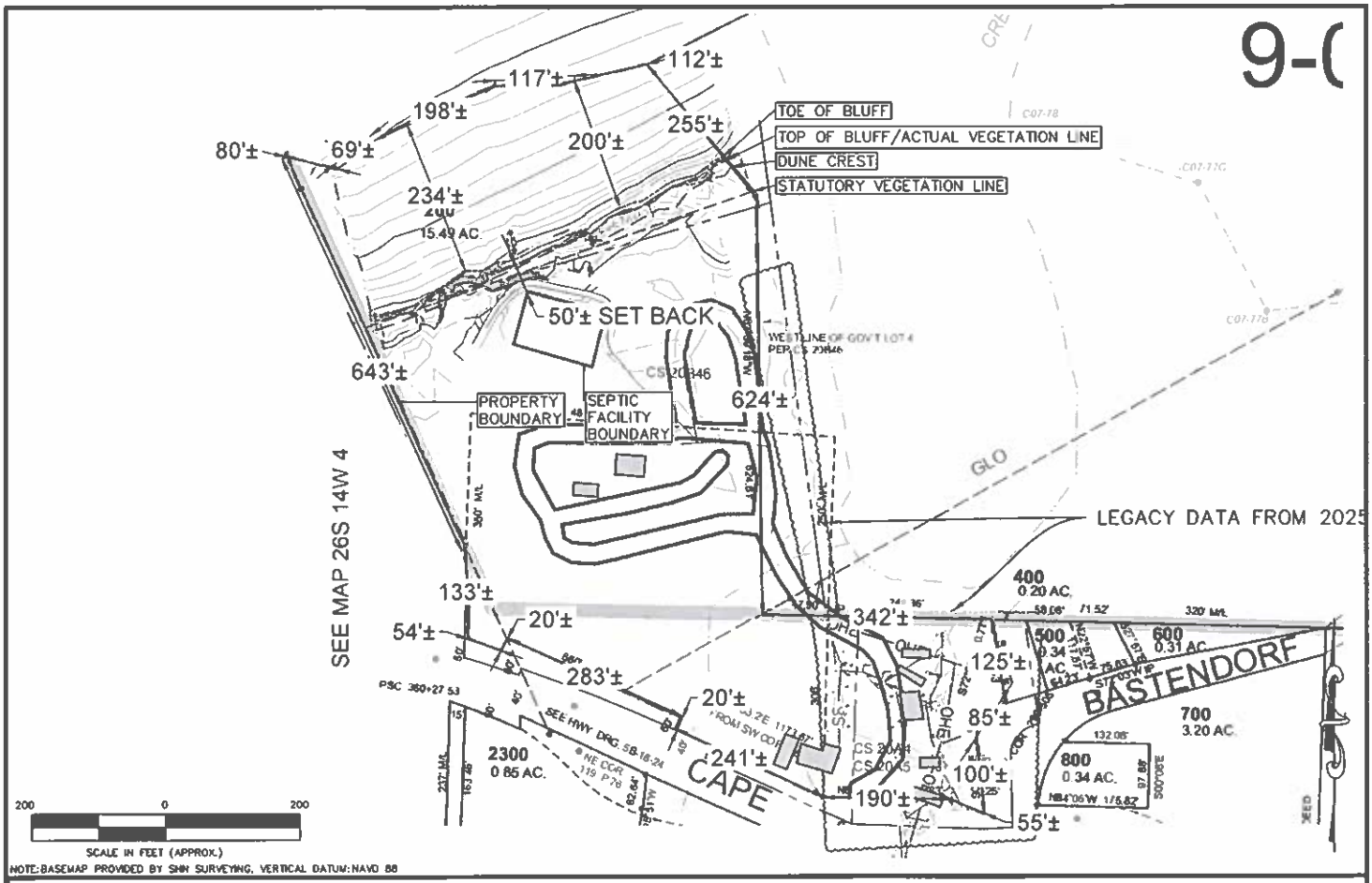
# APPENDIX A – SITE LOCATION PLAN




Map Source: https://ngmdb.usgs.gov/topoview

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| CERTERRA EARTH ENGINEERS | Proposed Shoreline Stabilization System<br>Sun Outdoors Coos Bay RV Park<br>90281 Cape Arago Highway<br>Coos Bay, Coos County, Oregon | Report No.<br>10-242216-03-R1<br><br>September 18, 2026 |

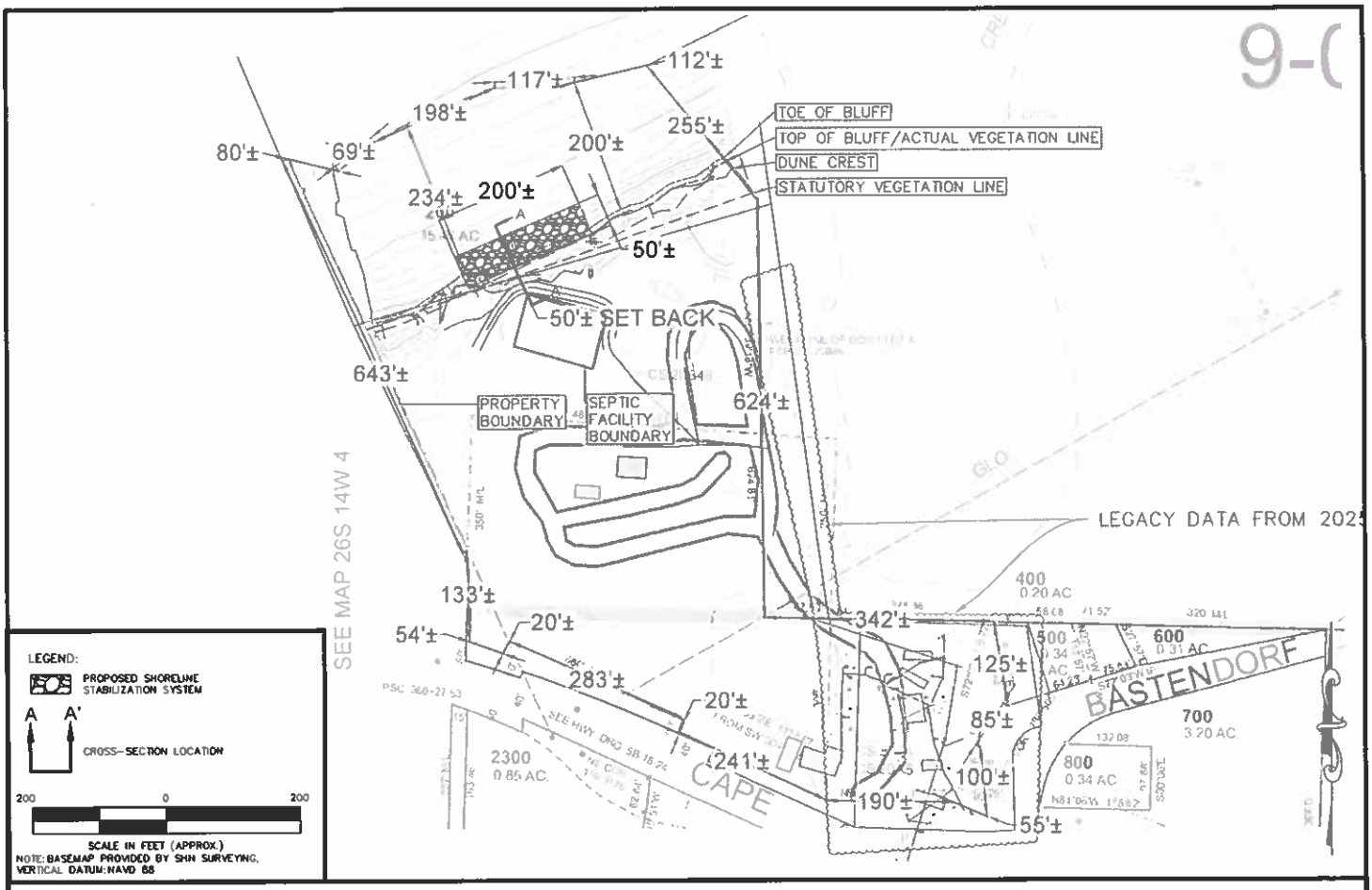
# Appendix B – Existing and Proposed Site Plans




NOTE: BASEMAP PROVIDED BY SHN SURVEYING, VERTICAL DATUM: NAVD 88

**EXISTING CONDITIONS - PLAN VIEW**

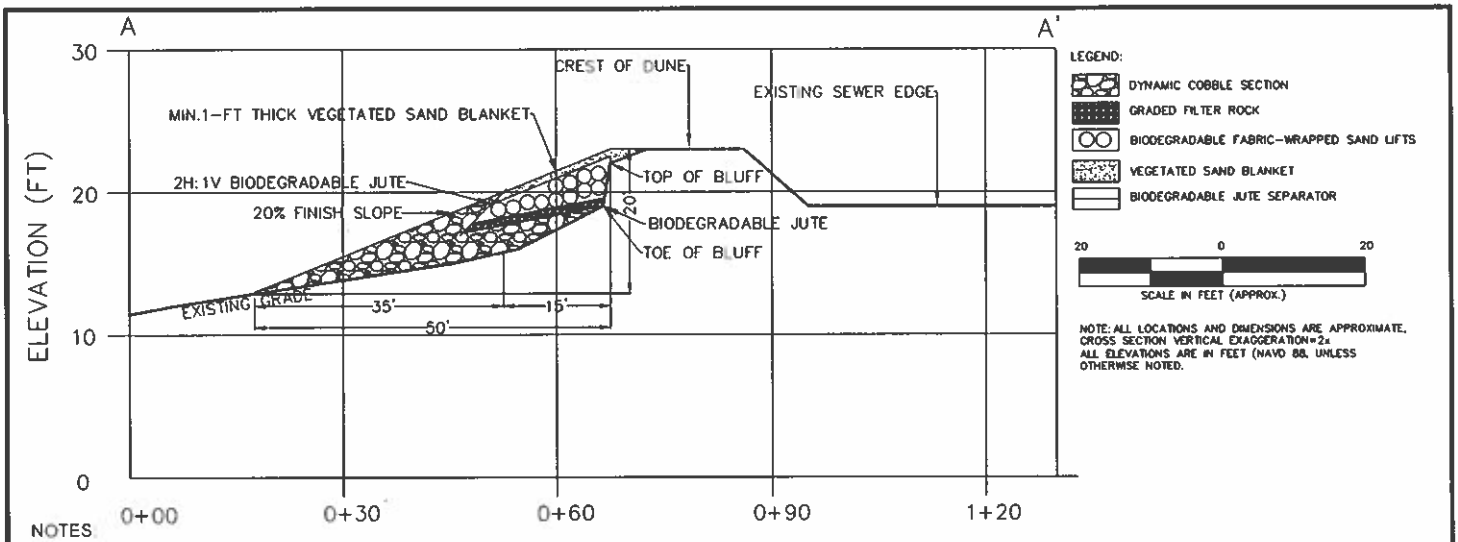
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| CERTERRA | Shoreline Protection Assessment<br>Sun Outdoors<br>Coos Bay, Oregon | Report No.<br>10-242216 | September 18, 2026 |




**PROPOSED CONDITIONS - PLAN VIEW**

| | | | |
|---|---|---|---|
| CERTERRA | **Shoreline Protection Assessment**<br>**Sun Outdoors**<br>**Coos Bay, Oregon** | **Report No.**<br>**10-242216** | **September 18, 2026** |

# Appendix C – Proposed Shoreline Stabilization System Cross-Section




NOTES

- The shoreline stabilization system shall extend from the top of bluff seaward to the existing beach level at a continuous 20 percent finish slope. The easternmost 15 feet, measured seaward from the top of bluff, shall consist of a vegetated sand section, with the remaining seaward portion consisting of a dynamic cobble berm. The finished surface shall transition continuously between the two sections without an abrupt break in grade.
- Beneath the lower portion of the vegetated sand section, provide an underlying cobble section extending continuously seaward to connect directly with the exposed dynamic cobble berm, as shown.
- Over the underlying cobble, place continuous biodegradable jute fabric followed by a minimum 12-inch-thick graded granular filter/transition layer to reduce migration of sand into cobble voids and provide a more uniform bearing surface for the overlying sand lifts.
- Over the filter/transition layer, construct stacked biodegradable jute-wrapped sand lifts with a nominal filled thickness of approximately 2 feet. Following placement of the sand lifts, extend the same continuous biodegradable jute fabric from beneath the filter/transition layer upward along the seaward face of the sand lifts to form the separator between the vegetated section and dynamic cobble berm, as shown.
- Provide a minimum 1-foot-thick sand blanket over the wrapped sand lifts, intended to support establishment of native dune/coastal vegetation. Grade the sand blanket to maintain the continuous 20 percent finish slope.
- Construct the dynamic cobble berm along the remaining seaward portion of the shoreline stabilization system, continuously connecting with the underlying cobble section beneath the vegetated section. The dynamic cobble berm and underlying cobble section shall consist of rounded cobbles generally ranging from 2 to 10 inches in diameter, with the majority between 4 and 8 inches. If rounded cobbles are not available, durable angular quarry rock of similar gradation may be used, subject to approval.
- At the lateral limits of the shoreline protection system, taper the proposed improvements into the adjacent existing shoreline conditions to provide a smooth transition in grade and materials.
- Following construction, plant the sand blanket with native dune/coastal vegetation in an effort to establish vegetative cover. Periodic inspection and maintenance should be anticipated following significant storm events, including redistribution of cobbles, sand replenishment, regrading, replanting, and localized repairs as necessary.

**PROPOSED CONDITIONS - CROSS-SECTION VIEW A-A'**

| CERTERRA | Shoreline Protection Assessment<br>Sun Outdoors<br>Coos Bay, Oregon | Report No.<br>10-242216-03 | September 18, 2026 |
|---|---|---|---|

# Ocean Shores Construction Impacts, Staging, and Public Safety Plan

Sun Outdoors Coos Bay RV Park
90281 Cape Arago Hwy, Coos Bay, OR 97420

Below is the Construction Impacts, Staging, and Public Safety Plan for the proposed construction of a hybrid shoreline stabilization system, consisting of a vegetated berm transitioning seaward into a cobblestone dynamic revetment (the "Project"), by Clean Rivers Erosion Control, Inc. ("Contractor") at Sun Outdoors Coos Bay RV Park, 90281 Cape Arago Highway, Coos Bay, Oregon (the "Property"). This plan addresses the applicable elements of the Oregon Parks and Recreation Department (OPRD) Ocean Shores Construction Impacts, Staging, and Public Safety Plan Guidelines (the "Guidelines").

This plan is accompanied by a Construction Staging and Access Site Plan, which identifies the upland staging area, equipment access route, haul routes, public access, construction fencing and signage, and other features required under Section 2(b) of the Guidelines. Together, these materials demonstrate that the Project has been designed to avoid and minimize impacts to the beach, adjacent properties, and public use areas.

Construction will be conducted entirely from the Property. All construction access will be through the Property from Cape Arago Highway, and no vehicular traffic will occur on the beach. All staging of materials, equipment parking, and other support activities will occur upland in the Property's southwest parking lot. The only equipment that will operate within the on-beach work area is a single skid steer that will place and shape the berm and revetment materials. No beach staging and no hauling of materials along the shoreline will occur. As described below, all construction activities will be carefully managed to maintain public safety and avoid impacts on public recreation.

## A. Overview of Staging and Work Areas

The proposed shoreline stabilization system will extend approximately 200 feet along the shoreline adjacent to the Property's existing sanitary sewer system, with an overall footprint of approximately 50 feet measured from the landward tie-in with the existing dune to the seaward toe of the dynamic revetment. The location and approximate limits of the work area, staging area, and equipment access route are shown on the Construction Staging and Access Site Plan.

All staging of materials, equipment parking, and other support activities will occur upland in the Property's southwest parking lot, which is the developed parking area closest to the work area. The staging area requires no excavation, grading, or movement of existing materials to make it usable for staging.

The cobble and rock materials for the dynamic revetment—durable cobbles and coarse gravel with particle diameters generally ranging from 2 to 10 inches, with the majority consisting of 4- to 8-inch cobbles—will be sourced from the Knife River rock pit located approximately 12 miles from the Project. Rock, filter aggregate, sand, and other construction materials will be delivered by dump truck to the upland staging area on an as-needed basis during active construction. To minimize the footprint and duration of stockpiling, no more than a one-week supply of rock will be stored in the staging area at any time. Other materials staged on site will include beach-

compatible sand, well-graded filter aggregate, biodegradable (jute or coir) fabric and sand bags, and native plant materials for revegetation.

The staging area will be demarcated with "warning," "keep out," and "construction zone" signage and will be enclosed by construction fencing during non-work hours. During non-work hours, all equipment, including the Contractor's skid steer, will be stored within the upland staging area. No equipment or materials will be staged or stored on the beach outside of active construction periods.

### B. Beach Access

The only equipment that will operate in the on-beach work area is a single yellow CAT 299 skid steer fueled with hydrotreated vegetable oil (HVO) renewable diesel.

The skid steer will access the work area directly from the upland staging area via the equipment access route shown on the Construction Staging and Access Site Plan, which crosses the Property from the southwest parking lot to the work area.

This access route has been selected to avoid any vehicular travel along the beach, avoid use of any public access point, and minimize disturbance to the existing dune, vegetation, and RV park operations. The skid steer will enter and exit the work area at this single location and will not travel beyond the immediate work area. Upon completion of construction, any areas disturbed by equipment access will be restored to pre-construction conditions.

### C. Proposed Haul Routes

No haul routes on the beach are necessary. All rock, sand, and other construction materials will be delivered by truck to the upland staging area through the Property from Cape Arago Highway. From the staging area, materials will be transported to the work area by the Contractor's skid steer using the designated equipment access route shown on the Construction Staging and Access Site Plan.

### D. Temporary Impacts on Public Access and Beach Use

Public use of the segment of beach fronting the Property is naturally limited. The developed public access to Bastendorff Beach—including the Bastendorff Beach County Park campground and its parking and beach access—is located up the beach to the northeast of the Property, and public beach visitation is concentrated there. The stretch of beach directly fronting the Property is used primarily by guests of the RV park. There are no public access points on or immediately adjacent to the Property, and no public access point will be used or obstructed by construction activities.

Construction activities also will not impede passage along the beach beyond the Property. The rocky headland immediately southwest of the Property juts into the ocean and terminates the sandy beach at that end, and the beach to the northeast will remain fully open and unobstructed.




The work area and staging area will be surrounded by construction fencing and signage at all times during the Project. The berm and revetment will be constructed in sections to limit the area disturbed at any one time. The Contractor will also monitor forecast tides and storm runup daily and will suspend work during unusually high tides or other conditions that could reduce the buffer between the work area and ocean runup.

Work will only occur only on non-holiday weekdays to minimize interaction with beach users. All equipment will be operated by experienced personnel familiar with construction in coastal environments. Operators will exercise caution at all times and will yield to the public, maintaining safe separation between construction activities and beach users.

### E. Signage and Fencing

To ensure public safety, the active work area will be clearly delineated from the surrounding beach. Warning signage (e.g., "Caution," "Danger," "Keep Out," and/or "Construction Zone" signs similar to those below) will be placed around the perimeter of the work area and the staging area at intervals not exceeding 50 feet, and will be sized and positioned so that signs are clearly legible from 100 feet away.






If any trench or other excavation must remain open outside of active work hours, they will be secured to prevent public access. Such areas will be enclosed using heavy-duty safety fencing (or equivalent), properly anchored, marked so as to be visible in low-light conditions, and maintained in place until the next workday.

### F. Temporary Physical Impacts and Cleanup of the Project Site

The upland staging area is an existing developed parking lot and requires no excavation, grading, or movement of existing materials. There will be no lasting sign of the staging area when the Project is complete.

Within the work area, only minimal rock and other building materials will be stored—typically only the amount needed for that day's work. Sand excavated to create the toe trench will be stored within the work area and promptly incorporated back into the shoreline stabilization system. Because the system is being constructed in sections, the temporary sand stockpile will be kept to a limited size.

All equipment fueling and maintenance will occur upland in the staging area. Fueling will be performed using automatic shutoff nozzles to prevent overfilling, and the Contractor's skid steer operates on HVO renewable diesel, further reducing the potential impact of any release. Spill kits will be kept near the equipment at all times so that cleanup of an unexpected spill can occur immediately. Spill response materials will include personal protective equipment, containment wattles, absorbent pads, and other appropriate cleanup supplies.

Following construction, disturbed soils and sands in the work area will be graded, and the berm and disturbed areas will be planted with erosion-resistant vegetation. Restoration will include planting approximately 3,000 plugs of American dune grass and native willow stakes and hydroseeding American dune grass (Leymus mollis) on the vegetated berm for erosion control, together with installation of all necessary erosion control devices. Revegetation will occur as soon as practical following final grading and during the appropriate planting season to maximize establishment to that berm will have a natural, vegetated dune profile.

### G. Description of Construction Equipment and Vehicles

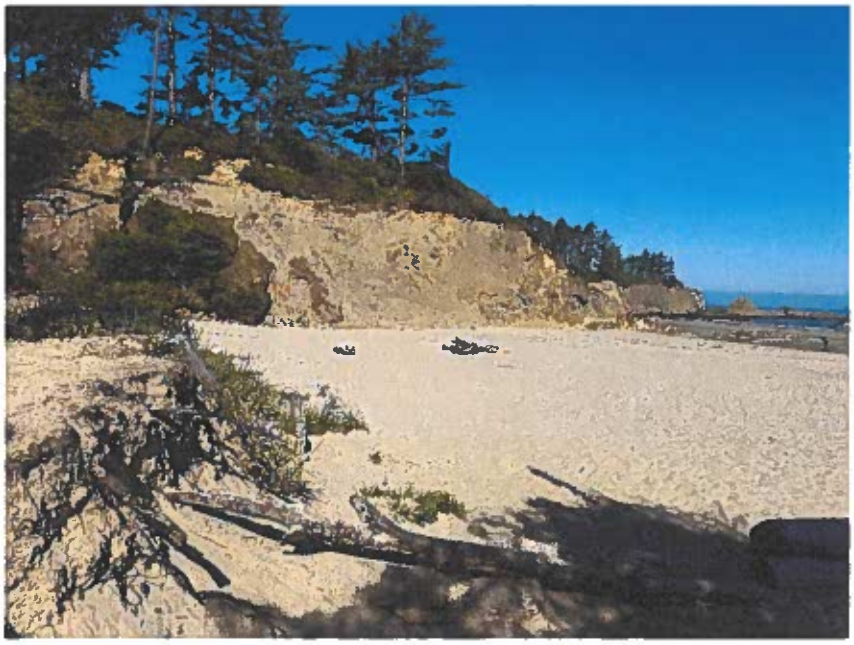
Only one piece of equipment—an HVO-fueled yellow CAT 299 skid steer—will operate within the on-beach work area during construction. This skid steer will also be the only equipment stored on the Property during non-work hours, and it will be parked om upland staging area.

On-road dump trucks will deliver rock, sand, and other materials to the upland staging area only. Haul trucks will not access the beach and will not be parked on the Property overnight.

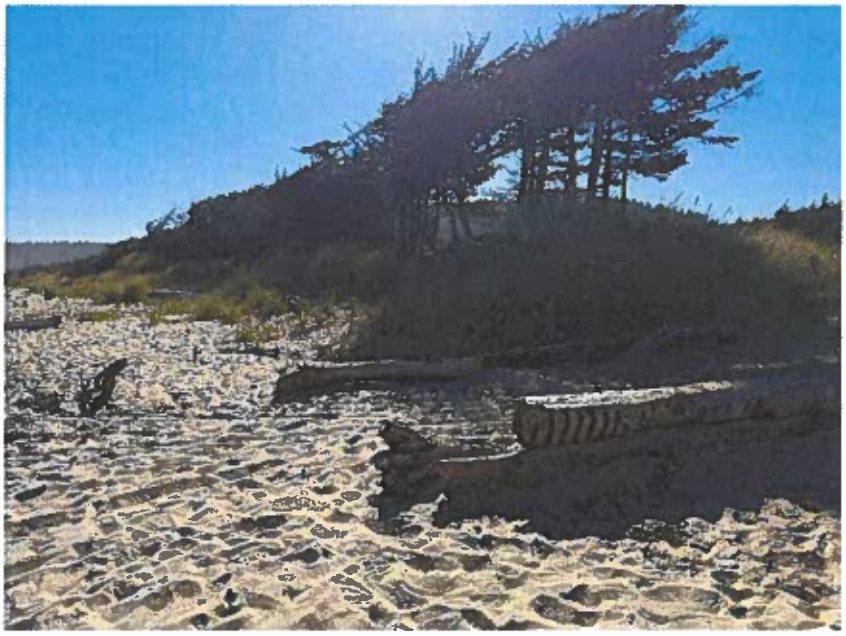
### H. Site Photos

As required by the Guidelines, below are photos showing the entire work area from the west, north, and south vantage points (taken on July 31, 2026).

*View from the North (looking south):*



*View from the South (looking north):*



*View from the West/Beach (looking east):*



## I. Detailed Project Schedule and Description of Daily Construction Activities

The anticipated start date for construction is April 1, 2027, with an estimated duration of approximately three to six weeks. Within this period, on-beach construction activities are expected to occur on approximately Monday to Friday. Work will not occur on weekends, official state holidays, or the work-weeks immediately before or after holiday weekends.

Construction will proceed in sections along the approximately 200-foot project alignment, beginning with the southern portion of the stabilization system, so that the disturbed area is limited.

Daily construction activities will occur for up to ten hours within the allowable work window of 8 a.m. to 5 p.m. on non-holiday weekdays. Specific start and end times will vary based on tidal conditions to ensure safe and efficient operations.

A typical workday will include the following activities:

1. **Site inspection:** Inspect the work area to confirm that all signage, fencing, and safety measures are in place and that no hazards are present. Address any identified issues prior to commencing work.

2. **Equipment preparation:** Conduct fueling and routine maintenance of equipment in the upland staging area using automatic shutoff nozzles, with spill kits at hand.

3. **Work area access:** Move the skid steer from the staging area to the work area via the designated equipment access route.

4. **Site preparation:** Excavate the toe trench at the base of the existing foredune (approximately two feet below existing beach grade). Excavated sand will be temporarily stored within the fenced work area and promptly incorporated back into the system.

5. **Construction of the shoreline stabilization system:** Depending on the stage of construction, activities may include:

    a. Placement of biodegradable sand bags in staggered, offset rows to construct the reinforced berm core;

    b. Placement and grading of beach-compatible sand to establish the berm geometry, including the minimum two-foot sand blanket;

    c. Transport of cobble and rock from the upland staging area using the skid steer and placement of the dynamic revetment; and

    d. Final grading, hydroseeding, and planting of native dune vegetation on completed sections.

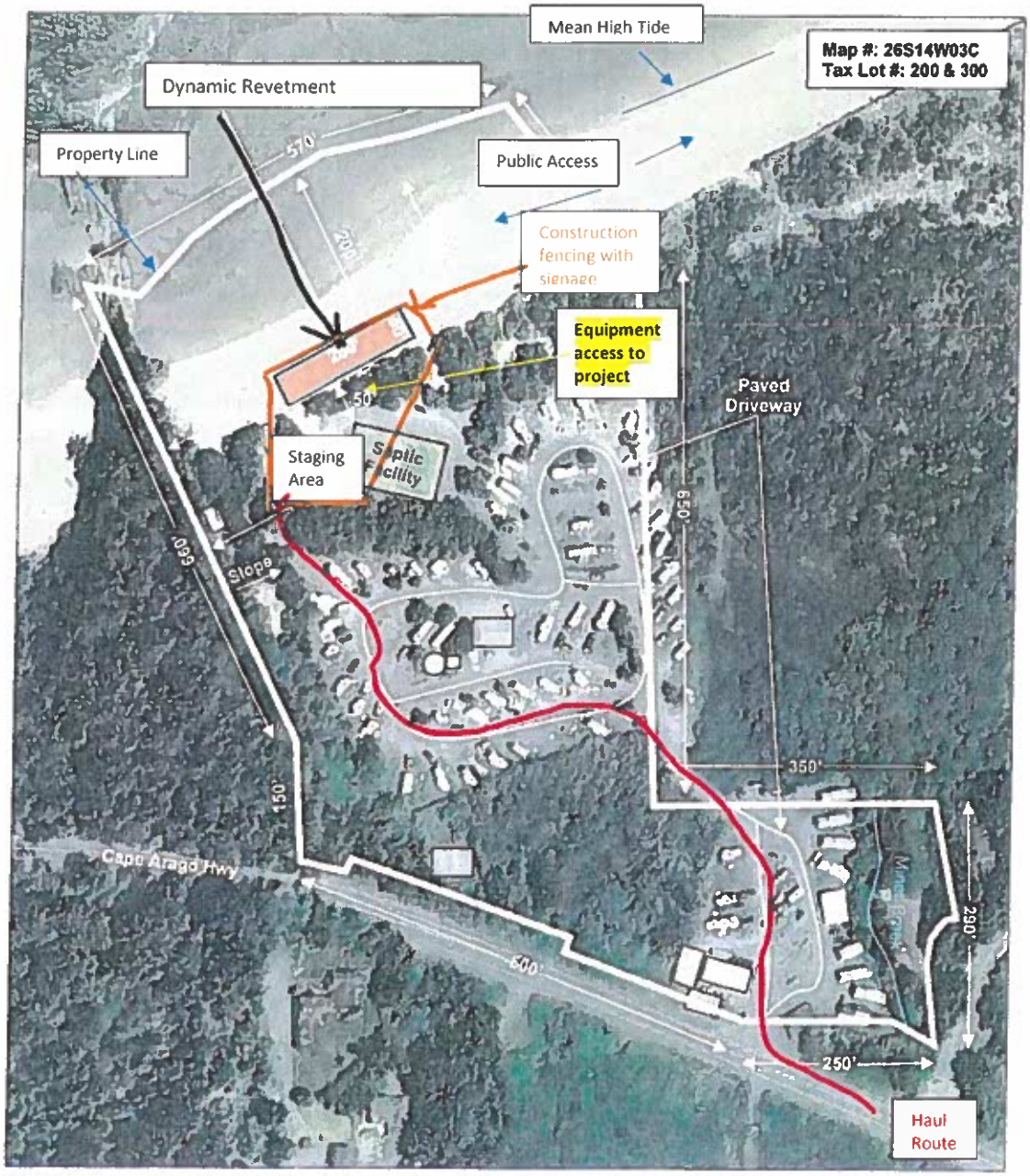
6. **End-of-day procedures:**

    a. Remove the skid steer from the work area and store it within the fenced upland staging area;

    b. Secure any open excavations with anchored safety fencing, marked for visibility in low light, if they will remain overnight; and

    c. Conduct a final inspection to confirm that signage, fencing, and safety measures are properly in place and that no hazards remain.

# Clean Rivers Map for OPRD

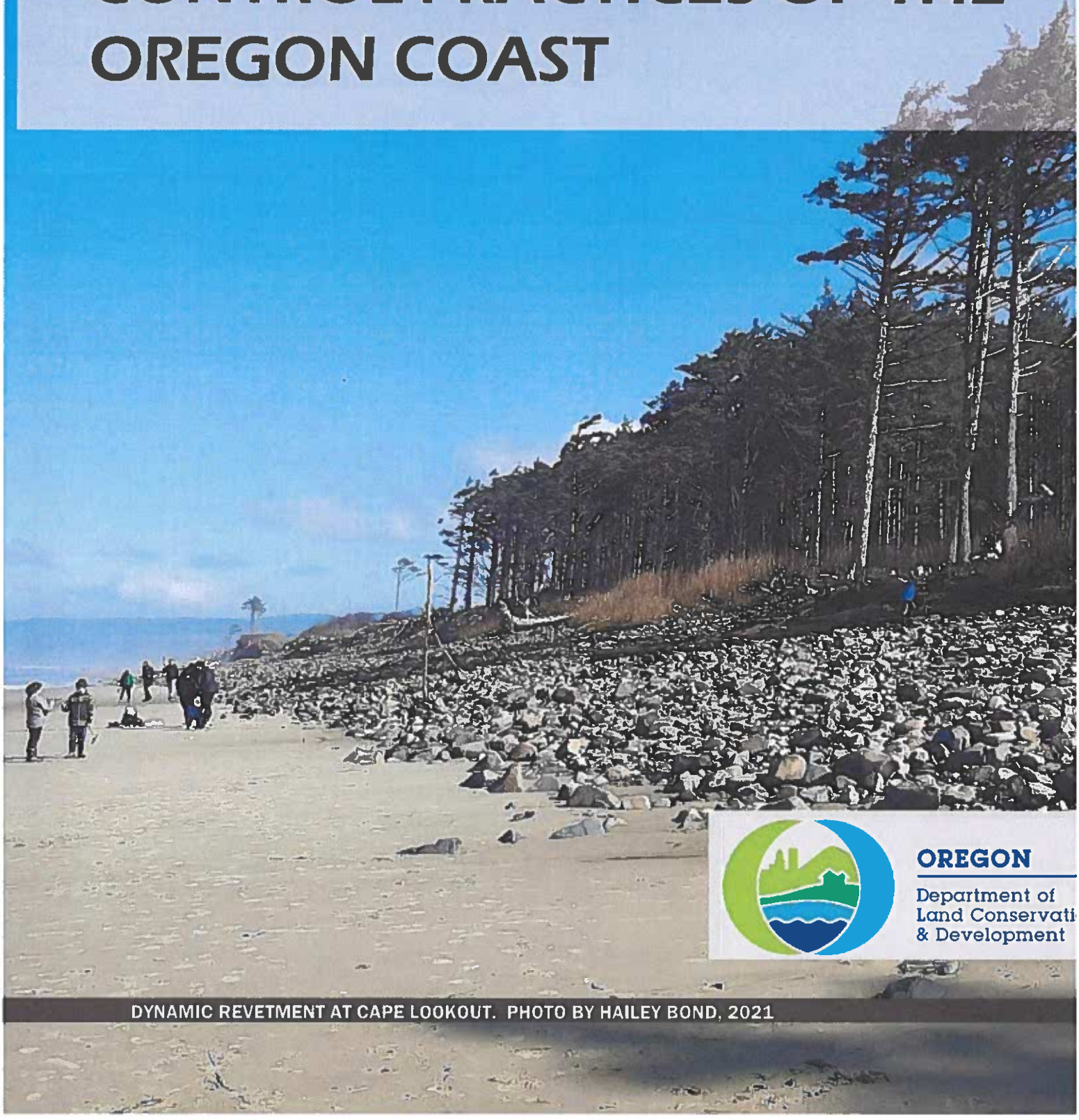



1 inch = 225 feet

Base Map Source: Google Earth, accessed on 3/12/25

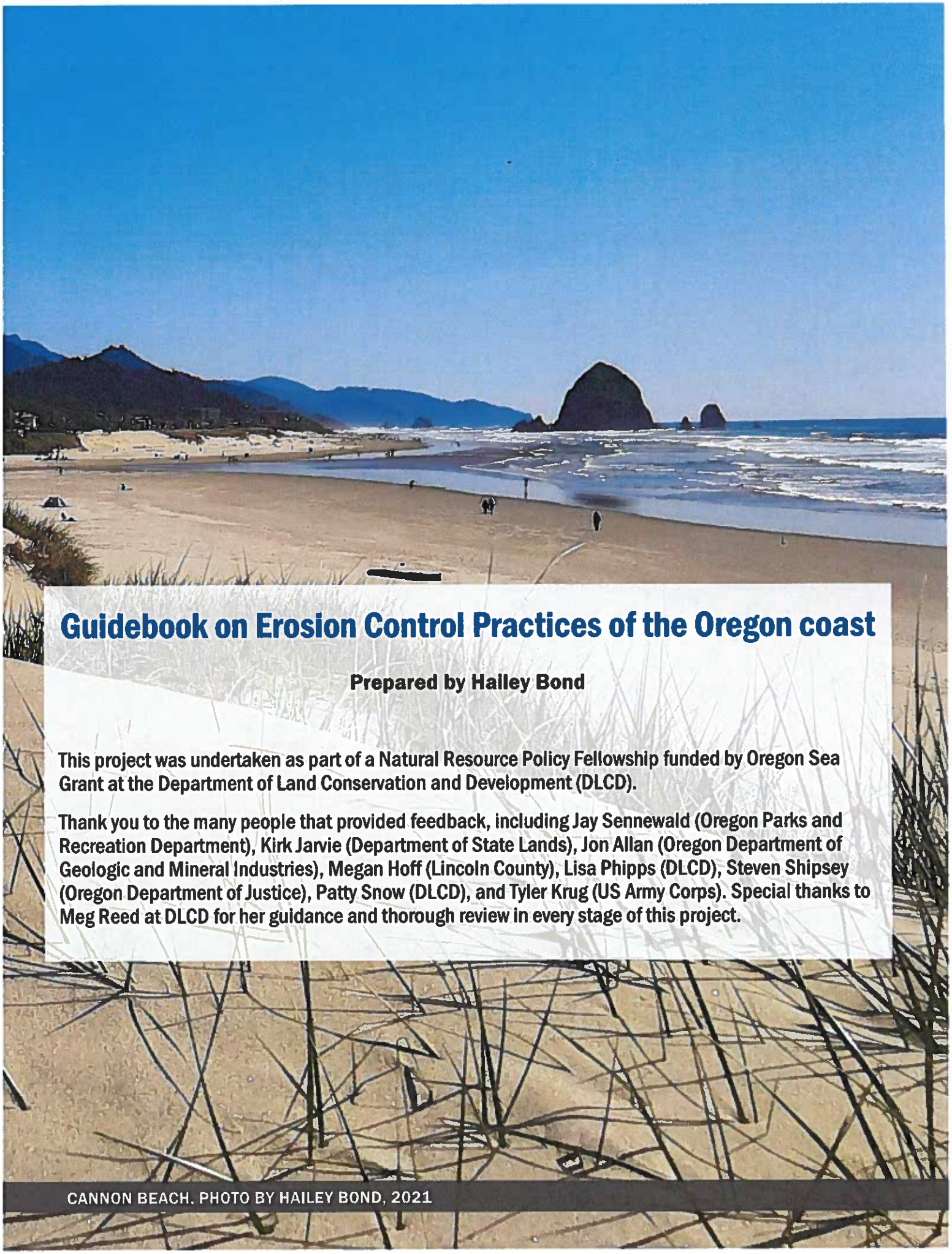
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| EARTH ENGINEERS | Map for Ocean Shores Construction Impacts, Staging, and Public Safety Plan Guidelines<br><br>SunOutdoors Coos Bay<br>90281 Cape Arago Highway<br>Coos Bay, Coos County, Oregon | March 27, 2026 |

# GUIDEBOOK ON EROSION CONTROL PRACTICES OF THE OREGON COAST



DYNAMIC REVETMENT AT CAPE LOOKOUT. PHOTO BY HAILEY BOND, 2021

OREGON
Department of
Land Conservati
& Development



# Guidebook on Erosion Control Practices of the Oregon coast

**Prepared by Hailey Bond**

This project was undertaken as part of a Natural Resource Policy Fellowship funded by Oregon Sea Grant at the Department of Land Conservation and Development (DLCD).

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CANNON BEACH. PHOTO BY HAILEY BOND, 2021

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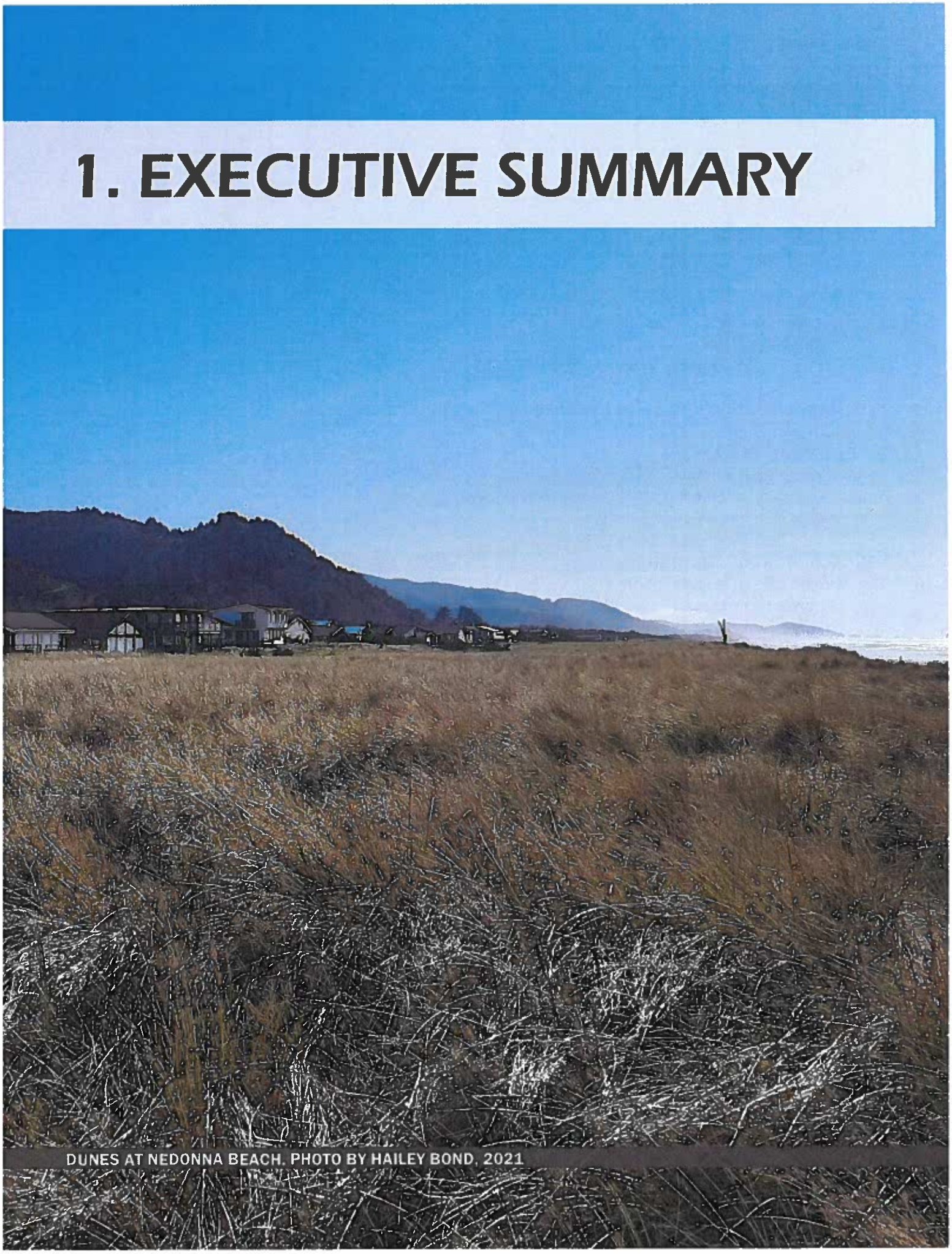
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# 1. EXECUTIVE SUMMARY



DUNES AT NEDONNA BEACH. PHOTO BY HAILEY BOND, 2021

# Executive Summary

Statewide Planning Goal 18 focuses on conserving and protecting Oregon's beach and dune resources, and on recognizing and reducing exposure to hazards in this dynamic environment. Goal 18, Implementation Requirement 5, limits the placement of beachfront protective structures to those areas where development existed prior to 1977. This policy effectively places a cap on the amount of ocean shore that may be hardened, and thus limits the cumulative impacts of such hardening. Shoreline armoring fixes the shoreline in place, traps sediment, and causes scouring and lowering of the beach profile. These actions can result over time in the loss of Oregon's public beaches.

Goal 18 restricts shoreline armoring with the statement "Permits for beachfront protective structures shall be issued only where development existed on January 1, 1977." However, the goal does not specifically define the phrase "beachfront protective structure" (BPS). Currently, the determination of whether a structure is or is not a beachfront protective structure is made on a case-by-case basis by permitting agencies and local governments. During meetings of the Goal 18 focus group facilitated by DLCD in 2019, members explored options for creating a definition that could be consistently applied. Focus group members settled on the following definition for a beachfront protective structure:

> "A static structure that is intended to remain in a fixed position with the purpose of redirecting wave energy and to minimize or eliminate coastal erosion risk to development. BPS are purposefully constructed and intended to maintain that form over time. This includes, but is not limited to, rip-rap revetments, seawalls, groins, breakwaters, jetties, bulkheads, geotextile sandbags, sand burritos, gabions, and concrete or mortar reinforcement such as shotcrete. Beachfront protective structures do not include dynamic treatments such as sand nourishment, cobble revetments, and similar non-structural or nonfixed erosion mitigation measures."

To assist coastal practitioners in consistently applying the beachfront protective structure definition, the focus group recommended that DLCD put together this guidance document on common erosion control measures in Oregon and how they are regulated. In addition to clarifying what is and is not a BPS, the erosion control guidebook is designed to be a resource for coastal practitioners and community members looking for more information on Goal 18 and erosion control. The guidebook covers the main policies and land use goals relevant to the Oregon coast, typical and atypical permitting processes for erosion control, and details about erosion control measures viable for the Oregon coast. Specific topics include:

## Beach Bill and Coastal Land Use Goals:

- Includes a brief history of the Beach Bill of 1967;
- Summarizes the coastal land use goals (Goals 16, 17, and 18) and describes how they influence regulations and permitting for different types of erosion control on the outer Oregon coast;
- Explains the way eligibility for beachfront protective structures is determined, including the definition of development and the jurisdictions responsible for making the determination; and
- Provides statistics broken down by littoral cell on the amount of structural erosion control and eligible properties along the coast.

## Permitting:

- Includes details about the most typical permitting processes for erosion control through OPRD, including timeline, requirements, and emergency permits; and
- Provides basic information and resources for further information about more complex permitting situations at jurisdictional boundaries, such as erosion control structures located at stream outlets.

## Erosion Control:

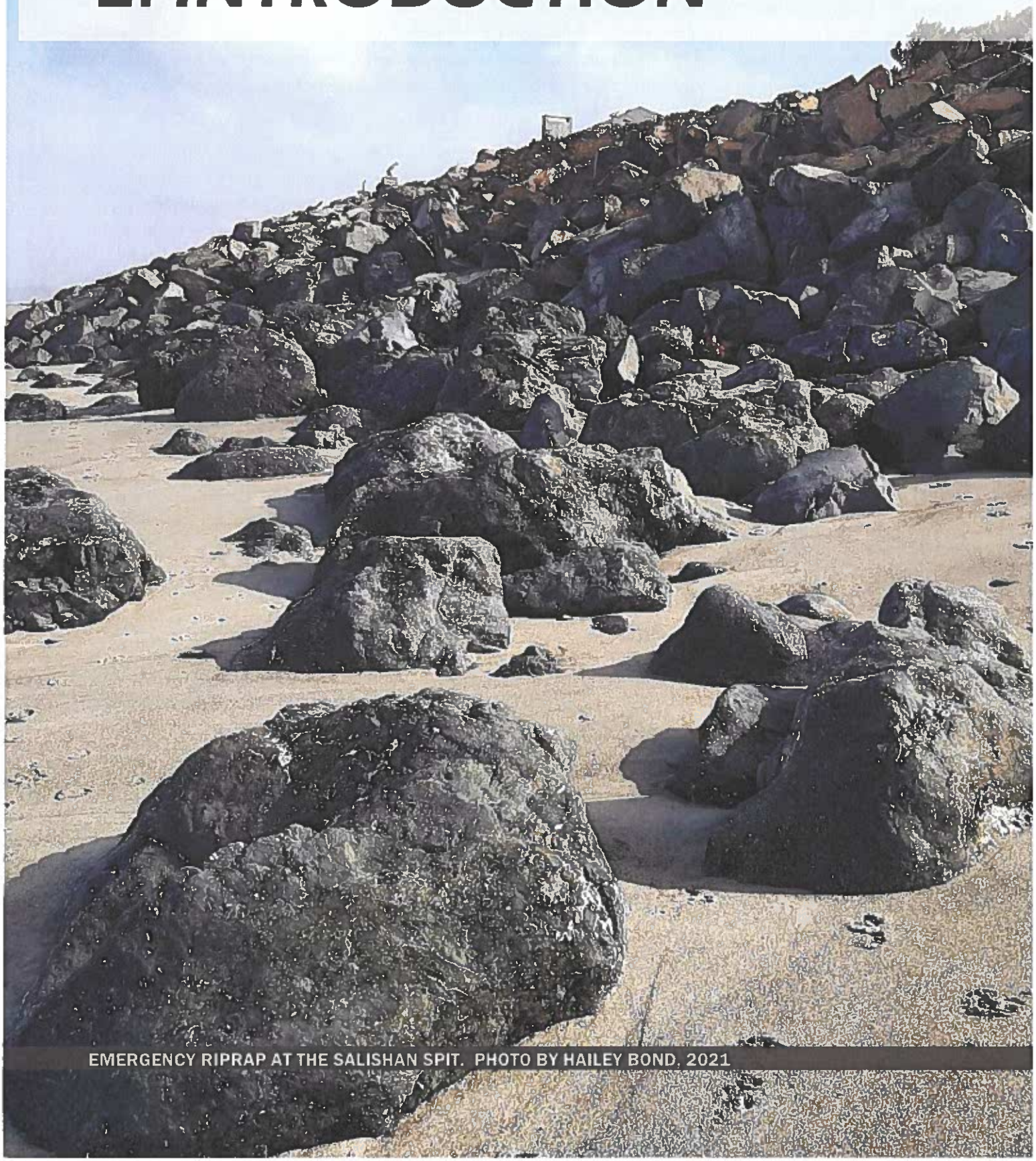
The guidebook discusses erosion control measures that are viable on the Oregon coast. The guidebook covers the benefits and drawbacks, regulatory information (including whether erosion control measures are considered structural), prevalence in Oregon, and suitability in responding to sea level rise impacts for each erosion control measure. Erosion control measures discussed include:

- Nonstructural: vegetative stabilization, dynamic revetment, beach nourishment, and beach scraping; and
- Structural: seawall, riprap revetment, sandbags, and gabion walls.



RIPRAP IN FRONT OF LINCOLN BEACH HOMES. PHOTO BY OREGON SHOREZONE, 2011

# 2. INTRODUCTION



EMERGENCY RIPRAP AT THE SALISHAN SPIT. PHOTO BY HAILEY BOND, 2021

# Project Need

In 2019, the Department of Land Conservation & Development (DLCD) convened a focus group of relevant interest groups, local government staff, and state agencies to review the equity and consistency of the application of Statewide Planning Goal 18: Beaches and Dunes, Implementation Requirement #5. This provision of the Goal relates specifically to shoreline armoring requirements. Shoreline armoring is the placement of structural material on the oceanfront with the intention of minimizing the risk of coastal erosion to development (e.g., riprap, seawalls). The focus group considered information related to the practical, political, technical, and scientific aspects of Goal 18 shoreline armoring requirements.

One of the concepts under review by the focus group was the definition of a Beachfront Protective Structure as described in Goal 18. The focus group identified that while Goal 18 has requirements for where beachfront protective structures (BPS) can be placed along the Oregon coast, it does not define the term "beachfront protective structure." Whether a structure is or is not a BPS is currently determined on a case-by-case basis by local jurisdictions and the Oregon Parks and Recreation Department (OPRD) (Goal 18: Pre-1977 Development Focus Group, 2019).

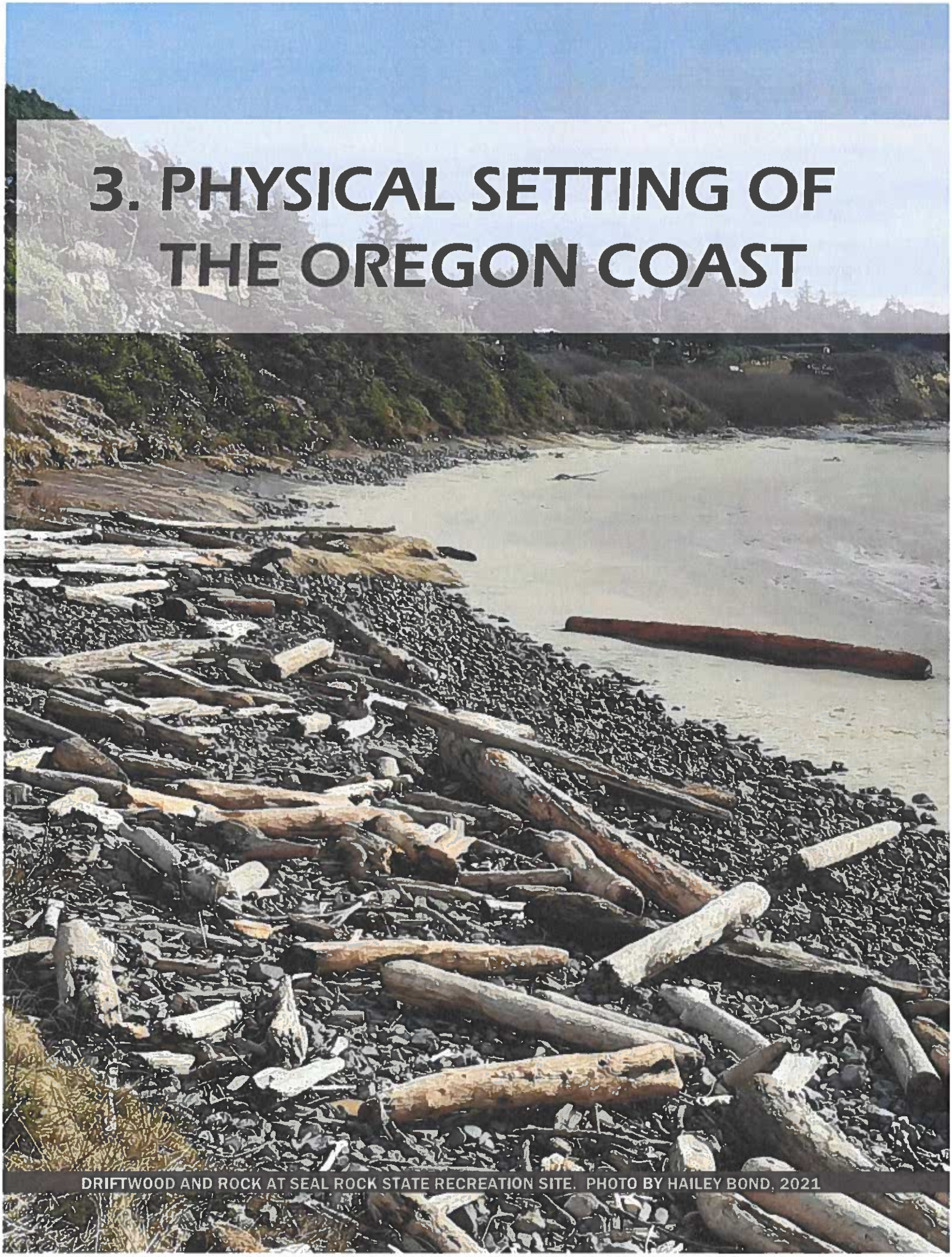
The focus group identified three pathways that would allow for the implementation of a BPS definition. Two options could be pursued through legal means: 1) goal amendment to add a definition of BPS to Goal 18; or 2) rulemaking through OPRD's rules to add a definition. However, focus group members felt that as the status quo currently works in most cases, the benefits of a formal legal definition did not outweigh the effort of pursuing a legal process. The third option discussed by the focus group was for DLCD to put together a guidance document on common erosion control measures in Oregon and how they are regulated. This document could include the unofficial definition of BPSs discussed in focus group meetings (discussed in more detail later) and help OPRD and local jurisdictions more evenly apply standards on what is and is not a BPS.

The focus group recommended the guidebook option, and this document is the result.

# Guidebook Audience

This guidebook is intended primarily for local planners to assist in the permitting of different kinds of erosion control. Planners might use this guidebook to understand the difference between a structural and non-structural erosion control mechanism, or might use it to find more information and resources when complicated questions involving multiple agencies come up. New planners might use this as a resource to acclimate to the permitting environment of the Oregon coast. Consulting engineers, environmental groups, homeowners, scientists, and others might also find this guidebook useful for its comprehensive overview of the permitting process of erosion control mechanisms and their viability on the Oregon coast, as well as a comprehensive list of references.

# 3. PHYSICAL SETTING OF THE OREGON COAST



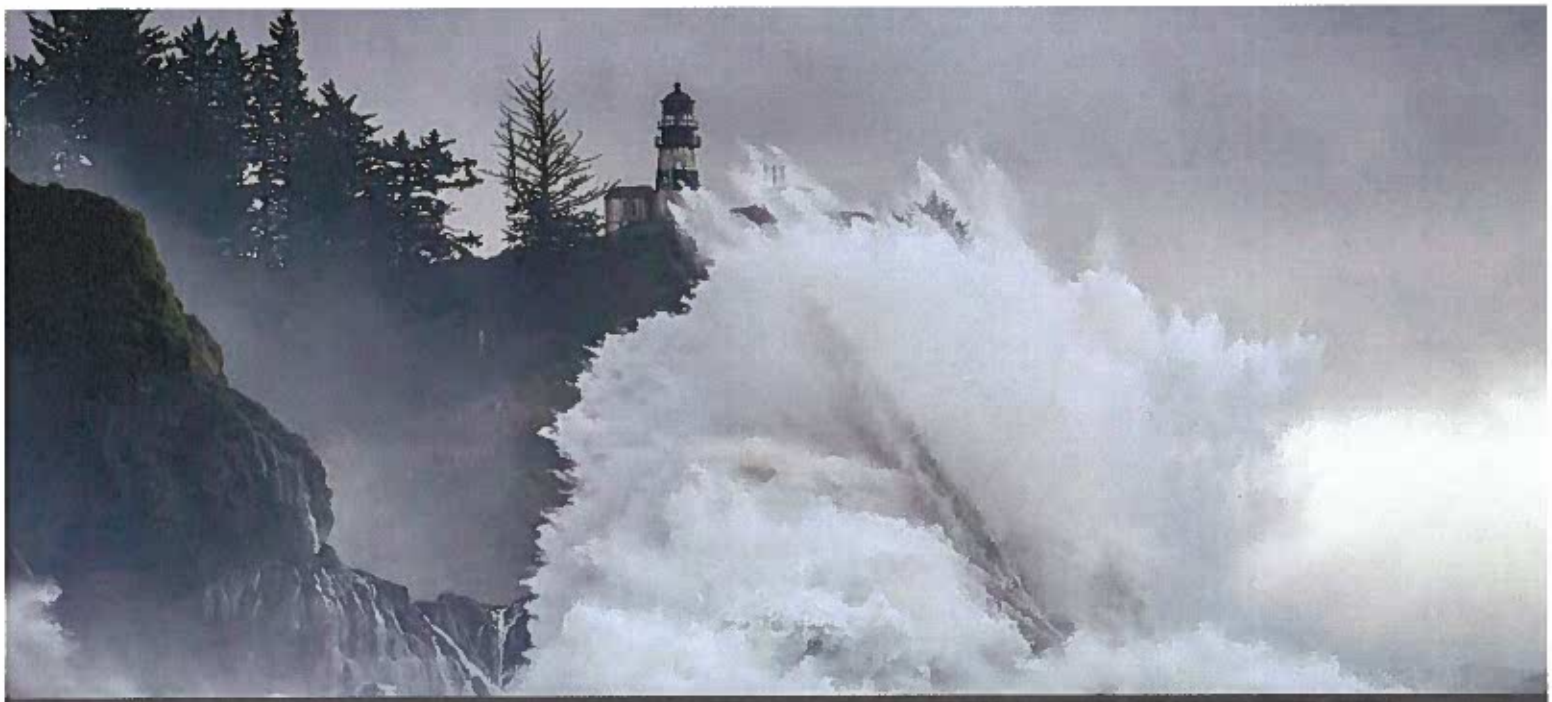
DRIFTWOOD AND ROCK AT SEAL ROCK STATE RECREATION SITE. PHOTO BY HAILEY BOND, 2021

## Wave Climate

Oregon is known for its extremely high-energy wave climate. These waves pose challenges to the safety of beachgoers and coastal property owners and contribute to erosion across the coast. Oregon waves are very seasonal in both height and direction. The smallest waves typically occur around July and August and typically average about 5 ft. The largest waves typically occur in December and January. The average winter significant wave height is 11.3 ft, but winter waves can often exceed 33 ft in deep water. Summer waves typically approach from the northwest, while winter waves approach from the southwest (Allan, Gabel, & O'Brien, 2018). Wave heights in Oregon are increasing over time: average significant wave heights are increasing by 0.05 ft/year (Ruggiero, Komar, & Allan, 2010). It is uncertain whether the increasing wave heights are caused by human-induced global warming or by natural climate cycles, but regardless of the cause, a continued increase in wave heights will undoubtedly affect coastal erosion and flooding potential in the future.

**"Significant wave height" is a term describing the average of the highest third of waves measured. Significant wave heights are typically used to describe wave conditions because they best represent the wave conditions that most affect people and their safety.**

Wave heights are not the only drivers of erosion on the Oregon coast; water levels also play a significant role. Oregon has an average tidal range of 5 - 6 ft, but during extreme spring tides, the tidal range can be 10 - 12 ft. In addition to tides, coastal water levels can also be affected by factors such as storm surge, wind, and river discharge (Allan, et al., 2015).



LARGE WAVES AT CAPE DISAPPOINTMENT, WASHINGTON. PHOTO BY JEFF RISHER PHOTOGRAPHY, 2020

El Niño and La Niña conditions also impact coastal erosion on the Oregon coast. In El Niño years, water levels along the coast are elevated and waves approach from a more southwesterly direction. Elevated water levels lead to increased erosion, and the wave direction pushes sediment northward. La Niña winters in Oregon tend to be colder, wetter, and produce larger waves than typical winters, causing widespread erosion across the Oregon coast (Allan, Gabel, & O'Brien, 2018; OSU Researcher analyzing erosion from La Niña, El Niño). Significant erosion on the Oregon coast has been associated with El Niño and La Niña events including the 1982-83 El Niño, 1997-98 El Niño, 1998-99 La Niña, 2015-16 El Niño, and 2020-21 La Niña events (Allan, Gabel, & O'Brien, 2018; Severe Erosion on U.S. West Coast during 2015-16 El Niño, 2017).

## Sea Level Rise

Sea level rise in Oregon is influenced by both its tectonic setting and global-scale changes in the volume of water (US Army Corps of Engineers, 2021). The Oregon coast generally experiences uplift, which means that the land is rising and dampening the effects of sea level rise. Uplift in the central and northern Oregon coasts is currently being outpaced by sea level rise (i.e. sea level appears to be rising), while the south coast and the Columbia River are experiencing higher rates of tectonic uplift relative to sea level rise (i.e. sea level appears to be falling). However, global climate models continue to project increasing rates of sea level rise for the future that will soon outpace the tectonic uplift across the entire Oregon coast (Allan, Gabel, & O'Brien, 2018; Erosion Continues Damage on Oregon Coast - Homes Threatened, More Finds, 2021).




KING TIDES AT COQUILLE POINT, BANDON. PHOTO BY RICK POECKER, 2020

On the Oregon coast, sea level is projected to rise between -0.2 - 2.9 ft in the next 50 years, depending on location and climate scenario used. The central coast will experience more sea level rise than the north and south coasts because it experiences less tectonic uplift (US Army Corps of Engineers, 2021). Sea level rise will exacerbate flooding and coastal erosion, particularly during El Niño and La Niña events and the yearly King Tides.

## Effects of Shoreline Armoring on the Beach

Statewide Planning Goal 18 limits the placement of beachfront protective structures and the cumulative impacts of shoreline hardening on beaches and dunes. BPS's do not protect the beach; rather, they protect the land and development behind the structure while negatively impacting the public beach.

When BPS's like riprap (the most common in Oregon) are placed on the beach, some of the beach is immediately lost due to the physical constraints of riprap construction. For optimal stability, riprap needs 1.5 - 2 ft of horizontal space for every foot of vertical coverage. Therefore, a riprap structure 25 ft tall (a reasonable estimate for Oregon) will lose 37.5 - 50 ft of beach in placement loss.

By preventing sand from eroding from the slope behind the BPS, the structure reduces the natural sand supply to the beach. Losing a sand source can affect the sediment budget, which is the balance between sediment sources (gain of sand) and sediment sinks (loss of sand). If too many sediment sources are limited in a littoral cell, the sediment budget can become unbalanced and lead to erosion. In littoral cells where the majority of the sand comes from erosion of the upland, a high percentage of shoreline armoring in the littoral cell can impact the sediment budget.

**A littoral cell is a coastal compartment that contains a complete cycle of sedimentation including sources, transport paths, and sinks. In Oregon, sediment sources typically include rivers and coastal erosion, while sediment sinks typically include estuaries and offshore areas. Hardly any sand travels between littoral cells. Using littoral cells to describe the coast is useful because they reflect the physical processes that impact the coast better than jurisdictional boundaries like county or city limits.**



BEACH NARROWING AT ROCKAWAY BEACH. PHOTO BY OREGON SHOREZONE, 2011

Over time, BPS's cause erosion and narrowing of the beach fronting them. Narrowing of the beach reduces north-south beach access, making it difficult or dangerous for people to walk on the beach during high tides. This can occur due to two processes. The first process contributing to beach narrowing is known as passive erosion, and it describes the effect of fixing the shoreline in place in an eroding area. Although the shoreline may be protected, erosion will continue to remove sand in front of the structure, causing the beach to narrow. Sea level rise will also contribute to this problem, leading to further erosion and beach narrowing in front of a BPS. Passive erosion is an unavoidable consequence of building structures on shorelines undergoing net long-term erosion, and can only be mitigated in the short-term through beach nourishment (Griggs, 2005). The second erosional process that can contribute to beach narrowing is known as active erosion and is less certain to occur than passive erosion. Active erosion refers to a seawall or revetment causing or accelerating erosion, and is situational and dependent on the location of the structure with respect to the mean water level and runup height (Ruggiero & McDougal, 2001). Active erosion becomes more likely when water levels regularly reach the toe of the BPS. In Oregon, active erosion is difficult to identify because rip embayments regularly cause significant longshore variations in erosion rate, making it impossible to distinguish increased erosion due to a structure from increased erosion due to rip embayments (Komar & McDougal, 1988). A literature review of relevant studies is provided in Griggs (2005) for further information on active erosion.

**Rip embayments occur when rip currents focus wave energy onto a short stretch of coast, causing acute erosion during storms. On the Oregon coast, rip embayments are typically 5-10 lots wide. Rip embayments often form prior to the storm that causes erosion (Komar & McDougal 1988).**



RIPRAP AT ROCKAWAY BEACH. PHOTO BY HAILEY BOND, 2021

# 4. RELEVANT POLICIES AND LAND USE PLANNING GOALS



BLOCK WALL AND GABIONS AT WECOMA BEACH. PHOTO BY HAILEY BOND, 2021

Background on policies and regulations implemented throughout Oregon's history can help contextualize the way erosion control structures are regulated on the Oregon coast. The Beach Bill of 1967 helped set aside the beach for public use in perpetuity, and the Coastal Land Use Planning Goals (adopted in 1977) helped prioritize the protection of coastal resources and public enjoyment of the beach within land use planning programs. These policies are useful to understanding the origin of existing permitting rules around beachfront protective structures.

## Oregon's Beach Bill

The 1967 Beach Bill was a landmark piece of legislation that captured the attitude of Oregonians towards the idea of a public right to the beach. The bill has its roots in the designation of the public beach as a highway by Governor Oswald West in 1913. The public assumed that this designation gave them rights to the entire beach. However, challenges by private property owners in 1966 clarified that the beaches were only public below the ordinary high tide line and that 112 of the 262 miles of sandy beach were privately owned. This led to a high-profile fight in the Oregon Legislature to pass the Beach Bill in 1967, which "codified into law already existing public rights to dry sand beaches" and "gave the State Highway Commission the authority to police, protect, and maintain the property." (Straton, 1977)



GOVERNOR TOM MCCALL AT THE BEACH. 1967. PHOTO CREDIT DLCD

The bill recognized easements of the dry sand for public use based on implied dedication and long recreational use without changing the underlying ownership of the beach. An exemption to taxation for the easements on dry sand was added after the passage of the bill (Straton, 1977).

For more information on the Beach Bill, see the DLCD website here or the Oregon encylopedia here.

After the bill was passed, the coast was surveyed to establish a permanent landward beach zone line. This survey approximated the vegetation line and is known as the "Statutory Vegetation Line" today. Until 1989, the Parks Department, a division of the Oregon Department of Transportation (ODOT), was the permitting authority for construction west of the statutory vegetation line. In 1989, the Parks Department separated from ODOT and became the Oregon Parks and Recreation Department (OPRD). OPRD was given jurisdiction over the beach west of the statutory vegetation line. During this time, the Department of State Lands (DSL) had jurisdiction between the statutory vegetation line and the highest measured tide. In 1999, ORS 196.800 and ORS 390.605 were amended with Senate Bill 11 to simplify the permitting process by changing OPRD's jurisdiction to "the land lying between extreme low tide of the Pacific Ocean and the statutory vegetation line as described by ORS 390.770 or the line of established upland shore vegetation, whichever is farther inland."

The Beach Bill solidified the mindset of Oregonians that the beach is a public resource that should be preserved for the public in perpetuity, and this notion continues to drive the state's approach to ocean shore alterations in Oregon today.

# Coastal Goals

## Goal 16: Estuarine Resources

Statewide Planning Goal 16 provides the principal guidance for the planning and management of Oregon's estuaries, which are the tidal mouths of rivers, where freshwater streams are met by the tide. The overall objective of Goal 16 is to "to recognize and protect the unique environmental, economic and social values of each estuary and associated wetlands; and to protect, maintain, where appropriate develop, and where appropriate restore the long term environmental, economic and social values, diversity and benefits of Oregon's estuaries." To accomplish this, the goal establishes detailed requirements for the preparation of estuary management plans, the review of individual development projects, and coordinated management by local, state, and federal agencies that regulate or have an interest in activities in Oregon's estuaries.

More information on coastal goals can be found on DLCD's website. An overview of the Statewide Land Use Planning Goals is avaliable here.

The goal requires individual estuary plans to designate appropriate uses for different areas within each estuary (estuary management units) based on biological and physical characteristics and features, and to provide for review of proposed estuarine alterations to assure that they are consistent with overall management objectives and that adverse impacts are minimized. Estuary designations include:

> Natural: Managed to assure the protection of significant fish and wildlife habitats, of continued biological productivity within the estuary, and of scientific, research, and educational needs. (Example: Sand Lake Estuary)

Conservation: Managed for long-term uses of renewable resources that do not require major alteration of the estuary, except for the purpose of restoration. (Example: Siletz Bay Estuary)

Development: Managed for more intense development or alteration, to provide for navigation and other identified needs for public, commercial, and industrial water-dependent uses. (Example: Yaquina Bay Estuary)

**A water-dependent use is a use or activity which can be carried out only on, in, or adjacent to water areas because the use requires access to the water body for water-borne transportation, recreation, energy production, or source of water.**

Most Goal 16 requirements are implemented through locally adopted estuary plans, but some are applied by state agencies through their review of various permit applications

Goal 16 impacts the permitting and construction of shoreline protective structures in situations when erosion occurs at the junction between estuaries and the outer coast. Although the design of these protective structures at the seaward boundaries of estuaries may be similar to those of the outer coast, they are regulated differently than beachfront protective structures on the outer coast (Oregon Coastal Management Program, n.d.). In natural and conservation estuaries, riprap is very restricted, but riprap is less restricted in development estuaries.

This document provides some information about the permitting of beachfront protective structures on the boundaries between estuaries and the ocean shore, which may be affected by Goal 16. However, this document is not a guide for Goal 16.

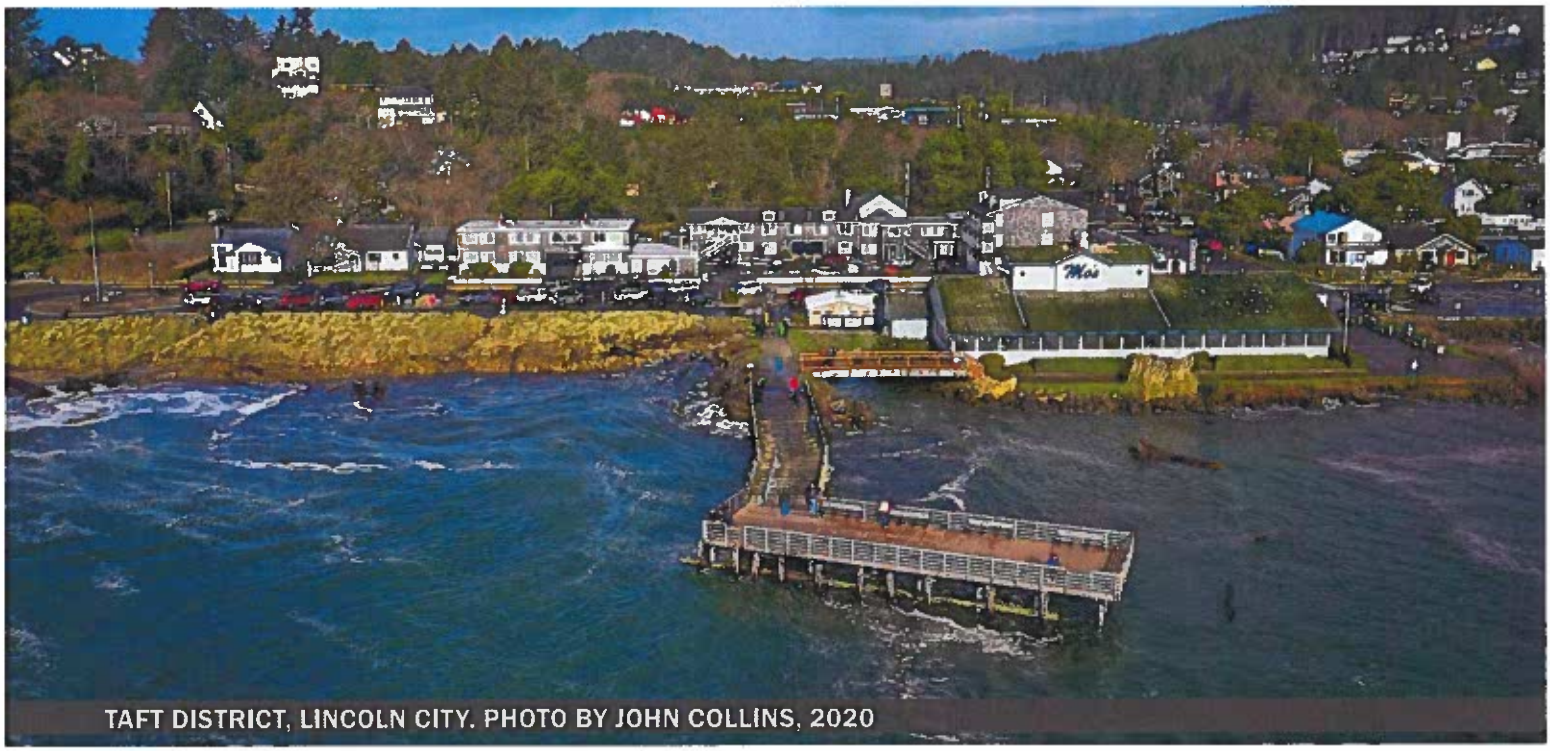


JETTY LAGOON, COLUMBIA RIVER JETTY. PHOTO BY BRIANA GOODWIN, 2018

## Goal 17: Coastal Shorelands

Statewide Planning Goal 17 outlines planning and management requirements for the lands bordering estuaries, as well as lands bordering the ocean shore and coastal lakes. In general, the requirements of Goal 17 apply in combination with other planning goals to direct the appropriate use of shoreland areas. Provisions in Goal 17 specifically focus on the protection and management of resources unique to shoreland areas. Examples of such resources include areas of significant shoreland habitat, lands especially suited for water dependent uses, lands providing public access to coastal waters, and potential restoration or mitigation sites.

Goal 17 requirements are implemented primarily through local comprehensive plans and zoning. Goal 17's Implementation Requirement 5 is particularly relevant to the permitting of erosion control mechanisms. It states that "land-use management practices and non-structural solutions to problems of erosion and flooding shall be preferred to structural solutions." This implementation requirement has led local governments and permitting agencies to create requirements for alternatives analyses, ensuring that structural erosion control is only used if necessary for the success of the project (Oregon Coastal Management Program, n.d.).



TAFT DISTRICT, LINCOLN CITY. PHOTO BY JOHN COLLINS, 2020

## Goal 18: Beaches and Dunes

Statewide Planning Goal 18 focuses on conserving and protecting Oregon's beach and dune resources, and on recognizing and reducing exposure to hazards in this dynamic environment. Goal 18 is central to the work of coastal communities in addressing the impacts of coastal hazards and climate change in areas along the ocean shore.

Local governments are required to inventory beaches and dunes and describe the stability, movement, groundwater resources, hazards and values of the beach, dune, and interdune areas. Local governments must then apply appropriate beach and dune policies for use in these areas.

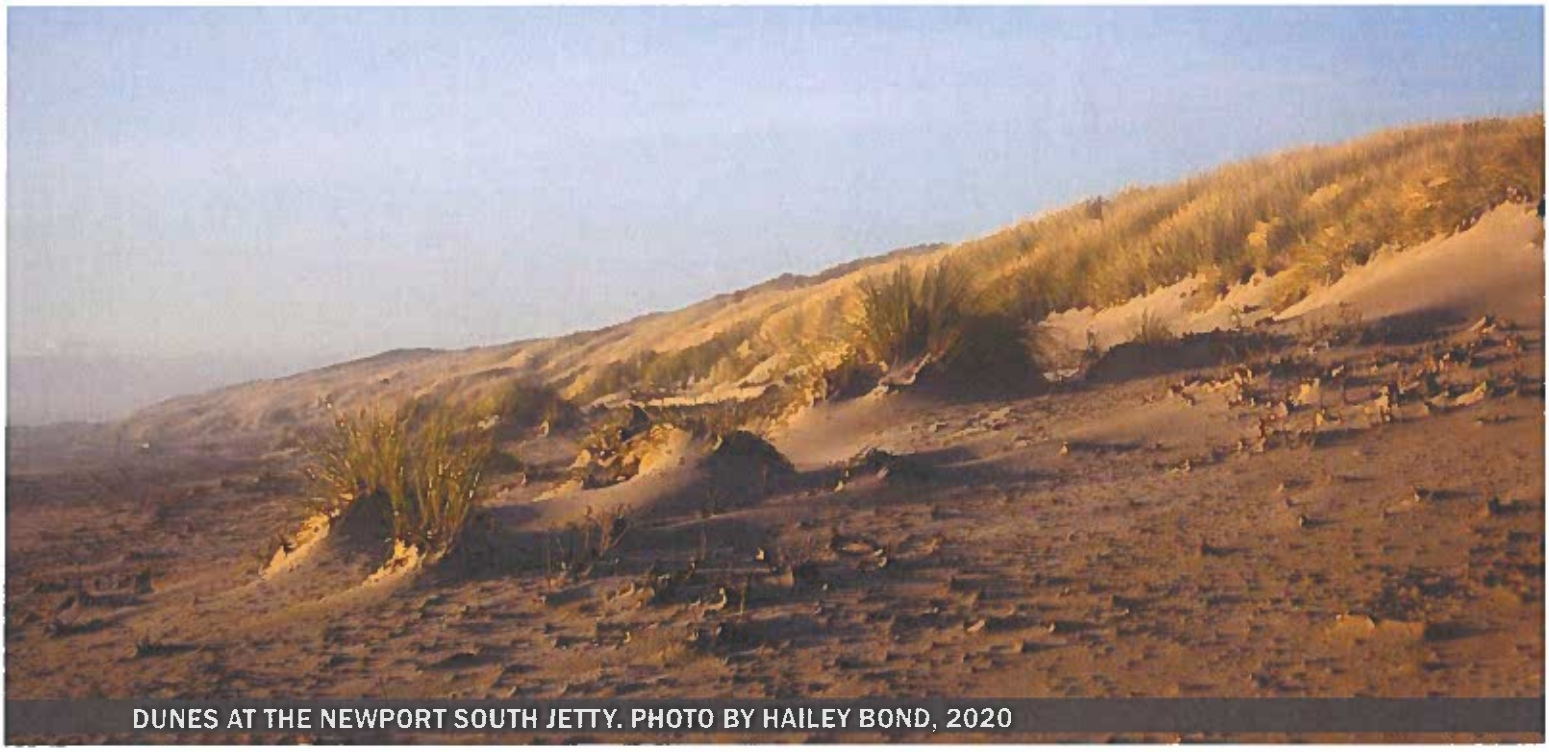
Goal 18's requirements of particular importance:

More information and resources about Goal 18 are available here.

**Prohibition Areas (Implementation Requirement 2):** The goal prohibits development on the most sensitive and hazardous landforms in the beach and dune environment, including beaches, active foredunes and other dune areas subject to severe erosion or flooding. This requirement has been instrumental in preventing inappropriate development on these critical landforms.

**Shoreline Armoring (Implementation Requirement 5):** The goal limits the placement of beachfront protective structures to those areas where development existed prior to January 1, 1977. The definition of development for purposes of Goal 18, Implementation Requirement #5 is "houses, commercial and industrial buildings, and vacant subdivision lots which are physically improved through construction of streets and provision of utilities to the lot." This policy effectively places a cap on the amount of ocean shore that may be hardened, and thus limits the cumulative impacts of such hardening.

Shoreline armoring can cause scouring and lowering of the beach profile, which can result over time in the loss of access to and use of Oregon's public beaches. New development is not eligible for structural shoreline protection and must account for shoreline erosion through non-structural approaches (e.g. increased setbacks). In the face of increased ocean erosion occurring in conjunction with climate change and sea level rise, limiting hard structures and allowing natural shoreline migration is a critical policy tool for conserving and maintaining Oregon's ocean beaches (Oregon Coastal Management Program, n.d.).



DUNES AT THE NEWPORT SOUTH JETTY. PHOTO BY HAILEY BOND, 2020

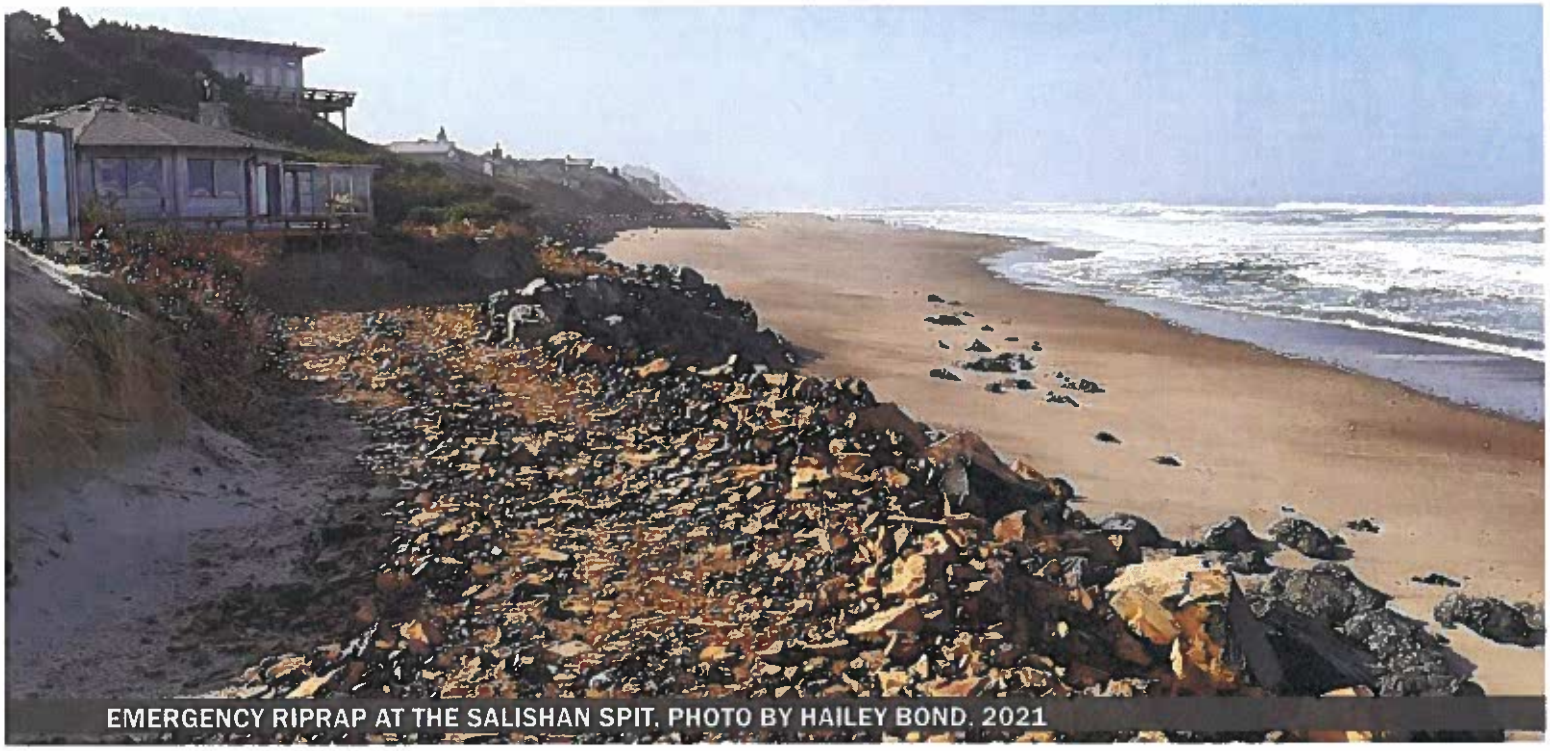
## Working definition of 'beachfront protective structure'

Goal 18 restricts beachfront protective structures as follows, "Permits for beachfront protective structures shall be issued only where development existed on January 1, 1977." However, the goal does not specifically define a beachfront protective structure. Currently, this determination is made on a case-by-case basis by permitting agencies and local governments.

During meetings of the Goal 18 focus group, members explored options for creating a definition that can be consistently applied. Focus group members settled on the following definition for a beachfront protective structure:

> "A static structure that is intended to remain in a fixed position with the purpose of redirecting wave energy and to minimize or eliminate coastal erosion risk to development. BPS are purposefully constructed and intended to maintain that form over time. This includes, but is not limited to, rip-rap revetments, seawalls, groins, breakwaters, jetties, bulkheads, geotextile sandbags, sand burritos, gabions, and concrete or mortar reinforcement such as shotcrete. Beachfront protective structures do not include dynamic treatments such as sand nourishment, cobble revetments, and similar non-structural or non-fixed erosion mitigation measures."

This document will use the above definition of a beachfront protective structure to provide guidance on which erosion control methods typically used in Oregon are considered to be beachfront protective structures and why.



EMERGENCY RIPRAP AT THE SALISHAN SPIT. PHOTO BY HAILEY BOND. 2021

# Eligibility for Beachfront Protective Structures

Goal 18, Implementation Requirement 5 provides that permits for beachfront protective structures shall be issued only where development existed on January 1, 1977. Development is defined as:

- Houses, commercial and industrial buildings;
- Vacant subdivision lots which are physically improved through construction of streets and provision of utilities to the lot; or
- Areas where an exception to Goal 18 Implementation Requirement 2 has been approved.

Statewide Planning Goal 18 requires that local comprehensive plans identify areas where qualifying development existed as of January 1, 1977 for the purpose of determining eligibility for BPS. However, because this requirement was added after most jurisdictions had already approved their Comprehensive Plans, most coastal jurisdictions do not have an official inventory of the eligibility of coastal parcels for shoreline armoring. In 2014, the Oregon Coastal Management Program created a coast-wide inventory of coastal parcels that are designated as eligible and ineligible for shoreline armoring (available in the Ocean Shores Data Viewer). The inventory is maintained by the Oregon Coastal Management Program, and is a resource for all coastal jurisdictions. For more information on the inventory, see the Shoreline Armoring Policy Analysis Report (Gardner, 2015) and its appendices, which contain a detailed decision tree explaining how eligibility was determined for every lot on the Oregon coast. Although coastal jurisdictions may use this inventory as an aid in making an eligibility determination, they are not bound by it. Ultimately, local jurisdictions are responsible for determining the eligibility of a property for shoreline armoring.

Oregon's coastal atlas is available online here




EXAMPLE OF ELIGIBILITY MAP FROM THE COASTAL ATLAS, 2021

# Eligibility and armoring statistics

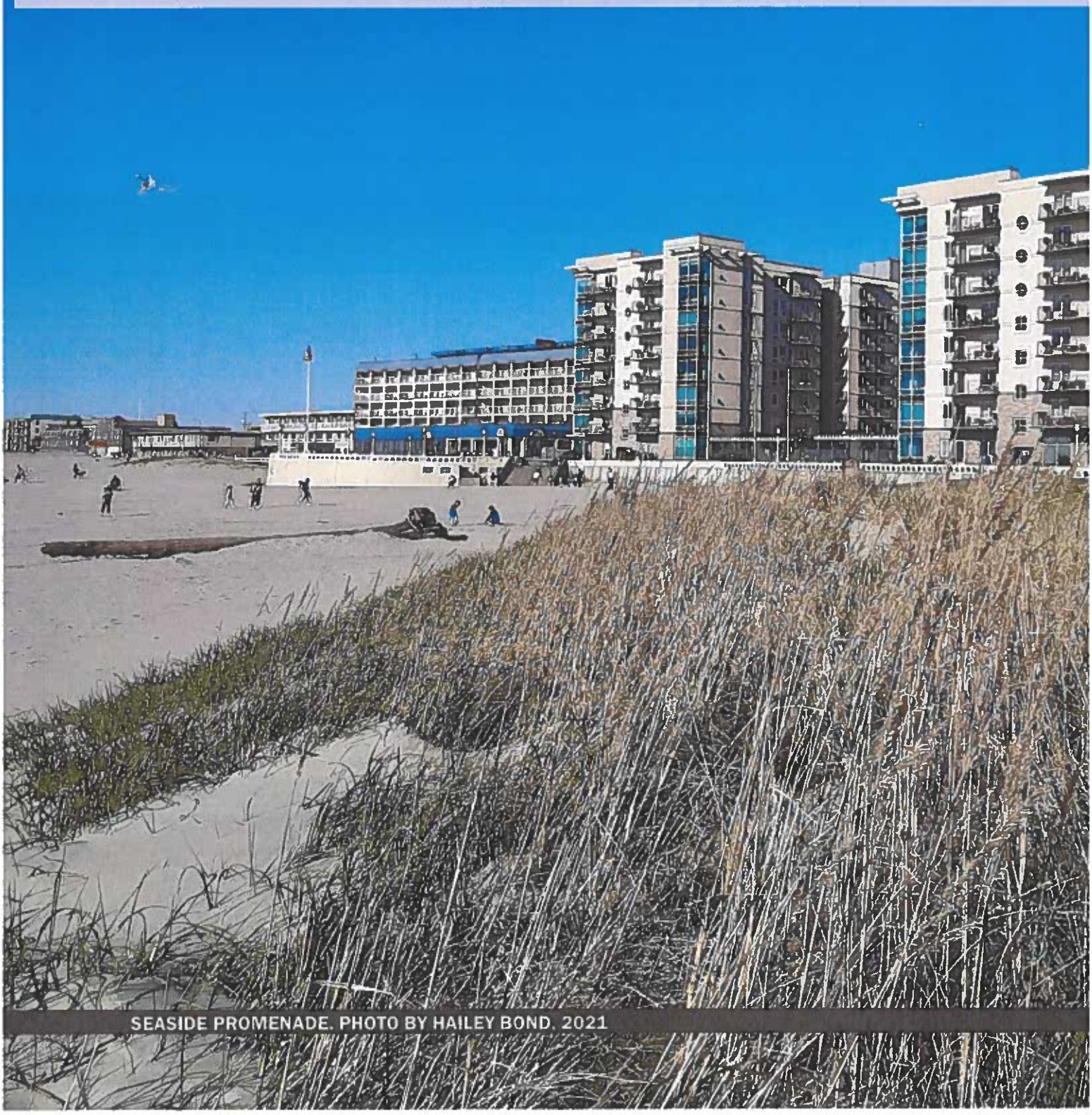
The effects of Goal 18's restriction on beachfront protective structures can vary along the coast. Goal 18's policies interact with environmental conditions along the coast to create different challenges for different communities. As an example, Gleneden Beach is a hotspot of erosion on the Oregon coast and has a mix of oceanfront properties that are eligible and ineligible for beachfront protective structures. Thus, the shoreline armoring provision of Goal 18 and the eligibility status of particular lots are often an important topic in that community. However, in places like Seaside and Gearhart, which are experiencing a general trend of sand accretion, or places like Yachats, which has a rocky coastline, the eligibility status of properties is less important because they are not generally threatened by erosion.

To provide context for the different challenges faced by different places on the coast, data on eligibility for beachfront protection and current amounts of shoreline armoring are provided below for littoral cells from north to south. The shoreline length was calculated using NOAA's Continuously Updated Shoreline Product (CUSP), excluding jetty lengths. Shoreline armoring data is from the beachfront protective structure database, which is provided and continuously maintained by OPRD. The length of shoreline eligible for armoring was calculated using the intersection between eligible parcels and the line of vegetation (ORS 390.770).

**Table 1: Eligibility and armoring statistics for each littoral cell on the Oregon coast.**

| Littoral Cell | Length of Littoral Cell (miles) | Length of Eligible coastline (miles) | Percent Eligible | Length of Structures (miles) | Percent Armored |
|---|---|---|---|---|---|
| Clatsop | 22.56 | 3.53 | 16% | 0.22 | 1% |
| Cannon | 16.77 | 5.43 | 32% | 2.36 | 14% |
| Rockaway | 23.5 | 5.41 | 23% | 1.70 | 7% |
| Netarts | 13.43 | 0.59 | 4% | 0.58 | 4% |
| Sandlake | 9.83 | 0.76 | 8% | 0.77 | 8% |
| Neskowin | 13.72 | 4.20 | 31% | 2.67 | 19% |
| Lincoln | 25.97 | 14.14 | 54% | 8.51 | 33% |
| Beverly | 8.76 | 1.10 | 13% | 0.12 | 1% |
| Newport | 31.58 | 11.54 | 37% | 4.00 | 13% |
| Heceta | 13.39 | 0.81 | 6% | 0 | 0% |
| Coos | 71.32 | 1.89 | 3% | 1.02 | 1% |
| Bandon | 39.86 | 1.30 | 3% | 0.04 | 0% |
| Elk | 8.98 | 0.64 | 7% | 0 | 0% |
| Humbug | 17.11 | 0.82 | 5% | 0.17 | 1% |
| Nesika | 9.92 | 1.31 | 13% | 0.06 | 1% |
| Rogue | 12.54 | 0.56 | 4% | 0.09 | 1% |
| Pistol | 6.96 | 0 | 0% | 0 | 0% |
| Ferrello | 31.51 | 5.00 | 16% | 0.47 | 2% |

# 5. EROSION CONTROL PERMITTING

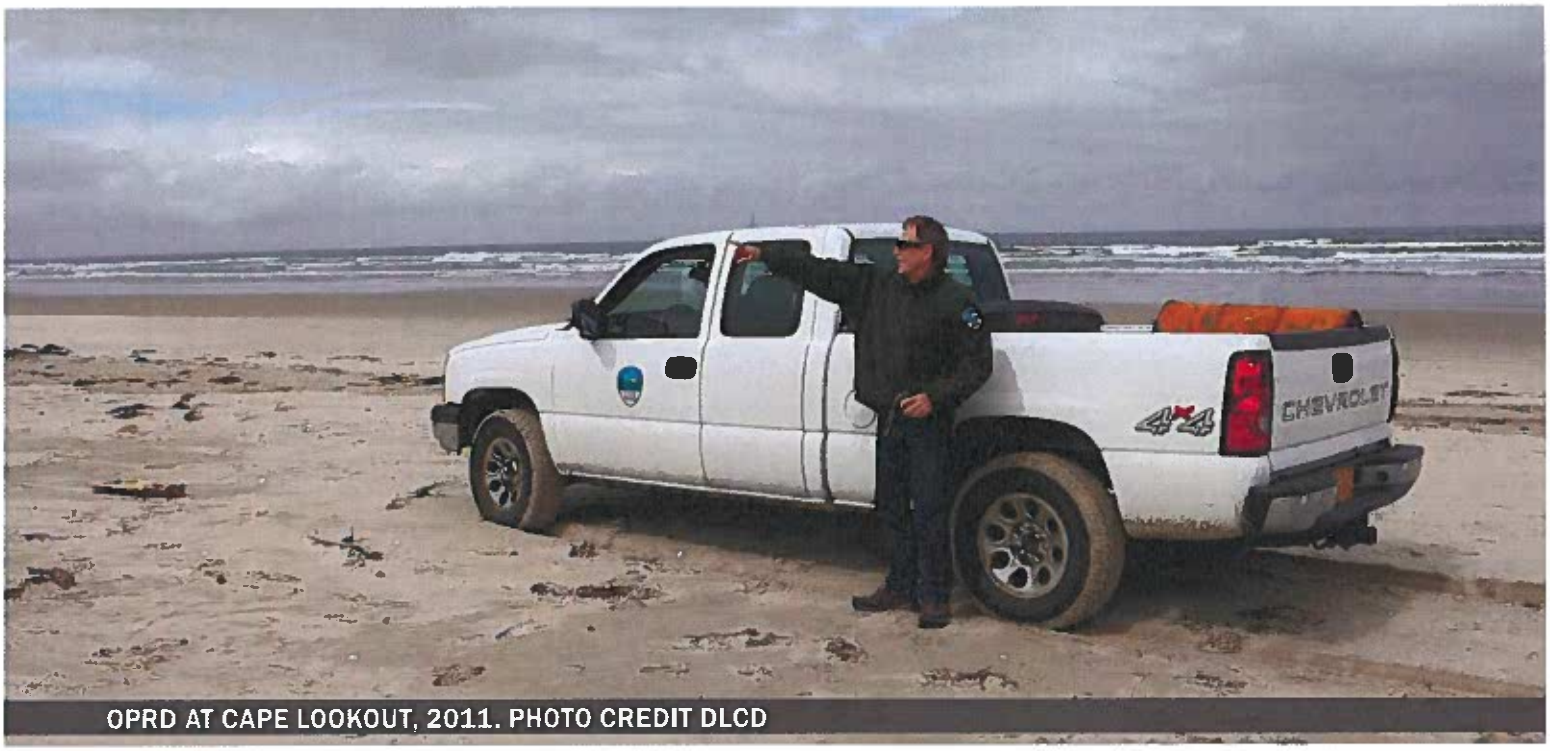


SEASIDE PROMENADE. PHOTO BY HAILEY BOND. 2021

# Agencies and Jurisdictions

## Oregon Parks and Recreation Department (OPRD)

OPRD has jurisdiction over the "Ocean Shore State Recreation Area," which is the area between extreme low tide and either the statutory vegetation line (ORS 390.770) or current vegetation line, whichever is further inland. OPRD may issue ocean shore alteration permits for shoreline armoring projects, access ways, sand alterations, pipelines, cables, conduits, and natural product removal. They do pre-project consultation and pre-project site visits to educate applicants on permitting processes and requirements. OPRD has authority to issue emergency permits. OPRD evaluates permits using general standards, scenic standards, recreation use standards, safety standards, and natural and cultural resource standards (OAR 736-020). While OPRD cannot regulate structures or other shoreline alterations that are landward of the most inland vegetation line, if the alterations are eventually exposed on the beach, they are considered by OPRD to be unpermitted structures and require a new permit. If structures are not in compliance with OPRD regulations, the agency can levy fines of up to $10,000 per day until offending structures are removed or brought into compliance, and/or the shoreline is restored.



OPRD AT CAPE LOOKOUT, 2011. PHOTO CREDIT DLCD

## Local Governments and Planning Offices

Local governments are responsible for identifying beach and dune areas in comprehensive plans and establishing policies and uses for these areas. They are also responsible for identifying areas where development existed on January 1, 1977, and, therefore, which areas are eligible for beachfront protective structures. Local governments are involved in the permitting process through the 'Land Use Compatibility Statement' (LUCS) form. Through the LUCS form, local governments determine whether the proposed development conforms to the provisions in

their local comprehensive plan and land use code. Those plans and codes must have been acknowledged by the Land Conservation and Development Commission (LCDC). On the coast, local governments have jurisdiction east of the statutory vegetation line or the actual line of vegetation, whichever is further east. In some cases, local governments may also have additional jurisdiction on the ocean shore related to National Floodplain Insurance Program requirements.

In some cases, local governments may also require a separate local permit (i.e. a building permit or floodplain development permit) for a beachfront protective structure outside of the permit required by OPRD. In cases where a structure is located landward of the vegetation line, a building permit or floodplain development permit (or, at minimum, a review of the proposed development) is likely required. Find more information about local permitting requirements, which may differ between jurisdictions, by contacting the local planning office directly.

## Department of Land Conservation and Development (DLCD)

DLCD advises and provides guidance to local governments and state agencies on the implementation of Goal 18 (as well as all 19 of the statewide planning goals). DLCD maintains an unofficial Goal 18 eligibility inventory that serves as a resource for local governments to determine Goal 18 eligibility for any oceanfront parcel or lot. Local governments make the final eligibility determination but are able to use the Goal 18 inventory as a tool to aid in their determination. DLCD led the Goal 18 focus group that identified the need for this guidebook.

Most state permits for beachfront protective structures are handled only by OPRD. However, in situations where a beachfront protective structure is needed in estuarine areas, both the Department of State Lands and the United States Army Corps of Engineers are involved. Local governments may also require permits for the installation of shoreline protective structures in these areas. Find more information about local permitting requirements, which may differ between jurisdictions, by contacting the local planning office directly.

## Department of State Lands (DSL)

DSL has jurisdiction over waters of the state, including estuary lands. Their jurisdiction extends to the highest measured tide or the upper edge of a wetland. When proposed in an estuary, shoreline protective structures are regulated under a removal-fill permit. DSL's Aquatic Resource Management Program (ARM) provides assistance during the permitting process, including information on which wetlands and waterways have removal-fill permit requirements, which requirements apply, and how the process works. They can also host pre-application meetings. DSL determines whether the project is consistent with the protection, conservation, and best uses of the water of the state and whether the project unreasonably interferes with preservation of waters for navigation, fishing, or public recreation. DSL can also issue emergency permits in circumstances that pose immediate and direct threats to public health, safety, or substantial property. DSL cannot issue permits that are contrary to Statewide Planning Goal 16 or the local comprehensive plans.

## United States Army Corps of Engineers (USACE)

When shoreline protective structures are proposed in wetlands, waterways or estuaries, the USACE possesses regulatory jurisdiction pursuant to Section 404 Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act of 1899 (RHA). Examples of project activities which may trigger a Section 404 CWA permit nexus from the USACE include wetland or waterway dredge or fill activities required for the construction of utility lines, outfall structures, road crossings, streambank stabilization, or beach nourishment. Examples of project activities which may trigger a Section 10 RHA permit nexus from the USACE include dredging, construction or modifications

of marinas, piers, wharves, floats, pilings, bulk heads, or submerged or aerial transmissions lines. In general, proposed work or structures occurring in, over, under or affecting navigable waters requires a Department of the Army permit issued by USACE. USACE Section 404 CWA regulatory jurisdiction extends to the high tide line in tidal waters, including wetlands. USACE Section 10 RHA regulatory jurisdiction extends to the mean high water mark in tidal waters.

## Permitting Process

For most beachfront protective structures on the open coast, OPRD is the state permitting agency. Their jurisdiction extends from the extreme low tide line to either the existing vegetation line or the statutory vegetation line (ORS 390.770), whichever is further inland. The changing jurisdictional boundary to the east essentially serves as a rolling recreational easement that can move as the beach erodes. This rolling easement is illustratedfor cases of both erosion and accretion below.



EXAMPLE OF OCEAN SHORE JURISDICTION IN ERODING AREA. PHOTO BY OREGON SHOREZONE. 2011



EXAMPLE OF OCEAN SHORE JURISDICTION IN ACCRETING AREA. PHOTO BY OREGON SHOREZONE, 2011

Ocean shore alteration permits have the following requirements:

- Project justification and impacts: A detailed description of the hazard and the threat it poses to the property, and a description of all potential impacts
- Project details: Dimensions, materials, and construction methods for project)
- Analysis of hazard avoidance: An analysis of hazard avoidance alternatives, including the relocation of existing buildings or other infrastructure
- Geologic Report: For projects greater than 50 ft in length, a geologic report from a registered professional geologist experienced in coastal processes is required

Ocean shore alteration permit forms are available online here

A geologic report must address the following:

- The potential impacts from the proposed project on sand source, supply and movement on the affected beach as well as within the same littoral cell;
- The bank or bluff stability and erosion rates on the subject property and adjacent properties and the potential impacts of the proposed project on bluff stability and erosion rates on the subject and adjacent properties;
- A review of potential non-structural solutions, including, but not limited to, vegetative stabilization, non-structural dynamic revetments and foredune enhancement. The review shall describe reasons why non-structural solutions were unsuccessful, if tried, or why they were considered unfeasible.
- The known or suspected geologic and seismic hazards in the project area and how the proposed project may affect or be impacted by those geologic and seismic hazards.

## Land Use Compatibility

Two jurisdictions need to sign off on an Ocean Shore Alteration Permit for it to be approved. First, the local government must fill out the planning department affidavit, which is called the Land Use Compatibility Statement (LUCS). The applicant is then responsible for submitting their permit application to the Oregon Parks and Recreation Department for their review and approval.

The planning department LUCS form review has two parts. In the first, the planning department makes the determination of the proposed beachfront protective structure's consistency with their local comprehensive plan and land use code by confirming that the subject property is eligible for structural beachfront protection under Goal 18 implementation provisions. While the Goal 18 eligibility inventory developed by DLCD can be used as a tool in this process, the local planning department alone is responsible for making the eligibility determination on the LUCS form, utilizing any and all information available to them, including building permit records, septic permit records, land use records, and assessor's records.

The second part of the LUCS form involves a determination by the local government on whether the beachfront protective structure is consistent with the local comprehensive plan and zoning ordinance.

After these determinations are made by the local government, OPRD evaluates the permit with a set of criteria given in OAR 736-020-0010 through 736-020-0030, discussed further below.

## Permit Decisions

After a permit application is submitted, the proposed project is posted with public notice for 30 days and adjacent landowners with common property boundaries are notified. The public has the opportunity to request a public hearing, which OPRD will schedule if ten or more written requests for a hearing are received. The applicant may request a public hearing or OPRD can also schedule hearings on its own initiative for complex or controversial projects.

If less than ten requests are received for a public hearing, and no hearing will occur based on applicant's request or OPRD initiative, OPRD has 60 days from the date of application to issue a decision.

If more than ten requests are received for a public hearing, the hearing will typically be held near the proposed project site. Notice for the time, date, and location of the hearing is posted in the same manner as the first public notice. The applicants can give a short presentation at the hearing and anyone can testify. Speaking time may be limited based on the number of people giving testimony. The hearing is not intended to be a discussion. People can ask questions of the applicant, but the applicant can choose whether to answer them. No decision is made at the hearing, but public opinion is considered during the permit review process, pursuant to OAR 736-020-0005 (Factors Evaluated).

After a public hearing, OPRD issues a written decision within 45 days. To appeal this decision, a person or agency must have standing, meaning that they have been involved in the public hearing process prior to their appeal by requesting public hearing or submitting testimony.

## Permit Criteria

OPRD evaluates permits using the following criteria. Only applications that meet the criteria will be approved.

**General Standards (OAR 736-020-0010)**

- Project Need – There shall be adequate justification for a project to occur on and alter the ocean shore area;
- Protection of Public Rights – Public ownership of or use of easement rights on the ocean shore is adequately protected;
- Public Laws – The applicant shall comply with federal, state, and local laws and regulations affecting the project;
- Alterations and Project Modifications – There are no reasonable alternatives to the proposed activity or project modifications that would better protect the public rights, reduce or eliminate the detrimental effects on the ocean shore, or avoid long term cost to the public;

- Public Costs – There are no reasonable special measures which might reduce or eliminate significant public costs. Prior to submission of the application, the applicant shall consider alternatives such as nonstructural solutions, provision for ultimate removal responsibility for structures when no longer needed, reclamation of excavation pits, mitigation of project damages to public interests, or a time limit on project life to allow for changes in public interest;
- Compliance with LCDC Goals – The proposed project shall be evaluated against the applicable criteria included within Statewide Planning Goals administered by the Department of Land Conservations and Development.

**Scenic Standards (OAR 736-020-0015)**

- Natural Features – The project shall retain the scenic attraction of key natural features, for example, beaches, headlands, cliffs, sea stacks, streams, tide pools, bedrock formations, fossil beds, and ancient forest remains;
- Shoreline Vegetation – The project shall retain or restore existing vegetation on the ocean shore when vital to scenic values;
- View Obstruction – The project shall avoid or minimize obstruction of existing view of the ocean and beaches from adjacent properties;
- Compatibility with Surroundings – The project shall blend in with the existing shoreline scenery (type of construction, color, etc.).

**Recreation Use Standards (OAR 736-020-0020)**

- Recreation Use – The project shall not be a detriment to public recreation use opportunities within the ocean shore area except in those cases where it is determined necessary to protect sensitive biological resources such as state or federally listed species;
- Recreation Access – The project shall avoid blocking off or obstructing public access routes within the ocean shore area except in those cases where it is determined necessary to protect sensitive biological resources such as a state or federally listed species.

**Safety Standards (OAR 736-020-0030)**

- Structural Safety – The project shall not be a safety hazard to the public due to inadequate structural foundations, lack of bank stability, or the use of weak materials subject to rapid ocean damage
- Obstructional Hazards – The project shall minimize obstructions to pedestrians or vehicles going onto or along the ocean shore area;
- Neighboring Properties – The project shall be designed to avoid or minimize ocean erosion or safety problems for neighboring properties;
- Property Protection - Beachfront property projects shall be designed to accomplish a reasonable degree of increased safety for the on-shore property to be protected.

**Natural and Cultural Resource Standards (OAR 736-020-0030)**

- Projects on the ocean shore shall avoid or minimize damage to the following natural resources, habitat, or ocean shore conditions, and where applicable shall not violate state standards
    - Fish and wildlife resources including rare, threatened, or endangered species and fish and wildlife habitats
    - Estuarine values and navigational interests
    - Historic, cultural, and archeological sites
    - Natural areas (vegetation or aquatic features)
    - Air and water quality of the ocean shore area
    - Areas of geologic interest, fossil beds, ancient forest remnants
- When necessary to protect native plant communities or fish and wildlife habitat on the subject or adjacent properties, only native, non-invasive plant species shall be used for revegetation

When OPRD issues permit approval, it includes conditions. These conditions can include, among others:

- To record on the property's deed a reference to the OPRD permit with conditions;
- A cash bond to ensure the permit conditions are met;
- A requirement that the project is constructed according to the approved plans;
- Requirements for beach access maintenance and inspections during construction;
- Requirements for sand coverage and vegetation plantings after construction;
- Deadline for project construction.

**Approved shoreline alteration permits are available on OPRD's website here. Their rationale for approval of permits are available in these files.**

## Emergency Permits

Emergency permits can be issued for the ocean shore by OPRD for properties in "imminent peril", defined as "a situation in which property is likely to be severely damaged or destroyed by action of the Pacific Ocean or waters of a bay or a river, or by landslide or other natural forces, and where such damage would be likely to occur prior to the time required for approval of an Ocean Shore Permit."

For OPRD to issue an emergency permit for structural erosion control, the property must meet the Goal 18 eligibility requirement necessary for the issuance of a typical shore alteration permit. Eligibility is not waived in emergency circumstances.

Generally, OPRD first confirms with the local government that the proposed alteration is compliant with the local comprehensive plan and Goal 18. However, if the local government is unavailable to make a determination of eligibility, OPRD can still issue a provisional emergency permit with the understanding that if the property is later found to not meet eligibility requirements, the permit will be rescinded and any shore alteration will need to be reversed. Emergency Permits can be issued in written or verbal form.

Within a year of issuance of the emergency permit, the permittee must apply for and receive a permit to convert their temporary project approved under an emergency permit into a permanent ocean shore alteration.

# Permitting in Estuaries

Estuary mouths and tidal stream outlets mark a shift in regulatory jurisdiction between Oregon Parks and Recreation Department (OPRD) and the Department of State Lands (DSL). The 'Ocean Shore' is regulated by OPRD, while the beds and banks of estuaries are regulated by DSL. When the migration of stream outlets threatens development and infrastructure and shoreline protective structures become necessary, the distinction between the two areas of regulatory jurisdiction becomes important.

At the mouth of an estuary or tidal stream, the boundary between OPRD jurisdiction (the ocean shore) and DSL jurisdiction (the estuary) is determined by extending a line across the mouth of the estuary that connects either: 1) the "statutory vegetation line" on either side of the estuary; or 2) the actual vegetation line on either side of the estuary, whichever line is further inland. The statutory vegetation line for many locations on the Oregon shore can be found on the Oregon Coastal Atlas. The actual vegetation line is determined by using the most recent aerial/ satellite photography available or through field surveys of the sites.

## DSL Permits

DSL authorizes shoreline protective structures in the estuary using the removal-fill permit process. To begin that process, the "Joint Permit Application Form" is used ("joint" because the US Army Corps of Engineers uses the same application form for the parallel federal permit process; see USACE permitting section below).

Like OPRD's ocean shore permit, DSL's permit application includes a Land Use Compatibility Statement that must be filled out by the local planning department, indicating the status of the proposed protective structure's consistency with the local comprehensive plan and ordinances. For shoreline protective structures under DSL jurisdiction in estuaries and stream outlets, Goal 16 applies, which means that restrictions on shoreline protective structures are different than those on the ocean shore governed by Goal 18.

More information on DSL's removal-fill program is available here.

In many cases, estuarine protective structures will also require authorization from DSL as the landowner of the submersible lands of the estuary. This is called proprietary authorization and is a separate process from removal-fill permitting. DSL staff can be contacted directly about proprietary authorization.

## Restrictions on shoreline protective structures

Under Goal 16, the only structure permissible for coastal erosion mitigation in natural and conservation management units is riprap. For the administration of Goal 16, riprap is defined by DLCD as "a layer, facing, or protective mound of stones randomly placed to prevent erosion, scour or sloughing of a structure or embankment; also, the stone so used. In local usage, the similar use of other hard material, such as concrete rubble, is also frequently included as riprap." Riprap is only allowed in these management units for uses that were developed as of October 7, 1977, which is different than Goal 18's eligibility cutoff date of January 1, 1977. Goal 16 also allows for the protection of unique natural resources, historical and archeological values, and public facilities regardless of their development date.

## DSL Emergency Permits

Like OPRD, DSL also has an emergency permit process. These permits may be issued in circumstances that pose an immediate and direct threat to public health, safety, or substantial property. Permits can be issued as quickly as one day. However, under the emergency process, DSL can only approve the minimum amount of work necessary to alleviate the immediate risk and DSL may require additional work to be completed after the emergency has abated to reduce or mitigate the project's impact to the estuarine environment.

## DSL Permit Evaluation

DSL is required by statute to make two determinations in issuing a removal-fill permit.

- The project is consistent with the protection, conservation, and best uses of the waters of this state; and
- The project does not unreasonably interfere with preservation of waters for navigation, fishing, or public recreation.

The terms "consistent," "protection," "conservation" and "best uses," and the "reasonableness" standard are subjective and allow DSL considerable discretion in decision-making.

Additionally, DSL is required to consider nine factors in making these determinations:

- **The public need for the proposed fill or removal and the social, economic or other public benefits likely to result from the proposed removal or fill**: DSL will consider whether the application has demonstrated a public need and what benefits the public may derive from the proposed removal-fill activity. When the applicant is a public body, DSL will generally accept the public body's finding as to local public need and benefit without further consideration.
- **The economic cost to the public if the proposed fill or removal is not accomplished**: DSL will consider the public economic costs if the removal-fill activity is not allowed. Examples of economic costs that DSL may consider include but are not limited to: impact to public infrastructure investments, increased travel time if road closure is required, and loss of access to public services.

- **The availability of alternatives to the project for which the fill or removal is proposed**: DSL will consider what alternative designs and construction methods were evaluated to avoid and minimize impacts to waters of this state. DSL must be able to conclude that the proposed project represents the practicable alternative with the least impact to waters of this state.
- **The availability of alternative sites for the proposed fill or removal**: DSL will consider whether there were alternative sites reasonably available to the applicant for the proposed project that would have lesser impacts to waters of this state.
- **Whether the proposed fill or removal conforms to sound policies of conservation and would not interfere with public health and safety**: DSL will consider how the proposed action incorporates appropriate protection of and conservation measures for waters of this state. Sound policies of conservation are considered at the project scale and within the landscape. DSL will also consider the potential positive and negative effects of the removal-fill on public health and safety. For example, positive effects might include removal-fill to protect a sewer line. Negative effects might include increased flood risk to nearby properties.
- **Whether the proposed fill or removal conforms with existing public uses of waters and with uses designated for adjacent land in an acknowledged comprehensive plan and land-use regulations**: DSL will consider the intended purpose of the removal-fill activity and its potential effect on existing uses of the waters proposed for impact, as well as effects of the removal-fill activity on designated uses of adjacent lands (e.g., whether the action significantly impairs, reduces or damages existing and designated land uses).
- **Whether the proposed fill or removal is compatible with the comprehensive plan and land use regulations for the area where the proposed removal of fill is to occur**. DSL will use the information provided by the local planning department in the Land Use Compatibility Statement for this consideration.
- **Whether the proposed fill or removal is for streambank protection**: ORS 196.805(2) identifies streambank protection as a beneficial use of waters.
- **Whether the applicant has provided all practical mitigation to reduce the adverse effects of the proposed fill or removal.** Proposals that involve permanent impacts to wetlands or waterways will typically require compensatory mitigation to offset those impacts.

**Additional considerations for estuarine impacts**: If the project involves fill or removal activity in an estuary for a "non-water dependent use," the following additional criteria must be satisfied:

- The removal-fill activity must be for a public use (e.g., a publicly owned project or privately owned project available for use by public)
- The removal-fill activity satisfies a public need that outweighs any harm to navigation, fisheries and recreation

### Mitigation

The placement of protective structures in estuarine environments can have significant negative impacts such as destroying habitat for native species along the banks, creating new habitat for non-native species, increasing water temperature, and deflecting water energy onto other nearby lands, leading to increased erosion. Assessment of the proposed structure's impact on the local environment is required as part of the removal-fill application. For any identified permanent impacts to estuary functions, mitigation for those losses will be required. DSL generally prefers "mitigation in kind," where the impact at the project location is reversed elsewhere. If this is not possible, other methods like buying mitigation credits from an approved mitigation bank (if available) or contributing to the DSL payment-in-lieu program may be an option.

**More information on DSL's removal-fill permitting program is available in their removal-fill guide. Mitigation information can be found in Chapter 8 of the guide.**

## US Army Corps Permitting

The Corps has two types of Department of the Army permits: General Permits and Individual Permits. General information is provided here, but an applicant needing one of these permits will need to seek further direction and information from USACE.

**Information about the Corps Nationwide Permits and Regional General Permits, including conditions is available here. More information about permits from the Portland District Office is available here.**

General Permits authorize activities that are similar in nature and cause only minimal adverse environmental impacts to aquatic resources, separately or on a cumulative basis. There are two types of general permits: Nationwide Permits and Regional General Permits.

Individual Permits are for activities that do not fit the requirements for a Nationwide Permit or Regional General Permit. There are two types of Individual Permits: Standard Individual Permits and Letters of Permission.

### How the permit process works

Permit applications received by the Corps of Engineers are given identification numbers and reviewed for completeness. A request for additional information may be sent if necessary. For standard individual permit reviews, a public notice initiating a 15- or 30-day public comment period will be issued within 15 days of receiving all the required information. After the comment period, the Corps will review all of the comments. The Corps may ask for additional information at this time and a public hearing may be conducted if one has been specifically requested or determined to be necessary. For all projects, the Corps will consult with other state and federal agencies and Native American tribes as appropriate. When all considerations are satisfied, the District Engineer will make a decision to either issue or deny the permit application. If a permit is denied, the applicant will receive a written explanation.

The Corps' goal is to decide on all applications within 60 days after receipt of a complete application for general permits and 120 days for individual permits, unless: a decision is precluded as a matter of law or procedures required by law; the case must be referred to higher authority; the comment period of a public notice is extended; a timely submittal of information or comments is not received from the applicant; the processing is suspended at the request of the applicant; or information needed by the district engineer for a decision on the application cannot reasonably be obtained within the 60- or 120-day period.

### USACE emergency and expedited permit processes

33 CFR § 325.2(e)(4) defines an emergency as a situation which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if a corrective action requiring a permit is not undertaken within a time period less than the normal time needed to process the application under standard procedures. In these situations, the USACE Division Engineer (a level above the Portland District) can authorize expedited reviews of permit applications.

More information regarding the Corps expedited and emergency review process is available here.

Applicants are strongly encouraged to notify the Corps of the need to perform emergency work before taking any action so that there may be an opportunity to obtain authorization before conducting the action. Calls to discuss the situation should be made to the Corps Regulatory Project Manager for the relevant county, or the Portland or Eugene Section chief.

### Federal Consistency

Although the USACE does not independently evaluate permitted projects against Oregon's coastal land use goals, these federal permits are subject to state federal consistency review pursuant to the Coastal Zone Management Act (CZMA), as well as state water quality certifications under Section 401 of the Clean Water Act (401). Both the CZMA and 401 evaluations, conducted by the Oregon Coastal Management Program and Oregon Department of Environmental Quality respectively, incorporate requirements for consistency with the coastal goals and local land use planning, and have the authority to object/deny issuance of federal permits for inconsistent projects, or incorporate conditions to assure consistency with these standards into the federal permit.

## Other Notes on Erosion Control Permitting

Each jurisdiction involved in ocean shore permitting has its own process and permit. However, to move forward with a project, all permits are needed. Permit approval from one agency does not guarantee permit approval from other agencies. Even when projects meet the requirements of the applicable land use planning goals, they are also not guaranteed a permit, as permitting agencies have additional requirements beyond those of the land use planning goals.

The Oregon coast has a high-energy wave climate with limited economic resources for major coastal projects. As discussed previously, Land Use Planning Goal 18 restricts beachfront protective structures to tax lots that were developed before January 1, 1977. Erosion control mechanisms can be divided into categories of structural and nonstructural. In this section, the limited number of erosion control mechanisms viable on the Oregon coast are covered in detail, with resources provided for further reading and research.

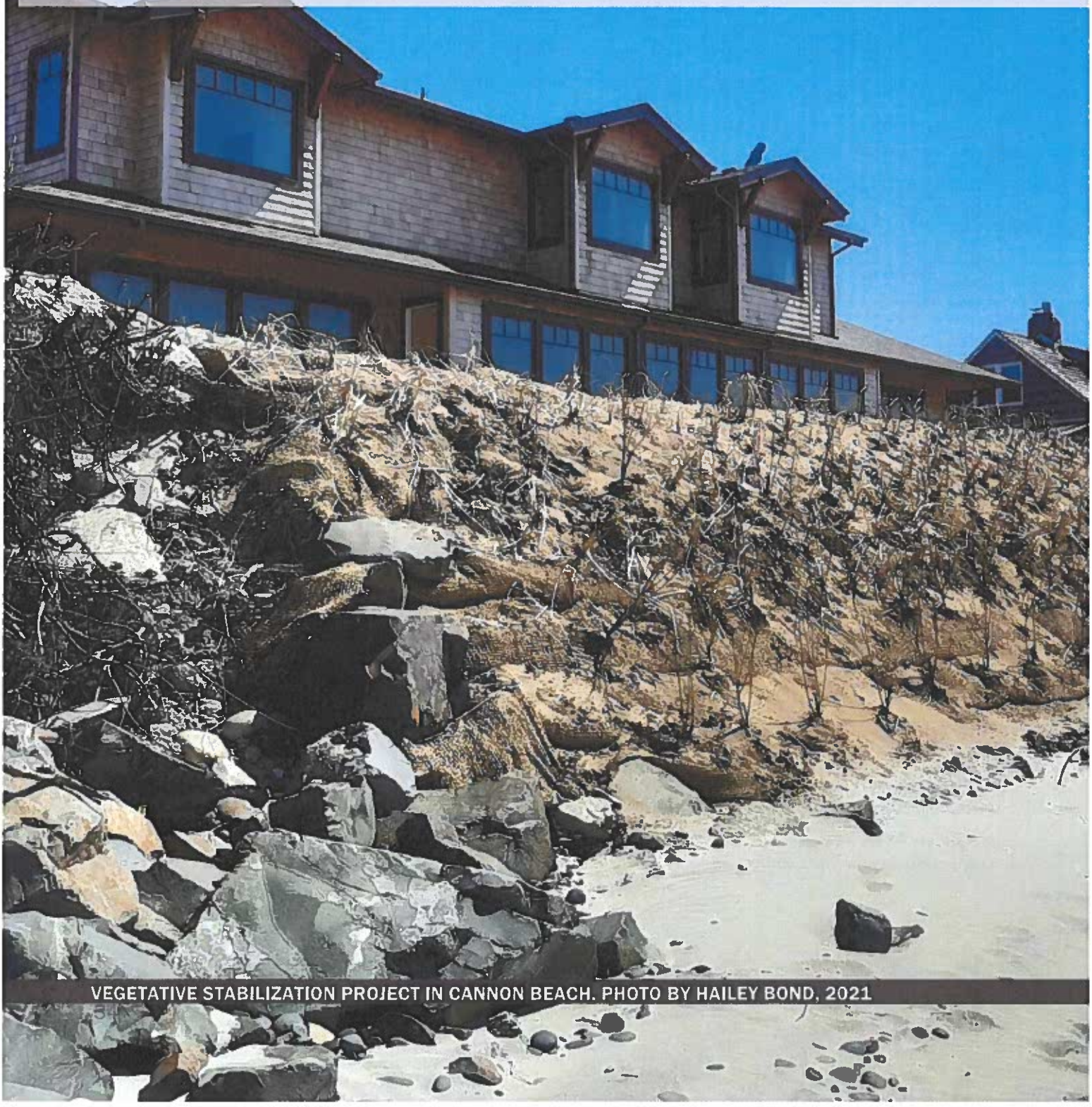
Living shorelines are commonly discussed as an option for nonstructural erosion control. The term "living shoreline" is a broad term that refers to the use of native vegetation to protect against shoreline erosion (Piercy, 2021). Living shorelines might include vegetation, oysters, rock sills, or wooden elements. While living shorelines provide protection against erosion while enhancing the environment in many parts of the world, they are better suited to areas with low-energy wave climates. This guidebook is focused on the high-energy outer coast of Oregon, so options suited to estuaries or other areas with low-energy wave climates are not covered in detail.

The term "hybrid living shoreline" refers to erosion control projects that include both natural and engineered features. They can vary drastically in their size, materials, and number of engineered features. Examples of hybrid structures in high energy wave environments are:

- A riprap revetment covered with an artificial dune (structural) (Winters, 2020);
- A dynamic revetment backed with an artificial dune (structural) (Allen, Komar, & Hart, 2003);
- A dynamic revetment, riprap revetment, piles, and planted terraces (structural) (Oregon Department of Transportation, 2017)l;
- A dynamic revetment and planted artificial dune (nonstructural) (Oregon Department of Transportation, 2017)

In Oregon, hybrid structures are subject to the same regulations as other kinds of erosion control measures. If a hybrid structure has any element that falls under the definition of a beachfront protective structure, it is considered a structure and thus will be regulated as such.

# 6. TYPES OF EROSION CONTROL



VEGETATIVE STABILIZATION PROJECT IN CANNON BEACH. PHOTO BY HAILEY BOND, 2021

NONSTRUCTURAL EROSION CONTROL

# Vegetative Stabilization

## Vegetative Stabilization - Quick Facts

- **Vegetative stabilization uses biodegradeable jute or coir fiber to stabilize an eroding slope while plants are established.**
- **There are two examples of vegetative stabilization used on the Oregon coast, both in Cannon Beach and constructed in 2002 and 2020.**
- **In Oregon, the vegetation used is typically Hooker's Willow.**
- **After several years, these projects are nearly indistinguishable from a natural slope.**
- **Vegetative stabilization does not provide the same level of protection as riprap, and is only suited to areas with mild to moderate erosion.**
- **Because the jute fabric biodegrades after a few years, this erosion control is considered nonstructural and does not require eligibility for Goal 18 for construction.**

## What is vegetative stabilization?

Vegetative stabilization in the high-energy wave environment of the Oregon coast refers to the use of biodegradable jute or coir fabric to stabilize an eroding slope while native vegetation can establish to provide longer-lasting protection against erosion. Typically, these projects are constructed by wrapping 8 – 24 in soil lifts in biodegradable fabric, which extends back into the slope approximately 6-8 ft (CalTrans, 2019; OPRD, 2002). The soil lifts are terraced to achieve the desired slope. Typically slopes for this method are 1.5-2 horizontal : 1 vertical (CalTrans, 2019). After construction of the stabilized bank, native vegetation is planted so it can establish a root system as the biodegradable fabric disintegrates. In Oregon, the native vegetation used for this kind of bank stabilization is typically Hooker's willow, which is resilient in the coastal environment and has roots capable of knitting the biodegradable fabric and soil together (OPRD, 2020). The types of plants and jute fabric need to be chosen thoughtfully so that the plants can become established by the time the soil fabric degrades. This type of project is also known as encapsulated soil lifts, fabric-encapsulated soil, or rolled erosion control products. It is common in riverine and highway bank stabilization.

## Vegetative Stabilization in Oregon

There are two examples of this type of erosion control mechanism. Both projects were constructed in Cannon Beach: the first in 2002 and the second in 2020. The project constructed in 2002 has been successful; the willows have established and the bank looks completely natural. There has been no significant erosion at the project site since its construction. Monitoring will occur at the second site to examine its performance over time.

## NONSTRUCTURAL EROSION CONTROL

# Vegetative Stabilization

This erosion control mechanism is among the only designs of vegetative stabilization that can survive in Oregon's high-energy wave environment. After the willows stabilize and the jute fabric degrades, the project is nearly indistinguishable from a natural slope, a clear advantage over structural erosion control mechanisms like riprap. The willows also provide ecosystem services by providing a more favorable environment for other native plants and animals. The mature willows can protect the slope by dissipating wave energy through their branches rather than simply reflecting it, reducing the chance of scour or other negative impacts on the beach due to the stabilized bank. While costs of riprap revetments can vary, both the vegetative stabilization projects constructed on the Oregon coast have been significantly cheaper than most riprap projects.

While vegetative stabilization is a valuable alternative to the more common kinds of structural erosion control in Oregon, it is not suitable for every location. This design is not as sturdy as riprap, and therefore cannot protect against erosion in the same way. It is therefore only suited to areas with mild to moderate erosion. The project requires the successful establishment of willow plantings, so it can be affected by poor soil or unusual weather events. The terraced soil burritos are also vulnerable to erosion at the toe of the slope. Several collections of case studies of this type design have identified toe erosion as a common form of failure (Miller, 1998; Alaska Department of Transportation, 2003). Like riprap, the slope is only stable between 1.5 – 2 horizontal :1 vertical, and therefore takes up space on the beach.



VEGETATIVE STABILIZATION PROJECT IN CANNON BEACH JUST AFTER CONSTRUCTION. PHOTO BY HAILEY BOND, 2021

NONSTRUCTURAL EROSION CONTROL

# Vegetative Stabilization



VEGETATIVE STABILIIZATION PROJECT IN CANNON BEACH 19 YEARS AFTER CONSTRUCTION. PHOTO BY HAILEY BOND, 2021

## How will vegetative stabilization perform under sea level rise?

In many locations, vegetative stabilization and restoration has been proven to help mitigate sea level rise impacts by reducing flooding (Piercy, 2021). However in Oregon's high-energy wave environment, the increase of wave impact and erosion due to sea level rise will likely degrade the stabilized slope. Structural solutions or relocation of development may be needed under increased erosion due to sea level rise.

## Vegetative stabilization policy

When constructed with biodegradable fabric, vegetative stabilization is considered a nonstructural erosion control mechanism and does not need Goal 18 eligibility for construction. It requires an OPRD permit for shore alteration. Check with the local jurisdiction for any local permits needed if the project will extend landward of OPRD's jurisdiction.

## Vegetative stabilization references


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Piercy, C. P. (2021). Chapter 10: Coastal Wetlands and Tidal Flats. In T. Bridges, J. K. King, J. D. Simm, M. W. Beck, G. Collins, Q. Lodder, & R. K. Mohan (Eds.), International Guidelines on Natural and Nature-Based Features for Flood Risk Management. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

NONSTRUCTURAL EROSION CONTROL

# Dynamic Revetment

## Dynamic Revetment - Quick Facts

- **Dynamic revetments are engineered beaches made of cobblestones (stones between 2.5 and 10 inches).**
- **The cobbles that compose dynamic revetments move with wave conditions, often gaining height during high-energy wave conditions and losing height during low-energy wave conditions.**
- **Construction of dynamic revetments is much cheaper than construction of traditional revetments because cobblestones can be dumped onto the beach rather than individually placed.**
- **Dynamic revetments do not provide the same level of reliable protection as traditional revetments, but have proven successful on high-energy coasts.**
- **Dynamic revetments require more maintenance than traditional revetments.**
- **Dynamic revetments are not suitable for use on single lots or in areas which don't already have cobbles on the beach.**
- **Because dynamic revetments move and reshape in response to wave conditions, they are not considered structures and do not require Goal 18 eligibility for construction**

### What is a dynamic revetment?

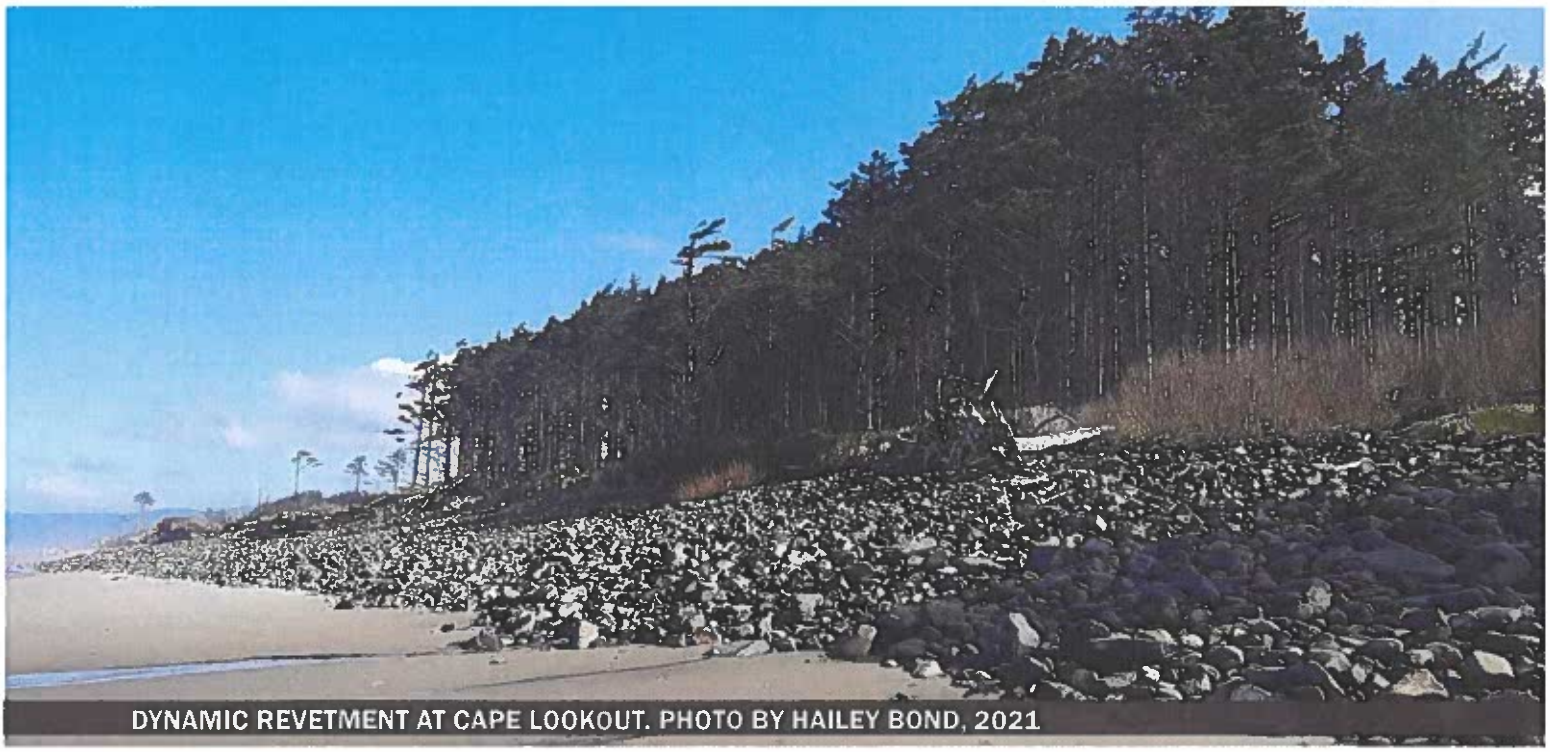
Dynamic revetments (also called cobble beaches and cobble berms) are beaches made of cobble stones. Cobbles are defined as stones with a diameter between 2.5 – 10 in (Masselink, Hughes, & Knight, 2011). Cobble beaches exist naturally but can also be constructed in erosive areas to dissipate wave energy and mitigate further erosion. Unlike traditional rock revetments, the cobbles in a dynamic revetment are expected to move in response to waves. As they move and change their shape, they can dissipate wave energy.

Research on dynamic revetments has been somewhat limited, so no 'typical' designs or methods exist. However, field studies in Oregon and Washington provide valuable information about potential designs and construction methods for the high-energy waves here.

In Oregon, field studies of naturally occurring cobble berms observed that they typically had crest height elevations of 19 – 23 ft and were composed of small to large cobbles (1 – 5 in). Slopes of cobble beaches ranged from 7.7 degrees to 14.1 degrees (Allan, Geitgey, & Hart, 2005).

Dynamic revetments have many benefits over traditional static revetments. They are more flexible than traditional riprap because they move in response to waves, meaning that, unlike traditional revetments, movement does not mean failure. Movement in response to wave conditions is often desirable, as dynamic revetments can gain material and increase their crest elevations during high wave conditions (Bayle, Kaminsky, Blenkinsopp, Weiner, & Cottrell, 2021; Allan, Hart, & Tranquili, 2006; Allan & Hart, 2007). Dynamic revetments are also more cost-effective

## NONSTRUCTURAL EROSION CONTROL
# Dynamic Revetment



DYNAMIC REVETMENT AT CAPE LOOKOUT. PHOTO BY HAILEY BOND, 2021

for several reasons. First, because the revetment moves and reshapes itself in response to wave conditions, the initial placement of the cobbles is less important than in the construction of a traditional revetment, making construction costs cheaper. Second, because the stone size is smaller, it is typically less expensive than typical armor stone. In Oregon, cobble beaches exist naturally, so constructed dynamic revetments are more compatible with the natural environment than other erosion control options (Allan, Geitgey, & Hart, 2005).

While dynamic revetments have advantages over traditional static revetments, there are drawbacks as well. As the cobbles can move, they don't provide the same level of protection as traditional riprap. Dynamic revetments also require more frequent maintenance, as cobbles can be moved off- or alongshore during extreme wave conditions. For the two dynamic revetments on the outer Oregon coast, maintenance approximately every 10 years is typical. Movement of cobbles can be especially concerning if the dynamic revetment is near a creek, as the cobbles could cut off the mouth of the creek (Oregon Department of Transportation, 2017). Cobbles also have the potential to become projectiles during storms, making them a hazard to people and property. Additionally, dynamic revetments work best over a stretch of coastline rather than on a lot-by-lot basis and thus may not be an appropriate option for an individual property owner.

NONSTRUCTURAL EROSION CONTROL

# Dynamic Revetment

## Dynamic revetments in Oregon

Oregon has two engineered dynamic revetments on the open coast. The first was completed at Cape Lookout in 2000. Cobbles were removed from the south end of the beach and moved northwards in front of an eroding campground. An artificial dune was also constructed using sand-filled geotextile bags with a sand covering and vegetation planting. The crest of the artificial dune was 23-26 ft at the south end of the structure, and 26-33 ft at the north end of the structure. The dynamic revetment crest elevation was 17 ft in the north and 23 ft in the south. The dynamic revetment was not planned to stop all overtopping, but to limit it and protect the artificial dunes from erosion (Allan, Komar, & Hart, 2003). The dynamic revetment has experienced relatively minor damage over its 20-year life, with periodic replenishment of cobble needed by OPRD and repairs required in 2007 and 2021.

The second dynamic revetment on the open coast is at the south jetty of the Columbia River. It was put in place to prevent breaching of the spit, which could have severe consequences for the estuary and jetties. The project was completed in 2013 and had a crest elevation of 22 ft, a crest width of 65 ft, and a slope of 0.2 that was expected to equilibrate to a slope of 0.07. Maintenance for the revetment is expected every 10-15 years (Allan & Gabel, 2016) and will be completed by USACE. While Allan & Gabel (2016) identified erosion at the north end of the revetment and cobble movement southward, the revetment has withstood several significant wave events.



DYNAMIC REVETMENT AT THE COLUMBIA RIVER. PHOTO BY JONATHAN ALLAN, 2013

# Dynamic Revetment

## How will dynamic revetments perform under sea level rise?

Dynamic revetments function best when placed above high tide. As sea levels rise, dynamic revetments that are already in place are expected to self-adapt to sea level rise through rollover transport. In other words, as the water level gets higher, cobbles are expected to roll over the top of the revetment, causing the whole structure to retreat backwards and upwards (Bayle, Blenkinsopp, Masselink, Beuzen, & Almar, 2020).

## Dynamic revetment policy

As dynamic revetments move and reshape in response to wave attack, they are considered non-structural and do not need to meet eligibility requirements under Goal 18 for permitting. If a dynamic revetment is constructed above the mean high tide line, it needs a permit from OPRD for construction. However, the permitting process at OPRD requires that shore alterations match their surroundings as much as possible. If a beach is sandy and does not naturally have some cobbles, a dynamic revetment may not be permitted for that beach. Check with the local jurisdiction for any local permits needed if the revetment will be landward of OPRD's jurisdiction.

## Dynamic revetment references

Allan, J. C., Hart, R., & Tranquili, V. (2006). Th euse of Passive Integrated Transponder Tags (PIT - tags) to trace cobble transport in a mixed sand-and-gravel beach on the high-energy Oregon coast, USA. Marine Geology, 63-86.

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NONSTRUCTURAL EROSION CONTROL

# Beach Nourishment

## Beach Nourishment - Quick Facts

- **Beach nourishment is the practice of adding sand to a beach to protect the backshore from erosion.**
- **Beach nourishment project designs are very specific to the location where they are constructed.**
- **Sand sources are often from offshore or from dredging of estuaries and rivers.**
- **Beach nourishment is not common in Oregon because of the high-energy wave climate and limited availability of sediment.**
- **Beach nourishment has occurred after dredging near the Columbia River and Port Orford.**
- **Beach nourishment is not considered a beachfront protective structure and does not require eligibility under Goal 18 for construction.**

### What is beach nourishment?

Beach nourishment is the practice of adding sand to a beach to protect the backshore from erosion, enhance recreation, or improve habitat. Beach nourishment is especially common on the East and Gulf coasts (ASBPA, n.d.) Beach nourishment projects are very specific to the site conditions where the project will take place. The United States Army Corps of Engineers' Shore Protection Assessment recommends that engineers consider:

- Climatology
- The shape of the beach
- The type of native sand
- Volume and rates of sediment transport
- Erosion patterns and causes
- Waves and water levels
- Historical data and previous storms
- Probability of certain beach behaviors at the site
- Existing structures and infrastructure
- Past engineering activities in the area

NONSTRUCTURAL EROSION CONTROL

# Beach Nourishment

Sand for beach nourishment is typically dredged from offshore using a barge and pumped onshore, although sand can also be brought from land sources using trucks (USACE, n.d.). To ensure the longevity of the beach nourishment project, sand should be the same size or coarser than the local sediment (Masselink, Hughes, & Knight, 2011).

There are three typical ways of constructing a beach nourishment: 1) sand can be placed in dunes above the influence of most waves; 2) sand can be placed directly on the beach to widen it; or 3) sand can be placed just offshore to create a sandbar. If sand is placed in dunes, storm waves may remove the sand during periods of high water. If sand is placed directly on the beach, it is placed at a steep slope and expected to reshape by flattening and spreading out. When placed in an offshore sandbar, waves will push it onshore to widen the beach (USACE, n.d.). All these options will require periodic renourishment.

Due to the expected movement of sand as a beach nourishment project equilibrates to the wave conditions, beach nourishments must be applied over a stretch of coastline rather than on a lot-by-lot basis.

For many areas, beach nourishment is an ideal option to maintain beaches. Compared to other erosion control methods, beach nourishment is easier to construct and maintain, and is most similar to the natural ecosystem. With regular maintenance and a suitable sand source, beach nourishment programs can consistently keep beaches at the desired width and reduce threats from erosion and flooding. Beach nourishment is especially desirable as a non-structural options in areas where structural erosion control is not preferred or prohibited due to its impact on the beach. Beach nourishment can hold the beach in a more natural state by making up for any sediment deficits causing erosion.

However, the suitability of beach nourishment programs is heavily dependent on a reliable, sustainable, clean sediment source for the life of the project. A sediment source that is too far away can quickly drive project costs beyond what communities can pay. Construction of nourishments can also impact plants and animals on the beach when layers of sand and heavy machinery are used (UCSB Explore Beaches, n.d.).

## How will beach nourishment perform under sea level rise?

Beach nourishment is used currently to mitigate sea level rise impacts in places where sediment sources are plentiful and beach nourishment is economically viable, like the East and Gulf coasts (Houston, 2020). As the rate of sea level rise increases, the volume of sand and the frequency of nourishment needed to maintain beach widths will likely increase, making beach nourishment more expensive and potentially no longer financially viable over time.

# Beach Nourishment

## Beach nourishment in Oregon

Beach nourishment is not common in Oregon for several reasons. First, suitable sand sources in Oregon are few and far between. Removing sand from offshore sources for use on the beach is difficult, costly, and has environmental and political ramifications. Dredging from estuaries is therefore the only viable sand source for beach nourishment (Tillamook County Department of Community Development, 2013). This sand may not be of the appropriate composition for beaches on the Oregon coast, and in many situations may be too far away to reasonably be used for cost-effective nourishment.

Due to Oregon's energetic wave climate, beach nourishment projects would require an immense amount of sand For example, to widen the beach by 100 ft in Neskowin, it was estimated that 250 cubic yards of sand would be required per linear foot of shoreline. For the approximately 7,000 ft of shoreline needing nourishment, ~1.8 million cubic yards of sand would be needed (Tillamook County Department of Community Development, 2013). Oregon's wave climate also means that maintenance may be needed more often in Oregon than in other places with less energetic wave climates.

Due to the high wave climate and lack of suitable sand sources, beach nourishment projects to protect the communities on the coast are estimated to come with high price tags. In 2017, USACE was involved in preparing a plan for beach nourishment project to protect Beverly Beach with an estimated cost of 15.5 million dollars (Oregon Department of Transportation, 2017). In 2013, 2,600 ft of beach nourishment in Neskowin was estimated at 18 million dollars (Tillamook County Department of Community Development, 2013).

The only two beach nourishment projects in Oregon listed on ASBPA's National Beach Nourishment Database are near the mouth of the Columbia River and near the Port of Port Orford breakwater (ASBPA, n.d.). These projects are both related to large federal navigation projects and are near estuaries with ongoing dredging. Material from dredging in the Port Orford harbor was also used to nourish beaches in the area to improve Snowy Plover habitat (NOAA, 2000).

## Beach nourishment policy

Beach nourishment is considered a non-structural erosion control measure in Oregon, and therefore does not need eligibility under Goal 18 for construction. Beach nourishment projects require permits from OPRD for sand placed above the tide line and permits from USACE and DSL for sand placed below the high tide line (Tillamook County Department of Community Development, 2013). Check with the local jurisdiction for any local permits needed if the project will extend landward of OPRD's jurisdiction.

## Beach nourishment references

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NONSTRUCTURAL EROSION CONTROL

# Beach Scraping

## Beach Scraping - Quick Facts

- **Beach scraping is the process of stimulating natural recovery from short-term erosion by moving sand from the intertidal zone to the beach.**
- **Beach scraping can be cost-effective and low-impact.**
- **Beach scraping is a temporary solution and not a long term management strategy.**
- **The amount of sand moved cannot exceed the natural rate of recovery. In other words, beach scraping can protect against damage due to consecutive storms but will not be effective in areas of chronic shoreline erosion.**
- **Beach scraping is not a beachfront protective structure and does not require eligibility under Goal 18 for construction.**

### What is beach scraping?

Beach scraping is the process of stimulating natural recovery from short-term erosion by moving sand from the intertidal zone to the beach or upper beach through mechanical means (Carley, 2010). Beaches naturally experience cycles of erosion and accretion on timescales from single storms to seasons. During erosive periods, sand erodes from the beach or dunes and is transported to the swash zone or a sandbar. During accretive periods, smaller waves naturally push this sand back up on the beach, restoring the eroded beach and dunes. Beach scraping accomplishes this natural process through mechanical means by using heavy machinery to move sand from the swash zone to the beach. When the swash zone is flattened by removing sand, it encourages accretion by letting waves propagate further up the beach to deposit sand.

Under the right circumstances, beach scraping can be a cost-effective and low-impact way of protecting infrastructure. Beach scraping does not require any import of sand, and the sand is always compatible with the surroundings because it cycles naturally between the intertidal zone and the beach. A beach scraping project is relatively cheap, can be completed rapidly, and is compatible with the aesthetics of the beach.

While beach scraping is a useful tool in some situations, it has some significant limitations. Beach scraping is a temporary solution for erosion and is not a good strategy for long-term management. Depending on the conditions, scraping may need to be completed several times during a year. It is useful for preventing damage due to consecutive storms without recovery time between them but is not effective in areas where chronic shoreline erosion is occurring. The scraping rate cannot exceed the rate of recovery of the intertidal zone without causing additional erosion (Tye, 1983; McNinch, 1992).

NONSTRUCTURAL EROSION CONTROL

# Beach Scraping

The design and implementation of beach scraping programs is variable based on site conditions. However, some recommendations and observations can be found in literature. Bruun (1983) recommended scraping depths of 0.7 to 1.6 ft and placement of the sand in dunes. Tye (1983) studied a beach scraping project with scraping volumes of 300 $ft^3/ft$ and concluded the scraping rate was excessive and the beach profiles did not recover. Gallien (2015) studied event, seasonal, and persistent berms in California and described event berms created by beach scraping as temporary structures with triangular cross-sections and relatively low volumes and crest elevations (43 $ft^3/ft$ and 5ft, respectively).

## Beach Scraping in Oregon

Beach scraping has been used infrequently on the Oregon coast. Private homes in Lincoln Beach and Cape Lookout State Park have both tried beach scraping but eventually pursued more permanent long-term solutions (riprap in Lincoln Beach and a dynamic revetment at Cape Lookout State Park). Beach scraping likely has limited utility in Oregon. In areas where chronic erosion is an issue, beach scraping at a rate less than that of the rate of recovery of the intertidal zone will not provide an acceptable level of protection. Beach scraping is useful when otherwise stable coastlines are in danger of infrastructure damage due to two consecutive storms.

## How will beach scraping perform under sea level rise?

Beach scraping is best used as temporary measure to prevent episodic erosion, so it is not a good solution for mitigating the effects of sea level rise.

## Beach Scraping Policy

Beach scraping is not a structural erosion control measure and does not require Goal 18 eligibility for construction. However, it does require an OPRD shore alteration permit and likely a joint removal-fill permit from DSL and USACE for removing sand in the intertidal zone. Check with the local jurisdiction for any local permits needed if the project will extend landward of OPRD's jurisdiction.

## Beach scraping references

Bruun, P. (1983). Beach Scraping - Is it damaging to Beach Stability. Coastal Engineering, 167-173.

Carley, J. T. (2010). Beach scraping as a coastal management option. Proceedings of the 19th NSW Coastal Conference, (p. Vol 890).

Gallien, T. O. (2015). Geometric properties of anthropogenic flood control berms on southern California beaches. Ocean and Coastal Management, 35-47.

McNinch, J. E. (1992). Effectiveness of Beach Scraping as a method of erosion control. Shore and Beach, 13-20.

Tye, R. (1983). Impact of Hurricane David and Mechanical Dune Restoration on Folly Beach, South Carolina. Shore and Beach, 3-9.

# Seawall

## Seawall - Quick Facts

- **Seawalls are structures built parallel to the shoreline to protect the upland from wave action, erosion, and flooding.**
- **There are several types of seawall design; all are heavily engineered and must be designed based on site conditions.**
- **Seawalls are generally effective at reflecting wave energy and protecting the upland.**
- **Seawalls built on eroding coasts cause the beach to narrow.**
- **Seawalls are prone to failure, especially if improperly designed.**
- **Seawalls are common in populous places on the central Oregon coast.**

### What is a seawall?

Seawalls are structures built parallel to the shoreline to protect the upland from wave action, erosion, and flooding. Seawalls are an extremely common method of controlling erosion on coastlines worldwide, and a quick image search will show a multitude of traditional and innovative seawall concepts on scales from single homes to entire cities. Most seawalls can be divided into three categories: vertical, curved, and stepped. As a note, many people include "rubble seawalls" in their seawall categories. However, in Oregon, rubble seawalls are typically known as riprap, and are discussed separately.

Vertical seawalls use a strong vertical face to reflect wave energy. They are typically made of concrete, but can also be made of sheet pile or other materials.

Curved seawalls are similar to vertical seawalls, but have a concave curved design to alter the way waves are reflected. Curved seawalls are intended to reduce the amount of scour that occurs due to wave reflection.

Stepped seawalls also protect the coast by reflecting wave energy, but the seawall, rather than having a smooth face, has a stair-step shape on the seaward side. Stepped seawalls are intended to break up and dissipate waves to better protect the upland and to prolong the life of the structure.

Seawalls are generally heavily engineered structures that must be designed based on wave heights, expected tides and storm surges, soil characteristics, and other factors.

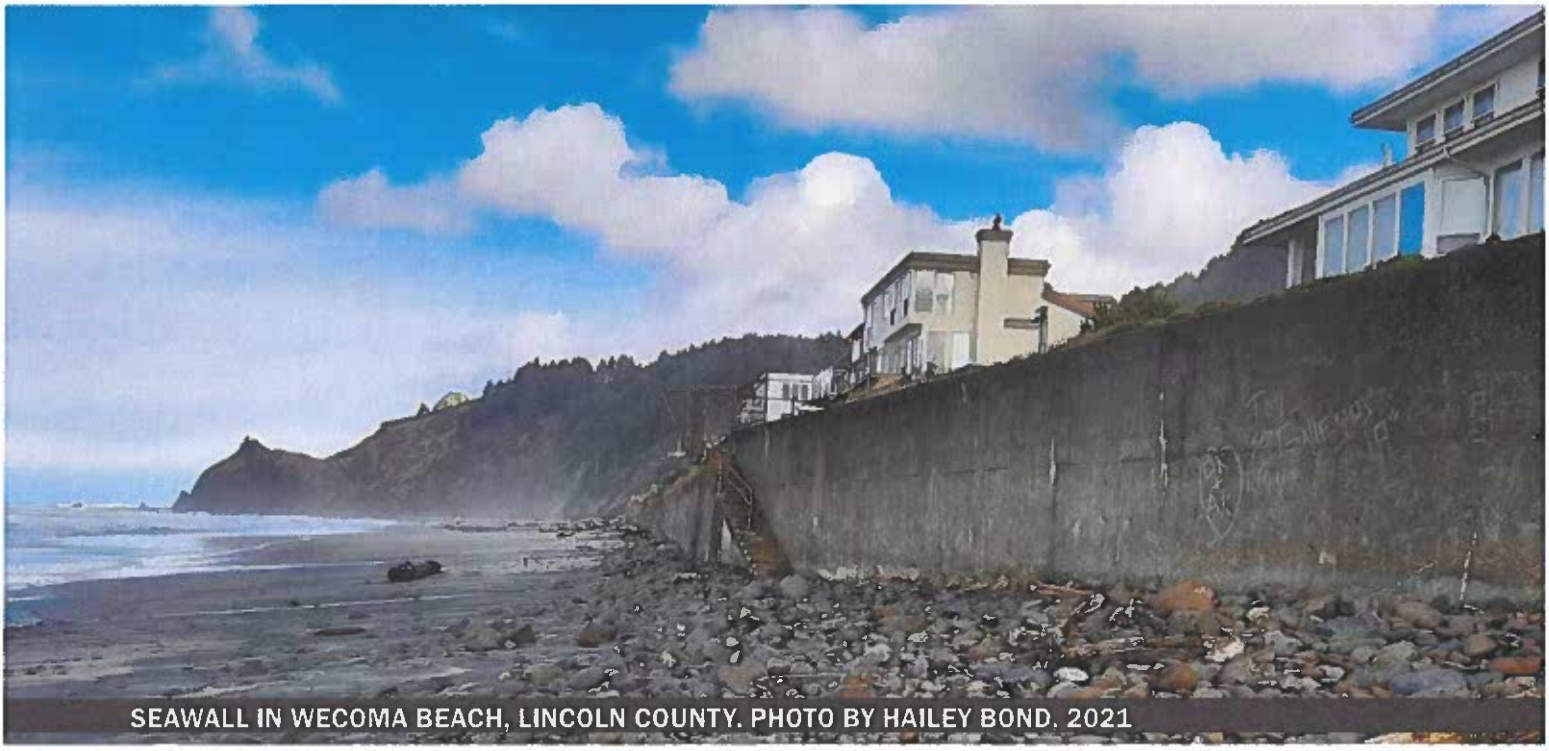
Seawalls have a number of benefits over other coastal protection structures. Like riprap revetments, they are effective at reflecting wave energy and protecting the upland. They also have additional benefits over riprap structures. Seawalls take up less land than riprap, and can be incorporated into promenades (Seaside, OR is a good example). Seawalls also can provide flood protection in addition to erosion control, so they can be used as effective storm surge and sunny-day flood protection (CTCN, n.d.).

## STRUCTURAL EROSION CONTROL
# Seawall

While seawalls are effective at reflecting wave energy and preventing flooding, their effectiveness comes with a price. Seawalls have a significant effect on the beach. They fix the shoreline in place, causing passive erosion, a term for the lowering of the beach due to sea level rise. Without a place for the beach fronting the seawall to migrate upward and landward, it will narrow and eventually be lost to the rising seas. Seawalls also interrupt the natural replenishment of sand to the beach through erosion of cliff faces, called sediment impoundment, which can lead to further erosion on the beach. In addition to the passive erosion seawalls cause simply by their presence, seawalls also have the potential to cause active erosion by impacting hydrodynamics and sediment transport processes. Kraus and McDougal (1996) provide a literature review detailing the scientific debate over the nature of active erosion and the circumstances under which it will occur. Weggel (1988) developed a rating system to classify the active erosion a seawall might cause based on the location of the seawall and the depth of water at its base. This rating can change over time due to sea level rise. Komar and McDougal (1988) studied active erosion specifically on the Oregon coast and, while scour and flanking were evident in their lab experiment, the complex and high-energy processes on the Oregon coast typically mask effects of seawalls and other hard structures.

Seawalls are also prone to failure, especially if not properly designed. Changes in water level, wave height, or deterioration of the seawall materials can contribute to seawall failure (Stokes Marine, 2020). They also tend to be more expensive than other erosion control options.

Seawalls also have an impact on the appearance and recreational opportunities of the beach. Seawalls disrupt the connection between the upland and the beach and require beachgoers to use designated beach access points. They also are not visually appealing and not generally appreciated by beachgoers.



SEAWALL IN WECOMA BEACH, LINCOLN COUNTY. PHOTO BY HAILEY BOND. 2021

STRUCTURAL EROSION CONTROL

# Seawall

## How will seawalls perform under sea level rise?

Seawalls have an advantage compared to other erosion control mechanisms, because they are effective against flooding and may help communities delay the effects of sea level rise. However, by holding the coastline in place, seawalls will contribute to the narrowing and eventual loss of beaches due to sediment impoundment and passive erosion. Seawalls also have the potential for failure under changing water levels, making them vulnerable to sea level rise.

## Seawalls in Oregon

Seawalls are a common sight along the central Oregon coast (e.g. Gleneden Beach), especially in populous areas. Riprap revetments are generally preferred over seawalls currently, but many seawalls in good repair are visible all over the coast.



PROMENADE AT SEASIDE. PHOTO BY HAILEY BOND, 2021

## Seawall policy

Seawalls are intended to hold the coastline in place, reflect wave energy, and remain static, so they are considered structures. To move forward with construction of a seawall, a property must be considered eligible under Goal 18. Seawalls also require an Ocean Shore Alteration Permit from OPRD for construction. Check with the local jurisdiction for any local permits needed if the seawall will be landward of OPRD's jurisdiction.

## Seawall references

CTCN. (n.d.). Sea Walls. Retrieved August 2021, from https://www.ctc-n.org/technologies/sea-walls

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# Riprap Revetment

## Riprap Revetment - Quick Facts

- **A riprap revetment, or riprap, is an engineered structure made of large boulders that protects the upland.**
- **Riprap is extremely common in Oregon, and a well-known standard design has been developed by coastal practitioners.**
- **Because the face of riprap is sloped, it takes up space on the beach during its construction.**
- **When placed on an eroding coast, riprap causes narrowing of the beach.**
- **If any stones in the riprap structure move, the entire structure may be destabilized.**
- **Riprap is a beachfront protective structure, and requires Goal 18 eligibility for construction.**

### What is riprap?

Riprap is an erosion control measure made of rocks placed on a slope for protection. Riprap is extremely common in Oregon; it accounted for 85% of hard stabilization structures constructed between 1976 -1999. The construction of riprap has a long history in Oregon, but riprap designs were not regulated in the early days of structural erosion protection. Komar and McDougal (1988) said about seawalls and riprap "Little consideration has been given to the design of these structures and their requirements specific to the Oregon coast, and the designs commonly are not based on sound engineering practice. As a result, some have not been successful." Additionally, until the 1990s, homeowners regularly designed their own riprap protection, and this riprap commonly did not meet modern minimum standards for performance. For example, in the winter of 2020/21, riprap built in 1973 failed on the Salishan Spit, jeopardizing homes and requiring emergency protection. Before engineering geologic reports were required for structures over 50 ft in length, riprap was sometimes not properly engineered.

Over the years of riprap construction on the Oregon coast, a typical design has been developed by engineering geologists and contractors. The design of riprap typically involves a layer of permeable bedding material that separates the rock from the sand underneath, a layer of filter rock, a layer of quarry run bedding, and a layer of riprap armor. The riprap rocks are generally placed individually with three points of contact to provide stability rather than being randomly dumped (Hiller, Aberle, & Lia, 2018). Riprap armor is often covered with sand and planted with beach grass. Examples of riprap structures can be found in OPRD's permit files.

Riprap is the most common erosion control measure in Oregon for a few reasons. Over time, it's been proven extremely successful. Trial and error have helped to develop designs that are best suited for the highly energetic wave climate in Oregon. The material for riprap is also readily available on the coast. Construction is relatively simple, and many contractors on the Oregon coast are very experienced in the construction of riprap.

# Riprap Revetment



RIPRAP ON THE SALISHAN SPIT. PHOTO BY HAILEY BOND, 2021

While riprap is generally successful as a short-term solution for erosion control, it has disadvantages. Riprap protects well against erosion, but in high wave conditions, wave overtopping and flooding can still impact structures behind the riprap. Riprap is susceptible to undermining due to scour, which can destabilize the whole structure and cause its failure. Riprap also has a negative effect on the beach. It takes up more space on the beach than other kinds of structural beachfront protective structures because it needs to be constructed at a 1.5 – 2 horizontal : 1 vertical slope. When placed on an eroding coast, riprap fixes the shoreline in place. However, sand continues eroding from in front of the structure causing beach lowering. This process is known as passive erosion. Under chronic erosive conditions, the beach may significantly narrow and create an artificial headland around the riprapped area. In some cases, riprap can increase the rate of erosion above the background rate. The impact of this process, called active erosion, is difficult to determine in Oregon, where variations in erosion rate can also be caused by powerful rip embayments. However, in general, active erosion is more likely to occur when the mean water level is above the base of the structure (Weggel, 1988; Ruggiero & McDougal, 2001).

## How will riprap perform under sea level rise?

Existing riprap will become less effective as sea level rises. While riprap can protect against erosion, it can do little against flooding as sea level rises and wave heights increase. Rising sea levels and passive erosion will continue to narrow the beach and make it impassable for more of the year. Active erosion may also increase as structures are impacted more often by high water levels. Additionally, sea level rise can enable waves to travel further up the beach without their energy dissipating, increasing the chance for damage to the structure due to scour and movement of riprap stones.

STRUCTURAL EROSION CONTROL

# Riprap Revetment

## Riprap policy

Riprap revetments are intended to protect the upland, remain in place, and reflect wave energy, so they are considered a beachfront protective structure and require Goal 18 eligibility for construction. Riprap also requires an ocean shore alteration permit from OPRD, as well as any necessary local permits. Check with the local jurisdiction for any local permits needed if the revetment will extend landward of OPRD's jurisdiction.




RIPRAP CONSTRUCTION IN LINCOLN BEACH. PHOTO BY HAILEY BOND, 2021

## Riprap revetment references

Hiller, P., Aberle, J., & Lia, L. (2018). Displacements as failure origin of placed riprap on steep slopes. Journal of Hydraulic Research, 141-155.

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Ruggiero, P., & McDougal, W. (2001). An analytic model for the prediction of wave setup, longshore currents and sediment transport on beaches with seawalls. Coastal Engineering, 161-182.

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# Sandbags

## Sandbags - Quick Facts

- **To prevent erosion, large geotextile tubes can be filled and stacked on the coast.**
- **Sandbags are generally considered a temporary solution to erosion; their lifespan is approximately 5 years due to UV exposure and damage.**
- **Sandbags can be placed without costly equipment or skilled labor, and are useful when materials such as rock or concrete are limited.**
- **When sandbags fail, they leave trash on the beach or in the water and can be an eyesore.**
- **Oregon has very few sandbag structures, but there is an artificial dune created with sandbags at Cape Lookout.**
- **Because sandbags are intended to remain in place and reflect wave energy, they are considered beachfront protective structures and require Goal 18 eligibility for construction.**

## What are sandbags?

Sandbags and sand tubes are names for the erosion control technique of filling geotextile (polyester and polypropylene are common) bags with sand to create a protective barrier against the ocean. In some places, sandbags are used as the most efficient protection material due to material or construction constraints (USACE Alaska). In others, sandbags are used for policy reasons because all other methods of protection have been prohibited (Neal, Pilkey, & Longo, 2017).

Sandbags are typically thought of as a temporary solution to erosion. Sandbag revetments are estimated to have a lifespan of approximately 5 years, although this can depend on the site conditions. Sandbag revetments can deteriorate due to UV damage of the geotextile fabric, and individual sandbags can fail due to small punctures, making them best for temporary protection (RISC-KIT, n.d.).

Sandbags are typically 3-5 ft wide and 7-15 ft long when measured flat. For an order-of-magnitude estimate, a sandbag 10 ft long and 5 ft wide, when filled, will contain approximately 3 tons of sand. Sandbag revetments must be constructed deep enough to avoid undercutting from changes in the beach profile, and filter fabric is recommended underneath the base of the revetment. Sandbags are most stable at a slope of 1.5-2H:1V but can be constructed at steeper slopes based on site conditions. Configurations of sandbags can vary widely, but typically they are laid across the dune face with approximately 30-50 percent overlap between bags. It is recommended for the sandbags to be covered with sand and feathered back into the face of the dune if possible (RISC-KIT, n.d.). USACE also recommends using a tether system to retain failed bags to avoid litter on the beach (USACE Alaska).

STRUCTURAL EROSION CONTROL

# Sandbags



SANDBAGS ERODING FROM ARTIFICIAL DUNE, CAPE LOOKOUT. PHOTO BY HAILEY BOND, 2021

Sandbag revetments have advantages over traditional revetments for a few reasons. Depending on the scale of the project, they can often be placed without costly equipment or skilled labor. The geotextile bags are lower cost than transporting revetment rock, especially in situations where there are no suitable rock sources nearby. Sandbag revetments are also good for temporary protection during episodic erosion events where permanent riprap is unnecessary (RISC-KIT, n.d.).

In some situations, sandbags are used as more permanent erosion solutions. This has disadvantages compared to traditional rock revetments. The design life of sandbag revetments is only about 5 years due to UV damage to the bags and failure of the bags after punctures from debris or vandalism. Upon failure, sandbags can create an eyesore as the geotextile fabric litters the beach. Sandbag revetments also have the same potential as rock revetments and seawalls to impact the beach, as they fix the shoreline in place artificially and can increase wave reflection and scour. However, sandbag revetments typically fail before they can cause lasting harm to the beach (RISC-KIT, n.d.).

## How will sandbags perform under sea level rise?

Sandbags have such a short design life that their performance under sea level rise is not relevant, as they will likely fail structurally before being impacted by effects of sea level rise.

# Sandbags

## Sandbags in Oregon

Sandbags are not commonly used in Oregon, as they are not suitable for the high-energy wave climate. However, geotextile sandbags were used in the construction of an artificial dune project at Cape Lookout, fronted by a dynamic revetment. The artificial dune was constructed with sandbags and then covered with sand and planted with vegetation. However, as erosion has impacted the artificial dune 20 years after its construction, some sandbags have failed and needed to be replaced. Sandbags were also used near Heceta Head, but failed under riverine processes and large wave runup during extreme storms.

## Sandbag policy

In Oregon, sandbags and sand tubes are considered structures, because they are intended to stay in one place and reflect wave energy. Therefore, they can only be used to protect areas that are eligible for beachfront protective structures under Goal 18. Sandbag structures will also need an ocean shore alteration permit from OPRD for construction. Check with the local jurisdiction for any local permits needed if sandbags will be landward of OPRD's jurisdiction

## Sandbag references

Neal, W., Pilkey, O., & Longo, N. (2017, April 1). Sandbagging at the Shore: North Carolina's Coastal Sand Bags and Political Sandbaggers. Retrieved from Coastal Care: https://coastalcare.org/2017/04/sandbagging-at-the-shore-north-carolinas-coastal-sand-bags-and-political-sandbaggers-by-william-neal-orrin-pilkey-norma-longo/

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# Gabions

## Gabions - Quick Facts

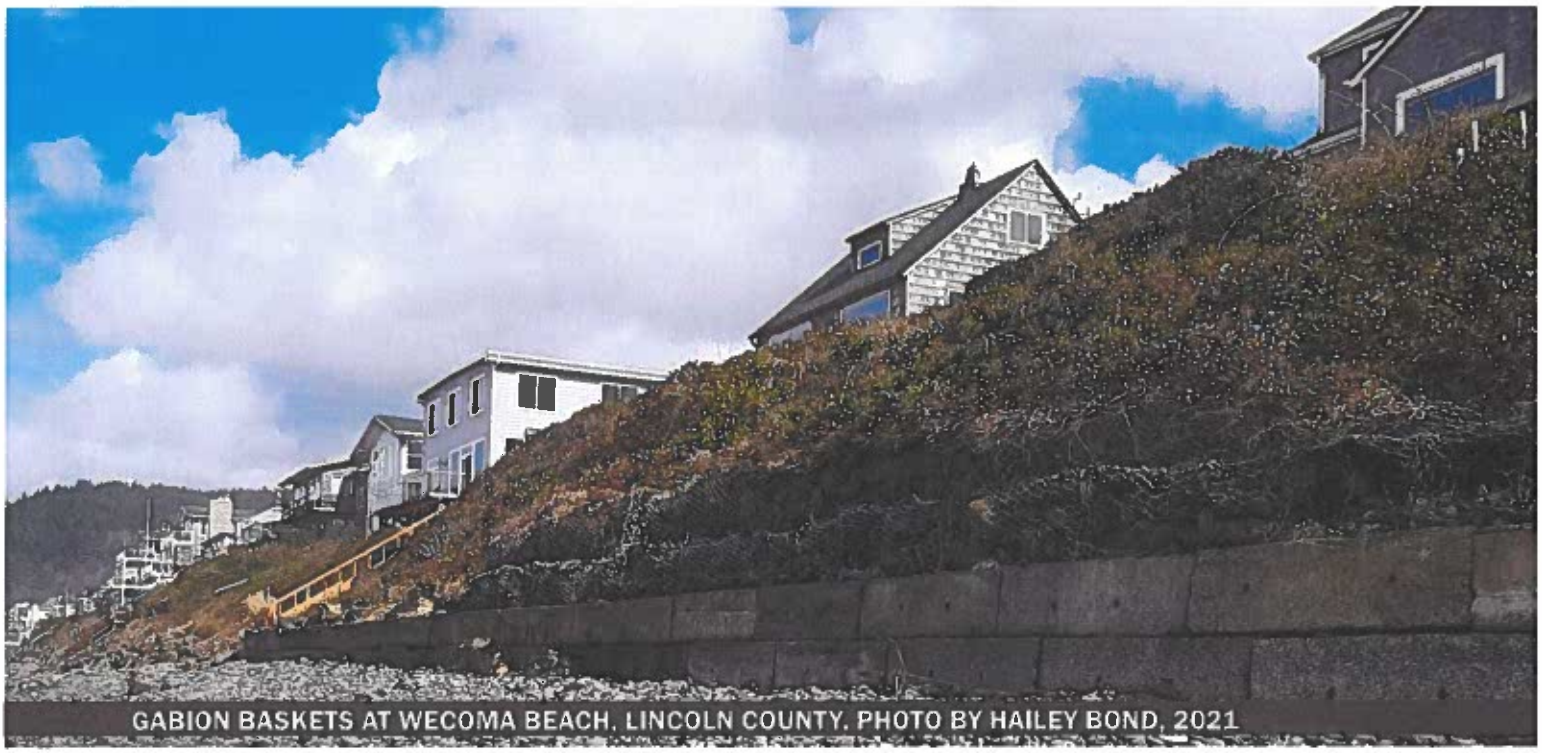
- **Gabions are wire baskets filled with rocks that can be used as building blocks for erosion control projects**
- **Gabion structures are cheaper than riprap or seawalls, and can build when large rock and concrete are scarce**
- **The wire used to construct gabions can easily be damaged or corroded, causing the baskets to fail.**
- **When gabions fail, they can become a safety hazard due to their sharp wire.**
- **Gabion structures are extremely prone to failure, both due to damage of the individual gabions and due to scour and undermining of the structure as a whole**
- **Gabion structures are considered beachfront protective strcutres, and require eligibility under Goal 18 for construction**

## What are gabions?

"Gabion" is the term for a wire basket filled with rocks that can act as a building block for bank stabilization or erosion control projects. Gabion baskets can be arranged on top of a backfilled slope with a filter layer similar to typical riprap designs or can be stacked to form a seawall (USACE CEM). On the Oregon coast, gabion baskets are typically used to build new seawalls or to add height to already existing seawalls. A single gabion basket can vary in size, but standard baskets are 3 ft wide, between 6-12 ft long, and 1-3 ft tall. The recommended size of the stones filling the gabion basket is between 4-8 inches in diameter. To avoid abrasion on the wires from the rocks within the basket, gabions must be filled tightly (USACE, 2011).

Gabion structures are a popular attempted solution for erosion and bank stabilization throughout the world. They are typically cheaper than riprap or seawalls and can be built without heavy equipment or access to concrete or typical riprap rock. However, they are not suitable for every environment. The wire on gabion baskets can be damaged by wave action, debris, cobble, and foot traffic. When the wire on the baskets is damaged, it can rust and further compromise the integrity of the basket. As the wire corrodes, it can spill rock out onto the beach and become a safety hazard. Structures made of gabion baskets are therefore not suitable for beaches that typically have driftwood or cobble and are not suitable in areas where wave impact would be frequent and high-energy. Like other types of structural erosion control, gabion baskets can also be undermined by scour or sediment washout, threatening the stability of the entire structure. While gabion structures are typically less costly than riprap or seawalls, their lifespan is often shorter than expected due to damage. A study based in Puerto Rico describes the "life cycle" of gabion erosion control on the island, with the last stage in the life cycle being "replacement –

# Gabions



GABION BASKETS AT WECOMA BEACH, LINCOLN COUNTY. PHOTO BY HAILEY BOND, 2021

failed gabions are replaced by more substantial hard structures or covered in concrete." The study suggests due to the regular replacement of gabions with a more substantial structure sooner than expected, gabions may not be as cost-effective as they seem (Jackson, Bush, & Neal, 2006). Gabion structures are classified by the USACE as having high reflection potential, indicating that they are similar to riprap and seawalls in their impact on the beach (USACE, 2011).

In Oregon, the use of gabion baskets is limited. Riprap and seawalls, while higher in cost, provide more reliable and sturdy protection. Of the few examples of gabion baskets used for erosion control on the Oregon coast, many are damaged.

## How will gabions perform under sea level rise?

Because of their susceptibility to damage from wave action, existing gabion structures will likely become less effective and more prone to damage as sea levels rise and the structures are impacted by waves and debris more often. Like other kinds of structural erosion control, gabion structures are susceptible to failure due to scour and sediment washout beneath the structure, which will become more likely as sea level rises.

# Gabions

## Gabion policy

Gabion walls are intended to protect the upland, remain in place, and reflect wave energy, so they are considered a beachfront protective structure and require Goal 18 eligibility for construction. Gabion walls also require an ocean shore alteration permit from OPRD, as well as any necessary local permits. Check with the local jurisdiction for any local permits needed if the gabion wall will extend landward of OPRD's jurisdiction.

## Gabion references

Jackson, C., Bush, D., & Neal, W. (2006). Gabions, A Poor Design for Shore Hardening: The Puerto Rico Experience. Journal of Coastal Research, 852-857.

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## Oregon Parks and Recreation Department
## Ocean Shores Construction Impacts, Staging, and Public Safety Plan Guidelines

The "Project Justification and Impacts" section of the OPRD Ocean Shore application requires applicants to describe all potential impacts this project may have in the short and long-term to neighboring properties, recreation, scenic, safety, and natural resources of the ocean shore. It also asks for the measures that will be taken to minimize those potential impacts. These guidelines were developed to assist with identifying common impacts and potential measures related to construction operations. The application must describe how your project will be performed in a manner that minimizes or avoids impacts to the ocean shore. During permit review OPRD is required by rule to determine that "There are no reasonable alternatives to the proposed activity or project modifications that would better protect the public rights, reduce or eliminate the detrimental affects on the ocean shore, or avoid long-term cost to the public" (OAR 736-020-0010 (4)).

1. **Goals for Ocean Shores Construction Impacts, Staging, and Public Safety Plan**
    a. Ensure impacts and alteration associated with construction are identified and considered in determining consistency with the review criteria set forth in OAR 736-020-0005 through 0030.
    b. Protect the safety of the public using the ocean shore (ORS 390.640) by minimizing pedestrian and emergency vehicle conflicts with construction vehicles, equipment, operations or hazardous conditions (includes but not limited to rock piles, fill material, and open trenches/excavation) during all construction operations.
2. **Guidelines for design and submission.**
    The following guidelines are being provided to assist applicants with identifying many of the common areas and topics that should be considered during development of a project on the ocean shore and meet the goals stated above. Not all elements identified below will be applicable to every project and the level of detail will be dependent on the complexity of the project and selected construction methods. OPRD requests that you try and identify as many of these topics in the application as possible. Elements may be included on the application form, in dedicated supplemental materials, and/or be included in other documents or drawings
    a. Alternatives considered for construction. Applications must describe how the proposed construction activities represents the least impact. While the criteria lower in this document will help minimize potential impacts to various resources, the first step is to attempt to avoid working on or from the beach except when no viable alternatives exist.
        i. Avoidance alternative: All staging and construction occur from the upland and no work occurs from the beach. Applicants must do their due diligence in identifying upland staging and access point prior to proposing a more impactful alternative. Applicants must document what was investigated and why this alternative is not feasible for technical reasons (i.e. no space between buildings for equipment, high cliff above work area). Things such as higher cost or complications related to landowner approvals do not preclude the need to look at this alternative.
        ii. Some impact alternative: Some work from beach and some from upland. This may include things like finding a staging area on private land with activities on beach limited to hauling and construction or building the lower portion of the structure from the beach and the upper portion from the upland location. This alternative may also be used to reduce the reliance on public access points and the distance traveled along the beach.
        iii. Maximum impact alternative: Proposing to do all staging, hauling, and construction from the beach maximizes the impact of a project and has the greatest risk to public safety, resources, and scenic values. This alternative must only be proposed once all other alternatives have been investigated and not alternative with less impacts can be identified. To further
    b. Drawings
        i. Plan view of the entire project area which includes the following elements to scale:
            1. Access points, clearly identify all public access (A) and exit (B) points to the beach.
            2. Temporary public accessway - a clear path which safely routes pedestrian and beachgoer travel onto the beach around the construction site from "Point A" to "Point B"

a. The path should be continuous and barricaded, roped, or flagged off to prevent pedestrians from entering the work space.
b. Short description of the materials used to create the construction barrier/pedestrian path at each location.

3. A clear path which routes pedestrian and emergency vehicle traffic north-south along the beach
    a. This path may not be any less than 25 feet wide.
    b. This path may not encroach within 25 feet of the expected surf zone. The applicant must monitor forecast high tides during the work period, and take into consideration forecast storm run up during high tide.
4. Signage locations
    a. Clearly label the location, type, and size of each sign.
    b. Signs spaced no farther than 50 feet apart or less as needed for a person to be able to see each sign from the next.
    c. Signs at beach entrances and exits.
    d. Signs along haul routes.
    e. Signs around any hazard areas (rock, debris, or fill piles, as well as open trenches or excavations).
5. Haul routes and proposed extent of work area for heavy equipment on the beach.
6. Areas of proposed grading, fill, or other alteration necessary to create haul routes or operate equipment on the beach with each type of proposed work identified.
7. Staging areas, temporary fill, temporary grading, or other construction related alteration associate with construction of the primary activity must be labeled for each type of material and include dimensions.
8. Location of equipment storage or parking while not in use on the ocean shore.
9. Site restoration areas.

ii. Side view or cross section of any of the following elements to scale:
1. Areas of proposed grading, fill, or other alteration necessary to create haul routes or operate equipment on the beach.
2. Staging areas, temporary fill, temporary grading, or other construction related alteration associate with construction of the revetment must be labeled for each type of material and include dimensions.
3. Areas of site restoration following construction.

iii. All drawings must include:
1. Tax lots and/or property lines
2. Mean High Tide line
3. Statutory Vegetation Line
4. Existing Vegetation Line
5. Existing, proposed, and final contours and site conditions
6. Scale bar to ensure scale is not lost during reproduction
7. Photo reference points
8. Static reference points (i.e. building corners, trees)

c. Detailed written description for each of the following elements:
i. Access points, for each public and private access point describe the type of access points, kinds of use, and the amount of use.
ii. Temporary public access ways
1. Describe methods you will use to ensure the public will be able to continue to safely access the ocean shore and transit north and south along the shore during construction.
2. Describe the methods you will use to minimize pedestrian conflicts with construction vehicles, equipment, operations or hazardous conditions (includes but not limited to rock piles, fill material, and open trenches/excavation) during construction operations.

3. Describe the proposed public accessways that will be provided and how they may change during operations. Temporary public accessways must provide:
    a. A convenient, contiguous pathway that maintains the existing level of pedestrian, vehicular, and emergency vehicle access outside of active work areas.
    b. A dedicated path that separates the public from equipment traffic.
    c. How and where physical barriers and signage that will be used to define the accessway and separate the public from equipment and work areas.
    d. A pathway clear of debris, construction activities, or other items that may disrupt or obstruct pedestrian, vehicular, and emergency vehicle access.
4. Describe how the proposed temporary accessway has been designed to maintain public use of the ocean shore.

iii. Access points and proposed haul routes
1. Include details on any and all proposed construction, excavation, or other alteration required to operate equipment on the ocean shore or secure access to the work area.
2. Describe haul routes, amount of use, timing of use, and location of use for equipment on the ocean shore.
3. Describe measures that will be taken to restore the haul route once the permitted work is complete.

iv. Staging
1. Describe the location of the various areas used to stage material or equipment during construction of the project and explain in detail the types and quantity of equipment and materials at each location.
2. Describe where and how equipment will be stored when not in use.
3. Spill prevention and rapid clean-up is expected on the ocean shore, please include a spill prevention and response plan that discusses all measures to protect the ocean shore from contamination, especially during fueling, lubrication, and storage of vehicles or fuels. Upland fueling is preferred.
4. Identify if there will there be any excavation, sand movement, or other alteration needed to make the staging area useable and how the site will be restored following the project.
5. Staging areas must be placed a minimum fifty feet north or south of a public access way and not restrict vehicular or pedestrian traffic from entering the beach or transiting north or south along the beach.

v. Temporary impacts
1. Describe the need for and details of any temporary fill, temporary grading, sand movement, or other construction related alteration associated with the primary permitted activity. Must identify each type of material and activity, and include dimensions, volumes, disposition of materials, and restoration of temporary impacts.
2. Describe all activities to restore the site post construction, including beach restoration, dune restoration, and upland restoration. This could include: grading, vegetation plantings, post construction monitoring, etc.

vi. Signage and barriers
1. Description of each sign type, location, the size of the sign, and messaging. Photos are appropriate as well. Signs must clearly articulate the nature of the hazard and expectations of the public.
    a. Signs that prohibit the public from entering a work area or direct the public through a safe route need to be clearly legible from 100 feet away.
    b. Signs should be spaced no farther than 50 feet apart or less as needed for a person to be able to see each sign from the next.
    c. Signs placed at all beach access points need to indicate the location and distance to the work areas and potential hazards, and include the dates the hazard will be present.

d. Signs should be placed around any rock, debris, or fill piles to discourage climbing.
e. Signs should also be placed around any open trenches or excavations.
f. All trenches and excavation should meet accepted standards for workplace and public safety. What additional measures will be taken when the site is not being worked on and contractors or other personnel are not present.

2. Description of the physical barriers to be used, where they will used, and how they will be used to define the work area and separate the public from equipment and work areas.
    a. Open trenches left overnight must be surrounded by construction fencing or similar barrier and should include a means to alert people in the dark of the upcoming hazard.

vii. Description of equipment
1. Detailed list of all vehicles, including color, make, model, type
2. Detailed list of all heavy equipment, including color, make, model, type

d. Site Photos
i. Provide photos of the work area from three vantage points. If the work area is long or you can't see additional work areas in the photos additional sets may be necessary to cover the entire work area.
1. From just south of the property looking north and clearly showing the proposed work area, a portion of the adjacent property to the south, and a significant portion of the beach west of the proposed work area.
2. From just north of the property looking south and clearly showing the proposed work area, a portion of the adjacent property to the north, and a significant portion of the beach west of the proposed work area.
3. From west looking east and clearly showing the proposed work area and a significant portion of the beach.

e. Project Schedule
i. When do you plan to start work on the ocean shore and when do you hope to complete work?
ii. How many days of on-beach construction do you expect this project to take?
iii. Describe the normal work hours and work days for the project.
iv. Identify any work periods you will not be operating on the beach.
1. For protection of the public, ORPD will typically not authorize work to be performed on weekends or work-weeks immediately before or after holiday weekends except under extenuating circumstances. Included holidays can be found at https://www.oregon.gov/das/pages/calendar.aspx
2. Description of how the work area will be secured and made safe for the public prior to any break in work (e.g. breaks, end of shift, evening & nights, weekends), This may include removal or isolation of equipment and hazards.

v. Detailed Construction Timeline
1. This can be included as a chart or as a written description. The following elements can be date or week certain and should include all activities on the ocean shore per project/site location/tax lot. Please provide the following:
    a. Date to commence work
    b. Staging material
    c. Excavation
    d. Material installation
    e. Landscaping or restoration
    f. Last day of work
    g. Final inspection date

f. Landowner Authorization.

i. Prior to OPRD being able to issue a permit the applicant will need to provide written authorization from the fee owner of affected properties not owned by the applicant, see OAR 736-020-0003(13).
    1. Affected properties include areas that will be directly impacted by construction activities including associated alteration or temporary impacts (e.g. beach grading, disposal of sand in the surf, stockpiling of material, haul roads), staging areas, equipment and vehicle access points, or other construction related impacts. It does not include activities that involve only driving on the beach.

ii. To facilitate processing, OPRD recommends that landowner authorizations be provided with application materials, as delays could jeopardize a permit decision given statutory timelines.

**Sun Outdoors, a Division of Sun, Inc.**
27777 Franklin Road, Suite 300
Southfield, MI 48034
Attention: Nick DiBella, Senior Vice President
c/o: William Rasmussen, Miller Nash LLP

April 1, 2026
Proposal No. 10-242216-P-A2

**Subject:** **Scope Amendment for Geotechnical Design Report**
**Proposed Vegetative Berm**
**Sun Outdoors Coos Bay RV Park**
**90281 Cape Arago Highway**
**Coos Bay, Coos County, Oregon**

Dear Mr. DiBella,

As requested, **Certerra Northwest, LLC** ("Certerra") is pleased to submit our scope amendment to provide geotechnical engineering services for the above referenced project. This proposal outlines our project understanding, proposed scope of services, schedule, fees, and General Conditions that will apply.

## PROJECT UNDERSTANDING

Our understanding of the project is based on our role as Engineering Geologist of Record for the project to date. This has included preparation of the Engineering Geologic Report for the subject site (Certerra Report No. 10-242216-02, dated September 4, 2025). Since that time, we have remained in coordination with the project team and have received supplemental project information, including correspondence from William Rasmussen with Miller Nash LLP.

The subject property is located in Coos County, Oregon, and includes developed areas supported by onsite septic facilities situated adjacent to the active shoreline. The shoreline is currently unprotected, and based on regional coastal processes and trends, the site is subject to ongoing erosion hazards. As such, implementation of a shoreline protection measure is warranted to mitigate potential impacts to upland improvements.

A Land Use decision for the project was approved by Coos County on March 6, 2026, based on our previously completed Engineering Geologic Report, which focused on the identification and evaluation of existing geologic hazards and their potential implications for the site. The scope of that effort did not include detailed surveying, engineering design, or preparation of plan figures depicting existing and proposed site conditions, as required for permitting.

We understand that the Client now intends to proceed with implementation of a vegetated cobble berm along the property's shoreline. Based on the current conceptual plan, the proposed berm will be approximately 200 feet long (parallel to the shoreline) and 50 feet wide (perpendicular to the shoreline).

In general, a vegetated cobble berm is intended to function as a dynamic, non-structural shoreline protection feature that dissipates wave energy, reduces shoreline erosion, and maintains separation between coastal processes and upland infrastructure. This type of approach is generally consistent with non-structural shoreline protection strategies described in Oregon Parks and Recreation Department (OPRD) guidance.

As part of this study, we will perform an Alternatives Analysis to evaluate the feasibility of this concept alongside other potential shoreline protection alternatives, including options with potentially lower environmental or coastal impact, in accordance with OPRD Ocean Shores permitting requirements.

This proposal is intended to support preparation of a design-level geotechnical and engineering geologic report suitable for submittal with an OPRD Ocean Shores Permit application. The scope will include development of project-specific design recommendations and supporting figures for the project.

## SCOPE OF SERVICES

Our proposed scope of services includes the scope necessary to develop design recommendations for the proposed shoreline protection measure (i.e., a vegetated cobble berm) and to prepare a Geologic Report in accordance with OPRD Ocean Shores Shoreline Protection Structure permit requirements.

Once authorized, we will perform one site reconnaissance to observe current shoreline conditions, including geomorphology, vegetation, and evidence of recent erosion. During the site visit, we will evaluate whether current conditions are generally consistent with observations from our October 2024 site visit. Site conditions will be documented through field notes and photographs.

Based on available information and site observations, we will develop engineering recommendations for a vegetated cobble berm as a potential shoreline protection alternative. This will include recommendations for berm geometry (including width, height, and side slopes), cobble sizing and gradation, berm thickness and profile configuration, and the extent of transition zones at the seaward and landward limits. We will also provide general recommendations for vegetation to support stabilization, in coordination with regulatory expectations, as well as general construction considerations and sequencing.

Design recommendations will be developed in consideration of OPRD guidance for non-structural shoreline protection measures, relevant portions of DLCD guidance (such as the *Guidebook on Erosion Control Practices of the Oregon Coast*), and observed site conditions and coastal processes.



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Our scope of services includes preparation of a design-level Engineering Geologic and Geotechnical Report suitable for submittal as part of an OPRD Ocean Shores Permit application for shoreline protection structures. The report will be prepared in accordance with the requirements outlined in Section 9 of the OPRD permit application. The report will include the following:

- A summary of site conditions and project background, including reference to relevant findings from our September 4, 2025 Engineering Geologic Report.
- An updated evaluation of coastal, geologic, and seismic hazards based on current observations, including discussion of how the proposed project may affect or be affected by those hazards.
- An evaluation of potential impacts of the proposed project on sand source, supply, and movement within the affected beach and littoral cell.
- An assessment of bank or bluff stability and erosion rates at the subject property and, to the extent feasible, adjacent properties.
- A description and evaluation of the vegetated cobble berm as a shoreline protection strategy, including an alternatives analysis to assess whether other shoreline protection approaches with potentially lower impact are appropriate for the subject property.
- Design recommendations for the proposed berm, including geometry, materials, and configuration, along with construction considerations and limitations.
- The preparation of supporting figures required for permitting, including a site plan showing the proposed berm layout relative to existing site features and cross-sections depicting the vegetated berm design.

**It should be noted that preparation of existing and proposed conditions figures will require surveying of the project area, including sufficient horizontal and vertical control to develop existing conditions plan and profile drawings. Based on coordination with the project team, we understand that these survey services will be performed by the project civil engineer (SHN) and are not included in our scope.** We understand that the preliminary budget estimate from SHN for these services is approximately $3,400. We recommend that the survey be coordinated with our site reconnaissance to ensure that the data required for preparation of our figures is obtained.

In addition, our scope of services does not include subsurface exploration or geotechnical field investigation, topographic or boundary survey, design of hard armoring systems, preparation of a Construction, Staging, and Safety Plan (as may be required for permitting), or preparation of FEMA Floodplain Development Permit documentation.

This proposal covers the design phase only. Our services will conclude upon submittal of the finalized report. Additional services to support permitting, including coordination with OPRD, participation in meetings or hearings, and responses to agency comments, are not included but may be provided on a time and materials basis upon request. Construction-phase services, including observation and special inspections, are also not included and may be provided under a separate authorization.



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## SCHEDULE AND FEE

We are available to begin work within approximately 1 week following receipt of written authorization to proceed. The site reconnaissance will be scheduled based on site access and availability. Following completion of the site visit, the design report and supporting figures will be submitted within approximately 4 to 5 weeks.

Our services for the geotechnical design phase described herein will be completed for a **lump sum fee of $9,790.00.**

The following is a breakdown of our lump sum fee:

| **Project Management and Administrative Support** | **Units** | **Rate** | **Cost** |
|---|---|---|---|
| Geotechnical Project Manager | 4 hrs | $175/hr | $700 |
| Principal Engineer / Engineering Geologist | 2 hrs | $230/hr | $460 |
| Administrative Support | 2 hrs | $85/hr | $170 |
| ***Subtotal*** | | | ***$1,330*** |
| | | | |
| **Site Reconnaissance and Mobilization** | **Units** | **Rate** | **Cost** |
| Geotechnical Project Manager | 10 hrs | $175/hr | $1,750 |
| Mileage | 500 miles | $0.85/mile | $425 |
| **Subtotal** | | | **$2,525** |
| | | | |
| **Geotechnical Design, Report Preparation, and Review** | **Units** | **Rate** | **Cost** |
| Geotechnical Engineering Staff | 12 hrs | $140/hr | $1,680 |
| Geotechnical Project Manager | 8 hrs | $175/hr | $1,400 |
| Associate Geotechnical Engineer | 3 hrs | $205/hr | $615 |
| Principal Engineering Geologist | 3 hrs | $230/hr | $690 |
| **Subtotal** | | | **$4,385** |
| | | | |
| **Drafting (Proposed Conditions Figures)** | **Units** | **Rate** | **Cost** |
| Geotechnical Project Manager | 4 hrs | $175/hr | $700 |
| Senior Drafter | 8 hrs | $150/hr | $1,200 |
| **Subtotal** | | | **$1,900** |
| | | | |
| **TOTAL FEE FOR PROPOSED SCOPE OF SERVICES** | | | **$9,790** |

As noted above, the lump sum fee does not include services during permitting or construction. If requested, a separate scope and fee can be prepared for supplemental services following completion of the design phase.

Additional services to support permitting (including coordination with OPRD, participation in meetings or hearings, and responses to agency comments), as well as construction-phase services (including observation and special inspections), may be provided on a time and materials basis in accordance with the following unit rates:

| | |
|---|---|
| Principal Geologist/Engineer | **$230.00** per hour |
| Project Geologist/Engineer | **$175.00** per hour |
| Staff Geologist/Engineer | **$140.00** per hour |
| Soils Special Inspector | **$130.00** per hour |
| Administrative Support | **$85.00** per hour |
| Mileage | **$0.85** per mile |

Note that these rates are applicable through December 31, 2026. After that date, our standard unit rates for the current year will apply.

If retained to provide geotechnical inspection services during construction, inspections will be subject to a three-hour minimum charge. Overtime rates (1.5 times the standard hourly rate) apply to inspection services performed on weekends, holidays, or in excess of eight hours in a single workday. Inspection services are billed portal-to-portal from our office, including travel time and mileage, and include report preparation and distribution time.

**WRITTEN NOTICE TO PROCEED**

Your written notice to proceed with the work proposed herein is required. Notice to proceed and acceptance of our General Conditions can be made by signing and returning a copy to our office. It is our sincere hope that we may be of service to you on this project. Should you have any questions, please contact our office.

Sincerely,

[redacted]

Jacqui Boyer
Geotechnical Project Manager

Adam Reese, C.E.G.
Principal Engineering Geologist

## SCOPE AMENDMENT ACCEPTANCE

**Project:** **Proposed Vegetative Berm**
**Sun Outdoors Coos Bay RV Park**
**90281 Cape Arago Highway**
**Coos Bay, Coos County, Oregon**
**Certerra Proposal No. 10-242216-P-A2**

**Lump Sum Fee:** **$9,790.00**

This Scope Amendment shall be considered an addendum to the original agreement between Certerra Northwest, LLC ("Certerra") and Sun Outdoors, as documented in Proposal No. 10-242216-P dated October 2, 2024, which was authorized by James P. Dawson, V.P. Construction of Sun Outdoors, on October 8, 2024. All terms, conditions, and provisions of the original proposal (10-242216-P) remain in effect and are incorporated into this Amendment by reference. It should be noted, since the execution of the original contract, our firm has undergone a name change and is now operating as Certerra Northwest, LLC. Any reference to "RMA" in the contracted General Conditions shall be understood to refer to Certerra Northwest, LLC.

By signing below, you hereby authorize Certerra Northwest, LLC to proceed with the additional services described in this Scope Amendment. Services performed under this amendment shall be subject to the same terms and conditions as outlined in the original agreement.

Authorized by:

Client Name: _____

Mailing Address: _____

Attention: _____

Phone: _____

E-mail: _____

Signed By (print): _____

Signature: _____

Title: _____

Date Signed: _____



certerra.com 2411 Southeast 8th Avenue, Camas, WA 98607 T. 360.567.1806

# CLEAN RIVERS

PO Box 429 • North Bend, OR 97459
www.cleanriversinc.com
LCB# 8349 CCB# 174246 WBE DBE# 4770

Office# 541-267-3560
cleanriversoffice@gmail.com


**Project: Sun Outdoors – Shoreline Protection**

**Location:** Coos Bay, OR
**Contractor:** Clean Rivers
**Date:** March 27th 2026

**Scope of Work:**

-provide and install dynamic revetment using 3" to 10" rip rap

-provide and install sandy soil vegetation berm for upper portion of dynamic revetment

-plant approximately 3000 plugs of American Dune Grass and Native Willow Stakes

-hydroseed American Dune Grass (Leymus Mollis) in vegetated berm for erosion control

-install all necessary erosion control devices and signage for project

Total for project: **$197,850**

**Exclusions:**

-permitting by other

-water provide by owner on site

-bathroom provided by owner on site

-construction and survey staking by others

-maps and other needed ,materials for permitting

**Coos County Community Development**
Mailing Address: 250 N. Baxter, Coquille, Oregon
60 E. Second St., Coquille OR 97423
Planning, Building, Onsite and Enforcement
Phone: 541-396-7770
Fax: 541-266-1146
www.co.coos.or.us
TDD (800) 735-2900

# NOTICE OF LAND USE DECISION

| | |
|---|---|
| **DATE:** | **Friday, March 6, 2026** |
| **File Number:** | ACU-25-040/FP-25-006 |
| **Type of Application:** | Administrative Conditional Use |
| **Proposal:** | Installation of a vegetated stabilization berm |
| **Property Owner:** | Sun Oceanside Beachfront RV LLC |
| **Property Location:** | 90281 Cape Arago Highway, Coos Bay, Oregon |

Dear Notice of Land Use Decision Recipient:

You are receiving this notice because you may own property within 250 feet of the subject property, represent a special district or government agency, have requested notice of land use decisions, or are otherwise entitled to notice under the Coos County Zoning and Land Development Ordinance. Receiving this notice does not necessarily mean the proposal will directly affect your property.

Coos County has issued a decision regarding the above-referenced land use application. The Planning Director has approved Administrative Conditional Use application ACU-25-040, subject to the conditions of approval contained in the attached decision and staff report. The proposal involves Installation of a vegetated stabilization berm.

The decision is based upon the submitted application, supporting materials, facts in the record, and findings addressing the applicable criteria of the Coos County Zoning and Land Development Ordinance and Comprehensive Plan.

## Subject Property Information

| | |
|---|---|
| Account Number: | 568200 |
| Map Number: | 26S1403C0-00200 |
| Property Owner: | SUN OCEANSIDE BEACHFRONT RV LLC<br>C/O SUN COMMUNITIES, INC<br>27777 FRANKLIN RD SUITE 200<br>SOUTHFIELD, MI 48034-8205 |
| Situs Address: | 90281 CAPE ARAGO HWY COOS BAY, OR 97420 |
| Acreage: | 15.49 Acres |
| Zoning: | RECREATION (REC) |
| Special Development Considerations and Overlays: | ARCHAEOLOGICAL AREAS (ARC)<br>BEACHES/DUNES - LIMITED (BDL)<br>COASTAL SHORELAND BOUNDARY (CSB) |

This notice shall be posted from March 6, 2026 to March 23, 2026

FLOODPLAIN 100 yr - 2018 (FP)
NATIONAL WETLAND INVENTORY (NWI)
NH EROSION COASTAL (NHERC)
NH TSUNAMI (NHTHO)
NORTH BEND TRANSITION ZONE (NBTZ)

**Decision**: **Approved with Conditions.** All decisions are based on the record. This decision is based on the existing record and will become final and effective at the close of the appeal period unless a complete application, along with the required fee, is submitted to the Planning Department by 12 p.m. on **Monday, March 23, 2026** . Appeals are based on the applicable land use criteria.

This decision complies with the Coos County Zoning and Land Development Ordinance (CCZLDO), specifically:

- General Compliance: Section 1.1.300 requires compliance with the Comprehensive Plan and Ordinance provisions. Additionally, Article 6.1 addresses lawfully created lots or parcels and Chapter VII for any Road, Driveway, Parking or Access requirements.
- Conditional Use Review:
  The zoning table sets out Uses, Developments, and Activities that may be listed in a zone and the type of review that is required within that zone. Section 4.3.200 identifies shoreline stabilization activities and the review process applicable within the Recreation (REC) zoning district. Administrative Conditional Uses are reviewed pursuant to Article 5.2 of the Coos County Zoning and Land Development Ordinance. The proposed shoreline stabilization activity is therefore reviewed for compliance with:
  - Section 4.3.200 Zoning Tables
  - Section 4.3.220 Additional Conditional Use Review Standards
  - Section 4.3.225 General Siting Standards
  - Section 4.3.230 Additional Siting Standards for REC zones
  - Article 4.11 Special Development Considerations and Overlays including:
    - Beaches and Dunes (Policy 5.10)
    - Coastal Shoreland Boundary
    - Natural Hazard Areas including Coastal Erosion
    - Floodplain Overlay Zone (Sections 4.11.211–4.11.257)

The application materials, including the application, staff report, decision documents, and supporting evidence in the record, are available for review online through the County's permitting system at: https://aca-oregon.accela.com/oregon/Default.aspx

The application and all documents and evidence in the record, including the staff report and applicable criteria, are also available for in-person inspection at the Coos County Planning Department, located at 60 East Second Street, Coquille, Oregon. Copies may be purchased for $0.50 per page. Additional information may be obtained by contacting the County staff member identified in this notice.

Any person who is adversely affected or aggrieved by this decision, or who is entitled to notice, may appeal the decision by filing a written appeal with the Coos County Planning Department within fifteen (15) days from the date this notice was mailed, in accordance with the Coos County Zoning and Land Development Ordinance. The appeal must identify the decision being appealed, state the basis for the appeal, and identify the alleged error in the decision.
This decision will not become final until the fifteen-day appeal period has expired. If an appeal is filed, the decision will be reviewed by the appropriate hearings body in accordance with County procedures. A person who receives mailed written notice of this decision may not appeal the decision directly to the Land Use Board of Appeals (LUBA) under ORS 197.830. A vicinity map showing the location of the subject property is attached.

If mailing documents to the Coos County Planning Department, the mailing address is:
Coos County Planning Department, 250 North Baxter Street, Coquille, Oregon 97423. Standing to appeal is limited to the applicant, an adversely affected party, or their legal counsel. If a consultant wishes to participate in a proceeding, they must do so in coordination with the party they are assisting, and any formal appeal must be filed by the party themselves or by their attorney. For more information, please contact Staff at (541) 396-7770.

**Reviewed by:** Jill Rolfe Digitally signed by Jill Rolfe Date: 2026.03.06 11:18:25 -08'00' **Date: Friday, March 06, 2026**
Jill Rolfe, Director

This decision is authorized by the Planning Director based on the staff's analysis of the Findings of Fact, Conclusions, Conditions of approval, application, and all evidence associated as listed in the exhibits.

## V. NOTICE REQUIREMENTS:

A notice of decision will be provided to property owners within 250 feet of the subject properties and the following agencies, special districts, or parties.

- **A Notice of Decision and Staff Report will be provided to the following:**

Mailed Copies: Applicants/Owners
Emailed Copies: Coos County Board of Commissioners, Coos County Planning Commission, Oregon Department of Land Conservation and Development, Coos County Assessor's Office, Consultants and other interested parties.

- **A Notice of Decision only**

Adjacent property owners, special districts, and other interested parties will receive a Notice of Decision and maps, but all other attachments can be found by contacting the Planning Department or visiting the website. This does not require additional special districts.

EXHIBITS:
Exhibit A: Conditions of Approval
Exhibit B: Vicinity Map;
Exhibit C: Staff Report -Findings of Fact and Conclusions which is available upon request.

**EXHIBIT "A"**
**CONDITIONS OF APPROVAL**

To receive a Zoning Compliance Letter (ZCL), the applicant must submit the following conditions on a response form. All applicable federal, state, and local permits must be obtained before any development activity begins. If any agency provided comments during the review, the property owner is responsible for ensuring compliance with those comments.

The applicant must comply with the following conditions. All costs associated with meeting these requirements are the applicant's responsibility. The applicant is not acting as an agent of the County, and failure to comply with or maintain these conditions may result in permit revocation pursuant to the Coos County Zoning and Land Development Ordinance (CCZLDO). Please review these conditions carefully. If you have any questions, contact planning staff.

1. Compliance with Approved Plans
   All development shall be completed in substantial conformance with the plans and supporting materials approved through Administrative Conditional Use ACU-25-040 and Floodplain Permit FP-25-006, except as modified by these conditions. Any substantial modification to the location, design, or extent of the shoreline stabilization feature shall require review and approval by the Planning Director.

2. Non-Structural Shoreline Stabilization
   The shoreline stabilization approved under this decision shall consist solely of the non-structural vegetated cobble berm stabilization method described in the approved engineering materials. Structural shoreline stabilization measures, including but not limited to seawalls, bulkheads, concrete revetments, or similar hardened structures, are not authorized by this approval and would require additional land use review and applicable state and federal permits.

3. Engineer Certification – Floodplain Standards
   Prior to commencement of development within the floodplain, certification from an Oregon licensed professional engineer shall be provided confirming that the project will not result in an increase in flood levels greater than one foot during the occurrence of the base flood discharge, consistent with Section 4.11.251(7) of the CCZLDO.

4. FEMA NFIP Biological Opinion Compliance (PIC Measures)
   Development authorized under this decision shall comply with the FEMA National Flood Insurance Program Biological Opinion Pre-Implementation Compliance Measures (PIC). Activities shall be conducted in a manner that results in no net loss of floodplain function, including flood storage capacity, water quality, and vegetation within the Special Flood Hazard Area.

5. Compliance with Engineering and Hazard Assessments
   All development shall be constructed in accordance with the recommendations and design parameters contained in the engineering and hazard evaluation materials submitted for the project. Any modification to the design that could alter floodplain function or

shoreline stability shall require review and approval by the Planning Director.

6. State and Federal Permit Compliance
   Prior to commencement of work within the shoreline or waters of the state, the applicant shall obtain all required permits and approvals from applicable state and federal agencies, which may include but are not limited to:
   a. Oregon Department of State Lands (Removal-Fill Permit)
   b. U.S. Army Corps of Engineers (Section 404 Permit), if applicable
   c. Oregon Parks and Recreation Department Ocean Shore Permit, if applicable

7. Copies of any required permits shall be provided to the County prior to commencement of work.

8. Maintenance of Stabilization Feature
   The approved vegetated cobble berm stabilization feature shall be maintained to ensure continued functionality. Alteration or removal of the stabilization feature that would reduce its effectiveness shall require review and approval by the Planning Director.

**EXHIBIT "B"**
**Vicinity Map**
*(not to scale)*

# COOS COUNTY COMMUNITY DEVELOPMENT

**Mailing Address: 250 N. Baxter, Coquille, Oregon 97423**
**Physical Address: 60 E. Second, Coquille Oregon**
**Phone: (541) 396-7770**
**TDD (800) 735-2900**




| | |
|---|---|
| File: | ACU-25-040 |
| Applicant/ Owner: | Sun Oceanside Beach Front RV, LLC |
| Date: | February 14, 2026 |
| Location: | Township 26S Range 14W Section 03C TL 200 |
| Proposal: | Administrative Conditional Use |

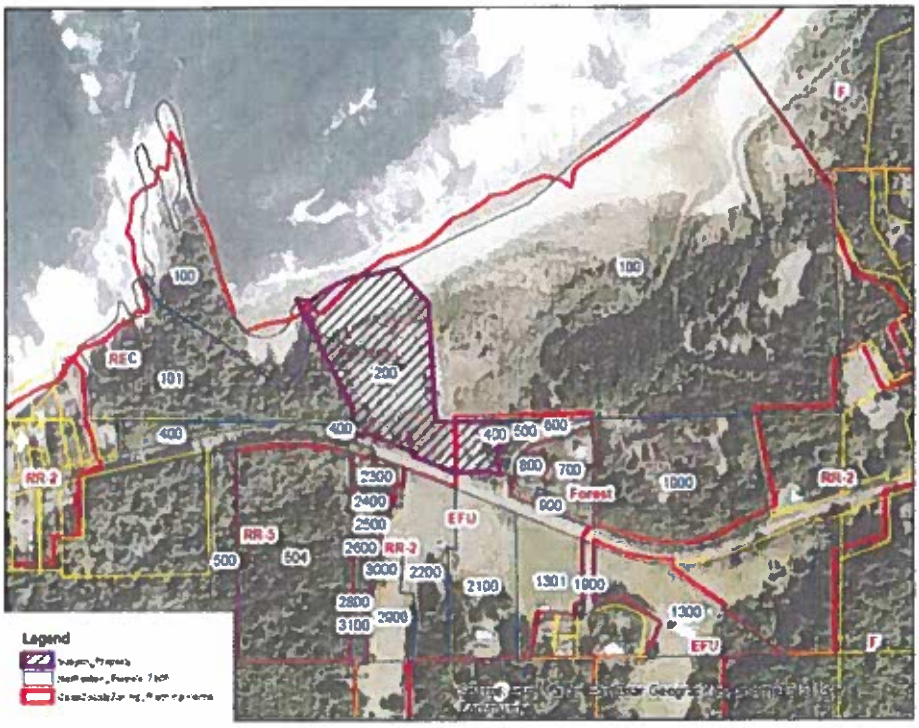


**EXHIBIT "C"**
**STAFF REPORT**
**FINDINGS OF FACT AND CONCLUSIONS**

## I. PROPOSAL AND BACKGROUND/PROPERTY HISTORY INFORMATION AND PRIOR COMPLIANCE:

### A. PROPOSAL

The applicant is requesting approval to install a vegetated cobble berm designed to stabilize coastal erosion and protect the existing septic system serving the RV park.

The proposed berm would be:

- Approximately 200 feet in length
- Approximately 50 feet in width
- Located roughly 200 feet inland from the shoreline, parallel to Bastendorff Beach

The berm is proposed as a non-structural stabilization measure intended to reduce coastal bluff erosion and maintain separation between the septic facilities and the ocean shoreline.

According to the submitted floodplain mitigation assessment and engineering documentation, the project is designed to:

- Avoid removal of existing vegetation where possible
- Avoid creation of new impervious surfaces
- Maintain existing floodplain storage capacity
- Ensure that base flood elevation increases do not exceed FEMA thresholds.

The project site is located within a Special Flood Hazard Area, but the engineering analysis concludes that the berm will not increase flood levels during the base flood event.

A wetland land-use response from the Oregon Department of State Lands indicates the project area falls within the Ocean Shore designation managed by Oregon Parks and Recreation Department, and DSL has indicated that the proposed work does not require a removal-fill permit under its jurisdiction.

Additional state or federal permits may still be required prior to construction.

### B. BACKGROUND/PROPERTY HISTORY INFORMATION AND PRIOR COMPLIANCE

The subject property consists of approximately 15 acres located west of Cape Arago Highway near Bastendorff Beach. The site is developed as the Sun Outdoors Coos Bay RV Park, which includes recreational vehicle spaces, tent camping areas, internal circulation roads, and associated support facilities.

The property is located within several coastal resource overlays including the Beaches and Dunes Limited Development Suitability area, the Coastal Shorelands Boundary, and the FEMA Special Flood Hazard Area.

In 1996, the County approved expansion of the RV park under Conditional Use approval ACU-96-010. In 2014, the County approved ACU-14-11, which allowed the expansion of tent camping sites within the Recreation zone in areas adjacent to Bastendorff Beach.

The 2014 approval specifically found that the tent sites would remain primitive in nature, with no excavation, fill, or structural development, and that the activity would maintain the stability of the dune system through preservation of native vegetation.
staff report w attachments

Conditions of approval required that the expansion area:

- Be used only for tent camping and day use activities;
- Avoid structural development or disturbance that could destabilize dune formations;
- Not be utilized during flood events; and
- Continue to comply with the conditions established under the earlier approvals for the RV park.

Following the 2014 approval, the property was sold to the current owner. Subsequent inspections determined that structures and improvements had been constructed within the tent camping area that were not authorized by the prior approvals. These improvements were inconsistent with the primitive camping approval and were required to be removed to restore compliance with the conditions of approval.

The current application (ACU-25-040) is therefore being reviewed independently to address shoreline erosion concerns associated with the septic facilities and coastal bluff adjacent to the developed campground.

Staff reviewed the history of land use approvals on the subject property and notes that previous approvals required preservation of the dune environment and limited development within the tent camping area.

C. KEY ISSUES FOR REVIEW

The primary issues for consideration in this application include:

- Whether the proposed stabilization measure complies with Goal 17 Coastal Shorelands policies and associated Beaches and Dunes protections.\
- Whether the berm design adequately addresses erosion hazards while maintaining dune stability and vegetation.
- Whether the project avoids adverse impacts to floodplain functions, coastal processes, and shoreline vegetation.
- Whether the project is consistent with the Recreation zoning district and previously approved recreational use of the property.

## D. ARTICLE 4.2 – ZONING PURPOSE AND INTENT

### SECTION 4.2.400 OPEN SPACE AND NATURAL RESOURCE ZONING DISTRICTS

Open Space and Natural Resource Districts are intended for especially sensitive areas where wildlife habitat or special scenic values have been identified or where natural hazards totally preclude any development.

**RECREATION (REC)**
The intent of the Recreation District is to designated recreation areas. The purpose of the "REC" district is to accommodate recreational uses of areas with high recreational or open space value.

The district applies solely to areas designated as "Recreation" in the Comprehensive Plan, which include state, county and other municipal parks, the Oregon Dunes National Recreation Area, as well as private lands currently developed as golf courses.

New recreational developments in this district shall be oriented to the open space nature of the land. The type and intensity of recreational developments in this district must be conditioned by environmental considerations set forth in the County's Coastal Shoreland/Dune Lands Comprehensive Plan policies where such developments are allowed in these coastal resource areas.

## II. GENERAL PROPERTY COMPLIANCE:

### A. COMPLIANCE PURSUANT TO SECTION 1.1.300:

*It shall be unlawful for any person, firm, or corporation to cause, develop, permit, erect, construct, alter or use any building. structure or parcel of land contrary to the provisions of the district in which it is located. No permit for construction or alteration of any structure shall be issued unless the plans, specifications, and intended use of any structure or land conform in all respects with the provisions of this Ordinance, unless approval has been granted by the Hearings Body.*

**FINDING: Staff has reviewed the property history and finds that, at the time of this report, the property complies with the Coos County Zoning and Land Development Ordinance. However, this does not preclude the possibility that additional information, which was unavailable during this review, might indicate non-compliance. The property was found to be out of compliance but has removed the unauthorized development at this time.**

### *B.* SECTION 6.1.125 LAWFULLY CREATED LOTS OR PARCELS:

*"Lawfully established unit of land" means:*
*1. The unit of land was created:*
*a. Through an approved or pre-ordinance plat;*

*b. Through a prior land use decision including a final decision from a higher court. A higher court includes the Land Use Board of Appeals;*
*c. In compliance with all applicable planning, zoning and subdivision or partition ordinances and regulations at the time it was created.*
*d. By a public dedicated road that was held in fee simple creating an interviewing ownership prior to January 1, 1986;*
*e. By deed or land sales contract, if there were no applicable planning, zoning or subdivision or partition ordinances or regulations that prohibited the creation.*
*f. By the claim of intervening state or federal ownership of navigable streams, meandered lakes or tidewaters. "Navigable-for-title" or "title-navigable" means that ownership of the waterway, including its bed, was passed from the federal government to the state at statehood. If a waterway is navigable-for-title, then it also is generally open to public use for navigation, commerce, recreation, and fisheries.*

**FINDING: The property was found to be lawfully in a prior application (ACU-14-11). The report stated that the property was created prior to 1986 by deed Book 293 Volume 226 as found in the Coos County Deed of Records.**

## III. STAFF FINDINGS AND CONCLUSIONS:

### *A. SUMMARY OF PROPOSAL AND APPLICABLE REVIEW CRITERIA:*

Request for a Land Use Approval through an Administrative Conditional Use to allow a Large Tract Forestland Dwelling, subject to Review Standard #9(B) and an Accessory Structure. Development is also subject to Section 4.6.130 Siting Standards for Dwellings and Structures in Forest Zones and 4.6.140 Development and Siting Criteria. Administrative Conditional Uses are reviewed under Article 5.2. This property is within the Natural Hazard Wind Erosion Special Development Overlay and shall comply with Article 4.11.

### *B. KEY DEFINITIONS:*

- *ACTIVITY: Any action taken either in conjunction with a use or to make a use possible. Activities do not in and of themselves result in a specific use. Several activities such as dredging, piling and fill may be undertaken for a single use such as a port facility. Most activities may take place in conjunction with a variety of uses.*
- *DEVELOP: To bring about growth or availability; to construct or alter a structure, to conduct a mining operation, to make a physical change in the use or appearance of land, to divide land into parcels, or to create or terminate rights to access.*
- *DEVELOPMENT: The act, process or result of developing.*
- *USE: The end to which a land or water area is ultimately employed. A use often involves the placement of structures or facilities for industry, commerce, habitation, or recreation.*
- *ZONING DISTRICT: A zoning designation in this Ordinance text and delineated on the zoning maps, in which requirements for the use of land or buildings and development standards are prescribed.*

## *C. COOS COUNTY ZONING AND LAND DEVELOPMENT ORDINANCE (CCZLDO)*

**SECTION 4.3.100 USES NOT LISTED AND COMPLIANCE WITH OTHER SECTIONS:** Development, Uses and Activities may be further restricted by Definitions, Review Standards, Development and Siting Criteria or Special Development Considerations and Overlays. If a use is not listed then it is prohibited unless a similar use determination is made pursuant to Article 5.14 or it is found to exempt from review pursuant to Section 1.1.800 Exclusions from Permit Requirements.

No structure shall be erected, converted enlarged, reconstructed, replaced, or altered, nor shall any structure or use be changed, except in accordance with the provisions of the CCZLDO. Certain uses, activities, structures or developments have been excluded from requiring a permit which is under Section 1.1.800 of the CCZLDO.

**SECTION 4.3.200 ZONING TABLES FOR URBAN AND RURAL RESIDENTIAL, MIXED COMMERCIAL-RESIDENTIAL, COMMERCIAL, INDUSTRIAL, MINOR ESTUARY AND SOUTH SLOUGH**

The table indicates the type of review process that is required. Remember that CU is an conditional use review and the letter prior explain what level of conditional use is required (A = administrative and H=Hearing)
As used in the zoning tables the following abbreviations are defined as:

- "P" permitted and requires no review from the Planning Department. No review is required but other agencies may have requirements.
- "CD" compliance determination review (permitted with standards) with clear and objective standards (Staff review usually referred to as Type I process or ministerial action). These uses are subject to development standards in sections 4.3.22, 4.3.230 and notices requesting comments may be provided to other agencies as result. The process takes a minimum of 30 days to complete. Industrial zones may require additional review. All structures and uses shall meet the applicable Development and Siting Criteria or Special Development Considerations and Overlays for the zoning district in which the structure will be sited.
- "ACU" Administrative Conditional Use (Planning Director's Decision usually referred to as a Type II Process)
- "HBCU" Hearing Body Conditional Use (Planning Commission, Board of Commissioner or Hearings Officer Decision usually referred to as a Type III Process)
- "PLA" Property Line Adjustments subject to standards found in Chapter 6.
- "P", "SUB", "PUD" = Partition, Subdivision, Planned Unit Development that require Land Division Applications subject to standards found in Chapter 6.
- The "Subject To" column identifies any specific provisions of Section 4.3.210 to which the use is subject.
- "N" means the use is not allowed.

| # | Use | Zone | Subject To |
|---|---|---|---|
| | | REC | |
| 86. | Shoreline Stabilization - Non-Structural | CD | (77) |

(77) SHORELINE STABILIZATION – This category includes structural and nonstructural stabilization.

a. Nonstructural: Permitted as a compliance determination unless otherwise restricted by a special development consideration or overlay.
b. Structural: Shoreland structural stabilization is subject to Natural Hazards Policy 5.11 as explained in this subsection. Coos County shall promote protection of valued property from risks associated with critical stream bank and ocean front erosion through necessary erosion-control stabilization measures, preferring nonstructural solutions where practical. Coos County shall implement this strategy by making "Consistency Statements" required for state and federal permits (necessary for structural stream bank protection measures) that support structural protection measures when the applicant establishes that non-structure measures either are not feasible or inadequate to provide the necessary degree of protection. This strategy recognizes the risks and loss of property from unabated critical stream bank erosion, and also, that state and federal agencies regulate structural solutions. A flood elevation certificate is required for a stabilization which will occur in the identified flood hazard area.

**FINDING: The applicant proposes installation of a vegetated cobble berm intended to reduce shoreline erosion and protect existing infrastructure associated with the recreational vehicle park. The proposed stabilization method is designed to function as a nonstructural erosion-control measure by using natural materials and vegetation to dissipate wave energy and reduce shoreline retreat. The project does not involve the installation of hardened shoreline protection such as seawalls, bulkheads, or other engineered structural armoring.**

**The site is located within the Coastal Shorelands Boundary and Beaches and Dunes overlay area, where preservation of dune stability and vegetation is an important consideration. The proposed stabilization approach utilizes natural materials and revegetation to maintain dune stability and minimize disturbance to coastal processes. Based on the materials submitted and the design described in the application, staff finds the proposal consistent with the intent of nonstructural shoreline stabilization methods.**

**Because the stabilization method relies on natural materials and vegetative stabilization rather than engineered structural armoring, the proposal is considered a nonstructural stabilization measure and is therefore permitted as a compliance determination under this section, subject to compliance with applicable overlays and development standards. The overlays and special development considerations require a conditional use and floodplain application review. These have been submitted. Therefore, this section has been addressed.**

***SECTION 4.3.220 ADDITIONAL CONDITIONAL USE REVIEW STANDARDS*** *for uses, development and activities listed in table 4.3.200*

*This section has specific criteria set by the zoning district for USES, ACTIVITIES and DEVELOPMENT: ****

(7) *RECREATION (REC), SOUTH SLOUGH (SS) AND MINOR ESTUARY AND SHORELAND (MES) – The following conditional use review standards applies to all USES, ACTIVITIES and DEVELOPMENT within the REC, SS and MES zoning districts.*

*(a) COMPATIBILITY: The proposed USE, ACTIVITY OR DEVELOPMENT is required to demonstrate compatibility with the surrounding properties or compatibility may be made through the imposition of conditions. Compatibility means that the proposed use is capable of existing together with the surrounding uses without discord or disharmony. The test is where the proposed use is compatible with the existing surrounding uses and not potential or future uses in the surround area.*

*(b) All parks (Recreational or Residential) shall comply with the following design criteria:*

- *i. The landscape shall minimize soil erosion. The exterior portion of the property shall provide an ornamental, sight-obscuring fence, wall, evergreen or other suitable screening/planting along all boundaries of the site abutting public roads or property lines that are common to other owners of property that are zoned for residential, except for points of ingress and egress;*
- *ii. Lighting: Any lights provided to illuminate any public or private parking area shall be so arranged as to reflect the light away from any abutting or adjacent residential district or use.*
- *iii. Exposed storage areas, service areas, utility buildings and structures and similar accessory areas and structures shall be subject to the setbacks of the this zoning designation, screen plantings or other screening methods;*
- *iv. Trash service shall be provided to the facility and the area for trash receptacle or receptacles shall be identified on the plot plan; and*
- *v. Hours of operation may be required in areas predominantly surrounded by residential zones.*

*(c) Any commercial use in conjunction with a recreational use shall be consistent with the following building size:*

- *i. No size limits inside urban growth boundary;*
- *ii. For building or buildings located within an Unincorporated Community Boundary as adopted by the Coos County Comprehensive Plan Volume 1 Part 2 § 5.5 the following square foot requirements apply:*

1. *Urban Unincorporated Community shall not exceed 8,000 square feet of floor space; or*
2. *Rural Unincorporated Community shall not exceed 4,000 square feet of floor space.*

**FINDING: This is not a new recreational park therefore; compatibility is the only portion of the criteria that is relevant. The subject property is zoned Recreation (REC) and is currently developed as an established recreational vehicle park with associated camping and recreational facilities. Surrounding properties include coastal shoreline areas, open space, recreational uses associated with Bastendorff Beach, and rural residential and recreational uses located along Cape Arago Highway.**

**The proposed activity involves shoreline stabilization intended to reduce erosion impacts along the coastal edge of the property and protect existing infrastructure associated with the recreational vehicle park. The stabilization method is designed to use natural materials and vegetative stabilization techniques, which are intended to blend with the surrounding coastal landscape and minimize visual and environmental impacts.**

**The activity does not introduce a new land use or expand the intensity of the existing recreational use on the property. Instead, it is intended to stabilize shoreline conditions and protect existing infrastructure serving the approved recreational use of the site. The project will not generate additional traffic, noise, lighting, or other impacts that would adversely affect neighboring properties or the surrounding recreational shoreline environment.**

**Because the stabilization measure is designed to be low profile and utilize natural materials, it is expected to remain visually compatible with the surrounding shoreline and recreational setting. In addition, any necessary permits or approvals from applicable state or federal agencies will ensure that the stabilization measures comply with coastal resource protection standards.**

**Based on the information provided, staff finds that the proposed shoreline stabilization activity is compatible with the existing recreational use of the property and the surrounding coastal and recreational land uses. Therefore, the proposal satisfies the compatibility standard of Section 4.3.220(7)(a).**

*SECTION 4.3.225 GENERAL SITING STANDARDS*

*All new USES, ACTIVITIES and DEVELOPMENT are subject to the following siting standards:*

(1) *Agricultural and Forest Covenant - Any applicant for a dwelling permit adjacent to a Forest or Exclusive Farm Zone shall sign a statement on the Compliance Determination or Zoning Clearance Letter acknowledging that: "the normal intensive management practices occurring on adjacent resource land will not conflict with the rural residential landowner's enjoyment of his or her property.*

(2) *Fences, Hedges, and Walls: No requirement, but vision clearance provisions of Section 7.1.525 apply.*

(3) *Limitation on uses of manufactured dwellings/structures for commercial purposes pursuant to ORS 466 et seq. Manufactured dwellings shall not be used for commercial purposes except:*

*(a) Where use of the manufactured dwelling for commercial purposes is authorized by the Building Codes Agency.*

*(b) Where used as a temporary sales office for manufactured structures; or*

*(c) As part of an approved home occupation. [OR-92-07-012PL]*

(4) *New lots or parcels - Creation of lots or parcels, unless it meets the circumstances of § 5.6.130, shall meet the street frontage, lot width, lot depth and lot size. Minimum road frontage/lot width shall be met unless waived by the Planning Director in consultation with the County Surveyor and County Roadmaster due to creating an unsafe or irregular configuration:*

*(a) Minimum Street frontage should be at least 30 feet; and*

*(b) Minimum lot width and Minimum lot depth is 50 feet.*

*Minimum parcel/lot size cannot be waived or varied unless otherwise provided by a specific zoning regulation. Tax lot creation and consolidations do not change the legally created status of a lot or parcel.*

(5) *Parking - Off-street access, parking and loading requirements per Chapter VII apply.*

(6) *Riparian -*

*(a) Riparian vegetation setback within 50 feet of a estuarine wetland, stream, lake or river, as identified on the Coastal Shoreland and Fish and Wildlife habitat inventory maps, shall be maintained except:*

*i. Trees certified as posing an erosion or safety hazard. Property owner is responsible for ensuring compliance with all local, state and federal agencies for the removal of the tree.*

*ii. Riparian vegetation may be removed to provide direct access for a water-dependent use if it is a listed permitted within the zoning district;*

*iii. Riparian vegetation may be removed in order to allow establishment of authorized structural shoreline stabilization measures;*

*iv. Riparian vegetation may be removed to facilitate stream or stream bank clearance projects under a port district, ODFW, BLM, Soil & Water Conservation District, or USFS stream enhancement plan;*

*v. Riparian vegetation may be removed in order to site or properly maintain public utilities and road right-of-ways;*

*vi. Riparian vegetation may be removed in conjunction with existing agricultural operations (e.g., to site or maintain irrigation pumps, to limit encroaching brush, to allow harvesting farm crops customarily grown within riparian corridors, etc.) provided that such vegetation removal does not encroach further into the vegetation buffer except as needed to provide an access to the water to site or maintain irrigation pumps; or*

*vii. The 50 foot riparian vegetation setback shall not apply in any instance where an existing structure was lawfully established and an addition or alteration to said structure is to be sited not closer to the estuarine*

*wetland, stream, lake, or river than the existing structure and said addition or alteration is not more than 100% of the size of the existing structure's "footprint".*

*(b) Riparian removal within the Coastal Shoreland Boundary requires an Administrative Conditional Use application and review. See Special Development Considerations Coastal Shoreland Boundary.*

*(c) The 50' measurement shall be taken from the closest point of the ordinary high water mark to the structure using a right angle from the ordinary high water mark.*

(7) *Setbacks:*

*(a) All Development with the exception of fences shall be set back a minimum of thirty-five (35) feet from any road right-of-way centerline, or five (5) feet from the right-of-way line, whichever is greater. This setback may be greater under specific zoning siting requirements.*

*(b) Firebreak Setback - New or replacement dwellings on lots, parcels or tracts abutting the "Forest" zone shall establish and maintain a firebreak, for a distance of at least 30 feet in all directions. Vegetation within this firebreak may include mowed grasses, low shrubs (less than ground floor window height), and trees that are spaced with more than 15 feet between the crowns and pruned to remove dead and low (less than 8 feet from the ground) branches. Accumulated needles, limbs and other dead vegetation should be removed from beneath trees.*

(8) *OUTDOOR STORAGE IN RESIDENTIAL ZONES (a) Boats and trailers, travel trailers, pick-up campers or coaches, motorized dwellings, and similar recreation equipment may be stored on a lot but not used as an accessory use; (b) Automotive vehicles or trailers of any kind or type without current license plates, where required, and which are not in mechanical working order, shall not be parked or stored on any residentially zoned property other than in completely enclosed buildings; (c) One operating truck may be stored on the lot of a truck driver provided it is accessory to the main use of the property. Additional trucks shall not be allowed.*

**FINDING: Staff reviewed the applicable general siting standards of Section 4.3.225. The proposal involves shoreline stabilization within an existing recreational development and does not include the creation of new lots, placement of manufactured dwellings, commercial use of manufactured structures, or development requiring agricultural or forest covenants. The proposal also does not involve outdoor storage or other uses regulated under this section.**

**The project is located within an existing developed recreational site and will not result in additional buildings or structures that would alter required setbacks from road rights-of-way. Riparian and shoreline conditions are addressed under the applicable Coastal Shoreland and shoreline stabilization criteria reviewed elsewhere in this report.**

**Based on the information provided, staff finds the proposal complies with the applicable provisions of Section 4.3.225 General Siting Standards.**

*SECTION 4.3.230 ADDITIONAL SITING STANDARDS*

*This section has specific siting standards and criteria set by the zoning district for USES, ACTIVITIES and DEVELOPMENT:* ***

**(7) RECREATION (REC), SOUTH SLOUGH (SS) AND MINOR ESTUARY AND SHORELAND (MES)**

a. Minimum lot/parcel size – There are no required minimum lot/parcel sizes.
b. Setback - There are no required setbacks.
c. Building Height – There are no building height requirements.
d. Building Density or Size limits – There are no building or size limits.

**FINDING: The subject property is located within the Recreation (REC) zoning district. Section 4.3.230(7) establishes additional siting standards for uses within the Recreation (REC), South Slough (SS), and Minor Estuary and Shoreland (MES) zones. These standards specify that there are no minimum lot or parcel size requirements, setback requirements, building height limitations, or building density or size limits applicable under this section.**

**The proposed shoreline stabilization activity does not involve the creation of new lots or parcels and does not include the construction of buildings or structures subject to height or density limitations. Therefore, the proposal is not constrained by the siting standards identified in this section.**

**Based on this review, staff finds the proposal consistent with the applicable provisions of Section 4.3.230 Additional Siting Standards.**

*ARTICLE 4.11 SPECIAL DEVELOPMENT CONSIDERATIONS AND OVERLAYS*

*SECTION 4.11.100 PURPOSE:*

*The purpose of this Article is to prescribe special regulations for the use and development of lands situated within resource or hazard areas identified on the Plan Maps for Volume I (Balance of County[1]).*

*SECTION 4.11.110 PRIORITY OF RESTRICTIONS:*

*When the restrictions imposed by the provisions of an overlay or special development consideration pertaining to a property is found to be in conflict with the primary zone the more restrictive provisions shall govern.*

[1] Zoning is broke up by three comprehensive plan references which included 2 estuary plans (Coos Bay and Coquille) and then the rest of the zoning referred to as the Balance of County Zoning.

## *SECTION 4.11.120 GOAL #5 CONFLICT RESOLUTION PROCESS:*

*When in the course of implementing the Coos County Comprehensive Plan it becomes evident that a conflict exists concerning the use of land identified as a Oregon Statewide Planning Goal #5 resource that is otherwise protected pursuant to OAR 660-16-005(1), then any proposed conflicting use may only be allowed after the an Administrative Conditional Use application has been completed based on findings that address the requirements of OAR 660-16-0005(2) and OAR 660-165-0010.*

## *SECTION 4.11.125 SPECIAL DEVELOPMENT CONSIDERATIONS:*

*The considerations are map overlays that show areas of concern such as hazards or protected sites. Each development consideration may further restrict a use. Development considerations play a very important role in determining where development should be allowed In the Balance of County zoning. The adopted plan maps and overlay maps have to be examined in order to determine how the inventory applies to the specific site.*

**FINDING: Article 4.11 establishes special regulations for the use and development of lands located within resource areas, hazard areas, and other mapped overlay areas identified in the Coos County Comprehensive Plan maps for the Balance of County. These provisions ensure that development occurring within mapped resource or hazard areas is reviewed for compliance with the applicable protection standards.**

**The subject property contains several mapped special development considerations identified on the Comprehensive Plan inventory maps, including coastal resource and hazard overlays. These overlays are addressed individually in the applicable sections of this staff report.**

**Pursuant to Section 4.11.110, when the provisions of a special development consideration or overlay conflict with the underlying zoning district, the more restrictive standard shall apply. The proposed development has been reviewed under the applicable overlay provisions to ensure compliance with these requirements.**

**Section 4.11.120 establishes the Goal #5 conflict resolution process for proposed uses that may conflict with protected Goal #5 resources. The proposed shoreline stabilization activity is being reviewed through the Administrative Conditional Use process, which provides the mechanism for evaluating potential conflicts with identified resource overlays where applicable.**

**Section 4.11.125 explains that special development considerations are mapped overlays identifying areas of concern such as hazards, resource areas, or protected sites that may impose additional development restrictions. The applicable overlays affecting the subject property are evaluated in the subsequent sections of this report.**

**Based on this review, the proposal has been evaluated under the applicable Special Development Considerations and Overlays and will be subject to the more restrictive provisions where applicable.**

*4.11.129 BEACHES AND DUNES (POLICY 5.10)*

*The Beaches and Dunes map has inventoried the following:*

- *Beaches and Dunes*

- *Suitable for most uses; few or no constraints (Does not require a review)*
- *Limited Suitability; special measures required for most development*
- *Not Suitable for Residential, commercial or Industrial Structures*

***Purpose Statement:***

*Coos County shall base policy decisions for dunes on the boundaries for these areas as identified on the plan map titled "Development Potential within Ocean Shorelands and Dunes" and the boundaries delineates following specific areas "Suitable", "Limited Suitability" and "Not Suitable" areas of development potential.*

a. *Limited Suitability: "Beach and Dune Areas with Limited Development Suitability" includes all dune forms except older stabilized dunes, active foredunes, conditionally stable foredunes that are subject to ocean undercutting or wave overtopping, and interdune areas (deflation plains) subject to ocean flooding.*

   *The measures prescribed in this policy are specifically required by Statewide Planning Goal #18 for the above-referenced dune forms; and that this strategy recognizes that designated mitigation sites must be protected from other uses.*

   *Implementation shall occur through an Administrative Conditional Use process, which shall include submission of a site investigation report that addresses this subsection, by a qualified registered and licensed geologist or engineer.*

   i. *Coos County shall permit development within areas designated as "Beach and Dune Areas with Limited Development Suitability" only upon the establishment of findings that consider at least:*

      *a) The type of use proposed and the adverse effects it might have on the site and adjacent areas;*

      *b) The need for temporary and permanent stabilization programs and the planned maintenance of new and existing vegetation;*

*c) The need for methods for protecting the surrounding area from any adverse effects of the development; and*

*d) Hazards to life, public and private property, and the natural environment which may be caused by the proposed use.*

*ii. Further, Coos County shall cooperate with affected local, state and federal agencies to protect the groundwater from drawdown, which would lead to loss of stabilizing vegetation, loss of water quality, or intrusion of saltwater into water supplies. Coos County shall cooperate with state and federal agencies in regulating the following actions in the beach and dune areas with limited development potential:*

*a) Destruction of desirable vegetation (including inadvertent destruction by moisture loss or root damage);*

*b) The exposure of stable and conditionally stable areas to erosion;*

*c) Construction of shore structures which modify current air wave patterns leading to beach erosion; and*

*d) Any other development actions with potential adverse impacts.*

*b. Unsuitable: Coos County shall prohibit residential development and commercial and industrial buildings within areas designated as "Beach and Dune Areas Unsuitable for Development". The "Beach and dune Areas Unsuitable for Development" includes: active foredunes; other foredunes which are conditionally stable and that are subject to ocean undercutting or wave overtopping; and interdune areas (deflation plains ) that are subject to ocean flooding.*

*The measures prescribed in this policy are specifically required by Statewide Planning Goal #18 for the above referenced dune forms, and that is important to ensure that development in sensitive beach and dune areas is compatible with or can be made compatible with, the fragile and hazardous conditions common to such areas.*

*Implementation shall occur through an Administrative Conditional Use process, which shall include submission of a site investigation report by a registered civil engineer or geologist that addresses this subsection. Coos County shall permit other developments in these areas only:*

*i. When specific findings have been made that consider at least:*

*a) the type of use proposed and the adverse effects it might have on the site and adjacent areas;*

*b) the need for temporary and permanent stabilization programs and the planned maintenance of new and existing vegetation;*

*c) the need for methods for protecting the surrounding area from any adverse effects of the development, and*

*d) hazards to life, public and private property, and the natural environment, which may be caused by the proposed use, and*

*ii. When it is demonstrated that the proposed development:*

*a) is adequately protected from any geologic hazards, wind erosion, undercutting, ocean flooding and storm waves; or is of minimal value; and*

*b) is designed to minimize adverse environmental effects, and*

*iii. When breaching of foredunes is contemplated the following specific criteria has to be addressed:*

*a) the breaching and restoration is consistent with sound principles of conservation, and either*

*b) the breaching is necessary to replenish sand supply in interdune areas, or*

*c) the breaching is done on a temporary basis in an emergency (e.g., fire control, cleaning up oil spills, draining farm lands, and alleviating flood hazards).*

*iv. Coos County shall cooperate with affected local, state and federal agencies to protect the groundwater from drawdown which would lead to loss of stabilizing vegetation, loss of water quality, or intrusion of saltwater into water supplies. Coos County shall cooperate with state and federal agencies in regulating the following actions in the beach and dune areas with limited development potential:*

*a) Destruction of desirable vegetation (including inadvertent destruction by moisture loss or root damage);*

*b) The exposure of stable and conditionally stable areas to erosion;*

*c) Construction of shore structures which modify current air wave patterns leading to beach erosion; and*

*d) Any other development actions with potential adverse impacts.*

**FINDING: SECTION 4.11.129 BEACHES AND DUNES (POLICY 5.10)**

**Finding: The Coos County Comprehensive Plan identifies areas within the coastal shorelands that contain beach and dune formations subject to varying development limitations. The Beaches and Dunes overlay map classifies these areas as Suitable, Limited Suitability, or Not Suitable for development in order to implement the requirements of Statewide Planning Goal 18.**

**According to the Comprehensive Plan inventory maps, portions of the subject property are located within an area designated "Beach and Dune Areas with Limited Development Suitability." Development within these areas requires review through the Administrative Conditional Use process and must demonstrate that the proposal considers the potential impacts to dune stability, vegetation, and coastal hazards.**

**The proposal involves shoreline stabilization intended to reduce erosion and protect existing infrastructure associated with the recreational vehicle park. The activity does not involve residential, commercial, or industrial building construction within the dune area, and the proposed stabilization approach utilizes natural materials and vegetation intended to maintain dune stability and reduce shoreline erosion.**

**The applicant has submitted supporting documentation addressing site conditions and coastal hazards associated with the proposed stabilization measures. The proposed activity has been evaluated with respect to the following required considerations:**

**• Type of Use and Potential Adverse Effects:**
**The proposal consists of shoreline stabilization intended to protect existing infrastructure associated with the approved recreational use of the property. The activity does not expand the intensity of the existing recreational use and is designed to minimize disturbance to dune formations and surrounding coastal resources.**

**• Stabilization and Vegetation Maintenance:**
**The stabilization approach incorporates vegetative and natural material methods intended to maintain dune stability and reduce erosion impacts. The project is designed to avoid unnecessary disturbance to existing vegetation and maintain the stabilizing functions of the dune environment.**

**• Protection of Surrounding Areas:**
**The proposed stabilization measures are intended to reduce shoreline erosion and protect existing improvements without creating additional impacts to surrounding properties or coastal resources.**

**• Hazards to Life and Property:**
**The stabilization activity is intended to address erosion hazards affecting the property and**

**associated infrastructure. The proposal has been reviewed with consideration of coastal hazard conditions and floodplain constraints.**

**The proposal does not involve development within areas designated as "Beach and Dune Areas Unsuitable for Development."** No **breaching of foredunes or construction of residential, commercial, or industrial structures within prohibited dune areas is proposed.**

**Based on the information provided and the nature of the proposed shoreline stabilization activity, staff finds that the proposal is consistent with the Beaches and Dunes policy requirements of Section 4.11.129 and Statewide Planning Goal 18, subject to compliance with any applicable state or federal permits and conditions of approval.**

*4.11.130 NON-ESTUARINE SHORELAND BOUNDARY (BALANCE OF COUNTY POLICY 5.10)*

*The Coastal Shoreland Boundary map has inventoried the following:*

- *Coastal Shoreland Boundary*
- *Beach Erosion*
- *Coastal Recreation Areas*
- *Area of Water-Dependent Uses*
- *Riparian Vegetation*
- *Fore Dunes*
- *Head of Tide*
- *Steep Bluffs over 50% Slope*
- *Significant wetland wildlife habitats*
- *Wetlands under agricultural use*
- *Areas of Exceptional Aesthetic or Scenic Quality and Coastal Headlands*
- *Headland Erosion*

***Purpose Statement:***

*Protection of major marshes (wetlands), habitats, headlands, aesthetics, historical and archaeological sites: Coos County shall provide special protection to major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources, and historic and archaeological sites located within the Coastal Shorelands Boundary of the ocean, coastal lakes and minor estuaries. This strategy shall be implemented through plan designations and ordinance measures that limit uses in these special areas to those uses that are consistent with protection of natural values, such as propagation and selective harvesting of forest products, grazing, harvesting wild crops, and low intensity water-dependent recreation. This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this plan.*

*Coos County shall consider:*

i. *"Major marshes" to include certain extensive marshes associated with dune lakes in the Oregon Dunes National Recreation Area and wetlands associated with New River as identified in the Inventory text and maps, and on the Special Considerations Map;*

ii. *"Significant wildlife habitat" to include "sensitive big-game range", Snowy Plover nesting areas, Bald Eagle, and Osprey nesting areas, Salmonid spawning and rearing areas, and wetlands;*

iii. *"Coastal headlands" to include Yoakum Point, Gregory Point, Shore Acres, Cape Arago south to Three-Mile Creek, Five Mile Point, and Coquille Point;*

iv. *"Exceptional resources Aesthetic or Scenic Quality" to include the coastal headlands identified above, and other areas identified in the Coastal Shorelands Inventory Map; and*

v. *"Historical, cultural and archaeological sites" to include those identified in the Historical, Cultural and Archaeological Sites Inventory and Assessment.*

a. *Uses allowed within the Coastal Shoreland Boundary: This strategy recognizes: (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration; and (2) that Statewide Planning Goal #17 places strict limitations on land divisions within coastal shorelands.*

i. *Uses within the Coastal Shoreland Boundary: Coos County shall manage its rural areas within the "Coastal Shorelands Boundary" of the ocean, coastal lakes and minor estuaries through implementing ordinance measures that allow the following uses:*

*a) Farm uses as provided in ORS 215;*

*b) Propagation and harvesting of forest products consistent with the Oregon Forest Practices Act.*

*c) private and public water dependent recreation developments;*

*d) aquaculture;*

*e) water-dependent commercial and industrial uses and water-related uses are allowed only upon finding by the Board of Commissioners that such uses satisfy a need, which cannot otherwise be accommodated on shorelands in urban and urbanizable areas;*

*f) single family residences on existing lots, parcels, or units of land when compatible with the objectives and implementation standards of the Coastal Shorelands goal, and as otherwise permitted by the underlying zone; or*

*g) any other uses, provided that the Board of Commissioners determines that such uses:*

*a. Satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas;*
*b. Are compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife habitat;*
*c. The "other" use complies with the implementation standard of the underlying zone designation; and*
*d. In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this plan.*

*ii. A site plan and design review is only necessary when required in Coos County Comprehensive Plan Volume I Part 2 § 3.5: Structures associated with the above uses, with the exception of farm and forest uses, shall only be permitted after an Administrative Conditional Use Review or higher review addressing the criteria and requirements of this subsection below and upon a finding that such uses do not otherwise conflict with the Special Development Considerations and Overlay Zones found in this Ordinance.*

*a) Site Review and Approval Criteria.*

*Construction, site development and landscaping shall be carried out in substantial accord with the plans, drawings, sketches and other documents as approved.*

*Nothing in this subsection shall be construed to prevent ordinary repair, maintenance and replacement of any part of the building or landscaping which does not involve a substantial change from the purpose and objectives of this section. Proposed "substantial changes" shall be submitted to the Planning Director for approval.*

*All variances from the site development criteria which are deemed necessary by the applicant shall be requested pursuant to ARTICLE 5.3.*

*These standards are intended to provide a frame of reference for the applicant to the development of a site and building plans as well as a method of review. These standards shall not be regarded as inflexible requirements, nor do they advocate any particular architectural style, for they are intended to encourage creativity,*

*invention and innovation. The following standards shall be utilized in reviewing the plans, drawings, sketches and other documents required under for this review:*

1. *Landscaping*
    a. *The landscape shall be such to minimize soil erosion and lessen the visual impact;*
    b. *Any grade changes shall be in keeping with the general appearance of neighboring developed areas.*
2. *Structures*
    a. *Proposed structures shall be related harmoniously to the terrain and to existing buildings in the vicinity that have a visual relationship to the proposed buildings;*
    b. *The achievement of such relationship may include the enclosure of space in conjunction with other existing buildings or other proposed buildings and the creation of focal points with respect to avenues of approach, terrain features or other buildings.*
3. *Drives, Parking and Circulation*

    *With respect to vehicular and pedestrian circulation, including walkways, interior drives and parking, special attention shall be given to the location and number of access points, general interior circulation, separation of pedestrian and vehicular traffic, and arrangement of parking areas that are safe and convenient and must comply with the standards found in Chapter VII. The Roadmaster is responsible for determining compliance with this subsection.*
4. *Surface Water Drainage*

    *Special attention shall be given to proper site surface drainage so that removal of surface waters will not adversely affect neighboring properties, the public storm drainage system, or create environmental problems.*
5. *Utility Service*
    a. *Whenever feasible, electric, telephone and other utility lines shall be underground;*
    b. *Any utility installations remaining above ground shall be located so as to have an harmonious relation to neighboring properties and the site;*
    c. *The proposed method of sanitary sewage disposal from all buildings shall be indicated.*

b) *Application Submittal and Review Procedure.*

1. *Submission of Documents - A prospective applicant for a building or other permit who is subject to site design review shall submit the following to the County Planning Director:*
    a. *A site plan, drawn to scale, shows the proposed layout of all structures and other improvements;*
    b. *A landscape plan, drawn to scale, showing the location of existing trees proposed to be retained on the site, the location and design of landscaped areas, the varieties and sizes of trees and plant*

*materials to be planted on the site, other pertinent landscape features, and irrigation systems required to maintain trees and plant materials;*

c. *Architectural drawings or sketches, drawn to scale, including floor plans, in sufficient detail to permit computation of yard requirements and showing all elevations of the proposed structures and other improvements as they will appear on completion of construction;*
d. *Specifications as to type, color and texture of exterior surfaces of proposed structures including reflective surfaces of solar collectors;*
e. *An application request which shall include:*
    1) *Name and address of applicant;*
    2) *Statement of applicant's legal interest in the property (owner, contract purchaser, lessee, renter, etc.) and a description of that interest, and in case the applicant is not the owner, verification of the owner's consent;*
    3) *Address and legal description of the property;*
    4) *Statement explaining the intended request;*
    5) *The required fee; and*
    6) *Any other materials or information as may be deemed necessary to assist in evaluation of the request. The request will be made prior to deeming the application complete. However, if this review is before the hearings body they may request for additional information to ensure compliance.*

2. *Threshold Standard. The Planning Director has the discretion to waive part or all of the site plan requirements if, in the Director's judgment, the proposed development is "de minimis" in extent to the existing development.*

b. *Land Divisions within the Coastal Shoreland Boundary: This strategy recognizes that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration under Statewide Planning Goal #17. Coos County shall permit subdivisions and partitions within the "Coastal Shorelands Boundary" of the ocean, coastal lakes or minor estuaries in rural areas only upon finding by the governing body:*

i. *That such land divisions will not conflict with agriculture and forest policies and ordinance provisions of the Coos County Comprehensive Plan and would be compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife and either;*

ii. *That the new land divisions fulfill a need that cannot otherwise be accommodated in other uplands or in urban and urbanizable areas;*

iii. *That the new land divisions are in a documented area, "committed" area; or*

iv. *That the new land divisions have been justified through a goal exception.*

c. *Coastal Lakes and Minor Estuary Coastal Shorelands: Coos County shall consider the following general priorities for the overall use of ocean, coastal lake or minor estuary coastal shorelands (from highest to lowest):*

i. *promote uses, which maintain the integrity of estuaries and coastal waters;*

ii. *provide for water-dependent uses;*

iii. *provide for water-related uses;*

iv. *provide for nondependent, nonrelated uses, which retain flexibility of future use and do not prematurely or inalterably commit shorelands to more intensive uses;*

v. *provide for development, including nondependent, nonrelated uses, in urban areas compatible with existing or committed uses;*

vi. *permit nondependent, nonrelated uses, which cause a permanent or long-term change in the features of coastal shorelands only upon a demonstration of public need.*

*In addition, priority uses for flood hazard and floodplain areas shall include agriculture, forestry, recreation and open space uses, which are water-dependent. This strategy shall serve as a guide when evaluating discretionary zoning and land development actions. This strategy recognizes Statewide Planning Goal #17 requirements.*

d. *Non-structural solutions for erosion control: Coos County shall prefer non-structural solutions to problems of erosion and flooding to structural solutions in ocean, coastal lake or minor estuary shorelands. Where shown to be necessary, water and erosion control structures, such as jetties, bulkheads, seawalls, and similar protective structures and fill shall be designed to minimize adverse impacts on water currents, erosion, and accretion patterns. Implementation of this strategy shall occur through county review of and comment on state and federal permit applications for such projects. This strategy is based on the recognition that non-structural solutions are often more cost-effective as corrective measures but that carefully designed structural solutions are occasionally necessary.*

e. *Riparian vegetation in Coastal Shoreland Boundary: Maintain, restore or enhancing riparian vegetation as consistent with water dependent uses requires a conditional use. Coos County shall maintain riparian vegetation within the shorelands of the ocean,*

*coastal lakes, and minor estuaries, and when appropriate, restore or enhance it, as consistent with water-dependent uses. Variances to riparian vegetation setback shall not be permitted within the CSB unless it is to allow for a water dependent use as permitted by the zoning. If a property owner would like to remove vegetation in the Coastal Shoreland Boundary then a conditional use is required. The Planning Department will request comments from ODFW and DEQ regarding water quality and fish habitat. An applicant may provide reports from a qualified biologist.*

*Timber harvest, if permitted in the zoning ordinance, shall be regulated by the Oregon Forest Practices Act. Where the County's Comprehensive Plan identifies riparian vegetation on lands in the coastal shorelands subject to forest operations governed by the FPA, the Act and Forest Practices Rules administered by the Department of Forestry will be used in such a manner as to maintain, and where appropriate, restore and enhance riparian vegetation. This strategy shall be implemented by County review of and comment on state permit applications for waterfront development.*

*This strategy is based on the recognition that prohibiting excessive removal of vegetative cover is necessary to stabilize the shoreline and, for coastal lakes and minor estuaries, to maintain water quality and temperature necessary for the maintenance of fish habitat.*

**FINDING: The subject property is located within the Coastal Shoreland Boundary (CSB) as identified on the Coos County Comprehensive Plan inventory maps. The Coastal Shoreland Boundary includes areas associated with coastal resources such as riparian vegetation, wetlands, coastal recreation areas, headlands, beach erosion areas, steep bluffs, and other environmentally sensitive resources.**

**The purpose of the Coastal Shorelands policy is to provide additional protection for significant coastal resources including wetlands, wildlife habitat, coastal headlands, scenic resources, and historic or archaeological sites while allowing limited development that is compatible with these natural resource values.**

**The subject property is zoned Recreation (REC) and is developed as an existing recreational vehicle park. The proposal involves shoreline stabilization intended to address erosion concerns and protect existing infrastructure associated with the approved recreational use of the property.**

**Within the Coastal Shoreland Boundary, uses such as water-dependent recreational developments and other uses that are compatible with the objectives of Statewide Planning Goal 17 may be permitted when reviewed through the Administrative Conditional Use process. The proposed shoreline stabilization activity is associated with an existing recreational development and is intended to protect existing improvements rather than introduce a new or more intensive land use.**

**The stabilization approach is designed to utilize non-structural measures and natural materials where feasible, which is consistent with the County's policy preference for non-structural erosion control methods within coastal shorelands. The project is also intended to maintain shoreline stability and reduce erosion impacts without significantly altering coastal processes or adversely affecting nearby resources.**

**The proposal does not involve land division within the Coastal Shoreland Boundary, and the existing recreational use of the property will remain unchanged. The activity also does not conflict with the resource protection objectives of Goal 17 related to protection of riparian vegetation, wildlife habitat, and coastal resources.**

**Based on this review, staff finds that the proposed shoreline stabilization activity is consistent with the purpose and applicable standards of Section 4.11.130 Non-Estuarine Shoreland Boundary and the objectives of Statewide Planning Goal 17.**

### *4.11.132 NATURAL HAZARDS (BALANCE OF COUNTY POLICY 5.11)*

*Coos County has inventoried the following hazards:*

- *Flood Hazard*
  - *Riverine flooding*
  - *Coastal flooding*
- *Landslides and Earthquakes*
  - *Landslide Susceptibility*
  - *Liquefaction potential*
- *Tsunamis*
- *Erosion*
  - *Riverine streambank erosion*
  - *Coastal*
    - *Shoreline and headlands*
    - *Wind*
- *Wildfire*

*Purpose Statements:*
*Coos County shall regulate development in known areas potentially subject to natural disasters and hazards, so as to minimize possible risks to life and property. Coos County considers natural disasters and hazards to include river and coastal flooding, landslides, liquefaction potential due to earthquakes, fault lines, tsunamis, river bank erosion, coastal erosion along shorelines and headlands, coastal erosion due to wind, and wildfires, including those areas affected by gorse.*

*This strategy shall be implemented by enacting special protective measures through zoning and other implementing devices, designed to minimize risks to life and property associated with new development and substantial improvements. The determination of whether a property is located in one of the above referenced potentially hazardous areas shall be made by the reviewing body*

*(Planning Director, Planning Commission, Board of Commissioners, or any designee based upon adopted inventory mapping). A specific site may not include the characteristics for which it is mapped. In these circumstances staff shall apply § 4.11.132.ii.2m.*

a. *Flooding: Coos County shall promote protection of valued property from risks associated with river and coastal flooding along waterways in the County through the establishment of a floodplain overlay zone (/FP) that conforms to the requirements for participation in the National Flood Insurance Program. See Sections 4.11.211-257 for the requirements of this overlay zone. See Sections 4.11.211-257 for the requirements of this overlay zone.*

b. *Landslides and Earthquakes*

   *Landslides: Coos County shall promote protection to life and property in areas potentially subject to landslides. New development or substantial improvements proposed in such areas shall be subject to geologic assessment review in accordance with section 4.11.150. Potential landslide areas subject to geologic assessment review shall include all lands partially or completely within "very high" landslide susceptibility areas as mapped in DOGAMI Open File Report O-16-02, "Landslide susceptibility map of Oregon."*

   *Earthquakes: Coos County shall promote protection of life and property in areas potentially subject to earthquake hazards. New development or substantial improvements in mapped areas identified as potentially subject to earthquake induced liquefaction shall be subject to a geologic assessment review as set out in this section. Such areas shall include lands subject to "very high" and "high" liquefaction identified in DOGAMI Open File Report O-13-06, "Ground motion, ground deformation, tsunami inundation, co-seismic subsidence, and damage potential maps for the 2012 Oregon Resilience Plan for Cascadia Subduction Zone Earthquakes."*

   *Coos County shall continue to support Building Codes to enforce any structural requirements related to landslide and earthquakes. Staff will notify Building Codes by providing a copy of the geologic assessment report with the Zoning Compliance Letter.*

c. *Tsunamis: Coos County shall promote increased resilience to a potentially catastrophic Cascadia Subduction Zone (CSZ) tsunami through the establishment of a Tsunami Hazard Overlay Zone (THO) in the Balance of County Zoning. See Sections 4.11.260-4.11.270 for the requirements of this overlay zone.*

d. *Reserved.*

e. *Erosion: Coos County shall promote protection of property from risks associated with shoreline, headland, and wind erosion and deposition hazards.*

*Coos County shall promote protection of property from risks associated with bank erosion along rivers and streams through necessary erosion-control and stabilization measures, preferring non-structural solutions when practical.*

*Any proposed structural development within a wind erosion/deposition area, within 100 feet of a designated bank erosion area, or on a parcel subject to wave attack, including all oceanfront lots, will be subject to a geologic assessment review as set out in Section 4.11.150. There is a setback of 100 feet from any rivers or streams that have been inventoried in the erosion layer. If a variance is requested, a geologic assessment will be required.*

*f. Wildfires: Coos County shall promote protection of property from risks associated with wildfires. New development or substantial improvements shall, at a minimum, meet the following standards, on parcels designated or partially designated as "High" or "Moderate" risk on the Oregon Department of Forestry 2013 Fire Threat Index Map for Coos County or as designated as at-risk of fire hazard on the 2015 Coos County Comprehensive Plan Natural Hazards Map:*

1. *The dwelling shall be located within a fire protection district or shall be provided with residential fire protection by contract. If the dwelling is not within a fire protection district, the applicant shall provide evidence that the applicant has asked to be included within the nearest such district or is provided fire protection by contract.*

2. *When it is determined that these standards are impractical the Planning Director may authorize alternative forms of fire protection that shall comply with the following:*
    a. *The means selected may include a fire sprinkling system, onsite equipment and water storage or other methods that are reasonable, given the site conditions, as established by credible documentation approved in writing by the Director;*
    b. *If a water supply is required for fire protection, it shall be a swimming pool, pond, lake, or similar body of water that at all times contains at least 4,000 gallons per dwelling or a stream that has a continuous year round flow of at least one cubic foot per second per dwelling;*
    c. *The applicant shall provide verification from the Water Resources Department that any permits or registrations required for water diversion or storage have been obtained or that permits or registrations are not required for the use; and*
    d. *Road access shall be provided to within 15 feet of the water's edge for firefighting pumping units. The road access shall accommodate the turnaround of firefighting equipment during fire season. Permanent signs shall be posted along the access route to indicate the location of the emergency water source.*

3. *Fire Siting Standards for New Dwellings:*

a. *The property owner shall provide and maintain a water supply of at least 500 gallons with an operating water pressure of at least 50 PSI and sufficient ¾ inch garden hose to reach the perimeter of the primary fuel-free building setback.*
b. *If another water supply (such as a swimming pool, pond, stream, or lake) is nearby, available, and suitable for fire protection, then road access to within 15 feet of the water's edge shall be provided for pumping units. The road access shall accommodate the turnaround of firefighting equipment during the fire season. Permanent signs shall be posted along the access route to indicate the location of the emergency water source.*

4. *Firebreak:*
   a. *A firebreak shall be established and maintained around all structures, including decks, on land owned or controlled by the applicant for a distance of at least 30 feet in all directions.*
   b. *This firebreak will be a primary safety zone around all structures. Vegetation within this primary safety zone may include mowed grasses, low shrubs (less than ground floor window height), and trees that are spaced with more than 15 feet between the crowns and pruned to remove dead and low (less than 8 feet from the ground) branches. Accumulated needles, limbs and other dead vegetation should be removed from beneath trees.*
   c. *Sufficient garden hose to reach the perimeter of the primary safety zone shall be available at all times.*
   d. *The owners of the dwelling shall maintain a primary fuel-free break area surrounding all structures and clear and maintain a secondary fuel-free break on land surrounding all structures that is owned or controlled by the owner in accordance with the provisions in "Recommended Fire Siting Standards for Dwellings and Structures and Fire Safety Design Standards for Roads" dated March 1, 1991, and published by Oregon Department of Forestry and shall demonstrate compliance with Table 1.*

*Table 1 – Minimum Primary Safety Zone*

| Slope | Feet of Primary Safety Zone | Feet of Additional Primary Safety Zone Down Slope |
|---|---|---|
| 0% | 30 | 0 |
| 10% | 30 | 50 |
| 20% | 30 | 75 |
| 25% | 30 | 100 |
| 40% | 30 | 150 |

e. *All new and replacement structures shall use non-combustible or fire resistant roofing materials, as may be approved by the certified official responsible for the building permit.*

*f. If a water supply exceeding 4,000 gallons is suitable and available (within 100 feet of the driveway or road) for fire suppression, then road access and turning space shall be provided for fire protection pumping units to the source during fire season. This includes water supplies such as a swimming pool, tank or natural water supply (e.g. pond).*

*g. The structure shall not be sited on a slope of greater than 40 percent.*

*h. If the structure has a chimney or chimneys, each chimney shall have a spark arrester.*

*i. Except for private roads and bridges accessing only commercial forest uses, public roads, bridges, private roads, and driveways shall be constructed so as to provide adequate access for firefighting equipment. Confirmation shall be provided from the Coos County Road Department or local fire protection district that these standards have been met.*

*5. Wildfires inside urban growth boundaries. Certain areas inside urban growth boundaries may present special risks and may be made subject to additional or different standards and requirements jointly adopted by a city and the county in the form of code requirements, master plans, annexation plans, or other means.*

**FINDING: Section 4.11.132 establishes policies intended to minimize risks to life and property associated with natural hazards such as flooding, landslides, earthquakes, tsunamis, erosion, and wildfire. The purpose of this section is to ensure that development within potentially hazardous areas is reviewed and designed in a manner that reduces risks and protects public safety.**

**The subject property is located in a coastal area where hazards such as coastal flooding and shoreline erosion may occur. The proposal involves shoreline stabilization intended to address erosion concerns and protect existing infrastructure associated with the recreational vehicle park. The stabilization activity is designed to reduce erosion hazards affecting the property and is consistent with the County's policy of promoting protection of property from risks associated with shoreline erosion while preferring non-structural solutions when practical.**

**Portions of the property are also located within a mapped flood hazard area. Development within the flood hazard area must comply with the requirements of the County's Floodplain Overlay Zone and applicable floodplain regulations. Documentation submitted with the application addresses floodplain conditions, and any required floodplain permits or elevation certifications will be required prior to construction.**

**The proposal does not involve new residential structures or substantial new development that would trigger wildfire siting standards, landslide assessments, or earthquake liquefaction reviews under this section.**

**Based on the information provided and the nature of the proposed shoreline stabilization activity, staff finds that the proposal is consistent with the Natural Hazards policies of**

**Section 4.11.132, subject to compliance with applicable floodplain regulations and other required permits.**

### *4.11.150 GEOLOGICAL HAZARDS SPECIAL DEVELOPMENT REVIEW STANDARDS*

*Applications for a geologic hazard review may be made concurrently with any other type of application required for the proposed use or activity. A review of the property must be conducted prior to any ground disturbance. All geologic hazard assessment reports shall include a description of the qualification of the licensed professional or professionals that prepared the assessment.*

*The applicant shall present a geologic hazard assessment report (geologic assessment) prepared by a qualified licensed professional competent in the practice of geosciences, at the applicant's expense, that identifies site specific geologic hazards, associated levels of risk, and the suitability of the site for the use and/or activity in view of such hazards. The geologic assessment shall include the required elements of this section and one of the following:*

a. *A statement that the use and/or activity can be accomplished without measures to mitigate or control the risk of geologic hazard to the subject property resulting from the proposed use and/or activity;*
b. *A statement that there is an elevated risk posed to the subject property by geologic hazards that requires mitigation measures in order for the use and/or activity to be undertaken safely sited on the property; or*
c. *A certification that there are no high or very high geological hazards present on site. If such is certified by a licensed professional then an Administrative Conditional Use application is not required. Coos County is not liable for any type of certification that a geological hazard is not present on site.*

### *4.11.155 GEOLOGICAL ASSESSMENT REVIEW*

*Geologic Assessment Review: The applicant(s) shall complete the following review to determine compliance with this section. This type of review requires a conditional use application and shall follow the administrative procedures for conditional uses found in Article 5 of the CCZLDO.*

1. *Except for activities identified in Subsection 2 of this section, as exempt, any new development or substantial improvement in an area subject to the provisions of this section shall require a Geologic Assessment Review.*

2. *The following development activities are exempt from the requirement for a Geologic Assessment Review:*
    a. *Maintenance, repair, or alterations to existing structures that do not alter the building footprint or foundation and do not constitute substantial improvement as defined in Chapter II.*
    b. *An excavation and/or fill which is less than two feet in depth, or which involves less than twenty-five cubic yards of volume;*

c. *Exploratory excavations under the direction of a certified engineering geologist or registered geotechnical engineer;*
d. *Construction of structures for which a building permit is not required;*
e. *Yard area vegetation maintenance and other vegetation removal on slopes less than 25%;*
f. *Forest operations subject to regulation under ORS 527 (the Oregon Forest Practices Act);*
g. *Maintenance and reconstruction of public and private roads, streets, parking lots, driveways, and utility lines, provided the work does not extend outside of the previously disturbed area;*
h. *Maintenance and repair of utility lines, and the installation of individual utility service connections;*
i. *Emergency response activities intended to reduce or eliminate an immediate danger to life, property, or flood or fire hazard;*
j. *Construction/erection of beachfront protective structures subject to regulation by the Oregon Parks and Recreation Department under OAR 736, Division 20; and*
k. *Any development or activity to be conducted on a site for which a certified engineering geologist has determined that there are no high or very high geologic hazards present. Coos County is not liable for any type of certification that a geologic hazard is not present on site.*

3. *Application, review and appeals for a Geologic Assessment Review shall be in accordance with the requirements for administrative conditional use review as set forth in Article 5.2. Applications for a Geologic Assessment Review may be made prior to or concurrently with any other type of application required for the proposed use or activity. Geologic Assessment Review shall be completed prior to any ground disturbance.*

4. *All applications for Geologic Assessment Review shall be accompanied by an engineering geologic report prepared by a certified engineering geologist at the applicant's expense.*

A. *<u>ENGINEERING GEOLOGIC REPORTS</u>*

1. *Engineering geologic reports required pursuant to this section shall be prepared by a certified engineering geologist licensed in the State of Oregon. Such reports shall be prepared consistent with standard geologic practices and employing generally accepted scientific and engineering principles. The content of such reports shall be generally consistent with the applicable provisions of "Guideline for Preparing Engineering Geologic Reports," 2nd Edition, 5/30/2014, published by the Oregon Board of Geologist Examiners.*

2. *Properties abutting the ocean shore that are located in a mapped regulated hazard area shall include the following additional information :*
   a. *Site description:*
      i. *The geological history and stabilization measures of the site including any previous riprap or dune grading, erosion events, or exposed trees on the*

*beach.*

ii. *Topography, including elevations and slopes on the property itself.*
iii. *Vegetation cover.*
iv. *Subsurface materials – the nature of the rocks and soils.*
v. *Conditions of the seaward front of the property, particularly for sites having a sea cliff.*
vi. *Description of streams or other drainage that might influence erosion or locally reduce the level of the beach.*
vii. *If the site is located on or adjacent to a estuarine water body or Coastal Lake including the Coastal Shoreland Boundary the following additional information shall be included:*
    1. *Presence of drift logs or other flotsam on or within the property.*
    2. *Proximity of nearby headlands that might block the longshore movement of beach sediments, thereby affecting the level of the beach in front of the property.*
    3. *Description of any shore protection structures that may exist on the property or on nearby properties.*
    4. *Presence of pathways or stairs from the property to the beach.*
    5. *Existing development including modification of soil or vegetation on the site, particularly any which might alter the resistance to wave attack.*
    6. *Average widths of the beach during the summer and winter.*
    7. *Median grain size of beach sediment.*
    8. *Average beach slopes during the summer and winter.*
    9. *Elevations above mean sea level of the beach at the seaward edge of the property during summer and winter.*
    10. *Presence of rip currents and rip embayments that can locally reduce the elevation of the fronting beach.*
    11. *Presence of rock outcrops and sea stacks, either offshore or within the beach zone.*
    12. *Information regarding the depth of beach sand down to bedrock at the seaward edge of the property.*

b. *Analyses of Erosion and Flooding Potential on the site:*
    i. *Analysis of DOGAMI beach monitoring data for the site (if available,) all activities affecting shoreline erosion and possible mass wasting, including weathering processes, land sliding or slumping.*
    ii. *Calculation of wave run-up beyond mean water elevation that might result in erosion of the sea cliff or foredune (see Stockdon, 2006).*[2]
    iii. *Evaluation of frequency that erosion-inducing processes could occur, considering the most extreme potential conditions of unusually high water levels together with severe storm wave energy.*
    iv. *For areas subject to dune-backed shorelines, use an established geometric*

[2] Stockdon, H. F., Holman, R. A., Howd, P. A. and Sallenger, A. H., 2006, Empirical parameterization of setup, swash, and runup: Coastal Engineering, 53, p 573-588.

*model to assess the potential distance of property erosion, and compare the results with direct evidence obtained during site visits, aerial photo analysis, or analysis of DOGAMI beach monitoring data.*

v. *For bluff-backed shorelines, use a combination of published reports, such as DOGAMI bluff and dune hazard risk zone studies, aerial photo analysis, and fieldwork to assess the potential distance of property erosion.*

vi. *Description of potential for sea level rise, estimated for local area by combining local tectonic subsidence or uplift with global rates of predicted sea level rise.*

c. *Determination of legal restrictions of shoreline protective structures (Goal 18 prohibition, local conditional use requirements, priority for non-structural erosion control methods).*

d. *Assessment of potential reactions to erosion events, addressing the need for future erosion control measures, building relocation, or building foundation and utility repairs.*

e. *The assessment should include recommendations:*

i. *Use results from the above analyses to establish setbacks (beyond any minimums set by this section or the underlying zone), building techniques, or other mitigation measures to ensure an acceptable level of safety and compliance with all local requirements.*

ii. *Recommend a foundation design, or designs, that render the proposed structures readily moveable.*

iii. *Recommend a plan for preservation of vegetation and existing grade within the setback area, if appropriate.*

iv. *Include consideration of a local variance process to reduce the building setback on the side of the property opposite the ocean, if this reduction helps to lessen the risk of erosion, bluff failure or other hazard.*

v. *Recommend methods to control and direct water drainage away from the ocean (e.g. to an approved storm water system); or, if not possible, to direct water in such a way so as to not cause erosion or visual impacts.*

3. *Engineering geologic reports required by this section shall include a statement from the preparer of the report that all of the applicable content requirements of this subsection have been addressed or are not applicable to the review.*

4. *Engineering geologic reports required by this section shall be valid for a period of five years from the date of preparation of such report. No extensions to this time line shall be granted.*

B. *<u>DECISIONS ON GEOLOGICAL ASSESSMENT REVIEWS</u>*

*A decision on a Geologic Assessment Review shall be based on the following standards:*

1. *The engineering geologic report shall meet the content standards set forth in within this Section.*
2. *In approving a Geologic Assessment Review, the decision maker may impose any conditions which are necessary to ensure compliance with the provisions of this section or with any other applicable provisions of the Coos County Zoning and Land Development Ordinance.*
3. *In the event the decision maker determines that additional review of the engineering geologic report by an appropriately licensed and/or certified professional is necessary to determine compliance with this section, Coos County may retain the services of such a professional for this purpose. The applicant shall be responsible for all costs associated with the additional review. The results of that evaluation shall be considered in making a decision on the Geologic Assessment Review.*

C. *DEVELOPMENT STANDARDS FOR USES SUBJECT TO GEOLOGIC ASSESSMENT REVIEW*

*In addition to the conditions, requirements and limitations imposed by a required engineering geologic report, all uses subject to a geologic assessment review shall conform to the following requirements:*

1. *Historical, Cultural, and Archaeological Resources: All activities and uses subject to Geologic Assessment Reviews proposed for areas of historical, cultural, or archaeologically sensitive areas, as identified on the Coos County Comprehensive Plan Map, shall require consultation with the appropriate local Tribe prior to the commencement of any and all ground disturbing activity. Proof of this consultation shall be provided as a part of application submission.*
2. *Hazard Disclosure Statement: All applications for new development or substantial improvements subject to Geologic Assessment Review shall provide a Hazard Disclosure Statement signed by the property owner that acknowledges:*
    a. *The property is subject to potential natural hazards and that development thereon is subject to risk of damage from such hazards;*
    b. *The property owner has commissioned an engineering geologic report for the subject property, a copy of which is on file with Coos County Planning Department, and that the property owner has reviewed the engineering geologic report and has thus been informed and is aware of the type and extent of hazards present and the risks associated with development on the subject property;*
    c. *The property owner accepts and assumes all risks of damage from natural hazards associated with the development of the subject property.*
3. *Mitigation measures: If on-site structural mitigation measures are required as a condition of approval, the applicant shall, prior to the issuance of a zoning compliance letter, record on the title to the subject property a notification that includes a description of the measures or improvements and that also specifies the obligation of the property owners to refrain from interfering with such measures or improvements and to maintain them.*
4. *Safest site requirement: All new structures shall be located within the area most suitable for development based on the least exposure to risk from hazards as determined by an engineering geologist as part of an engineering geologic report prepared in accordance*

*with Section 4.11.150 through 4.11.155. Notwithstanding the provisions of the underlying zone, as necessary to comply with this requirement, any required yard or setback may be reduced by up to 50% without a variance.*

5. *Certification of compliance: Permitted development shall comply with the recommendations in the required engineering geologic report. Certification of compliance shall be provided to the director by the applicant as follows:*
    a. *Plan Review Compliance: Building, construction or other development plans shall be accompanied by a written statement from a certified engineering geologist stating that the plans comply with the recommendations contained in the engineering geologic report for the approved Geological Assessment Review.*
    b. *Inspection Compliance: Upon the completion of any development activity for which the engineering geologic report recommends an inspection or observation by a certified engineering geologist, the applicant shall provide to the director a written statement from the certified engineering geologist indicating that the development activity has been completed in accordance with the applicable engineering geologic report recommendations.*
    c. *Final Compliance: Upon completion of development requiring an engineering geologic report, the applicant shall submit to the director:*
        i. *A written statement by a certified engineering geologist indicating that all performance, mitigation, and monitoring measures specified in the report have been satisfied; and,*
        ii. *If mitigation measures incorporate engineering solutions designed by a licensed professional engineer, a written statement of compliance by the design engineer.*

**FINDING: Sections 4.11.150 and 4.11.155 of the Coos County Zoning and Land Development Ordinance establish standards for development within areas subject to geologic hazards. These sections require that development proposed within mapped hazard areas be evaluated through a geologic hazard assessment prepared by a qualified licensed professional competent in the practice of geosciences. The purpose of the assessment is to identify site-specific hazards, evaluate the level of risk associated with those hazards, and determine whether the proposed use or activity can be safely sited on the property.**

**The subject property is located within a mapped Natural Hazard – Erosion Coastal (NHERC) inventory area identified on the Coos County Comprehensive Plan Natural Hazards maps. Because the property is located within a coastal erosion hazard area and the proposal involves shoreline stabilization activities, the application is subject to geologic assessment review under these provisions.**

**The applicant submitted a Coastal Engineering Geologic Report prepared by a qualified licensed professional evaluating shoreline conditions, coastal processes, erosion potential, and the suitability of the site for the proposed stabilization activity. The report includes**

**documentation of the professional qualifications of the preparer and provides an evaluation of coastal hazards affecting the property.**

**The assessment evaluates site conditions including shoreline characteristics, erosion processes, and potential impacts associated with coastal storm events and wave action. The report also provides recommendations regarding stabilization measures and shoreline management practices intended to reduce erosion impacts while maintaining natural shoreline processes.**

**The proposed project consists of the installation of a vegetated cobble berm located approximately 200 feet parallel to the shoreline designed to function as a stabilization feature separating coastal processes from the existing septic facilities. The proposed stabilization approach is designed as a non-structural shoreline stabilization method intended to function with natural shoreline processes rather than introduce structural shoreline protection.**

**Structural shoreline protection devices such as seawalls, revetments, or bulkheads are generally discouraged or restricted under coastal planning policies because they can interfere with natural sand transport and accelerate erosion along adjacent shorelines. The proposed vegetated cobble berm relies on natural materials and vegetation to stabilize the area and is intended to reduce erosion impacts while maintaining natural shoreline dynamics.**

**The submitted engineering geologic report addresses the required elements of Sections 4.11.150 and 4.11.155, including identification of site-specific hazards, evaluation of erosion processes affecting the site, and recommendations for stabilization measures appropriate for the site conditions. The report was prepared consistent with accepted geologic practices and provides the necessary evaluation of coastal hazards affecting the property.**

**Based on the submitted geologic assessment and supporting materials, staff finds that the application includes the required engineering geologic report prepared by a qualified licensed professional and that the report adequately evaluates the coastal erosion hazards affecting the site. The proposal is designed to minimize risks associated with coastal erosion and to implement stabilization measures consistent with the recommendations provided in the geologic report.**

**Therefore, the proposal is found to be consistent with the applicable requirements of Sections 4.11.150 and 4.11.155 of the Coos County Zoning and Land Development Ordinance.**

***OVERLAY ZONE:***

***SECTION 4.11.200 PURPOSE:***

*Overlay zones may be super-imposed over the primary zoning district and will either add further*

*requirements or replace certain requirements of the underlying zoning district. The requirements of an overlay zone are fully described in the text of the overlay zone designations. An overlay zone is applicable to all Balance of County Zoning Districts and any zoning districts located within the Coos Bay Estuary Management Plans when the Estuary Policies directly reference this section.*

## ***OVERLAY ZONE: FLOODPLAIN***

## ***DESIGNATION: /FP***

### *SECTION 4.11.211 AUTHORIZATION*

*The State of Oregon has been delegated the responsibility through local government units to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, Coos County does ordain as follows:*

### *SECTION 4.11.212 FINDINGS OF FACT*

1. *The flood hazard areas of Coos County are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.*
2. *These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately flood proofed, elevated, or otherwise protected from flood damage also contribute to the flood loss.*

### *SECTION 4.11.213 STATEMENT OF PURPOSE*

*It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:*

1. *To protect human life and health;*
2. *To minimize expenditure of public money and costly flood control projects;*
3. *To minimize the need for rescue and relief effects associated with flooding and generally undertaken at the expense of the general public;*
4. *To minimize prolonged business interruptions;*
5. *To minimize damage to public facilities and utilities, such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in areas of special flood hazard;*
6. *To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;*

7. *To ensure that potential buyers are notified that property is in an area of special flood hazard; and*

8. *To ensure that those who occupy areas of special flood hazard assume responsibility for their actions.*

## *SECTION 4.11.214 METHODS OF REDUCING FLOOD LOSSES*

*In order to accomplish its purposes, this ordinance includes methods and provisions for:*

1. *Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;*
2. *Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;*
3. *Controlling the alteration of natural flood plans, stream channels, and natural protective barriers, which help accommodate or channel flood waters;*
4. *Controlling filling, grading, dredging, and other development which may increase flood damage;*
5. *Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or may increase flood hazards in other areas; and*
6. *Coordinating and supplementing the provisions of the state building code with local land use and development ordinances.*

## *SECTION 4.11.220 DEFINITIONS*

*Unless specifically defined below, words or phrases used in this Overlay Zone shall be interpreted so as to give them the meaning they have in common usage and to give this Ordinance the most reasonable application.*

1. *"APPEAL" means a request for a review of the interpretation of any provision of this Overlay Zone or a request for a variance.*
2. *"AREA OF SHALLOW FLOODING" means a designated AO, AH, AR/AO, AR/AH, or VO zone on a community's Flood Insurance Rate Map (FIRM) with a 1 percent or greater annual chance of flooding to an average depth of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.*
3. *"AREA OF SPECIAL FLOOD HAZARD" is the land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year. The area may be designated as Zone A on the FHBM. After detailed ratemaking has been completed in preparation for publication of the flood insurance rate map, Zone A usually is refined into Zones A, AO, AH, A1–30, AE, A99, AR, AR/A1–30, AR/AE, AR/AO, AR/AH, AR/ A, VO, or V1–30, VE, or V. For purposes of these regulations, the term "special flood hazard area" is synonymous in meaning with the phrase "area of special flood hazard".*

4. *"BASE FLOOD" means the flood having a one percent chance of being equalled or exceeded in any given year.*
5. *"BASEMENT" means any area of the building having its floor subgrade (below ground level) on all sides.*
6. *"BELOW GRADE CRAWL SPACE" means an enclosed area below the base flood elevation in which the interior grade is not more than two feet below the lowest adjacent exterior grade and the height, measured from the interior grade of the crawlspace to the top of the crawlspace foundation, does not exceed 4 feet at any point.*
7. *"BREAKAWAY WALL" means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.*
8. *"COASTAL HIGH HAZARD AREA" means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.*
9. *"CRITICAL FACILITY" means a facility in which a slight chance of flooding might be too great. Critical facilities include, but are not limited to, schools; nursing homes; hospitals; police, fire, and emergency response installations; and installations which produce, use, or store hazardous materials or hazardous waste.*
10. *"DEVELOPMENT" means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures; mining; dredging; filling; grading; paving; excavation or drilling operations; or storage of equipment or materials located within the area of special flood hazard.*
11. *"ELEVATED BUILDING" means, for insurance purposes, a nonbasement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.*
12. *"FLOOD" or "FLOODING" means:*
    a. *A general and temporary condition of partial or complete inundation of normally dry land areas from:*
        i. *The overflow of inland or tidal waters.*
        ii. *The unusual and rapid accumulation or runoff of surface waters from any source.*
        iii. *Mudslides (i.e., mudflows) which are proximately caused by flooding as defined in paragraph (a)(ii) of this definition and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.*
    b. *The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (a)(i) of this definition.*

13. *"FLOODPLAIN ADMINISTRATOR" means the Planning Staff member designated to administer the floodplain program.*
14. *"FLOOD ELEVATION STUDY" means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.*
15. *"FLOOD INSURANCE RATE MAP (FIRM)" means an official map of a community, on which the Federal Insurance Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community. A FIRM that has been made available digitally is called a Digital Flood Insurance Rate Map (DFIRM).*
16. *"FLOOD INSURANCE STUDY" see flood elevation study.*
17. *"FLOODWAY" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.*
18. *"LOWEST FLOOR" means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking or vehicles, building access, or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this Overlay Zone, found at Section 4.11.252(1)(b).*
19. *"HEARINGS BODY" means the body that will hear the appeal. This could be the Planning Commission or the Board of Commissioners.*
20. *"MANUFACTURED DWELLING" means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured dwelling" does not include a "recreational vehicle."*
21. *"MANUFACTURED HOME PARK OR SUBDIVISION" means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.*
22. *"NEW CONSTRUCTION" means structures for which the start of construction commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.*
23. *"RECREATIONAL VEHICLE" means a vehicle which is:*
    a. *Built on a single chassis;*
    b. *400 square feet or less when measured at the largest horizontal projection;*
    c. *Designed to be self-propelled or permanently towable by a light duty truck; and*
    d. *Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.*
24. *"SUBSTANTIAL DAMAGE" means damage of any origin sustained by a structure whereby the cost of restoring the structure to the state it was in before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.*
25. *"SUBSTANTIAL IMPROVEMENT" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This*

*term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:*

a. *Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or*
b. *Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".*

26. *"VARIANCE" means a grant of relief from the requirements of this Ordinance which permits construction in a manner that would otherwise be prohibited by this Ordinance.*
27. *"WATER DEPENDENT" means a structure for commerce or industry which cannot exist in any other location and is dependent on the water by reason of the intrinsic nature of its operations.*

## *SECTION 4.11.231 LANDS TO WHICH THIS OVERLAY ZONE APPLIES*

*This Ordinance shall apply to all areas of special flood hazards within the jurisdiction of Coos County that have been identified on the Flood Insurance Maps dated December 7, 2018 as described in Section 4.11.232.*

## *SECTION 4.11.232 BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD*

*The areas of special flood hazard identified by the Federal Insurance & Mitigation Administration in a scientific and engineering report entitled "The Flood Insurance Study for Coos County, Oregon and Incorporated Areas" revised December 7, 2018, with accompanying Flood Insurance Maps are hereby adopted by reference and declared to be a part of this Ordinance. The Flood Insurance Study is on file at location. The best available information for flood hazard area identification as outlined in Section 4.11.243.2 shall be the basis for regulation until a new FIRM is issued which incorporates the data utilized under Section 4.11.243.2.*

## *SECTION 4.11.233 INTERPRETATION*

*In the interpretation and application of this ordinance, all provisions shall be:*

1. *Considered as minimum requirements; and*
2. *Deemed neither to limit or repeal any other powers granted under State statutes.*

## *SECTION 4.11.234 WARNING AND DISCLAIMER OF LIABILITY*

*The degree of flood protection required by this Ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This Ordinance shall not create liability on the part of Coos County, any officer or employee thereof, or the*

*Federal Insurance & Mitigation Administration, for any flood damages that result from reliance on this Ordinance or any administrative decision lawfully made hereunder.*

## *SECTION 4.11.235 ESTABLISHMENT OF DEVELOPMENT PERMIT*

1. *Floodplain Application Required*
   *A floodplain application shall be submitted and approved before construction or regulated development begins within any area of special flood hazard established in Section 4.11.232. The permit shall be for all structures including manufactured homes, as set forth in the "DEFINITIONS," and for all development including fill and other activities, also as set forth in the "DEFINITIONS."*
2. *Application*
   *An application shall be made on the forms furnished by the Planning Department and may include, but not be limited to, plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing. Specifically, the following information is required:*
   a. *Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures which may be submitted by a registered surveyor;*
   b. *Elevation in relation to mean sea level of floodproofing in any structure;*
   c. *Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in Section 4.11.252; and*
   d. *Description of the extent to which a watercourse will be altered or relocated as a result of proposed development.*
   e. *Plot plan drawn to scale showing the nature, location and dimensions and elevation referenced to mean sea level, or NAVD 88, whichever is applicable, of the area in question including existing and proposed structures, fill, storage of materials, and drainage facilities. Applicants shall submit certification by an Oregon registered professional engineer or land surveyor of the site's ground elevation and whether or not the development is located in a flood hazard area. If so, the certification shall include which flood hazard area applies, the location of the floodway at the site, and the 100 year flood elevation at the site. A reference mark shall be set at the elevation of the 100 year flood at the site. The location, description, and elevation of the reference mark shall be included in the certification; and*
   f. *Any other information required to show compliance.*
   g. *Applications for variance, water course changes or staff determinations will be noticed with an opportunity to appeal in the same manner as a conditional use (see Chapter V). Non-discretionary determination of compliance with the standards will be processed in the same manner as a Compliance Determination (see Article 5.10)*

## *SECTION 4.11.242 DESIGNATION OF THE LOCAL ADMINISTRATOR*

*The Coos County Planning Director or designated staff is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions. The Floodplain Administer may delegate authority to implement these provisions.*

## *SECTION 4.11.243 DUTIES AND RESPONSIBILITIES OF THE FLOODPLAIN ADMINISTRATOR*

*Duties of the local floodplain administrator shall include, but not be limited to:*

1. *Application Review*
    a. *Reviews all applications to determine that the floodplain requirements of this Ordinance have been satisfied.*

    b. *Review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334*

    c. *Review all requested development to determine if it is located in the floodway. If located in the floodway, assure that the encroachment provisions of Section 4.11.254 are met.*

2. *Use of Other Base Flood Data (In A and V Zones)*
   *When base flood elevation data has not been provided (A and V Zones) in accordance with Section 4.11.232, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the local administrator shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer Sections 4.11.252, SPECIFIC STANDARDS, and 4.11.254 FLOODWAYS.*

3. *Information to be Obtained and Maintained*
    a. *Where base flood elevation data is provided through the Flood Insurance Study, FIRM, or required as in Section 4.11.243(2), obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basements and below-grade crawlspaces) of all new or substantially improved structures, and whether or not the structure contains a basement.*
    b. *For all new or substantially improved floodproofed structures where base flood elevation data is provided through the Flood Insurance Study, FIRM, or as required in Section 4.11.243(2):*
        i. *Verify and record the actual elevation (in relation to mean seal level); and*
        ii. *Maintain the floodproofing certifications required in Section 4.11.235(2)(c).*

c. *Maintain for public inspection all records pertaining to the provisions of this ordinance.*

4. *Alteration of Watercourses*
   a. *Notify adjacent communities, the Department of Land Conservation and Development and other appropriate state and federal agencies, prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance & Mitigation Administration.*
   b. *Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.*

5. *Requirement to Submit New Technical Data*
   a. *Base Flood Elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, the Floodplain Administrator shall notify the Federal Insurance Administrator of the changes by submitting technical or scientific data in accordance with Volume 44 Code Federal Regulations Section 65.3. Such a submission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and floodplain management requirements will be based upon current data.*
   b. *The property owner shall be responsible for preparing the technical and scientific data required by FEMA under paragraph (5)(a) of this section, and for paying any processing or application fees associated with FEMA's review of the submitted data.*
   c. *The Floodplain Administrator shall be under no obligation to sign the Community Acknowledgement Form, which is part of the CLOMR/LOMR application, until the applicant demonstrates that the project will or has met the requirements of this code and all applicable State and Federal laws.*

6. *Interpretation of FIRM Boundaries*
   *The Floodplain Administrator shall make interpretations where needed, as to exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Section 4.11.244.*

## *SECTION 4.11.244 VARIANCE PROCEDURE*

*The variance procedures discussed in this section only apply to variance of floodplain standards and do not extend to other variance requests.*

1. *Appeal Board*
   a. *In the case of an appeal the process under Section 5.8 shall apply.*

b. *The hearings body reviewing the appeal shall consider if there is an error in any requirement, decision, or determination made by the county in the enforcement or administration of this ordinance.*
c. *In passing upon such applications, the hearings body shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:*
    i. *The danger that materials may be swept onto other lands to the injury of others;*
    ii. *The danger to life and property due to flooding or erosion damage;*
    iii. *The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;*
    iv. *The importance of the services provided by the proposed facility to the community;*
    v. *The necessity to the facility of a waterfront location, where applicable;*
    vi. *The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;*
    vii. *The compatibility of the proposed use with existing and anticipated development;*
    viii. *The relationship of the proposed use to the comprehensive plan and flood plain management program for that area;*
    ix. *The safety of access to the property in times of flood for ordinary and emergency vehicles;*
    x. *The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and*
    xi. *The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.*
d. *Upon consideration of the factors of Section 4.11.244(1)(c) and the purposes of this ordinance, the Planning Commission or Board of Commissioners may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.*
e. *The local floodplain administrator shall maintain the records of all appeal actions and report any variances to the Federal Insurance & Mitigation Administration upon request.*

2. *<u>Conditions for Variances</u>*
*This variance language only applies to variance for floodplain standards and does not extend to other type of variance requests.*
    a. *Generally, the only condition under which a variance from the elevation standard may be issued is for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (i-xi) in*

*Section 4.11.244(1)(c) have been fully considered. As the lot size increases the technical justification required for issuing the variance increases.*

b. *Variances may be issued for the reconstruction, rehabilitation, or restoration of structures listed on the National Register of Historic Places or the Statewide Inventory of Historic Properties, without regard to the procedures set forth in this section.*
c. *Variances shall not be issued within a designated floodway if any increase in flood levels during the base flood discharge would result.*
d. *Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.*
e. *Variances shall only be issued upon:*
    i. *A showing of good and sufficient cause;*
    ii. *A determination that failure to grant the variance would result in exceptional hardship to the applicant; and*
    iii. *A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in Section 4.11.244(1)(c), or conflict with existing local laws or ordinances.*
f. *Variances, as interpreted in the National Flood Insurance Program, are based on the general zoning law principle that they pertain to a physical piece or property; they are not personal in nature and do not pertain to the structure, its inhabitants, economic or financial circumstances. They primarily address small lots in densely populated residential neighborhoods. As such, variances from the flood elevations should be quite rare.*
g. *Variances may be issued for nonresidential buildings in very limited circumstances to allow a lesser degree of floodproofing than watertight or dry-floodproofing, where it can be determined that such action will have low damage potential, complies with all other variance criteria except Section 4.11.244(2)(a), and otherwise complies with Sections 4.11.251(1-3) of the GENERAL STANDARDS.*
h. *Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.*

## *SECTION 4.11.251 GENERAL STANDARDS*

*In all areas of special flood hazards, the following standards are required:*

1. *Anchoring*
    a. *All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure; and*
    b. *All manufactured homes must likewise be anchored to prevent flotation, collapse, or lateral movement, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to,*

*use of over-the-top or frame ties to ground anchors (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques).*

2. *Construction Materials and Methods*
   a. *All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage;*
   b. *All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage; and*
   c. *Electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.*

3. *Utilities*
   a. *All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;*
   b. *New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and*
   c. *On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding consistent with the Oregon Department of Environmental Quality.*

4. *Land Divisions Proposals*
   a. *All land division proposals shall be consistent with the need to minimize flood damage;*
   b. *All land division proposals that are proposing public utilities and facilities such as sewer, gas, electrical, and water systems shall be required to locate and construct them to minimize or eliminate flood damage;*
   c. *All land division proposals that consist of three or more lots shall have adequate drainage provided to reduce exposure to flood damage; and*
   d. *Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments which contain at least 50 lots or 5 acres (whichever is less).*

5. *Review of Applications*
   *Where elevation data is not available either through the Flood Insurance Study, FIRM, or from another authoritative source [Section 4.11.243(2)], applications for structural development shall be reviewed to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. Failure to elevate at least two feet above grade in these zones may result in higher insurance rates.*

6. *AH Zone Drainage*
   *Adequate drainage paths are required around structures on slopes to guide floodwaters around and away from proposed structures.*

7. *Other Development. Includes mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of a special flood hazard, but does not include such uses as normal agricultural operations, fill less than 12 cubic yards, fences, road and driveway maintenance, landscaping, gardening and similar uses which are excluded from definition because it is the County's determination that such uses are not of the type and magnitude to affect potential water surface elevations or increase the level of insurable damages.*

   *Review and authorization of a floodplain application must be obtained from the Coos County Planning Department before "other development" may occur. Such authorization by the Planning Department shall not be issued unless it is established, based on a licensed engineer's certification that the "other development" shall not:*

   a. *Result in any increase in flood levels during the occurrence of the base flood discharge if the development will occur within a designated floodway; or,*
   b. *Result in a cumulative increase of more than one foot during the occurrence of the base flood discharge if the development will occur within a designated flood plain outside of a designated floodway.*

8. *COMMUNITY OFFICIAL BASE FLOOD ELEVATION DETERMINATION REQUEST AND PROCEDURES: The Coos County Planning Department shall sign a community official base flood elevation (BFE) confirmation received from a mortgage insurance company if:*
   a. *The development is located outside of the mapped flood hazard area;*
   b. *A Letter of Map Revision or Amendment has been approved by FEMA; or*
   c. *The property has an approved flood hazard determination application that shows the development was built to flood proofing standards or is located above the base flood elevation.*

   *If the development is located within the mapped flood hazard area and there is not a flood hazard determination on file with the Coos County Planning Department a confirmation letter will not be signed until a flood hazard application has been approved as complying with Sections 4.11.211 through 4.11.252.*

## *SECTION 4.11.252 SPECIFIC STANDARDS*

*In all areas of special flood hazards where base flood elevation data has been provided (Zones A1-30, AH, and AE) as set forth in Section 4.11.232, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or Section 4.11.243(2), Use of Other Base Flood Data (In A and V Zones), the following provisions are required:*

1. *Residential Construction*

a. *New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to a minimum of one foot above the base flood elevation; and*
b. *Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:*
    i. *A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided;*
    ii. *The bottom of all openings shall be no higher than one foot above grade; and*
    iii. *Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.*

2. *Nonresidential Construction*
*New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated at or above the base flood elevation; or, together with attendant utility and sanitary facilities, shall:*
    a. *Be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;*
    b. *Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;*
    c. *Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in Section 4.11.243(3)(b);*
    d. *Nonresidential structures that are elevated, not floodproofed, must meet the same standards for space below the lowest floor as described in 4.11.252(1)(b);*
    e. *Applicants floodproofing nonresidential buildings shall be notified that flood insurance premiums will be based on rates that are one foot below the floodproofed level (e.g. a building floodproofed to the base flood level will be rated as one foot below);*
    f. *Applicants shall supply a comprehensive Maintenance Plan for the entire structure to include but not limited to: exterior envelope of structure; all penetrations to the exterior of the structure; all shields, gates, barriers, or components designed to provide floodproofing protection to the structure; all seals or gaskets for shields, gates, barriers, or components; and, the location of all shields, gates, barriers, and components as well as all associated hardware, and any materials or specialized tools necessary to seal the structure; and*

g. *Applicants shall supply an Emergency Action Plan (EAP) for the installation and sealing of the structure prior to a flooding event that clearly identifies what triggers the EAP and who is responsible for enacting the EAP.*

3. *Manufactured Dwellings*
   a. *Manufactured dwellings supported on solid foundation walls shall be constructed with flood openings that comply with Section 4.11.252(1)(b) above;*
   b. *The bottom of the longitudinal chassis frame beam in A zones, shall be at or above BFE;*
   c. *The manufactured dwelling shall be anchored to prevent flotation, collapse, and lateral movement during the base flood. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques); and*
   d. *Electrical crossover connections shall be a minimum of 12 inches above BFE.*

4. *Recreational Vehicles*
   *Recreational vehicles placed on sites are required to:*
   a. *Be on the site for fewer than 180 consecutive days; and*
   b. *Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or*
   c. *Meet the requirements of Section 4.11.252(3) above and the elevation and anchoring requirements for manufactured homes.*

5. *Small Accessory Structures*
   *Relief from elevation or floodproofing as required in Section 4.11.252(1) or 4.11.252(2) above may be granted for small accessory structures that are:*
   a. *Less than 200 square feet and do not exceed one story;*
   b. *Not temperature controlled;*
   c. *Not used for human habitation and are used solely for parking of vehicles or storage of items having low damage potential when submerged;*
   d. *Not used to store toxic material, oil or gasoline, or any priority persistent pollutant identified by the Oregon Department of Environmental Quality shall unless confined in a tank, that is installed in compliance with this ordinance or stored at least one foot above Base Flood Elevation;*
   e. *Located and constructed to have low damage potential;*
   f. *Constructed with materials resistant to flood damage;*
   g. *Anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, during conditions of the base flood;*
   h. *Constructed to equalize hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwater. Designs for complying with this requirement must be certified by a licensed professional engineer or architect or:*

i. *provide a minimum of two openings with a total net area of not less than one square inch for every square foot of enclosed area subject to flooding;*
ii. *the bottom of all openings shall be no higher than one foot above the higher of the exterior or interior grade or floor immediately below the opening;*
iii. *openings may be equipped with screens, louvers, valves or other coverings or devices provided they permit the automatic flow of floodwater in both directions without manual intervention; and*

i. *Constructed with electrical and other service facilities located and installed so as to prevent water from entering or accumulating within the components during conditions of the base flood.*

6. *<u>Below-Grade Crawlspaces</u>*
*Below-grade crawlspaces are allowed subject to the following standards as found in FEMA Technical Bulletin 11-01, Crawlspace Construction for Buildings Located in Special Flood Hazard Areas:*
   a. *The building must be designed and adequately anchored to resist flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. Hydrostatic loads and the effects of buoyancy can usually be addressed through the required openings stated in Section B below. Because of hydrodynamic loads, crawlspace construction is not allowed in areas with flood velocities greater than five (5) feet per second unless the design is reviewed by a qualified design professional, such as a registered architect or professional engineer. Other types of foundations are recommended for these areas;*
   b. *The crawlspace is an enclosed area below the base flood elevation (BFE) and, as such, must have openings that equalize hydrostatic pressures by allowing the automatic entry and exit of floodwaters. The bottom of each flood vent opening can be no more than one (1) foot above the lowest adjacent exterior grade;*
   c. *Portions of the building below the BFE must be constructed with materials resistant to flood damage. This includes not only the foundation walls of the crawlspace used to elevate the building, but also any joists, insulation, or other materials that extend below the BFE. The recommended construction practice is to elevate the bottom of joists and all insulation above BFE;*
   d. *Any building utility systems within the crawlspace must be elevated above BFE or designed so that floodwaters cannot enter or accumulate within the system components during flood conditions. Ductwork, in particular, must either be placed above the BFE or sealed from floodwaters;*
   e. *The interior grade of a crawlspace below the BFE must not be more than two (2) feet below the lowest adjacent exterior grade;*
   f. *The height of the below-grade crawlspace, measured from the interior grade of the crawlspace to the top of the crawlspace foundation wall must not exceed four (4) feet at any point. The height limitation is the maximum allowable unsupported wall height according to the engineering analyses and building code requirements for flood hazard areas;*

g. *There must be an adequate drainage system that removes floodwaters from the interior area of the crawlspace. The enclosed area should be drained within a reasonable time after a flood event. The type of drainage system will vary because of the site gradient and other drainage characteristics, such as soil types. Possible options include natural drainage through porous, well-drained soils and drainage systems such as perforated pipes, drainage tiles or gravel or crushed stone drainage by gravity or mechanical means; and*
h. *The velocity of floodwaters at the site should not exceed five (5) feet per second for any crawlspace. For velocities in excess of five (5) feet per second, other foundation types should be used.*

*For more detailed information refer to FEMA Technical Bulletin 11-01.*

*In areas where a regulatory floodway has not been designated, no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.*

## *SECTION 4.11.254 FLOODWAY*

*Located within areas of special flood hazard established in Section 4.11.232 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles, and erosion potential, the following provisions apply:*

1. *Except as provided in paragraph (3), prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional civil engineer is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge;*
2. *If Section 4.11.254(1) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 4.11.251 et seq;*
3. *RESERVED*
4. *Temporary structures placed in the floodway: Relief from no-rise evaluation, elevation or dry flood-proofing standards may be granted for a non-residential structure placed during the dry season (June – October) and for a period of less than ninety (90) days. A plan for the removal of the temporary structure after the dry season or when a flood event threatens shall be provided. The plan shall include disconnecting and protecting from water infiltration and damage all utilities servicing the temporary structure; and*

5. *Temporary storage of goods and materials, not including hazardous materials, is allowed in the floodway for a period of less than ninety (90) days within the dry season (June – October).*

## *SECTION 4.11.255 STANDARDS FOR SHALLOW FLOODING AREAS (AO ZONES)*

*Shallow flooding areas appear on FIRMs as AO zones with depth designations. The base flood depths in these zones range from 1 to 3 feet above ground where a clearly defined channel does not exist, or where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is usually characterized as sheet flow. In these areas, the following provisions apply:*

1. *New construction and substantial improvements of residential structures and manufactured homes within AO zones shall have the lowest floor (including basement) elevated above the highest grade adjacent to the building, a minimum of one foot above the depth number specified on the FIRM (at least two feet if no depth number is specified);*
2. *New construction and substantial improvements of nonresidential structures within AO zones shall either:*
    a. *Have the lowest floor (including basement) elevated above the highest adjacent grade of the building site, one foot or more above the depth number specified on the FIRM (at least two feet if no depth number is specified); or*
    b. *Together with attendant utility and sanitary facilities, be completely Flood Proofed to or above that level, so that any space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. If this method is used, compliance shall be certified by a registered professional engineer or architect as in section 4.11.252(2)(c).*
3. *Require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures; and*
4. *Recreational vehicles placed on sites within AO Zones on the community's FIRM either:*
    a. *Be on the site for fewer than 180 consecutive days; and*
    b. *Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or*
    c. *Meet the requirements of Section 4.11.255 above and the elevation and anchoring requirements for manufactured homes.*

## *SECTION 4.11.256 COASTAL HIGH HAZARD AREAS*

*Located within areas of special flood hazard established in Section 4.11.232 are Coastal High Hazard Areas, designated as Zones V1-V30, VE, and/or V. These areas have special flood hazards associated with high velocity waters from surges and, therefore, in addition to meeting all provisions in this ordinance and state building code, the following provisions shall also apply:*

1. *All new construction and substantial improvements in Zones V1-V30 and VE (V if base flood elevation data is available) shall be elevated on pilings and columns so that:*

a. *The bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated a minimum of one foot above the base flood level; and*
b. *The pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Wind and water loading values shall each have a one percent chance of being equaled or exceeded in and given year (100-year mean recurrence interval);*

2. *A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of 1 (a) and (b) of this section;*
3. *Obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures in Zones V1-30, VE, and V, and whether or not such structures contain a basement. The local administrator shall maintain a record of all such information;*
4. *All new construction shall be located landward of the reach of mean high tide;*
5. *Provide that all new construction and substantial improvements have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purpose of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:*
    a. *Breakaway wall collapse shall result from water load less than that which would occur during the base flood; and*
    b. *The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and nonstructural). Maximum wind and water loading values to be used in this determination shall each have a one percent chance of being equaled or exceeded in any given year (100-year mean recurrence interval).*
6. *If breakaway walls are utilized, such enclosed space shall be useable solely for parking of vehicles, building access, or storage. Such space shall not be used for human habitation;*
7. *Prohibit man-made alteration of sand dunes which would increase potential flood damage;*
8. *The use of fill for structural support of buildings is prohibited.*
9. *All manufactured homes to be placed or substantially improved within Zones V1-V30, V, and VE on the community's FIRM on sites:*

a. *Outside of a manufactured home park or subdivision;*
b. *In a new manufactured home park or subdivision;*
c. *In an expansion to an existing manufactured home park or subdivision; or*
d. *In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood; meet the standards of paragraphs 5.6(1) through (8) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones V1-30, V, and VE on the FIRM meet the requirements of Section 5.2-3.*

10. *Recreational vehicles placed on sites within Zones V1-30, V, and VE on the community's FIRM either:*
    a. *Be on the site for fewer than 180 consecutive days, if permitted by the zoning district; and*
    b. *Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or*
    c. *Meet the requirements of Section 4.11.241(1) Permitting requirements and paragraphs (1) through (9) of this section.*

### *SECTION 4.11.257 CRITICAL FACILITY*

*Construction of new critical facilities shall be, to the extent practicable, located outside the limits of the Special Flood Hazard Area (SFHA) (100-year floodplain).*

*Construction of new critical facilities shall be permissible within the SFHA if no feasible alternative site is available, taking into account cost and practicability. Critical facilities constructed within the SFHA shall have the lowest floor elevated three feet above BFE or to the height of the 500-year flood, whichever is higher. Access to and from the critical facility should also be protected to the height utilized above. Floodproofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into floodwaters. Access routes elevated to or above the level of the base flood elevation shall be provided to all critical facilities to the extent possible.*

**FINDING: The subject property is located within the Floodplain Overlay (/FP) and is therefore subject to the provisions of Sections 4.11.200 through 4.11.257 of the Coos County Zoning and Land Development Ordinance. The purpose of the Floodplain Overlay is to promote the public health, safety, and general welfare by minimizing public and private losses due to flood conditions, protecting life and property, reducing damage to utilities and public facilities, and ensuring that development within areas of special flood hazard is designed and reviewed to minimize flood damage.**

**Pursuant to Sections 4.11.231 and 4.11.232, the Floodplain Overlay applies to all areas of special flood hazard identified on the Flood Insurance Study for Coos County, Oregon and Incorporated Areas and the accompanying Flood Insurance Rate Maps dated December 7,**

**2018, which are adopted by reference. The property is mapped within Flood Zone VE, which is a coastal high hazard area subject to wave action. The Base Flood Elevation (BFE) for the site is 1 foot NAVD88.**

**The proposed work consists of installation of a vegetated cobble berm intended to provide separation between existing sanitary system infrastructure and the adjacent shoreline while maintaining natural shoreline processes. The stabilization method utilizes natural materials and vegetation and functions as a non-structural shoreline stabilization feature rather than a hardened structural shoreline protection device.**

**The site lies within the Special Flood Hazard Area (SFHA) associated with the Pacific Ocean shoreline. Floodplain mitigation materials prepared by Cafferata Consulting evaluated floodplain functions of the site including floodplain storage, water quality, and vegetation. The analysis concludes that the project will result in no net loss of floodplain storage, water quality, or vegetation, as the work does not introduce new impervious surfaces within the Special Flood Hazard Area, does not remove trees within the floodplain, and does not convert undeveloped floodplain area to developed space.**

**The floodplain evaluation further determined that the proposed berm will not adversely affect floodplain storage capacity and will not alter the ability of the floodplain to convey floodwaters. The stabilization feature is designed to function within existing coastal processes and does not introduce structures that would obstruct or redirect flood flows.**

**An engineering evaluation prepared by Lucien Friedenfels, Professional Engineer, confirms that the property is located within VE Zone, corresponding to the 1-percent annual chance flood area, and that the Base Flood Elevation is 1 foot NAVD88. Based on the flood elevation impact analysis, the proposed work will not increase the water surface elevation of the base flood more than one foot at any point within the floodplain. This certification satisfies the requirements of Section 4.11.251(7) governing "other development" within the floodplain.**

**In addition to the local floodplain standards, development within the floodplain must also comply with the FEMA National Flood Insurance Program (NFIP) Biological Opinion requirements, including the Pre-Implementation Compliance Measures (PIC) established for Oregon communities participating in the NFIP. These PIC measures are intended to ensure that floodplain development does not result in a net loss of floodplain functions that support listed species and habitat protected under the Endangered Species Act.**

**The floodplain mitigation assessment prepared for the site evaluated the project under the FEMA NFIP Biological Opinion Pre-Implementation Compliance Measures and determined that the project results in no net loss of floodplain function in terms of floodplain storage, water quality, and vegetation. The project avoids disturbance of existing trees within the Special Flood Hazard Area, does not introduce additional impervious surfaces, and does not reduce floodplain storage capacity. As a result, the project is**

**consistent with FEMA's PIC compliance requirements for development within flood hazard areas.**

**The proposal does not involve new residential construction, new nonresidential buildings, manufactured dwellings, critical facilities, or a variance from floodplain standards regulated under Sections 4.11.244, 4.11.252, or 4.11.257. The activity consists solely of shoreline stabilization and associated grading/fill and is therefore reviewed under the floodplain permitting and "other development" standards applicable to the site.**

**Based on the floodplain analysis, the engineer's certification, and the FEMA NFIP Pre-Implementation Compliance (PIC) evaluation demonstrating no net loss of floodplain function, the proposal is found to be consistent with the applicable provisions of the Floodplain Overlay, Sections 4.11.200 through 4.11.257 of the Coos County Zoning and Land Development Ordinance, subject to issuance of the required floodplain development permit and compliance with all applicable state and federal permits prior to ground disturbance.**

## IV. DECISION

In conclusion Staff finds that the applicant has address most of the relevant criteria and the ones that have not been address or cannot be completed until after the approval is obtained have been made conditions of approval. Therefore, the proposed Large Tract Forestland Dwelling meets the requirements of the Coos County Zoning and Land Development Ordinance, with conditions listed in Exhibit "A" of this report.

## V. EXPIRATION:

This does decision does not expire but the Geotech Report are only valid for five years. If the criteria changes prior to implementation additional review may be required.