

IN THE BOARD OF COMMISSIONERS  
FOR CLATSOP COUNTY, OREGON

ORDINANCE NO. 03-08

(AN ORDINANCE AMENDING THE  
(CLATSOP COUNTY COMPREHENSIVE  
(PLAN AND THE LAND AND WATER AND  
(DEVELOPMENT USE ORDINANCE (80-14) AND  
(STANDARDS DOCUMENT FOR NATURAL  
(HAZARDS AND BEACHES AND DUNES A STATE  
(PERIODIC REVIEW WORK TASK NO. 2 BY THE  
(BOARD OF COMMISSIONERS AND ADOPTING  
(CERTAIN FINDINGS AND BACKGROUND  
(REPORTS AND RESCINDING INCONSISTENT  
(PROVISIONS

The Board of County Commissioners of Clatsop County, Oregon ordains as follows:

SECTION 1. SHORT TITLE.

This ordinance shall be known as the Natural Hazards and Beaches and Dunes Work Task No. Two (2) Periodic Review Amendments.

SECTION 2.

The Board of County Commissioners of Clatsop County, Oregon recognizes the need to revise and amend the Clatsop County Comprehensive Plan as amended and the Land and Water and Development and Use Ordinance (80-14) and Standards Document, in the interest of the health, safety and welfare of the citizens of Clatsop County and pursuant to State law, the Board of Commissioners hereby determines the necessity of approving the above request amending the said Clatsop County Comprehensive Plan policies, background reports and Land and Water and Development and Use Ordinance (80-14) and Standards document zoning regulations deleting certain overlay maps and adding a beach front averaging section to the Land and Water and Development Use Ordinance.

The Board of County Commissioners determines and takes notice that the adoption procedure for this ordinance complies with State Periodic Review requirements for Work Task No. two (2). The County Planning Commission has sought review and comment and has conducted the public hearing process pursuant to the requirements of ORS 215.050 and 215.060. The Planning Commission held a public hearing on June 24, 2003. The Board received and considered the Planning Commission's recommendations on this request and held a public hearing on this ordinance pursuant to law on July 23, 2003.

### SECTION 3. CONFORMITY WITH THE LAW.

This ordinance shall not substitute for nor eliminate the necessity for conformity with any and all laws or rules of the State of Oregon, or its agencies, or any ordinance, rule or regulation of Clatsop County.

### SECTION 4. INCONSISTENT PROVISIONS.

This ordinance shall supersede, control and repeal any inconsistent provision of the Clatsop County Land and Water Development and Use Ordinance, as amended, or any other ordinance or regulation made by Clatsop County.

### SECTION 5. SEPARABILITY.

If any section, subsection, sentence, clause, phrase or any other portion of this ordinance is for any reason held invalid or unconstitutional by a court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision and such holding shall not affect the validity of the remaining portions of this ordinance.



SECTION 6. EFFECTIVE DATE.


This ordinance shall be in full force and effective thirty (30) days from the date the Chair signs this Ordinance.

SECTION 7. ADOPTION CLAUSE.

The Board of Commissioners hereby approves the amendments, set forth in Exhibits "A through "F" attached hereto and by reference herein made a part of this ordinance in its entirety.

Approved this 13<sup>th</sup> day of August, 2003.

THE BOARD OF COUNTY COMMISSIONERS  
FOR CLATSOP COUNTY, OREGON

By   
Helen Westbrook, Chair

By   
Recording Secretary

Effective Date: September 12, 2003

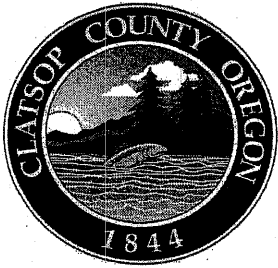
APPROVED AS TO FORM:

  
Clatsop County Counsel

**PROPOSED AMENDMENTS  
COMPREHENSIVE PLAN**

**NATURAL HAZARD POLICIES**

1. The County shall seek to minimize or avoid development in areas where flooding, geologic and other natural conditions can create circumstances that are hazardous to life and/or property. Natural hazards regulated under Statewide Planning Goal 7 shall include floods (coastal and riverine), landslides, earthquakes and related hazards, tsunamis, coastal erosion, and wildfires.
2. The County shall avoid development in hazard areas where the risk to people and property cannot be mitigated.
3. In adopting policies and implementing measures to protect people and property from natural hazards, the County will consider:
  - a. the benefits of maintaining natural hazard areas as open space, recreation and other low density uses;
  - b. the beneficial effects that natural hazards can have on natural resources and the environment; and
  - c. the effects of development and mitigation measures in identified hazard areas on the management of natural resources.
4. The County shall give special attention to emergency access when considering development in identified hazard areas.
5. Where development in potentially hazardous areas is permitted, the County shall require a site-specific hazard investigation, by appropriate licensed and registered professionals, to establish construction feasibility and make recommendations to mitigate conditions that are potentially hazardous. The investigation shall evaluate the risk to the site as well as the risk the proposed development may pose to other properties.
6. The County shall prohibit the siting of essential facilities, major structures, hazardous facilities, and special occupancy structures, as defined in the state building code (ORS 455.447(1)(a)(b)(c) and (e)), in identified hazard areas, where the risk to public safety cannot be mitigated, unless an essential facility is needed within a hazard area in order to provide essential emergency response services in a timely manner.
7. The County shall encourage cluster development where clustering will avoid, or minimize the development of potentially hazardous areas.
8. Development, particularly that occurring on moderately to steeply sloped land, shall be planned to minimize grading and the resultant loss of vegetative cover.
9. The County shall implement an erosion and sedimentation control program in order to minimize potential geologic hazards and maintain stream quality.
10. The siting of septic tanks and drainfields shall take into consideration any adverse geologic impacts their functioning might have.
11. The County will develop an educational program to inform the public of the risks associated with development in natural hazard areas of the county.
12. The County encourages the vacation or replatting of old unimproved subdivisions located in steeply sloped areas, or other areas with identified geologic hazards. The County will consider waiving applicable fees as an incentive.



## AGENDA

### CLATSOP COUNTY BOARD OF COMMISSIONERS

**Agenda Category:** Public Hearing

**Agenda Date:** July 23, 2003

**Agenda Title:** Ordinance 03-08 Periodic Review Work Task No. 2 Geological Hazards Floodplain Hazards and Beaches and Dunes Hazards

**To be presented by:** Rainmar Bartl, Contract Land Use Planner for CDD

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#### SUMMARY

This is Periodic Review Work Task No. 2, legislative amendments to meet compliance with Statewide Planning Goal 7 Natural Hazards and Goal 18 Beaches and Dunes. The proposed amendments and summary staff report are attached. Three separate staff reports and findings to support the amendments are also attached. The proposed Comprehensive Plan policies, LWDUO (80-14) and Standards Document amendments will modify and update the regulations that may affect future development in geohazard, floodplain and beaches and dunes areas as identified on existing overlay zones and zoning map. The Clatsop County Planning Commission by a unanimous vote, recommended approval of the request. The Board reviewed this item at the July 2, 2003 work session. The packet contained herein includes the following:

Summary Staff report

Ordinance

- Exhibit A Staff report to the Planning Commission on Geological Hazards, with findings
- Exhibit B Staff report to the Planning Commission on the Floodplain Hazards, with findings.
- Exhibit C Staff report to the Planning Commission on the Beaches and Dunes, with findings and adopt by reference the background report to include the DOGAMI report by Allan and Priest, 2001.
- Exhibit D Codified amendments proposed for adoption.
- Exhibit E Resolution and Order and the draft minutes of the Planning Commission meeting June 24, 2003 (signed minutes will be available after 7-22-03 and presented at the hearing).

Staff finds the information submitted into the record, sufficient to adopt the proposed legislative amendments to the Comprehensive Plan and LWDUO and Standards document in compliance with State Periodic Review Requirements.

#### DEPARTMENT'S REQUESTED ACTION:

Open hearing, take testimony, close hearing, approve the proposed amendments with findings, and conduct 1<sup>st</sup> reading by short title only, of Ordinance No. 03-08.

#### COUNTY ADMINISTRATOR'S RECOMMENDATION:

I concur with the department's recommendation.

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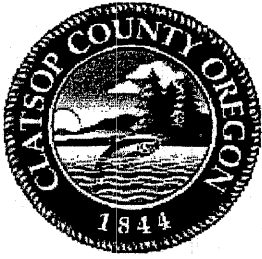
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**STAFF REPORT**  
**SUPPLEMENTAL REPORT - NATURAL HAZARDS**

**TO:** Board of County Commissioners

**STAFF:** Rainmar Bartl, Contract Land Use Planner

**HEARING DATE:** July 23, 2003 *W. Smith*

**REPORT AVAILABLE:** July 10, 2003

**REQUEST:** Legislative Comprehensive Plan text amendments to the Background Report and Goals and Policies regarding Beaches and Dunes, Geologic Hazards and Flood Hazards. Land and Water Development and Use Ordinance (80-14) text amendments regarding the Active Dune Overlay District, the Beaches and Dunes Overlay District, the Standards Document, Beach and Dune Area Requirements, the Flood Hazard Overlay District, Geologic Hazard Overlay Zone and related amendments, including a new section, Oceanfront Averaging.

**APPLICANT:** Clatsop County

**LOCATION:** Countywide

**AUTHORIZATION:** The proposed amendments are being processed as a periodic review amendment.

**APPLICABLE CRITERIA**  
State-wide Planning Goals, Goal #7 Natural Hazards  
State-wide Planning Goals, Goal #18 Beaches and Dunes,  
Clatsop County Comprehensive Plan, Goals and Policies.

**RECOMMENDATION:** The Planning Commission has recommended that the Board adopt the proposed natural hazard amendments.

## **BACKGROUND INFORMATION**

Three staff reports were prepared for the planning commission, one for the proposed beaches and dunes amendments, a second for the proposed flood hazard amendments and a third for the proposed geologic hazard amendments. The findings in these staff reports are still appropriate to the Board's consideration of the proposed amendments.

The planning commission held a public hearing on the proposed amendments on June 24<sup>th</sup>, 2003. Four persons testified at the hearing. In addition, the planning commission received two pieces of correspondence. Between twenty and thirty telephone calls were answered regarding the proposed natural hazards amendments (all county property owners were notified by first class mail).

The attached documentation includes the Planning Commission R&O and the minutes from the Planning Commission public hearing, in draft form. At the next scheduled hearing on July 22, 2003 the Planning Commission will review and adopt the minutes. The approved minutes will be faxed to the Board and presented by staff at the July 23, 2003 Public Hearing.



**Exhibit A**  
**Staff Report to the Planning Commission**  
**Geological Hazards**



## STAFF REPORT

**TO:** Planning Commission

**STAFF:** Rainmar Bartl, Contract Land Use Planner

**HEARING DATE:** June 24, 2003 *W.A. Smith received 6/17/03*

**REPORT AVAILABLE:** June 17, 2003

**REQUEST:** Legislative Comprehensive Plan text amendments to the Background Report and Goals and Policies regarding Natural Hazards. Clatsop County Land and Water Development and Use Ordinance (80-14) text amendments regarding the Geologic Hazard Overlay Zone and related amendments, including a new section, Oceanfront Averaging

**APPLICANT:** Clatsop County

**LOCATION:** Countywide

**AUTHORIZATION:** The proposed amendments are being processed as a periodic review amendment, as part of Work Task No.2.

**APPLICABLE CRITERIA** State-wide Planning Goals, Goal #7 Natural Hazards  
Clatsop County Comprehensive Plan, Goals and Policies.

**RECOMMENDATION:** Staff recommends that the Planning Commission, upon review of the materials and testimony, provide a recommendation, including any proposed modifications, to the Board of Commissioners.



## **BACKGROUND INFORMATION**

The proposed amendments consist of three elements. First, amendments to the natural hazards section of the comprehensive plan background report. Second, amendments to the comprehensive plan goals and policies, County-Wide Element Goal #7 – Natural Hazards and policies in the Southwest Coastal Community Plan, Clatsop Plains Community Plan, and Elsie Jewell Community Plan. Third, amendments to the Land and Water Development and Use Code and the Clatsop County Standards Document concerning the Geologic Hazard Overlay Zone, new standards for oceanfront averaging and standards for the preparation of geotechnical reports.

The proposed amendments to the natural hazards section of the comprehensive plan background report provides updated background information on hazards associated with earthquakes, landsliding, high ground water and compressible soils, streambank erosion and deposition, wave overtopping and undercutting, inlet migration, and sand inundation.

The comprehensive plan natural hazards policies have been revised to accurately reflect updated background information, amendments to State-wide Planning Goal #7, Areas Subject to Natural Hazards, the proposed revisions of the development code, and the policy direction the county has pursued since the policies were first adopted. The changes also include a number of housekeeping amendments.

The proposed amendments to the Geologic Hazard Overlay District include the following:

- Areas where site specific geologic hazard reports are required are identified as area of landslides and landslide topography, oceanfront lots and identified beach and dune hazard areas, and areas with compressible soils. Generally, there is no change in the areas that require a site-specific geologic site investigation.
- A new section which permits the Planning Director to grant a waiver for a geologic site investigation where a report by a geologist provides information that the site does not contain the identified potentially hazardous geologic condition.
- Changes the procedure for reviewing a geologic hazard report from a Type II procedure to a Type I procedure.
- Establishment of new standards for the preparation of geologic hazard reports.
- Establishment of standards for grading in geologic hazard area – covers cuts, fills and impact on drainage.

The proposed amendments to the Development Code also include a new section for establishing the oceanfront setback for properties that abut the ocean shore.

1   **Citizen Involvement**  
2

3   All Clatsop County property owners were notified by first class mail of the proposed  
4   amendments regarding flood hazards.  
5

6   **Proposed Comprehensive Plan Text Amendments**  
7

8   The Comprehensive Plan Background Report will be amended to include the proposed  
9   revisions to the natural hazards section.  
10

11   The proposed Comprehensive Plan Goals and Policies, County-Wide Element Goal #7 –  
12   Natural Hazards will replace the existing policies in this section.  
13

14   **Proposed Zoning Ordinance Amendments**  
15

16   The proposed amendments to the Geologic Hazard Overlay District are intended update  
17   the county's standards regarding where and how geologic site investigations are to be  
18   prepared and reviewed. Standards for cut, fill and drainage are incorporated into the  
19   requirements of the geologic hazard overlay district. The amendments also combine the  
20   standards presently found in the Development Code and the Standards Document.  
21

22   **CRITERIA AND FINDINGS**  
23

24   This is a periodic review amendment.  
25

26   Criteria that must be met or shall be met in adoption of the proposed amendments shall  
27   demonstrate conformance with:  
28

- 29       1       Applicable Statewide Planning Goals  
30       2       The Clatsop County Comprehensive Plan  
31

32   **Applicable State-wide Planning Goals**  
33

34   Staff has reviewed the proposed amendments and applies the following findings and  
35   conclusions to these amendments.  
36

37   There are 19 Statewide Planning goals. Staff has reviewed the proposed amendments and  
38   finds that the following goals are applicable to this request.  
39

40   **GOAL 1: CITIZEN INVOLVEMENT**  
41

42   *To develop a citizen involvement program that insures the opportunity for citizens to be*  
43   *involved in all phases of the planning process.*  
44  
45

1 **Finding:**

2  
3 The County has provided a "Measure 56 notice" to all county property owners.  
4

5 **GOAL 7: AREAS SUBJECT TO NATURAL HAZARDS**

6  
7 *Section A Natural Hazards Planning provides that 1. Local governments shall adopt*  
8 *comprehensive plans (inventories, policies and implementing measure) to reduce risk to*  
9 *people and property from natural hazards. 2. Natural hazards for purposes of this goal*  
10 *are floods (coastal and riverine), landslides, earthquakes and related hazards, tsunamis,*  
11 *coastal erosion, and wildfires. Local governments may identify and plan for other*  
12 *natural hazards.*  
13

14 **Finding:**

15  
16 The proposed amendments include updated inventory information on natural hazards, i.e.  
17 earthquakes and tsunamis, landsliding, high ground water and compressible soils,  
18 streambank erosion and deposition, wave overtopping and undercutting, inlet migration,  
19 and sand inundation. Flood hazards are addressed in the flood hazard section, which is  
20 being adopted concurrently with this proposed amendment. Wildfire hazards are not  
21 being addressed by the proposed amendments. These may be considered at a later date.  
22 The proposed amendments include policy statements which address the types of natural  
23 hazards identified by the natural hazards inventory. The proposed amendments to the  
24 Development Code establish standards and procedures for development in identified  
25 potential hazard areas that will ensure that the development is conducted in a manner that  
26 will protect people and property from the identified natural hazard.  
27

28 *Section B Response to New Hazard Information 1. New hazard inventory information*  
29 *provided by federal and state agencies shall be reviewed by the Department in*  
30 *consultation with affected state and local government representatives. 2. After such*  
31 *consultation, the Department shall notify local governments if new hazard information*  
32 *requires a local response. 3. Local governments shall respond to new inventory*  
33 *information on natural hazards within 36 months after being notified by the Department*  
34 *of land Conservation and Development, unless extended by the Department.*  
35

36 **Finding:**

37  
38 Proposed Natural Hazard Policy 19 addresses this goal requirement.  
39

40 *Implementation Requirement 3.b prohibiting the siting of essential facilities and special*  
41 *occupancy structures, as defined in the state building code (ORS 455.447(1)(a)(b)(c) and*  
42 *(e), in identified hazard areas, where risk to public safety cannot be mitigated, unless an*  
43 *essential facility is needed within a hazard area in order to provide essential emergency*  
44 *response services in a timely manner.*  
45

1 **Finding:**

2  
3 Proposed Natural Hazard Policy 6 addresses this goal requirement.

4  
5 **The Clatsop County Comprehensive Plan**

6  
7 The Clatsop County Comprehensive Plan, Goals and Policies Element contains a Goal 7  
8 Natural Hazards section. The Clatsop County Comprehensive Plan, Goals and Policies  
9 Element contains the Southwest Coastal Community Plan Policies, Clatsop Plains  
10 Community Plan Policies, and Elsie Jewell Community Plan Policies.

11  
12 Staff has reviewed the proposed amendment and applies the following findings and  
13 conclusions to these amendments.

14  
15 **Findings:**

16  
17 The comprehensive plan policies related to natural hazards have been revised to  
18 accurately reflect updated background information, amendments to the State-wide  
19 Planning Goals, the revisions to the Development Code, and the policy direction the  
20 county has pursued since the policies were first adopted. Thus, the proposed policies are  
21 the functional equivalent of the existing policies and as such are consistent with them.

22  
23 **Conclusion:**

24  
25 The proposed amendments are consistent with the comprehensive plan.

26  
27 **SUMMARY FINDINGS:** Staff finds that the criteria are met for the proposed  
28 amendment.

- 29  
30 • This amendment complies with statewide planning goals.  
31  
32 • The proposed amendments are in compliance with the County Comprehensive  
33 Plan.  
34  
35 • The proposed amendments do not conflict with the LWDUO and Standards  
36 Document as amended.  
37

38 **Process Findings:**

39  
40 A public hearing has been scheduled before the Planning Commission on June 24,  
41 2003 for the proposed amendments. Appropriate notice has been given to the  
42 Department of Land Conservation and Development (DLCD), to the public in the  
43 form of a newspaper notice, an individual Ballot Measure 56 notices were mailed to  
44 all property owners outside of urban growth boundaries on May 20, 2003. Two  
45 public places were posted with a notice. Applicable procedural requirements have

1 been met for this proposed text amendment application.

2  
3 **EXHIBITS**

4  
5 Exhibit A Proposed Comprehensive Plan Background Report  
6 Amendments

7 Exhibit B Existing Comprehensive Plan Background Report -  
8 Annotated

9 Exhibit C Proposed Amendments to Comprehensive Plan Policies

10 Exhibit D Proposed Amendments to Comprehensive Plan Policies -  
11 Annotated

12 Exhibit E Proposed Amendments to Land and Water Use and  
13 Development Code and Standards Document

14 Exhibit F Proposed Amendments to Land and Water Use and  
15 Development Code and Standards Document - Annotated  
16



**Exhibit A**  
**Proposed Comprehensive Plan**  
**Background Report Amendments**

**Amend the Comprehensive Plan, Natural Hazards Background Report to read as follows:**

**BACKGROUND REPORT**  
**NATURAL HAZARDS:**

Clatsop County is subject to a variety of natural hazards. Catastrophic hazards are regional in scale and scope. Cascadia Subduction Zone earthquakes, and the ground shaking, subsidence, landsliding, liquefaction, and tsunami that accompany them, fall into the catastrophic hazard category. Chronic hazards are those, which are local in scale and scope. Chronic hazards include landsliding and sloughing; high groundwater and compressible soils; streambank erosion and deposition; riverine flooding; and wildfire. Wave overtopping and undercutting; inlet migration; and sand inundation are chronic hazards unique to the coast. A variety of human activities, such as the construction of jetties and seawalls or site excavation, may enhance chronic hazard potential. Being local in nature, the threats to human life and property that arise from chronic hazards are generally less severe than those associated with catastrophic hazards. However, their wide distribution and frequent occurrence makes chronic hazards a more immediate concern.

**CATASTROPHIC HAZARDS**

Oregon is in a geologic setting where a continental plate, the North American Plate, and an oceanic plate, the Juan de Fuca Plate, are converging. The North American Plate is moving westward and the Juan de Fuca Plate is moving toward the northeast and below the North American Plate along a fault termed the Cascadia Subduction Zone. The Cascadia Subduction Zone is approximately 700 miles long and parallels the Oregon, Washington and Northern California coasts.

Earthquakes in Oregon are associated with the movement of these plates. Crustal earthquakes occur along relatively short and shallow faults within the North American Plate. Intraplate earthquakes occur along faults located deep within the descending Juan de Fuca Plate. These types of earthquake can occur anywhere off the Oregon coast, beneath the Coast Range, or in the Willamette Valley. Typically they have not exceeded magnitude 6. However they are capable of being in excess of magnitude 7.

Subduction zone earthquakes occur along the boundary between the two plates, as the strain that has accumulated within the subduction zone is suddenly and dramatically released. There has been no subduction zone earthquakes recorded since the European settlement of the Northwest. However, a body of scientific evidence collected since the late 1980's have confirmed their existence. Based on an analysis of over 400 years of detailed records of damage-causing tsunamis that have been kept by the Japanese, Satake et al. (1996) have concluded that the last Cascadia Subduction Zone earthquake was a Magnitude 9 event that occurred at about 9:00 P.M. on January 26, 1700. This is consistent with Native American legends that say the earthquake occurred on a winter night (Komar, 1997). Scientists estimate that as

many as thirteen major earthquake events have occurred on the northern portion of the Oregon coast during the past 7,700 years. The intervals between earthquakes range from 300 to 1,000 years, with the average return interval for such an event being on the order of every  $400 \pm 200$  years. Summarizing the work of a number of investigators, DOGAMI (1995) suggest that Oregon could experience a Magnitude 8-9 subduction zone earthquake in the near future. Specifically, they report that there is a 10-20% chance that such a great earthquake event could occur in the next 50 years.

More detailed information on potential seismic risk can be found in DOGAMI 1996's GMS-100 Earthquake Hazard Maps for Oregon and DOGAMI's 1999 IMS-10 Relative Earthquake maps of Selected Urban Areas in Western Oregon, the latter of which includes a map for the Astoria-Warrenton area of Clatsop County.

Considering the potential magnitude, a subduction zone earthquake would significantly affect Clatsop County. The extent of damage from such an event will depend not only upon its magnitude, but also where along the subduction zone the earthquake occurs and whether the entire fault ruptures, or it ruptures in segments. Damage would include that resulting from ground shaking, as well as that from earthquake-induced liquefaction, landsliding, subsidence, and tsunamis. Madin (1992) has outlined a generalized subduction zone earthquake scenario. At the onset, severe ground shaking occurs for several minutes. During this time, amplification and liquefaction effects occur in areas of unconsolidated, saturated sediment. Massive ancient landslides are reactivated. Rapid, coast-wide subsidence on the order of 2 to 6 feet also occurs in association with the release of accumulated strain during the earthquake. Although flooding associated with subsidence would occur immediately in some low-lying areas, the effects of subsidence are more likely to be manifest over the long term as increased flooding and coastal erosion during storms.

This scenario is further complicated by the likely occurrence of a locally generated tsunami expected to arrive about 30 minutes after the initial earthquake and to continue to arrive at intervals over a period of several hours. Shorelines of bays, estuaries, and low-lying sand barriers would experience immediate flooding and erosion. DOGAMI's Open File Report O-95-67 and accompanying maps O-95-09 to O-95-16 project tsunami elevations along the Clatsop County coastline that range from 15 feet at the low end to as much as 40 feet at the high end. DOGAMI's 1997 IMS-3: Tsunami Hazard Map of the Seaside-Gearhart Area, Clatsop County, Oregon; 1999 IMS-11 Tsunami Hazard Map of Astoria Area, Clatsop County, Oregon; 1999 IMS-12 Tsunami Hazard Map of Warrenton Area, Clatsop County Oregon provide more detailed information on projected tsunami elevations but over a limited area. Projected elevations shown on these detailed maps are comparable to those noted above from their earlier work.

#### **CHRONIC HAZARDS: Landsliding and Sloughing**

Mass movement is the slow or rapid down-slope movement of rock, soil, or fill under the influence of



gravity. Mass movement includes landsliding or slumping, sloughing, debris or mudflows, rock fall, and soil creep. Sloughing refers to smaller-scale, simpler, surficial mass movement. Landsliding/slumping refers to larger-scale, more complex, deeper-seated mass movement. The term landsliding is generally applied to translational mass movement, or motion that occurs along a more or less planar surface. The term slumping is generally applied to rotational mass movement, or motion that occurs about an axis. Most large mass movements possess both translational and rotational components of motion.

A number of factors affect slope stability by acting to increase driving forces and/or reduce resisting forces. Material composition is a primary control on slope stability. Hard headland-forming basalts for example, while not immune to mass wasting, do not readily give way. In contrast, soft bluff-forming sandstones and mudstone are highly susceptible to slope movement. Prolonged winter rains saturate these porous bluff materials, both loading the slope and lowering cohesive strength, to further decrease slope stability. The geometry and structure of bluff materials also affects slope stability. They define lines of weakness and control surface as well as subsurface drainage for example. By removing sediment from the base of bluffs and by cutting into the bluffs themselves, processes of wave attack may also affect slope stability. The extent to which the beach fronting the bluff acts as a buffer is important in this regard.

Two reports done by Oregon Department of Geology and Mineral Industries form the basis for many of the areas subject to the geologic hazard overlay zone provisions of the county's development code: Environmental Geology of Inland Tillamook and Clatsop Counties (Bulletin 79) and Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties (Bulletin 74). As part of these reports, landslide topography and steep slopes were mapped for the entire County at a scale of 1 inch to 1 mile. These reports include a classification of landslide topography by age. Active landslides are defined as "areas where ground movement is continuous or periodic or areas in which historic, within about 100 years, movement has taken place. Such areas include debris and rockfalls on headlands, shallow slump failures along terraces fronting the ocean and bays, and areas of local slump in upland areas." Inactive geologic landslides are defined to "include areas characterized by erosion-modified headscarps and hummocky, poorly drained topography, but show no evidence of recent movement such as tilted trees, cracks, back-tilted blocks, and sag ponds." Old landslide topography is defined as "large areas of irregular hummocky ground having disrupted drainage and not well-defined headscarps. Such areas lack evidence of historic movement, and postulated landslide movement within them may have occurred from several hundred to several thousand years ago. Old land slide topography is typified by well-rounded ridges and well-established although irregular drainage patterns."

The reports referenced above indicate that extensive areas of Clatsop County have been, or are subject to slope movement. The majority of these areas are in the mountainous interior of the county, an area used almost exclusively for forestry and thus beyond the regulatory authority of the county. However, there are other areas within the County that are subject to landslide hazards, such as rural areas along the

## Columbia River and the Southwest Coastal Planning Area.

The Southwest Coastal Planning Area is the coastal area south of Cannon Beach to the Tillamook County Line. The geology of this bluff-backed segment of shoreline is characterized by the contact between marine terrace deposits of coastal lowlands and the older sedimentary rocks of the uplands. This area has a history of major landslide activity including the Silver Point and Ecola landslides. Because high mass movement potential and active landslides existed in an urbanizing area, Clatsop County contracted with Martin Ross, geologist, in 1978, to identify and map geologic hazards and develop policies and recommendations regarding future development. In his report "A Field Inventory of Geologic Hazards From Silver Point to Cove Beach, Clatsop County, Oregon" Ross mapped active landslides, areas of soil creep, areas of ocean undercutting, and geologic rock units. He found that the entire coastline within the study area was retreating landward at varying rates as a result of slope movement exacerbated by wave undercutting. Ross's recommendations form the basis of the County's policies included in the Southwest Coastal Community Plan for development in this area.

The observed impacts of the 1982-83 El Niño event in the Southwest Coastal Planning Area support Ross's observations. During this period, there was a severe depletion of sand from the beaches south of Hug Point and a marked widening of the beaches north of Silver Point, particularly in the vicinity of Chapman Point. The loss of the wave buffering sand from the beach in the Cove Beach -Falcon Cove area, resulted in bluff retreat and the loss of at least one oceanfront dwelling and the need to move several others.

Recent geologic site investigations performed in this area by Tom Horning also support Ross's observations. Horning, in site investigation reports prepared for the Cove Beach area, estimates that during the 1982-83 El Niño event, and the two following years, the shoreline in the south-central portion of Cove Beach receded 20 to 25 feet. Before the El Niño event, annual shoreline retreat was only on the order of 1 foot per year, or about 5% of that which was experienced as a result of El Niño. Conversely, Rosenfeld, in his report "Cannon Beach: An Integrated Approach to Sand Management" (1997) estimates that at the end the El Nino event fully 30% of the sand in the entire Falcon Point- Chapman Point littoral cell was contained in the area between Ecola Creek and Chapman Point.

While believed to be much the same, details of the impacts of the 1997-98 El Niño event on bluff retreat in the Southwest Coastal Planning Area is not available at the time of this writing. El Niño impacts are considered further below under the heading of wave overtopping and undercutting.

Another source of information regarding areas with landslide potential is the detailed soils mapping by the Soil Conservation Service (SCS). In 1979-80, Don Leach, District Conservationist, and Phil Smith, Soil Scientist of the SCS, prepared an inventory of soils, which have the potential to become hazardous at

certain slopes in relation to slumping, creeping and landslides. In 1988 a complete soil survey of Clatsop County was completed by the SCS. The soil survey changed the names of soil types used. 'Table 2' lists soil types, identified by Leach and Smith as having landslide potential, but utilizing the 1988 soil survey names. This conversion was done by John Shipman of the Natural Resources Conservation Service in 1999.

**Table 2: Soils Hazardous in Relation to Mass Movement**

<b>Soils</b>	<b>Mapping Symbol</b>	<b>Slopes at which becomes hazardous</b>
Templeton	60D, 61E	20%
Skipanon	58D, 58E	20%
Rinearson	56D, 56E, 56F	20%
Scaponia	57E	20%
Svensen loam	59D, 59E, 59F	20%
Humitropepts	27	25%
Necanicum	50E, 50F	50%
Klistan	31E, 31F	50%
Astony	1E, 1F	50%
Ascar	3F	60%
Harslow	22F	60%
Kilchis	29F	60%
Grindbrook (bedrock substratum)	21D	20%
Braun	7D, 7E	20%
Ecola	16D, 16F	20%

#### **CHRONIC HAZARDS: High Groundwater and Compressible Soils**

High ground water was one of the geologic hazards identified by Bulletin 74. In the alluvial lowland areas near streams and rivers and in the interdune areas of the Clatsop Plains, the groundwater table is at or near the ground surface much of the year. Potential problems associated with high ground water identified in Bulletin 74 are health hazards associated with the location of septic tanks and drainfields, engineering problems associated with underground storage tanks, and engineering problems associated with excavations for utilities and foundations. High ground water can also create problems for emergency access where roads are located in low-lying areas. 'Table 3' lists soils exhibiting high ground water levels, utilizing 1988 soil survey names.

**Table 3: Soils Exhibiting High Ground Water Levels**

<b>Soils</b>	<b>Detailed Soils Map Symbol</b>
Loconda	39A, 40A, & portion of 73A

Heceta	Portion of 24C
Braillier mucky peat	5A
Coquille-Clatsop complex	11A, 12A
Warrenton	72A

Compressible soils are another geologic hazard identified by Bulletin 74. Compressible soils include peat and organic soils. They occur in tidal flats areas such as those associated with the Columbia, Skipanon, Lewis and Clark, and John Day Rivers, and in interdune areas on the Clatsop Plains. Compressible soils undergo a significant decrease in volume when subject to loading and can cause differential settlement if proper engineering is not employed in the design of the construction project. 'Table 4' lists compressible soils, utilizing 1988 soil survey names.

**Table 4: Compressible Soils**

Soils	Detailed Soils Map Symbol
Peat	21A
Brailler mucky peat	5A
Bergsvik mucky peat	6A
Loconda	39A, 40A, & portion of 73A
Coquille-Clatsop complex	11A, 12A

Much of the area in Clatsop County with high ground water and compressible soils consists of dike tidelands and floodplains, which have been committed to Exclusive Farm Use.

#### **CHRONIC HAZARDS: Streambank Erosion and Deposition**

Streambank erosion is a geologic hazard identified by Bulletin 79. The report notes that areas in the immediate vicinity of stream and river channels are subject to undercutting and stream-bank erosion. The report states that the areas of most active stream bank erosion are those with steep slopes, little vegetative cover, and a position on the outside of river or stream channel curves. The North Fork of the Nehalem River is cited as the area in Clatsop County where stream bank erosion is most common. In addition to the loss of land, stream erosion is responsible for deterioration of water quality, destruction of fish spawning grounds and estuary productivity and silt deposition, which results in the clogging of the streams and estuaries.

The outer banks along channel curves are the most susceptible to this hazard because it is there that the momentum of the water carries it against the bank with the most force. Erosion can begin as a result of flooding and then continue during periods of normal flow after protective vegetation has been removed. The building up of a gravel bar can divert the stream into a bank and initiate erosion.

Streambank erosion is a special hazard in diked areas. Much of the problem may be due to wave action caused by tug and other boat traffic.

According to a report by the State Soil and Water Conservation Commission, both direct and indirect measures must be accomplished if this hazard is to be controlled. Direct actions would include the installation of riprap, groins, jetties, and baffles. Planting of the streambank is another direct stabilizing method. Indirect methods of control are an attempt to get at the causes of erosion and are often the most difficult. Control of logging activity to reduce the amount of sediment and debris in the water is one major concern in the study area.

Maintaining trees along stream banks (except where they are on undercut banks) is essential to general the health of the stream health generally. Restricting the activity of livestock in areas of present and potential erosion has proven valuable in other areas. The imposition of speed limits on rivers could be a preventive step for erosion in diked areas.

#### **CHRONIC HAZARDS: Wave Overtopping and Undercutting**

The Clatsop Plains is the coastal area between Gearhart and Warrenton. A dune-backed shoreline characterizes this area. Extreme wave and water levels associated with storm events is the primary factor affecting the stability of dune-backed shorelines. Tides, storm surges, barometric pressure effects, temperature effects, and baroclinic currents all affect mean water level. Superimposed upon these longer term elevations in mean water level are short-term variations associated with the passage of waves and expressed at the shoreline as runup. Extreme water surface elevations achieved during storms result from the simultaneous occurrence of individual maxima within this range of forcing events. In terms of flooding, or wave overtopping, it is the magnitude of the storm water level that is of particular interest. In terms of erosion, or wave undercutting, storm duration and direction as well as magnitude need to be considered.

DOGAMI's June 2001 Report, Coastal Erosion Hazard Zones along the Clatsop Plains, Oregon, provides a thorough review of factors affecting Clatsop County shoreline stability, including a detailed analysis of shoreline change. This report, and its accompanying maps and geospatial data, also identify potential landward erosion zones along the Clatsop Plains shoreline using a geometric model developed by Komar et al 1999. For the three identified scenarios, the higher risk scenario yields landward retreat distances on the order of 350 +/- 100 feet and the lower risk scenarios yields distances in excess of 600 feet.

Another source of information are the FEMA Flood Insurance Rate Maps.

#### **CHRONIC HAZARDS: Inlet Migration**

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Inlet-affected shorelines are also significantly affected by the processes of wave attack. In this setting waves interact with tidal and fluvial forces to control patterns of inlet migration. The Columbia River Jetties effectively fix the location of the Columbia River Mouth. Recent work completed by the Washington Department of Ecology considers the extent to which the jetties, as well as other human activities, have had and may continue to have a significant impact on patterns and trends of shoreline change both north and south of the Columbia River mouth. Natural inlets in Clatsop County, such as at the mouth of the Necanicum River and Ecola Creek, are small compared to the Columbia River. Still, inlet dynamics may be important locally.

#### **CHRONIC HAZARDS: Sand Inundation**

The El Niño winter of 1997-98 and the La Niña storms of 1998-99 have focused attention on the threats posed by beach and dune erosion along the Oregon coast. However, even in association with these erosion episodes and particularly following them, there are segments of the Oregon coast where too much sand is the problem. Conforming to a pattern of littoral cell circulation and sedimentation, these areas tend to be located at the north ends of headland bounded segments of shoreline. Growth in the height and width of the foredune in these areas has enhanced ocean flood/erosion protection potential, but rapid heavy sand accumulation has also resulted in the inundation of dwellings, restriction of ocean views, and loss of beach access.

El Nino events are associated with strong storms, an elevated sea-level and a northward shift of beach sand with a specific littoral cell. During the 1982-83 period, there was a severe deletion of sand from the beaches south of Hug Point and a marked widening of the beaches north of Silver Point, particularly in the vicinity of Chapman Point. The loss of the wave buffering sand from the beach in the Cove Beach -Falcon Cove area, resulted in shoreline retreat and the loss of at least one oceanfront dwelling and the need to move several others. In the area of Breakers Point, north of Ecola Creek sand accretion lead to the growth of large active foredunes.

Conversely, Rosenfeld, in his report "Cannon Beach: An Integrated Approach to Sand Management" (1997) estimates that at the end the El Nino event fully 30% of the sand in the entire Falcon Point-Chapman Point littoral cell was contained in the area between Ecola Creek and Chapman Point.

Wind and wave erosion hazards are discussed further in the DOGAMI Technical Report "Coastal Erosion Hazard Zones Along the Clatsop Plains, Oregon: Gearhart to Fort Stevens" (Open File Report 0-01-04).

#### **CHRONIC HAZARDS: Human Activities**

Human activities affect the stability of all types of shoreline. At longer time and larger space scales jetty construction and maintenance dredging are factors that affect shoreline stability. This is particularly true along dune-backed and inlet-affected shorelines. Cumulative effects of shoreline hardening and the

planting of European Beachgrass can also be considered in this context. The latter activity has markedly affected shoreline stability along dune-backed shorelines of the Oregon coast.

Examples of human activities that affect shoreline stability over shorter time and smaller space scales include those associated with residential and commercial development, such as grading and excavation, surface and subsurface drainage alterations, vegetation removal, and vegetative as well as structural shoreline stabilization. With the exception of the latter two, these activities tend to be a particular concern along bluff-backed shorelines. Typically associated with heavy recreational use, pedestrian and vehicular traffic are other types of human activities that affect shoreline stability over shorter time and smaller space scale. Because these activities may result in the loss of fragile vegetation cover, they are a particular concern along dune-backed shorelines. Along bluff-backed shorelines graffiti carving can be added to the list of human activities that affect shoreline stability and are associated with heavy recreational use.

Structures and facilities are subject to severe damage or complete destruction over time from moving masses of earth. This movement may be initiated or accelerated in a relatively stable area by man's activities. Excavations, cuts, fill and drainage modifications may decrease the stability of an area and initiate sliding. Water introduced into the subsurface by drain fields, and improper handling of runoff may also initiate slides. Excavations may steepen the slopes at the top of an old earth flow or slump making it unstable. Cutting the toe of an old slide can make it unstable and reactivate movement.

## References

DOGAMI 1995

DOGAMI. 1996 "GMS-100 Earthquake Hazard Maps for Oregon"

DOGAMI Open File Report O-95-67

DOGAMI Maps O-95-09 to O-95-16

DOGAMI. 1997. "IMS-3: Tsunami Hazard Map of the Seaside-Gearhart Area, Clatsop County, Oregon"

DOGAMI. 1999 "IMS-10: Relative Earthquake maps of Selected Urban Areas in Western Oregon"

DOGAMI. 1999. "IMS-11: Tsunami Hazard Map of Astoria Area, Clatsop County, Oregon"

DOGAMI. 1999. "IMS-12: Tsunami Hazard Map of Warrenton Area, Clatsop County, Oregon".

DOGAMI. "Environmental Geology of Inland Tillamook and Clatsop Counties" (Bulletin 79)

DOGAMI. "Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties" (Bulletin 74)

DOGAMI. June 2001. "Coastal Erosion Hazard Zones Along the Clatsop Plains, Oregon: Gearhart to Fort Stevens" (Open File Report O-01-04).

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February 25, 2003

Komar, P.D. 1997.

Madin, I. 1992. *Seismic Hazards on the Oregon Coast*, in Coastal Natural Hazards: Science, Engineering and Public Policy. Corvallis: Oregon Sea Grant.

Ross, Martin. 1978. "A Field Inventory of Geologic Hazards From Silver Point to Cove Beach, Clatsop County, Oregon."

Rosenfeld. 1997. "Cannon Beach: An Integrated Approach to Sand Management."  
Satake et al. (1996)

U.S. Department of Agriculture, Soil Conservation Service. January 1973. General Soil Map with Soil Interpretations for Land Use Planning, Clatsop County, Oregon.

U.S. Department of Agriculture, Soil Conservation Service. February 1988. Soil Survey of Clatsop County, Oregon.

U.S. Department of Housing and Urban Development, Federal Insurance Administration. January 1978. Flood Insurance Study, Clatsop County, Oregon, Unincorporated Areas.



**Exhibit B**  
**Existing Comprehensive Plan**  
**Background Report - Annotated**

BACKGROUND REPORT  
NATURAL HAZARDS  
GEOLOGIC HAZARD RELATED MATERIAL  
PROPOSED TO BE DELETED

Mass Movement

Extensive areas of Clatsop County are subject to mass movement, the majority of which is in the mountainous interior of the County used exclusively for forestry. However, throughout the County there are areas which are subject to mass movement potential which have potential for more varied use, such as rural areas along the Columbia River and the southwest coastal area.

Mass movement is the slow or rapid down slope movement of rock, soil or fill under the influence of gravity. Mass movement includes landslides, soil creep, slumping or rockfall.

Structures and facilities are subject to severe damage or complete destruction over time from moving masses of earth. This movement may be initiated or accelerated in a relatively stable area by man's activities. Excavations, cuts, fill and drainage modifications may decrease the stability of an area and initiate sliding. Water introduced into the subsurface by drain fields, and improper handling of runoff may also initiate slides. Excavations may steepen the slopes at the top of an old earth flow or slump making it unstable. Cutting the toe of an old slide can make it unstable and reactivate movement.

The Southwest Coastal Planning Area has a history of major landslide activity including the Silver Point and Ecola landslides. Because high mass movement potential and active landslides existed in an urbanizing area, Clatsop County contracted with Martin Ross, geologist, to identify and map geologic hazards and develop policies and recommendations regarding future development. Active landslides, areas of soil creep, areas of ocean undercutting, and geologic rock units were mapped as part of the study. The study found the entire coastline within the study area retreating landward at varying rates caused by ocean wave undercutting and related landsliding. Approximately 45 active landslides were mapped. His recommendations form the basis of the County's policies included in the Southwest Coastal Community Plan for development in this area.

In the remainder of the County, general geologic hazards information exists in the form of 2 reports done by Oregon Department of Geology and Mineral Industries: Environmental Geology of Inland Tillamook and Clatsop Counties and Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties. As part of these reports, landslide topography and steep slopes were mapped for the entire County at a scale of 1 inch to 1 mile. While not at a scale useful for detailed information on specific parcels, the information has been incorporated into the Environmental Plans which the CACs will use in determining carrying capacities land use designations.

Another source of information which provides more detailed information at a better scale is the detailed soils mapping by the Soil Conservation Service (SCS). Don Leach, District Conservationist, and Phil Smith, Soil Scientist of the SCS, have prepared an inventory of soils which become hazardous at certain slopes in relation to slumping, creeping and landslides (see Table 1). Detailed soils information exists for a portion of the County, with the remainder of the County expected to be mapped by 1982.

Table 2. Soils Hazardous in Relation to Mass Movement

Soils	Mapping Symbol	Slopes at which becomes hazardous
Astoria silt loam	2E, F, G	20%
Hembre silt loam	12H	60%
Kilchis silt loam	27	60%
Klickitat stony loam	20G, H	50-60%
Svensen loam	37E, F, G	20%
Terrace escarpment	28E	
Tolovana silt loam	38E, F, G, H, F-1	20%
Winema silty clay (33 silt loam)	34E, F, G	20%
Ecola silt loam (13 silt loam)	13E, F, G, H	20%

## EARTHQUAKES

Earthquakes have not been common along the Oregon Coast during recorded history, and only one very minor event has been recorded in this century with an epicenter near Astoria.

However, numerous moderate tremors originating in and around Puget Sound have been felt in Astoria. The sensitivity of unstable Astoria slopes to crustal vibration originating at a considerable distance depends on the magnitude of the event and local groundwater saturation levels at the times of the event.

Very recent crustal studies have verified a suspected major tectonic fracture zone (subduction) along the continental margin adjacent to Oregon and Washington. This feature is part of a global



1 system of shifting crustal places, any segment of which poses an earthquake hazard. The fact  
2 that no major earthquakes have been recorded locally along this fracture in the past 175 years  
3 should not be seen as proof of immunity from hazard. Indeed, it may portend the development of  
4 severe crustal stresses unrelieved by periodic small-magnitude adjustments.

5  
6 It is quite likely that a strong earthquake in or near Puget Sound, or a moderate to strong  
7 earthquake with epicenter offshore, could trigger enormous catastrophic landslides in Astoria.

8  
9 The identification of subsurface faults in or near Astoria should not be interpreted as evidence of  
10 contemporary faulting, any more than the existence of marine fossils adjacent to Irving Avenue is  
11 evidence of current sea-level stand. Only in very rare cases when physical evidence of recent  
12 fault movement exists, can a fault be presumed to be active. The NE-SW fault transecting the  
13 east end of Astoria peninsula (Carter, 1975) is inferred from fossil evidence, and quite likely has  
14 not been active for millions of years.

## 15 16 HIGH GROUNDWATER AND COMPRESSIBLE SOILS

### 17 18 High Ground Water

19  
20 In the alluvial lowland areas near streams and rivers and in the interdune areas of the Clatsop  
21 Plains, the groundwater table is at or near the ground surface much of the year. Problems  
22 associated with high ground water are summarized by Schlicker, et al.

23  
24 Some of the more important engineering problems associated with a high water table are related  
25 to hydrostatic pressure. For instance, when gasoline or fuel oil is pumped from underground  
26 storage tanks, the tanks may be buoyed to the surface by the ground water pressure. If the water  
27 level in concrete swimming pools and reservoirs is lowered during times of high ground water,  
28 hydrostatic uplift may cause collapse of the structures. Water pressure can also fracture the floor  
29 and walls of basements if pressure is allowed to build up.

30  
31 Health hazards may also arise from high ground water conditions. For example, in areas where  
32 septic tanks and drain fields cannot operate properly, effluent may rise to the surface and flow  
33 downslope to contaminate streams and drainage ditches.

34  
35 Excavations for installation of utilities, basements and foundations will fill with water in areas of  
36 high ground water, making it necessary to install pumping facilities for dewatering. To prevent  
37 collapse of walls it may be necessary to brace the cuts."  
38

Table 3. Soils Exhibiting High Ground Water Levels

Soils	Detailed Soils Map Symbol
Peat	21A
Brailler muck	3 A
Clatsop silty clay loam	5 A
Coquille silty clay loam	7 A
Warrenton loamy fine sand	23 A

Much of the problem of building in high ground water has been addressed by the present Department of Environmental Quality (DEQ) rules which prohibit the issuance of a septic tank permit when the ground water level is within 5 ½ feet of the ground surface.

#### Compressible Soils

Most of the soils with high ground water levels also experience problems due to the compressible properties of the soils. Compressible soils are soils which undergo a significant decrease in volume when subject to loading.

Table 4. Compressible Soils

Soils	Detailed Soils Map Symbol
Peat	21A
Brailler muck	3 5A
Clatsop silty clay loam	5 A
Coquille silty clay loam	7 A

Much of the area in Clatsop County with high ground water and compressible soils consists of dike tidelands and floodplains which have been committed to Exclusive Farm Use.

#### EROSION AND DEPOSITION

Erosion hazards in Clatsop County are divided into three categories: streambank erosion, wind erosion, and wave erosion.

1  
2 Wind and wave erosion hazards have been discussed in the Beaches and Dunes Background  
3 Report. In addition, the geologic hazards report by Martin Ross addresses ocean wave  
4 undercutting and related landsliding in the Southwest Coastal planning area.  
5

## 6 STREAMBANK EROSION AND DEPOSITION

7

8 Areas of most active streambank erosion are recognized by steep slopes, little vegetative cover,  
9 and position on the outside of stream and river channels. In addition to the loss of land, stream  
10 erosion is responsible for deterioration of water quality, destruction of fish spawning grounds and  
11 estuary productivity and silt deposition which results in the clogging of the streams and estuaries.  
12

13 The outer banks along channel curves are the most susceptible to this hazard because it is there  
14 that the momentum of the water carries it against the bank with the most force. Erosion can  
15 begin as a result of flooding and then continue during periods of normal flow after protective  
16 vegetation has been removed. The building up of a gravel bar can divert the stream into a bank  
17 and initiate erosion.  
18

19 Streambank erosion is a special hazard in diked areas. Much of the problem may be due to wave  
20 action caused by tug and other boat traffic.  
21

22 According to a report by the State Soil and Water Conservation Commission, both direct and  
23 indirect measures must be accomplished if this hazard is to be controlled. Direct actions would  
24 include the installation of riprap, groins, jetties, and baffles. Planting of the streambank is  
25 another direct stabilizing method. Indirect methods of control are an attempt to get at the causes  
26 of erosion and are often the most difficult. Control of logging activity to reduce the amount of  
27 sediment and debris in the water is one major concern in the study area.  
28

29 Allowing trees to remain, i.e. providing a buffer, on the banks (except where they are on undercut  
30 banks), is essential to the health of the stream generally. Restricting the activity of livestock in  
31 areas of present and potential erosion have proven valuable in other areas. The imposition of  
32 speed limits on rivers could be a preventive step for erosion in diked areas.  
33

34 Streams and rivers in Clatsop County with erosion hazards have been identified by the  
35 Department of Geology and Mineral Industries as part of their two environmental geology reports  
36 and through the 208 Program conducted by the DEQ. Erosion rates are not known for the  
37 various rivers and streams in the County, which makes it difficult to prescribe safe setbacks for  
38 improvements. However, floodways of various widths exist along the streams and rivers within  
39 which no permanent structures are allowed. In addition, the CACs will be prescribing building  
40 setbacks along water bodies for the multiple purpose of preventing erosion, maintaining wildlife  
41 habitat, and providing a natural filter for runoff.  
42  
43  
44

(Wp)Geobacde

**Exhibit C**  
**Proposed Amendments to**  
**Comprehensive Plan Policies**



**PROPOSED AMENDMENTS  
COMPREHENSIVE PLAN**

**NATURAL HAZARD POLICIES**

1. The County shall seek to minimize or avoid development in areas where flooding, geologic and other natural conditions can create circumstances that are hazardous to life and/or property. Natural hazards regulated under Statewide Planning Goal 7 shall include floods (coastal and riverine), landslides, earthquakes and related hazards, tsunamis, coastal erosion, and wildfires.
2. The County shall avoid development in hazard areas where the risk to people and property cannot be mitigated.
3. In adopting policies and implementing measures to protect people and property from natural hazards, the County will consider:
  - a. the benefits of maintaining natural hazard areas as open space, recreation and other low density uses;
  - b. the beneficial effects that natural hazards can have on natural resources and the environment; and
  - c. the effects of development and mitigation measures in identified hazard areas on the management of natural resources.
4. The County shall give special attention to emergency access when considering development in identified hazard areas.
5. Where development in potentially hazardous areas is permitted, the County shall require a site-specific hazard investigation, by appropriate licensed and registered professionals, to establish construction feasibility and make recommendations to mitigate conditions that are potentially hazardous. The investigation shall evaluate the risk to the site as well as the risk the proposed development may pose to other properties.
6. The County shall prohibit the siting of essential facilities, major structures, hazardous facilities, and special occupancy structures, as defined in the state building code (ORS 455.447(1)(a)(b)(c) and (e)), in identified hazard areas, where the risk to public safety cannot be mitigated, unless an essential facility is needed within a hazard area in order to provide essential emergency response services in a timely manner.
7. The County shall ~~consider~~ <sup>encourage</sup> permitting cluster development where clustering will avoid, or minimize the development of potentially hazardous areas.
8. Development, particularly that occurring on moderately to steeply sloped land, should be planned to minimize grading and the resultant loss of vegetative cover.
9. The County shall implement an erosion and sedimentation control program in order to minimize potential geologic hazards and maintain stream quality.
10. The siting of septic tanks and drainfields should take into consideration any adverse geologic impacts their functioning might have.
11. The County will develop an educational program to inform the public of the risks associated with development in natural hazard areas of the county.
12. The County encourages the vacation or replatting of old unimproved subdivisions located in steeply sloped areas, or other areas with identified geologic hazards. The County will consider waiving applicable fees as an incentive.



- 1 13. The County has established a riparian vegetation protection buffer along streams and rivers.  
2 The County shall rely on this buffer to protect and stabilize stream banks and to provide for  
3 the location of structures in a manner that minimizes the risks associated with stream bank  
4 erosion.
- 5 14. The Department of Environmental Qualities best management practices for agriculture shall  
6 be supported to reduce erosion and sedimentation of streams
- 7 15. The County shall review state and federal permits for shoreline stabilization measures to  
8 ensure that potential adverse impacts on adjacent property are minimized and/or mitigated.
- 9 16. The County shall work with federal and state agencies to identify and map flood hazards, and  
10 to manage development in those areas to protect people and property from flooding.
- 11 17. The County should coordinate its land use comprehensive plan and decisions with its  
12 emergency preparedness, response, recovery, and mitigation programs.
- 13 18. The County shall respond to new inventory information on natural hazards within 36 months  
14 after being notified by the Department of Land Conservation and Development (DLCD),  
15 unless that time is extended by DLCD.
- 16 19. Upon receiving notice of new hazard information from the Department of Land Conservation  
17 and Development, the County shall:
  - 18 A. Evaluate the risk to people and property based on the new inventory information and an  
19 assessment of:
    - 20 1. the frequency, severity and location of the hazard;
    - 21 2. the effects of the hazard on existing and future development;
    - 22 3. the potential for development in the hazard area to increase the frequency and severity  
23 of the hazard; and
    - 24 4. the types and intensities of land uses to be allowed in the hazard area.
  - 25 B. Allow an opportunity for citizen review and comment on the new inventory information  
26 and the results of the evaluation and incorporate such information into the comprehensive  
27 plan, as necessary.

28  
29 GEOHAZARDPOLICYDLCD DRAFT  
30

**Exhibit E**  
**Proposed Amendments to Land and Water and Development and Use**  
**Ordinance (80-14)**

*Done*

**PROPOSED AMENDMENTS**  
**Land and Water and Development and Use Ordinance (80-14)**

**GEOLOGIC HAZARD OVERLAY ZONE**

**Amend the Development Ordinance, Geologic Hazard Overlay District to read as follows:**

**Section 4.030 Geologic Hazards Overlay Zone (GHO)**

**Section 4.031 Purpose**

The intent of the geologic hazards overlay is to minimize building hazards and threats to life and property that may be created by landslides, ocean flooding and erosion, weak foundation soils, and other hazards as identified and mapped by the County. This purpose is achieved by basing County decisions on accurate geologic and soils information prepared by qualified professionals.

**Section 4.032 Applicability**

This section applies to all development in the following potentially hazardous areas:

1. Areas subject to mass wasting including:
  - a. Active landslides, inactive landslides, landslide topography and mass movement topography identified in the Oregon Department of Geology and Mineral Industries (DOGAMI) Bulletins 74 and 79;
  - b. Faults including definite, indefinite, inferred and concealed in the Oregon Department of Geology and Mineral Industries (DOGAMI) Bulletins 74 and 79;
  - c. All areas identified in the report, "A Field Inventory of Geologic Hazards from Silver Point to Cove Beach, Clatsop County, Oregon", prepared by Martin Ross in 1978, as needing site specific investigations;
2. Areas subject to wave attack, including
  - a. All oceanfront lots; and
  - b. The beach and dune hazard area as defined in Section 4.042.
3. Areas with compressible soils identified in the Soil Survey of Clatsop County (SCS) and referenced in Clatsop County's Comprehensive Plan Background Report, Natural Hazards.
4. The determination of whether a property is located in one of the above referenced potentially hazardous areas shall be made at the sole discretion of the Director. The mapping that forms the basis for the identification of the above areas may be generalized in nature. A specific site may not include the characteristics for which it is mapped. In these circumstances, the Director may grant a waiver from the requirements of Section 4.030. The waiver shall be in the form of a written finding. The finding shall be based on a report, from a professional specified in Section 4.034, detailing the basis for the determination that the site does not contain the identified potentially hazardous geologic condition.



1           Section 4.033 Geologic Hazard Permit Requirements.

2  
3 All persons proposing any activity requiring a development permit on property located in potentially  
4 hazardous areas identified in Section 4.032 shall obtain a geologic hazard permit.  
5

6 1. Application for a geologic hazard permit shall be on forms provided by the County and shall  
7 include a geotechnical report prepared in conformance with the requirements of Section 4.034.

8 2. Before a development permit can be issued, the geotechnical report must be approved as part of  
9 the development permit approval process.  
10

11 a. Where a geotechnical report recommends that additional site investigations, such as borings or  
12 test pits, are undertaken, application for geologic hazard permit will be deemed incomplete until the  
13 results of those investigations have been provided to the County.

14 b. Where an application is made for a conditional use permit, a variance, a subdivision, a partition,  
15 or a planned development located in an area identified in Section 4.032, a geotechnical report in  
16 conformance with Section 4.034 shall be prepared. The Director may also require a geotechnical report  
17 in conjunction with a proposed zone change.  
18

19 3. Application for a geologic hazard permit may be made concurrently with an application for a  
20 development permit.

21 4. The approved site investigation report shall be referred to in deed and other documents of sale  
22 and shall be recorded with the record of deeds  
23

24           Section 4.034 Geotechnical Report Requirements

25  
26 For areas identified in Section 4.032 (1) and 4.032 (2), the geotechnical report shall be prepared  
27 by a certified engineering geologist or a registered professional geologist. If a geotechnical report is  
28 prepared by a geologist and structural recommendations are incorporated into that report, those  
29 recommendations, must be made in consultation with an engineering geologist, structural engineer, or  
30 civil engineer.  
31

32 1. For areas identified in Section 4.032 (1), the geotechnical report shall:

33 a. Identify the hazards to life, public and private property which may be caused by mass movement  
34 (landsliding and sloughing), soil erosion or deposition, and earthquakes;

35 b. Identify the hazards to life, public and private property, and the natural environment which may  
36 be caused by the proposed use and other human activities;

37 c. Describe how the proposed development or use will be adequately protected from geologic  
38 hazards, including landsliding and sloughing, soil erosion or deposition, and earthquakes, or is of  
39 minimal value; and

40 d. Describe how the proposed development is designed to minimize the adverse effects it might  
41 have on the site and adjacent areas.  
42

43 2. For areas identified in Section 4.032 (2), and in addition to the standards identified in Section  
44 4.034 (2), the geotechnical report shall identify the hazards to life, public and private property which  
45 may be caused by wind erosion or accretion, wave undercutting (erosion), and ocean overtopping  
46 (flooding, including tsunami),  
47

48 3. For areas identified in Section 4.032 (1) and 4.032 (2), the geotechnical report shall describe how  
49 the proposed development provides for temporary and permanent stabilization and the planned

1. maintenance of new and existing vegetation. Existing stabilizing vegetation, particularly trees, shall not be removed on slopes of 20% or greater.

4. For areas identified in Section 4.032 (1) and 4.032 (2), the geotechnical report shall be prepared in conformance with the document "Clatsop County – Geotechnical Report Content Standards".

5. For areas identified in Section 4.032 (3), the geotechnical report shall be prepared by a certified engineering geologist, soils engineer, or civil engineer. Geotechnical reports prepared for areas identified in Section 4.032 (3) shall incorporate specific construction and structural recommendations to address the soil characteristics of the site. Where pertinent, the discussion of specific construction and structural recommendations shall include: site preparation such as compaction or replacement of existing soils, bearing loads and the corresponding amount of settlement, steps to be taken with respect to ground and surface water, special foundation requirements, and foundation recommendations based on bearing capacity, design criteria, and the effect of adjacent loads.

6. For all areas identified in Section 4.032, the geotechnical report shall be prepared in conformance with the document "Clatsop County – Grading Standards".

#### Section 4.035 Geologic Hazard Permit Review.

An application for a geologic permit shall be reviewed under a Type I procedure.

1. A geologic hazard permit shall be approved by the Director if:

a. The conclusions of the geotechnical report supports a finding that there are no adverse effects of the site's geologic characteristics on the proposed development and the proposed site modifications will not adversely affect geologic conditions and processes in the immediate area: or

b. The conclusions of the geotechnical report supports a finding that if specified actions are taken to address an identified potential hazard then the effects of the site's geologic characteristics on the proposed development will be at an acceptable level and the effects of the proposed site modifications on the geologic conditions and processes in the immediate area are at an acceptable level.

2. Specific recommendations contained in the geologic report shall be incorporated into the approved geologic hazard permit. Based on content, recommendations and conclusions of the geotechnical report, or comments received during the public comment period, the Director may apply other conditions to the issuance of a geologic hazard permit.

3. The specific recommendations contained in the geotechnical report, and conditions applied to the geologic hazard permit shall be incorporated into the plans and specifications of the development which is the subject of the development permit.

4. Where there is not a concurrent application for a geologic hazard permit and a development permit for a specified development, the person(s) who prepared the geotechnical report shall submit a letter to the Director verifying that the proposed plans, details, and specifications of the proposed development have been reviewed and are in keeping with the recommendations contained in the geotechnical report that formed the basis for the issuance of the geologic hazard permit, or they shall make recommendations or changes that are needed in the proposed development in order to bring it into conformance with the recommendations contained in the geotechnical report.

5. When a geotechnical report submitted in conjunction with a development permit that is more than two years old, a letter shall be submitted to the Director from the person(s) who prepared the report.

1 The letter shall provide verification that the geotechnical report is still valid for the proposed project.

2  
3 Section 4.036 Independent Review  
4

5 The Director, at his discretion and at the applicants expense, may require an evaluation of a  
6 geotechnical report by another expert of his choosing. As part of its review of a land use application  
7 located in an area subject to Section 4.032, the Hearings Officer, Planning Commission, or Board of  
8 Commissioners may also require, at the applicants expense, an evaluation of a geotechnical report that  
9 was prepared in conjunction with the land use application. The results of that evaluation shall be used in  
10 making the final decision on the effected land use permit.  
11

12 Section 4.040 Standards The review and approval of development permits in the geologic  
13 hazard overlay district shall be based on the conformance of the proposed development plans with the  
14 following grading standards. Conditions of approval may be imposed on the development permit to  
15 assure that the development plans meets the standards of this section and to prevent the creation of a  
16 hazard to public or private property.  
17

18 1. Site Plan Information Required. In addition to the information required for a development  
19 permit, the site plan shall show where clearing, grading, excavation or filling is to occur, the area where  
20 existing vegetative cover will be retained, the location of any streams and wetland areas on immediately  
21 adjacent to the property, and the general direction of slopes. A statement shall be provided  
22 summarizing the extent of land clearing and grading and the quantity of cut and/or fill material involved.  
23

24 2. Preparation of Grading Plan Based on the findings and conclusions of the geotechnical report, or  
25 the nature of the proposed development, The Planning Director, at his sole discretion, may require that a  
26 grading plan prepared by a registered engineer be submitted with the application for a development  
27 permit. The Planning Director may require that such a grading plan, in addition to information required  
28 by Section 4.040.1 include the following additional information:  
29

- 30 a. Existing and proposed contours of the property, at two-foot contour intervals;  
31 b. The location of the existing structures and building, including those within twenty-five feet of the  
32 property;  
33 c. The location of all surface and subsurface drainage devices to be constructed; and  
34 d. Design details of proposed retaining walls.  
35

36 3. General Standards. The proposed development plans shall meet the following general standards:

- 37 a. Natural vegetation will be protected and retained wherever possible; Natural vegetation will be  
38 protected and retained wherever possible;  
39 b. To the extent possible, roads and driveways shall follow the natural contours of the site; and To  
40 the extent possible, roads and driveways shall follow the natural contours of the site; and  
41 c. An erosion control plan shall be prepared and implemented in conformance with the  
42 requirements of Section S2.500. An erosion control plan shall be prepared and implemented in  
43 conformance with the requirements of Section S2.500.  
44

45 4. Cuts. Proposed cuts shall meet the following standards:

- 46  
47 a. The site development shall be design to minimize the need for cuts.  
48 b. The slope of cut surfaces shall not be steeper than is safe for the intended use and shall not be  
49 steeper than two horizontal to one vertical unless an engineering report finds that a cut at a steeper slope  
50 will be stable and not create a hazard to public or private property;

- c. Cuts shall not remove the toe of any slope where a potential for landslide exists;
- d. Cuts shall be setback from property lines so as not to endanger or disturb adjoining property; and
- e. Retaining walls shall be constructed in accordance with the Oregon State Structural Specialty Code.

5. Fills. Proposed fills shall meet the following standards:

- a. The site development shall be designed to minimize the need for fill.
- b. The slope of fill surfaces shall not be steeper than is safe for the intended uses and shall not be steeper than two horizontal to one vertical unless an engineering report finds that a steeper slope will be stable and not create a hazard to public or private property. Fill slopes shall not be constructed on natural slopes steeper than two horizontal to one vertical.
- c. Fill shall be setback from property lines so as not to endanger or disturb adjoining property.
- d. The ground surface shall be prepared to receive fill by removing vegetation, noncomplying fill, topsoil and other unsuitable materials, and scarifying to provide a bond with the new fill.
- e. Structural fill shall be designed by a registered civil engineer in accordance with standard engineering practices.

6. Drainage. The following standards shall be met:

- a. Proposed grading shall not alter drainage patterns so that additional storm water is directed onto adjoining property.
- b. Cut and fill slopes shall be provided with subsurface drainage as necessary for stability.
- c. The site grading and drainage improvements shall be designed to carry both concentrated water and surface sheet flow water to the nearest practical drainage way, as specified by the Planning Director.

D

## CLATSOP COUNTY STANDARDS FOR THE PREPARATION OF GEOTECHNICAL REPORTS

### I. GENERAL INFORMATION

The following items should be addressed:

- A. Client or party that commissioned the report
- B. Name(s) of geologists who did the mapping and other investigation on which the report is based, and dates when the work was done.
- C. Location and size of area, and its general setting with respect to major or regional geographic and geologic features.
- D. Purpose and scope of the report and geologic investigation, including the proposed use of the site. Also, identify level of the study, i.e., feasibility, preliminary, final, etc.
- E. Topography and drainage within or affecting the area.
- F. General nature, distribution, and abundance of exposures of earth materials within the area
- G. Nature and source of available subsurface information and geologic reports or maps. Suitable explanations of the available data should provide a technical reviewer with the means of evaluating the reliability. Reference to cited works or field observations should be made, to substantiate opinions and conclusions.
- H. Disclosure of known or suspected geologic hazards affecting the area, including a statement regarding past performance of existing facilities (such as buildings or utilities) in the immediate vicinity.
- I. Locations of test holes and excavations (drill holes, test pits, and trenches) shown on maps and sections and described in the text of the report. 'Be actual data, or processed data upon which interpretations are based, should be included in the report to permit technical reviewers to make their own assessments regarding reliability and interpretation.
- J. All field and laboratory testing procedures (by ASTM designation, if appropriate) and test results
- K. Disclosure statement of geologist's financial interest, if any, in the project or the client's organization.
- L. The signature and seal of the certified engineering geologist who prepared the report.



## II. GEOLOGIC MAPPING AND INVESTIGATION

- A. Geologic mapping of the area should be done at a scale which shows sufficient detail to adequately define the geologic conditions present. For many purposes, available published geologic maps are unsuitable to provide a basis for understanding the site conditions, so independent geologic mapping is needed. If available published geologic maps are used to portray site conditions, they must be updated to reflect geologic or topographic changes which have occurred since map publication. It may be necessary for the geologist to extend mapping into adjacent areas to adequately define significant geologic conditions.
- B. Mapping should be done on a suitable topographic base or aerial photograph, at an appropriate scale with satisfactory horizontal and vertical control. The date and source of the base should be included on each map or photo.
- C. The geologist doing the investigation and preparing the map should report the nature of bedrock and surficial materials, the structural features and relationships, and the three-dimensional distribution of earth materials exposed and inferred within the area. A clear distinction should be made between observed and inferred features and relationships.
- D. The report should include one or more appropriately positioned and scaled cross sections to show subsurface relationships that cannot be adequately described in words alone. Fence or block diagrams may also be appropriate.

## III. GEOLOGIC DESCRIPTIONS

The report should contain brief but complete descriptions of all natural materials and structural features recognized or inferred within the subject area. Where interpretations are added to the recording of direct observations, the basis for such interpretations should be clearly stated. Describe all field mapping and exploration procedures (surface geologic reconnaissance, drilling, trenching, geophysical survey, etc.).

The following checklist may be used as a general, though not necessarily complete, guide for descriptions:

- A. Bedrock
1. Identification of rock types
  2. Relative and absolute age and, where possible, correlation with named formations and other stratigraphic units.
  3. Surface and subsurface expression, areal distribution, and thickness.
  4. Pertinent physical characteristics (e.g., color, grain size, nature of stratification, strength, variability).

5. Distribution and extent of zones of weathering; significant differences between fresh and weathered rock.
  6. Special engineering geologic characteristics or concerns (e.g., factors affecting proposed grading, construction, and land use).
- B. Structural features-stratification, faults, discontinuities, foliation, schistosity, folds
1. Occurrence, distribution, dimensions, orientation and variability; both within and projecting into the area.
  2. Relative ages, where pertinent.
  3. Special features of faults (e.g., topographic expression, zones of gouge and breccia, nature of offsets, age of movements, youngest faulted unit and oldest unfaulted unit).
  4. Other significant structural characteristics or concerns.
- C. Surficial deposits-alluvial, colluvial, eolian, glacial, lacustrine, marine, residual, mass movement, volcanic (such as cinders and ash), and fill.
1. Identification of material, grain size, relative age, degree of activity of originating proms.
  2. Distribution, dimensional characteristics, variations in thickness, degree of soil development, surface expression.
  3. Pertinent physical and engineering characteristics (e.g., color, grain size, lithology, compactness, cementation, strength, thickness, variability).
  4. Special physical or chemical features (e.g., indications of volume change or instability, such as expansive clays or peat).
  5. Other significant engineering geologic characteristics or concern.
- D. Surface and shallow subsurface hydrologic conditions, including groundwater, springs, and streams and their possible effect on the site. Indicate how conditions may be affected by variations in precipitation, temperature, etc.
1. Distribution, occurrence, and variations (e.g., drainage courses, ponds, swamps, springs, seeps, aquifers).
  2. Identification and characterization of aquifers; depth to groundwater and seasonal fluctuations, flow direction, gradient, recharge and discharge areas.
  3. Relationships to topographic and geologic features.

4. Evidence for earlier occurrence of water at localities now dry (e.g., vegetation, mineral deposits, historic records).
5. Other significant engineering geologic characteristics or concerns, such as fluctuating water table and the effects of proposed modifications on future hydrologic processes.

E. Seismic considerations.

1. Description of the seismotectonic setting of the area (including size, frequency, and location of historic earthquakes), current seismic zoning, and expected seismic risk.
2. Potential for area to be affected by surface rupture (including sense and amount of displacement, and width of surface deformation zone).
3. Probable response of site to likely earthquakes (estimated ground motion).
4. Potential for area to be affected by earthquake-induced landslides or liquefaction,
5. Potential for area to be affected by regional tectonic deformation (subsidence or uplift).

#### IV. ASSESSMENT OF GEOLOGIC FACTORS

Assessment of existing geologic conditions and processes with respect to intended use of the site constitutes the principal contribution of the report. It involves 1) the effects of the geologic features upon the proposed grading, construction, and land use, and 2) the effects of these proposed modifications upon future geologic conditions and processes in the area.

The following checklist includes topics that ordinarily should be considered in discussions, conclusions and recommendations in geologic reports:

A. General suitability of proposed land use to geologic conditions

1. Areas to be avoided, if any, and mitigation alternatives
2. Topography and slope
3. Stability of geologic units.
4. Flood and tidal inundation, erosion, and deposition.
5. Problems caused by geologic features or conditions in adjacent properties
6. Other general problems.

B. Identification and extent of known or probable geologic conditions which may result in risk to the proposed land use (such as flood inundation, shallow groundwater, storm surge, surface- and groundwater pollution, snow avalanche, landslide, debris flow, rock fall, expansive soil, collapsible soil, subsidence, erosion, deposition, earthquake shaking, fault rupture, tectonic deformation, liquefaction, seiche, tsunami, volcanic eruption).

C. Recommendations for site grading.

1. Prediction of what materials and structural features will be encountered in proposed cuts.
2. Prediction of stability based on geologic factors; recommended avoidance or mitigation alternatives to cope with existing or potential landslide masses.
3. Excavation considerations (hard or massive rock, groundwater flows)
4. General considerations of proposed fill masses in canyons or on sidehills
5. Suitability of on-site material for use as compacted fill
6. Recommendations for positioning fill masses, provision for subdrainage, buttressing, and the need for erosion protection on fill slopes.
7. Other recommendations required by the proposed land use, such as the angle of cut slopes, position of drainage terraces, need for rock-fall and/or erosion protection on cut slopes.

D. Drainage considerations

1. Protection from inundation or wave erosion along shorelines
2. Soil permeability, suitability for septic systems.
3. Protection from sheet flood or gully erosion, and debris flows or mud flows.

E. Limitations of study, and recommendations for additional investigations. Considering the scope of work and intended use of the site, provide a statement of the limitations of the study and the need for additional studies outside the stated scope of work.

1. Borings, test pits, and/or trenches needed for additional geologic information
2. Percolation tests needed for design
3. Program of subsurface exploration and testing that is most likely to provide data needed by the soils or civil engineer.
4. Program for long-term monitoring of the site to evaluate geologic conditions (survey hubs, inclinometers, extensometers, etc.).

PROPOSED AMENDMENTS to the Clatsop County Land And Water and Development and Use Ordinance 80-14 (LWDUO) and Standards Document. Proposed new text is shown in bold as follows:

## OCEANFRONT AVERAGING

- I. Amend the Development Ordinance, Section 1.030 Definitions, by adding a new definition of ocean yard to read as follows:

**Ocean yard means a yard measured horizontally and at a right angle from the Statutory Vegetation Line established and described by ORS 390.770 to the nearest point of a building, as building is defined in Section 3.015. An ocean yard may be a front yard, rear yard, or a side yard.**

- II. Amend the LWDUO, Section 3.108 RSA-Single Family Residential Zone (RSA-SFR) and the LWDUO Standards, by adding a new subsection 8, Oceanfront Setback to read as follows, and renumbering subsequent subsections:

**8. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- III. Amend the LWDUO, Section 3.150 Coastal Residential Zone (CR) and LWDUO Standards, by adding a new subsection 8, Oceanfront Setback to read as follows, and renumbering subsequent subsections:

**8. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- IV. Amend the LWDUO, Section 3.260 Rural Community Residential Zone (RCR) and the LWDUO Standards, by adding a new subsection 8, Oceanfront Setback to read as follows, and renumbering subsequent sections:

**8. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- V. Amend the LWDUO, Section 3.332(5) Tourist Commercial Zone (TC) and the LWDUO Standards, Setbacks by adding a new subsection (f) to read as follows:

**f. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- VI. Amend the LWDUO Standards Document to read as follows:

*Done* <sup>5</sup>  
**Section 3.015 Oceanfront Setback.** For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line.

1. The location of the oceanfront setback line for a given lot depends on the location of buildings on lots abutting the oceanshore in the vicinity of the proposed building site and:

- A. For the Clatsop Plains area the location and orientation of the following reference lines

- 1) Described as the construction setback line in section 4.042:

A line 570 feet landward of the Statutory Vegetation Line established and described by ORS 390.770, or the circa 1920's shoreline, whichever is further inland for the area north of Surf Pines to Columbia River south Jetty.

- 2) Described as the Pinehurst construction setback line, in Ordinance 92-90; and

- 3) Described as the Surf Pines construction setback line, in Ordinance 83-17 and extended to include the Charlton property Tax Lot 300.

- B. For the Southwest Coastal Planning Area and elsewhere along the Clatsop County

coast, the location and orientation of the Statutory Vegetation Line or the line of established upland shore vegetation, whichever is further inland.

2. For the purpose of determining the oceanfront setback line, the term "building" refers to a permanent residential or commercial structure attached to a fixed foundation on a lot. The term "building" does not include accessory structures or uses.
3. The oceanfront setback line that is established shall be parallel with the reference lines established in the preceding Section 3.015 (1) and measurements from buildings shall be perpendicular to these reference lines.
4. The setback of a building from these reference lines is measured from the most seaward point of the buildings foundation. A buildings foundation excludes decks, porches, and similar building additions.
5. The oceanfront setback line for a parcel is determined as follows:
  - A. If there are legally constructed buildings within 200 feet of the exterior boundary (side lot lines) of the subject property to both the north and south, the oceanfront setback line for the subject property is the average oceanfront setback of the nearest buildings to the north and south.
  - B. If there are legally constructed buildings within 200 feet of the

1 exterior boundary (side lot lines) of the subject property in only one  
2 direction, either the north or south, the oceanfront setback line for  
3 the subject property is that of the nearest building.

4 C. If there are no legally constructed buildings within 200 feet of the  
5 exterior boundary (side lot lines) of the subject property, the  
6 oceanfront setback line for the subject property shall be established  
7 by the geotechnical report.  
8

9 6. Notwithstanding the above provisions, the Director shall require a  
10 greater oceanfront setback where information in a geotechnical report  
11 prepared pursuant to Section 4.030 indicates that a greater oceanfront  
12 setback is required to protect the proposed building from an identified  
13 coastal erosion hazard.  
14



**Exhibit F**  
**Proposed Amendments to LWDUO and Standards Document**  
**Annotated**



THE EXISTING GEOLOGIC HAZARD RELATED  
DEVELOPMENT CODE AND STANDARDS DOCUMENT SECTIONS TO BE DELETED  
AS FOLLOWS:

**Words in bold are to be added**  
~~Words that are struck out are to be deleted~~

- I. The text of the existing geologic hazard overlay ordinance which is to be deleted:

Section 4.030. Geologic Hazards Overlay District (/GHO).

Section 4.031. Purpose. This district applies to the Arch Cape and Falcon Cove areas of exception for certain Goal 18 beachfront protective structure requirements and to all areas of Clatsop County that are known to be subject to geologic hazards of mass movement, earthquakes, high groundwater, compressible soils, erosion, and deposition. The intent of this district is to establish special criteria and procedures for development in hazardous areas so as to reduce the potential for property damage, personal injury and loss of life.

Section 4.032. Mapping. Areas of geologic hazards are identified on maps included in the inventory documents of Clatsop County's Comprehensive Plan. The boundaries of this special district are consistent with the identified hazardous areas. Boundaries may be changed when site investigations show that a hazard does not exist on particular sites. The procedure for changing district boundaries is specified in Section 5.406 of this Ordinance.

Section 4.033. Development and Use Permitted. Any permitted or conditional development and use allowed in the underlying zone may be permitted within the boundaries of this special district under a Type II procedure, unless a Type III procedure is required in the underlying zone, subject to applicable criteria and development standards and site plan approval.

Section 4.034. Development and Use Criteria. The following limitations and requirements shall apply to all developments proposed for areas subject to the specified geologic hazard unless a detailed site investigation finds that the criteria are not appropriate.

1. Mass Movement and Earthquakes.
  - a. Densities may be increased for mass movement and active slide areas to a maximum of 7,500 square feet in Rural Service Areas when a preliminary site investigation report indicates the area can withstand greater development or when a detailed site investigation report is required and indicates the area can withstand greater development. A registered geologist shall conduct the study and provide a recommendation on the density limitation noted above.

- b. The overall density of the proposed development may exceed the above stated limits through use of a cluster development on stable or less steep portions of the site. See Section S3.152 for Cluster Development standards.
  - c. Densities may be decreased for mass movement or slide areas to a minimum of 1 or 2 dwelling units per acre in Rural Service Areas when the preliminary investigation report or a detailed site investigation report as required indicates unfavorable conditions. A registered geologic shall conduct the study and provide a recommendation on the density limitation noted above.
  - d. Access roads and driveways shall follow natural slope contours to the maximum extent possible.
  - e. Existing stabilizing vegetation, particularly trees, shall not be disturbed during development on slopes of 20% or greater.
2. High Groundwater and Compressible Soils.
- a. Development in areas of high groundwater and compressible soils shall be consistent with regulations of the Department of Environmental Quality and shall incorporate engineering precautions/solutions recommended in the detailed site investigation report.
  - b. In areas of three or more feet depth of IEP soils, a detailed site investigation report will be required.
3. Erosion and Deposition.
- a. Development in areas subject to erosion shall not result in the destruction of stabilizing vegetation or in the exposure of areas to erosion.
  - b. Permanent revegetation shall be started on the site immediately upon completion of construction, final grading or utility placement.
  - c. Technical or structural means of preventing erosion that might result from the proposed development shall be provided if vegetative means are not sufficient and if designed to minimize adverse impacts on water currents, erosion and accretion patterns.
  - d. Structures in areas subject to stream erosion shall be placed no closer than 25 feet to the stream bank in order to maintain a buffer of riparian vegetation and avoid the erosion hazard.
  - e. Residential structures on oceanfront lots in the Arch Cape and Falcon Cove areas of exception to Goal 18 beachfront protective structure requirements and to all

other oceanfront areas of Clatsop County that are known to be subject to geologic hazards shall be set back from the ocean side of the lot the maximum distance permitted by the applicable roadside setback, unless the site investigation report required by Section 4.035 clearly demonstrates that any hazard from shoreline erosion would not threaten the structure an assumed 30 year life span.

**Section 4.035. Procedures.** An application for a permit for development within the GHO district shall be considered under the Type II procedure and shall include the following:

1. A preliminary site investigation report, except for geologic hazards identified by Martin Ross in "A Field Inventory of Geologic Hazards from Silver Point to Cove Beach, Clatsop County, Oregon", which includes evidence of the existence or non-existence of geologic hazards, prepared by a qualified geologist, engineering geologist, soil scientist or civil engineer and submitted by the applicant, consistent with standards in Section S3.700.
2. For areas identified as geologic hazards in the Martin Ross report stated above, for all of the Arch Cape and Falcon Cove oceanfront lots included in the Comprehensive Plan exception to Goal 18, and for areas determined to have evidence of a geologic hazard in Section 4.035(1) above, a detailed site investigation report which describes the extent and severity of the hazard; the capability of the site and adjacent affected areas to support the proposed development and the possible techniques/safeguards that could be used to adequately protect life, property and environment shall be prepared and certified by a registered, engineering geologist or civil engineer and submitted by the applicant, consistent with standards in Section S3.700.
3. Approval of a proposed development in an area of geologic hazards shall be conditioned on the applicant's agreement to provide the safeguards recommended and certified by a qualified engineering geologist or civil engineer and on satisfying the criteria set forth above.

**Section 4.036. Guarantee of Performance.** The applicant for the development permit shall be required to post a performance bond to insure that safeguards recommended in the detailed site investigation report are in fact provided. The method of guarantee, inspection and certification and release of guarantee are specified in Section 10.110 of this Ordinance.

II. Amend Section 5.226 Subdivisions, Preliminary Plat Information by adding a new subsection to read as follows:

27. In areas subject to the geologic hazard overlay zone, a grading plan prepared in conformance with Section 4.040.

III. Amend the Standards Document, Section S2.010 Grading of Building Site, by deleting this section in its entirety:

- ✓ S2.010 Grading of Building Site. The grading of a building site shall conform to the standards contained in Chapter 70 of the 19

79 edition of the Uniform Building Code published by the International Conference of Building Officials for all hazard, active dune and structures allowed in active dune districts.

- ✓ IV Amend the Standards Document Geologic Hazard Requirements by deleting this section in its entirety:

Geologic Hazard Requirements

S3.700. Special Requirements for Hazard Areas. The special requirements applicable in the Hazard maps in the Comprehensive Plan are set forth in S3.700 to S3.708. The general procedures and requirements for approving development in the district are contained in Sections 3.840 through 3.852 of the Clatsop County Land and Water Development and Use Ordinance of 1980. The standards in S3.700 to S3.708 shall be used in conducting such approvals.

S3.702. Preliminary Site Investigation.

S3.704. Detailed Site Investigation for Geologic Hazard Areas. Development in a Geologic Hazards Overlay District requires a detailed site investigation report if the preliminary site investigation report required in Section S3.702 confirms existence of a geologic hazard area or is in a geologic hazard area identified by Martin Ross' report a Field Inventory of Geologic Hazards from Silver Point to Cove Beach, Clatsop County, Oregon. The report shall contain the information listed below together with appropriate identification of information sources and the date of the information.

Before a development permit can be issued, the site investigation report must be approved as part of the development permit approval process. The approved site investigation report shall be referred to in the deed and other documents of sale and shall be recorded with the record of deeds.

1. Background Data in Report. The site investigation report shall contain the following background information:
  - a. The methods used in the investigation and the approximate number of man-hours spent on the site.
  - b. a general analysis of the local and regional topography and geology including the faults, folds, geologic and engineering geologic units and any soil, rock and structural details important to engineering or geologic interpretations.
  - c. a history of problems on and adjacent to the site, which may be derived from discussions with local residents and officials and the study of old photographs, reports and newspaper files.

- d. The extent of the surface soil formation and its relationship to the vegetation of the site, the activity of the land form and the location of the site.
  - e. The following ground photographs of the site with information showing the scale and date of the photographs and their relationship to the topographic map:
    - (1) a view of the general area.
    - (2) The site of the proposed development.
    - (3) Any features which are important to the interpretation of the hazard potential of the site.
    - (4) Unusual natural features and important wildlife habitat.
2. Topography Map. a topography base map of (1 to 100) scale and with a contour interval of (two feet) shall be prepared identifying the following features and shall be accompanied by references to the source and date of information used.
- a. The position of the lot line.
  - b. The boundaries of the property.
  - c. Species identification of major plant communities.
  - d. Any springs, streams, marshy areas or standing bodies of water.
  - e. Areas subject to flooding, including those shown on the flood hazard maps prepared under the HUD National Flood Insurance Program.
  - f. Areas subject to stream erosion and areas exhibiting significant surface erosion due to improper drainage and runoff concentration.
  - g. Geological information, including lithologic and structural details important to engineering and geologic interpretation.
3. Subsurface Analysis. If upon initial investigation it appears there are critical areas where the establishment of geologic conditions at depth is required, a subsurface analysis obtained by drill holes, well logs and other geophysical techniques shall be conducted by the person responsible for the site investigation report to include the following data as appropriate.
- a. The lithology and compaction of all subsurface horizons to bedrock.
  - b. The depth, width, slope and bearing of all horizons containing significant amounts of silt and clay and any other subsurface waters.
  - c. The depth, bearing and capacity of seasonal and permanent aquifers.
  - d. Underlying areas of buried vegetation.
4. Development Proposal. The site investigation report shall include the following information on the proposed development as applicable. The information will be shown on the maps described above or appropriately referenced.
- a. Plans and profiles showing the position and height of each structure, paved area and area where cut and fill is required for the construction.

- b. The percent and location of the surface of the site which will be covered by impermeable or semi-impermeable surfaces.
  - c. Points to preserve for public access.
  - d. a description of the impact of the development on any critical biological habitats.
  - e. a stabilization program for the development describing:
    - 1. how much of the site will be exposed during construction and what measures will be taken to reduce erosion.
    - 2. a revegetation program designed to return open areas to a stable condition as soon as possible following construction.
    - 3. the time of commencement of revegetation planting.
  - f. a description of safeguards that will be provided as part of the proposed development.
  - g. For a logging or farming operation, areas to be protected from vegetation loss or groundwater pollution shall be identified and means for protection described.
5. Special Review for Water Supply or Sewerage. If a well or an on-site sewage disposal system is planned, the proposed location shall be described and the following shall be determined:
- a. The maximum and minimum levels (seasonal extreme) in water table height.
  - b. The expected water needs of the proposed development.
  - c. The water supply capacity and the expected effect of the increased water consumption on the water table.
  - d. Any detrimental contamination of the groundwater, lakes or marshes that may occur.
6. Conclusions in the Report.
- a. The site investigation report shall contain conclusions stating the following:
    - 1. How intended use of the land is compatible with the existing conditions.
    - 2. The existing or potential hazards found during the investigation.
    - 3. The manner for achieving compliance with applicable development criteria and standards.
  - b. Recommended safeguards and mitigation for specific areas and hazards shall be specified.
  - c. Conclusions shall be based on data included in the report and the sources of information and facts shall be referenced.



S3.706. Site Investigation Report Review. The Planning Director, Planning Commission or Board of Commissioners may want to have a technical site investigation report reviewed including the methods actually used to avoid hazards. The Planning Director, Planning Commission or Board of Commissioners may request the owner or developed to pay for a portion or all of the review on behalf of the County.

S3.708. Qualifications. The site investigation report shall be conducted by a registered geologist. The Department of Planning and Development shall maintain a list of qualified geologists.

V. Amend the Standards Document, Section S5.108 Lot Grading by deleting it in its entirety and replacing it with the following

~~S5.108. Lot Grading. Lot grading shall conform to the following standards unless physical conditions demonstrate the propriety of other standards:~~

- ~~1. Cut slopes shall not exceed one and one half feet horizontally to one foot vertically.~~
- ~~2. Fill slopes shall not exceed two feet horizontally to one for vertically.~~
- ~~3. The character of soil for fill and the characteristics of lots made usable by fill shall be suitable for the purpose intended.~~

Lot grading in areas subject to the geologic hazard overlay zone shall conform to the standards of Section 4.040.

VI. Amend the Standards Document S4.300 General Soil Development by deleting this section in its entirety.

#### General Soil Development

S4.300. Purpose. The following standards shall apply to construction activity when: there is a waterway or floodplain on the property; the surface of the construction site will be bare or in a disturbed condition in winter; there is a potential for water pollution from sources other than soil; sediment deposition from the site may result in damage to property downstream; part of the development is planned on soils in Groups 1 or 8; or an underground tile line or natural drainage way will be interrupted by excavation or grading.

S4.302. General Standards. Proper design of erosion control measures and timely establishment of vegetation is essential to avoid erosion problems during and after construction. Alignment, grades, area of disturbed soil and bank slopes should be based on soil erodibility, climatic exposure, geology, proposed vegetative restoration and maintenance considerations. Some features involved in earth construction are more vulnerable to erosion than others and require special design considerations.

#### S4.304. Design Standards for Erosion Control Measures.

- a. Earth Slopes. Erosion of cut or fill slopes is usually caused by water concentrations at the top of the slope flowing down an unprotected bank. Runoff should be diverted to safe outlets by diversions or other means. Slopes should be protected from erosion by quick establishment of vegetative cover, benches or terraces, slope protection structures, mulches, rock or concrete, or a combination of these practices.
- b. Waterways or Causeways. Waterways should be designed to avoid serious erosion problems. Wide channels with flat side slopes lined with grass or other vegetation will usually have very slight erosion. Where channel gradients are steep, concrete linings or grade control structures may be required. Space limitations may make it necessary to use concrete or stone linings. Every effort should be made to preserve natural channels.
- c. Structures for Erosion Control. Erosion can be controlled with grade control structures, energy dissipaters, special culverts, and various types of pipe structures. Structures are expensive and should be used only if vegetation, rock or other measures will not provide adequate erosion control.
- d. Existing Vegetation. Existing vegetation, adequate to control erosion, should be preserved wherever possible. Regeneration of woody plants should be encouraged where acceptable.
- e. Soil Treatment. The ability of soil to sustain vegetation for erosion control must be ascertained. Fertilizer needs should be determined by a soil test. a general recommendation adequate for most situations is 50-50-50 lbs/acre of nitrogen, phosphate and potash at seeding time.
- f. Seedbed Protection. Fertilizer should be incorporated into the soil, where practical, to a depth of 4 inches. Soil should not be too fluffy not too compacted, but friable to permit property seed depth.
- g. Seeding. Composition of seed mixtures should be chosen with consideration given to soil drainage and intended purpose for vegetation. Following recommended rates, dates and seeding procedures, use certified seed to insure mixture-composition, and high purity and germination percentage.
- h. Mulching. Mulching will be needed on difficult seeding sites.

S4.306. Construction Standards. Plans, specifications, and special provisions of a construction contract should show the location, scope and manner of performing erosion control measures. Measures left to the discretion of the contract or engineer should be as few as practicable and the method of payment for such work should be stated in the contract.

Scheduling construction operations is an important factor. A construction schedule that meets the requirements for erosion control should be made a part of the construction project proposal or should be submitted by the contractor for approval by the engineer.

Permanent soil protection of streets and drainage facilities that will divert runoff from unprotected soils should be completed as early as practicable. The area of exposed soil and the duration of exposure should be minimized by proper scheduling. Temporary protection, such as fiber mats, plastic, straw, and fast-growing grasses may be required. Partially completed drainage structures should be inspected carefully during construction to prevent erosion.

Fording streams with equipment should be kept to a minimum, and where frequent crossings will be necessary, temporary bridges or culverts should be used.

Although disturbances of streams, lakes or reservoirs should be avoided during construction, drainage structures, channel changes, and embankment encroachments are sometimes necessary. Specifications and special provisions should include control of the contractor's operation in performing work in these areas.

Diversions or other protective measures may be needed to avoid sediment problems. Embankment slopes that encroach on stream channels should be adequately protected. Where practicable, a protective area of vegetative cover should be felt, or established, between embankments and adjacent stream channels. Borrow and waste disposal areas should be selected with full consideration given to erosion control and restoration. When it became necessary to locate such areas near or in stream channels, special precautions should be taken to minimize erosion and sediment problems. Permits are required by the Division of State Lands for fill and removal activities in channels.

Plans for the control of drainage water must include measures to keep sediment from entering streams and must be completed before borrow or disposal operations begin. Diversion channels, dikes, sediment basins and sediment traps can be used for this purpose. Topsoil should be saved for restoring excavated areas. Final restoration of borrow or waste disposal areas should include grading and establishment of vegetative cover. The restored area should be well drained unless approval is given to convert the pit areas into lakes for fish and wildlife, recreation, stock water or irrigation.

1. No major soil disturbance during major rainy season (Nov.-May) without adequate erosion control practices first installed.
2. Restrict exposure of disturbed soil without cover to the least area required and for the shortest time possible. Do not allow disturbed areas to go unprotected during heavy rain season. Protect areas to be retained from equipment or use as storage areas.
3. All areas of cut or fill except on active dune sand must have topsoil removed to a depth of 6-9 inches and stockpiled for later replacement or reuse.
4. For temporary stabilization, seed topsoil stockpile to Annual Rye Grass 20 lbs./acre; Cereal Oats or Rye 100 lbs./acre; or cover with mulch 2 tons/acre (4 straws deep) or some other material to prevent erosion prior to September 1.

5. Surface water shall be diverted from the construction site and surface and subsurface water sources shall be protected from construction site pollutants.
6. Grading and shaping of construction site should be done during dry weather. Install temporary and permanent stabilization practices as soon after disturbing the area as possible. Provide for removal of surface water. Develop a surface grade of 2% or more away from buildings.
7. Cut banks should be as flat as possible. Rock or concrete retaining walls with seep holes should be considered for banks steeper than 1:1 slope.
8. Water from road ditch should not be dumped over fill banks but on hard ground away from fills.
9. Road culverts should be placed on hard ground with water out letting from culverts onto hard ground in a manner to prevent erosion.
10. On sandy soils, road ditches should be lined (rock, asphalt, half round pipe, etc.) to prevent road shoulder and ditch bottom from erosion.
11. All areas will by necessity be left bare after September 1 shall be seeded to a cover crop (Cereal Oats or Rye 100 lbs./acre, Annual Rye Grass 20 lbs./acre; or Perennial Rye Grass 25 lbs./acre). Mulching and mulching with landscaping is a viable alternative to seeding. Areas in excess of 7% slope must be mulched prior to seeding. If by October 1, seeding has not established itself to the point of being an effective erosion control device, a straw mulch may be required.

12. Recommended seeding mixtures:

- a. New lawn seeding (August 1-September 15, or April 15-May 15)

2 lbs./1,000 sq.ft.	Astoria Bent Grass
3 lbs./1,000 sq.ft.	Creeping Red Fescue

- b. Temporary critical area seeding (August 1-September 30)

Annual Rye Grass - 20 lbs./acre  
 or Cereal Oats or Rye - 100 lbs./acre  
 or Perennial Rye Grass - 25 lbs./acre

- c. Permanent critical area (road cut or fills, permanent open areas)  
 Seedings (April 15-May 15, or August 1-September 30)

Creeping Red Fescue - 10 lbs./acre  
 Perennial Rye Grass - 3 lbs./acre  
 Astoria Bent Grass - 2 lbs./acre

Lotus Major - 2 lbs./acre

d. Dikes

Astoria Bent Grass - 3 lbs./acre

Tall Fescue - 15 lbs./acre

Annual Rye Grass - 3 lbs./acre

No legumes to reduce rodent burrowing

- e. Streambank protection seed on banks that are sloped 3:1 or flatter. Seed between April 15-May 15 or August 1-September 15. Cover with mulch following seeding.

Tall Fescue - 12 lbs./acre

Creeping Red Fescue - 10 lbs./acre

Perennial Rye Grass - 3 lbs./acre

Astoria Bent Grass - 2 lbs./acre

Lotus Major - 2 lbs./acre

13. Fertilizer.

50-70 lbs./acre Nitrogen (N2)

60-100 lbs./acre Phosphate (P205)

60-80 lbs./acre Potash (K20)

14. Lot density activities, such as agriculture, shall be preferred uses in areas of poor drainage and/or boggy lowlands.
15. Commercial activities in wet lowlands when adjacent to the water shall be water-dependent or water-related.
16. Development is to be encouraged in areas located on slight to moderate slopes and having moderately well-drained areas.
17. Development on peat and other compressible soils shall be discouraged.
18. In those areas where development has already occurred on peat and other compressible soils policies contained in the County-wide Element shall apply.

S4.308. Soil Groups for Conservation.

Group Number	Soil Definition	Percent Slope
1	Diked tideland and floodplain soils, poorly drained to well drained	Nearly level
2	Poorly and somewhat poorly drained terrace soils	Less than 7
3	Well drained and moderately	Less than 7

	well drained terrace and upland soils	
4	Deep upland soils	7-12
5	Very deep terrace soils, well drained with gravelly subsurface soil	7-20
6	Steep soils	Greater than 30
7	Shallow soils and rock outcrops	5-30
8	Deep sandy soils, poorly drained to well drained	3-30

**S4.310. Conservation Practices.** Treatment of a critical erosion or sediment producing site may be for the period of construction or may be a permanent measure. These practices are separated into those which are necessary and those which may be optional, depending upon site conditions.

#### Conservation Practices

Soil Groups

	1	2	3	4	5	6	7	8
<u>Necessary Temporary Practices</u>								
Critical planting area	X	X	X	X	X	X	X	X
Mulching						X	X	X
Seasonal construction	X	X		X	X	X		
Topsoiling (stockpiling of topsoil)		X	X	X	X		X	X
<u>Optional Temporary Practices</u>								
Debris basin		X	X	X	X			
Diversion		X	X	X	X	X		
Dike	X							
Filter strip		X	X	X	X	X		
Stream buffer	X							
Mulching	X	X	X	X	X			
<u>Necessary Permanent Practices</u>								
Contoured development				X	X	X		
Critical area planting	X			X	X	X	X	X
Drain (subsurface draining, including foundation drains)		X						
Land grading (surface drainage)	X	X	X	X	X	X		
Maintaining vegetation	X					X	X	X
Mulching								X



<u>Optional Permanent Practices</u>								
Critical area planting		X	X					
Debris basin	X	X	X	X	X			
Dike								
Diversion		X	X	X	X	X		
Drainage (subsurface drainage)	X	X	X	X				
Grade stabilization structure			X	X	X	X		
Grassed waterway	X	X	X	X	X			
Heavy use area protection		X	X	X	X	X	X	X
Maintaining vegetation	X	X	X	X	X	X		
Stream channel stabilization	X							
Streambank protection								
Structure for water control	X		X	X	X	X	X	
Mulching		X	X	X	X	X	X	

**Exhibit B**  
**Staff Report to the Planning Commission**  
**Floodplain Hazards**



## STAFF REPORT

**TO:** Planning Commission

**STAFF:** Rainmar Bartl, Contract Land Use Planner

**HEARING DATE:** June 24, 2003

**REPORT AVAILABLE:** June 17, 2003

**REQUEST:** Legislative Comprehensive Plan text amendments to the Background Report and Goals and Policies regarding Flood Hazard. Clatsop County Land and Water Development and Use Ordinance (80-14) text amendments regarding the Flood Hazard Overlay District.

**APPLICANT:** Clatsop County

**LOCATION:** Countywide

**AUTHORIZATION:** The proposed amendments are being processed as a periodic review amendment, a part of Work Task No.2.

**APPLICABLE CRITERIA** State-wide Planning Goals, Goal #7 Natural Hazards  
Clatsop County Comprehensive Plan, Goals and Policies.

**RECOMMENDATION:** Staff recommends that the Planning Commission, upon review of the materials and testimony, provide a recommendation, including any proposed modifications, to the Board of Commissioners.

## **BACKGROUND INFORMATION**

The proposed amendments consist of three elements. First, amendments to the flood hazard section of the comprehensive plan background report. Second, amendments to the comprehensive plan goals and policies, County-Wide Element Goal #7 – Natural Hazards, Flood Hazard Policies and Ocean and Coastal Lake Shoreland Policies; and Community Plans – Southwest Coastal Community Plan. Third, amendments to the Land and Water Development and Use Code and the Clatsop County Standards Document concerning the Flood Hazard Overlay District.

The proposed amendments to the flood hazard section of the comprehensive plan background report provides updated background information on hazards associated with flooding, particularly information about tsunami hazards.

The comprehensive plan flood hazard policies have been revised to accurately reflect updated background information, the proposed revisions of the development code and the policy direction the county has pursued since the policies were first adopted. The changes also include a number of housekeeping amendments.

The proposed amendments to the Flood Hazard Overlay District are intended to bring the county's standards for development in defined flood hazard areas into compliance with those of the National Flood Insurance Program. The amendments also combine the provisions presently found in the Development Code and the provisions found in the Standards Document. Minor technical amendments have been made to the following provisions of the Flood Hazard Overlay District:

- Definitions
- Administrative provisions
- Standards for granting variances
- General standards concerning anchoring, construction materials and methods, utilities and subdivisions
- Specific standard for residential construction, non-residential construction, manufactured homes, recreational vehicles, floodway encroachments, coastal high hazard areas, and areas of shallow flooding

The proposed amendments to the Flood Hazard Overlay District also include the following optional amendments concerning:

- Critical facilities
- Substantial improvements
- Foundation protection
- Protection of flood storage capacity
- Accessory structures and uses

1 The proposed amendments the Flood Hazard Overlay District includes a new provision  
2 concerning the placement of fish enhancement structures in the floodway.  
3

4 The proposed amendments to the Flood Hazard Overlay District will not alter any of the  
5 flood maps or the flood designations of property. If property is presently not subject to  
6 the Flood Hazard Overlay District, its status will not change.  
7

### 8 **Citizen Involvement**

9

10 All Clatsop County property owners were notified by first class mail of the proposed  
11 amendments regarding flood hazards.  
12

### 13 **Proposed Comprehensive Plan Text Amendments**

14

15 The Comprehensive Plan Background Report will be amended to include the proposed  
16 revisions to the flood hazards section.  
17

18 The proposed Comprehensive Plan Goals and Policies, County-Wide Element Goal #7  
19 – Natural Hazards, Flood Hazard Policies will replace the existing policies in this section.  
20 The Estuarine Resources and Coastal Shorelands, Goal #16 & #17 Ocean and Coastal  
21 Lake Shoreland Policies will be amended to include the revised policy language.  
22 The Southwest Coastal Community Plan will be amended to include the revised policy  
23 language.  
24

### 25 **Proposed Zoning Ordinance Amendments**

26

27 The proposed amendments to the Flood Hazard Overlay District are intended to bring the  
28 county's standards for development in defined flood hazard areas into compliance with  
29 those of the National Flood Insurance Program. The amendments also combine the  
30 provisions presently found in the Development Code and the provisions found in the  
31 Standards Document.  
32

### 33 **CRITERIA AND FINDINGS**

34

35 This is a periodic review amendment.  
36

37 Criteria that must be met or shall be met in adoption of the proposed amendments shall  
38 demonstrate conformance with:  
39

- 40 1 Applicable Statewide Planning Goals
- 41 2 The Clatsop County Comprehensive Plan
- 42

### 43 **Applicable State-wide Planning Goals**

44

1 Staff has reviewed the proposed amendments and applies the following findings and  
2 conclusions to these amendments.

3  
4 There are 19 Statewide Planning goals. Staff has reviewed the proposed amendments and  
5 finds that the following goals are applicable to this request.

6  
7 GOAL 1: CITIZEN INVOLVEMENT

8 *To develop a citizen involvement program that insures the opportunity for citizens to be*  
9 *involved in all phases of the planning process.*

10  
11 **Findings:**

12  
13 The County has provided a "Measure 56 notice" to all county property owners.

14  
15 GOAL 7: AREAS SUBJECT TO NATURAL HAZARDS

16  
17 *Implementation Requirement 4: Local governments will be deemed to comply with Goal*  
18 *7 for coastal and riverine flood hazards by adopting and implementing local floodplain*  
19 *regulations that meet the minimum National Flood Insurance Program (NFIP)*  
20 *requirements.*

21  
22 **Findings:**

23  
24 The proposed amendments to the Flood Hazard Overlay District are intended to bring the  
25 county's standards for development in defined flood hazard areas into compliance with  
26 those of the National Flood Insurance Program.

27  
28 **The Clatsop County Comprehensive Plan**

29  
30 The Clatsop County Comprehensive Plan, Goals and Policies Element contains a Goal 7  
31 Natural Hazards section pertaining to flood hazards and a Goal 16 and 17 Estuarine  
32 Resources and Coastal Shorelands section pertaining to Ocean and Coastal Lake  
33 Shorelands. The Clatsop County Comprehensive Plan, Goals and Policies Element  
34 contains the Southwest Coastal Community Plan.

35  
36 Staff has reviewed the proposed amendment and applies the following findings and  
37 conclusions to these amendments.

38  
39 **Findings:**

40  
41 The comprehensive plan policies related to flood hazard have been revised to accurately  
42 reflect updated background information, the revisions to the Development Code  
43 necessary to ensure that it is consistent with the National Flood Insurance Program, and  
44 the policy direction the county has pursued since the policies were first adopted. Thus,



1 the proposed policies are the functional equivalent of the existing policies and as such are  
2 consistent with them.

3  
4 **Conclusion:**

5  
6 The proposed amendments are consistent with the comprehensive plan.

7  
8 **SUMMARY FINDINGS:** Staff find that the criteria are met for the proposed  
9 amendment.

- 10  
11 • This amendment complies with statewide planning goals.  
12  
13 • The proposed amendments are in compliance with the County Comprehensive  
14 Plan.  
15  
16 • The proposed amendments do not conflict with the LWDUO and Standards  
17 Document as amended.  
18

19 **Process Findings:**

20  
21 A public hearing has been scheduled before the Planning Commission on  
22 June 24, 2003 for the proposed amendments. Appropriate notice has been  
23 given to the Department of Land Conservation and Development (DLCD),  
24 to the public in the form of a newspaper notice, an individual Ballot  
25 Measure 56 notices were mailed to all property owners outside of urban  
26 growth boundaries on May 20, 2003. Two public places were posted with  
27 a notice. Applicable procedural requirements have been met for this  
28 proposed text amendment application.  
29

30 **EXHIBITS**

31  
32 Exhibit A Proposed Comprehensive Plan Background Report  
33 Amendments

34 Exhibit B Existing Comprehensive Plan Background Report - Annotated

35 Exhibit C Proposed Amendments to Comprehensive Plan Policies

36 Exhibit D Proposed Amendments to Land and Water and Development  
37 Use (Or. 80-14) and Standards Document

38 Exhibit E Proposed Amendments to Land and Water and Development  
39 Use (Or. 80-14) and Standards Document - Annotated

40 Exhibit F Letters of Testimony (if any received to date).



**Exhibit A**  
**Proposed Comprehensive Plan**  
**Background Report Amendments**

PROPOSED AMENDMENTS  
BACKGROUND REPORT  
NATURAL HAZARDS  
FLOOD HAZARD RELATED MATERIAL

FLOOD HAZARDS

Clatsop County may experiences flooding from three different sources: stream flooding, ocean flooding and tsunamis.

Stream and Normal Ocean Flooding

Stream flooding in the upland areas of the County is much less severe than in the low, flat coastal and estuary areas. The extent of flooding in the upland areas is most times limited by the narrowness of the stream valleys, an exception being the broader floodplains in the Elsie-Jewell area. Some of the rivers have built up terraces along their banks, which constricts many of the floods to the channel. The major hazard associated with upland flooding is streambank erosion.

The most extensive flooding occurs in the low lying coastal and estuary areas. Coastal streams respond quickly to the rapid runoff caused by the steep topography and low bedrock permeability of the uplands. Flooding is the greatest when stream flooding occurs in conjunction with ocean flooding from high tides and winter storms. Storms that produce the storm surges also bring heavy rains. High tides hold back the high river flows and greatly aggravate lowland flooding along streams.

Ocean flooding also affects diked areas bordering the Columbia River and Youngs Bay when high tides and river flows close the tide gates. While tide gates are closed, storm runoff accumulates and floods the flat, low lying floodplain areas. This flooding is temporary, however, as the water drains through the tide gates on the next low tide.

Tsunami

The other type of coastal flooding hazard is the tsunami. Tsunami is the term applied to waves generated at sea by earthquakes. There are two types of tsunami events, near shore tsunamis and distant tsunamis. Tsunamis have the potential to be by far the most destructive flooding event. The inundation of low lying coastal areas can result in the loss of both property and lives. A near shore tsunamis will be generated by a Cascadia Subduction Zone earthquake (See the Earthquakes section). Scientists estimate that such an earthquake will generate a tsunami with wave runup heights of 16 to 30 feet above the prevailing seas. The first tsunami crest will arrive within 15 - 30 minutes after the earthquake is felt. Multiple waves will occur, with later crests having the potential to be higher than the initial event. After the earthquake and tsunami event, a significant amount of beach erosion can occur as beaches seek to reestablish equilibrium with the new lower elevations of the coastline.

W:\PL\Veronica\Hazards\back ground Flood Hazards codified 6-17-03.doc

1  
2 In 1996, the Oregon Department of Geology and Mineral Industries (DOGAMI), pursuant to  
3 ORS 455.446 and 455.447, prepared maps showing the tsunami inundation zone for the Oregon  
4 coast based on a magnitude 8.8 subduction zone earthquake. The base map for this mapping is  
5 the USGS 7.5 minute maps which are at a scale of 1:24,000. Pursuant to the Oregon Revised  
6 Statutes referenced above, the mapped inundation zone identifies areas where the construction of  
7 certain types of essential facilities and special occupancy structures is restricted.  
8

9 In 1998, DOGAMI completed tsunami hazard mapping for the Seaside-Gearhart area. The study  
10 area extended from north of the Highlands Road to an area in the vicinity of the Johnson rock  
11 quarry south of Peterson Point. The study identified areas of moderate, high and extreme risk  
12 associated with a major Cascadia Subduction Zone earthquake.  
13

14 Tsunamis from earthquakes located at transoceanic sites (e.g., Alaska, Japan, Chile) are termed  
15 distant tsunamis. Researchers have found the wave height of distant tsunamis to be directly  
16 related to the magnitude of the earthquake with which it is associated. The most recent  
17 significant distant tsunami in Clatsop County was the 1964 Good Friday tsunami caused by a  
18 submarine earthquake that occurred off the south coast of Alaska. The tsunami caused  
19 considerable damage to the cities of Warrenton, Seaside, and Cannon Beach. Warrenton suffered  
20 \$20,000 damage, particularly to docks and log rafts in the mill area. Seaside was struck by a wall  
21 of water estimated to be more than 10 feet high, which flowed up the Necanicum River, doing  
22 \$40,000 damage as far inland as the golf course. The surge of water in Cannon Beach was so  
23 great it swept the 200-foot long Elk Creek highway bridge 1/4 mile upstream. Motels along Elk  
24 Creek were badly damaged and much of the business district was flooded.  
25

26 The Federal government has established a warning system that notifies local emergency  
27 preparedness personnel in the event of a far shore tsunami. Generally, 4 to 15 hours of notice can  
28 be given.  
29

### 30 Flood Damage and Protection 31

32 Flood damage is greatest in areas of fast flowing currents. The force of these currents can cause  
33 damage by smashing floating objects against stationary structures, by scouring out channels  
34 under or around structures, eroding away foundations and washing out roads and bridges.  
35

36 Although not an immediate threat to life, flooding in areas outside of rapidly moving water can  
37 cause loss to buildings, equipment, and facilities from water and mud damage. A danger to  
38 safety is contamination of well and drinking water supplies.  
39

40 The federal flood insurance program differentiates between the two types of flood areas  
41 mentioned above by the terms "floodway" and "area of special flood hazard". The floodway is  
42 the flood channel that carries the fast moving floodwater. Areas of special flood hazard are areas  
43 of rising floodwaters without rapid flow.  
44



1 Clatsop County has participated in the National Flood Insurance Program since 1974. A  
2 floodplain ordinance and final maps establishing elevations, boundaries of floodways and special  
3 flood hazard areas was adopted June 21, 1978. Regulations for floodplains and floodways were  
4 adopted in relation to the degree of hazard. No structures for human habitation are allowed in  
5 floodways. In other flood areas, structures must be flood proofed or elevated above the level of a  
6 flood which has a 1% or greater chance of happening in any one year (100 year flood). The flood  
7 elevations determined in coastal areas took coastal flooding and tsunamis into consideration.  
8

9 In addition, Clatsop County, in its planning process, has taken flood hazards into consideration  
10 when determining land use designations. Most of the diked tideland and areas of the County  
11 with broad floodplains have been placed in Exclusive Farm Use (EFU) zones. The EFUs zones  
12 protect agricultural uses which is are compatible with flood areas while limiting the number of  
13 residential and commercial structures  
14

15 The Department of Environmental Quality has rules whereby a sanitarian can deny approval for  
16 an on-site treatment system based on excessive saturation, if frequent flooding occurs, or based  
17 on high groundwater if the water table rises from below. These rules are intended to ensure that  
18 on-site treatment systems function without creating a health hazard or water pollution.  
19  
20

Table 1. Flooding in Clatsop County: 1953 - 1977

Date	Description	Damage (thousands of dollars)
Memorial Day, 1953	Vanport Flood	N/A
February, 1960	Freak Wave	N/A
January, 1964	River Flooding; Astoria - 4.32" of rain in 24 hours	N/A
March, 1964	Tsunami Heavy damage to homes and bridge washout in Cannon Beach. Heavy damage to homes in 6 block area of north Seaside and washouts of 12 th Street, Railroad, and Hwy. 101 bridges.	City of Warrenton 20 City of Seaside 20 private property in Seaside 235 TOTAL for County 1,000
December, 1964 January 1965	Flooding of the Columbia and Nehalem Rivers Damages on Columbia River (Oregon side from Willamette River to mouth of Columbia River)	TOTAL 1,181 Businesses 275 Flood fight & Rehab. 370 Physical Damage 536 Emergency Relief 41 TOTAL 328
December, 1966	Damages on Nehalem River (including Tillamook County)	N/A
December, 1967	Flooding on Necanicum River. Seaside, 3.35" of rain in 48 hours	N/A
December, 1970	High winds and freak wave (damage and overtopping of dikes on Lewis & Clark River, Youngs River, Brownsmead, Knappa, Blind Slough and Gnat Creek. Cannon Beach was declared a special disaster area.)	Cannon Beach 125 Seaside 7 County- mainly agricultural damages 200
January, 1971	Flooding on Neawanna Creek. Seaside, 3.65 " of rain in 48 hours. Crown Camp, 5.6 " of rain in 48 hours with 20-32" of snow in hills.	N/A
December, 1972	High storm tides and heavy rains (100 mph winds reported at Cannon Beach). Seaside - 1.53" of rain in 24 hours with 15-26" snowmelt in hills.	Cannon Beach 75 County- mainly agricultural damages 216.5
	High storm tide (+12 feet). Overtopping of dikes caused flooding in Alderbrook (Astoria) and in Brownsmead causing dike and tidegate washout.	N/A Brownsmead damages 13
	High storm tides and river flooding (tide 2-3 feet above normal). Flooding on the Nehalem River.	TOTAL 203.3

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Date	Description	Damage (thousands of dollars) (estimated total county damages)
January, 1974	State of Oregon declared disaster area.	
December, 1975	Stream flooding. Clatsop Airport - 8.99" of rain in 6 days. Floodgate washout on Skipanon River.	N/A
February, 1976	Storm tides (sea swells were reported as 12-18 feet).	Arch Cape and Cannon Beach 75
December, 1977	High tide and river flooding. Astoria - 3.28" of rain in 24 hours. Overtopping of dikes on Youngs River, Lewis & Clark River, Brownsmead and Svensen Island. Tidegate and road washout occurred on Lewis & Clark Road. Extremely hazardous surf conditions on all beaches.	Damages 80

Sources: The Daily Astorian, U.S. Dept. of Agriculture, Soil Conservation Service, U.S. Army Corps of Engineers, and the National Weather Service.

1 Since 1979, the most severe flooding event occurred in February of 1996. A damage survey  
2 report prepared for the Federal Emergency Management Agency by Clatsop County estimated  
3 that the damage to public facilities, roads and individual property was approximately 2.65  
4 million. Actual damage probably exceeded this figure. Flood damage was heaviest in rural  
5 Clatsop County, especially in the Nehalem River Valley, where the river crested 14 feet above  
6 flood stage. A log jam destroyed a bridge on the Lower Nehalem River, leaving the  
7 neighborhood of Sha-Ne-Mah without any road access. A section of Highway 202 was damaged  
8 resulting in an O-DOT road modification project with an estimated cost of one million dollars.  
9 The Columbia River flooded diked lands in the Brownsmead, Burnside and Svensen island area.  
10 The railroad access to western Clatsop County was closed by a landslide at Aldrich Point. (By  
11 1999, the slide had not been removed). Emergency personnel evacuated residents around the  
12 county, with between 200 and 300 residents being evacuated in the Nehalem River Valley.  
13 National Guard troops distributed sandbags in Westport, Wauana, Seaside and at the Tongue  
14 Point Job Corps Center in Astoria.

15  
16 Although the majority of property owners located in flood hazard areas do not have flood  
17 insurance, claims filed under the Federal Flood Insurance Program can provide some information  
18 on the extent of flood damage and where it is located. Since 1977, 29 property loss claims have  
19 been filed with FEMA; only one of these claims is considered to be a repetitive loss claim. Of  
20 the 29 claims, 14 were filed in the early part of 1996 and are assumed to have been associated  
21 with the February 1996 flood. Although the effect of the 1996 flood was significant, the  
22 information on claims filed under the Federal Flood Insurance Program indicate that flooding has  
23 not been a major problem in the county over the last two decades.

24  
25  
26  
27 (Floodbac



**Exhibit B**  
**Existing Comprehensive Plan**  
**Background Report - Annotated**

PROPOSED AMENDMENTS  
BACKGROUND REPORT

Proposed New Text is shown in **bold**, deleted text is shown in ~~strikethrough~~

NATURAL HAZARDS  
FLOOD HAZARD RELATED MATERIAL

**FLOOD HAZARDS**

Clatsop County **may** experiences flooding from three different sources: stream flooding, ocean flooding and tsunamis.

Stream and Normal Ocean Flooding

Stream flooding in the upland areas of the County is much less severe than in the low, flat coastal and estuary areas. The extent of flooding in the upland areas is most times limited by the narrowness of the stream valleys, an exception being the broader floodplains in the Elsie-Jewell area. Some of the rivers have built up terraces along their banks, which constricts many of the floods to the channel. The major hazard associated with upland flooding is streambank erosion.

The most extensive flooding occurs in the low lying coastal and estuary areas. Coastal streams respond quickly to the rapid runoff caused by the steep topography and low bedrock permeability of the uplands. Flooding is the greatest when stream flooding occurs in conjunction with ocean flooding from high tides and winter storms. Storms that produce the storm surges also bring heavy rains. High tides hold back the high river flows and greatly aggravate lowland flooding along streams.

Ocean flooding also affects diked areas bordering the Columbia River and Youngs Bay when high tides and river flows close the tide gates. While tide gates are closed, storm runoff accumulates and floods the flat, low lying floodplain areas. This flooding is temporary, however, as the water drains through the tide gates on the next low tide.

Tsunami

The other type of coastal flooding hazard is the tsunami. Tsunami is the term applied to waves generated at sea by earthquakes ~~or particularly violent volcanic activity~~. **There are two types of tsunami events, near shore tsunamis and distant tsunamis. Tsunamis have the potential to be by far the most destructive flooding event. The inundation of low lying coastal areas can result in the loss of both property and lives. A near shore tsunamis will be generated by a Cascadia Subduction Zone earthquake (See the Earthquakes section). Scientists estimate that such an earthquake will generate a tsunami with wave runup heights of 16 to 30 feet above the prevailing seas. The first tsunami crest will arrive within 15 - 30 minutes after**

1 the earthquake is felt. Multiple waves will occur, with later crests having the potential to  
2 be higher than the initial event. After the earthquake and tsunami event, a significant  
3 amount of beach erosion can occur as beaches seek to reestablish equilibrium with the new  
4 lower elevations of the coastline.

5  
6 In 1996, the Oregon Department of Geology and Mineral Industries (DOGAMI), pursuant  
7 to ORS 455.446 and 455.447, prepared maps showing the tsunami inundation zone for the  
8 Oregon coast based on a magnitude 8.8 subduction zone earthquake. The base map for  
9 this mapping is the USGS 7.5 minute maps which are at a scale of 1:24,000. Pursuant to  
10 the Oregon Revised Statutes referenced above, the mapped inundation zone identifies areas  
11 where the construction of certain types of essential facilities and special occupancy  
12 structures is restricted.

13  
14 In 1998, DOGAMI completed tsunami hazard mapping for the Seaside-Gearhart area. The  
15 study area extended from north of the Highlands Road to an area in the vicinity of the  
16 Johnson rock quarry south of Peterson Point. The study identified areas of moderate, high  
17 and extreme risk associated with a major Cascadia Subduction Zone earthquake.

18  
19 Tsunamis from earthquakes located at transoceanic sites (e.g., Alaska, Japan, Chile) are  
20 termed distant tsunamis. Researchers have found the wave height of distant tsunamis to be  
21 directly related to the magnitude of the earthquake with which it is associated. The most  
22 recent significant distant tsunami in Clatsop County was the —The 1964 Good Friday  
23 tsunami caused by a submarine earthquake that occurred off the south coast of Alaska.. The  
24 tsunami caused considerable damage to the cities of Warrenton, Seaside, and Cannon Beach.  
25 Warrenton suffered \$20,000 damage, particularly to docks and log rafts in the mill area. Seaside  
26 was struck by a wall of water estimated to be more than 10 feet high, which flowed up the  
27 Necanicum River, doing \$40,000 damage as far inland as the golf course. The surge of water in  
28 Cannon Beach was so great it swept the 200-foot long Elk Creek highway bridge 1/4 mile  
29 upstream. Motels along Elk Creek were badly damaged and much of the business district was  
30 flooded.

31  
32 ~~In addition to severe damage to public and private property, tsunamis carry the threat of loss of~~  
33 ~~life on beaches and other low-lying areas. This accentuates the need for efficient and~~  
34 ~~comprehensive local warning procedures. Tsunamis are detected by the Seismic Sea-Wave~~  
35 ~~Warning System at the Environmental Sciences Services Administration station in Honolulu.~~  
36 ~~Warnings are relayed first to the Oregon State Emergency Services Office and then to county and~~  
37 ~~city personnel along the coast. A tsunami watch means that conditions conducive to the~~  
38 ~~generation of a tsunami have occurred. A tsunami warning means that a tsunami has actually~~  
39 ~~been observed. The Federal government has established a warning system that notifies~~  
40 ~~local emergency preparedness personnel in the event of a far shore tsunami. Generally,~~  
41 ~~Warnings generally give 4 to 15 hours of notice can be given.~~



## Flood Damage and Prevention

Flood damage is greatest in areas of fast flowing currents. The force of these currents can cause damage by smashing floating objects against stationary structures, by scouring out channels under or around structures, eroding away foundations and washing out roads and bridges.

Although not an immediate threat to life, flooding in areas outside of rapidly moving water can cause loss to buildings, equipment, and facilities from water and mud damage. A danger to safety is contamination of well and drinking water supplies.

The federal flood insurance program differentiates between the two types of flood areas mentioned above by the terms "floodway" and "area of special flood hazard". The floodway is the flood channel that carries the fast moving floodwater. Areas of special flood hazard are areas of rising floodwaters without rapid flow.

Clatsop County has participated in the National Flood Insurance Program since 1974. A floodplain ordinance and final maps establishing elevations, boundaries of floodways and special flood hazard areas was adopted June 21, 1978. Regulations for floodplains and floodways were adopted in relation to the degree of hazard. No structures for human habitation are allowed in floodways. In other flood areas, structures must be flood proofed or elevated above the level of a flood which has a 1% or greater chance of happening in any one year (100 year flood). The flood elevations determined in coastal areas took coastal flooding and tsunamis into consideration.

In addition, Clatsop County, in its planning process, has taken flood hazards into consideration when determining land use designations. Most of the diked tideland and areas of the County with broad floodplains have been placed in Exclusive Farm Use (EFU) **zones**. The EFUs zones protect agricultural uses which **are** compatible with flood areas while ~~because it limits~~ the number of residential and commercial structures ~~prone to flood hazards~~.

~~A problem that remains in floodplains in which building is allowed is the possible contamination of wells and water supplies from septic tanks located in frequently flooded areas. While homes are protected against flooding by required elevation, the DEQ presently has no rules to restrict the placement of septic tanks in an area which, for example, floods every year. This is especially a problem along the Necanicum River. While the Federal Insurance Program requires that septic tanks be located so as to avoid impairment or contamination during flooding, the DEQ rules do not at this time implement this requirement. The Department of Environmental Quality has rules whereby a sanitarian can deny approval for an on-site treatment system based on excessive saturation, if frequent flooding occurs, or based on high groundwater if the water table rises from below. These rules are intended to ensure that on-site treatment systems function without creating a health hazard or water pollution.~~

~~Planning for floodplains has occurred through the Environmental Plans completed for each of the planning areas of the County. Some of the Environmental Plans recommend a classification of~~

- 1 ~~flood areas into three classes. This system has been superseded by the classification system of~~
- 2 ~~the National Flood Insurance Program.~~

Table 1. Recent History of Flooding in Clatsop County: 1953 - 1977

Date	Description	Damage (thousands of dollars)
Memorial Day, 1953	Vanport Flood	N/A
February, 1960	Freak Wave	N/A
January, 1964	River Flooding; Astoria - 4.32" of rain in 24 hours	N/A
March, 1964	Tsunami Heavy damage to homes and bridge washout in Cannon Beach. Heavy damage to homes in 6 block area of north Seaside and washouts of 12 th Street, Railroad, and Hwy. 101 bridges.	City of Warrenton 20 City of Seaside 20 private property in Seaside 235 TOTAL for County 1,000
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December, 1967	High winds and freak wave (damage and overtopping of dikes on Lewis & Clark River, Youngs River, Brownsmead, Knappa, Blind Slough and Gnat Creek. Cannon Beach was declared a special disaster area.)	Cannon Beach 125 Seaside 7 County- mainly agricultural damages 200
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January, 1971	High storm tides and heavy rains (100 mph winds reported at Cannon Beach). Seaside - 1.53" of rain in 24 hours with 15-26" snowmelt in hills.	Cannon Beach 75 County- mainly agricultural damages 216.5
December, 1972	High storm tide (+12 feet). Overtopping of dikes caused flooding in Alderbrook (Astoria) and in Brownsmead causing dike and tidegate washout.	N/A Brownsmead damages 13



Date	Description	Damage (thousands of dollars)
January, 1974	High storm tides and river flooding (tide 2-3 feet above normal). Flooding on the Nehalem River. State of Oregon declared disaster area.	TOTAL 203.3 (estimated total county damages)
December, 1975	Stream flooding. Clatsop Airport - 8.99" of rain in 6 days. Floodgate washout on Skipanon River.	N/A
February, 1976	Storm tides (sea swells were reported as 12-18 feet).	Arch Cape and Cannon Beach 75
December, 1977	High tide and river flooding. Astoria - 3.28" of rain in 24 hours. Overtopping of dikes on Youngs River, Lewis & Clark River, Brownsmead and Svensen Island. Tidegate and road washout occurred on Lewis & Clark Road. Extremely hazardous surf conditions on all beaches.	Damages 80

Sources: The Daily Astorian, U.S. Dept. of Agriculture, Soil Conservation Service, U.S. Army Corps of Engineers, and the National Weather Service.

1  
2 Since 1979, the most severe flooding event occurred in February of 1996. A damage survey  
3 report prepared for the Federal Emergency Management Agency by Clatsop County  
4 estimated that the damage to public facilities, roads and individual property was  
5 approximately 2.65 million. Actual damage probably exceeded this figure. Flood damage  
6 was heaviest in rural Clatsop County, especially in the Nehalem River Valley, where the  
7 river crested 14 feet above flood stage. A log jam destroyed a bridge on the Lower  
8 Nehalem River, leaving the neighborhood of Sha-Ne-Mah without any road access. A  
9 section of Highway 202 was damaged resulting in an O-DOT road modification project  
10 with an estimated cost of one million dollars. The Columbia River flooded diked lands in  
11 the Brownsmead, Burnside and Svensen island area. The railroad access to western  
12 Clatsop County was closed by a landslide at Aldrich Point. (By 1999, the slide had not been  
13 removed). Emergency personnel evacuated residents around the county, with between 200  
14 and 300 residents being evacuated in the Nehalem River Valley. National Guard troops  
15 distributed sandbags in Westport, Wauana, Seaside and at the Tongue Point Job Corps  
16 Center in Astoria.

17  
18 Although the majority of property owners located in flood hazard areas do not have flood  
19 insurance, claims filed under the Federal Flood Insurance Program can provide some  
20 information on the extent of flood damage and where it is located. Since 1977, 29 property  
21 loss claims have been filed with FEMA; only one of these claims is considered to be a  
22 repetitive loss claim. Of the 29 claims, 14 were filed in the early part of 1996 and are  
23 assumed to have been associated with the February 1996 flood. Although the effect of the  
24 1996 flood was significant, the information on claims filed under the Federal Flood  
25 Insurance Program indicate that flooding has not been a major problem in the county over  
26 the last two decades.

27  
28  
29 Words and phrases that are in bold are to be added to the text

30  
31 ~~Words and phrases that are struckout are to be deleted from the text~~

32 (Floodbac

**Exhibit C**  
**Proposed Amendments to**  
**Comprehensive Plan Policies**  
**With an Annotated Form**

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**PROPOSED AMENDMENTS**  
**COMPREHENSIVE PLAN**  
**FLOOD HAZARD POLICIES**

Goal 7 - Natural Hazards

Goal

To protect life and property from natural disasters and hazards.

Flood Hazard Policies

1. Clatsop County recognizes the value of an integrated flood hazard management program in order to protect life and property and shall continue participation in the Federal Flood Insurance Program.
2. Through an integrated flood hazard management program, the county will implement and administer appropriate land use planning techniques and construction standards.
3. The County will develop and maintain educational efforts regarding the public benefit derived from an integrated flood hazard management program.
4. The County shall limit land uses in the floodplain to those uses identified by the adopted floodplain regulations as suitable.
5. The County shall strive to make flood hazard information, including that related to tsunamis, available to the public to insure that owners and potential buyers of flood prone land are aware of the hazard.
6. To provide continued flood protection, the County encourages the mMaintenance and repair of existing flood control structures. The construction of new dikes, for the purpose of establishing future development in floodplain areas, shall be discouraged.



- 1 7. Agriculture, forestry, open space and recreation shall be the preferred uses of  
2 flood prone areas.
- 3
- 4 8. The County shall prohibit the placement of hospitals, public schools, nursing  
5 homes, and other similar public uses within areas subject to flooding.
- 6
- 7 9. Subdivisions occurring within floodplain areas shall be encouraged to cluster land  
8 uses outside of the floodplain area leaving the floodplain in open space.
- 9
- 10 10. For specified areas, the County will consider the adoption of regulations requiring  
11 the preparation and implementation of a drainage plan as part of its review and  
12 approval of conditional use permits and development permits.
- 13

14 II. Ocean and Coastal Lake Shorelands Policies D

15  
16 1. Implementation Policy 2

17  
18 The County will provide a detailed review of development permit applications to  
19 ensure compliance with adopted county policies and standards. This review will  
20 include application for State and Federal permits.

21  
22 III. Southwest Coastal Community Plan D

23  
24 A. Coastal and Stream Shorelands Policy 2 /

- 25
- 26 2. In order to provide the greatest view potential for properties throughout the  
27 RURAL LANDS\* and RURAL SERVICE AREA, the Design Review Committee  
28 shall review the effects of new building plans on adjacent property in the RSA.  
29 The building height shall be limited to 26 feet through the Community Plan area,  
30 with ocean front property limited to 18 feet subject to variances approved by the  
31 County Planning Commission.<sup>a</sup>

32  
33 B. Stream/Ocean Flooding

34

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<sup>a</sup> The Rural Community Plans proposed for adoption , Periodic Review Work Task No. 3 will amend this rule to conform to the rural community zones, e.g. Arch Cape Rural Community Residential.

1  
2  
3 Words and phrases that are underlined are to be added to the existing text

4 ~~Words and phrases that are struck out are to be deleted from the existing text~~

5 **"Discussion sections"** are **bolded text** included in some of the sections below, to help guide  
6 discussions about the proposed changes; they will be deleted in the codified amendments  
7

8 **PROPOSED AMENDMENTS**  
9 **COMPREHENSIVE PLAN**  
10 **FLOOD HAZARD POLICIES** D

11  
12 Goal 7 - Natural Hazards

13  
14 Goal

15  
16 To protect life and property from natural disasters and hazards.

17  
18 Flood Hazard Policies

- 19  
20 1. Clatsop County recognizes the value of an integrated flood hazard management  
21 program in order to protect human-life and property and shall continue  
22 participation in the Federal Flood Insurance Program.

- 23  
24 2. ~~Flood hazard engineering works are not the final answer to deter potential~~  
25 ~~flooding; a sound land use program must precede them.~~

26  
27 Through an integrated flood hazard management program, the county will  
28 implement and administer appropriate land use planning techniques and  
29 construction standards.

30  
31 **Discussion: The idea of this policy is sound. However, the**  
32 **reference/relationship between the land use program and "engineering**  
33 **works" has been improved.**

- 34  
35 3. The County will develop and maintain educational efforts regarding the public  
36 benefit derived from an integrated flood hazard management program.



1 There are several creeks in the area which could be subject to flash flooding, the  
2 largest of which is Arch Cape Creek. Areas along the coast, which are subject to  
3 the 100-year flood, have been mapped under the National Flood Insurance  
4 Program and are designated on Flood Insurance Rate Maps.  
5

6 C. Landslides/Erosion Policy 7 /  
7

8 7. Shoreline protective devices such as seawalls, revetments or dikes shall be  
9 evaluated for their impacts on adjacent property, visual impacts, impact on public  
10 access, and potential public costs. Beachfront protective devices shall be  
11 evaluated, both those located east and west of the State Zone Line.  
12

13 D. Landslides/Erosion Policy (8 is deleted) /  
14

15 E. Growth Policy 4 /  
16

17 4. Cut and fill techniques of land development shall be discouraged. Filling  
18 of lots or property shall be carried out only after a site investigation to  
19 insure that adjacent property will not be affected by drainage or storm  
20 water, erosion or visual intrusion onto other property.  
21  
22

floodpolicy

1           **Discussion:** A broad based educational program is an important element in  
2           an effective flood hazard management program.

- 3  
4       43.   ~~A floodplain ordinance shall be adopted which sets forth development standards~~  
5       ~~for the floodway and areas of special flood hazard. Structures for human~~  
6       ~~habitation shall be prohibited from the floodway. Structures in the floodway~~  
7       ~~fringe shall be flood proofed or required to have their first floor elevated at least~~  
8       ~~one foot above the 100 year flood level.~~

9  
10       The County shall limit land uses in the floodplain to those uses identified by the  
11       adopted floodplain regulations as suitable.

12  
13       **Discussion:** This policy is proposed for amendment so that it takes the  
14       form of a policy statement rather than a flood construction standard. In  
15       addition, this policy conflicts with the floodway standard of the development  
16       code. Section S3.656.1 permits encroachments into the floodway under  
17       certain conditions (this is also the FEMA standard).

- 18  
19       54.   The County shall strive to make flood hazard information, including that related  
20       to tsunamis, available to the public to insure that owners and potential buyers of  
21       flood prone land are aware of the hazard.

22  
23       **Discussion:** The policy is proposed for amendment to reflect new  
24       information about the risks associated with a subduction zone tsunami.

- 25  
26       65.   To provide continued flood protection, the County encourages the mMaintenance  
27       and repair of existing flood control structures works shall be encouraged. Where  
28       ~~development occurs or is planned on existing diked lands, the dikes shall be~~  
29       ~~improved and maintained. The cConstruction of new dikes, for the purpose of~~  
30       ~~establishing future development in floodplain areas, shall be discouraged.~~

31  
32       **Discussion:** The existing policy contains three ideas. 1). The maintenance  
33       and repair of "existing flood control works." This is a sound policy and is  
34       proposed for retention in the revised policy language. 2). Generally, diking  
35       districts have the responsibility for maintaining dikes. Requiring the  
36       improvement of dikes before development on diked land can occur may  
37       exceed the county's authority. It is doubtful whether the county has  
38       implemented this policy. Its implementation could be either very expensive,

1 or very restrictive. Therefore, it is recommended that it be deleted from the  
2 policy statement. 3) A policy discouraging the construction of new dikes is a  
3 sound one because of the impact of diking on the floodplain. For this reason,  
4 this portion of the policy is recommended for retention.  
5

- 6 6. ~~All future river or stream crossings shall be designed to provide adequate~~  
7 ~~waterway openings and bridge clearance above flood flows. Existing roads and~~  
8 ~~bridges that are subject to being undermined or washed out will be identified on~~  
9 ~~maps for reference during emergency situations.~~

10  
11 **Discussion:** The first sentence provides appropriate policy direction.  
12 However, the language is similar in intent to existing Policy 11 and Policy 11  
13 is being retained. The task identified in the second sentence has not been  
14 implemented. The county has identified "lifeline routes" that are used for  
15 emergency planning purposes. This fact does not require a policy reference.  
16

- 17 7. Agriculture, forestry, open space and recreation shall be the preferred uses of  
18 flood prone areas.  
19

- 20 8. The County shall prohibit the placement of Community structures such as  
21 hospitals, public schools, nursing homes, and other similar public uses within  
22 areas subject to flooding, etc. will not be built in areas identified as flood prone.  
23

24 **Discussion:** The planning commission is recommending that the county's  
25 flood hazard overlay district be amended to prohibit the listed public  
26 facilities within the 500-year floodplain.  
27

- 28 9. Subdivisions occurring within floodplain areas shall be encouraged to cluster land  
29 uses outside of the floodplain area leaving the floodplain in open space.  
30

- 31 10. ~~Filling and construction within designated floodways shall be prohibited if it~~  
32 ~~presents a danger of raising future flood levels.~~  
33

34 **Discussion:** This is a standard and should be addressed in the development  
35 code and not the comprehensive plan. The flood hazard overlay zone  
36 provisions permit some construction in the floodway. Such construction, if  
37 appropriately considered and designed, may be appropriate and should not  
38 be prohibited by comprehensive plan policy language.

- 1  
2 10. For specified areas, the County will consider the adoption of regulations requiring  
3 the preparation and implementation of a drainage plan as part of its review and  
4 approval of conditional use permits and development permits.

5  
6 **Discussion:** This policy is based on the ideas in the Southwest Coastal  
7 **Community Plan's Landslide/Erosion Policy 8.** Specifically, that there are  
8 areas in the county which are not within a mapped FEMA flood hazard area, but  
9 which may be subject to a flood hazard if appropriate planning to handle storm  
10 drainage is not undertaken. **Implementation of this policy will require the**  
11 **preparation of specific regulations. It is recommended that the development**  
12 **of these regulations be a collaborative process with the Public Work**  
13 **Department.**

14  
15  
16 II. Ocean and Coastal Lake Shorelands Policies

- 17  
18  
19 1. Implementation Policy 2 ~~Clatsop County shall review the following for~~  
20 ~~consistency with the Clatsop County Comprehensive Plan, zoning map, zoning ordinance~~  
21 ~~and Land and Water Use Standards:~~

- 22  
23 a. ~~State and Federal permit applications for uses and activities within shorelands;~~  
24 b. ~~applications for Clatsop County Development Permits; including building and~~  
25 ~~mobile home placement permits, development permits for flood hazard areas; preliminary~~  
26 ~~subdivision plat applications and planned developments within coastal shorelands;~~  
27 c. ~~A 95 project pre-application notifications, by means of referral from and~~  
28 ~~comment to the Clatsop-Tillamook Intergovernmental Council.~~

29  
30 The County will provide a detailed review of development permit applications to  
31 ensure compliance with adopted county policies and standards. This review will  
32 include application for State and Federal permits.

33  
34 **Discussion:** This existing policy is a very broad policy. It is recommended  
35 that the policy is revised to focus on the application of county policies and  
36 standards to development permit applications, including those for federal  
37 and state permits.  
38

1  
2 III. Southwest Coastal Community Plan  
3

4 A. Coastal and Stream Shorelands Policy 2  
5

- 6  
7 2. In order to provide the greatest view potential for properties throughout the  
8 RURAL LANDS\* and RURAL SERVICE AREA, the Design Review Committee  
9 shall review the effects of new building plans on adjacent property in the RSA.  
10 The building height shall be limited to 26 feet through the Community Plan area,  
11 with ocean front property limited to 18 feet subject to variances approved by the  
12 County Planning Commission.

13  
14 ~~Those owners of vacant lots which are located in the "V Zone" of the Clatsop~~  
15 ~~County Floodplain Map should be encouraged to apply for variances to the~~  
16 ~~floodplain elevation height when restrictions are economically unfeasible and~~  
17 ~~adjacent properties do not conform to floodplain elevations.~~ D

18  
19 **Discussion:** The second paragraph needs to be deleted. Implementation of  
20 such a policy would be counter to the intent of FEMA's flood hazard  
21 program.  
22

23  
24 B. Stream/Ocean Flooding  
25

26 There are several creeks in the area which could be subject to flash flooding, the  
27 largest of which is Arch Cape Creek. Areas along the coast, which are subject to  
28 the 100-year flood, have been mapped ~~on the Flood Hazard Boundary Map~~ under  
29 the National Flood Insurance Program and are designated on Flood Insurance  
30 Rate Maps, ~~as being in areas of ocean flooding potential. The areas are identified~~  
31 ~~as those subject to the 100-year coastal flood and high velocity waters (wave~~  
32 ~~action) potentially causing damages similar to those in the floodway. Twenty-~~  
33 ~~three County wide policies were developed and adopted by the County. They can~~  
34 ~~be found in the Hazards section of the Plan.~~ D

35  
36 **Discussion:** This introductory paragraph is being streamlined.  
37  
38

1 C. Landslides/Erosion Policy 7

- 2  
3 7. ~~Development in areas of potential flood hazard shall be controlled by the~~  
4 ~~County Flood Hazard Management Ordinance. Flood hazard Shoreline~~  
5 ~~protective devices such as seawalls, revetments or dikes shall be evaluated~~  
6 ~~for their impacts on adjacent property, visual impacts, impact on public~~  
7 ~~access, and potential public costs. prior to approval. Beachfront protective~~  
8 ~~devices shall be evaluated, both those located east and west of the State~~  
9 ~~Zone Line. using the State Parks Division criteria concerning visual~~  
10 ~~impacts, access, impacts on adjacent property and public cost.~~

11  
12 **Discussion:** This policy combines two areas of concern. Areas  
13 **subject to the flood hazard overlay zone and standards for shoreline**  
14 **protection measures. A reference to the flood hazard overlay**  
15 **ordinance is not required. It is proposed that the policy be revised so**  
16 **that it only addresses shoreline protection measures.**

17  
18 D. Landslides/Erosion Policy 8

- 19  
20 8. ~~In the wetlands or lowland areas in the southern area of Arch Cape or the~~  
21 ~~northern area of Cove Beach which are in the identified Flood Hazard area, a~~  
22 ~~complete drainage plan shall be presented and approved by the County Engineer~~  
23 ~~prior to filling or construction, showing how storm drainage is to be carried off~~  
24 ~~the site without affecting adjacent properties.~~

25  
26 **Discussion:** It is unclear what flood hazard area is referred to in this  
27 **policy. However, if it refers to areas regulated under the FEMA**  
28 **program, then the policy is in conflict with the flood hazard overlay**  
29 **standards because fill is permitted in some areas regulated by the**  
30 **flood hazard overlay zone. In addition, the flood hazard overlay zone**  
31 **does not require a "drainage plan." For these reasons it is**  
32 **recommended that the policy be deleted. However, a policy which**  
33 **seeks to establish regulations to address storm drainage problems**  
34 **associated with fill and development is an appropriate area of concern**  
35 **and thus a new policy along these lines, Flood Hazard Policy 10, is**  
36 **being proposed.**

37  
38 E. Growth Policy 4



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4. Cut and fill techniques of land development shall be discouraged. Filling of lots or property shall be carried out only after a site investigation to insure that adjacent property will not be affected by drainage or storm water, raised flood elevations, erosion or visual intrusion onto other property.

**Discussion: This policy contains a variety of unrelated ideas. The reference to flood elevations is deleted to avoid confusion with standards in the flood hazard overlay zone.**

Words and phrases that are highlighted are to be added to the existing text  
~~Words and phrases that are struck out are to be deleted from the existing text~~

floodpolicy

**Exhibit D**  
**Proposed Amendments to Land and Water**  
**and Development Use (Or. 80-14) and Standards Document**

**PROPOSED AMENDMENTS**

**Land And Water And Development And Use Ordinance (80-14)**

**FLOOD HAZARDS**

**Amend the Development Code, Flood Hazard Overlay District to read as follows:**

**Section 4.000. Flood Hazard Overlay District (/FHO)\***

**Section 4.010. Purpose**

The purpose of the flood hazard overlay district is to identify those areas of the County subject to the hazards of periodic flooding and establish standards and regulations to reduce flood damage or loss of life in those areas. This district shall apply to all areas of special flood hazards within the unincorporated areas of Clatsop County as identified on Flood Insurance Rate Maps (FIRM) and Flood Boundary and Floodway Maps. In advancing these principles and the general purposes of the Clatsop County Comprehensive Plan, the specific objectives are:

1. To promote the general health, welfare and safety of the County.
2. To prevent the establishment of certain structures and land uses unsuitable for human habitation because of the danger of flooding, unsanitary conditions or other hazards.
3. To minimize the need for rescue and relief efforts associated with flooding.
4. To help maintain a stable tax base by providing for sound use and development in flood-prone areas and to minimize prolonged business interruptions.
5. To minimize damage to public facilities and utilities located in flood hazard areas.
6. To insure that potential home and business buyers are notified that property is in a flood area.

**Section 4.011. Definitions**

The following words and phrases shall be interpreted so as to give them the meanings they have in common usage and to give this chapter its most reasonable application:

**"Area of shallow flooding"** means a designated AO or AH zone on the Flood Insurance Rate Map (FIRM). The base flood depth range is from one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

**"Area of special flood hazard"** means the land in the flood plain subject to a one percent or greater chance of flooding in any given year. Designation on maps always includes the letter A or V.

**"Base flood"** means the flood having a one percent chance of being equaled or exceeded in any

given year.

**"Basement"** means any area of the building having its floor subgrade (below ground level) on all sides.

**"Breakaway wall"** means a wall that is not a 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.

**"Coastal high-hazard area"** means the area subject to high velocity waters, including but not limited to, storm surge or tsunamis. The map is designated on a FIRM (Flood Insurance Rate Map) as zone V, V1, V30 or VE zone.

**"Critical facilities"** means those structures or facilities which produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials; hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood; police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood; and public and private facilities that are vital to maintaining or restoring normal services to flooded areas before, during and after a flood.

**"Development"** means any manmade change to improved or unimproved real property, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of special flood hazard.

**"Existing manufactured home park or subdivision"** means one in which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed is completed before the effective date of Clatsop County's floodplain management regulations (1980). The "construction of facilities" includes, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads.

**"Flood" or "flooding"** means a general and temporary condition of partial or complete inundation of normally dry land areas from:

1. The overflow of inland or tidal waters; and/or
2. The unusual and rapid accumulation of runoff of surface waters from any source.

**"Flood Hazard Boundary Map"** means the official map used by the Federal Emergency Management Agency (FEMA) where the boundaries of the areas of special flood hazard have been designated.



1  
2 **"Flood Insurance Rate Map (FIRM)"** means the official map on which the Federal Emergency  
3 Management Agency (FEMA) has delineated areas of special flood hazards.  
4

5 **"Flood insurance study"** means the official report provided by the Federal Emergency  
6 Management Agency (FEMA) that includes flood profiles, the flood boundary-floodway map and  
7 the water surface elevation of the base flood.  
8

9 **"Flood proofing"** means any combination of structural and nonstructural additions, changes, or  
10 adjustments to structures which reduce or eliminate flood damage to real estate or improved real  
11 property, water and sanitary facilities, structures and their contents.  
12

13 **"Highest adjacent grade"** means the highest natural elevation of the ground surface prior to  
14 construction next to the proposed walls of a structure.  
15

16 **"Lowest floor"** means the lowest floor of the lowest enclosed area (including basement). An  
17 unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access or  
18 storage, in an area other than a basement area, is not considered a building's lowest floor,  
19 provided that such enclosure is not built so as to render the structure in violation of the applicable  
20 non-elevation design requirements of this chapter.  
21

22 **"Manufactured home"** means a structure, transportable in one or more sections, which is built on  
23 a permanent chassis and is designed for use with or without a permanent foundation when  
24 connected to the required utilities. The term manufactured home does not include a recreational  
25 vehicle.  
26

27 **"Manufactured home park or subdivision"** means a parcel (or contiguous parcels) of land  
28 divided into two or more manufactured home lots for rent or sale.  
29

30 **"Mean sea level (MSL)"** means the National Geodetic Vertical Datum (NGVD) of 1929 or other  
31 datum, to which base flood elevations shown on the flood insurance rate map are referenced.  
32

33 **"New construction"** means the structures for which the "start of construction" commenced on or  
34 after the effective date of the ordinance codified in this section.  
35

36 **"New manufactured home park or subdivision"** means a manufactured home park or  
37 subdivision for which the construction of facilities for serving the lots on which the manufactured  
38 homes are to be affixed (including at a minimum, the installation of utilities, the construction of  
39 streets, and either final site grading or the pouring of concrete pads) is completed on or after the

1 effective date of the adoption of this chapter.

2  
3 **"Recreation vehicle"** means a vehicle which is (1) built on a single chassis, (2) four hundred  
4 square feet or less when measured at the largest horizontal projection, (3) designed to be  
5 self-propelled or permanently towable by a light-duty truck, and (4) primarily designed as  
6 temporary living quarters for recreational, camping, travel or seasonal use and not for use as a  
7 permanent dwelling.

8  
9 **"Regulatory floodway"** means the channel of a river or other watercourse and the adjacent land  
10 areas that must be reserved in order to discharge the base flood without cumulatively increasing  
11 the water surface elevation more than a designated height.

12  
13 **"Special flood hazard area (SFHA)"** means areas subject to inundation from the waters of a  
14 one-hundred-year flood.

15  
16 **"Start of construction"** includes substantial improvement, and means the date the building  
17 permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation,  
18 addition placement or other improvement was within one hundred eighty days of the permit date.  
19 The actual start means either the first placement of permanent construction of a structure on a  
20 site, such as the pouring of a slab or footings, the installation of piles, the construction of columns  
21 or any work beyond the stage of excavation; or the placement of a manufactured home on a  
22 foundation. Permanent construction does not include land preparation, such as clearing, grading  
23 and filling; nor does it include the installation of streets and walkways; nor does it include  
24 excavation for a basement, footings, piers or foundation or the erection of temporary forms; nor  
25 does it include the installation on the property of accessory buildings, such as garages or sheds  
26 not occupied as dwelling units or not part of the main structure. For a substantial improvement,  
27 the actual start of construction means the first alteration of any wall, ceiling, floor, or other  
28 structural part of a building, whether or not that alteration affects the external dimensions of the  
29 building.

30  
31 **"Structure"** means a walled and roofed building including a gas or liquid storage tank that is  
32 principally above ground, as well as a manufactured home.

33  
34 **"Substantial damage"** means the damage of any origin sustained by a structure whereby the cost  
35 of restoring the structure to its before damage condition would equal or exceed fifty percent of the  
36 market value of the structure before the damage occurred.

37  
38 **"Substantial improvement"** means any combination of repair, reconstruction, or improvement of  
39 a structure, taking place during the life of the structure the cumulative cost of which equals or



1 exceeds 50 percent of the market value of the structure either: (1) before the improvement or  
2 repair is started; or (2) if the structure has been damaged and is being restored, before the  
3 damage occurred. For the purposes of this definition "substantial improvement" is considered to  
4 occur when the first alteration of any wall, ceiling, floor, or other structural part of the building  
5 commences, whether or not that alteration affects the external dimensions of the structure. The  
6 term does not, however, include either: (1) any project for improvement of a structure to correct  
7 existing violations of state or local health, sanitary, or safety code specifications which have been  
8 identified by the local code enforcement official and which are the minimum necessary to assure  
9 safe living conditions; or (2) any alteration of a structure listed on the National Register of Historic  
10 Places or a State Inventory of Historic Places.  
11

#### 12 Section 4.012. Establishment of Flood Zones

13 The areas of special flood hazard identified by the Federal Insurance Administration through a scientific  
14 and engineering report entitled "Flood Insurance Study" for Clatsop County dated July 3, 1978 with  
15 accompanying Flood Insurance Rate Maps (FIRM) and Flood Boundary Maps and any revisions thereto  
16 are hereby adopted by reference and declared to be part of this Ordinance.  
17

#### 18 Section 4.013 Requirements For a Development Permit

19 A development permit shall be required in conformance with the provisions of this chapter and processed  
20 pursuant to Section 4.014. The permit shall be for all structures including manufactured homes, as set  
21 forth in Section 4.011 "Definitions" and for all other development including fill and other activities, also as  
22 set forth in the Section 4.011 "Definitions". Application for a Development Permit shall be made to the  
23 Planning Director on forms furnished by him and shall specifically include the following information:

- 24 1. Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures.
- 25 2. Elevation in relation to mean sea level to which any structure has been flood proofed.
- 26 3. Certification by a registered professional engineer or architect that any non-residential flood  
27 proofed structure meets the flood proofing criteria in Section 4.030.2.
- 28 4. Description of the extent to which any water course will be altered or relocated as a result of  
29 proposed development.  
30

#### 31 Section 4.014 Development and Use Permitted

32 Development permits shall be subject to the standards of Section 4.028 -4.036 and be processed as a  
33 Type I procedure.  
34

#### 35 Section 4.015 Duties and Responsibilities

36 The duties of the Planning Director shall include, but not be limited to the following:

- 37 1. Review all applications to determine that the permit requirements of this ordinance have been  
38 satisfied.
- 39 2. Review all applications to insure that all necessary permits have been obtained from those

Federal, State or local governmental agencies from which prior approval is required.

3. Review all applications in the area of special flood hazard to determine if the proposed development adversely affects the flood-carrying capacity of the special flood hazard area.

#### Section 4.016 Use of Other Base Flood Data

When base flood elevation data has not been provided in accordance with Section 4.012, the Planning Director shall obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, as criteria for requiring that new construction, substantial improvements, or other development comply with Section 4.030.

#### Section 4.018 Information to be Obtained and Maintained by Planning Director

Where base flood elevation data is provided through the flood insurance study or obtained as provided in Section 4.016, the Planning Director shall:

1. Verify and record the actual elevations (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures and whether or not the structure contains a basement.
2. For all new or substantially improved flood proofed structures:
  - A. Verify and record the actual elevation (in relation to mean sea level), to which the structure was flood proofed, and
  - B. Maintain the flood proofing certifications required in Section 4.013.3
3. Maintain for public inspection all records pertaining to the provisions of this ordinance.
4. In coastal high hazard areas, certification shall be obtained from a registered professional engineer or architect that the structure is securely anchored to adequately anchored-pilings or columns in order to withstand velocity waters.

#### Section 4.019 Compliance

No structure or land shall be located, extended, converted or altered without full compliance with the terms of the ordinance codified in this chapter and other applicable regulations.

#### Section 4.020 Alteration of Water Courses

The Planning Director shall:

1. Notify adjacent communities and the Oregon Department of Land Conservation and Development prior to any alteration or relocation of a water course, and submit evidence of such notification to the Federal Emergency Management Agency.
2. Require that maintenance is provided within the altered or relocated portion of said water course so that the flood carrying capacity is not diminished.

#### Section 4.022 Interpretation of FIRM Boundaries

The Planning Director shall make interpretations where needed, as to the exact location of the boundaries

of the areas of special flood hazards. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretations as provided in this Ordinance.

#### Section 4.024 Warning and Disclaimer of Liability

The degree of flood protection required by this Ordinance is considered reasonable for regulatory purposes and is based on engineering and scientific 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 a liability on the part of Clatsop County or by an officer, or employee thereof for any flood damages that result from reliance on this Ordinance or any administrative decision lawfully made there under.

#### Section 4.025 Appeals

An appeal of a Planning Director decision pursuant to this chapter may be appealed in accordance with Section 2.230

#### Section 4.026 Variances

A request for a variance from a standard contained in this chapter shall be reviewed in accordance with the procedures of Section 5.130 - 5.134. The following standards are applicable to a variance request, not those of Section 5.132:

1. Variances shall only be issued upon:
  - A. a showing of good and sufficient cause,
  - B. a determination that failure to grant the variance would result in exceptional hardship to the applicant, and
  - C. 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 or conflict with existing local laws or ordinances.
2. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
3. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
4. Variances may be issued for the repair or rehabilitation of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure without regard to the procedures set forth in the remainder of this section. The criteria of Section 4.026.1 shall not be applied to historic structures.

5. When a variance is granted, the county shall give written notice to the property owner within five days after the decision is final. The notice shall state that: (a) the structure or manufactured home will be allowed to be built or placed with the lowest floor elevation at or below the base flood elevation, and (b) that the issuance of the variance to construct a structure below the base flood level will result in increased premium rates for flood insurance as high as twenty-five dollars for every one hundred dollars of insurance coverage, and (c) such construction below the base flood level increases the risk to life and property. The above notification shall be maintained with a record of all variance actions.
6. Variance Time Limit. Authorization of a variance shall conform to the requirements of Section 5.134.

#### Section 4.028 General Standards

In all areas of special flood hazards as presented on the FIRM, the following standards shall apply for all new construction and substantial improvements:

1. Anchoring:
  - A. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure.
  - B. All manufactured homes shall be anchored to resist flotation, collapse, or lateral movement by providing over-the-top and frame ties to ground anchors. Specific requirements shall be that:
    - 1) Over-the-top ties be provided at each end of the manufactured home, with two additional ties per side at intermediate locations and manufactured homes less than fifty (50) feet long requiring one additional tie per side.
    - 2) Frame ties be provided at each corner of the home with five additional ties per side at intermediate points and manufactured homes less than fifty (50) feet long requiring four additional ties per side.
    - 3) All components of the anchoring system be capable of carrying a force of 4,800 pounds; and
    - 4) Additions to the manufactured home be similarly anchored.
  - C. An alternative method of anchoring may involve a system designed to withstand a wind force of ninety (90) miles per hour or greater. Certification must be provided to the Building Official that this standard has been met.
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 or substantial improvements shall be constructed by methods and practices that minimize flood damage.
  - C. Electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities shall be elevated to one foot above flood level 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

- 1 infiltration of flood waters into the system.
- 2 B. New and replacement sanitary sewage systems shall be designed to minimize or eliminate
- 3 infiltration of flood waters into the systems and discharges from the systems into flood waters.
- 4 C. On-site waste disposal systems shall be located to avoid impairment to them or contamination
- 5 from them during flooding.
- 6
- 7 4. Subdivision Proposals:
- 8 A. All subdivision proposals shall be consistent with the need to minimize flood damage.
- 9 B. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and
- 10 water systems located and constructed to minimize flood damage.
- 11 C. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood
- 12 damage.
- 13 D. Base flood elevation data shall be provided for subdivision proposals and other proposed
- 14 developments of fifty lots or greater or five acres, whichever is less.
- 15
- 16 5. Critical Facilities: Critical facilities shall be constructed on properly compacted fill and have the lowest
- 17 floor (including basement) elevated at least one foot above the elevation of the 500-year flood.
- 18
- 19 6. Review of Development Permits: Where elevation data is not available, either through the flood
- 20 insurance study or from other administrative source, applications for development permits shall be
- 21 reviewed to assure that proposed construction will be reasonably safe from flooding. The test of
- 22 reasonableness is a local judgment and includes use of historical data, high water marks,
- 23 photographs of past flooding, etc. where available. Failure to elevate to at least two feet above grade
- 24 in these zones may result in higher insurance rates.
- 25

#### 26 Section 4.030 Specific Standards

27 In all areas of special flood hazards where base flood elevation data has been provided, the following  
28 provisions are required:

- 29 1. Residential Construction: New construction or substantial improvement of any residential structure
- 30 shall have the lowest floor, including basement, elevated to one foot above the base flood elevation.
- 31 Fully enclosed areas below the lowest floor that are subject to flooding shall be designed to
- 32 automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of
- 33 floodwaters. Designs for meeting this requirement must either be certified by a registered
- 34 professional engineer or architect or must meet or exceed the following minimum criteria: a) a
- 35 minimum of two openings having a total net area of not less than one (1) square inch for every square
- 36 foot of enclosed area subject to flooding shall be provided; b) the bottom of all openings shall be no
- 37 higher than one (1) foot above grade; and c) openings may be equipped with screens, louvers, or
- 38 other coverings or devices provided that they permit the automatic flow of floodwaters in both
- 39 directions.

- 1  
2 2. Non-Residential Construction: New construction or substantial improvement of any commercial,  
3 industrial, or other non-residential structure shall either have the lowest floor, including basement,  
4 elevated to one (1) foot above the base flood elevation or, together with attendant utility and sanitary  
5 facilities, shall: a) be flood proofed so that below this level the structure is water tight with walls  
6 substantially impermeable to the passage of water; b) have structural components having the  
7 capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and c) be certified  
8 by a registered professional engineer or architect that the design and methods of construction are in  
9 accordance with standards of practice for meeting provisions of this section based on their  
10 development and/or review of the structural design, specifications and plans. Such certification shall  
11 be provided as set forth in Section 4.018.2. Fully enclosed areas below the lowest floor that are  
12 subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior  
13 walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must  
14 either be certified by a registered professional engineer or architect or must meet or exceed the  
15 following minimum criteria: a) a minimum of two openings having a total net area of not less than one  
16 (1) square inch for every square foot of enclosed area subject to flooding shall be provided; b) the  
17 bottom of all openings shall be no higher than one (1) foot above grade; and c) openings may be  
18 equipped with screens, louvers, or other coverings or devices provided that they permit the automatic  
19 flow of floodwaters in both directions.  
20  
21 3. Foundation Protection: A registered professional civil engineer shall develop or review the structural  
22 design, specifications and plans for the foundation of the building and shall certify that the design and  
23 methods of construction are in accordance with accepted practices to withstand flotation, collapse,  
24 lateral movement, erosion and scour, undermining, and the effects of water and wind acting  
25 simultaneously on all building components during the base flood.  
26  
27 4. Protection of Floodplain Storage Capacity: Whenever any portion of a floodplain is authorized for  
28 development, the volume of space occupied by the authorized fill below the base flood elevation shall  
29 be compensated for and balanced by a hydraulically equivalent volume of excavation taken from  
30 below the base flood elevation. Any such excavations shall be constructed to drain freely to the  
31 watercourse. No area below the waterline of a pond or other body of water can be credited as a  
32 compensating excavation.  
33  
34 5. Manufactured Homes:  
35 A. Manufactured homes that are to be placed or substantially improved on sites within Zone A1-A30,  
36 AH, and AE and located: i) outside of a manufactured home park or subdivision, ii) in a new  
37 manufactured home park or subdivision iii) in an expansion of an existing manufactured home  
38 park or subdivision or iv) in an existing manufactured home park or subdivision on which a  
39 manufactured home has incurred substantial damage as the result of a flood shall be elevated on



a permanent foundation such that the lowest floor of the manufactured home is elevated to one foot above the base flood elevation and securely anchored to an adequately anchored foundation system to resist flotation collapse and lateral movement.

- B. Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A1-30, AH and AE that are not subject to provision of 5.a above shall be elevated so that either: i) the lowest floor of the manufactured home is elevated to one foot above the base flood elevation and securely anchored to an adequately anchored foundation system to resist flotation collapse and lateral movement; or ii) the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

- C. No manufactured home shall be placed in a coastal high hazard area, except in an existing manufactured home park or existing manufactured home subdivision.

- 6. Recreation Vehicle: All recreational vehicles to be placed on sites within zone A1-30, AH, AO and AE shall either: a) be on the site for fewer than 180 consecutive days and be fully licensed and ready for highway use; or, b) meet the permit requirements of Section 4.013 and the elevation and anchoring requirements for manufactured homes listed in Section 4.030.5. A recreation vehicle is ready for highway use if it is 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.

#### 7. Standards for Accessory Structures and Uses

- A. Residential accessory structures shall require a development permit pursuant to Section 4.013. If the accessory structure is valued at more than 10% of the residential structure, all requirements of the flood hazard overlay district shall apply. Otherwise, the applicant need not satisfy the submittal requirements of Section 4.013.1 - 4 or the standards of Sections 4.028 and 4.030, provided that:

- 1) The floor area of all floors of the accessory structure totals 600 square feet or less.
- 2) The accessory structure shall be used only for parking and storage.
- 3) The accessory structure shall be designed to have low flood damage potential.
- 4) The accessory structure shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of flood waters.
- 5) The accessory structure shall be firmly anchored to prevent flotation that may result in damage to other structures.
- 6) All service facilities, such as electrical and heating equipment associated with the accessory structure, shall be elevated to a height of one foot above the base flood elevation.

- B. When accessory structures built under the provisions of this section exceed a value greater than

ten (10) percent of the value of the principal residential structure, substantial increases in insurance rates may result.

#### Section 4.032 Floodway

Located within areas of special flood hazard are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, erosion potential, the following provisions apply:

1A. Encroachments, including fill, new construction, substantial improvements, and other development is prohibited unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

A registered civil engineer shall certify all analysis.

1B. Fish enhancement structures shall be permitted where a qualified hydraulic or hydrology professional provides a feasibility analysis and certification that the project was designed to keep any rise in 100-year flood levels as close to zero as practicable and that no structure will be impacted by the development. In making the determination that the project was designed to keep any rise in 100-year flood levels as close to zero as practicable and that no structure will be impacted by the development, the analysis shall have considered the cumulative impact of the proposed project in conjunction with other developments that have been approved in the floodway in the vicinity of the proposed project.

2. The county may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the county first applies for a conditional FIRM and floodway revision, fulfils the requirements for such revisions and receives the approval of the Federal Emergency Management Agency.

3. If Section 4.032 (1)A or (2) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 4.028 and 4.030.

4. Where no regulatory floodway is designated, no new construction, substantial improvement, or other development, including fill, shall be permitted within the A1-30 and AE zones unless it is demonstrated that the cumulative effect of the proposed development, when combined with other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point in the community.

#### Section 4.034 Coastal High Hazard Area

Coastal high hazard areas (Zones V1-30, VE and V) are located within the areas of special flood hazard. These areas have special flood hazards associated with high velocity waters from tidal surges, and therefore, in addition to meeting all applicable provisions in this chapter, the following provisions shall also apply:

1. All new construction and substantial improvements 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 to 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 any given year (one-hundred-year mean recurrence interval);
  - C. 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 subsections (1)(A) and (1)(B) above.
2. The Planning Department shall 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 and whether or not such structures contain a basement. A record of all such information shall be retained.
3. All new construction shall be located landward of the reach of mean high tide.
4. All new construction and substantial improvements shall have the space below the lowest floor either free of obstruction or constructed with nonsupporting breakaway walls, open wood latticework 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 ten and no more than twenty pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of twenty 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 a 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 (one-hundred-year mean recurrence interval).
5. 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.
6. The use of fill for structural support of buildings is prohibited.
7. Manmade alteration of sand dunes which would increase potential flood damage is prohibited.
8. No manufactured home shall be placed in a coastal high hazard area, except in an existing manufactured home park or existing manufactured home subdivision. Such a manufactured home shall be placed in conformance with the requirements of Section 4.030.5.B.
9. Recreational vehicles shall be placed on the site for fewer than 180 consecutive days and be fully

licensed and ready for highway use. A recreation vehicle is ready for highway use if it is 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.

Section 4.036 Specific Standards for Areas of Shallow Flooding (AO and AH Zone)

In all areas of special flood hazards designated as areas of shallow flooding, the following provisions shall apply:

1. All new construction and substantial improvements of residential structures shall have the lowest floor including basement elevated to one foot plus the depth number specified on the FIRM above the highest adjacent grade on the property. The adjacent grade is defined to be the natural or existing grade of the site prior to the proposed site alteration. If no depth number is specified on the FIRM, the lowest floor including basement shall be elevated to at least two feet above the highest adjacent grade.
2. All construction and substantial improvement of non-residential structures shall:
  - A. Have the lowest floor including basement elevated to one foot plus the depth number specified on the FIRM above the highest adjacent grade on the property. The adjacent grade is defined to be the natural or existing grade of the site prior to the proposed site alteration. If no depth number is specified on the FIRM, the lowest floor including basement shall be elevated to at least two feet above the highest adjacent grade; or
  - B. Together with attendant utility and sanitary facilities be completely flood proofed to meet the flood proofing standard of Section 4.030.2
3. Provide adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.
- II. Amend the Standards Document, Section S3.650- 3.660, Flood Hazard Requirements by deleting the section in its entirety and replacing Section S3.650 with Tsunami Inundation Zone, Review Required.

Section S.3.650 Tsunami Inundation Zone, Review Required

Pursuant to OAR 632-05-050 Tsunami Inundation Zone, persons proposing new construction of or the conversion to essential facilities, hazardous facilities, major structures, or special occupancy structures are required to contact the Oregon Department of Geology and Mineral Industries (DOGAMI) at the earliest reasonable date for a consultation regarding the requirements of ORS 455.446 and 455.447 that pertain to their proposed facility or structure. As used in this section, "essential facility" means hospitals and other medical facilities having surgery and emergency treatment areas, fire and police stations, tanks or other structures containing housing or supporting water or fire suppression materials or equipment required for the protection of essential or hazardous facilities or special occupancy structures, emergency vehicle shelters and garages, structures and equipment in emergency-preparedness centers, standby power generating equipment for essential facilities, and structures and equipment in government

1 communication centers and other facilities required for emergency response. As used in this section,  
2 "hazardous facility" means structures housing supporting or containing sufficient quantities of toxic or  
3 explosive substances to be of danger to the safety of the public if released. As used in this section,  
4 "special occupancy structure" means covered structures whose primary occupancy is public assembly  
5 with a capacity greater than 300 persons, buildings with a capacity greater than 250 individuals for every  
6 public, private or parochial school through secondary level or child care centers, buildings for colleges or  
7 adult education schools with a capacity greater than 500 persons, medical facilities with 50 or more  
8 resident, incapacitated patients not included in facilities mentioned above, jails and detention facilities, and  
9 all structures and occupancies with a capacity greater than 5,000 persons.

10  
11 Section S. 3.655 Verification of Review

12 Prior to the issuance of a development permit for a regulated structure or facility, the developer of that  
13 structure or facility shall present verification of consultation with DOGAMI, or verification of an exception.  
14  
15

**Exhibit F**  
**Letters of Testimony**



**Exhibit E**  
**Proposed Amendments to Land and Water**  
**and Development Use (Or. 80-14)**  
**and Standards Document - Annotated**

1 PROPOSED AMENDMENTS – FLOOD HAZARDS

2  
3 Words and phrases that are underlined are to be added to the text  
4 Words and phrases that are struckout are to be deleted from the text  
5

6 I Amend the Land and Water Development Code, Section 4.000 Flood Hazard Overlay  
7 District to read as follows.  
8

9 Section 4.000. Flood Hazard Overlay District (/FHO)\*.  
10

11 Section 4.010. Purpose. This district is intended The purpose of the flood hazard  
12 overlay district is to identify and recognize those sections areas of the County subject  
13 to the hazards of periodic flooding and to establish ~~special standards and regulations to~~  
14 reduce flood damage or loss of life in those areas. This district shall apply to all areas  
15 of special flood hazards within the unincorporated areas of Clatsop County as identified  
16 on Flood Insurance Rate Maps (FIRM) and Flood Boundary and Floodway Maps. In  
17 advancing these principles and the general purposes of the Clatsop County  
18 Comprehensive Plan, the specific objectives are:  
19

- 20 1. To promote the general health, welfare and safety of the County.  
21 2. To prevent the establishment of certain structures and land uses unsuitable for  
22 human habitation because of the danger of flooding, unsanitary conditions or  
23 other hazards.  
24 3. To minimize the need for rescue and relief efforts associated with flooding.  
25 4. To help maintain a stable tax base by providing for sound use and development  
26 in flood-prone areas and to minimize prolonged business interruptions.  
27 5. To minimize damage to public facilities and utilities located in flood hazard areas.  
28 6. To insure that potential home and business buyers are notified that property is in  
29 a flood area.  
30

31 Section 4.011. Definitions. The following words and phrases shall be  
32 interpreted so as to give them the meanings they have in common usage and to  
33 give this chapter its most reasonable application:  
34

35 “Area of shallow flooding” means a designated AO or AH zone on the  
36 Flood Insurance Rate Map (FIRM). The base flood depth range is from one to  
37 three feet; a clearly defined channel does not exist; the path of flooding is  
38 unpredictable and indeterminate; and velocity flow may be evident. Such  
39 floodings is characterized by ponding or sheet flow.  
40

41 “Area of special flood hazard” means the land in the flood plain subject to  
42 a one percent or greater chance of flooding in any given year. Designation on  
43 maps always includes the letter A or V.  
44

45 “Base flood” means the flood having a one percent chance of being



1 equaled or exceeded in any given year.

2  
3 □Basement□ means any area of the building having its floor subgrade  
4 (below ground level) on all sides.

5  
6 □Breakaway wall□ means a wall that is not a part of the structural support  
7 of the building and is intended through its design and construction to collapse  
8 under specific lateral loading forces, without causing damage to the elevated  
9 portion of the building or supporting foundation system.

10  
11 □Coastal high-hazard area□ means the area subject to high velocity  
12 waters, including but not limited to, storm surge or tsunamis. The map is  
13 designated on a FIRM (Flood Insurance Rate Map) as zone V, V1 □ V30 or VE  
14 zone.

15  
16 "Critical facilities" means those structures or facilities which produce, use,  
17 or store highly volatile, flammable, explosive, toxic, and/or water-reactive  
18 materials; hospitals, nursing homes, and housing likely to contain occupants  
19 who may not be sufficiently mobile to avoid death or injury during a flood; police  
20 stations, fire stations, vehicle and equipment storage facilities, and emergency  
21 operations centers that are needed for flood response activities before, during,  
22 and after a flood; and public and private facilities that are vital to maintaining or  
23 restoring normal services to flooded areas before, during and after a flood.

24  
25 □Development□ means any manmade change to improved or unimproved real  
26 property, including but not limited to buildings or other structures, mining,  
27 dredging, filling, grading, paving, excavation or drilling operations located within  
28 the area of special flood hazard.

29  
30 □Existing manufactured home park or subdivision□ means one in which  
31 the construction of facilities for servicing the lots on which the manufactured  
32 homes are to be affixed is completed before the effective date of Clatsop  
33 County's floodplain management regulations (1980). The □construction of  
34 facilities" includes, at a minimum, the installation of utilities, the construction of  
35 streets, and either final site grading or the pouring of concrete pads.

36  
37 □Flood□ or □flooding□ means a general and temporary condition of partial  
38 or complete inundation of normally dry land areas from:

- 39 1. The overflow of inland or tidal waters; and/or  
40 2. The unusual and rapid accumulation of runoff of surface waters from  
41 any source.

42  
43 □Flood Hazard Boundary Map□ means the official map used by the Federal  
44 Emergency Management Agency (FEMA) where the boundaries of the areas of

1 special flood hazard have been designated.

2  
3 □Flood Insurance Rate Map (FIRM)□ means the official map on which the  
4 Federal Emergency Management Agency (FEMA) has delineated areas of special  
5 flood hazards.

6  
7 □Flood insurance study□ means the official report provided by the Federal  
8 Emergency Management Agency (FEMA) that includes flood profiles, the flood  
9 boundary-floodway map and the water surface elevation of the base flood.

10  
11 □Flood proofing□ means any combination of structural and nonstructural  
12 additions, changes, or adjustments to structures which reduce or eliminate flood  
13 damage to real estate or improved real property, water and sanitary facilities,  
14 structures and their contents.

15  
16 □Highest adjacent grade□ means the highest natural elevation of the  
17 ground surface prior to construction next to the proposed walls of a structure.

18  
19 □Lowest floor□ means the lowest floor of the lowest enclosed area  
20 (including basement). An unfinished or flood-resistant enclosure, usable solely  
21 for parking of vehicles, building access or storage, in an area other than a  
22 basement area, is not considered a building's lowest floor, provided that such  
23 enclosure is not built so as to render the structure in violation of the applicable  
24 non-elevation design requirements of this chapter.

25  
26 □Manufactured home□ means a structure, transportable in one or more  
27 sections, which is built on a permanent chassis and is designed for use with or  
28 without a permanent foundation when connected to the required utilities. The  
29 term manufactured home does not include a recreational vehicle.

30  
31 □Manufactured home park or subdivision□ means a parcel (or contiguous  
32 parcels) of land divided into two or more manufactured home lots for rent or sale.

33  
34 □Mean sea level (MSL)□ means the National Geodetic Vertical Datum  
35 (NGVD) of 1929 or other datum, to which base flood elevations shown on the  
36 flood insurance rate map are referenced.

37  
38 □New construction□ means the structures for which the □start of  
39 construction□ commenced on or after the effective date of the ordinance codified  
40 in this section.

41  
42 □New manufactured home park or subdivision□ means a manufactured  
43 home park or subdivision for which the construction of facilities for serving the  
44 lots on which the manufactured homes are to be affixed ( including at a

1 minimum, the installation of utilities, the construction of streets, and either final  
2 site grading or the pouring of concrete pads) is completed on or after the  
3 effective date of the adoption of this chapter.

4  
5 □Recreation vehicle□ means a vehicle which is (1) built on a single  
6 chassis, (2) four hundred square feet or less when measured at the largest  
7 horizontal projection, (3) designed to be self-propelled or permanently towable by  
8 a light-duty truck, and (4) primarily designed as temporary living quarters for  
9 recreational, camping, travel or seasonal use and not for use as a permanent  
10 dwelling.

11  
12 □Regulatory floodway□ means the channel of a river or other watercourse  
13 and the adjacent land areas that must be reserved in order to discharge the base  
14 flood without cumulatively increasing the water surface elevation more than a  
15 designated height.

16  
17 □Special flood hazard area (SFHA)□ means areas subject to inundation  
18 from the waters of a one-hundred-year flood.

19  
20 □Start of construction□ includes substantial improvement, and means the  
21 date the building permit was issued, provided the actual start of construction,  
22 repair, reconstruction, rehabilitation, addition placement or other improvement  
23 was within one hundred eighty days of the permit date. The actual start means  
24 either the first placement of permanent construction of a structure on a site, such  
25 as the pouring of a slab or footings, the installation of piles, the construction of  
26 columns or any work beyond the stage of excavation; or the placement of a  
27 manufactured home on a foundation. Permanent construction does not include  
28 land preparation, such as clearing, grading and filling; nor does it include the  
29 installation of streets and walkways; nor does it include excavation for a  
30 basement, footings, piers or foundation or the erection of temporary forms; nor  
31 does it include the installation on the property of accessory buildings, such as  
32 garages or sheds not occupied as dwelling units or not part of the main structure.  
33 For a substantial improvement, the actual start of construction means the first  
34 alteration of any wall, ceiling, floor, or other structural part of a building, whether  
35 or not that alteration affects the external dimensions of the building.

36  
37 □Structure means a walled and roofed building including a gas or liquid  
38 storage tank that is principally above ground, as well as a manufactured home.

39  
40 □Substantial damage□ means the damage of any origin sustained by a  
41 structure whereby the cost of restoring the structure to its before damage  
42 condition would equal or exceed fifty percent of the market value of the structure  
43 before the damage occurred.  
44

1        □Substantial improvement□ means any combination of repair,  
2 reconstruction, or improvement of a structure, taking place during the life of the  
3 structure the cumulative cost of which equals or exceeds 50 percent of the  
4 market value of the structure either: (1) before the improvement or repair is  
5 started; or (2) if the structure has been damaged and is being restored, before the  
6 damage occurred. For the purposes of this definition "substantial improvement"  
7 is considered to occur when the first alteration of any wall, ceiling, floor, or other  
8 structural part of the building commences, whether or not that alteration affects  
9 the external dimensions of the structure. The term does not, however, include  
10 either: (1) any project for improvement of a structure to correct existing violations  
11 of state or local health, sanitary, or safety code specifications which have been  
12 identified by the local code enforcement official and which are the minimum  
13 necessary to assure safe living conditions; or (2) any alteration of a structure  
14 listed on the National Register of Historic Places or a State Inventory of Historic  
15 Places.

16  
17 Section 4.011 4.012. Establishment of Flood Zones. The areas of special flood hazard  
18 identified by the Federal Insurance Administration through a scientific and engineering  
19 report entitled "Flood Insurance Study" for Clatsop County dated July 3, 1978 with  
20 accompanying Flood Insurance Rate Maps (FIRM)s and Flood Boundary Maps and any  
21 revisions thereto are hereby adopted by reference and declared to be part of this  
22 Ordinance.

23  
24 Section 4.012. 4.013 Establishment of Building Permit and Requirement For a  
25 Development Permit. A building permit and development permit shall be required in  
26 conformance with the provisions of this section chapter and processed pursuant to  
27 Section 4.013 4.014. The permit shall be for all structures including manufactured  
28 homes, as set forth in the Section 4.011 "Definitions" and for all other development  
29 including fill and other activities, also as set forth in the Section 4.011 "Definitions".  
30 Application for a building permit shall be made to the Building Official and for a  
31 Development Permit shall be made to the Planning Director on forms furnished by them  
32 - him and shall specifically include the following information:

- 33  
34 1. Elevation in relation to mean sea level, of the lowest floor (including basement)  
35 of all structures.  
36 2. Elevation in relation to mean sea level to which any non-residential structure that  
37 has been flood proofed.  
38 3. Certification by a registered professional engineer or architect that any non-  
39 residential flood proofed structure meets the flood proofing criteria in Section  
40 S3.652(2). 4.030.2.  
41 4. Description of the extent to which any water course will be altered or relocated as  
42 a result of proposed development.  
43

44 Section 4.013 4.014. Development and Use Permitted. Development permits shall be  
45 subject to the standards of Section S3.6500-S3.660 4.028 -4.036 and be processed as



1 a Type I procedure. ~~Any conditional development and use allowed in the underlying~~  
2 ~~zone may be permitted within the boundaries of this special district under a Type II~~  
3 ~~procedure, unless a Type III procedure is required in the underlying zones subject to~~  
4 ~~applicable development and use standards and site plan approval.~~

5  
6 Section 4.014 4.015. Duties and Responsibilities. The duties of the ~~Building Official,~~  
7 Planning Director shall include, but not be limited to the following:

- 8  
9 1. Review all applications to determine that the permit requirements of this  
10 ordinance have been satisfied.
- 11 2. Review all applications to insure that all necessary permits have been obtained  
12 from those Federal, State or local governmental agencies from which prior  
13 approval is required.
- 14 3. Review all applications in the area of special flood hazard to determine if the  
15 proposed development adversely affects the flood-carrying capacity of the  
16 special flood hazard area.

17  
18 Section 4.016. Use of Available Other Base Flood Data. ~~The Building Official or When~~  
19 ~~base flood elevation data has not been provided in accordance with Section 4.012, the~~  
20 Planning Director shall obtain, review and reasonably utilize any base flood elevation  
21 and floodway data available from a Federal, State or other source, as criteria for  
22 requiring that new construction, substantial improvements, or other development in  
23 Zone A comply with ~~Section 4.030 S3.654 (1), Specific Standards, Residential~~  
24 ~~Construction, and S3.654 (2), Specific Standards, Non-Residential Construction, and~~  
25 ~~S3.654 (3) Manufactured Homes.~~

26  
27 Section 4.018. Information to be Obtained and Maintained by Building Official or  
28 Planning Director. Where base flood elevation data is provided through the flood  
29 insurance study or obtained as provided in Section 4.016, the Planning Director shall:

- 30  
31 1. ~~Obtain~~ Verify and record the actual elevations (in relation to mean sea level) of  
32 the lowest floor (including basement) of all new or substantially improved  
33 structures and whether or not the structure contains a basement.
- 34  
35 2. For all new or substantially improved flood proofed structures:  
36 A. Verify and record the actual elevation (in relation to mean sea  
37 level), to which the structure was flood proofed, and  
38 B. Maintain the flood proofing certifications required in ~~Section 3.010.3~~  
39 4.013.3.
- 40 3. Maintain for public inspection all records pertaining to the provisions of this  
41 ordinance.
- 42 4. In coastal high hazard areas, certification shall be obtained from a registered  
43 professional engineer or architect that the structure is securely anchored to  
44 adequately anchored-pilings or columns in order to withstand velocity waters.  
45

1 Section 4.019 Compliance. No structure or land shall be located, extended,  
2 converted or altered without full compliance with the terms of the ordinance codified in  
3 this chapter and other applicable regulations.

4  
5 Section 4.020. Alteration of Water Courses. ~~The Building Official or~~ Planning Director  
6 shall:

- 7  
8 1. Notify adjacent communities and the Oregon ~~Water Resources Department of~~  
9 Land Conservation and Development prior to any alteration or relocation of a  
10 water course, and submit evidence of such notification to the Federal Insurance  
11 Administration Emergency Management Agency.  
12 2. Require that maintenance is provided within the altered or relocated portion of  
13 said water course so that the flood carrying capacity is not diminished.  
14

15 Section 4.022. Interpretation of FIRM Boundaries. The Planning Director shall make  
16 interpretations where needed, as to the exact location of the boundaries of the areas of  
17 special flood hazards. The person contesting the location of the boundary shall be  
18 given a reasonable opportunity to appeal the interpretations as provided in this  
19 Ordinance.  
20

21 Section 4.024. Warning and Disclaimer of Liability. The degree of flood protection  
22 required by this Ordinance is considered reasonable for regulatory purposes and is  
23 based on engineering and scientific considerations. Larger floods can and will occur on  
24 rare occasions. Flood heights may be increased by man-made or natural causes.  
25

26 This Ordinance does not imply that land outside the areas of special flood hazards or  
27 uses permitted within such areas will be free from flooding or flood damages. This  
28 ordinance shall not create a liability on the part of Clatsop County or by an officer, or  
29 employee thereof for any flood damages that result from reliance on this Ordinance or  
30 any administrative decision lawfully made hereunder.  
31

32 Section 4.025 Appeals. An appeal of a Planning Director decision pursuant to this  
33 chapter may be appealed in accordance with Section 2.230  
34

35 Section 4.026. Variances. A request for a variance from a standard contained in this  
36 chapter shall be reviewed in accordance with the procedures of Section 5.130 - 5.134.  
37 The following standards are applicable to a variance request, not those of Section  
38 5.132:  
39

40 1. Variances shall only be issued upon:

- 41  
42 A. a showing of good and sufficient cause,  
43 B. a determination that failure to grant the variance would result in  
44 exceptional hardship to the applicant, and  
45

1 C. a determination that the granting of a variance will not result in  
2 increased flood heights, additional threats to public safety,  
3 extraordinary public expense, create nuisances, cause fraud on or  
4 victimization of the public or conflict with existing local laws or  
5 ordinances.

6  
7 ~~1. Variances may be issued for the reconstruction, rehabilitation or restoration of~~  
8 ~~structures listed on the National Register of Historic Places or the State Inventory~~  
9 ~~of Historic Places, without regard to the procedures set forth in the remainder of~~  
10 ~~this section.~~

11  
12 2. Variances shall not be issued within any designated floodway if any increase in  
13 flood levels during the base flood discharge would result.

14  
15 3. Variances shall only be issued upon a determination that the variance is the  
16 minimum necessary, considering the flood hazard, to afford relief.

17  
18 4. Variances may be issued for the repair or rehabilitation of structures listed on the  
19 National Register of Historic Places or the State Inventory of Historic Places, upon a  
20 determination that the proposed repair or rehabilitation will not preclude the structures  
21 continued designation as a historic structure and the variance is the minimum  
22 necessary to preserve the historic character and design of the structure without regard  
23 to the procedures set forth in the remainder of this section. The criteria of Section  
24 4.026.1 shall not be applied to historic structures.

25  
26 5. When a variance is granted, the county shall give written notice to the property  
27 owner within five days after the decision is final. The notice shall state that: (a) the  
28 structure or manufactured home will be allowed to be built or placed with the lowest  
29 floor elevation at or below the base flood elevation, and (b) that the issuance of the  
30 variance to construct a structure below the base flood level will result in increased  
31 premium rates for flood insurance as high as twenty-five dollars for every one hundred  
32 dollars of insurance coverage, and (c) such construction below the base flood level  
33 increases the risk to life and property. The above notification shall be maintained with a  
34 record of all variance actions.

35  
36 4. ~~Variances shall only be issued upon:~~

- 37  
38 a. ~~a showing of good and sufficient cause,~~  
39 b. ~~a determination that failure to grant the variance would result in~~  
40 ~~exceptional hardship to the applicant, and~~  
41 c. ~~a determination that the granting of a variance will not result in~~  
42 ~~extraordinary public expense, create nuisances, cause fraud on or~~  
43 ~~victimization of the public or conflict with existing local laws or~~  
44 ~~ordinances.~~  
45

5. ~~Any applicant to whom a variance is granted shall be given written notice of the required lowest floor elevation stated in feet below the base flood elevation, and that the cost of flood insurance will be commensurate with the increase risk resulting from the reduced lowest flood elevation.~~

6. ~~Variance Time Limit. Authorization of a variance shall be void after six months unless the new construction, substantial improvement or approved activity has taken place. However, the Planning Commission may, at its discretion, extend authorization for one additional six month period upon request. Authorization of a variance shall conform to the requirements of Section 5.134.~~

Section 4.028 General Standards. In all areas of special flood hazards as presented on the FIRM, the following standards shall apply for all new construction and substantial improvements:

1. Anchoring:

A. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure.

B. All manufactured homes shall be anchored to resist flotation, collapse, or lateral movement by providing over-the-top and frame ties to ground anchors. Specific requirements shall be that:

1). Over-the-top ties be provided at each end of the manufactured home, with two additional ties per side at intermediate locations and manufactured homes less than fifty (50) feet long requiring one additional tie per side.

2). Frame ties be provided at each corner of the home with five additional ties per side at intermediate points and manufactured homes less than fifty (50) feet long requiring four additional ties per side.

3). All components of the anchoring system be capable of carrying a force of 4,800 pounds; and

4). Additions to the manufactured home be similarly anchored.

C. An alternative method of anchoring may involve a system designed to withstand a wind force of ninety (90) miles per hour or greater. Certification must be provided to the Building Official that this standard has been met.

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 or substantial improvements shall be constructed by methods and practices that minimize flood damage.

- 1 C. Electrical, heating, ventilation, plumbing and air conditioning equipment  
2 and other service facilities shall be elevated to one foot above flood level  
3 so as to prevent water from entering or accumulating within the  
4 components during conditions of flooding.

5  
6 3. Utilities:

- 7  
8 A. All new and replacement water supply systems shall be designed to  
9 minimize or eliminate infiltration of flood waters into the system.  
10 B. New and replacement sanitary sewage systems shall be designed to  
11 minimize or eliminate infiltration of flood waters into the systems and  
12 discharges from the systems into flood waters.  
13 C. On-site waste disposal systems shall be located to avoid impairment to  
14 them or contamination from them during flooding.

15  
16 4. Subdivision Proposals:

- 17  
18 A. All subdivision proposals shall be consistent with the need to minimize  
19 flood damage.  
20 B. All subdivision proposals shall have public utilities and facilities such as  
21 sewer, gas, electrical and water systems located and constructed to  
22 minimize flood damage.  
23 C. All subdivision proposals shall have adequate drainage provided to reduce  
24 exposure to flood damage.  
25 D. Base flood elevation data shall be provided for subdivision proposals and  
26 other proposed developments of fifty lots or greater or five acres, whichever  
27 is less.

28  
29 5. Critical Facilities: Critical facilities shall be constructed on properly compacted  
30 fill and have the lowest floor (including basement) elevated at least one foot above the  
31 elevation of the 500-year flood.

32  
33 6. Review of Development Permits: Where elevation data is not available, either  
34 through the flood insurance study or from other administrative source,  
35 applications for development permits shall be reviewed to assure that proposed  
36 construction will be reasonably safe from flooding. The test of reasonableness is  
37 a local judgment and includes use of historical data, high water marks,  
38 photographs of past flooding, etc. where available. Failure to elevate to at least  
39 two feet above grade in these zones may result in higher insurance rates.

40  
41 Section 4.030 Specific Standards. In all areas of special flood hazards where base  
42 flood elevation data has been provided, the following provisions are required:

- 43  
44 1. Residential Construction: New construction or substantial improvement of any  
45 residential structure shall have the lowest floor, including basement, elevated to

273  
1 one foot above the base flood elevation. Fully enclosed areas below the lowest  
2 floor that are subject to flooding shall be designed to automatically equalize  
3 hydrostatic flood forces on exterior walls by allowing for the entry and exit of  
4 floodwaters. Designs for meeting this requirement must either be certified by a  
5 registered professional engineer or architect or must meet or exceed the  
6 following minimum criteria: a) a minimum of two openings having a total net area  
7 of not less than one (1) square inch for every square foot of enclosed area  
8 subject to flooding shall be provided; b). the bottom of all openings shall be no  
9 higher than one (1) foot above grade; and c). openings may be equipped with  
10 screens, louvers, or other coverings or devices provided that they permit the  
11 automatic flow of floodwaters in both directions.

12  
13 2. Non-Residential Construction: New construction or substantial  
14 improvement of any commercial, industrial, or other non-residential structure  
15 shall either have the lowest floor, including basement, elevated to one (1) foot  
16 above the base flood elevation or, together with attendant utility and sanitary  
17 facilities, shall: a). be flood proofed so that below this level the structure is water  
18 tight with walls substantially impermeable to the passage of water; b). have  
19 structural components having the capability of resisting hydrostatic and  
20 hydrodynamic loads and effects of buoyancy; and c). be certified by a registered  
21 professional engineer or architect that the design and methods of construction  
22 are in accordance with standards of practice for meeting provisions of this  
23 section based on their development and/or review of the structural design,  
24 specifications and plans. Such certification shall be provided as set forth in  
25 Section 4.018.2. Fully enclosed areas below the lowest floor that are subject to  
26 flooding shall be designed to automatically equalize hydrostatic flood forces on  
27 exterior walls by allowing for the entry and exit of floodwaters. Designs for  
28 meeting this requirement must either be certified by a registered professional  
29 engineer or architect or must meet or exceed the following minimum criteria: a) a  
30 minimum of two openings having a total net area of not less than one (1) square  
31 inch for every square foot of enclosed area subject to flooding shall be provided;  
32 b). the bottom of all openings shall be no higher than one (1) foot above grade;  
33 and c). openings may be equipped with screens, louvers, or other coverings or  
34 devices provided that they permit the automatic flow of floodwaters in both  
35 directions.

36  
37 3. Foundation Protection: A registered professional civil engineer shall develop or  
38 review the structural design, specifications and plans for the foundation of the  
39 building and shall certify that the design and methods of construction are in  
40 accordance with accepted practices to withstand flotation, collapse, lateral  
41 movement, erosion and scour, undermining, and the effects of water and wind  
42 acting simultaneously on all building components during the base flood.

43  
44 4. Protection of Floodplain Storage Capacity. Whenever any portion of a  
45 floodplain is authorized for development, the volume of space occupied by the



1 authorized fill below the base flood elevation shall be compensated for and balanced by  
2 a hydraulically equivalent volume of excavation taken from below the base flood  
3 elevation. Any such excavations shall be constructed to drain freely to the watercourse.  
4 No area below the waterline of a pond or other body of water can be credited as a  
5 compensating excavation.  
6

7 5. Manufactured Homes:  
8

9 A. Manufactured homes that are to be placed or substantially improved on  
10 sites within Zone A1-A30, AH, and AE and located: i). outside of a manufactured  
11 home park or subdivision, ii). in a new manufactured home park or subdivision  
12 iii). in an expansion of an existing manufactured home park or subdivision or iv).  
13 in an existing manufactured home park or subdivision on which a manufactured  
14 home has incurred substantial damage as the result of a flood shall be elevated  
15 on a permanent foundation such that the lowest floor of the manufactured home  
16 is elevated to one foot above the base flood elevation and securely anchored to  
17 an adequately anchored foundation system to resist flotation collapse and lateral  
18 movement.  
19

20 B. Manufactured homes to be placed or substantially improved on sites in an  
21 existing manufactured home park or subdivision within Zones A1-30, AH and AE  
22 that are not subject to provision of 5.a above shall be elevated so that either: i).  
23 the lowest floor of the manufactured home is elevated to one foot above the  
24 base flood elevation and securely anchored to an adequately anchored  
25 foundation system to resist flotation collapse and lateral movement; or ii). the  
26 manufactured home chassis is supported by reinforced piers or other foundation  
27 elements of at least equivalent strength that are no less than 36 inches in height  
28 above grade and be securely anchored to an adequately anchored foundation  
29 system to resist flotation, collapse, and lateral movement.  
30

31 C. No manufactured home shall be placed in a coastal high hazard area,  
32 except in an existing manufactured home park or existing manufactured home  
33 subdivision.  
34

35 6. Recreation Vehicle: All recreational vehicles to be placed on sites within zone  
36 A1-30, AH, AO and AE shall either: a). be on the site for fewer than 180  
37 consecutive days and be fully licensed and ready for highway use; or, b). meet  
38 the permit requirements of Section 4.013 and the elevation and anchoring  
39 requirements for manufactured homes listed in Section 4.030.5. A recreation  
40 vehicle is ready for highway use if it is on its wheels or jacking system, is  
41 attached to the site only by quick disconnect type utilities and security devices,  
42 and has no permanently attached additions.  
43  
44  
45

1 7. Standards for Accessory Structures and Uses.

2  
3 A. Residential accessory structures shall require a development permit  
4 pursuant to Section 4.013. If the accessory structure is valued at more  
5 than 10% of the residential structure, all requirements of the flood hazard  
6 overlay district shall apply. Otherwise, the applicant need not satisfy the  
7 submittal requirements of Section 4.013.1 - 4 or the standards of Sections  
8 4.028 and 4.030, provided that:

- 9  
10 1).. The floor area of all floors of the accessory structure totals 600  
11 square feet or less.  
12  
13 2).. The accessory structure shall be used only for parking and storage.  
14  
15 3).. The accessory structure shall be designed to have low flood  
16 damage potential.  
17  
18 4).. The accessory structure shall be constructed and placed on the  
19 building site so as to offer the minimum resistance to the flow of  
20 flood waters.  
21  
22 5).. The accessory structure shall be firmly anchored to prevent  
23 flotation that may result in damage to other structures.  
24  
25 6).. All service facilities, such as electrical and heating equipment  
26 associated with the accessory structure, shall be elevated to a  
27 height of one foot above the base flood elevation.  
28

29 B. When accessory structures built under the provisions of this section  
30 exceed a value greater than ten (10) percent of the value of the principal  
31 residential structure, substantial increases in insurance rates may result.  
32

33 Section 4.032 Floodway. Located within areas of special flood hazard are areas  
34 designated as floodways. Since the floodway is an extremely hazardous area due to  
35 the velocity of flood waters which carry debris, potential projectiles, erosion potential,  
36 the following provisions apply:

37  
38 1A. Encroachments, including fill, new construction, substantial improvements, and  
39 other development is prohibited unless it has been demonstrated through  
40 hydrologic and hydraulic analyses performed in accordance with standard  
41 engineering practice that the proposed encroachment would not result in any  
42 increase in flood levels within the community during the occurrence of the base  
43 flood discharge. All analysis shall be certified by a registered civil engineer.  
44  
45

1B. Fish enhancement structures shall be permitted where a qualified hydraulic or hydrology professional provides a feasibility analysis and certification that the project was designed to keep any rise in 100-year flood levels as close to zero as practicable and that no structure will be impacted by the development. In making the determination that the project was designed to keep any rise in 100-year flood levels as close to zero as practicable and that no structure will be impacted by the development, the analysis shall have considered the cumulative impact of the proposed project in conjunction with other developments that have been approved in the floodway in the vicinity of the proposed project.

2. The county may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the county first applies for a conditional FIRM and floodway revision, fulfils the requirements for such revisions and receives the approval of the Federal Emergency Management Agency.

3. If Section 4.032 (1) (A) or (2) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 4.028 and 4.030.

4. Where no regulatory floodway is designated, no new construction, substantial improvement, or other development, including fill, shall be permitted within the A1-30 and AE zones unless it is demonstrated that the cumulative effect of the proposed development, when combined with other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point in the community.

Section 4.034. Coastal High Hazard Area. Coastal high hazard areas ( Zones V1-30, VE and V) are located within the areas of special flood hazard. These areas have special flood hazards associated with high velocity waters from tidal surges, and therefore, in addition to meeting all applicable provisions in this chapter, the following provisions shall also apply:

1. All new construction and substantial improvements 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 to 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 any given year (one-hundred-year mean recurrence interval);

1           C. A registered professional engineer or architect shall develop or  
2 review the structural design, specifications and plans for the construction  
3 and shall certify that the design and methods of construction to be used  
4 are in accordance with accepted standards of practice for meeting the  
5 provisions of subsections (1)(A) and (1)(B) above.  
6

7           2. The Planning Department shall obtain the elevation (in relation to mean  
8 sea level) of the bottom of the lowest structural member of the lowest floor  
9 (excluding pilings and columns) of all new and substantially improved structures  
10 and whether or not such structures contain a basement. A record of all such  
11 information shall be retained.  
12

13           3. All new construction shall be located landward of the reach of mean high  
14 tide.  
15

16           4. All new construction and substantial improvements shall have the space  
17 below the lowest floor either free of obstruction or constructed with  
18 nonsupporting breakaway walls, open wood latticework or insect screening  
19 intended to collapse under wind and water loads without causing collapse,  
20 displacement or other structural damage to the elevated portion of the building or  
21 supporting foundation system. For the purpose of this section, a breakaway wall  
22 shall have a design safe loading resistance of not less than ten and no more  
23 than twenty pounds per square foot. Use of breakaway walls which exceed a  
24 design safe loading resistance of twenty pounds per square foot (either by  
25 design or when so required by local or state codes) may be permitted only if a  
26 registered professional engineer or architect certifies that the designs proposed  
27 meet the following conditions: a). breakaway wall collapse shall result from a  
28 water load less than that which would occur during the base flood; and b).the  
29 elevated portion of the building and supporting foundation system shall not be  
30 subject to collapse, displacement or other structural damage due to the effects of  
31 wind and water loads acting simultaneously on all building components  
32 (structural and nonstructural). Maximum wind and water loading values to be  
33 used in this determination shall each have a one percent chance of being  
34 equaled or exceeded in any given year (one-hundred-year mean recurrence  
35 interval).  
36

37           5. If breakaway walls are utilized, such enclosed space shall be useable  
38 solely for parking of vehicles, building access or storage. Such space shall not  
39 be used for human habitation.  
40

41           6. The use of fill for structural support of buildings is prohibited.  
42

43           7. Manmade alteration of sand dunes which would increase potential flood  
44 damage is prohibited.  
45

1  
2 8. No manufactured home shall be placed in a coastal high hazard area,  
3 except in an existing manufactured home park or existing manufactured home  
4 subdivision. Such a manufactured home shall be placed in conformance with  
5 the requirements of Section 4.030.5.B.  
6

7 9. Recreational vehicles shall be placed on the site for fewer than 180  
8 consecutive days and be fully licensed and ready for highway use. A recreation  
9 vehicle is ready for highway use if it is on its wheels or jacking system, is  
10 attached to the site only by quick disconnect type utilities and security devices,  
11 and has no permanently attached additions.  
12

13 Section 4.036. Specific Standards for Areas of Shallow Flooding (AO and AH Zone).  
14 In all areas of special flood hazards designated as areas of shallow flooding, the  
15 following provisions shall apply:  
16

17 1. All new construction and substantial improvements of residential structures shall  
18 have the lowest floor including basement elevated to one foot plus the depth  
19 number specified on the FIRM above the highest adjacent grade on the property.  
20 The adjacent grade is defined to be the natural or existing grade of the site prior  
21 to the proposed site alteration. If no depth number is specified on the FIRM, the  
22 lowest floor including basement shall be elevated to at least two feet above the  
23 highest adjacent grade.  
24

25 2. All construction and substantial improvement of non-residential structures shall:  
26

27 A. Have the lowest floor including basement elevated to one foot plus  
28 the depth number specified on the FIRM above the highest  
29 adjacent grade on the property. The adjacent grade is defined to  
30 be the natural or existing grade of the site prior to the proposed site  
31 alteration. If no depth number is specified on the FIRM, the lowest  
32 floor including basement shall be elevated to at least two feet  
33 above the highest adjacent grade; or  
34

35 B. Together with attendant utility and sanitary facilities be completely  
36 flood proofed to meet the flood proofing standard of Section  
37 4.030.2  
38

39 3. Provide adequate drainage paths around structures on slopes to guide  
40 floodwaters around and away from proposed structures.  
41

42 II. Amend the Standards Document, Section S3.650- 3.660, Flood Hazard  
43 Requirements by deleting the section in its entirety and replacing Section S3.650 with  
44 Tsunami Inundation Zone, Review Required.  
45

1  
2 Flood Hazard Requirements\*  
3

4 ~~S3.650. Purpose. The purpose of this section is to set forth standards that guide~~  
5 ~~development in areas of special flood hazard, floodways, coastal high hazards and~~  
6 ~~areas of shallow flooding in order to reduce personal injury, property damage and loss~~  
7 ~~of life.~~  
8

9 ~~S3.652. General Standards. In all areas of special flood hazards as presented on the~~  
10 ~~FIRM, the following standards shall apply for all new construction and substantial~~  
11 ~~improvements:~~  
12

13 ~~1. Anchoring:~~  
14

- 15 ~~a. All new construction and substantial improvements shall be anchored to~~  
16 ~~prevent flotation, collapse or lateral movement of the structure.~~  
17 ~~b. All manufactured homes shall be anchored to resist flotation, collapse, or~~  
18 ~~lateral movement by providing over the top and frame ties to ground~~  
19 ~~anchors. Specific requirements shall be that:~~  
20  
21 ~~i. Over the top ties be provided at each end of the manufactured~~  
22 ~~home, with two additional ties per side at intermediate locations~~  
23 ~~and manufactured homes less than fifty (50) feet long requiring one~~  
24 ~~additional tie per side.~~  
25 ~~ii. Frame ties be provided at each corner of the home with five~~  
26 ~~additional ties per side at intermediate points and manufactured~~  
27 ~~homes less than fifty (50) feet long requiring four additional ties per~~  
28 ~~side.~~  
29 ~~iii. All components of the anchoring system be capable of carrying a~~  
30 ~~force of 4,800 pounds; and~~  
31 ~~iv. Additions to the manufactured home be similarly anchored.~~  
32 ~~e. An alternative method of anchoring may involve a system designed to~~  
33 ~~withstand a wind force of ninety (90) miles per hour or greater.~~  
34 ~~Certification must be provided to the Building Official that this standard~~  
35 ~~has been met.~~  
36

37 ~~2. Construction Materials and Methods:~~  
38

- 39 ~~a. All new construction and substantial improvements shall be constructed~~  
40 ~~with materials and utility equipment resistant to flood damage.~~  
41 ~~b. All new construction or substantial improvements shall be constructed by~~  
42 ~~methods and practices that minimize flood damage.~~  
43

44 ~~3. Utilities:~~  
45



- 1 a. ~~All new and replacement water supply systems shall be designed to~~  
2 ~~minimize or eliminate infiltration of flood waters into the system.~~
- 3 b. ~~New and replacement sanitary sewage systems shall be designed to~~  
4 ~~minimize or eliminate infiltration of flood waters into the systems and~~  
5 ~~discharges from the systems into flood waters.~~
- 6
- 7 c. ~~On-site waste disposal systems shall be located to avoid impairment to~~  
8 ~~them or contamination from them during flooding.~~
- 9
- 10 4. ~~Mechanical and Utility Equipment: Electrical, heating, ventilation, plumbing, and~~  
11 ~~air conditioning equipment and other service facilities shall be designed and/or~~  
12 ~~located so as to prevent water from entering or accumulating within the~~  
13 ~~components during conditions of flooding.~~
- 14
- 15 5. ~~Use of Openings in Enclosures Below a Structure's Lowest Floor: For all new~~  
16 ~~construction and substantial improvements, fully enclosed areas below the~~  
17 ~~lowest floor that are subject to flooding shall be designed to automatically~~  
18 ~~equalize hydrostatic flood forces on exterior walls by allowing for the entry and~~  
19 ~~exit of floodwaters. Designs for meeting this requirement must either be certified~~  
20 ~~by a registered professional engineer or architect or must meet or exceed the~~  
21 ~~following minimum criteria: a minimum of two openings having a total net area of~~  
22 ~~not less than one (1) square inch for every square foot of enclosed area subject~~  
23 ~~to flooding shall be provided. The bottom of all openings shall be no higher than~~  
24 ~~one (1) foot above grade. Openings may be equipped with screens, louvers, or~~  
25 ~~other coverings or devices provided that they permit the automatic entry and exit~~  
26 ~~of floodwaters.~~
- 27
- 28 6. ~~Subdivision Proposals:~~
- 29
- 30 a. ~~All subdivision proposals shall be consistent with the need to minimize~~  
31 ~~flood damage.~~
- 32 b. ~~All subdivision proposals shall have public utilities and facilities such as~~  
33 ~~sewer, gas, electrical and water systems located and constructed to~~  
34 ~~minimize flood damage.~~
- 35 c. ~~All subdivision proposals shall have adequate drainage provided to reduce~~  
36 ~~exposure to flood damage.~~
- 37 d. ~~Base flood elevation data shall be provided for subdivision proposals and~~  
38 ~~other proposed developments greater than fifty lots or five acres,~~  
39 ~~whichever is less.~~
- 40
- 41 7. ~~Review of Building Permits and Development Permits: Where elevation data is~~  
42 ~~not available, applications for building permits and development permits shall be~~  
43 ~~reviewed to assure that proposed construction will be reasonably safe from~~  
44 ~~flooding. The test of reasonableness is a local judgment and includes use of~~  
45 ~~historical data, high water marks, photographs of past flooding, etc. where~~

1 available.

2  
3 ~~S3.654. Specific Standards. In all areas of special flood hazards where base flood~~  
4 ~~elevation data has been provided, the following provisions are required:~~

5  
6 1. ~~Residential Construction: New construction or substantial improvement of any~~  
7 ~~residential structure shall have the lowest floor, including basement, elevated to~~  
8 ~~one foot above the base flood elevation.~~

9  
10 2. ~~Non-Residential Construction: New construction or substantial improvement of~~  
11 ~~any commercial, industrial, or other non-residential structure shall either have the~~  
12 ~~lowest floor, including basement, elevated to one (1) foot above the base flood~~  
13 ~~elevation or, together with attendant utility and sanitary facilities, be floodproofed~~  
14 ~~so that below this level the structure is water tight with walls substantially~~  
15 ~~impermeable to the passage of water and with structural components having the~~  
16 ~~capability of resisting hydrostatic and hydrodynamic loads and effects of~~  
17 ~~buoyancy. a registered professional engineer or architect shall certify that the~~  
18 ~~standards of this subsection are satisfied. Such certification shall be provided to~~  
19 ~~the official as set forth in Section 3.402.b.~~

20  
21 3. ~~Manufactured Homes: All manufactured homes to be placed or substantially~~  
22 ~~improved within zone A1 A30, AH, and AE shall be elevated on a permanent~~  
23 ~~foundation such that the lowest floor of the manufactured home is at or above~~  
24 ~~the base flood elevation.~~

25  
26 a. ~~Manufactured homes shall be securely anchored to an adequately~~  
27 ~~anchored foundation system, in accordance with Section 4.010.1.b. or c.~~

28 b. ~~For new manufactured home parks and subdivision; for expansions to~~  
29 ~~existing manufactured home parks and subdivision; for existing~~  
30 ~~manufactured home parks and subdivision where the repair,~~  
31 ~~reconstruction or improvement of the streets, utilities and pads equals or~~  
32 ~~exceeds fifty (50) percent of the value of the streets, utilities and pads~~  
33 ~~before repair, reconstruction or improvement has commenced; and for~~  
34 ~~manufactured homes not placed in a manufactured home park or~~  
35 ~~subdivision require:~~

36  
37 i. ~~Stands or lots are elevated on compacted fill to or above the base~~  
38 ~~flood level (insurance can be waived); or~~

39 ii. ~~Stands or lots are elevated on compacted fill or on pilings so that~~  
40 ~~the lowest floor of the mobile home will be at or above the base~~  
41 ~~level (insurance required); and~~

42 iii. ~~Adequate surface drainage and access for hauler are provided;~~  
43 ~~and~~

44 iv. ~~In the instance of elevation on piers or pilings that:~~  
45 ~~lots are large enough to permit steps;~~

- 1 ~~\_\_\_\_\_ pier and piling foundations are placed in stable soil no more~~  
2 ~~than ten feet apart, and~~  
3 ~~\_\_\_\_\_ reinforcement is provided for piers and pilings more than six~~  
4 ~~(6) feet above the ground level.~~  
5 c. ~~No manufactured home shall be placed in a coastal high hazard area,~~  
6 ~~except in an existing manufactured home park or existing manufactured~~  
7 ~~home subdivision.~~  
8

9 ~~4. Standards for Accessory Structures and Uses\*.~~

- 10  
11 a. ~~Residential accessory structures shall require a development permit~~  
12 ~~pursuant to Section 4.012. If it is determined that the accessory structure~~  
13 ~~may cause significant flood risk, all requirements of Section 4.000-4.026~~  
14 ~~and Section S3.650-S3.660 shall be satisfied. Otherwise, the applicant~~  
15 ~~need not satisfy the submittal requirements of Subsection 703.10B3 or the~~  
16 ~~specific standards of Subsection 703.14A2, provided that:~~

- 17  
18 1. ~~The floor area of all floors of the accessory structure totals 1,000~~  
19 ~~square feet or less.~~  
20  
21 2. ~~The accessory structure shall not be used for human habitation.~~  
22  
23 3. ~~The accessory structure shall be designed to have low flood~~  
24 ~~damage potential.~~  
25  
26 4. ~~The accessory structure shall be constructed and placed on the~~  
27 ~~building site so as to offer the minimum resistance to the flow of~~  
28 ~~flood waters.~~  
29  
30 5. ~~The accessory structure shall be firmly anchored to prevent~~  
31 ~~flotation which may result in damage to other structures.~~  
32  
33 6. ~~All service facilities, such as electrical and heating equipment~~  
34 ~~associated with the accessory structure, shall be elevated or~~  
35 ~~floodproofed.~~  
36

- 37 b. ~~When accessory structures built under the provisions of this section~~  
38 ~~exceed a value greater than ten (10) percent of the value of the principal~~  
39 ~~residential structure, substantial increases in insurance rates may result.~~  
40

41 ~~S3.656. Floodway. Located within areas of special flood hazard are areas designated~~  
42 ~~as floodways. Since the floodway is an extremely hazardous area to the velocity of~~  
43 ~~flood waters which carry debris, potential projectiles, erosion potential, the following~~  
44 ~~provisions apply:~~  
45

1. ~~Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.~~

2. ~~If Section S3.656(1) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section S3.654, Specific Standards.~~

~~S3.658. Coastal High Hazard Area. Coastal high hazard areas (V Zones) are located within the areas of special flood hazard. These areas have special flood hazards associated with high velocity waters from tidal surges, and therefore, the following provisions shall apply:~~

- ~~1. All buildings or structures shall be located landward of the mean high tide.~~
- ~~2. All buildings or structures shall be elevated so that the lowest floor is one foot above the base flood elevation level, with all space below the lowest supporting member open so as not to impede the flow of water except for breakaway walls as provided for in Section 4.030.8.~~
- ~~3. All buildings or structures shall be securely anchored on pilings or columns.~~
- ~~4. Pilings or columns used as structural support shall be designed and anchored so as to withstand all applied loads of the base flood flow.~~
- ~~5. Compliance with provisions of Section S3.658 2, 3 and 4 shall be certified to by a registered professional engineer or architect.~~
- ~~6. There shall be no fill used for structural support.~~
- ~~7. There shall be no alteration of sand dunes which would increase potential flood damage.~~
- ~~8. Breakaway walls shall be allowed below the base flood elevation provided they are not a part of the structural support of the building and are designed so as to break away under abnormally high tides or wave action, without damage to the structural integrity of the building on which they are to be used.~~
- ~~9. If breakaway walls are utilized, such enclosed space shall not be used for human habitation.~~
- ~~10. Prior to construction, plans for any structure that will have breakaway walls must be submitted to the Building Official for approval.~~
- ~~11. Any alteration, repair, reconstruction or improvement to a structure started after the enactment of this ordinance shall not enclose the space below the lowest floor unless breakaway walls are used as provided for in Section 4.030.8 and 9.~~

~~S3.660. Specific Standards for Areas of Shallow Flooding (AO Zone). In all areas of special flood hazards designated as areas of shallow flooding, the following provisions~~

1 shall apply:

2  
3 ~~1\*. All new construction and substantial improvements of residential structures shall~~  
4 ~~have the lowest floor including basement elevated one foot above the highest\*~~  
5 ~~adjacent grade on the property or above the depth number specified on the~~  
6 ~~FIRM (at least two feet if no depth number is specified).\*~~

7  
8 ~~2\*. All construction and substantial improvement of non-residential structures shall:~~

9  
10 a. ~~Have the lowest floor including basement elevated one (1) foot~~  
11 ~~above the highest adjacent grade on the property or above the~~  
12 ~~depth number specified on the FIRM (at least two feet if no depth~~  
13 ~~number if specified); or\*~~

14  
15 b. ~~Together with attendant utility and sanitary facilities be completely~~  
16 ~~floodproofed to or above the level designated in Section S3.660 2a,~~  
17 ~~so that any space below that level is watertight with walls~~  
18 ~~substantially impermeable to the passage of water and with~~  
19 ~~structural components having the capability of resisting hydrostatic~~  
20 ~~and hydrodynamic loads and effects of buoyancy. a registered~~  
21 ~~professional engineer or architect shall certify that the standards of~~  
22 ~~this subsection are satisfied.~~

23  
24 ~~3\*. Where elevation data is not available either through the Flood Insurance Study~~  
25 ~~or from another authoritative source, applications for building permits shall be~~  
26 ~~reviewed to assure that proposed construction will be reasonably safe from~~  
27 ~~flooding. The test of reasonableness is a local judgment and includes use of~~  
28 ~~historical data, high water marks, photographs of past flooding, etc. where~~  
29 ~~available. Failure to elevate at least two feet above grade in these zones may~~  
30 ~~result in higher insurance rates.~~

31  
32 S.3650 Tsunami Inundation Zone, Review Required. Pursuant to OAR 632-05-050  
33 Tsunami Inundation Zone, persons proposing new construction of or the conversion to  
34 essential facilities, hazardous facilities, major structures, or special occupancy  
35 structures are required to contact the Oregon Department of Geology and Mineral  
36 Industries (DOGAMI) at the earliest reasonable date for a consultation regarding the  
37 requirements of ORS 455.446 and 455.447 that pertain to their proposed facility or  
38 structure. As used in this section, "essential facility" means hospitals and other medical  
39 facilities having surgery and emergency treatment areas, fire and police stations, tanks  
40 or other structures containing housing or supporting water or fire suppression materials  
41 or equipment required for the protection of essential or hazardous facilities or special  
42 occupancy structures, emergency vehicle shelters and garages, structures and  
43 equipment in emergency-preparedness centers, standby power generating equipment  
44 for essential facilities, and structures and equipment in government communication  
45 centers and other facilities required for emergency response. As used in this section,

1 "hazardous facility" means structures housing supporting or containing sufficient  
2 quantities of toxic or explosive substances to be of danger to the safety of the public if  
3 released. As used in this section, "special occupancy structure" means covered  
4 structures whose primary occupancy is public assembly with a capacity greater than  
5 300 persons, buildings with a capacity greater than 250 individuals for every public,  
6 private or parochial school through secondary level or child care centers, buildings for  
7 colleges or adult education schools with a capacity greater than 500 persons, medical  
8 facilities with 50 or more resident, incapacitated patients not included in facilities  
9 mentioned above, jails and detention facilities, and all structures and occupancies with  
10 a capacity greater than 5,000 persons.

11  
12 Section S. 3.655 Verification of Review Prior to the issuance of a development permit  
13 for a regulated structure or facility, the developer of that structure or facility shall present  
14 verification of consultation with DOGAMI, or verification of an exception.

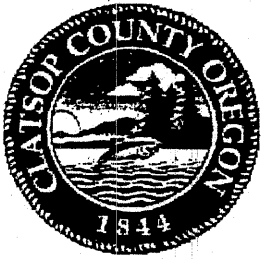
15  
16 Words and phrases that are underlined are to be added to the text

17  
18 ~~Words and phrases that are struckout are to be deleted from the text~~

19  
20 (w)Flood.ord



**Exhibit C**  
**Staff Report to the Planning Commission**  
**Beaches and Dunes**



## STAFF REPORT

**TO:** Planning Commission

**STAFF:** Rainmar Bartl, Contract Land Use Planner

**HEARING DATE:** June 24, 2003  
**REPORT AVAILABLE:** June 17, 2003

**REQUEST:** Legislative Comprehensive Plan text amendments to the Background Report and Goals and Policies regarding Beaches and Dunes and the Clatsop Plains Community Plan, Beaches and Dunes Policies. Clatsop County Land and Water Development and Use Ordinance (80-14) text amendments regarding the Active Dune Overlay District, the Beaches and Dunes Overlay District, and the Standards Document, Beach and Dune Area Requirements. State Periodic Review Work Task No.2.

**APPLICANT:** Clatsop County

**LOCATION:** Countywide

**AUTHORIZATION:** The proposed amendments are being processed as a periodic review amendment, Work Task No.2.

**APPLICABLE CRITERIA** State-wide Planning Goals, Goal #18 Beaches and Dunes  
Clatsop County Comprehensive Plan, Goals and Policies.

**RECOMMENDATION:** Staff recommends that the Planning Commission, upon review of the materials and testimony, provide a recommendation, including any proposed modifications, to the Board of Commissioners.

## BACKGROUND INFORMATION

This proposal is part of Periodic Review Work Task No. 2 Update of Natural Hazards and Beaches and Dunes/Shorelands, a project that began with a grant contract to the Columbia River Estuary Task Forces (CREST), from the Oregon Department of Land Conservation and Development (DLCD). Completion of the project is through a contract with Rainmar Bartl, consultant and CDD staff. Staff would like to acknowledge DLCD staff and CREST staff for the work they did in conjunction with this grant project, and add a word of thanks for their oversight, and technical assistance.

The proposed amendments consist of three elements. First, amendments to the beaches and dunes section of the comprehensive plan background report. Second, amendments to the comprehensive plan goals and policies, County-Wide Element Goal #18 – Beaches and Dunes Policies and Clatsop Plains Community Plan beaches and dunes policies. Third, amendments to the Land and Water Development and Use Code and the Clatsop County Standards Document concerning the Active Beach and Dune Overlay District, the Beaches and Dunes Overlay District, and the Standards Document, Beach and Dune Area Requirements.

The proposed amendments to the beaches and dunes section of the comprehensive plan background report, Section 18 Background (Inventory) Data, incorporate a report into the background information by reference. That report is titled “Coastal Erosion Hazard Zones Along the Clatsop Plains Oregon: Gearhart to Fort Stevens” and was prepared by Jonathan Allen and George Priest in 2001. As described in the executive summary of the report:

*“ This report describes and documents a range of coastal hazard zones distinguished for the Clatsop Plains. In particular, the report focuses on identifying maximum potential erosion distances for dune-backed shorelines using the geometric model developed by Komar and others (1999). Four hazard zones have been identified for the Clatsop Plains, an active hazard zone high, moderate and low risk zones that respectively depict decreasing risks of becoming active in the future. The landward boundary of the high-hazard zone defines a conservative but reasonable limit of expansion of the active hazard zone in the next 60-100 years. The landward boundary of the low hazard zone defines the outermost limit of expansion of the active hazard zone associated with a catastrophic event such as a great earthquake on the Cascadia subduction zone, coupled with severe storms.”*

The proposed amendments to the comprehensive plan policies consolidate all the county’s beaches and dunes policies in one location, rather than having them located in both the County-Wide policy section and the Community Plans section. The policies address the requirements of State-wide Planning Goal – Goal #18 Beaches and Dunes and issues unique to the beach and dune areas of Clatsop County.

1 The proposed amendments to the Development Code and Standards Document:

- 2 - Combine the existing Active Dune Overlay District and the Beaches and Dunes  
3 Overlay District into one overlay zone and consolidate all the applicable standards  
4 in that overlay zone.
- 5 - Within the new proposed Beach and Dune Overlay Zone, uses and activities are  
6 regulated by whether they are located on the beach, in a defined dune hazard area,  
7 or in the dune construction area, rather than by the type of dune formation in  
8 which they are located, active, conditionally stable or stable.
- 9 - The proposed construction setback line is established as follows:
  - 10 1. For property north of Surf Pines the line is located 570 feet landward of  
11 the Statutory Vegetation Line.
  - 12 2. For Surf Pines, the construction line is the Surf Pines construction setback  
13 line established by Ordinance 83-17 and this construction line is extended  
14 to include the Charlton property (Tax Lot 300).
  - 15 3. For Pinehurst, the construction line is the Pinehurst construction setback  
16 line established by Ordinance 92-90.

## 17 18 **Citizen Involvement**

19  
20 All Clatsop County property owners were notified by first class mail of the proposed  
21 amendments regarding flood hazards.  
22

## 23 **Proposed Comprehensive Plan Text Amendments**

24  
25 The proposed amendments to the beaches and dunes section of the comprehensive plan  
26 background report, Section 18 Background (Inventory) Data, incorporates a report into  
27 the background information by reference. That report is titled "Coastal Erosion Hazard  
28 Zones Along the Clatsop Plains Oregon: Gearhart to Fort Stevens" and was prepared by  
29 Jonathan Allen and George Priest in 2001.  
30

31 The proposed Comprehensive Plan Goals and Policies, County-Wide Element Goal #18 –  
32 Beaches and Dunes Policies will replace the existing policies in this section. In addition,  
33 the beaches and dunes policies in the Clatsop Plains Community Plan are being deleted  
34 and combined with those of the County-Wide Goal #18 Element.  
35

## 36 **Proposed Zoning Ordinance Amendments**

37  
38 The proposed amendments to the Development Code and Standards Document:

- 39 - Combines the existing Active Dune Overlay District and the Beaches and Dunes  
40 Overlay District into one overlay zone and consolidate all the applicable standards  
41 in that overlay zone.
- 42 - Within the new proposed Beach and Dune Overlay Zone, uses and activities are  
43 regulated by whether they are located on the beach, in a defined dune hazard area,  
44 or in the dune construction area, rather than by the type of dune formation such as  
45 active, conditionally stable or stable dune.



- 1        - The proposed construction setback line is established as follows:
- 2            1. For property north of Surf Pines, the line is located 570 feet landward of
- 3            the Statutory Vegetation Line.
- 4            2. For Surf Pines, the construction line is the Surf Pines construction setback
- 5            line established by Ordinance 83-17 and this construction line is extended
- 6            to include the Charlton property (Tax Lot 300).
- 7            3. For Pinehurst, the construction line is the Pinehurst construction setback
- 8            line established by Ordinance 92-90.
- 9

## 10 **CRITERIA AND FINDINGS**

11

12 This is a state periodic review amendment, a portion of Work Task No. 2.

13

14 Criteria that must be met or shall be met in adoption of the proposed amendments shall

15 demonstrate conformance with:

16

- 17        1        Applicable Statewide Planning Goals
- 18        2        The Clatsop County Comprehensive Plan
- 19

### 20 **Applicable State-wide Planning Goals**

21

22 Staff has reviewed the proposed amendments and applies the following findings and

23 conclusions to these amendments.

24

25 There are 19 Statewide Planning goals. Staff has reviewed the proposed amendments and

26 finds that the following goals are applicable to this request.

27

#### 28 **GOAL 1: CITIZEN INVOLVEMENT**

29 *To develop a citizen involvement program that insures the opportunity for citizens to be*

30 *involved in all phases of the planning process.*

31

#### 32 **Finding:**

33

34 The County has provided a "Measure 56 notice" to all county property owners.

35

#### 36 **GOAL 18: BEACHES AND DUNES**

37

38 *Comprehensive Plan Requirements provides that "Based upon the inventory,*

39 *comprehensive plans for coastal areas shall: identify beach and dune areas; and*

40 *establish policies and uses for these areas consistent with the provisions of this goal."*

41

#### 42 **Finding:**

43

44 The proposed amendments include updated inventory information on the potential for

45 coastal erosion hazard on the Clatsop Plains, the area within Clatsop County that includes

1 dune areas. The findings of the report, "Coastal Erosion Hazard Zones Along the Clatsop  
2 Plains Oregon: Gearhart to Fort Stevens, " have been used to create three defined beach  
3 and dune areas within which applicable uses are regulated, the beach, the dune hazard  
4 area, and the dune construction area. The regulations established in the three defined  
5 beach and dune areas are consistent with the provisions of Statewide Planning Goal #18.

6  
7 *Implementation Requirement 1 states that "local governments and state and federal*  
8 *agencies shall base decisions on plans, ordinances and land use actions in beach and*  
9 *dune area, other than older stabilized dunes, on specific findings that include at least: (a)*  
10 *the type of user proposed and the adverse effects it might have on the site and adjacent*  
11 *areas: (b) temporary and permanent stabilization programs and planned maintenance of*  
12 *new and existing vegetation; (c) methods for protecting the surrounding area from any*  
13 *adverse effects of development; and (d) hazards to life, public and private property, and*  
14 *the natural environment which may be caused by the proposed use."*

15  
16 **Finding:**

17  
18 This goal requirement is addressed by proposed Beaches and Dunes Policy 3 and Beach  
19 and Dune Overlay Zone, Section 4.049 General Development and Use Criteria.

20  
21 *Implementation Requirement 2 states that "local governments and state and federal*  
22 *agencies shall prohibit residential developments and commercial and industrial buildings*  
23 *on beaches, active foredunes, on other foredunes which are conditionally stable and that*  
24 *are subject to ocean undercutting or wave overtopping, and interdune areas (deflation*  
25 *plains) that are subject to ocean flooding . . . "*

26  
27 **Finding:**

28  
29 Proposed Beaches and Dunes Policy 2 addresses this goal requirement as does the Beach  
30 and Dune Overlay Zone, Section 4.045 Permitted Development and Uses.

31  
32 *Implementation Requirement 3 states that " local governments and state and federal*  
33 *agencies shall regulate actions in beach and dune areas to minimize the resulting*  
34 *erosion. Such actions include, but are not limited to, destruction of desirable vegetation*  
35 *(including inadvertent destruction by moisture loss or root damage), the exposure of*  
36 *stable and conditionally stable areas to erosion, and construction of shore structures*  
37 *which modify current or wave patterns leading to beach erosion. "*

38  
39 **Finding:**

40  
41 Proposed Beaches and Dunes Policy 4, 5 & 13 addresses this goal requirement. The  
42 Beach and Dune Overlay Zone addresses this goal requirement with specific standards  
43 which are applied to the uses that are permitted on the beach, in the dune hazard area and  
44 in the dune construction area. More specifically, Section 4.049.3 permits the Planning  
45 Director to require a wind erosion control plan in dune hazard and dune construction



1 areas prior to the issuance of a development permit and Section 4.046.4.B, requires that  
2 structural shoreline stabilization measures consider potential adverse impacts on adjacent  
3 property.

4  
5 *Implementation Requirement 4 states that "local, state and federal plans, implementing*  
6 *actions and permit reviews shall protect the groundwater. . . "*

7  
8 **Finding:**

9  
10 Proposed Beaches and Dunes Policy 6 addresses this goal requirement. The Beach and  
11 Dune Overlay Zone addresses this goal requirement in Section 4.049.1.E General  
12 Development and Use Criteria.

13  
14 *Implementation Requirement 5 states that "permits for beachfront protective structures*  
15 *shall be issued only where development existed on January 1, 1977. . . ."*

16  
17 **Finding:**

18  
19 Proposed Beaches and Dunes Policy 15 addresses this goal requirement., The Beach and  
20 Dune Overlay Zone addresses this goal requirement in Section 4.046.4.B.2).(a).,  
21 Development and Uses Permitted with review, Structural shoreline stabilization.

22  
23 *Implementation Requirement 5 states that "the criteria for review of al shore and*  
24 *beachfront protective structures shall provide that: (a) visual impacts are minimized (b)*  
25 *necessary access to the beach is maintained; . . . "*

26  
27 **Finding:**

28  
29 The Beach and Dune Overlay Zone addresses this goal requirement in Section  
30 4.046.4.B.2), Development and Uses Permitted with review, Structural shoreline  
31 stabilization.

32  
33 *Implementation Requirement 6 states that "Foredunes shall be breached only to*  
34 *replenish sand supply in interdune areas, or on a temporary basis . . . "*

35  
36 **Finding:**

37  
38 Proposed Beaches and Dunes Policy 7 addresses this goal requirement. The Beach and  
39 Dune Overlay Zone addresses this goal requirement in Section 4.045..C, Development  
40 and Uses Permitted, Foredune breaching.

41  
42 *Implementation Requirement 7 states that "grading or sand movement necessary to*  
43 *maintain views or to prevent sand inundation may be allowed . . . "*

44  
45 **Finding:**

1  
2 Proposed Beaches and Dunes Policy 8 addresses this goal requirement. The Beach and  
3 Dune Overlay Zone addresses this goal requirement in Section 4.047.1.A, Conditional  
4 Development and Uses, Fore dune grading.

5  
6 **Conclusion:**

7  
8 The proposed amendments are consistent with the StateWide Planning Goals.

9  
10 **The Clatsop County Comprehensive Plan**

11  
12 The Clatsop County Comprehensive Plan County-Wide Element contains a Goal 18  
13 Beaches and Dunes section. The Clatsop County Comprehensive Plan also contains  
14 Clatsop Plains Community Plan policies.

15  
16 The proposed Goal #18 – Beaches and Dunes Policies will replace the existing policies in  
17 this section. In addition, the beaches and dunes policies in the Clatsop Plains Community  
18 Plan are being deleted and combined with those of the County-Wide Goal #18 Element.

19  
20 Staff has reviewed the proposed amendment and applies the following findings and  
21 conclusions to these amendments.

22  
23 **Findings:**

24  
25 The comprehensive plan policies related to beaches and dunes have been revised to  
26 accurately reflect updated background information, amendments to the State-wide  
27 Planning Goals, the revisions to the Development Code, and the policy direction the  
28 county has pursued since the policies were first adopted. Thus, the proposed policies are  
29 the functional equivalent of the existing policies and as such are consistent with them.

30  
31 **Conclusion:**

32  
33 The proposed amendments are consistent with the comprehensive plan.

34  
35 **SUMMARY FINDINGS:** Staff finds that the criteria are met for the proposed  
36 amendment.

- 37  
38 • This amendment complies with statewide planning goals.  
39  
40 • The proposed amendments are in compliance with the County Comprehensive  
41 Plan.  
42  
43 • The proposed amendments do not conflict with the LWDUO and Standards  
44 Document as amended.  
45

1 **Process Findings:**

2  
3 A public hearing has been scheduled before the Planning Commission on June 24,  
4 2003 for the proposed amendments. Appropriate notice has been given to the  
5 Department of Land Conservation and Development (DLCD), to the public in the  
6 form of a newspaper notice, an individual Ballot Measure 56 notices were mailed to  
7 all property owners outside of urban growth boundaries on May 20, 2003. Two  
8 public places were posted with a notice. Applicable procedural requirements have  
9 been met for this proposed text amendment application.

10 **EXHIBITS**

- 11  
12 Exhibit A Proposed Comprehensive Plan Background Report  
13 Amendments  
14 Exhibit B Proposed Amendments to Comprehensive Plan Beaches  
15 and Dunes Policies  
16 Exhibit C Proposed Amendments to Comprehensive Plan Beaches  
17 and Dunes Policies – Annotated  
18 Exhibit D Proposed Amendments to Land and Water and  
19 Development Use Ordinance 80-14, and Standards  
20 Document –Beaches and Dunes Overlay Zone  
21 Exhibit E Proposed Amendments to Land and Water Use and  
22 Development Use Ordinance 80-14, and Standards  
23 Document - Annotated  
24

**Exhibit A**  
**Proposed Comprehensive Plan**  
**Background Report Amendments**



PROPOSED AMENDMENT  
COMPREHENSIVE PLAN BACKGROUND REPORT  
BEACHES AND DUNES

I. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes, Background (Inventory) Data, Section 2 Beach and Dune Formation, Accretion, Erosion and Migration, additions to existing text is in **bold type**, existing text to be deleted is ~~strikethrough~~, first paragraph to read as follows as follows:

~~The Clatsop Plains sand dunes are a very young (2000–3000 years old) geologic land formation of active and transient stability. They are comprised of fine and medium grained quartz with lesser feldspar, magnetite, mica, and undetermined rock fragments. The average rate of this beach growth over the last 2000 years has been estimated to be about 3 ft./year (Palmer, 1978). Thus is perhaps 1 to 2 percent of the annual sand production of the Columbia River (No exact sediment yield data is available), and about 5 to 10% of the possible total longshore beach transport of sand (Palmer, 1978)~~

The report titled “Coastal Erosion Hazard Zones Along the Clatsop Plains Oregon: Gearhart to Fort Stevens,” prepared by Jonathan Allen and George Priest in 2001 provides the following description of the Clatsop Plains:

*The Clatsop Plains are a barrier-beach ridge system that has prograded (advanced) seaward over the past 4000 years. Between 4050 years BP and AD 1700, the coastline is estimated to have accreted an average rate of 0.7 m/yr. (2.3 ft/yr.) (Woxell, 1998). From 1700 (when the last major subduction zone earthquake occurred), to 1885 (Prior to jetty construction), the Clatsop plains accreted at a slightly reduced rate of 0.5 m/yr. (1.6 ft/yr.), with an average rate of 3.3 m/yr. (10.8 ft/yr.) (Woxell). During the last 120 years the Clatsop Plains have continued to prograde seaward, but at rates exceeding several meters per year due to large sand supplies from the Columbia River, and as a result of jetty construction at the mouth of the Columbia River (Gelfenbaum and others 1999). These rates ranged from 2.0 to 5.8 m/yr. (6.6 to 19 ft/yr.), with an average rate of 3.3 m/yr. (10.8 ft/yr.) (Woxell, 1998). Since about the mid-1920s the rate of coastal erosion advance slowed, while erosion has been the dominant shoreline response along the northern end of the Clatsop Plains (i.e. about 6 km (3.7 miles) of Clatsop Spit is presently eroding. The recent phase of erosion may be a function of either: a. change in the sedimentation budget of the Columbia River cell . . . periodic climate shifts (e.g. the Pacific Decadal Oscillation) which cause sediments to be re-distributed along the coast (e.g. 25 years of relatively persistent El Nino conditions since the mid-1790s), or as a result of an increase in the frequency and magnitude of storms in the North Pacific (e.g. Graham and Diaz, 2002) an hence [increased] wave energies along the Oregon coast (e.g. Allen and Komar, 2000a 2000b).*

II. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes , Background (Inventory) Data, Section 2 Beach and Dune Formation, Accretion, Erosion and Migration, fourth and fifth paragraph to read as follows as follows:

1  
2 The beaches and dunes ~~were first have been~~ inventoried and classified according to their  
3 stability **in the document**, Beaches and Dunes of the Oregon Coast developed by the USDA Soil  
4 Conservation Service and the Oregon Coastal Conservation and Development Commission  
5 (OCCDC March, 1975). **The OCCDC report** mapped the dunes into three broad associations:  
6 active dunes, recently stabilized dunes, and older stabilized dunes. The extent, distribution and  
7 mapping of these dune forms are found in Beaches and Dunes of the Oregon Coast. Interdune  
8 areas or deflation plains were included in OCCDC mapping but not as a separate association.  
9 **They were** ~~and have been~~ updated in ~~the a subsequent more recent~~ study, Significant Shoreland  
10 and Wetland Habitats in the Clatsop Plains by Duncan Thomas.

11  
12 ~~See Stability of Coastal Dunes, Clatsop County, Oregon for a more detailed description of the~~  
13 ~~formation, accretion, erosion and migration of the active dunes in the Clatsop Plains.~~

14  
15 **In the past**, Clatsop County **has relied** ~~relies~~ upon the following documents for its inventory and  
16 classification of beaches and dunes:

- 17  
18 1. Beaches - - Beaches and Dunes of the Oregon Coast, by USDA Soil Conservation  
19 Service and OCCDC, March 1975.  
20 2. Dunes -  
21 a. Beaches and Dunes of the Oregon Coast by USDA Soil Conservation Service for  
22 Older Stabilized Dune and Recently Stabilized Dune Forms;  
23 b. Stability of Coastal Dunes, Clatsop County, Oregon, by Leonard Palmer 1978 for  
24 Active Dune forms;  
25 c. Significant Shoreland and Wetland Habitats in the Clatsop Plains, by Duncan  
26 Thomas for Interdune (or Deflation Plain) Forms; and  
27 d. Horning Geosciences Report, by Tom Horning September 22, 1998 (Ordinance  
28 No.02-05).  
29

30 These documents formed the basis for the Goal Exceptions that the county adopted in  
31 conjunction with establishing the Surf Pines construction setback line (Ordinance 83-17)  
32 and the analysis that formed the basis for establishing the Pinehurst construction line by  
33 Ordinance 92-90. The Horning Report established the portions of Tax Lot 300, the  
34 Charlton property, which were no longer within the active dune area.

35  
36 Since the publication of the above reports, a new and more detailed report analyzing the  
37 characteristics of the Clatsop Plains has been prepared. That report "Coastal Erosion  
38 Hazard Zones Along the Clatsop Plains Oregon: Gearhart to Fort Stevens," prepared by  
39 Jonathan Allen and George Priest in 2001 is briefly discussed here and is adopted by  
40 reference into this document. As described in the executive summary of the report:

41  
42 *" This report describes and documents a range of coastal hazard zones distinguished for the*  
43 *Clatsop Plains. In particular, the report focuses on identifying maximum potential erosion*  
44 *distances for dune-backed shorelines using the geometric model developed by Komar and*  
45 *others (1999). Four hazard zones have been identified for the Clatsop Plains, an active hazard*  
46 *zone high, moderate and low risk zones that respectively depict decreasing risks of becoming*



1 *active the next 60-100 years. The landward boundary of the low hazard zone defines the*  
2 *outermost limit of expansion of the active hazard zone associated with a catastrophic event*  
3 *such as a great earthquake on the Cascadia subduction zone, coupled with severe storms."* D

4  
5 **The findings and scenarios contained in the report, "Coastal Erosion Hazard Zones Along**  
6 **the Clatsop Plains Oregon: Gearhart to Fort Stevens," have been used to establish the**  
7 **parameters of the county's regulations for beach and dune areas on the Clatsop Plains.**  
8

9 III. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes,  
10 Background (Inventory) Data, Section 3 Dune Classification and Limitations by deleting this D  
11 section in its entirety.  
12

13 IV. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes, D  
14 Background (Inventory) Data, by deleting the Map titled "Generalized Beaches and Dunes  
15 Clatsop Plains Planning Area."  
16  
17  
18  
19  
20

# **NOTICE**

The Oregon Department of Geology and Mineral Industries is publishing this paper because the information furthers the mission of the Department. To facilitate timely distribution of the information, this report is published as received from the authors and has not been edited to our usual standards.

**STATE OF OREGON  
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES  
Suite 965, 800 NE Oregon St., #28  
Portland, Oregon 97232**

## **OPEN-FILE REPORT O-01-04**

# **COASTAL EROSION HAZARD ZONES ALONG THE CLATSOP PLAINS, OREGON: GEARHART TO FORT STEVENS**

**PRELIMINARY  
TECHNICAL REPORT TO CLATSOP COUNTY**

**2001**

**By  
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# **NOTICE**

The results and conclusions of this report are necessarily based on limited geologic and geophysical data. At any given site in any map area, site-specific data could give results that differ from those shown in this report. This report cannot replace site-specific investigations. The hazards of an individual site should be assessed through geotechnical or engineering geology investigation by qualified practitioners.

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## EXECUTIVE SUMMARY

This report describes and documents a range of coastal hazard zones distinguished for the Clatsop Plains. In particular, the report focuses on identifying maximum potential erosion distances for dune-backed shorelines using the geometric model developed by Komar and others (1999). Four hazard zones have been identified for the Clatsop Plains, an active hazard zone characterized by existing, active erosion processes, and three zones of potential future erosion, high, moderate, and low risk zones that respectively depict decreasing risks of becoming active in the future. Of most interest to planners are the landward boundaries of the high and low risk zones. The landward boundary of the high-hazard zone defines a conservative but reasonable limit of expansion of the active hazard zone in the next 60-100 years. The landward boundary of the low-hazard zone defines the outermost limit of expansion of the active hazard zone associated with a catastrophic event such as a great earthquake on the Cascadia subduction zone, coupled with severe storms.

Defining these erosion hazard zones was accomplished by detailed analysis of coastal erosion processes affecting the County. The most important conclusions reached from this analysis are:

- 1) The Clatsop Plains are a barrier-beach ridge system that has prograded (advanced) seaward over the past 4000 years. Between 4050 years BP and AD 1700, the coastline is estimated to have accreted at an average rate of 0.7 m/yr (2.3 ft/yr) (Woxell, 1998). From 1700 (when the last major subduction zone earthquake occurred), to 1885 (prior to jetty construction), the Clatsop Plains accreted at a slightly reduced rate of 0.5 m/yr (1.6 ft/yr).
- 2) During the past 120 years, the Clatsop Plains have continued to prograde seaward, but at rates exceeding several meters per year due to large sand supplies from the Columbia River, and as a result of jetty construction at the mouth of the Columbia River (Gelfenbaum and others, 1999). These rates ranged from 2.0 to 5.8 m/yr (6.6 to 19 ft/yr), with an average rate of 3.3 m/yr (10.8 ft/yr) (Woxell, 1998).
- 3) Since about the mid-1920s the rate of coastal advance slowed, while erosion has been the dominant shoreline response along the northern end of the Clatsop Plains (i.e. about 6 km (3.7 miles) of Clatsop Spit is presently eroding).
- 4) The recent phase of erosion may be a function of either:
  - a. A change in the sediment budget of the Columbia River cell. For example, the volume of sand supplied by the Columbia River decreased from an estimated  $4.3 \times 10^6 \text{ m}^3/\text{yr}$  (for the period 1878 – 1934) to  $1.4 \times 10^6 \text{ m}^3/\text{yr}$  (for the period 1958 – 1997), a decrease by a factor of 3 during historical times (Gelfenbaum and others, 1999). Part of this may be the product of almost 200 dams that have been built along the Columbia and Willamette River, which trap sands carried down the rivers, and/or it may be related to existing dredging practices in the Lower Columbia River, which remove large volumes of sand from the coastal system;
  - b. Periodic climate shifts (e.g. the Pacific Decadal Oscillation) which cause sediments to be re-distributed along the coast (e.g. 25 years of relatively persistent El Niño conditions since the mid-1970s), or as a result of an increase in the frequency and magnitude of storms in the North Pacific (e.g. Graham and Diaz,

2001) and hence wave energies along the Oregon coast (e.g. Allan and Komar, 2000a, 2000b).

These types of changes may have important implications for the future stability of coastal shorelines in the Columbia littoral cell, including the Clatsop Plains.

- 5) Hazard zones were determined along the Clatsop Plains using a geometric model developed by Komar and others (1999), whereby property erosion occurs when the total water level produced by the combined effect of extreme wave runup ( $R$ ) plus the tidal elevation ( $E_T$ ), exceeds some critical elevation of the fronting beach, typically the elevation of the beach-dune junction ( $E_j$ ). Three scenarios were used to model erosion hazard zones on dune-backed beaches:

- o *Scenario 1 (HIGH-risk)*. This scenario is based on a large storm wave event (wave heights ~47.6 ft high) occurring over the cycle of an above average high tide, coincident with a 3.3 ft storm surge. Under this scenario, the designated HIGH-risk hazard zone was estimated to be 360 ft, while individual beach sites may vary by as much as 243 ft to 522 ft due to subtle differences in the character of the beach (beach slope and beach/dune junction)

The following two scenarios (MODERATE and LOW-risk events) are one of two "worst case" events identified for the Clatsop coastline. Both scenarios have low probabilities of occurrence.

- o *Scenario 2 (MODERATE-risk)*. This scenario is based on an extremely severe storm event (waves ~52.5 ft high) coupled with a large storm surge of 5.6 ft. Under this particular scenario, the maximum potential erosion distances (MPED) vary considerably, with calculated MPED's that ranged from 390 to 825 ft, while the designated width of the moderate hazard zone was established at 572 ft.
- o *Scenario 3 (LOW-risk)*. This scenario is similar to *scenario 2* above but incorporates a 3.3 ft vertical lowering of the coast as a result of a Cascadia subduction zone earthquake. MPED estimated for *scenario 3* ranged from 424 to 938 ft, while the designated width of the low hazard zone was established at 635 ft.

## INTRODUCTION

This report provides an assessment of existing and potential future coastal erosion hazards along the Clatsop Plains, which forms the seaward margin of Clatsop County. The area examined in this report extends from Gearhart in the south to Fort Stevens in the North, a distance of some 25 km (15.5 miles). The purpose of this investigation is to provide County planners with a sound understanding of coastal erosion problems along the Clatsop Plains, and to assist in effective decision-making adjacent to the shoreline. Because the information presented here is regional in its coverage it is not intended for use as a site-specific analysis tool. Nevertheless, the investigation does provide a good guideline to areas in need of more detailed site-specific geotechnical studies.

The response of coastal shorelines in the form of erosion or accretion is exceedingly sensitive to a multitude of complex factors that include the beach sediment budget, wave energy, variations in water level, nearshore morphology, shoreline orientation, and the geology of the region. Because many shorelines are composed of unconsolidated sediments, including significant stretches of the Oregon coast, they are able to respond rapidly and are among the most dynamic and changeable of all landforms. It is this dynamism at the coast that makes beaches such an integral and important landform as they moderate the effects of wave energy.

Fundamental to coastal management is the beach, which serves an important role as a natural buffer between the processes that modify them, and the properties and infrastructure that back the beaches. Sound management of coastal shorelines should therefore encourage the growth of beaches and well-vegetated foredunes as a buffer against storm wave erosion and as a barrier to inland penetration of storm wave run-up. Increasingly however, the rapid growth in population and increased urbanization of coastal margins has encroached on the "active zone" of the beach system. As a result, the natural response of coastal shorelines to erode has come into conflict with the "built" environment. Such development is characteristic of much of the Oregon coast (e.g. Gleneden Beach, Pacific City, and Rockaway), and is the product of escalating property values and the desire to establish infrastructure as close as possible to the ocean's edge (Schlicker and others, 1972; Komar, 1997; Priest, 1999). Once the properties are established, the expectation is that the coast will remain where it is. Clearly, for sensible shoreline management to occur, sufficient technically sound information on the likelihood and magnitude of shoreline change must be placed into the hands of decision makers so they can make wise choices regarding shoreline management practices.

The objective of this investigation is to map the projected landward erosion hazard boundaries based on three wave erosion scenarios. The three scenarios are based on essentially the same conditions used by Allan and Priest (2001), but adjusted for local variations in projected sea level rise, storm surge, and possible Cascadia subduction events.



## BEACH PROCESSES AND FEATURES

The Oregon coast can be broadly characterized by long stretches of sandy beaches that are bounded by resistant basaltic headlands. These types of systems are referred to as *littoral cells*, and include both a cross-shore extent (*littoral zone*, Figure 1) and a longshore component. Because the headlands extend into deep-water, wave processes are unable to transport sediment around the ends of the headlands. As a result, the headlands form a natural barrier for sediment transport, preventing sand exchange between adjacent littoral cells. Thus, a littoral cell is essentially a self-contained compartment, deriving all of its sediments from within that cell.

Terminology used to describe the form of a beach is shown in Figure 1 while the specific zones within which important coastal processes are operating is presented in Figure 2. It is important to understand that a beach cannot simply be thought of as the visible sandy foreshore since this represents only a small portion of an onshore-offshore sand exchange system that extends well to seaward (Figure 1). Thus, the littoral zone extends from the backshore (which may encompass a dune field, beach ridge, sea-cliffs etc.), seaward to some limiting depth where underwater bed changes tend to be minimal. On the Oregon coast, the seaward limit of onshore-offshore sand exchange is about 14 m.

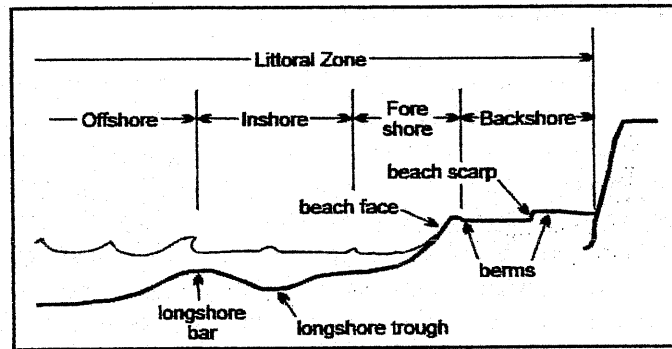


Figure 1 Terminology used to define aspects of the beach (Komar, 1998a).

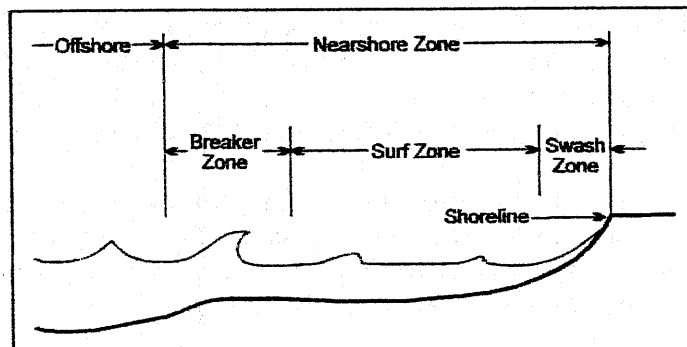


Figure 2 Terminology used to describe the various process zones in the nearshore (Komar, 1998a).

The visible part of the beach is referred to as the foreshore and backshore (Figure 1). Within the foreshore, swash and backwash processes are important for modifying the shape of beaches (Komar, 1998a). The extent to which these processes influence the beach is a function of the wave breaker height, water levels, current velocities, grain-size, beach slope, and foreshore saturation. Swash processes may contribute to the formation of depositional features on the beach (*berms*), which reflects the limits of wave run-up, or may cause erosion *scarps* to form (Figure 1). Berms or beach ridges located at higher elevations reflect swash run-up elevations produced by larger wave conditions.

The nearshore is the "engine room" of coastal processes. It is the zone dominated by wave and current processes and is especially significant for the entrainment and transportation of beach sediments (Figure 2). It is a zone of wave transformation culminating with the highly turbulent process of wave breaking. This last process tends to occur across a nearshore bar of which several may be present.

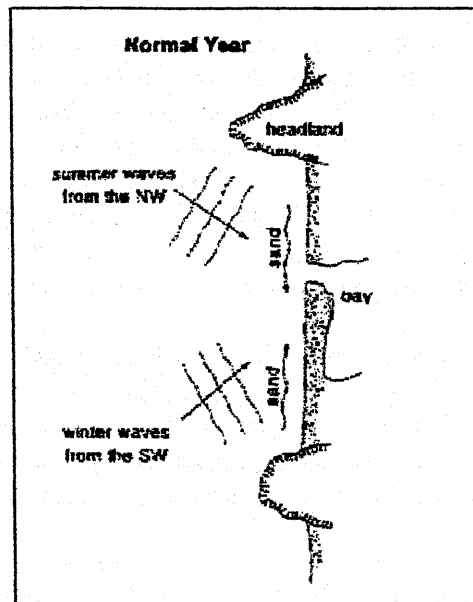
Within the nearshore, a distinction can be made between sand movement that is directed in primarily *onshore-offshore* directions, and the movement of sands *parallel* to the beach. The latter process can be especially significant and is dependent on the direction at which waves approach the shore. When waves approach the shore at some angle to it, *longshore currents* are formed. These currents are confined to a narrow zone landward of the breaker zone and can be responsible for the movement of substantial volumes of sand along a given shore. Along the Oregon coast, the role of longshore currents is especially important due to a seasonal variation in the direction of wave approach between summer and winter (Figure 3). During the summer waves approach the coast from the northwest, causing sand to move southward along the coast, while in winter the waves arrive from the southwest and drive the sand back to the northern ends of the beaches (Komar, 1998b). Thus, over several normal years there is a net equilibrium balance so that the net sand transport is zero.

### **Beach Erosion – What is it?**

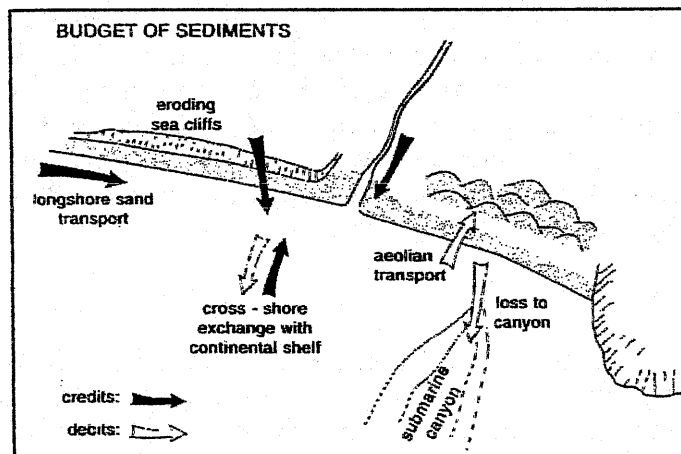
The erosion of beaches is a complex phenomenon, which can have one or more of a variety of causes and visible expressions. Integral to an understanding of coastal change is the concept of the beach sediment budget<sup>1</sup> (Figure 4). This notion is analogous to an accounting system such that an assessment is made of the amount of sediment that is arriving at a beach (credits) with that which is removed (debits) and relating these to the net gain or loss (balance of sediments) for a given beach (Komar, 1998a). Thus, the balance of sediments should approximately equal the local beach erosion or accretion.

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<sup>1</sup> The beach sediment budget is the time rate of change of sand within the coastal system and is dependent on the rate at which sand is brought into the system versus the rate at which sand leaves the system. The budget of sediments involves making assessments of the sediment contributions (credits) and losses (debits) and relating these to the net gain or loss (balance of sediments) in a given sedimentary compartment or littoral cell (Komar, 1998a).



**Figure 3** The alongshore-seasonal movement of beach sediments on the Oregon coast (Komar, 1998b).



**Figure 4** Schematic illustration of the principal components that are involved in the development of a sediment budget (Komar, 1998a).

Coastal changes along the Pacific Northwest (PNW) span an extremely wide range of temporal and spatial scales (Figure 1), due to the diverse range of processes that influence the coastal environment (Shoreland Solutions, 1998). Table 1 presents a summary of features that can be identified on an eroding or accreting beach. The table is broadly divided into short-term, historical, and long-term effects.

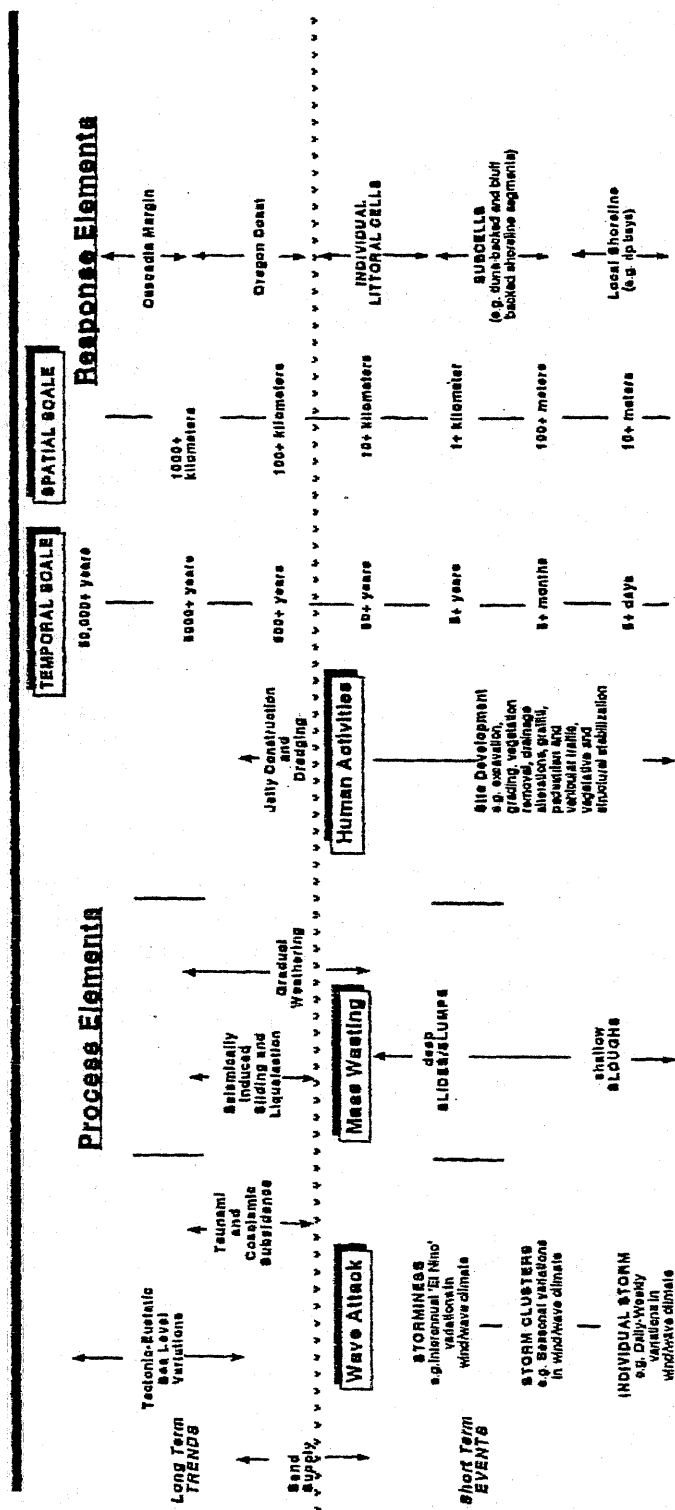


Figure 5 Temporal scales of coastal change and factors that influence the stability of shorelines (Shoreland Solutions, 1998).

**Table 1 Beach morphology characteristics that may be identified over a range of time scales (Dr. R.M. Kirk, University of Canterbury, personal communication).**

Time Scale	Accretion	Erosion
<b>Short Term</b> (weeks to months, year to year)	Beach wide, steep Soft foreshore Berm/s present Ridges and runnels Accretion of dune face No bars offshore or degraded Characterized by large cross-shore changes in the beach Low water table, free draining beach.	Beach narrow, flat Hard foreshore Berm/s absent Scarp/s present Erosion of dune face Bars present offshore Characterized by small cross-shore changes in the beach High water table, clogged beach pore spaces
<b>Medium Term</b> (period of years to decades) (position of envelope)	Dune growth Incipient new dune on backshore Advancing vegetation lines Changes in the position of the shore (e.g. the mean water line) measurable from ground survey, maps or air photos.	Dune destruction scarps breaches washovers truncated vegetation lines Retreat of duneface, crest, profile locus evident from ground survey, maps, or air photos Rip embayments in foredunes
<b>Long Term</b> (geological years x 10 <sup>3</sup> and >cr)	Multiple ridges Soil and vegetation sequences Airfall deposits Changes in relative base level (+ve) Raised beaches or other features.	Truncated sequences of ridges, soils, vegetation and associated deposits. Changes in relative base level (-ve) Drowned ridges or other features.

As indicated in Figure 1, the coastal response varies between short and long-term events. Short-term events have time-scales that range from a few days to several years, and can cause highly localized site-specific problems (e.g. rip embayments), or much larger scale changes that influence entire shoreline segments. Beaches may also exhibit characteristic patterns of change that occur over considerably longer periods of time (centuries to thousands of years). These latter changes influence the overall stability and shape of the coastline and are ultimately dependent on adjustments to the beach sediment budget.

Changes to the character of the beach are therefore to be expected. However, any action that results in one or more elements of the sediment budget being altered can be expected to produce a corresponding series of adjustments in the others (Kirk, 1979). As Kirk further observed, such compensating changes will be manifested as adjustments in the form (height and width of a beach) and/or position (advance or retreat) of the beach system. These types of changes are especially important at the historical and longer time scales (Table 1). In the case of the Clatsop Plains, an excellent example of changes to the sediment budget is the effects from jetty construction, which caused the Clatsop Plains shoreline to advance seaward. These changes are described in more detail below.

From a planning perspective, it is important to appreciate the wide range of temporal and spatial scales in which beaches can respond. Of particular importance is distinguishing between movements in the beach form (its height and width) that occur over short time

scales (in response to variations in the waves and currents), from those longer-term changes that are ultimately dependent on the state of balance or imbalance among the various elements of the sediment budget. From a shore management perspective it is important to clearly distinguish the shorter temporal beach changes from the longer-term adjustments, since they have very different implications for land-use adjacent to any water body (Figure 6). Therefore, sensible shoreline management provides sufficient space in which the natural changes that occur on beaches can eventuate, without either damage to developed assets or infrastructure, or the need to resort to costly shore stabilization structures to protect the assets. This last response not only destroys the aesthetic qualities of a particular shore, invariably they are poorly constructed, more often than not exacerbating or transferring the problem elsewhere.

With respect to the beach sediment budget, if a beach receives more material than it loses it is said to be '*over-nourished*'. Such a beach will accumulate sands and its position will advance seaward. As a result, the foreshore will widen and steepen. Dunes may also begin to form on the backshore. Similarly, the nearshore will also be steep, while longshore sand bars will either be absent or poorly developed (Table 1).

Alternatively, if a beach is losing more material than it is gaining it is said to be '*under-nourished*'. In other words, the beach sediment budget is said to be in deficit (Figure 6). Such a beach will erode and its position will retreat landward. As a result, the beach face will narrow and become flatter. Sediments contained in dunes or in other deposits are removed either offshore or along the shore. Within the surfzone, the underwater profile will widen and the bed will become flatter (Table 1). Longshore sand bars may be prevalent and well developed, particularly if sand exchange is predominantly shore normal.

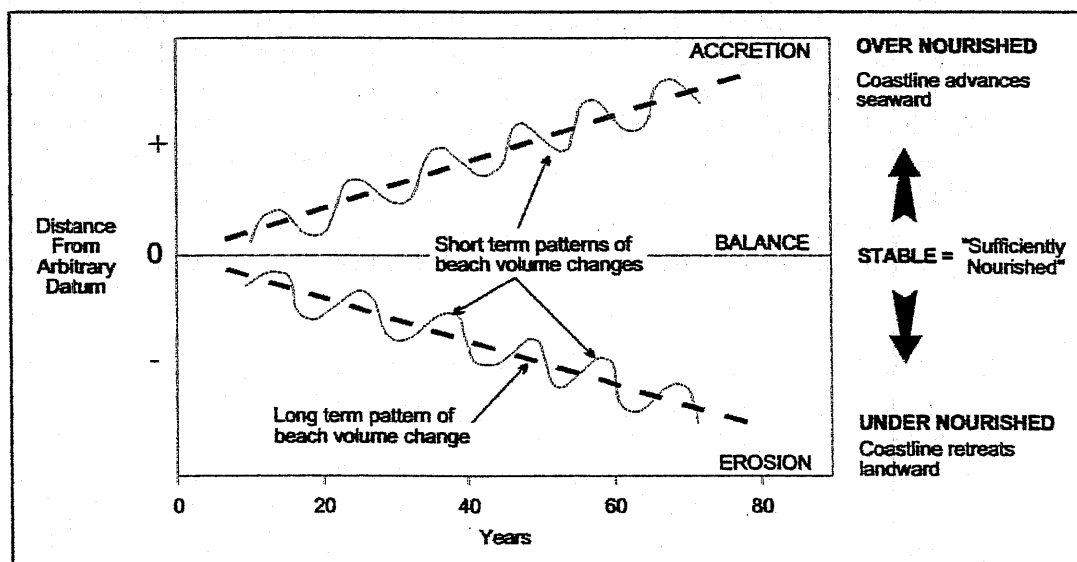


Figure 6 Long-term erosional trend in a sand beach sediment budget (Kirk, 1979).



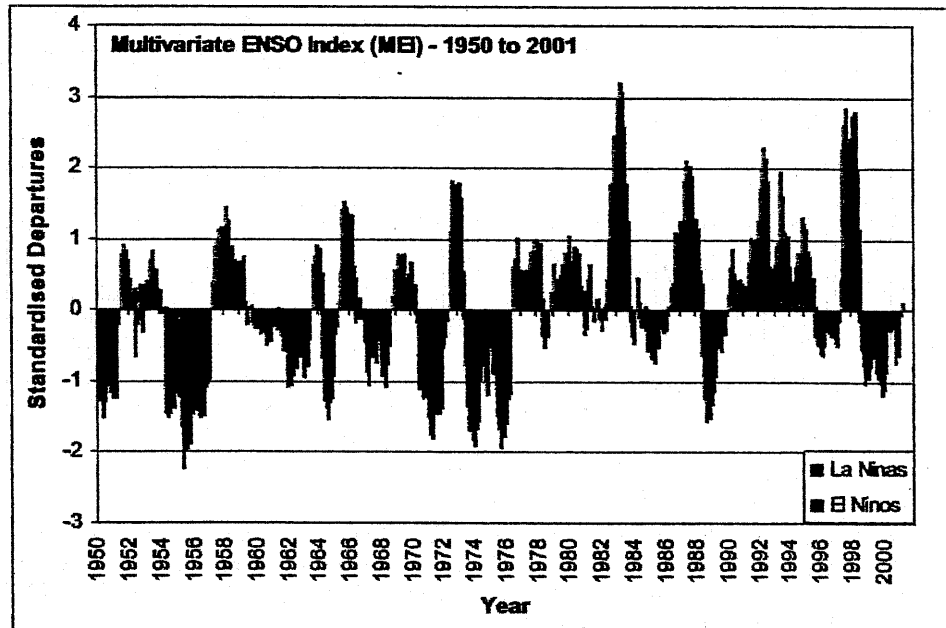
Beaches that experience no net losses or net gains are said to be 'stable'. In the long term, such beaches will neither advance nor retreat and thus there is a net balance of sediment. Nevertheless, it is important to note that 'stable' beaches are far from static, and will periodically erode in response to storm waves, while intervening quiescent periods will contribute to further sediment buildup on the beach foreshore causing it to prograde (Kirk, 1979). Large transfers of sand can also occur from time to time along a particular shore in response to different wave approaches (e.g. Figure 3). On such a beach "the term 'stable' should not be equated with a state of no change, but rather it should be interpreted as variation within some measurable limits about a mean position and efforts should be made to determine where these limits fall " (Kirk, 1979). Hence, in such situations it is important that infrastructure is located outside the identified limits with an additional 'safety' margin of clearance also included. In summary, irrespective of the causes of coastal erosion, ultimately it is a reflection of a negative status in the beach sediment budget.

## SCALES OF COASTAL CHANGE IN THE PACIFIC NORTHWEST

Most obvious and simplest to appreciate in the Pacific Northwest (PNW) are those beach changes that occur between summer and winter (i.e. the seasonal response, Figure 5). During the summer months beaches accumulate sediments due to the predominance of low wave heights and long wave periods, while in winter the same beaches erode rapidly in response to an increase in wave energy and changes in the directions of wave approach. Periodically these natural cycles of coastal change are enhanced by the occurrence of infrequent high magnitude storm events that can account for significant amounts of dune retreat. For example, analyses of coastal change along the Clatsop Plains have revealed values of dune recession that are on the order of 125 ft during the 1998-99 La Niña winter (Ruggiero and Voigt, 2000). However, because the record of such occurrences is relatively short, limited to 30 years at best, the effects from extreme storm events, or from storms-in-series remain largely qualitative or unknown (Komar and others, 1999). Perhaps the best example is the winter of 1939, which produced some of the worst storms ever seen along the Oregon coast, causing massive coastwide erosion (Dr. Paul Komar, personal communication). Since then the beaches have undergone periods of rebuilding, interspersed with subsequent erosion and rebuilding phases. The overall result however is that the effects of the 1939 winter storms are now masked by more recent coastal changes. Nevertheless, it is almost certain that such an extreme event will re-occur in the immediate future, and will probably contribute to extensive property damage.

Recently, it has been recognized that the occurrence of severe storm events and the development of coastal hazards, are related to major climate regime shifts such as the El Niño/La Niña Southern Oscillation (ENSO) phenomenon (Figure 7). El Niños exhibit dominant periods of 5 to 6 years (Ghil and Vautard, 1991), but may recur on 2 to 7 year cycles (Kleeman and others, 1996). Figure 7 shows a temporal plot of the occurrence of ENSO events since 1950, and is based on a multivariate ENSO index (MEI) developed by (Wolter and Timlin, 1993). Positive values of the MEI represent El Niño events, while negative values represent the La Niña phase. As can be seen from the graph, El

Niños have tended to dominate much of the climate spectrum since about 1976, while La Niñas were more frequent prior to 1976.



**Figure 7** Multivariate ENSO index (MEI) showing the incidence of El Niños and La Niñas since 1950 (Data from Dr. K Wolter, <http://www.cdc.noaa.gov/~kew/MEI/>).

Under normal oceanographic and climate conditions, the PNW is characterized by a seasonal increase in mean water levels between summer and winter (Figure 8). During the summer months water levels along the PNW coast are lowest, due to coastal upwelling that produces cold, dense water, which depresses the mean level of the sea (Huyer, 1983). In the winter the water is warmer due to the absence of upwelling, and its thermal expansion contributes to an increase in the mean elevation of the sea (Figure 8). Coastal currents also play a role, the northward direction of the current affecting the cross-current geostrophic slope of the water's surface, raising water levels to the right of the current along the PNW coast; the stronger the current, the greater the rise in the water level (Huyer, 1983). The above processes tend to be further enhanced during an El Niño, which typically raises mean water levels along the PNW coast by 0.26 - 0.33 m above the average curve, elevating the levels of the tides (Komar and others, 2000; Allan and Komar, In Press). Because the waves are superimposed on tides they are able to reach much higher elevations on beaches during an El Niño, contributing to significantly higher rates of coastal erosion. Furthermore, because the storm tracks are deflected further south so they mainly cross the California coast, wave approach offshore of the PNW coast is increasingly from the southwest, resulting in "hot spot" erosion along the southern ends of the littoral cells, northern ends of river mouths, and tidal inlets to the bays, with a net drift of beach sands to the north (Figure 9) (Komar, 1986, 1997).

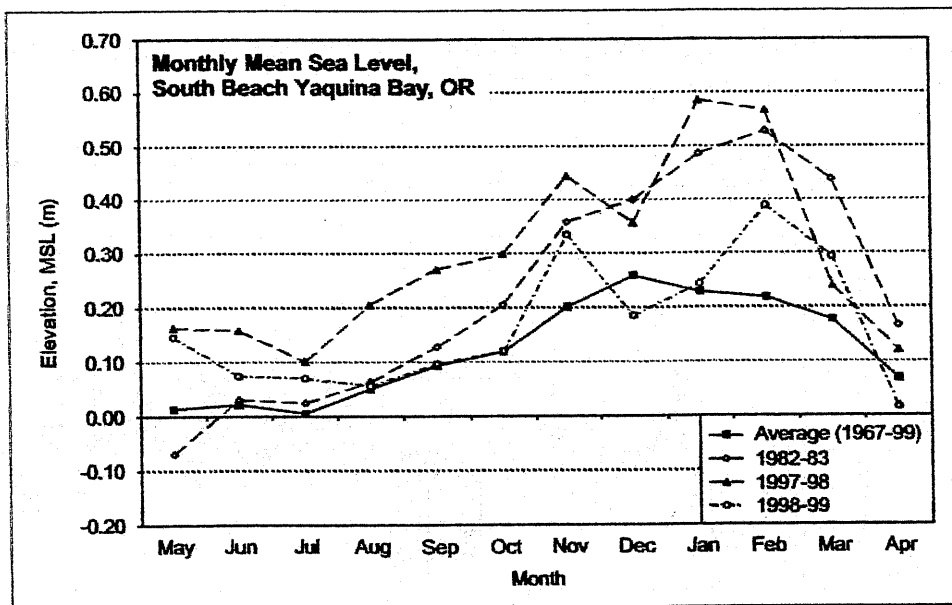


Figure 8 Monthly mean water levels derived from analyses of tide-gauge measurements in Yaquina Bay, Oregon. Included are the 1967-98 long-term averages (excluding El Niño years), and results for the 1982-83 and 1997-98 El Niño years and the 1998-99 La Niña year (Allan and Komar, In Press).

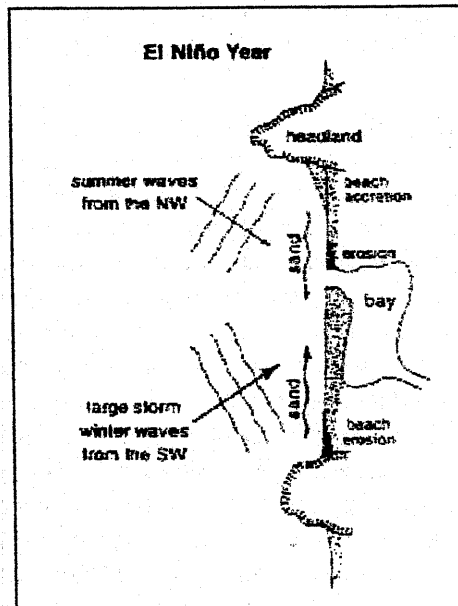


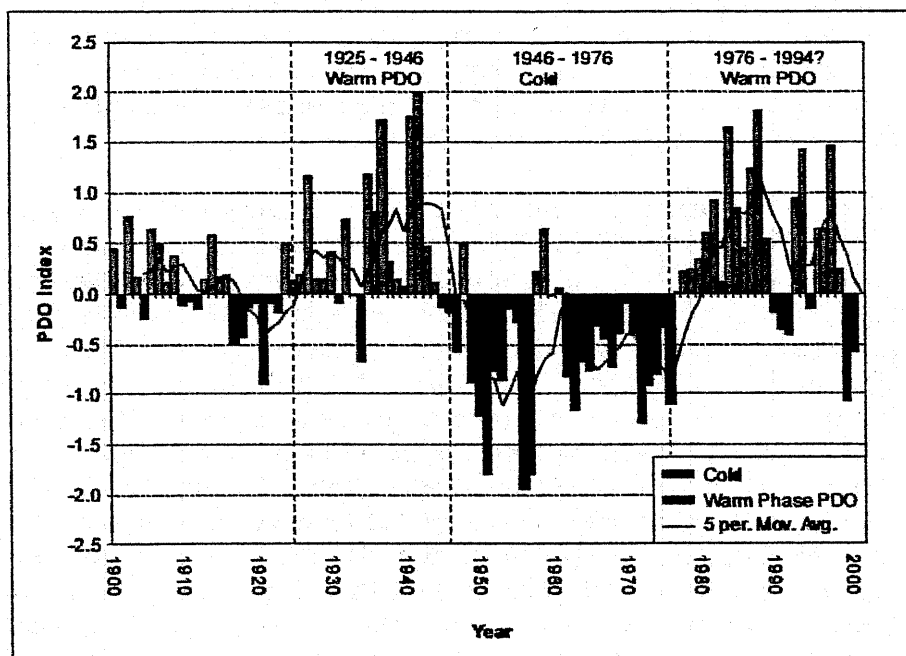
Figure 9 The alongshore movement of beach sediments on the Oregon coast during an El Niño (Komar, 1998b).

Unlike El Niños, the coastal response associated with a La Niña event is less well known, and is mainly due to the relatively few La Niñas that have occurred over the past 20 years (Figure 7). During this climate phenomenon, mean water levels tend to be much closer to normal, while large winter storm systems cross the PNW coast (Komar and others, 2000; Allan and Komar, In Press). As a result of the storm tracks, wave energy levels tend to be elevated during La Niña events and coastal erosion is widespread. This type of response was most apparent during the 1998-99 La Niña event.

ENSO events are superimposed on much longer climate cycles that periodically change on a 20 to 30 year basis (Figure 10). These latter climate shifts, known as the Pacific Decadal Oscillation (PDO), have occurred on at least four occasions during the past century (Mantua and others, 1997). Furthermore, warm phases of the PDO tend to be characterized by a greater incidence of El Niños, while the cold PDO phase is typified by a higher incidence of La Niñas. Since about 1977, the PDO has been in a predominantly warm phase characterized by a greater frequency of El Niños (Figure 10). However, since 1994 there is some suggestion that the PDO may have "flipped" from the warm PDO phase back to a cold PDO phase (Taylor, 1999). The evidence for this is thought to be the generally higher than average rainfall experienced throughout the PNW since about 1994. Furthermore, apart from the 1997-98 El Niño, La Niña conditions have prevailed over the latter half of the 1990s. Thus, it is possible that the rise in coastal problems experienced along the Oregon coast during the past three decades may be related to the warm PDO phase, while the more recent period of severe erosion observed during the last few years, especially those associated with the 1998-99 La Niña winter storms, may be related to the beginnings of a cold PDO cycle.

Of further concern to coastal planners and managers are possible changes in the world's climate that may occur over the course of this century. It is likely that such climate changes will impact coastal systems, as variations in the incidence of storm frequency, storm tracks, or the heights of waves. For example, studies in the North Atlantic have identified a progressive increase in ocean wave heights off Lands End, United Kingdom (Carter and Draper, 1988; Bacon and Carter, 1991). Recently, a similar upward trend of increasing wave heights and periods (and therefore the wave energy) was discovered offshore from the PNW coast (Allan and Komar, 2000a, 2000b). This progressive increase in the wave statistics is greatest offshore from the Washington coast, amounting to about  $0.042 \text{ m.yr}^{-1}$  for the annual averages of the winter waves, and represents a 1-m increase in the average wave heights during the 25-year record of measurements. Slightly smaller increases were found offshore from the Oregon and Northern California coasts. The exact cause of the rise in North Pacific wave heights was not determined. Recently, analyses of the North Pacific storm climatology suggest a long-term increase in both the frequency and magnitude of storms since the early 1940s (Graham and Diaz, 2001). Using wave hindcasting techniques, Graham and Diaz were also able to demonstrate a progressive rise in North Pacific wave heights that substantiate the findings of Allan and Komar (2000a; 2000b). Furthermore, they identified increasing sea surface temperatures in the western tropical Pacific as a plausible cause of the observed changes in North Pacific storm frequency and intensity. This raises the obvious question of what

might be expected in the next 25 years or more, with the apparent on-going trend of global warming.



**Figure 10** The Pacific Decadal Oscillation (PDO) climate index, 1900-1999 (Data from Dr. N. Mantua, <http://jisao.washington.edu/pdo/>).

It is apparent from this review that atmospheric and oceanographic forces are far from constant in the PNW over short or even longer time-scales. Furthermore, since coastal change tends to emulate the forcing mechanisms, namely climate, the erosion of beaches is not necessarily a constant process. This makes it extremely difficult to project future patterns of coastal change. However, it is precisely this sort of projection that is required in this investigation.

As noted earlier, previous studies of coastal change indicate that the beaches of the PNW mainly respond episodically (Komar and others, 1999; Peterson and others, 2000), due to the occurrence of large storms such as the March 2-3, 1999, or storms-in-series as occurred during the 1997-98 El Nino winter. This has led coastal scientists to develop models to account for such episodic erosion. In particular, Komar and others (1999) developed a geometric model to estimate the maximum potential erosion distance (MPED) on those beaches backed by dunes. For the purpose of this investigation, we have used the geometric model to estimate the MPED based on three scenarios, high, moderate, and low risk events. Each of the three scenarios is fully described below. It should be stressed however, that such models do not account for long-term changes in the beach sediment budget. As a result, further analyses is likely to be necessary to better understand the role of changing sediment budgets and how this might impact on the future stability of the Clatsop Plains.

## STUDY AREA

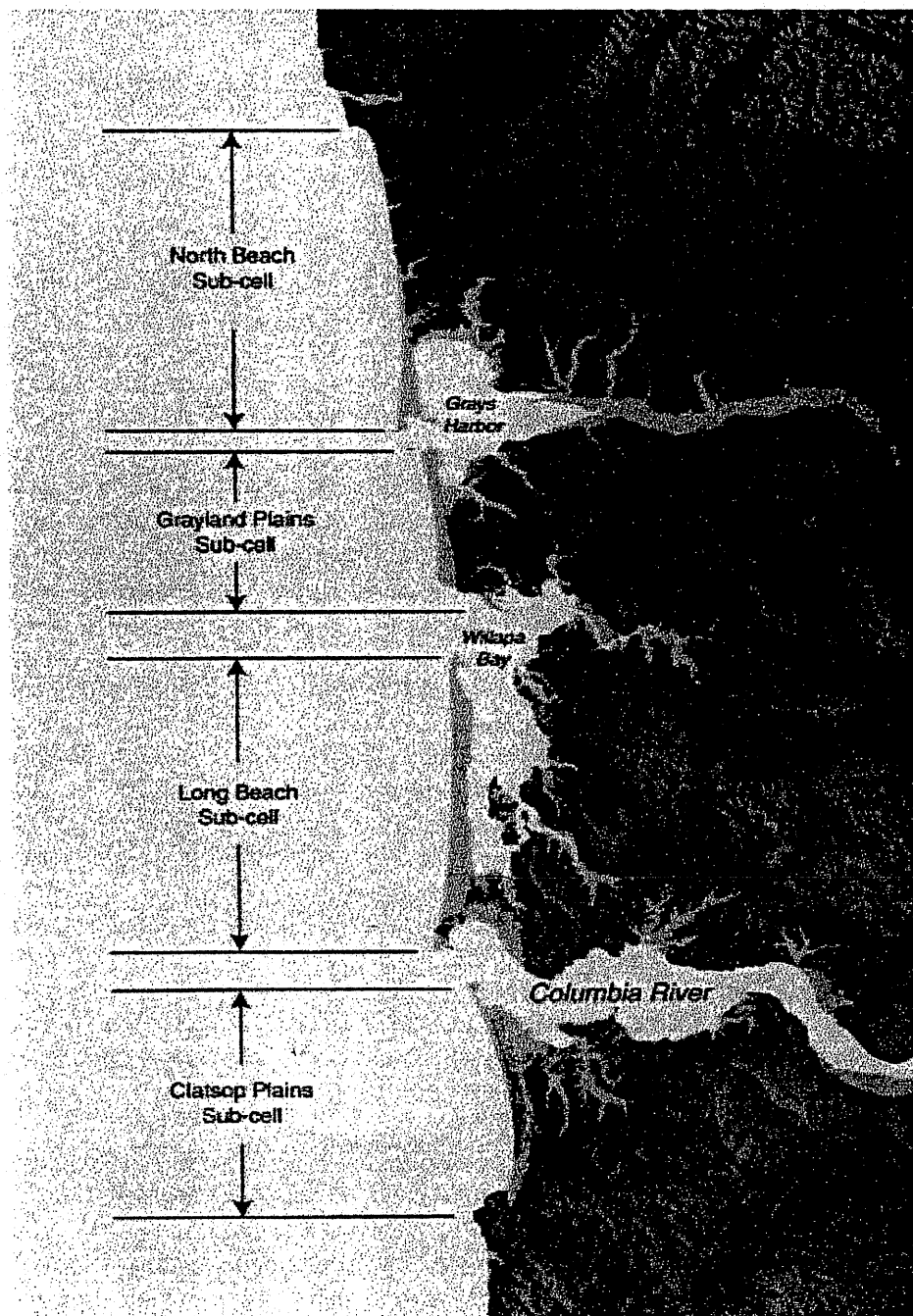
The Clatsop Plains are an arcuate shaped coastline that extends from Tillamook Head in the south to the mouth of the Columbia River (MCR) (Figure 11). The plains form part of a smaller sub-cell (34 km in length) located within the much larger Columbia River littoral cell, a 165 km coastal system that extends from Tillamook Head, Oregon, to Point Grenville, Washington (Figure 11).

The coastline of the Clatsop Plains is characterised by wide surf zones and prominent longshore bars in the nearshore, while the beaches are backed by an extensive dune sequence (Cooper, 1958; Woxell, 1998; Kaminsky and others, 1999a). The frontal foredunes that immediately back the beaches range in height from several meters to over 16 m. These dunes increase in height from Seaside to Kyle Lake, and then decrease in height towards Clatsop Spit (Ruggiero and Voigt, 2000). The beaches are gently sloping (mean slope ( $S$ ) of 0.032,  $\pm$  0.007), and have a somewhat lower beach slope when compared with those slopes identified along the Tillamook County coastline (Allan and Priest, 2001). The sediments that comprise the beaches range in size from 0.14–0.25 mm (classified as medium- to fine-grained sand) (Schlicker and others, 1972; Peterson and others, 1994; Ruggiero and Voigt, 2000).

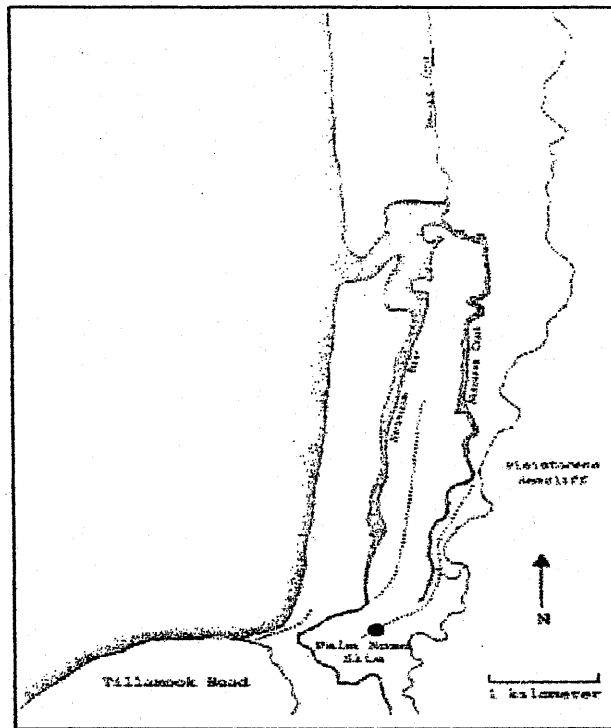
For the past few thousand years, the shorelines of the Columbia littoral cell, including the Clatsop Plains, have accreted, causing the coastline to advance seawards (prograde) by a few hundred to several thousand meters. This process is thought to have begun around 4000 years ago, as the rate of sea-level rise slowed (Woxell, 1998). Evidence for this comes from a beach-sand wood sample that was dated at 4050 years BP (before present), and from an archaeological site at Palm Rose that was first occupied around 3650 years BP (Figure 12). Using these data as a baseline, Woxell (1998) determined that the Clatsop Plains accreted at an average rate of 0.7 m/yr (2.3 ft/yr) from about 4000 years BP to AD 1700. This latter date coincides with the last major subduction zone earthquake, which caused the PNW coastline to drop in elevation by 0 to 2 m (Peterson and others, 2000). Between 1700 and 1885, accretion rates along the Clatsop Plains fell slightly to around 0.5 m/yr (1.6 ft/yr). The year 1885 is significant since this was when construction of the south jetty began.

The seaward progradation of the Clatsop Plains has continued throughout the past 120 years, but at rates exceeding several meters per year due to large supplies of sand from the Columbia River, and as a result of jetty construction at the MCR (Gelfenbaum and others, 1999). Of particular significance has been the construction and subsequent extensions of the south jetty, which caused a dramatic increase in the rate of shoreline advance. According to Woxell (1998), historic accretion rates along the Clatsop Plains ranged from 2.0 to 5.8 m/yr (6.6 to 19 ft/yr), with an average rate of 3.3 m/yr (10.8 ft/yr). Furthermore, the highest accretion rates were identified near the MCR. However, since about the mid-1920s the rate of coastal advance has slowed, while erosion has been the dominant shoreline response along Clatsop Spit. These latter adjustments suggest a change in the overall sediment budget of the Columbia River cell, which may have important implications to the future stability of coastal shorelines adjacent to the MCR.





**Figure 11** Map of the Columbia River littoral cell and four sub-cells including the Clatsop Plains sub-cell (Gelfenbaum and Kaminsky, 2000).



**Figure 12** The Palm Rose site (dated using  $^{14}\text{C}$  at 3650 BP) located at the southern end of the Clatsop Plains. Dotted lines indicate buried cobble ridges (Woxell, 1998).

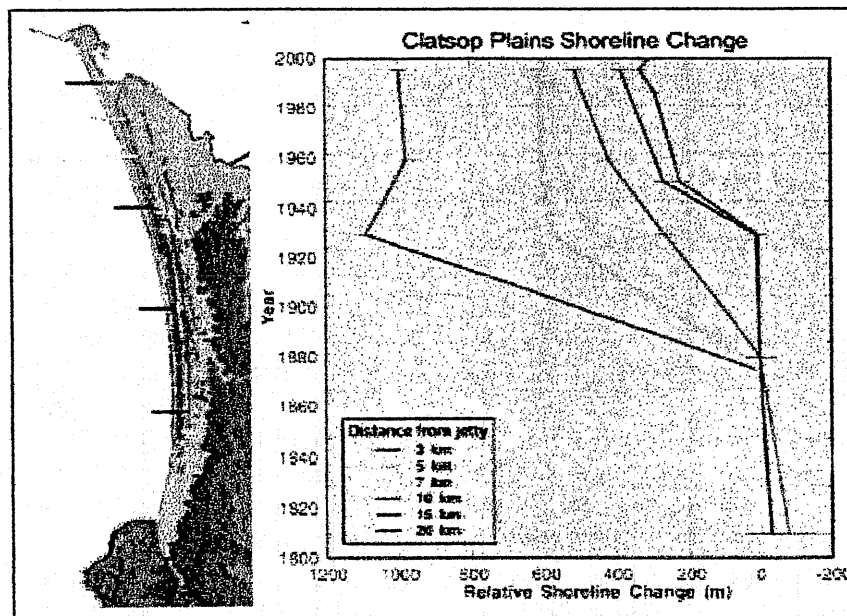
Figure 13 presents historic shoreline change rates for selected sites along the Clatsop Plains. Apparent in the figure are the large amounts of accretion that has taken place over the past 200 years. For example, Clatsop Spit advanced seaward by some 1100 m (3600 ft), while shoreline changes near Gearhart were on the order of +350 m (+1150 ft). Also evident in Figure 13 is a decline in the rate of shoreline advance during the last century, with evidence of a switch to erosion along Clatsop Spit. This last response has been occurring since the mid-1920s, and includes about 6 km (3.7 miles) of the spit tip. The recent phase of erosion identified along Clatsop Spit, including several other sites in the Columbia River littoral cell, may be related to an overall decrease in the supply of sand from the Columbia River. For example, the volume of sand supplied by the Columbia River decreased from an estimated  $4.3 \times 10^6 \text{ m}^3/\text{yr}$  (for the period 1878 – 1934) to  $1.4 \times 10^6 \text{ m}^3/\text{yr}$  (for the period 1958 – 1997), a decrease by a factor of 3 during historical times (Gelfenbaum and others, 1999).

The reduction in sand supplied by the Columbia River may be a function of several processes, including:

- The construction of over 200 dams, which provide an effective trap for sediment that is transported down the Columbia and Willamette rivers (Gelfenbaum and others, 1999);

- A reduction in the peak Columbia River flow statistics over the past 60 years, which may have contributed to a reduction in the rivers ability to transport sediment (Sherwood and others, 1990);
- Dredging of the lower Columbia River estuary by the U.S. Army Corps of Engineers (Sherwood and others, 1990; Gelfenbaum and others, 1999), and;
- Continued re-adjustments of the Columbia River littoral system to jetty construction.

Despite a plethora of information obtained as a result of the Southwest Washington Coastal Erosion Study (SWCES) (<http://www.ecy.wa.gov/programs/sea/swces/>) run by the U.S. Geological Survey and the Washington Department of Ecology, a number of important questions remain unanswered. These include questions about the transportation of sediment within the Columbia littoral cell (i.e. where it is coming from and going to), the sources of sediment (e.g. whether the inner continental shelf is a major source of sand), and the role of climate shifts (e.g. 25 years of relatively persistent El Niño conditions). The latter in particular may account for some of the recent erosion problems identified along the coast.



**Figure 13** Historical and recent shoreline changes measured along the Clatsop Plains (Figure courtesy of Department of Ecology, Washington).

## METHODS

The approach used to define coastal hazard zones along the Clatsop Plains is comprehensively described in Appendix A and B, while Figure 14 presents a conceptual diagram of the hazard zones.

In brief, coastal hazard zones have been determined using the geometric model developed by Komar and others (1999). The basis for this model is that property erosion occurs when the total water level produced by the combined effect of extreme wave runup ( $R$ ) plus the tidal elevation ( $E_T$ ), exceeds some critical elevation of the fronting beach, typically the elevation of the beach-dune junction ( $E_j$ ). As a result, when  $E_T > E_j$ , erosion occurs and the beach erodes until  $E_T$  approximately equals the  $E_j$ . Critical then in applying the model to evaluate the susceptibility of coastal properties to erosion, is an evaluation of the occurrence of extreme tides ( $E_T$ ), the runup of waves ( $R$ ), and the joint probabilities of these processes along the coast (Ruggiero and others, 2001). Appendix A presents a summary of such analyses for the Oregon coast.

Four hazard zones have been identified for Clatsop County. These include an ACTIVE HAZARD ZONE, which identifies the currently active beach environment, and three other zones that identify potential erosion hazards associated with specific extreme events. These last zones are defined as HIGH, MODERATE, and LOW risk zones. The locations and descriptions of the various hazard zones have subsequently been incorporated into MapInfo, Geographic Information System (GIS) software.

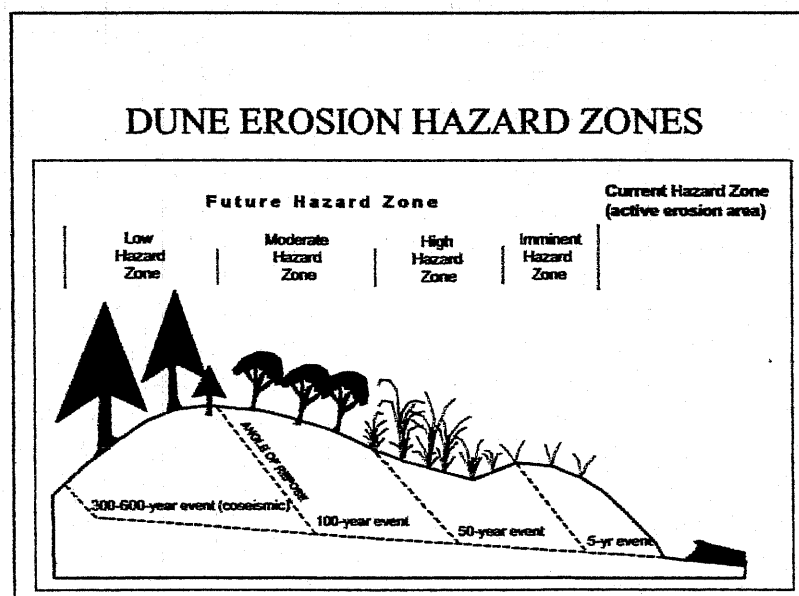


Figure 14 Schematic diagram showing possible dune erosion hazard zones (Allan and Priest, 2001).

### **Active Erosion Zone**

An active erosion hazard zone (AEZ) (Figure 14) was mapped for the dune-backed shorelines throughout the study area based on an analysis of historical shoreline positions, geomorphic features identified from aerial photographs (e.g. erosion scarps), and from an analysis of the total wave runup elevation (tides + wave runup) at the shore. The approach used to define the AEZ is described in Appendix B. On dune-backed beaches, the AEZ distinguishes the zone of beach variability, a region in which beaches undergo considerable change (e.g. changes in the position of the shoreline (height and width) relative to some known datum point). Thus, it represents the portion of beach that is known to have changed in recent times due to large wave events and changes in sediment supply. It is therefore the zone that can be expected to change in the immediate future. As a result, there can be no doubt that building within the active hazard zone represents considerable risk.

It is important to note that the AEZ as defined here should not be confused with the "active dune" or "active foredune" used by State regulators (e.g. OCZMA, 1979; DLCD, 1995). For example, OCZMA (1979) defines the Active Foredune as those dunes that possess insufficient vegetative cover to retard wind erosion, while Goal 18 (Beaches and Dunes) of Oregon's Statewide Planning Goals and Guidelines prohibits the residential and commercial development of beaches and active foredunes (DLCD, 1995).

### **Scenarios of Coastal Change used for the Clatsop Plains**

The maximum extent of shoreline variability on dune-backed beaches can also be estimated from oceanographic factors using empirical modeling techniques rather than direct geomorphic observations. The advantage of these techniques is that they can depict erosion events that may be difficult or impossible to define by geomorphic field observations of the effects of past erosion events. This report presents the results of maximum potential erosion distances (MPED) for the Clatsop Plains based on three scenarios. In developing the three scenarios, we have attempted to steer clear of such terminology as the 100-year extreme event, which can often be misconstrued. Instead, we have defined our scenarios according to HIGH, MODERATE, and LOW risk hazard zones. Furthermore, although the following scenarios indicate increasing levels of potential erosion (especially the two "worst case" scenarios), they respectively represent decreasing levels of risk of becoming active over the next 60-100 years. Because of the difficulties of identifying the most appropriate combination of extreme high waves and tides, the following scenarios assume that a major storm occurs over the course of an above average high tide. Along the northern Oregon coast, the Mean Higher High Tide averages about 2.57 m (8.42 ft) at the Astoria tide gauge and is relative to Mean Lower Low Water (MLLW). When converted to the NAVD'88 datum, this amounts to an elevation of 2.66 m (8.74 ft). Thus, when other variables are added to this, all of the elevations will be relative to the NAVD'88 datum.

Scenario 1 describes a HIGH-risk hazard zone. The variables included in this scenario are:

- 14.5 m (47.6 ft) significant wave height,
- 17 second peak spectral wave period,
- 2.66 m (8.74 ft) Mean Higher High Tide,
- 0.4 m (1.31 ft) monthly mean water level,
- 1.0 m (3.28 ft) storm surge.

This particular scenario is similar to the 2-3 March 1999 La Niña storm, which caused widespread damage along the Oregon coast (Allan and Komar, in press). The scenario assumes that a major storm occurs over the course of an above average high tide. To accommodate the monthly rise in mean water levels between summer and winter, an additional 0.4 m (1.31 ft) has been added to the high tide. Furthermore, because the extreme storms that occurred during the 1997-98 El Nino and 1998-99 La Nina winter produced significant storm surges, we have included a 1.0 m (3.28 ft) storm surge component as part of this scenario. When combined, these data yield a water elevation of 4.1 m (13.33 ft) relative to the NAVD'88 datum.

Scenario 2 describes a MODERATE hazard zone, and includes the following variables:

- 16.0 m (52.5 ft) significant wave height,
- 20 second peak wave period,
- 2.66 m (8.74 ft) Mean Higher High Tide,
- 0.4 m (1.31 ft) monthly mean water level,
- 1.7 m (5.58 ft) storm surge,

The MODERATE hazard zone is one of two "worst case" scenarios. This particular scenario assumes that the rise in wave heights identified offshore from the PNW coast by Allan and Komar (2000a; 2000b; in review) continues over the course of the next century. In effect, the 16.0 m (52.5 ft) significant wave heights used in this scenario is similar to the predicted 100-year storm wave shown in Appendix A (Table A2). The variables used to generate the water levels are the same as those shown in scenario 1, except that we have incorporated a larger storm surge component, 1.7 m (5.58 ft). According to Flick and others (1999), the Astoria gauge shows no evidence of a long-term rise in mean sea level. As a result, we have excluded such a term in scenario 2. This combination of events has an extremely low probability of occurrence. However, the results are still useful in that they provide a landward limit of potential erosion (assuming no long-term trends in the coast) due to an especially severe storm.

Scenario 3 describes a LOW hazard zone, and includes the following variables:

- 16.0 m (52.5 ft) significant wave height,
- 20 second peak wave period,
- 2.66 m (8.74 ft) Mean Higher High Tide,
- 0.4 m (1.31 ft) monthly mean water level,



- 1.7 m (5.58 ft) storm surge,
- 1.0 m (3.28 ft) lowering of the coast due to a Cascadia subduction zone earthquake.

The LOW hazard zone is the second "worst case" scenario, and incorporates all of the variables used in scenario 2, but with the added feature of a Cascadia subduction zone event. These events have been shown to occur in response to large earthquakes in the Cascadia margin, and have a recurrence interval of approximately 500 years (Geometrics Consultants, 1995; Darienzo and Peterson, 1995; Atwater and Hemphill-Haley, 1996). These types of events can cause some parts of the PNW coast to be abruptly lowered by 0 - 2 m (0 - 6.6 ft) (Peterson and others, 2000). Because of the lower coastal elevations, wave processes will therefore be able to reach much further up the beach. As a result, it can be expected that erosion would be widespread under this scenario with extensive coastal retreat. Furthermore, the process of erosion is likely to persist for several decades until the coastal environment has achieved a new state of dynamic equilibrium, and as interseismic strain builds up on the locked Cascadia subduction zone interface. Under this scenario, we have adopted a value of 1.0 m (3.28 ft) coseismic subsidence for the Clatsop Plains, which is "typical" for this part of the northern Oregon coast based on paleoseismic analyses of previous subduction events (Peterson and others, 2000).

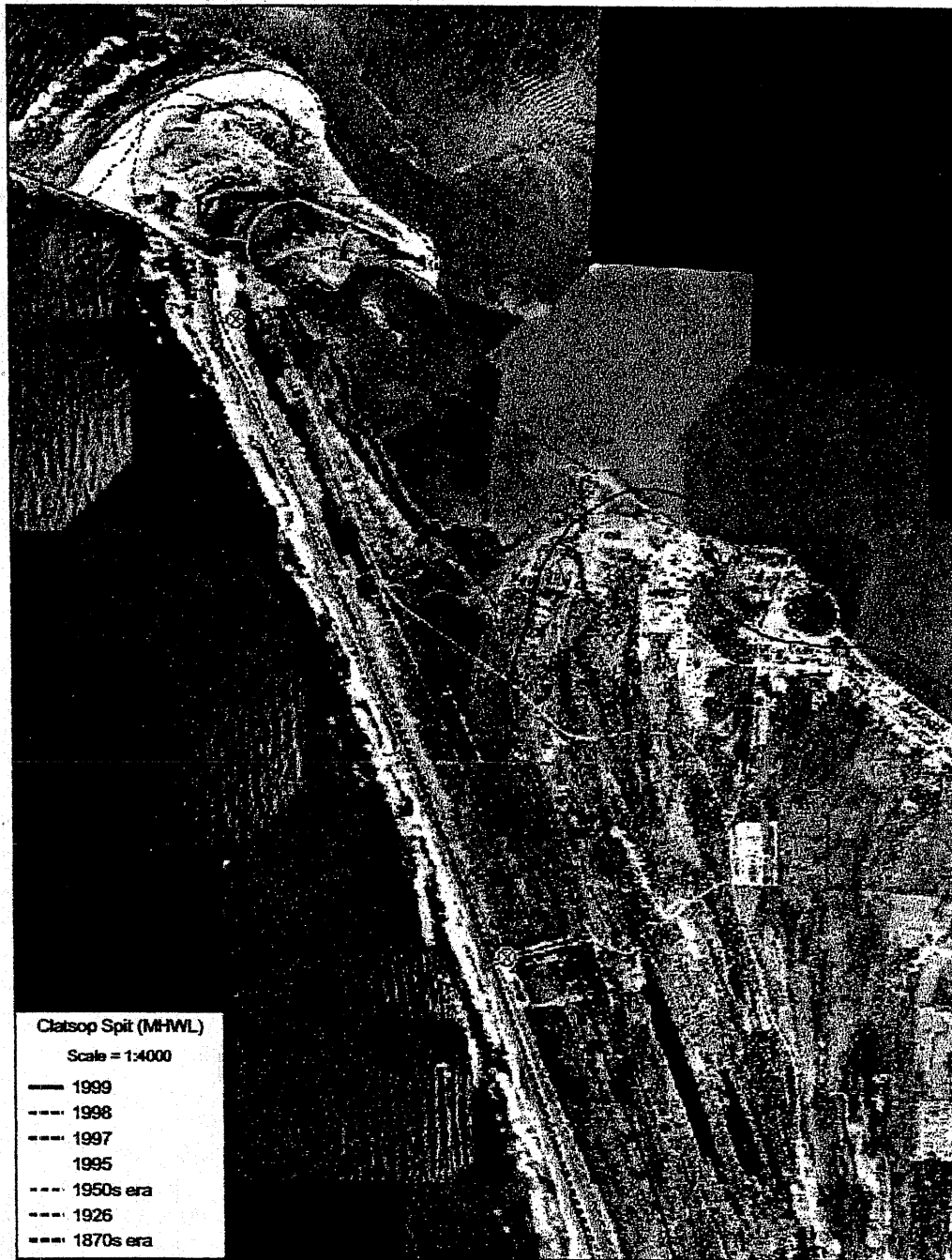
## RESULTS AND DISCUSSION

### Clatsop County Historical Shoreline Positions

This section presents a qualitative discussion of large-scale changes in shoreline positions identified along the Clatsop Plains from the NOS T-sheets, aerial photographs, and LIDAR data. The approach adopted here is to describe the broad changes identified at three locations along the Clatsop Plains; Clatsop Spit, Slusher Lake (located mid-way along the Clatsop Plains), and Gearhart in the south.

Figure 15 identifies those shoreline changes along Clatsop Spit over the past 120 years. With the construction and subsequent extensions of the south Columbia River jetty, it is apparent that the coastline advance seaward at an extremely rapid rate. For example, between the 1870s and 1926 the coastline prograded by some 500 m (1640 ft), measured near the bottom of Figure 15, and by ~1000 m (3280 ft) around mid photo. Of particular significance, was the extension of Clatsop Spit by about 4.6 km (2.86 miles) over a period of 50 years. A major source of the sand that accumulated along Clatsop Spit was likely from changes in the Columbia River inlet, and offshore from the Clatsop Plains (i.e. the mid-continental shelf region). For example, between the 1870s and 1926 these areas combined lost about 364 million m<sup>3</sup> of sand (Gelfenbaum and others, 2001). Between 1926 and the 1950s, the northern end of Clatsop Spit eroded by some 200 to 250 m (650 ft to 820 ft) (Figure 15). However, since the 1950s erosion of the spit appears to have stabilized, indicated by the close proximity of the 1950s shoreline to the more recent shoreline positions (i.e. 1990s). Nevertheless, photographic evidence from the most recent aerial photography flight (1999) indicates that Clatsop Spit continues to erode.

This is shown in Figure 16, which identifies an erosion scarp that probably formed over the 1998-99 La Niña winter.



**Figure 15** Historical shoreline changes along Clatsop Spit (1870s era, 1926, 1950s era, 1995, shoreline data courtesy of the SWCES).

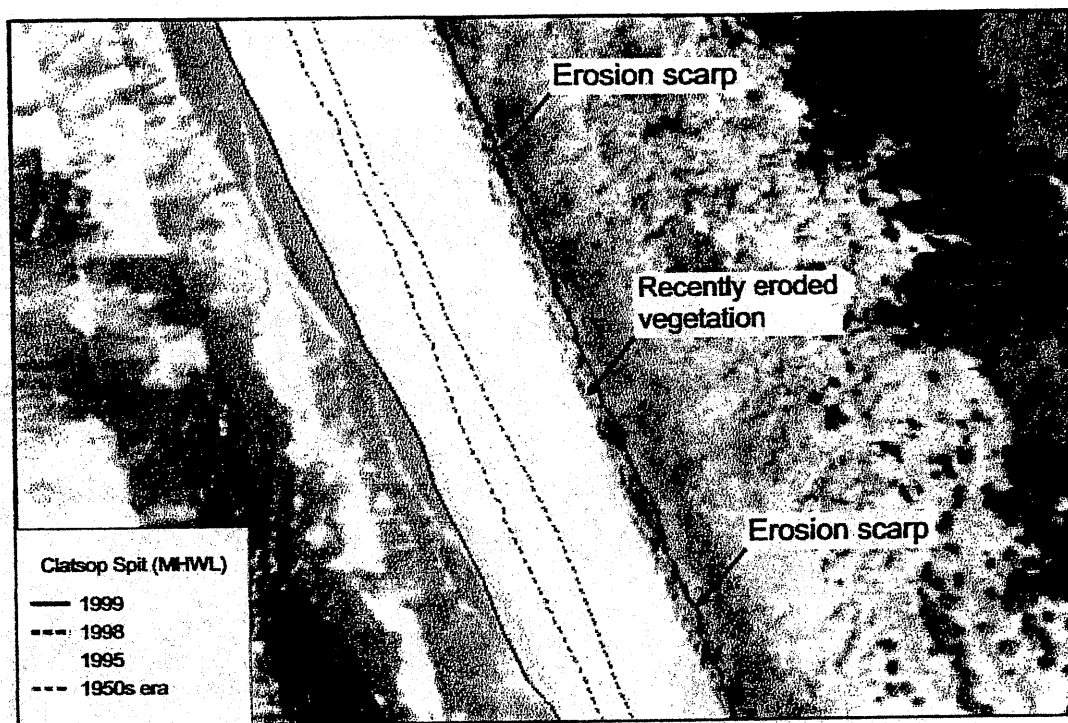


Figure 16 Recent evidence of erosion along Clatsop Spit.

Shoreline changes identified near Slusher Lake (located mid-way along the Clatsop Plains) are shown in Figure 17. The results again indicate the dramatic effect jetty construction has had on the beach system with the coastline having advanced seaward by about 450 m (1476 ft). Unlike Clatsop Spit, changes in the position of the shore between the 1870s and 1926 were relatively minor. More significant was the amount coastal progradation that took place between 1926 and the 1950s (+350 m (+1150 ft)), which occurred along almost the entire length of the Clatsop Plains (except for Clatsop Spit). These changes are likely the product of continued erosion and deepening of the Columbia River inlet, and further deepening offshore from the Clatsop Plains (i.e. the mid-continental shelf region). These two regions combined lost an additional 147 million m<sup>3</sup> of sediment (Gelfenbaum and others, 2001). The coastline continued to prograde after the 1950s (Figure 17), though at a much-reduced rate. These latter changes may be related to a reduction in the rate of erosion identified adjacent to Columbia River inlet, and on the mid-continental shelf region offshore from the Clatsop Plains. For example, these regions lost an additional 100 million m<sup>3</sup> between the 1950s and 1999. The close proximity of the more recent shoreline positions (i.e. 1990s era) indicates that there has been very little change in the position of the shorelines during the last 10 years. This raises the question whether such changes (or lack of) is a function of a general slowing in the rate of sediment accumulation on the Clatsop Plains, or whether the system may switch over and begin to erode (as identified along Clatsop Spit).



**Figure 17** Historical shoreline changes near Slusher Lake (1870s era, 1926, 1950s era, 1995, shoreline data courtesy of the SWCES).

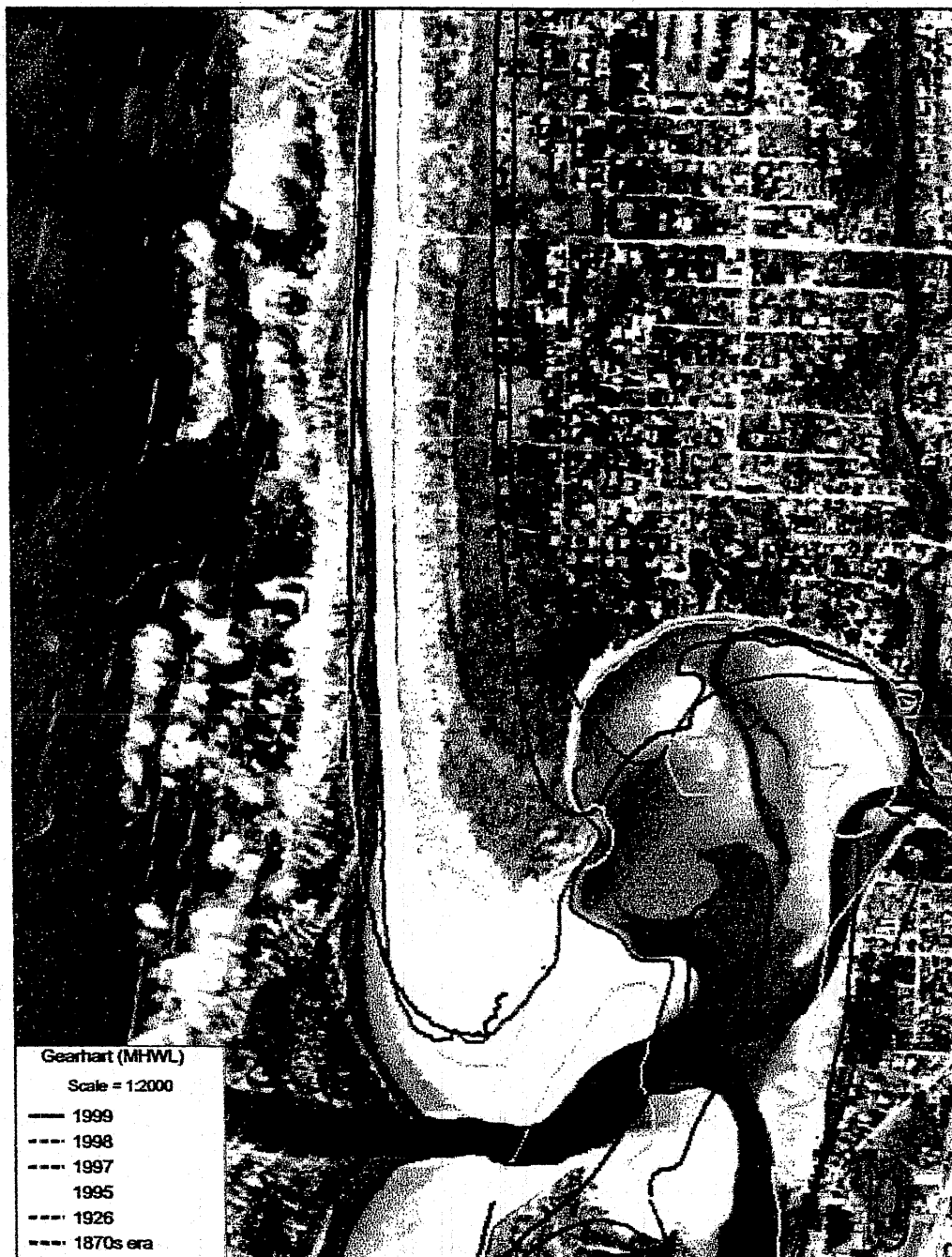
Figure 18 identifies those shoreline changes that occurred adjacent to Gearhart. The results indicate that the coastline initially retreated between the 1870s and 1926. It is possible that this initial phase of erosion was associated with a general reorientation of the Clatsop Plains. Unfortunately there is no shoreline information for the 1950s for the Gearhart region.

Between 1926 and 1995, the shoreline advanced seaward by about 250 m (820 ft). Since about 75% of the coastal change identified at Slusher Lake to the north occurred between 1926 and the 1950s, it quite possible that the shoreline adjacent to Gearhart moved seaward by about 190 m (623 ft). This would place the 1950s era shoreline close to the dark green vegetation line that can be identified running just landward (about 100 ft) of the beach (Figure 18). Unlike the central and northern Clatsop coastline, the latter half of the 1990s appears to have been dominated by erosion. For example, the 1998 and 1999 shorelines are about 30 m to 60 m (100 ft to 200 ft) landward of the 1995 and 1997 shoreline positions. These estimates are outside the margin of error associated with the 1995 and 1999 aerial photographs (see Table B1, Appendix B). Finally, it can be seen from Figure 18 that the mouth of the Necanicum Bay has fluctuated significantly over the past 120 years. Figure 18 indicates that the bay mouth was much wider (870 m (2850 ft)) during the early part of last century, narrowing to about 70 m (230 ft) wide in 1999. These latter changes highlight the dynamic nature of bay mouths, and reinforce the importance of limiting the development of such areas.

### **Coastal Hazard Zones in Clatsop County**

This section examines the possible future coastal response that may occur under a variety of extreme scenarios. It is important to stress that the erosion estimates that are presented below are associated with specific scenario events. Thus, the hazard zones do not account for any possible reductions in the overall sediment budget. For example, continued removal of sand through dredging could conceivably alter the stability of the entire Columbia River littoral cell, and hence the Clatsop Plains.

Estimates of maximum potential erosion distances (MPED) for the dune-backed beaches have been determined by the geometric model (Appendix A) for each 100 m section of beach according to the three scenarios presented previously. These data have subsequently been tabulated in an EXCEL spreadsheet for each littoral cell. Because of the variability in the morphology of the beaches along the Clatsop Plains, specifically in terms of the beach-dune toe elevations ( $E_j$ ) and the slopes of the beach ( $\tan \beta$ ), the estimated MPED data were similarly characterized by a wide range of values. To standardize the data somewhat, an average MPED was determined for each littoral cell. In a sense, this approach is similar to taking an average of all the beach slopes and beach-dune toe elevations, and then applying the geometric model to the average data. The average MPED data have subsequently been used to generate the HIGH (red zone), MODERATE (orange zone), and LOW-risk (yellow zone) hazard zones shown in Appendix C, along with the existing ACTIVE HAZARD ZONE.



**Figure 18** Historical shoreline changes near Gearhart (1870s era, 1926, 1950s era, 1995, shoreline data courtesy of the SWCES).



Table 2 presents values of the calculated MPED identified for the Clatsop Plains. As can be seen for the HIGH-risk hazard zone, estimated erosion distances range from 240 to 522 feet, with an average MPED of 360 feet. It is this last value that has been incorporated into a GIS layer in MAPINFO, and is shown as the HIGH-risk coastal hazard zone in Appendix C. As expected, a much broader range of values characterize the MODERATE and LOW risk scenarios (Table 2), with some potential erosion distances that extend up to 940 feet. Such variation reflects the broad characteristics of the beach morphology at the end of the 1997-98 El Niño winter. For example, the narrowest MPED estimates were typically associated with those beaches with high dune-toe elevations and steep beach slopes, essentially stretches of coast that had not undergone significant erosion during the 1997-98 El Niño winter. Average maximum potential erosion distance estimates for the MODERATE and LOW risk hazard zones were determined to be 572 ft and 635 ft respectively (Table 2). These zones are shown graphically in Appendix C.

**Table 2** Maximum potential erosion distances determined for the Clatsop Plains.

<i>Hazard zone scenarios</i>	<i>Min (ft)</i>	<i>Max (ft)</i>	<i>Average MPED (ft)</i>
HIGH	243	522	<b>360</b>
MODERATE	390	825	<b>572</b>
LOW	424	938	<b>635</b>

The above calculations provide an estimate of the average maximum potential erosion distance for sandy beaches located along the Clatsop Plains. These estimates have been based on three scenarios, two of which, 2 and 3 are "worst case" scenarios, since they assume a major storm coincident with a large storm surge, or a subduction event occurring simultaneously. Clearly, these latter events have an extremely low probability of occurrence, though the results are likely still meaningful in that they provide an understanding of the potential upper limit of extreme erosion.

Of greater value to planners are those estimates of maximum potential erosion associated with the HIGH-risk scenario (*scenario 1*), since it is this scenario that is most likely to take place along the Oregon coast. As indicated in Table 2, the average MPED determined for the Clatsop Plains is 360 ft. However, even under the HIGH-risk scenario some beach sites have predicted coastal retreat of up to 522 ft. Generally, these sites tend to be located adjacent to rip embayments (e.g. the south jetty), Necanicum Bay mouth, and areas where access tracks (which may be further associated with a region where the dune has opened up) join the beach. Because of the lower beach elevations ( $E_f$ ) and slopes that characterize such areas, very large potential erosion distances are always going to be predicted by the geometric model. Nevertheless, beach measurements by Ruggiero and Voigt (2000) revealed that the Clatsop beaches have recently eroded by as much as 125 ft.

The reality is, that it is unlikely that a single storm event would contribute toward coast-wide erosion of the magnitudes shown in Table 2 along the Clatsop County coastline, because of certain assumptions that are characteristic of the geometric model:

- The geometric model projects a mean linear beach slope. As a result, if the beach is more concave, it is probable that the amount of erosion would be less, though not by much (Komar and others, 1999);
- The model assumes an instantaneous erosional response, with the dunes retreating landward as a result of direct wave attack. However, the reality of coastal change is that it is far more complex than this so that there is in fact a time lag in the erosional response behind the forcing mechanism. As noted by Komar and others, the extreme high runup elevations calculated from Equation 1 (Appendix A) occur for only a very short period of time, i.e. the period of time in which the high wave runup elevations coincide with high tides. Since the elevation of the tide varies with time (e.g. daily), the amount of erosion can be expected to be much less when the water levels are lower. Thus, it is probable that several storms similar to those used in the current modeling, are in fact required to cause the amounts of coastal retreat shown in Table 2, and;
- As beaches erode, the sediment is removed offshore (or further along the shore) into the surf zone where it accumulates as nearshore sand bars. This process helps to reduce the incoming wave energy by causing the waves to break further offshore, dissipating much of the wave energy, and forming the wide surf zones that are characteristic of the Oregon coast. In turn, this process helps to reduce the rate of beach erosion that occurs.

Despite these limitations, it is conceivable that several severe storms could occur in relatively quick succession (storm-in-series) as occurred in February 1999, which would contribute to widespread coastal retreat. Furthermore, although the most recent winters (1997-98 El Niño and 1998-99 La Niña winters) were exceptional stormy, previous events (e.g. the 12 October 1962 "Columbus Day" storm, or the 1939 storms) have produced coastwide damage on a scale not seen in the last two decades. As a result, the geometric model remains a useful approach for estimating maximum potential erosion distances along dune-backed beaches.

## CONCLUSIONS

Hazard zones on dune-backed beaches were determined for the Clatsop Plains using a geometric model, whereby property erosion occurs when the total water level produced by the combined effect of extreme wave runup ( $R$ ) plus the tidal elevation ( $E_T$ ), exceeds some critical elevation of the fronting beach, typically the elevation of the beach-dune junction ( $E_J$ ). Three scenarios were used to model erosion hazard zones on dune-backed beaches:

- *Scenario 1* (HIGH-risk) is analogous to the 2-3 March 1999 La Niña winter storm. This scenario is based on the storm waves occurring over the cycle of an above average high tide, coincident with a 3.3 ft storm surge. Under this scenario, the designated HIGH-risk hazard zone was estimated to be 360 ft, while individual beach sites may vary by as much as 243 ft to 522 ft due to subtle differences in the character of the beach (beach slope and beach/dune junction).
- *Scenario 2* (MODERATE-risk) is one of two "worst case" situations in which a severe storm event is coupled with a large storm surge of 5.6 ft. Maximum potential erosion distances (MPED) estimated for the Clatsop Plains under this particular scenario vary considerably, with calculated MPED's that ranged from 390 to 825 ft, while the designated width of the moderate hazard zone was established at 572 ft.
- *Scenario 3* (LOW-risk) is the second "worst case" scenario, and is the same as *scenario 2*, but incorporating a 3.3 ft subsidence from a Cascadia subduction zone earthquake. MPED estimated for *scenario 3* ranged from 424 to 938 ft, while the designated width of the low hazard zone was established at 635 ft.

The range of shoreline retreat predicted for dune backed beaches is clearly quite large for Clatsop County, and reflects the uncertainty in predicting future shoreline behavior based purely on extreme wave erosion events. Despite the low probabilities of some of the extreme water level scenarios adopted for Clatsop County, the width of the resulting average hazard zones is still justified since it can accommodate in a gross sense such changes as migrating rip current embayments, the wholesale transport of sand by longshore drift, and the on-offshore transport of sand. This type of modeling however ignores any long-term change in the sediment budget of the Columbia River littoral cell. For example, analyses of previous studies (particularly the results of the SWCES) indicate that there has been a reduction in the amount of sand sourced from the Columbia River. Evidence for this includes the large-scale loss of sand in the Columbia River inlet, and the mid-continental shelf region offshore from the Clatsop Plains. These latter changes could conceivably contribute to further erosion of the Clatsop Plains in the future, particularly along Clatsop Spit, which has been eroding since 1926.

Finally, we strongly recommend that the County continue to monitor coastal changes along the Clatsop Plains on a regular basis. Such monitoring may include repeated surveys of beach cross-sections established as part of the SWCES (e.g. re-survey on a bi-annual basis), or analyses of coastal changes determined from any future aerial photography or LIDAR flights. Monitoring shoreline changes in the future is particularly critical for two reasons. Perhaps most importantly, regular monitoring can provide early warning of shoreline changes that could threaten lives and property. Monitoring is also fundamental to testing the validity of the assumptions made in the geometric model for dune-backed shorelines and the bluff retreat scenarios mapped for bluff-backed shorelines. At this stage, the geometric model does not account for "hotspot" erosion that occurs at the southern ends of littoral cells and mouths of the bays. As a result, further efforts are required to better define maximum potential erosion distances in these regions by incorporating empirical observations into the analysis. In addition, it is evident that the geometric model predicts an instantaneous beach response to a major storm. The reality however, is that there is some lag in the response time of the beach. In other words, does the beach require several storms to produce the type of maximum erosion predicted by the geometric model? or are the erosion estimates achieved over an entire season? Further efforts directed towards examining these issues would provide greater confidence in the predictions made by the geometric model.

## **ACKNOWLEDGMENTS**

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## REFERENCES CITED

Allan, J.C. and P.D. Komar, 2000a, Are ocean wave heights increasing in the eastern North Pacific? EOS, Transaction of the American Geophysical Union, 47: 561-567.

Allan, J.C. and P.D. Komar, 2000b, Spatial and temporal variations in the wave climate of the North Pacific: Unpublished report to, Department of Land Conservation and Development, 46.

Allan, J.C. and P.D. Komar, In Press, Extreme storms on the Pacific Northwest Coast during the 1997-98 El Niño and 1998-99 La Niña: Journal of Coastal Research.

Allan, J.C. and P.D. Komar, In review, The wave climate of the eastern North Pacific: Long-term trends and El Niño/La Niña dependence: Journal of Coastal Research.

Allan, J.C. and G.R. Priest, 2001, Evaluation of coastal erosion hazard zones along dune and bluff backed shorelines in Tillamook County, Oregon: Cascade Head to Cape Falcon: Oregon Department of Geology and Mineral Industries, Portland, Oregon: 111.

Atwater, B.F. and E. Hemphill-Haley, 1996, Preliminary estimates of recurrence intervals for great earthquakes of the past 3500 year at northeastern Willapa Bay, Washington: U.S. Geological Survey, 87.

Bacon, S. and D.J.T. Carter, 1991, Wave climate changes in the North Atlantic and North Sea: International Journal of Climatology, 11: 545-558.

Carter, D.J.T. and L. Draper, 1988, Has the north-east Atlantic become rougher?: Nature: 332, 494.

Geometrics Consultants, 1995, Seismic source characterization, in Geometrics Consultants, Seismic design mapping, State of Oregon: Project number 2442, Final report prepared for Oregon Department of Transportation, 2-1 to 2-153.

Cooper, W.S., 1958, Coastal sand dunes of Oregon and Washington: Geological Society of America. Memoir 72: 169.

Daniels, R.C., R.H. Huxford and D. McCandless, 1998, Coastline mapping and identification of erosion hazard areas in Pacific County, Washington: ESRI 1998 User Conference, San Diego, California.

Daniels, R.C., P. Ruggiero and D. McCandless, 2000, Interpretation of the average high water line from aerial photography: Variability and repeatability: in G. Gelfenbaum and G. M. Kaminsky, Southwest Washington coastal erosion workshop report 1998: Washington Department of Ecology, Olympia, WA, and U.S. Geological Survey, Menlo Park, CA, OFR 99-524: 182.

Dariento, M.E. and C.D. Peterson, 1995, Magnitude and frequency of subduction zone earthquakes along the northern Oregon coast in the past 3,000 years: Oregon Geology, 57(1): 3-12.

DLCD, 1995, Oregon's statewide planning goals & guidelines: Department of Land Conservation and Development, 42.

Flick, R.E., J.F. Murray and L.C. Ewing, 1999, Trends in U.S. tidal datum statistics and tide range a data report atlas: SIO Reference Series No. 99-20, Scripps Institution of Oceanography, 22.

Gelfenbaum, G., M.C. Buijsman, C.R. Sherwood, H.R. Moritz and A.E. Gibbs, 2001, Coastal evolution and sediment budget at the mouth of the Columbia River, USA: 4th International Conference on Coastal Dynamics, Lund, Sweden.

Gelfenbaum, G. and G.M. Kaminsky, 2000, Southwest Washington coastal erosion workshop report 1999: Washington Department of Ecology, Olympia, WA, and U.S. Geological Survey, Menlo Park, CA, OFR 00-439, 187.

Gelfenbaum, G., C.R. Sherwood, C.D. Peterson, G.M. Kaminsky, M.C. Buijsman, D.C. Twichell, P. Ruggiero, A.E. Gibbs and C. Reed, 1999, The Columbia River cell: A sediment budget overview: Proceedings of Coastal Sediments '99, Hauppauge, Long Island, New York, American Society of Civil Engineers: 1660-1675.

Ghil, M. and R. Vautard, 1991, Interdecadal oscillations and the warming trend in global temperature time series: Nature, (350): 324-327.

Graham, N.E. and H.F. Diaz, 2001, Evidence for intensification of North Pacific Winter Cyclones since 1948: Bulletin of the American Meteorological Society.

Huxford, R.H., 1998, Historical map recovery using multiple, integrated ESRI programs: ESRI 1998 User Conference, San Diego, California.

Huyer, A., 1983, Coastal upwelling in the California current system: Progress in Oceanography, 12: 259-284.

Huyer, A., W.E. Gilbert and H.L. Pittock, 1983, Anomalous sea levels at Newport, Oregon, during the 1982-83 El Niño: Coastal Oceanography and Climatology News, 5: 37-39.

Kaminsky, G.M., M.C. Buijsman, G. Gelfenbaum, P. Ruggiero, H.M. Jol, A.E. Gibbs and C.D. Peterson, 1999a, Synthesizing geological observations and processes-response data for modeling coastal change at management scale: Proceedings of Coastal Sediments '99, Hauppauge, Long Island, New York, American Society of Civil Engineers: 1708-1723.



Kaminsky, G.M., R.C. Daniels, R.H. Huxford, D. McCandless and P. Ruggiero, 1999b, Mapping erosion hazard areas in Pacific County, Washington: *Journal of Coastal Research*, SI(28): 158-170.

Kirk, R.M., 1979, Dynamics and management of sand beaches in southern Pegasus Bay: Morris and Wilson Consulting Engineers Technical Report to, Christchurch City Council and Waimari District Council, Christchurch, NZ: 121.

Kleeman, R., R.A. Colman, N.R. Smith and S.B. Power, 1996, A recent change in the mean state of the Pacific basin climate: Observational evidence and atmospheric and oceanic responses: *Journal of Geophysical Research*, 101(C9): 20483-20499.

Komar, P.D., 1986, The 1982-83 El Nino and erosion on the coast of Oregon: *Shore and Beach*, 54(2): 3-12.

Komar, P.D., 1997, *The Pacific Northwest Coast: Living with the Shores of Oregon and Washington*: Durham and London, Duke University Press: 195.

Komar, P.D., 1998a, *Beach processes and sedimentation*: New Jersey, Prentice Hall, Inc. Englewood Cliffs: 544.

Komar, P.D., 1998b, The 1997-98 El Niño and erosion on the Oregon coast: *Shore & Beach*, 66(3): 33-41.

Komar, P.D. and J.C. Allan, 2000, Analyses of extreme waves and water levels on the Pacific Northwest coast: Unpublished, Department of Land Conservation and Development, 24.

Komar, P.D., J.C. Allan, G.M. Dias-Mendez, J.J. Marra and P. Ruggiero, 2000, El Niño and La Niña - erosion processes and impacts: *Proc. 27th International Conference on Coastal Engineering*.

Komar, P.D., W.G. McDougal, J.J. Marra and P. Ruggiero, 1999, The rational analysis of setback distances: Applications to the Oregon coast: *Shore & Beach*, 67: 41-49.

Mantua, N.J., S.R. Hare, Y. Zhang, J.M. Wallace and R.C. Francis, 1997, A Pacific interdecadal oscillation with impacts on salmon production: *Bulletin of the American Meteorological Society*, 78: 1069-1079.

Moore, L.J., 2000, Shoreline mapping techniques: *Journal of coastal research*, 16(1): 111-124.

OCZMA, 1979, *Beaches and Dunes Handbook for the Oregon Coast*: Report to the Oregon Department of Land Conservation and Development, Newport, Oregon:

Peterson, C.D., M.E. Darienzo, D. Hamilton, D.J. Pettit, R.K. Yeager, P.L. Jackson, C.L. Rosenfeld and T.A. Terich, 1994, Beach-shoreline database, Pacific Northwest Region, USA: OFR 0-94-2, Oregon Department of Geology and Mineral Industries, Portland, OR: 29.

Peterson, C.D., D.L. Doyle and E.T. Barnett, 2000, Coastal flooding and beach retreat from coseismic subsidence in the Central Cascadia Margin, USA: *Environmental and Engineering Geoscience*, 6(3): 255-269.

Priest, G.R., 1999, Coastal shoreline change study Northern and Central Lincoln County, Oregon: *Journal of Coastal Research*, SP Issue(28): 140-157.

Ruggiero, P., P.D. Komar, W.G. McDougal and R.A. Beach, 1996, Extreme water levels, wave runup and coastal erosion: 25th International Conference on Coastal Engineering, Amer. Soc. Civil Engrs.

Ruggiero, P., P.D. Komar, W.G. McDougal, J.J. Marra and R.A. Beach, 2001, Wave runup, extreme water levels and the erosion of properties backing beaches: *Journal of Coastal Research*, 17(2): 407-419.

Ruggiero, P. and B. Voigt, 2000, Beach monitoring in the Columbia River littoral cell, 1997-2000: Publication No. 00-06-026, Coastal Monitoring & Analysis Program, Washington Department of Ecology, Olympia, WA: 113.

Schlicker, H.G., R.J. Deacon, J.D. Beaulieu and G.W. Olcott, 1972, Environmental geology of the coastal region of Tillamook and Clatsop Counties, Oregon: Oregon Department of Geology and Mineral Industries Bulletin, Portland, OR: 164.

Sherwood, C.R., D.A. Jay, R.B. Harvey, P. Hamilton and C.A. Simenstad, 1990, Historical changes in the Columbia River Estuary: *Progress in Oceanography*, 25: 299-352.

Shih, S.M., P.D. Komar, K.J. Tillotsen, W.G. McDougal and P. Ruggiero, 1994, Wave run-up and sea-cliff erosion: 24th International Conference on Coastal Engineering, American Society of Civil Engineers: 2170-2184.

Shoreland Solutions, 1998, Chronic coastal natural hazards model overlay zone: Technical report, Department of Land Conservation and Development, 43.

Taylor, G., 1999, Long-term wet-dry cycles in Oregon: <http://www.oce.orst.edu/ats/>.

USGS, 2000, Coastal and Nearshore Mapping with Scanning Airborne Laser (Lidar): <http://coastal.er.usgs.gov/lidar/>.

Vincent, P., 1989, Geodetic Deformation of the Oregon Cascadia Margin: Master's thesis, University of Oregon, Eugene:

Wolter, K. and M.S. Timlin, 1993, Monitoring ENSO in COADS with a seasonally adjusted principal component index: 17th Climate Diagnostics Workshop, Norman, OK, Climatology Survey, CIMMS and the School of Meteorology, University of Oklahoma: 52-57.

Woxell, L.K., 1998, Prehistoric beach accretion rates and long-term response to sediment depletion in the Columbia River littoral system, USA: M.S., Portland State University, Portland, OR: 206.

## APPENDIX A: THE GEOMETRIC MODEL

For property erosion to occur on sandy beaches, the total water level produced by the combined effect of wave runup ( $R$ ) plus the tidal elevation ( $E_T$ ), must exceed some critical elevation of the fronting beach, typically the elevation of the beach-dune junction ( $E_J$ ). This basic concept is depicted in Figure A1, and in an expanded form as the geometric model in Figure A2. Clearly, the more extreme the total water level elevation, the greater the resulting erosion that occurs along both dunes and bluffs (Komar and others, 1999).

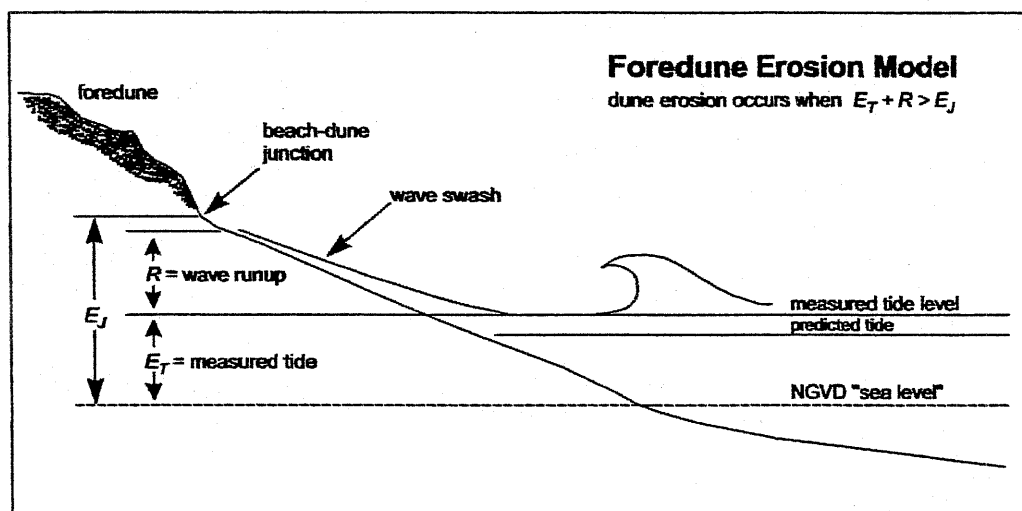


Figure A 1 The foredune erosion model (Komar and others, 1999).

As can be seen from Figure A2, estimating the maximum amount of dune erosion ( $DE_{max}$ ) is dependant on identifying the total water level elevation,  $WL$ , which includes the combined effects of extreme high tides plus storm surge plus wave runup, relative to the elevation of the beach-dune junction ( $E_J$ ). Therefore, when the  $WL > E_J$  the beach retreats landward by some distance, until a new beach-dune junction is established, whose elevation approximately equals the extreme water level. Since beaches along the high-energy Oregon coast are typically wide and have a nearly uniform slope ( $\tan \beta$ ), the model assumes that this slope is maintained, and the dunes are eroded landward until the dune face reaches point B in Figure A2. As a result, the model is geometric in that it assumes an upward and landward shift of a triangle, one side of which corresponds to the elevated water levels, and then the upward and landward translation of that triangle and beach profile to account for the total possible retreat of the dune (Komar and others, 1999). An additional feature of the geometric model is its ability to accommodate further lowering of the beach face due to the presence of a rip current. This feature of the model is represented by the beach-level change  $\Delta BL$  shown in Figure A2, which causes the dune to retreat some additional distance landward until it reaches point C. As can be seen from Figure A2, the distance from point A to point C depicts the total retreat,  $DE_{max}$ , expected during a particularly severe event that includes the localized effect of a rip current.

Critical then in applying the model to evaluate the susceptibility of coastal properties to erosion, is an evaluation of the occurrence of extreme tides ( $E_T$ ), the runup of waves ( $R$ ), and the joint probabilities of these processes along the coast (Ruggiero and others, 2001).

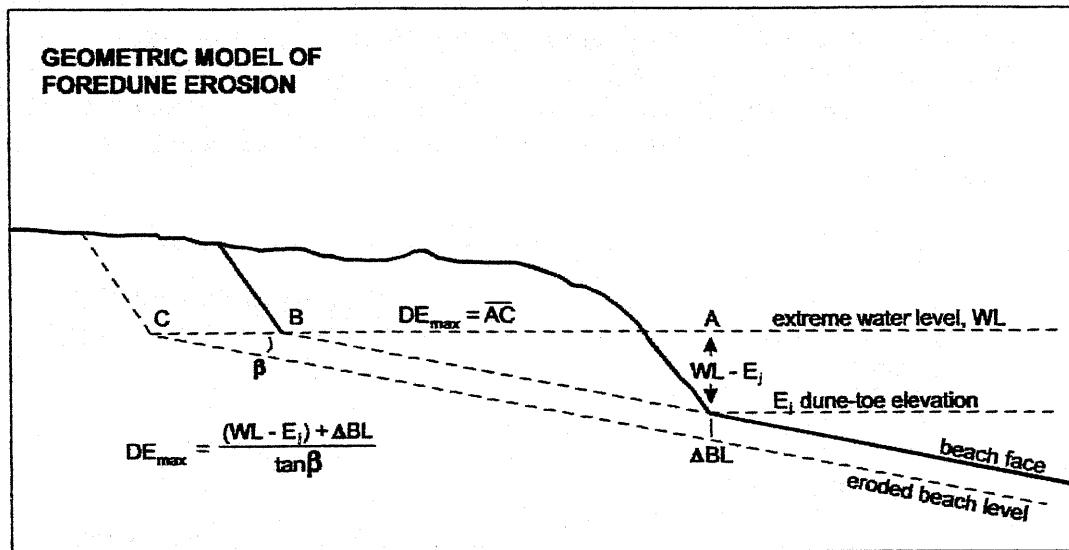


Figure A 2 The geometric model used to assess the maximum potential beach erosion in response to an extreme storm (Komar and others, 1999).

#### Wave Runup

Detailed studies of wave runup along the Oregon Coast, under a range of wave conditions and beach slopes (Ruggiero and others, 1996; Ruggiero and others, 2001), have yielded the following relationship

$$R_{2\%} = 0.27 (S H_{SO} L_O)^{1/2} \quad (\text{Equation 1})$$

for estimating the 2% exceedance runup ( $R$ ) elevation, where  $S$  is the beach slope ( $\tan \beta$ ),  $H_{SO}$  is the deep-water significant wave height,  $L_O$  is the deep-water wave length given by  $L_O = (g/2\pi)T^2$  where  $T$  is the wave period, and  $g$  is acceleration due to gravity ( $9.81 \text{ m.s}^{-1}$ ). Therefore, estimates of the wave runup elevation depend on knowledge of the wave heights and periods. Since a major objective of this investigation is to estimate the maximum potential erosion ( $DE_{max}$ ) that may occur in response to sustained periods of wave attack during extreme storm events (Figure A2), it is important to examine the probabilities of extreme wave occurrence offshore from the PNW coast.

Wave data (wave heights and periods) have been measured in the North Pacific using wave buoys and sensor arrays for almost 30 years. These data have been collected by NOAA, which operates the National Data Buoy Center (NDBC), and by the Coastal Data Information Program (CDIP) of Scripps Institution of Oceanography. Previous analyses of these data up through 1996 by Ruggiero and others (1996; 2001) indicated that the

projected 100-year extreme storm would generate a deep-water significant wave height on the order of 33 ft. However, during the 1997-98 El Niño that height was exceeded by one storm, and by four 100-year storms during the 1998-99 La Niña winter, with the March 2-3, 1999 storm having generated deepwater significant wave heights of 46 ft (Table A1). Finally, a sixth 100-year storm occurred during the winter of January 2000.

**Table A 1** Peak storm wave statistics for the Newport wave buoy for the major 1997-98 El Niño and 1998-99 La Niña (Allan and Komar, In Press).

<i>Buoy #46050</i>	<i>Date</i>	<i>Significant wave height (feet)</i>	<i>Wave Period (s)</i>	<i>Wave Breaker height (feet)</i>
El Niño (1997-98)	19-20 Nov, 1997	34.5	14.3	38.4
La Niña (1998-99)	25-26 Nov, 1998	35.4	12.5	37.1
	6-7 Feb, 1999	33.1	12.5	35.4
	16-17 Feb, 1999	32.8	20.0	42.3
	2-3 Mar, 1999	46.3	16.7	51.8
La Niña (1999-00)	16-17 Jan, 2000	39.7	14.2	43.0

In response to the large wave events that occurred during the latter half of the 1990s, the wave climate of the eastern North Pacific has been re-examined to determine the probabilities of extreme wave occurrence offshore from the PNW coast (Komar and Allan, 2000; Allan and Komar, In review). Using standard techniques of extreme value analysis, the 10- through 100-year extreme values for the deep-water significant wave heights were determined for several wave buoys located along the West Coast of the U.S. These analyses yield 100-year storm wave heights that ranged from 46 to 55.1 ft, for four wave buoys offshore from the PNW coast. Apart from highlighting the extreme nature of the wave climate in the eastern North Pacific, these results also emphasize the variability of the wave climate along the coasts of Washington and Oregon due to deviations in the predominant storm tracks. To accommodate this type of variation in our analyses and for input into Equation 1, the extreme wave height estimates were averaged, so that mean 10-through 100-year extreme value significant wave heights could be determined for the Oregon coast. These values are presented in Table A2.

Analyses have also been undertaken of the range of wave periods that are experienced in the eastern North Pacific (Komar and Allan, 2000; Allan and Komar, in review). These data have been examined using joint-frequency graphs of the significant wave heights versus the spectral-peak periods, the latter being the region where most of the wave energy occurs. The analyses have revealed that the largest wave heights tend to correspond to spectral-peak periods that range from 15 to 17 seconds, with some storm events producing periods up to 20 seconds. Since Equation 1 is particularly sensitive to

the magnitude of the wave period, we have focused on the longer period wave events in our modeling of wave runup elevations.

**Table A 2** Average extreme-wave projections based on data from four NDBC wave buoys located offshore the Pacific Northwest coast.

<i>Projection (years)</i>	<i>Extreme wave heights (feet)</i>
10	39.7
25	44.3
50	47.6
75	49.2
100	52.5

### Tides

The elevation of the sea, in part controlled by the astronomical tide, is extremely important for the occurrence of beach and property erosion along the Oregon coast (Komar, 1986). This process is particularly enhanced when large waves are superimposed on top of elevated water levels, so that wave processes are able to reach much higher elevations on the shore. It is the combined effect of these processes that invariably leads to toe erosion on coastal dunes and bluffs, and eventually coastal recession.

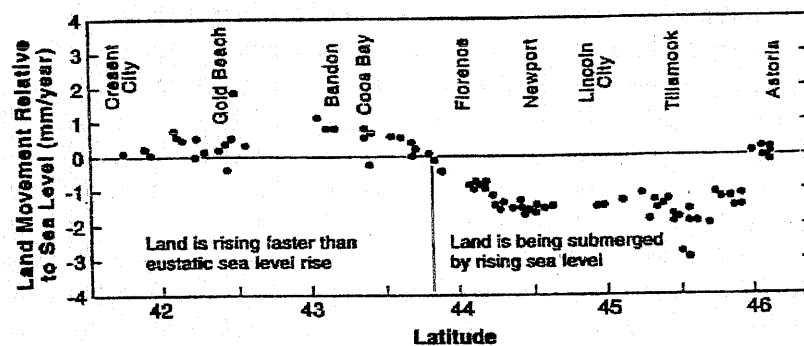
The actual level of the measured tide can be considerably higher than the predicted level provided in most standard Tide Tables, and is a function of a variety of atmospheric and oceanographic forces, which ultimately combine to raise the mean elevation of the sea. These latter processes also vary over a wide range of time-scales, and may have quite different effects on the coastal environment. For example, strong onshore winds coupled with the extreme low atmospheric pressures associated with a major storm, can cause the water surface to be raised along the shore as a storm surge. Along the PNW coast, the role of storm surges in coastal hazard applications has for the most part been ignored, largely because the storm surge elevations were thought to be quite small. For example, analyses of daily mean water levels up through 1996 at Newport, Oregon, revealed that the surges are typically of the order of 0.3 to 0.5 ft (Ruggiero and others, 1996). However, recent analyses of storm surges that occurred during the 1997-98 El Niño and 1998-99 La Niña winters revealed surges that were on the order of 1.3 to 2.0 ft, which suggest that much larger storm surge heights can be experienced along the PNW coast (Allan and Komar, In Press). As a result, any analysis of future coastal change should include a storm surge component.

Much longer-term processes that depend on offshore water temperatures and ocean currents can also influence the monthly-averaged water levels observed along the coast (Komar and Allan, 2000). In particular, analyses of the South Beach, Yaquina Bay tide gauge located in Newport, reveal a seasonal increase in mean water levels along the Oregon coast that occurs between summer and winter. This seasonal rise in mean water levels is on the order of 0.7 to 1.3 ft, and is a function of changes in the water temperature



and effects from ocean currents (Komar and others, 2000). Additional analyses of water levels were carried out using the Astoria tide gauge, located within the Columbia River estuary. The analyses revealed a pattern of seasonal variability in mean water levels that are analogous to the Newport tide gauge. Because of these similarities, we have used the Newport tidal data in our modeling of MPED along the Clatsop Plains. As noted earlier, major climate events such as El Niños can also have a dramatic impact on water level elevations along the U.S. West Coast. For example, during the 1982-83 El Niño, water levels along the Oregon coast were raised by about 1.6 ft, and remained elevated for several months (Huyer and others, 1983). These findings were reinforced in a subsequent investigation of water levels during the 1997-98 El Niño by Komar and others (2000).

Long-term trends in the level of the sea can also be identified along the Oregon coast, which relate to the global (eustatic) rise in mean sea level that has been occurring over the past several thousand years. However, these changes in mean sea level are complicated due to on-going changes in the level of the land that are also occurring along the Oregon coast (Vincent, 1989). For example, Vincent demonstrated that the southern Oregon coast is rising at a faster rate than the global rise in mean sea level, while the northern Oregon coast is being slowly submerged by the rise in mean sea level (Figure A3). Analyses of long-term sea level changes at the Astoria tide gauge by Flick and others (1999) indicated that mean sea level at Astoria has remained relatively static. This compares with a rise in mean sea level of 3.7 mm/yr identified at the South Beach, Yaquina Bay tide gauge on the central Oregon coast (Flick and others, 1999). Thus, for modeling the MPED along the Clatsop Plains, we have not included a term to account for a long-term rise in mean sea level.



**Figure A 3** Elevation changes along the Oregon coast, measured by geodetic surveys (Vincent, 1989). The elevation changes are relative to the global increase in sea level, with positive values representing a rise in the land at a higher rate than the increase in sea level, while negative values represent the progressive submergence of the land (Komar, 1997)

It is therefore apparent that the Oregon coast experiences highly variable mean-water levels, with the occurrence of extreme high tides being a contributing factor to the development of erosion problems (Komar and others, 1999). To accommodate the huge variability in tidal elevations experienced along the Oregon coast, an extreme value

analysis (similar to that used to estimate the probabilities of the extreme wave heights) has been used to analyze the tidal elevations for the South Beach, Yaquina Bay tide gauge (Shih and others, 1994; Ruggiero and others, 1996; Ruggiero and others, 2001). Table A3 presents the 5- through 100-year expected extreme tide levels ( $E_T$ ) determined for the South Beach, Yaquina Bay tide gauge. These data are referenced to the National Geodetic Vertical Datum of 1929 (NGVD'29) datum. As can be seen from Table A3, the expected 50- and 100-year tide is on the order of 8.2 ft, and likely includes the effects of an El Niño. Furthermore, it is apparent from Table A3 that there is in effect little difference in the extreme tidal elevations estimated for the 5- through 100-year expected tides, with the difference amounting to only about 1.0 ft.

### Beach Morphology

Having described the various process elements that are required as input into the geometric model, it remains for the morphological variables of the beach to be determined. These last variables include determinations of the beach slope ( $\tan \beta$ ) and the beach-dune toe elevation ( $E_I$ ).

A remote sensing technology, LIDAR, was used to assess the morphology of beaches at the end of the 1998 El Niño winter. These data were obtained from the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center website (<http://www.csc.noaa.gov/crs/tcm/index.html>), operated in tandem with the United States Geological Survey (USGS) and NASA. The LIDAR data consists of x, y, and z values of land topography that are derived using a laser ranging system mounted on board a De Havilland Twin Otter aircraft. To measure the coastal topography, the aircraft flies at an altitude of approximately 700 meters at a rate of about 60 m.s<sup>-1</sup>, and surveys a several hundred meter wide swath of the shoreline, acquiring a value of the surface elevation every few square meters (USGS, 2000). Subsequent analyses of the LIDAR data by NOAA staff have revealed that the data has a vertical accuracy within  $\pm 0.5$  ft, while the horizontal accuracy of these measurements are within  $\pm 2.6$  ft. As noted by the USGS, use of LIDAR enables hundreds of kilometers of coastline to be mapped in a single day, with data densities that are unsurpassed using traditional survey technologies. Furthermore, subsequent survey runs using the same system can provide unprecedented data, which may be used to investigate the magnitude, spatial variability, and causes of coastal changes that occur during severe storms. All LIDAR data obtained from the NOAA/USGS/NASA website were in the 1983 Oregon State Plane Coordinate system, while the elevations were relative to the North American Vertical Datum of 1988 (NAVD' 88).

Once the LIDAR data was obtained from NOAA, the data were subsequently pruned (e.g. data points located in the surf zone were removed), and then analyzed using a triangulation approach to generate a grid data set. This process was accomplished using Vertical Mapper (contour modeling and display software), which operates seamlessly within MapInfo's GIS software. Having generated the grid data, cross-sections of the beach morphology could then be constructed along the Clatsop Plains. These were established at 100 m interval along the coast. Identification of the beach-dune junction ( $E_I$ ) was accomplished in an EXCEL spreadsheet. Features used to distinguish the beach-

dune junction included erosion scarps, major breaks in slope, or some combination. Beach slopes were estimated using standard linear regression techniques and included those data seawards from the beach-dune junction out to about the 3.3-ft contour elevation relative to the NAVD'88 datum.

**Table A 3** Extreme annual tides (Shih and others, 1994). Note all elevations are relative to the NGVD'29 datum.

<i>Projection (years)</i>	<i>Mean water elevation (feet)</i>
5	7.2
10	7.5
25	7.9
50	8.2
100	8.2

## APPENDIX B: ACTIVE HAZARD ZONE

An AEZ was mapped throughout the study area based on an analysis of historical shoreline positions, geomorphic features identified from aerial photographs (e.g. erosion scarps), and from an analysis of the total wave runup elevation (tides + wave runup) at the shore. The landward boundary of the AEZ was established by analyzing the total wave runup elevation (tides + wave runup) at the shore using Equation 1 (Appendix A) and the parameters outlined in Scenario 1. This produced an average elevation of 10 m relative to the NAVD'88 vertical datum. The 10 m contour elevation line was identified from Gearhart to Clatsop Spit, using the 1998 LIDAR topographic grid data. Some adjustments of the 10 m contour line were necessary along the northern end of Clatsop Spit due to the significant erosion that is being experienced there. These data were subsequently drawn on 1999 digital orthophotos in MapInfo obtained from the SWCES.

The seaward boundary of the AEZ was established as the most seaward contemporary Mean High Water Line (MHWL) identified from National Ocean Service (NOS) Topographic (T) sheets, 1995 and 1999 aerial photographs, and from the LIDAR data. The methodology for deriving the MHWL is discussed below. These data were especially useful for identifying coastal changes along Clatsop Spit, and around the mouth of the Necanicum estuary. The results clearly highlight the highly dynamic nature of both the spit ends and the mouths of the estuaries.

### Approaches used to derive historical and contemporary shoreline positions

Historical and contemporary shoreline positions were derived from National Ocean Service (NOS) Topographic (T) sheets, 1995 and 1999 aerial photographs, and from the 1997 and 1998 LIDAR data. These data provide an understanding of the variability of previous shoreline locations that supplement the estimates of coastal change determined by the geometric model. For example, variations in the position of the shore, typically identified as the MHWL on the NOS T-sheets, can reveal details of:

- Long-term and short-term advance or retreat of the shore,
- Longshore movement of beach sediment,
- The impact of storms, including spit breaches, overwash, and changes in inlet mouth position, and
- Human impacts caused by construction (e.g. the jetties) or dredging.

National Ocean Service T-sheets covering the period 1870s era, 1926, and 1950s era were obtained from the SWCES. The images were georeferenced and orthorectified<sup>2</sup> using the ERDAS Imagine<sup>TM</sup> and Orthomax<sup>TM</sup> software to correct for various distortions (Kaminsky and others, 1999b). The historical shoreline positions were subsequently derived using visual cues to determine the MHWL (Daniels and others, 1998; Huxford,

<sup>2</sup> Ortho-rectification means removing distortions from the photo, so it can be used as an accurate map of the features that it depicts. These distortions include distortion around the photo edges caused by the camera lens, distortion due to elevation variation throughout the photograph, and changes in the altitude and attitude (pitch, roll, yaw) of the airplane (Kaminsky and others, 1999b).

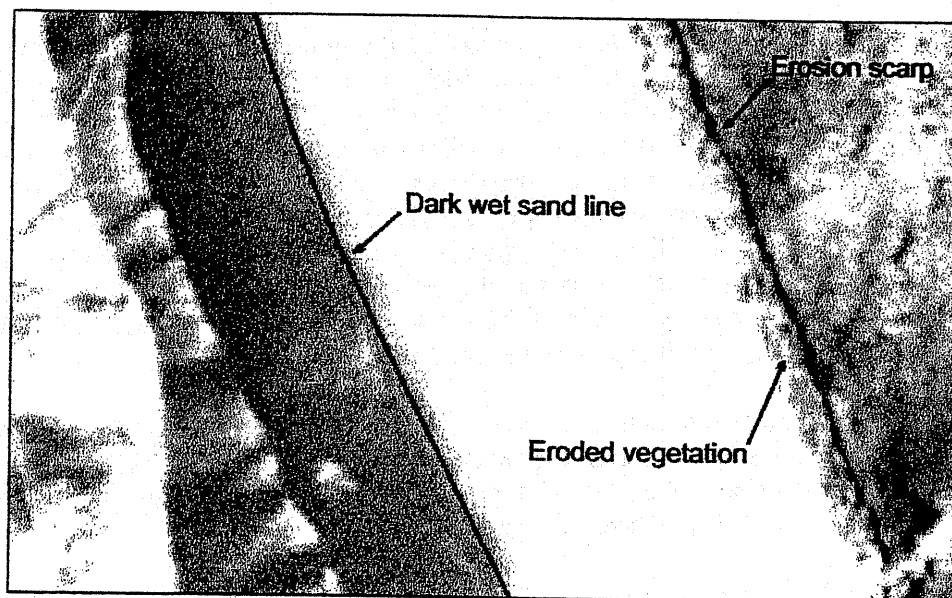
1998). Errors associated with the identified shorelines (vector data) were analyzed, Table B1, and found to meet the published NOS accuracy standards for the original data source (e.g.  $\pm 3$  m for 1:10,000 T-sheet and  $\pm 6$  m for 1:20,000 T-sheets) (Daniels and others, 2000). Great care was taken to account for the variability of the various shoreline positions. However, it is recognized that some error may occur during the digitizing process that is largely a function of the ability of the operator to accurately follow the position of the shoreline. Estimates by Anders and Byrnes (1991 in Moore, 2000) indicate that such operator errors are on the order of  $\pm 5.0$  m at 1:20,000 map scale, while analyses by Daniels and others (1998) indicated an operator error of  $\pm 6.0$  m for the NOS T-sheets and  $\pm 2.0$  m for the aerial photographs (Table B1).

Additional shoreline positions were derived from photography flown in August and September of 1995 (Daniels and others, 1998), 1997 and 1998 LIDAR data, and from 1999 digital orthophotos. These latter datasets provide the most up-to-date assessments of the character of the Clatsop coastline.

Besides the errors associated with digitizing a shoreline from historical NOS T-sheets, there are also problems with digitizing shoreline positions from the digital orthophotos. The line between the wet and dry sand, which can be clearly identified on aerial photographs as a tonal change, is the most commonly used proxy for defining a shoreline position (Moore, 2000). This line closely approximates the HWL, which in turn approximates the MHWL. An example of this is shown in Figure B1. According to Moore (2000), there are a number of potential errors that may arise from using the wet/dry line to represent a shoreline. These include:

- 1) Variations in the HWL over the short-term as a result of storm events, or as a result of seasonal variations in the wave climate;
- 2) The HWL may also fluctuate in response to the tidal stage, beach slope, or wave conditions;
- 3) Interpretation of the HWL from an aerial photograph, or;
- 4) Measurements that are derived from HWL that are used to define rates of coastal change.

Of the errors listed above, those associated with seasonal and daily changes in the tidal cycle present the greatest problem for scientists attempting to define a shoreline. As part of the SWCES, Daniels and others (2000) carried out detailed analyses of the MHWL position over five months, using different techniques (e.g. beach surveys, interpretation of aerial photos, and GPS). They found that the MHWL varied on a monthly basis from as little as  $\pm 13.0$  m to  $\pm 17.6$  m. These variations are purely a function of monthly differences in the tidal elevations and the wave conditions. Based on their analyses, Daniels and others (2000) identified an average seasonal variability in the position of the MHWL of  $\pm 15.0$  m (Table B1).



**Figure B 1** The dark wet sand line used to identify the MHWL along Clatsop Spit. Note the erosion scarp clearly identified to the right of the white sand. This indicates further evidence of continued erosion along Clatsop Spit.

The range of potential errors associated with determining the historical shoreline positions from the NOS T-sheets, and from aerial photographs is summarized in Table B1. As indicated in the table, total errors range from  $\pm 41$  m (134.5 ft) for the 1880 era T-sheets to  $\pm 20$  m (65.6 ft) for the aerial photographs.

**Table B 1** Total error and uncertainty budget for MHWL estimates (Daniels and others, 2000).

	<i>Shoreline Derivation Error</i>	<i>Shoreline Interpretation Uncertainty</i>	<i>Seasonal Variability</i>	<i>Total Error and Uncertainty</i>
	<i>m (ft)</i>	<i>m (ft)</i>	<i>m (ft)</i>	<i>m (ft)</i>
1880 era T-sheets	$\pm 20$ (65.6)	$\pm 6$ (19.7)	$\pm 15$ (49.2)	$\pm 41$ (134.5)
1920 and 1950 era T-sheets	$\pm 6$ (19.7)	$\pm 6$ (19.7)	$\pm 15$ (49.2)	$\pm 27$ (88.6)
Aerial Photography	$\pm 3$ (9.8)	$\pm 3$ (9.8)	$\pm 15$ (49.2)	$\pm 20$ (65.6)









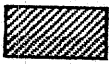



For further information on the analysis procedures used to identify historical shoreline positions in the Columbia littoral cell, refer to Daniels and others (1998), Huxford (1998), and Kaminsky and others (1999b).

## APPENDIX C: COASTAL HAZARD ZONES OF THE CLATSOP PLAINS

Coastal erosion hazard zones drawn on 1999 digital orthophotos for the Clatsop Plains (digital images were provided by the Southwest Washington Coastal Erosion Study). North is at the top of the page.

Maps progress sequentially from Clatsop Spit in the north to Gearhart in the south. Map scales are indicated with each figure.

### Key to Appendix C

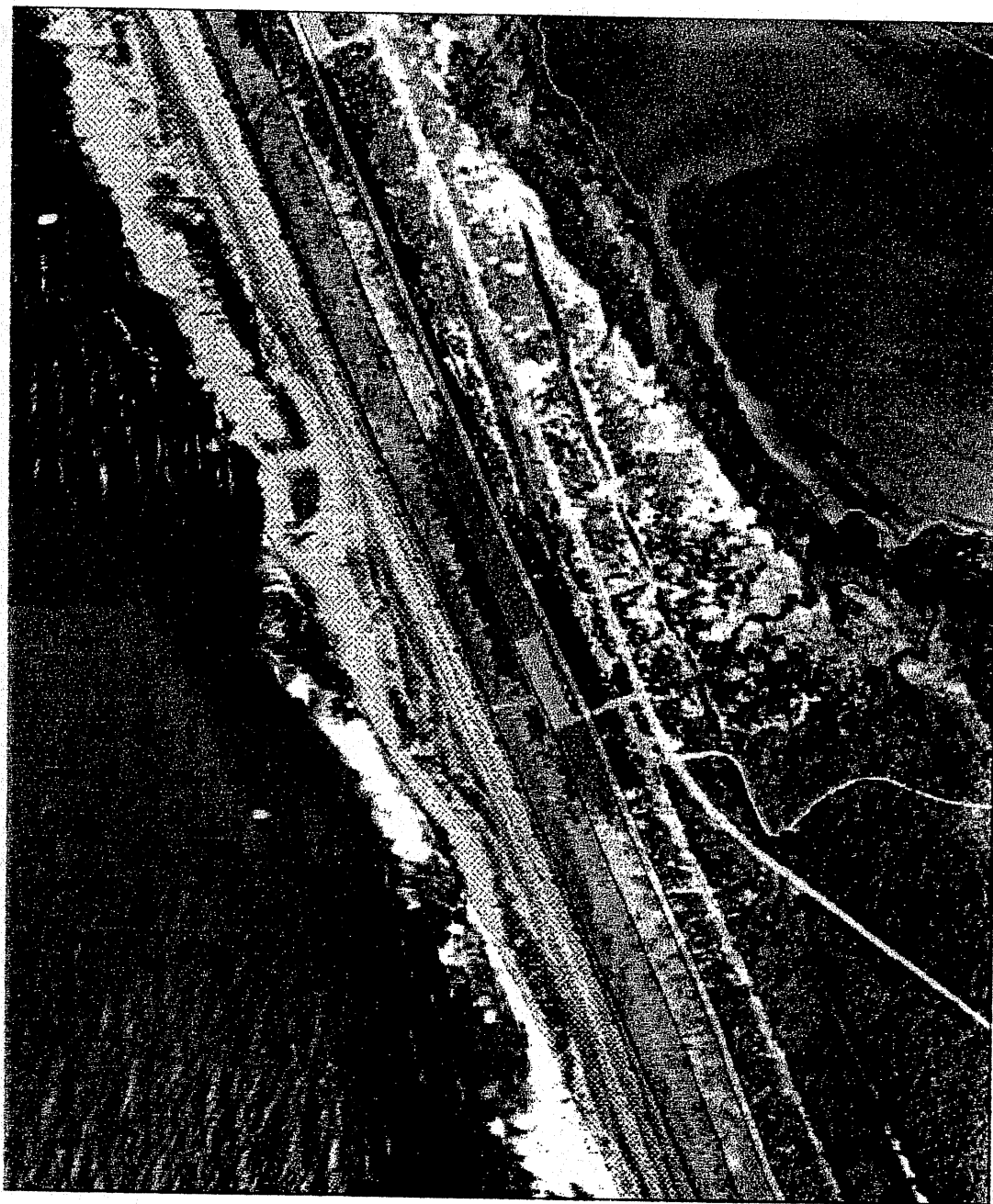
	Beach/dune toe junction as at April 1998
	Digital shorelines
	1999
	1998
	1997
	1995
	1950s era
	1926
	1870s era
	Active erosion hazard zone
	High-risk coastal erosion hazard zone
	Moderate-risk coastal erosion hazard zone
	Low-risk coastal erosion hazard zone



**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



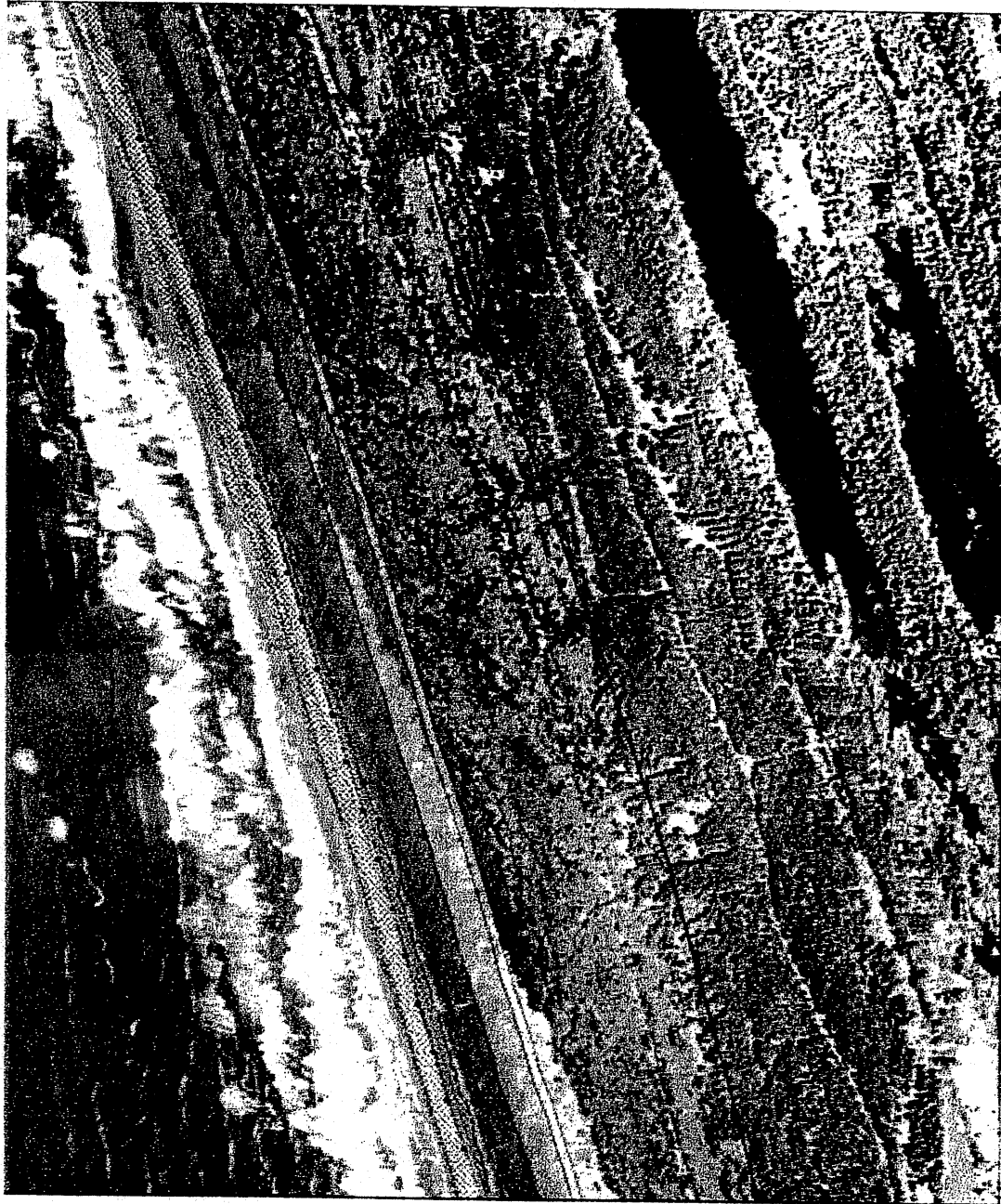
**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



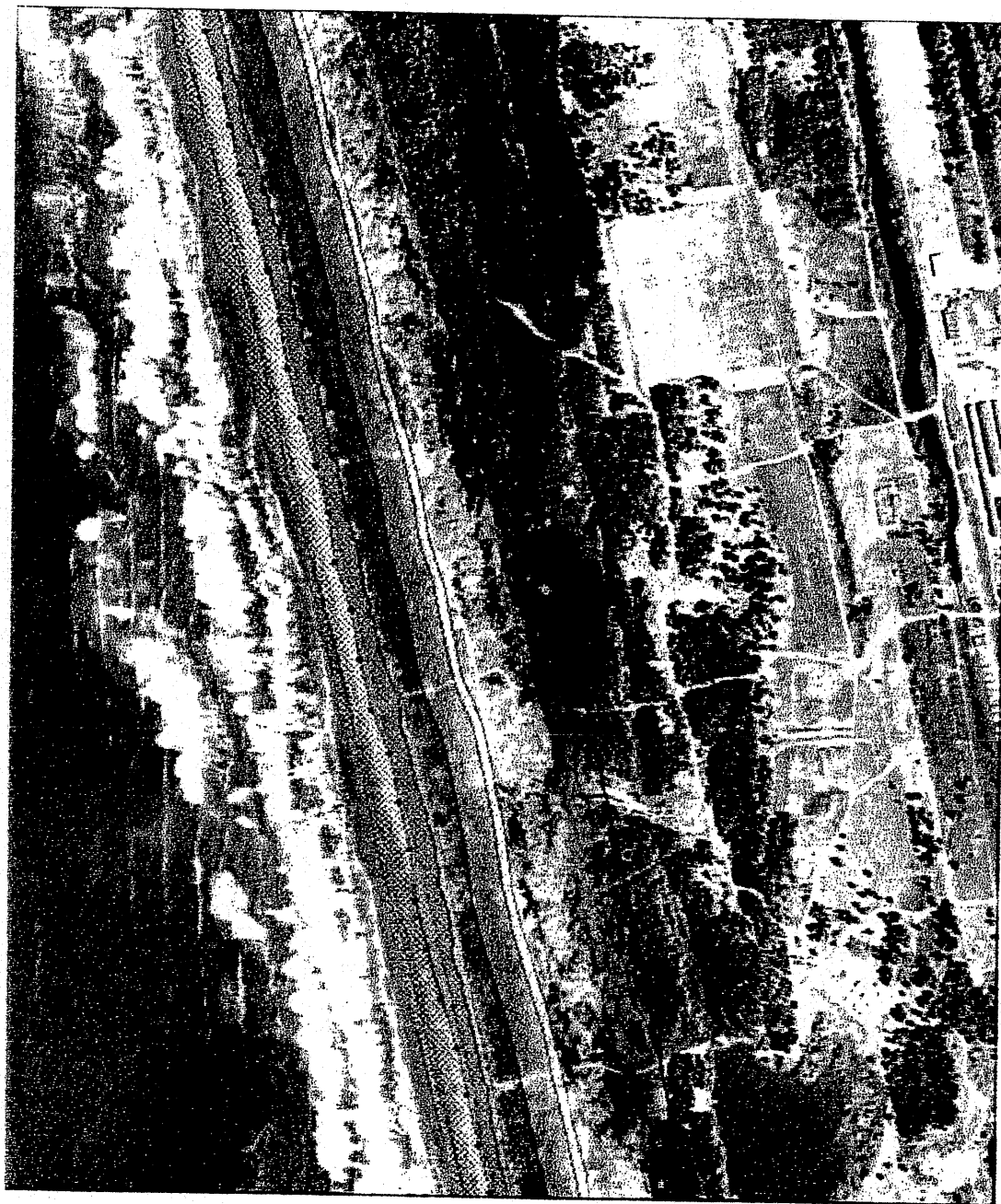
**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



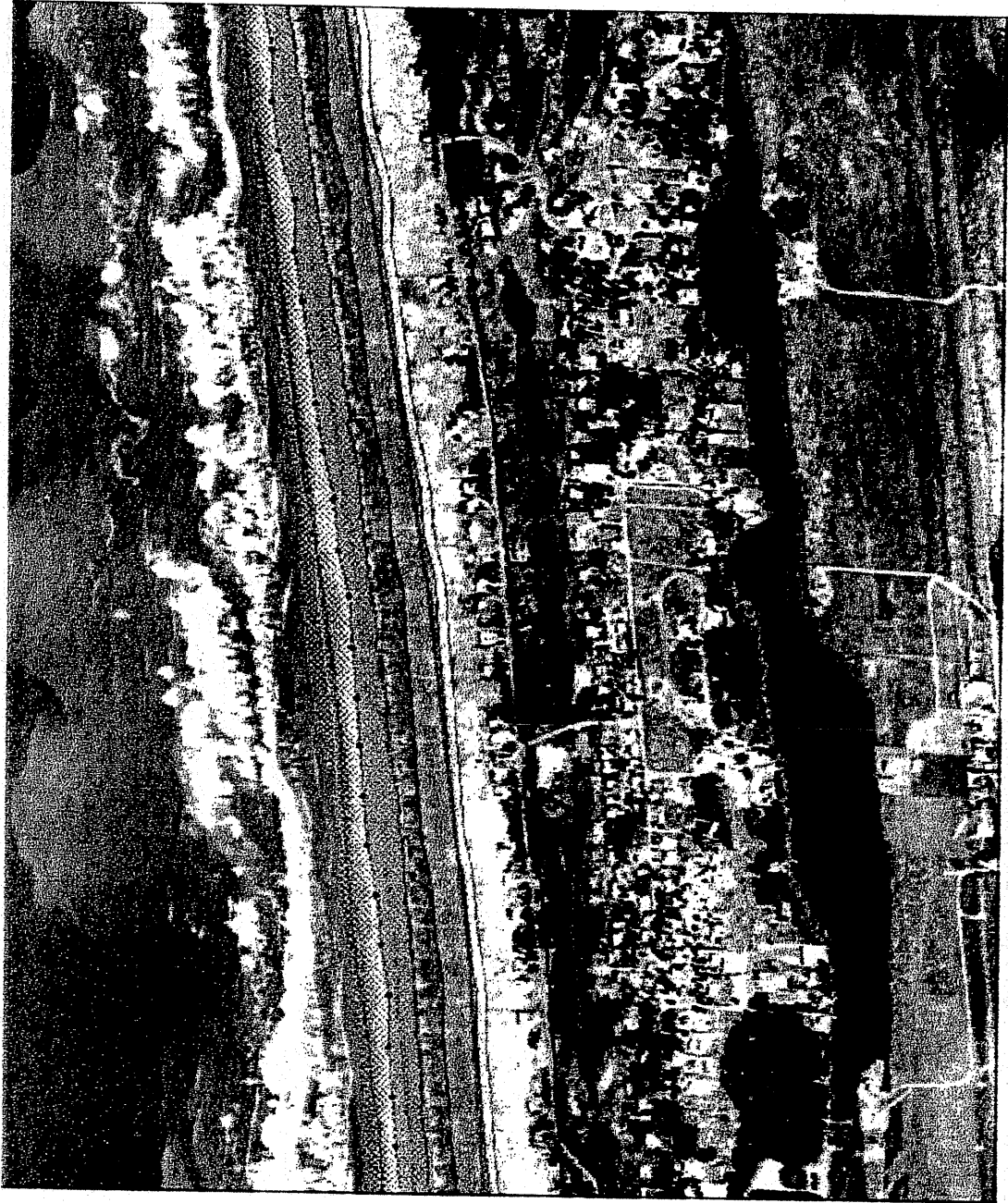


**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)





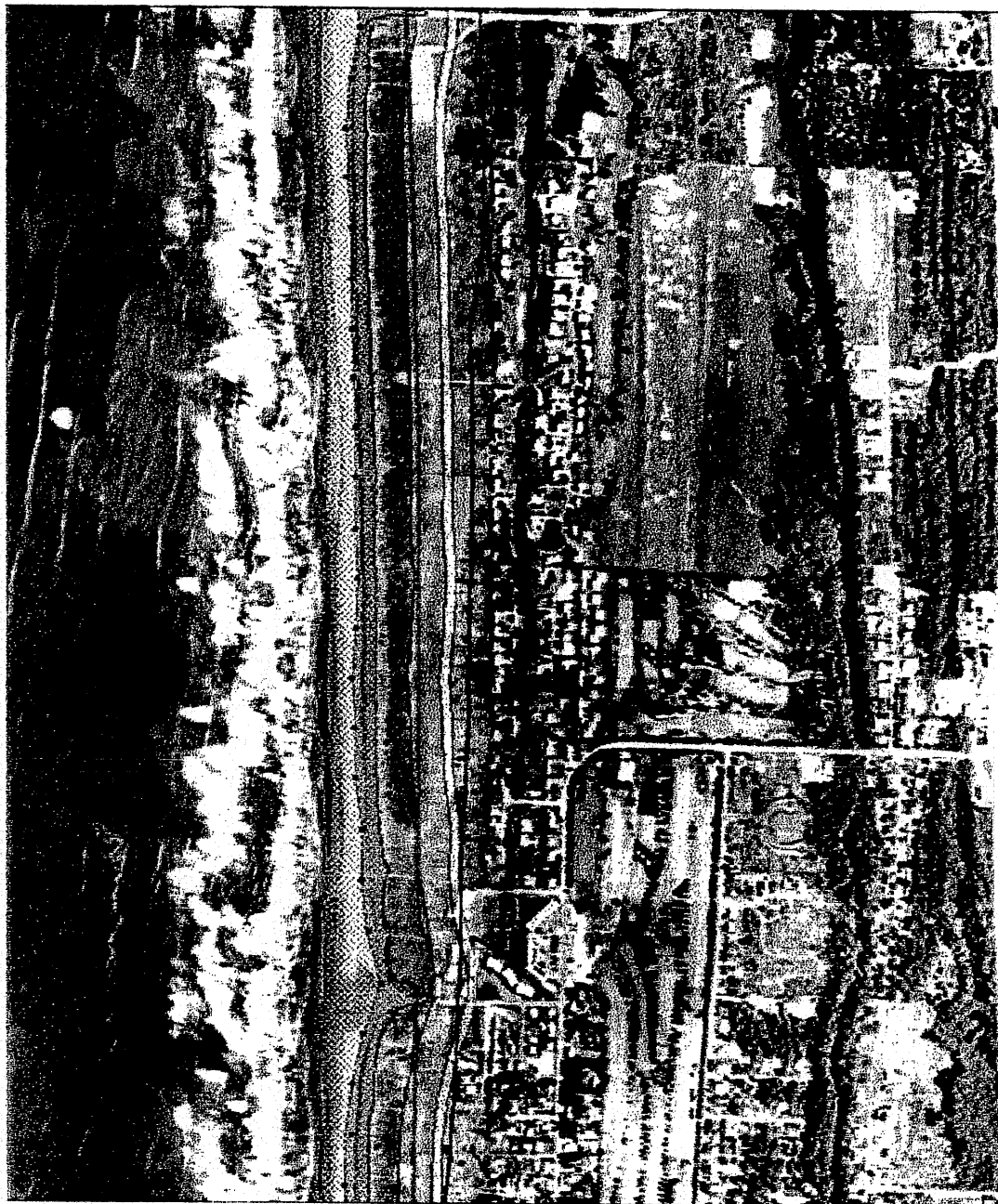
**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



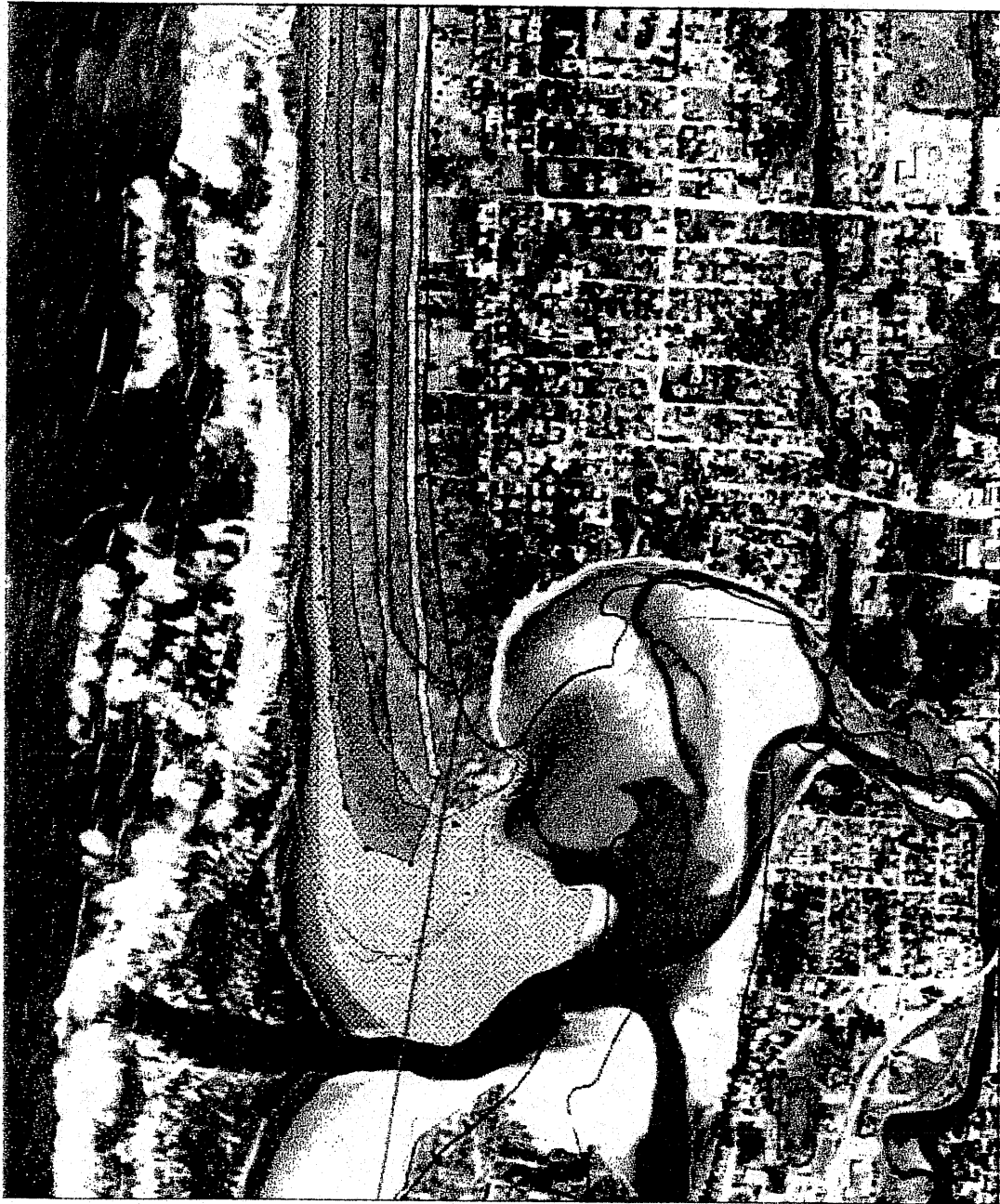
**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)



**APPENDIX C (cont.)**  
(scale = 1:12,000 or 1 inch = 1,000 ft)





**Exhibit B**  
**Proposed Amendments to Comprehensive**  
**Plan Beaches and Dunes Policies**

PROPOSED AMENDMENTS  
COMPREHENSIVE PLAN  
BEACHES AND DUNES POLICIES

Goal 18 - Beaches and Dunes

Goal

To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas; and

To reduce the hazard to human life and property from natural or man-induced actions associated with these areas.

Beaches and Dunes Policies

1. Uses permitted on the beach, the area located west of the statutory Vegetation Line as established and described by ORS 390.770, or the line of established upland shore vegetation, whichever is further inland, shall be consistent with the requirements ORS 390.605 - 390.725 and Oregon Administrative Rules adopted pursuant thereto. Residential development and commercial and industrial buildings are prohibited. The County will coordinate its actions in beach areas with the Oregon Department of Parks and Recreation.
2. Uses permitted on active foredunes, on other foredunes which are conditionally stable and are subject to ocean undercutting or wave overtopping, and on interdune areas (deflation plains) that are subject to ocean flooding shall be limited to low intensity uses which have minimal impact on the dune system and which have a minimal monetary value. Residential developments and commercial and industrial buildings are prohibited.
3. The County, in making land use decisions in beach and dune areas, other than older stabilized dunes, shall consider the impact of the proposed development on the site and on adjacent areas, and the methods that are proposed for protecting the site and adjacent areas from any potential adverse effects of the proposed development.
4. The stability of all types of dunes, in relationship to the potential for wind erosion, is based on the maintenance of its vegetative cover. For this reason, the county shall implement a wind erosion control program that minimizes site disturbance, provides for temporary and permanent sand stabilization, and requires the continued maintenance of newly established vegetation.
5. On active and conditionally stable dunes, pedestrian, bicycle, equestrian and vehicular circulation shall be managed to minimize adverse impacts to dunes and their stabilizing vegetation

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6. Land use actions (i.e. Comprehensive Plan changes, zone changes, subdivisions and partitions, planned developments, conditional use permits) shall be reviewed by the Planning Commission or the Department of Planning and Development so that the proposed activity(ies) will not result in the drawdown of the groundwater supply which could lead to any or all of the following:
  - a. the loss of stabilizing vegetation,
  - b. the loss of water quality,
  - c. salt water intrusion into the water supply,
  - d. result in the permanent drawdown of the dune lakes.
7. Foredunes shall be breached only on a temporary basis for emergency purposes such as fire control, cleaning up oil spills, or alleviating flood hazards. Breaches in foredune areas shall be restored in a manner that is consistent with the character of the area prior to the foredune breaching.
8. Foredune grading for view enhancement or to prevent on-going sand inundation may be allowed for structures in foredune areas that were committed to development on or before January 1, 1977 and where an overall plan for managing the foredune grading is prepared. Before construction can begin, the foredune grading plan must be adopted as an amendment to the Comprehensive Plan.
9. The extensive modification of dune areas other than that permitted by an approved plan for foredune grading for view enhancement, is strongly discouraged because the shape of unmodified dune forms is an essential element in defining the physical character of the Clatsop Plains.
10. Clustering of development is encouraged so that development occurs on the most stable dune areas, with less stable areas retained as open space.
11. The County will provide for the appropriate management of dune areas within Fort Stevens State Park through the adoption of the Fort Stevens State Park Master Plan.
12. Removal of vegetation which provides wildlife habitat shall be limited. Unnecessary removal of shoreline vegetation shall be prohibited.
13. In order to establish construction feasibility, within the dune construction area, and to provide recommendations on methods to mitigate potentially hazardous conditions, a site specific investigations by registered professional geologist or certified engineering geologist shall be required for the issuance of a development permit in all beach and dune areas that the Planning Director considers to have a hazard potential.
14. On-site sewage disposal systems shall be prohibited in active foredunes, on other

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1 foredunes which are conditionally stable and are subject to ocean undercutting or wave  
2 overtopping, and on interdune areas (deflation plains) that are subject to ocean flooding  
3

4 15 Beachfront protective structures shall be permitted only where development existed on or  
5 before January 1, 1977.  
6

7 16. Where appropriate, developers may be required to dedicate easements for public access to  
8 the beach.  
9

10 17. The county supports studies designed to increase scientific knowledge about the  
11 processes that have shaped and will continue to shape the dunes of the Clatsop Plains.  
12

### 13 Beaches and Dunes Recommended Actions 14

15 1. To avoid desiccation of the groundwater lakes and encroachment of sea water, a water  
16 management program which is consistent with the water budget equation for the Clatsop  
17 Plains should be developed. The County should request technical and financial assistance  
18 from state and federal agencies in evaluating water development potentials.  
19

20 2. The County, in cooperation with other local jurisdictions, should consider a cost/benefit  
21 comparison of developing the Clatsop Plains aquifer as a water source with other sources  
22 of water supply.  
23  
24

### 25 CLATSOP PLAINS COMMUNITY PLAN D 26 BEACHES AND DUNES POLICIES 27

28 *Dune Policies references for this section are deleted.*  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43

**Exhibit C**  
**Proposed Amendments to Comprehensive Plan**  
**Beaches and Dunes Policies -Annotated**

PROPOSED AMENDMENTS  
COMPREHENSIVE PLAN  
BEACHES AND DUNES POLICIES

New text is shown is **bold**, deleted text is shown in ~~strikethrough~~

Goal 18 - Beaches and Dunes

Goal

To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas; and

To reduce the hazard to human life and property from natural or man-induced actions associated with these areas.

Beaches and Dunes Policies with Amendments

~~Following the initial lifting of most areas from the moratorium, Clatsop County in conjunction with the Town of Hammond and the cities of Gearhart and Warrenton applied to the Environmental Protection Agency for funds to do a Ground Water Protection Plan under Section 208 of the Clean Water Act (PL 92-800). The grant was approved to do the study. It had four objectives<sup>9</sup>:~~

- ~~(1) — to identify and establish water quality data;~~
- ~~(2) — identify the current pollution sources and levels;~~
- ~~(3) — predict future impacts of development on the ground water; and~~
- ~~(4) — develop and implement a program that will protect and enhance the water quality of the Clatsop Plains.~~

~~Findings, Conclusions and Recommendations of the study are listed in the Clatsop Plains Community Plan. The Environmental Quality Commission adopted the study which also lifted the moratorium on August 27, 1982.~~

Beach Policies:

~~Use regulations and policies for all beaches (defined as waterline to vegetation line) are set forth in the Oregon Beach Law (ORS 390.705 et.seq.). This law affirms the public's right to use of the beach. Policies in the State law include the following:~~

- ~~a. — Improvements on beaches; removal of sand, rock, mineral, marine growth and other natural products; and laying of pipe, cable, or conduit access beaches requires permits. Permits are based on the following considerations, among other:~~
- ~~(1) — The public need for healthful, safe, aesthetic surroundings and conditions;~~

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<sup>9</sup>R.W. Beek and Associates, Clatsop Plains Ground Water Protection Plan and Environmental Assessment, March, 1982, page I-5.

~~the natural scenic, recreational and other resources of the area; and the present and prospective need for conservation and development of those resources.~~

~~(2) The physical characteristics or the changes in the physical characteristics of the area and the suitability of the area for particular uses and improvements.~~

~~(3) The land uses, including public recreational use if any, and the improvements in the area, the trends in land uses and improvements, the density of development and the property values in the area.~~

~~(4) The need for recreation and other facilities and enterprises in the future development of the area and the need for access to particular sites in the area.~~

b. ~~No deposit of debris, logs, rubbish, or refuse is allowed.~~

e. ~~Use of motor vehicles or aircraft on beaches is restricted to varying degrees along the coast.~~

d. ~~Public beach access sites are provided by the State Parks System at 1 1/2 - 3 mile intervals. Future State public beach access points may be established upon a showing of public need for proposed beach access. If it is determined that there is a public need, the State must then satisfactorily prove why this location for the proposed beach access, when compared with other locations, best serves the public need.~~

e. ~~Sand removal shall be prohibited.~~

**1. Uses permitted on the beach, the area located west of the statutory Vegetation Line as established and described by ORS 390.770, or the line of established upland shore vegetation, whichever is further inland, shall be consistent with the requirements ORS 390.605 - 390.725 and Oregon Administrative Rules adopted pursuant thereto. Residential development and commercial and industrial buildings are prohibited. The County will coordinate its actions in beach areas with the Oregon Department of Parks and Recreation. Residential development and commercial and industrial buildings are prohibited.**

Discussion: A shorter statement of the existing policy



1 Dune Policies:

- 2
- 3 ~~1. Local governments and state and federal agencies shall base decisions on plans,~~
- 4 ~~ordinances and land use actions in beach and dune areas, other than older stabilized~~
- 5 ~~dunes, on specific findings that shall include at least:~~
- 6
- 7 a. ~~the type of use proposed and the adverse effects it might have on the site and~~
- 8 ~~adjacent areas;~~
- 9
- 10 b. ~~temporary and permanent stabilization programs and the planned maintenance of~~
- 11 ~~new and existing vegetation;~~
- 12
- 13 c. ~~methods for protecting the surrounding area from any adverse effects of the~~
- 14 ~~development; and~~
- 15
- 16 d. ~~hazards to life, public and private property, and the natural environment which~~
- 17 ~~may be caused by the proposed use.~~
- 18

19 Discussion: The existing language is more in the nature of a development ordinance

20 standard. It will be incorporated into the revised beaches and dunes overlay zone. The

21 general intent of this policy is contained in proposed policy 3.

22

- 23 2. **Uses permitted on active foredunes, on other foredunes which are conditionally**
- 24 **stable and are subject to ocean undercutting or wave overtopping, and on interdune**
- 25 **areas (deflation plains) that are subject to ocean flooding shall be limited to low**
- 26 **intensity uses which have minimal impact on the dune system and which have a**
- 27 **minimal monetary value.** Residential developments and commercial and industrial
- 28 buildings are prohibited. ~~in areas designated as active dunes (except for areas where the~~
- 29 ~~active dune has been committed to these uses where Clatsop County is requesting an~~
- 30 ~~Exception to the Beaches and Dunes Goal #18), active foredunes, or other foredunes,~~
- 31 ~~which are conditionally stable and that are subject to ocean undercutting or wave~~
- 32 ~~overtopping, and on interdune areas (deflation plains) that are subject to ocean flooding.~~
- 33 ~~Other development in these areas shall be permitted only if the findings required in (1)~~
- 34 ~~above are presented and it is demonstrated that the proposed development:~~
- 35
- 36 a. ~~is adequately protected from any geologic hazards, wind erosion, undercutting,~~
- 37 ~~ocean flooding and storm waves; or is of minimal value; and~~
- 38
- 39 b. ~~is designed to minimize adverse environmental effects.~~
- 40

41 Discussion: The first part of the policy revision is intended to clarify language. The

42 second portion is a development ordinance standard, its general intent is contained in

43 proposed policy 4.

44

- 1 3. The County, in making land use decisions in beach and dune areas, other than older  
2 stabilized dunes, shall consider the impact of the proposed development on the site  
3 and on adjacent areas, and the methods that are proposed for protecting the site and  
4 adjacent areas from any potential adverse effects of the proposed development.  
5

6 Discussion: A revised statement of portions of existing policy 1 &2.  
7

8 ~~3. Clatsop County shall prohibit:~~  
9

10 a. ~~the destruction of stabilizing vegetation (including the inadvertent destruction by~~  
11 ~~moisture loss or root damage), and~~  
12

13 b. ~~the exposure of stable and conditionally stable areas to erosion, and~~  
14

15 c. ~~construction of shore structures which modify current or wave patterns or the~~  
16 ~~beach sand supply.~~  
17

18 ~~4. Erosion shall be controlled and the soil stabilized by vegetative cover on all dune lands.~~  
19 ~~Mechanical and/or structural means shall only be allowed after it has been demonstrated~~  
20 ~~that vegetative cover will not stabilize the dune and the impacts on non-vegetative~~  
21 ~~stabilization have been assessed and mitigated.~~  
22

- 23 4. The stability of all types of dunes, in relationship to the potential for wind erosion, is  
24 based on the maintenance of its vegetative cover. For this reason, the county shall  
25 implement a wind erosion control program that minimizes site disturbance, provides  
26 for temporary and permanent sand stabilization, and requires the continued  
27 maintenance of newly established vegetation.  
28

29 Discussion: The new policy combines into one statement existing policy 3&4's intent  
30 with regard to wind erosion stabilization.  
31

- 32 5. On active and conditionally stable dunes, **pedestrian, bicycle, equestrian and vehicular**  
33 **traffic circulation shall be managed to minimize adverse impacts to dunes and their**  
34 **stabilizing vegetation.** ~~confined to hard surfaced roads; recurring pedestrian or~~  
35 ~~equestrian traffic shall be confined to roads or trails.~~  
36

37 Discussion: The revised policy states an objective without requiring that it be achieved  
38 in a particular manner.  
39

- 40 6. Land use actions (i.e. Comprehensive Plan changes, zone changes, subdivisions and  
41 partitions, planned developments, conditional use permits) shall be reviewed by the  
42 Planning Commission or the Department of Planning and Development so that the  
43 proposed activity(ies) will not result in the drawdown of the groundwater supply which  
44 could lead to any or all of the following:

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- a. the loss of stabilizing vegetation,
- b. the loss of water quality,
- c. salt water intrusion into the water supply,
- d. result in the permanent drawdown of the dune lakes.

7. **Foredunes ~~may only~~ shall be breached only on a temporary basis such as in the case of an for emergency purposes such as (e.g. fire control, cleaning up oil spills, or and alleviating flood hazards) . In all cases the breaching and restoration after the breaching is consistent with sound principles of conservation Breaches in foredune areas shall be restored in a manner that is consistent with the character of the area prior to the foredune breaching.**

Discussion: The revised policy includes a statement on the intent of restoration after breaching.

8. **Foredune grading for view enhancement or to prevent on-going sand inundation may be allowed for structures in foredune areas that were committed to development on or before January 1, 1977 and where an overall plan for managing the foredune grading is prepared. Before construction can begin, the foredune grading plan must be adopted as an amendment to the Comprehensive Plan.**

Discussion: The policy implements Goal #18, Implementation Requirement #7.

- ~~8. Clatsop Soil and Water Conservation District and the Clatsop County Department of Planning and Development should work closely together in prescribing plans for alteration and revegetation required by development in areas where they are permitted~~

Discussion: The proposed policies lay out the county's responsibility for managing the alteration of existing vegetated areas.

9. **The extensive modification of dune areas other than that permitted by an approved plan for foredune grading for view enhancement, is strongly discouraged because the shape of unmodified dune forms is an essential element in defining the physical character of the Clatsop Plains.**

Discussion: With the exception of the clause pertaining to foredune grading, this is an existing policy in the Clatsop Plains Community Plan.

- ~~9. Any areas or combination of areas larger than 2,000 square feet in active, conditionally stable and interdune (deflation plain) areas to be cleared of vegetation shall have stabilization plan approved by the Clatsop County Department of Planning and Development prior to the work. The Department of Planning and Development shall monitor the stabilization program regularly and prescribe additional conditions if it~~

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1 becomes apparent that the stabilization program is not effective. The developer shall  
2 inform the Planning Director upon major completion.  
3

4 Discussions: This is a standard that will be addressed in the development code. Proposed  
5 policy 4 addresses the need for a wind erosion control plan.  
6

- 7 **10. Clustering of development is encouraged so that development occurs on the most**  
8 **stable dune areas, with less stable areas retained as open space.**  
9

10 Discussion: This is an existing policy in the Clatsop Plains Community Plan.  
11

- 12 ~~10. Removal of vegetation during construction in any sand area shall be kept to the minimum~~  
13 ~~required for building placement or other valid purpose. Removal of vegetation should not~~  
14 ~~occur more than 30 days prior to grading or construction. Permanent revegetation shall~~  
15 ~~be started on the site as soon as practical after construction, final grading or utility~~  
16 ~~placement. Storage of sand and other materials should not suffocate vegetation.~~  
17

18 Discussions: This is a standard that will be addressed in the development code. Proposed  
19 policy 4 addresses the need for a wind erosion control plan.  
20

- 21 **11. The County will provide for the appropriate management of dune areas within Fort**  
22 **Stevens State Park through the adoption of the Fort Stevens State Park Master**  
23 **Plan.**  
24

25 Discussion: This policy reflects the fact the Fort Stevens Master Plan is the controlling  
26 document for future actions at Fort Stevens State Park.  
27

- 28 ~~11. In all open sand areas, revegetation must be closely monitored and carefully maintained,~~  
29 ~~including restrictions on pedestrian traffic. Revegetation should return the area to its~~  
30 ~~preconstruction level of stability. j Trees should be planted along with ground cover such~~  
31 ~~as grass or shrubs. To encourage stabilization a revegetation program with time limits~~  
32 ~~shall be required by the Planning Department as a condition of all development permits~~  
33 ~~and land use actions (i.e. Comprehensive Plan changes, zone changes, subdivisions and~~  
34 ~~partitions, planned developments, conditional use permits).~~  
35

36 Discussions: This is a standard that will be addressed in the development code. Proposed  
37 policy 4 addresses the need for a wind erosion control plan.  
38

- 39 **12. Removal of vegetation which provides wildlife habitat shall be limited. Unnecessary**  
40 **removal of shoreline vegetation shall be prohibited.**  
41

- 42  
43 **13. In order to establish construction feasibility, within the dune construction area, and**  
44 **to provide recommendations on methods to mitigate potentially hazardous**

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1 **conditions, a** ~~Site specific investigations by a qualified person such as a geologist, soils~~  
2 ~~scientist, or geomorphologist~~ **registered professional geologist or certified engineering**  
3 **geologist** shall be required ~~by the Planning Director prior to~~ **for the issuance of a**  
4 **development permit in all beach and dune areas** ~~areas that the Planning Director feels~~  
5 ~~may be subject to wind erosion or other~~ **considers to have a hazard potential.**  
6

7 Discussion: Clarification of policy language.  
8

- 9 ~~14. Site investigations, or the qualifications of the persons performing them, may be~~  
10 ~~submitted to the State Department of Geology or other agency for review of~~  
11 ~~recommendations. Site reports shall include the history of erosion or other hazard in the~~  
12 ~~vicinity of the site, shall map areas with recent evidence of erosion, and shall recommend~~  
13 ~~the location(s) of structures, and the type of protection required to protect the proposed~~  
14 ~~use and adjacent property. Site investigations shall be done at the developer's expense.~~  
15

16 Discussion: This is a standard and will be addressed in the development code.  
17

- 18 ~~15. The County should consider the enactment of Chapter 70 of the State Uniform Building~~  
19 ~~Code, in addition to the above policies, to control grading and excavation.~~  
20

21 Discussion: The intent of this policy will be implemented by a standard in the proposed  
22 beaches and dunes overlay zone that applies grading standards similar to those required in  
23 geologic hazard areas.  
24

- 25 ~~16. Adequate setbacks for structures must be provided for by considering the rate of erosion~~  
26 ~~together with the anticipated life of any structures.~~  
27

28 Discussion: This concept is addressed in the implementing overlay zone.  
29

- 30 **14.17. On-site Subsurface sewage disposal systems shall be prohibited in active foredunes, on**  
31 **other foredunes which are conditionally stable and are subject to ocean**  
32 **undercutting or wave overtopping, and on interdune areas (deflation plains) that**  
33 **are subject to ocean flooding** ~~all active dune areas that also are in a flood hazard overlay~~  
34 ~~zone.~~  
35

36 Discussion: On-site sewage disposal systems should be treated similarly to structures and  
37 as such should not be permitted in potential hazard areas such as active foredunes.

- 38 **1518. Beachfront protective structures shall be permitted only where development existed**  
39 **on or before January 1, 1977. Structural shoreline stabilization methods shall be**  
40 **permitted only if:**  
41

- 42 a. ~~There is a critical need to protect a structure that is threatened by erosion hazard;~~  
43 b. ~~Impacts on adjacent property are minimized;~~

- e. ~~Visual impacts are minimized;~~
- d. ~~Access to the beach is maintained;~~
- e. ~~Long term or recurring costs to the public are avoided; and~~
- f. ~~Riparian vegetation is preserved as much as possible.~~

~~These criteria shall apply to structural shoreline stabilization both east and west of the State zone line.~~

19. ~~The County's review of beachfront protective structures, both east and west of the State zone line, shall be coordinated with the Department of Transportation and the Division of State Lands.~~

20. ~~The priorities for shoreline stabilization for erosion control are (from highest to lowest):~~

- a. ~~Proper maintenance of existing riparian vegetation;~~
- b. ~~Planting of riparian vegetation;~~
- e. ~~Vegetated riprap;~~
- d. ~~Non-vegetated riprap;~~
- e. ~~Bulkhead or seawall.~~

~~Where riprap, bulkheads or seawalls are proposed as beachfront protective measures, evidence shall be provided that higher priority methods of erosion control will not work.~~

21. ~~Beachfront protective structures shall be designed by a registered engineer, if landslide retention is a factor in the placement of the structure, or if the County's design criteria for riprap are not used. The structure shall be the minimum necessary to provide the level of protection required.~~

Discussion: New policy statement 15 indicates where shoreline stabilization is permitted, consistent with Goal #18 Implementation Requirement #5. The deleted policies are standards and will be incorporated in the development code.

22. ~~The emergency placement of riprap to protect buildings from an imminent threat shall be permitted without a permit. However, the county, Oregon Department of Transportation, Oregon Division of State Lands shall be notified of the placement. Within 30 days of the emergency placement of riprap, an application for a beachfront protective structure shall be applied for to either Clatsop County or the appropriate state agency. If the permit is approved and requires alteration or removal of the emergency fill, the applicant shall comply with the permit condition.~~

Discussion: This is a standard and not a policy.

16. **Where appropriate, developers may be required to dedicate easements for public access to the beach.**

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Discussion: This is an existing policy in the Clatsop Plains Community Plan.

17. **The county supports studies designed to increase scientific knowledge about the processes that have shaped and will continue to shape the dunes of the Clatsop Plains.**

Discussion: A new policy that combines elements of existing recommendation 6 & 7.

#### Beaches and Dunes Recommended Actions

##### Recommended Action:

- ~~1. The State, in conjunction with the Clatsop Soil and Water Conservation District and Clatsop County, should develop and implement an education program to explain beach and dune processes to the general public and to schools.~~

Discussion: This is beyond the scope of activities the county has been involved in.

12. To avoid desiccation of the groundwater lakes and encroachment of sea water, a water management program which is consistent with the water budget equation for the Clatsop Plains should be developed. The County should request technical and financial assistance from state and federal agencies in evaluating water development potentials.

23. The County, in cooperation with other local jurisdictions, should consider a cost/benefit comparison of developing the Clatsop Plains aquifer as a water source with other sources of water supply.

- ~~4. A study of the importance of driftwood in the dune building process and the feasibility and likely impact of commercial removal of driftwood needs to be undertaken.~~

Discussion: This issue does not warrant a specific study.

- ~~5. A comprehensive analysis of the carrying capacity of each of the sand landforms for recreational use (including ORVs and pedestrian access), livestock and development needs to be developed.~~

Discussion: Such a study would be difficult to undertake and expensive. There is no agreed upon methodology for determining carrying capacity.

6. ~~Measurement of dune migration and natural dune building process by the Clatsop Soil~~

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1 and Water Conservation District should be continued.  
2

3 Discussion: Is being combined with recommendation 7 into a new policy.  
4

5 ~~7. A study is necessary to evaluate the extent to which littoral drift and longshore transport~~  
6 ~~of sediment contribute to the sand supply of beaches, dunes and sand spits in comparison~~  
7 ~~to more local sources (i.e. nearby headlands and shoreline erosion and coastal streams and~~  
8 ~~rivers); projection of future trends in replenishment and identification of the drift sectors~~  
9 ~~(the areas where these local erosion and accretion processes interact).~~  
10

11  
12 ~~8. The Department of Planning and Development should work with state and local law~~  
13 ~~enforcement agencies to obtain greater enforcement of laws designed to protect the~~  
14 ~~vegetation and stability of the dunes.~~  
15

16 Discussion: This recommendation is beyond the scope of the planning program.  
17

18 ~~9. A study of the impacts of sand removal on sand flow patterns, groundwater supplies,~~  
19 ~~aesthetics, destruction of wildlife habitat and property and associated structures needs to~~  
20 ~~be undertaken. The study should identify those areas suitable for sand removal based on~~  
21 ~~historical sand supply.~~  
22

23 Discussion: This is not a well conceived recommendation.  
24  
25

26 CLATSOP PLAINS COMMUNITY PLAN  
27 BEACHES AND DUNES POLICIES  
28

29 Dune Policies  
30

31 ~~1. No filling shall be permitted which would raise the grade level of any structure and~~  
32 ~~subvert the intent of the height restriction along beach front lots.~~  
33

34 Discussion: This objective is achieved by measuring building height from the exiting  
35 grade. Therefore, there is no need for this policy.

36 ~~2. No intensive development on top of dune ridges should be permitted. Residential~~  
37 ~~developments should be located on the sides of dunes, in order to maintain the views of~~  
38 ~~the Clatsop Plains.~~  
39

40 Discussion: This policy does not appear to have been implemented in the past. It is of  
41 questionable value.  
42

43 ~~3. The top of narrow (15') and steeply sloped dunes (greater than 25%) shall be preserved~~  
44 ~~for open space. Development should not be on ridge tops in order to blend with rather~~

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1 than dominate the surrounding landscape.

2  
3 Discussion: This policy does not appear to have been implemented in the past. It is of  
4 questionable value.

- 5  
6 4. ~~Cluster developments designed to maximize open space toward the beach should be~~  
7 ~~promoted and given preference over subdivisions with sprawling uniformly sized lots.~~  
8

9 Discussion: This policy has been added to the general policy statements.

- 10  
11 5. ~~Extensive modification of dunes is strongly discouraged because such activities are~~  
12 ~~difficult to stabilize in addition to the fact that the rolling dunes make up the character of~~  
13 ~~the Clatsop Plains.~~  
14

15 Discussion: This policy has been added to the general policy statements.

- 16  
17 6. ~~Roads in dune areas should, as much as possible, be routed along troughs between dune~~  
18 ~~ridges. Roads should not be located in the vegetative area along the face or top of dunes.~~  
19

20 Discussion: This is not necessarily a good idea. These "trough areas" are generally  
21 deflation plains which are subject to potential flooding hazard.

- 22  
23 7. ~~The County shall work with the State to provide much stricter enforcement of vehicular~~  
24 ~~traffic on the beaches.~~  
25

26 Discussion: If anything, this is a responsibility of the County Sheriff. It does not belong  
27 in the comprehensive plan.

- 28  
29 8. ~~State and local jurisdictions should cooperate to evolve the most efficient traffic flow~~  
30 ~~patterns, parking arrangements, and policing requirements for areas on and adjacent to~~  
31 ~~active dune areas, especially parks and access areas.~~  
32

33 Discussion: A portion of this policy is covered by proposed policy 6. The portion  
34 dealing with parks is covered by proposed policy 10.

- 35  
36 9. ~~Active dunes are stabilized sand areas where wind erosion is critical. Types of uses~~  
37 ~~which would be appropriate would be hiking, equestrian and nature trails, historic~~  
38 ~~preservation of an area or structure, beach access points, and temporary open sided~~  
39 ~~structures if adequate stabilization is provided. Off road vehicles, grazing of livestock,~~  
40 ~~structures and sand removal are prohibited uses in active dune areas.~~  
41

42 Discussion: Duplicates general policy statement on what is permitted in active dune  
43 areas.  
44

1 ~~10. Active dune areas may be included within Planned Developments, subdivisions and~~  
2 ~~major partitions as designated open space areas.~~

3  
4 Discussion: This concept is covered by proposed policy 10.

5  
6 ~~11. Decisions on plans, ordinances and land use actions in beach and dune areas, other than~~  
7 ~~older stabilized dunes shall be based on findings that include:~~

- 8  
9 a) ~~the type of use proposed and the adverse effects it might have on the site and~~  
10 ~~adjacent areas;~~  
11 b) ~~temporary and permanent stabilization programs and the planned maintenance of~~  
12 ~~new and existing vegetation;~~  
13 c) ~~methods of protecting the surrounding area from any adverse effects of the~~  
14 ~~development;~~  
15 d) ~~hazards to life, public and private property, and the natural environment which~~  
16 ~~may be caused by the proposed use; and~~  
17 e) ~~adequate protection of the development from any geologic hazards, wind erosion,~~  
18 ~~undercutting, ocean flooding and storm waves; or a finding that the development~~  
19 ~~is of minimal value.~~

20  
21 Discussion: Duplicates proposed policy 3.

22  
23 ~~12. Where appropriate, developers may be required to dedicate easements for public access to~~  
24 ~~public beaches.~~

25  
26 Discussion: This policy has been added to the general policy statements, proposed policy  
27 16.

28  
29 Fort Stevens State Park Subarea Policy

30  
31 ~~Off road vehicles should not be permitted on dune or wetland areas in the park and shall not~~  
32 ~~traverse the NATURAL wetland salt marsh in Clatsop Spit.~~

33  
34 Discussion: This type of issue is addressed in the Fort Stevens Park Master Plan and  
35 proposed policy 11.

36  
37 Clatsop Plains Aquifer Policy

38  
39 ~~1. Land use actions (i.e. Comprehensive Plan changes, zone changes, subdivisions and~~  
40 ~~partitions, planned developments, conditional use permits, etc.) shall be reviewed by the~~  
41 ~~Planning Commission and the Department of Planning and Development to insure that~~  
42 ~~the proposed activity(ies) will not:~~

- 43  
44 a. ~~adversely affect the water quality;~~

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- b. ~~result in the drawdown of the groundwater supply;~~
- c. ~~result in the loss of stabilizing vegetation, or~~
- d. ~~salt water intrusion into the water supply.~~

Discussion: This duplicates Policy 6.

#### Recommended Actions

- 1. ~~To avoid desiccation of the groundwater lakes and encroachment of sea water, a water management program which is consistent with the water budget equation for the Clatsop Plains should be developed. The County should request technical and financial assistance from state and federal agencies in evaluating water development potentials.~~
- 2. ~~The County, in cooperation with other local jurisdictions, should consider a cost/benefit comparison of developing the Clatsop Plains aquifer as a water source with other sources of water supply.~~

Discussion: This issue is By recommendations 1 & 2.

#### Wind and Ocean Shoreline Erosion Policies

- 1. ~~Clatsop County shall prohibit:~~
  - a. ~~the destruction of stabilizing vegetation (including the inadvertent destruction by moisture loss or root damage).~~
  - b. ~~the exposure of stable and conditionally stable areas to erosion, and~~
  - c. ~~construction of shore structures which modify current or wave patterns or the beach sand supply.~~

Discussion: This duplicates a general policy

- 2. ~~Erosion shall be controlled and the soil stabilized by vegetation and/or mechanical and/or structural means on all dune lands. After stabilization, continuous maintenance shall be provided. In those areas where the County has taken an Exception to the Beaches and Dunes Goal, the County shall have building permits reviewed by the Soil Conservation Service and use their recommendations as conditions of approval.~~

Discussion: This duplicates a general policy

- 3. ~~Removal of vegetation during construction in any sand area shall be kept to the minimum required for building placement or other valid purpose. Removal of vegetation should not occur more than 30 days prior to grading or construction. Permanent revegetation shall be started on the site as soon as practical after construction, final grading or utility~~

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1 placement. Storage of sand and other materials should not suffocate vegetation.

2  
3 Discussion: This duplicates a general policy

- 4  
5 ~~4. In all open sand areas, revegetation must be clearly monitored and carefully maintained,~~  
6 ~~which may include restrictions on pedestrian traffic. Revegetation shall return the area to~~  
7 ~~its pre-construction level of stability or better. Trees should be planted along with ground~~  
8 ~~cover such as grass or shrubs. To encourage stabilization, a revegetation program with~~  
9 ~~time limits shall be required by the Planning Department as a condition of all building~~  
10 ~~permits and land use actions (i.e. Comprehensive Plan changes, zone changes,~~  
11 ~~subdivisions and partitions, planned developments, conditional use permits etc.).~~

12  
13 Discussion: This duplicates a general policy

- 14  
15 ~~5. Removal of vegetation which provides wildlife habitat shall be limited. Unnecessary~~  
16 ~~removal of shoreline vegetation shall be prohibited.~~

17  
18 Discussion: This duplicates a general policy

- 19  
20 ~~6. Site specific investigations by a qualified person such as a geologist, soils scientist, or~~  
21 ~~geomorphologist may be required by the County prior to the issuance of building permits~~  
22 ~~in open sand areas, on the ocean front, in steep hillsides of dunes, regardless of the~~  
23 ~~vegetative cover, and in any other conditionally stable dune area which, in the view of the~~  
24 ~~Planning Director or Building Official, may be subject to wind erosion or other hazard~~  
25 ~~potential. Site investigations may be submitted to the State Department of Geology and~~  
26 ~~other agencies for review of recommendations.~~

27  
28 Discussion: This duplicates a general policy

- 29  
30 ~~7. Log debris plays an important role in the formation and maintenance of foredunes.~~  
31 ~~Therefore, driftwood removal from sand areas and beaches for both individual and~~  
32 ~~commercial purposes should be regulated so that dune building processes and scenic~~  
33 ~~values are not adversely affected.~~

34  
35 Discussion: Same comment as in the general policy section.

36  
37 Recommended Action

38  
39 ~~The County should work with the Clatsop Soil and Water Conservation District in determining~~  
40 ~~whether their three zones affecting dunes are needed in light of new State law requirements.~~

41  
42 Discussion: No action was taken on this recommendation in the last twenty years and  
43 therefore it is being proposed for deletion.

44  
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**Exhibit D**  
**Proposed Amendments to Land and Water Use**  
**and Development Code and Standards Document**  
**-Beaches and Dunes Overlay Zone**



PROPOSED AMENDMENTS  
LAND AND WATER AND DEVELOPMENT AND USE ORDINANCE (80-14)  
BEACHES AND DUNES

I. Amend Section 4.040, Active Dune Overlay District to read as follows:

Section 4.040. Beach and Dune Overlay District (A/BDO).

Section 4.041. Purpose. The intent of the beach and dune overlay is to regulate uses and activities in the affected areas in order to: ensure that development is consistent with the natural limitations of the oceanshore; ensure that identified recreational, aesthetic, wildlife habitat and other resources are protected; conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of beach and dune areas; and to reduce the hazards to property and human life resulting from both natural events and development activities.

Section 4.042. Applicability The beach and dune overlay (BDO) includes the following beach and dune areas:

1. The beach, which extends from extreme low tide landward to the Statutory Vegetation Line established and described in ORS 390.770, or the line of established upland shore vegetation, whichever is further inland;
2. The dune hazard area, which extends From the Statutory Vegetation Line established and described by ORS 390.770 or the line of established upland shore vegetation, which ever is further inland, landward to the construction setback line.

The construction setback line is established as follows:

- A. A line 570 feet landward of the Statutory Vegetation Line established and described by ORS 390.770 for the area north of Surf Pines to the Columbia River south jetty.
- B. The Pinehurst construction setback line, established and described in Ordinance 92-90;and
- C. The Surf Pines construction setback line, established and described in Ordinance 83-17 and extended north to include T7N, R10W, Section 16C, Tax Lot 300 (Charlton Property).

3. The dune construction area, which extends from the construction setback line as defined in the section above, landward to the eastern limit of Highway 101.

Section 4.043. Relationship to the Underlying Zone. Uses and activities permitted in the Beach and Dune Overlay zone(BDO) are subject to the provisions and standards of the underlying zone and this chapter. Where the provisions of this district and the underlying zone conflict, the provisions of this district shall apply.

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1  
2 Section 4.044 State Parks and Recreation Department Regulated Uses. Uses and  
3 activities permitted on the beach, as defined in Section 4.042(1), are those permitted  
4 subject to review and approval by the Oregon Parks and recreation Department  
5 consistent with ORS 390.605-390.725 and OAR Divisions 20-30.  
6

7 Section 4.045. Permitted Development and Uses. The following developments and  
8 uses are permitted under a Type I procedure subject to specific development standards.  
9

10 1. In the dune hazard area as defined in Section 4.042(2),  
11

12 A. Maintenance and repair of existing structures, including roads and subsurface  
13 disposal systems.

14 B. Drainage improvements, including storm water outfall.

15 C. Foredune breaching, where:

16 1). The breaching is required to replenish sand supply in interdune areas, or  
17 is undertaken on a temporary basis for emergency purposes such as fire  
18 control or the alleviation of a flood hazard.

19 2). There are no other reasonable alternatives to alleviate the emergency.

20 3). The breaching does not endanger existing development.

21 4). The area affected by the breaching is restored according to an approved  
22 restoration plan prepared by a registered professional geologist or certified  
23 engineering geologist, where the restoration plan shall include appropriate  
24 revegetation; and

25 5). At a minimum, foredunes shall be restored to a dune profile which  
26 provides flood protection equivalent to that prior to breaching.

27 D. Remedial grading, in the following cases:

28 1). Clearing of sand which is inundating houses or commercial buildings and  
29 their associated improvements. Sand may be graded up to thirty-five feet  
30 from a building's foundation subject to the following conditions:

31 (a). The area to be graded constitutes open sand dunes or the back slope  
32 of a foredune,

33 (b). There is no modification to the crest of a foredune,

34 (c). At a minimum, the area graded shall maintain the one hundred year  
35 flood elevation as established by the county's Flood Insurance Rate Map  
36 (FIRM), and

37 (d). No grading shall occur seaward of the Statutory Vegetation Line,  
38 except for placement of material removed from the structure in question;

39 2). Excavation necessary for the purpose of placing a beachfront protective  
40 structure;

41 3). Clearing of sand which is inundating a public street and is interfering with  
42 vehicular

43 4). Excavation of sand necessary to alleviate stormwater build-up;

44 5). Minor reshaping of the forward portion of a dune necessary to provide an  
45 even slope for the planting of stabilizing vegetation; and

1  
2 6). Where feasible, all graded sand shall be placed on the beach or foreslope  
3 portion of the adjoining dune. Where not feasible, then sand shall be  
4 placed at a location approved by the county. In no event shall sand be  
5 removed from the beach and dune system.

6 E. Maintenance of existing riparian vegetation, including the planting of additional  
7 riparian vegetation.

8 2. In the dune construction area defined in Section 4.042(3), any permitted uses  
9 allowed in the underlying zone subject to the applicable standards of that zone and the  
10 applicable general standards of Section 4.049.

11  
12 Section 4.0446. Development and Uses Permitted with Review. The following  
13 developments and uses are permitted under a Type II procedure, Sections 5.040 to  
14 5.050, subject to the applicable general standards of Section 4.049.

15  
16 1. Beachfront protective structures seaward of the Statutory Vegetation Line established  
17 and described by ORS 390.770 or the line established upland shore vegetation,  
18 whichever is further inland require a permit from the Oregon Parks and Recreation  
19 Department and the County. The County's review of beachfront protective structures  
20 shall be coordinated with the Oregon Parks and Recreation Department.

21  
22 2. The emergency placement of riprap on the beach, as defined above and in Section  
23 4.042(1) requires a permit from the Oregon Parks and Recreation Department (OPRD).

24  
25 3. No construction is permitted prior to the issuance of an OPRD permit.

26  
27 4. On the beach, as defined in Section 4.042(1), and in the dune hazard area as  
28 defined in section 4.042(2), and in the dune construction area as defined in section  
29 4.042(3):

30  
31 A. Pedestrian and Equestrian Trail.

32  
33 1). To minimize the loss of vegetation, fencing adjacent to the trail may be  
34 required in order to restrict traffic to the designated trail, and

35 2). Subdivisions or other developments of ten or more dwelling units shall  
36 provide public trails to the beach.

37  
38 B. Structural shoreline stabilization

39  
40 1). The priorities for beachfront protection, from highest to lowest, are:

41 (a). Proper maintenance of existing vegetation.

42 (b). Planting of riparian vegetation.

43 (c). Rip-rap.

44 (d). Bulkhead or seawall.

- 1 2). Proposals for rip-rap, bulkheads, or seawalls shall demonstrate that:  
2 (a). The beachfront protective structure is located in an area where the  
3 county has identified that development existed on or before  
4 January 1, 1977.  
5 (b). The development is being threatened by erosion hazard.  
6 (c). Non-structural means of shoreline stabilization cannot provide  
7 adequate erosion protection.  
8 (d). The structure is the minimum necessary to provide for the level of  
9 protection that has been identified.  
10 (e). The structure is placed as far landward as is practical, consistent  
11 with maintaining existing riparian vegetation.  
12 (f). Potential adverse impacts on adjacent property are minimized.  
13 (g). Existing public access is preserved. The county may require that  
14 the shoreline stabilization incorporate steps or other improvements  
15 to enhance public access to the beach.  
16 (h). Visual impacts are minimized.  
17 (i). Any rip-rap shall be covered with sand and revegetated with beach  
18 grass, willow or other appropriate vegetation.

19  
20 C. Sand stabilization program

- 21  
22 1). The program shall be prepared by a qualified individual approved by the  
23 County  
24 2). The program shall be based on an analysis of the area subject to accretion  
25 or erosion. The area selected for management shall be found, based on the  
26 analysis, to be of sufficient size to successfully achieve the program objectives.  
27 3). The program shall include specifications on how identified activities are to be  
28 undertaken. The specifications should address such elements as: the  
29 proposed type of vegetation to be planted or removed; the distribution, required  
30 fertilization and maintenance of vegetation to be planted; the location of any sand  
31 fences; and the timing of the elements of the proposed program.  
32 4). Fire-resistant species are the preferred stabilizing vegetation within twenty-  
33 five feet of existing dwellings or structures. Fire resistant vegetation should only  
34 be planted when the foreslope and crest of the dune are adequately stabilized to  
35 prevent significant accumulation of windblown sand.  
36 5). Where the placement of sand fences is proposed, evidence shall be provided  
37 that the planting of vegetation alone will not achieve the stated purpose of the  
38 sand stabilization program. Fencing may be permitted on a temporary basis to  
39 protect vegetation that is being planted as part of the program, or to control the  
40 effects of pedestrian beach access on adjacent areas.  
41

42 5. In the dune construction area as defined in section 4.042 (3), any permitted uses  
43 allowed in the underlying zone subject to the applicable standards of that zone and the  
44 applicable standards of Section 4.049.  
45



1 Section 4.047. Conditional Development and Use. The following developments and  
2 uses may be permitted under a Type IIa procedure Sections 5.010 to 5.025, subject to  
3 the applicable general of Section 4.049.  
4

- 5 1. On the beach, as defined in section 4.042(1), and in the dune hazard area as  
6 defined in section 4.042(2):  
7

8 A. Foredune grading

9 Foredune grading for view enhancement or to prevent sand inundation may be  
10 allowed only in foredune areas that were committed to development on or before  
11 January 1, 1977 and where an overall plan for foredune grading is prepared.  
12

13 1). A foredune grading plan shall be prepared by a qualified expert approved by  
14 the County.

15 2). A foredune grading plan shall be based on an consideration of factors  
16 affecting the stability of the shoreline to be managed including sources of sand,  
17 ocean flooding, and patterns of accretion and erosion (including wind erosion),  
18 and the effects of beachfront protective structures and jetties.

19 3). The foredune grading plan shall:

20 (a) Cover an entire beach and foredune area subject to an accretion  
21 problem, including adjacent areas potentially affected by changes in  
22 flooding, erosion or accretion as a result of dune grading;

23 (b) Specify minimum dune height and width requirements to be  
24 maintained for protection from flooding and erosion. The minimum height  
25 for flood protection is four feet above the one hundred year flood elevation  
26 established by the FEMA flood insurance studies;

27 (c). Identify and set priorities for low and narrow dune areas which need to  
28 be built up;

29 (d). Prescribe standards for redistribution of sand and temporary and  
30 permanent stabilization measures including the timing of these activities;  
31 and

32 (e). Prohibit removal of sand from the beach-foredune system.  
33

- 34 2. In the dune construction area as defined in section 4.042(3), any conditional uses  
35 allowed in the underlying zone subject to applicable standards of that zone and  
36 the applicable general standards of Section 4.049.  
37

38 Section 4.048 Prohibited Activities. The following activities are prohibited in all areas  
39 within the beach and dune overlay (BDO) as defined in Section 4.042:  
40

- 41 1. Removal of sand from the beach or dune system.  
42 2. Removal of stabilizing vegetation, except in conjunction with a permitted  
43 development or use.

1  
2 Section 4.049. General Development and Use Criteria. The following criteria are  
3 applicable to developments and uses in the BDO, in addition to those specific standards  
4 identified in Sections 4.044 through 4.047.  
5  
6

- 7 1. For development located in all areas in the BDO as defined by Section 4.042,  
8 other than older stabilized dunes, findings shall address the following:  
9  
10 A. The adverse effects the proposed development might have on the site and  
11 adjacent areas;  
12 B. Temporary and permanent stabilization proposed and the planned  
13 maintenance of new and existing vegetation;  
14 C. Methods for protecting the surrounding area from any adverse effects of  
15 the development;  
16 D. Hazards to life, public and private property, and the natural  
17 environment which may be caused by the proposed use.  
18 E. How the proposed development will not result in the draw down of the  
19 groundwater supply in a manner that would lead to:  
20 1). The loss of stabilizing vegetation;  
21 2). The loss of water quality;  
22 3). Salt water intrusion into the water supply; or  
23 4). Significant lowering of interdune water level. Building permits for  
24 single-family dwellings are exempt from this requirement if appropriate  
25 findings are provided at the time of subdivision approval.  
26  
27 2. For development on the beach, as defined in section 4.042(1), and in the dune  
28 hazard area as defined in section 4.042(2) a geotechnical report in conformance  
29 with Section 4.030, shall be required by the Planning Director prior to the  
30 issuance of a development permit.  
31  
32 3. For development in the dune hazard area as defined in section 4.042 (2) and in the  
33 dune construction area as defined in section 4.042(3) a wind erosion control plan  
34 shall be required by the Planning Director prior to the issuance of a development  
35 permit. The purpose of the wind erosion control plan is to maintain the stability of the  
36 site during periods when the vegetative cover is removed and to ensure that  
37 adjacent properties are not adversely affected. The plan shall:  
38 A. Identify areas where vegetation is to be removed and the type of  
39 vegetation to be removed;  
40 B. Describe any temporary sand stabilization measures to be used during  
41 construction;  
42 C. The proposed type of vegetation to be planted to stabilize the site after  
43 construction, including the density of planting, proposed fertilization,

- A. A line 570 feet landward of the Statutory Vegetation Line established and described by ORS 390.770 for the area north of Surf Pines to the Columbia River south jetty.
- B. The Pinehurst construction setback line, established and described in Ordinance 92-90; and
- C. The Surf Pines construction setback line, established and described in Ordinance 83-17 and extended north to include T7N, R10W, Section 16C, Tax Lot 300 (Charlton Property).

3. The dune construction area, which extends from the construction setback line as defined in the section above, landward to the eastern limit of Highway 101.

**Section 4.043. Relationship to the Underlying Zone.** Uses and activities permitted in the Beach and Dune Overlay zone (BDO) are subject to the provisions and standards of the underlying zone and this chapter. Where the provisions of this district and the underlying zone conflict, the provisions of this district shall apply.

**Section 4.044 State Parks and Recreation Department Regulated Uses.** Uses and activities permitted on the beach, as defined in Section 4.042(1), are those permitted subject to review and approval by the Oregon Parks and recreation Department consistent with ORS 390.605-390.725 and OAR Divisions 20-30.

**Section 4.043-5. Permitted Development and Uses-Permitted.** The following developments and ~~uses their accessory developments~~ are permitted under a Type I procedure subject to applicable **specific** development standards.

1. In the dune hazard area as defined in Section 4.042(2),

- ~~1. Use of equipment needed to help stabilize and maintain the vegetation of the dune.~~
- ~~2. Scientific study of natural and cultural systems such as dunes, dune stabilization, aquifer monitoring wells, archeological remains.~~
- ~~3. Wildlife sanctuary.~~
- ~~4. Low intensity recreation.~~
- 5.A. Maintenance and repair of existing structures, and including roads and subsurface disposal systems.
- ~~6. Subsurface sewage disposal systems except for areas designated as a Flood Hazard Overlay District (/FHO).\*~~
- ~~7. Private beach access.\*~~
- B. Drainage improvements, including storm water outfall.
- C. Foredune breaching, where:
  - 1). The breaching is required to replenish sand supply in interdune areas, or is undertaken on a temporary basis for emergency

- purposes such as fire control or the alleviation of a flood hazard.
- 2). There are no other reasonable alternatives to alleviate the emergency.
  - 3). The breaching does not endanger existing development.
  - 4). The area affected by the breaching is restored according to an approved restoration plan prepared by a registered professional geologist or certified engineering geologist, where the restoration plan shall include appropriate revegetation; and
  - 5). At a minimum, foredunes shall be restored to a dune profile which provides flood protection equivalent to that prior to breaching.
- D. Remedial grading, in the following cases:
- 1). Clearing of sand which is inundating houses or commercial buildings and their associated improvements. Sand may be graded up to thirty-five feet from a building's foundation subject to the following conditions:
    - (a). The area to be graded constitutes open sand dunes or the back slope of a foredune,
    - (b). There is no modification to the crest of a foredune,
    - (c). At a minimum, the area graded shall maintain the one hundred year flood elevation as established by the county's Flood Insurance Rate Map (FIRM), and
    - (d). No grading shall occur seaward of the Statutory Vegetation Line, except for placement of material removed from the structure in question;
  - 2). Excavation necessary for the purpose of placing a beachfront protective structure;
  - 3). Clearing of sand which is inundating a public street and is interfering with vehicular
  - 4). Excavation of sand necessary to alleviate stormwater build-up;
  - 5). Minor reshaping of the forward portion of a dune necessary to provide an even slope for the planting of stabilizing vegetation; and
  - 6). Where feasible, all graded sand shall be placed on the beach or foreslope portion of the adjoining dune. Where not feasible, then sand shall be placed at a location approved by the county. In no event shall sand be removed from the beach and dune system.
- E. Maintenance of existing riparian vegetation, including the planting of additional riparian vegetation.

2. In the dune construction area defined in Section 4.042(3), any permitted uses allowed in the underlying zone subject to the applicable standards of that zone and the applicable general standards of Section 4.049.

Section 4.0446. Development and Uses Permitted with Review. The following developments and their accessory developments ~~uses~~ are permitted under a Type II procedure, and Sections 5.040 to 5.050, subject to ~~the applicable criteria and~~ general

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- 1 method of maintenance, and timing of the planting;  
2 D. The removal of vegetation shall be kept to a minimum during site  
3 preparation and construction; and  
4 E. No site clearing is permitted prior to the issuance of the development  
5 permit for the proposed development or use. Site clearing shall occur no  
6 sooner than is necessary prior to construction. The permanent  
7 revegetation of the site shall be started as soon as is practical, but in no  
8 event later than six months after the completion of construction.  
9

10 II. Amend Section 4.060 Beaches and Dunes Overlay District, by deleting this D  
11 section in its entirety.

12  
13 III. Amend the Standards Document, Beach and Dune Area Requirements, Section D  
14 S4.100 - 4.138 by deleting it in its entirety.  
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**Exhibit E**  
**Proposed Amendments to Land and Water Use**  
**and Development Code and Standards Document**  
**- Annotated**

1 PROPOSED AMENDMENTS  
2 LAND AND WATER AND DEVELOPMENT AND USE ORDINANCE (80-14)  
3

4 BEACHES AND DUNES  
5

- 6 I. Amend Section 4.040, Active Dune Overlay District to read as follows:  
7

8 Section 4.040. Active Beach and Dune Overlay District (A /BDO).  
9

10 Section 4.041. Purpose. The intent of this section is to regulate actions in active dune  
11 areas in order to protect the fragile nature of the dune. Should the regulations of this  
12 overlay district be in conflict with the underlying primary zone or the regulations of the  
13 Glatfop County Soil and Water Conservation District, the conflict(s) shall be resolved by  
14 the application of the more stringent regulation(s) **the beach and dune overlay is to**  
15 **regulate uses and activities in the affected areas in order to: ensure that**  
16 **development is consistent with the natural limitations of the oceanshore; ensure**  
17 **that identified recreational, aesthetic, wildlife habitat and other resources are**  
18 **protected; conserve, protect, where appropriate develop, and where appropriate**  
19 **restore the resources and benefits of beach and dune areas; and to reduce the**  
20 **hazards to property and human life resulting from both natural events and**  
21 **development activities.**  
22

23 Section 4.042. Mapping Applicability. Active dunes, conditionally stable dunes, and  
24 dunes subject to ocean undercutting and wave overtopping are identified on maps  
25 accompanying Stability of Coastal Dunes, January, 1978, report by Leonard Palmer.  
26 Dune areas mapped in the study were identified by LCDC criteria (see report). Active  
27 dunes were defined by evidence from photographs, photo maps, soils, and landforms,  
28 to be active or to show recurrent activity in the context of approximately 100 years. The  
29 mapping is not intended to specify site conditions or stability, nor to replace site specific  
30 studies. The dune mapping is intended to be a preliminary working designation of areas  
31 in which further studies may be required. The boundaries mapped should be changed  
32 when on site conditions are shown to have changed, or when improved data is  
33 obtained. **The beach and dune overlay(BDO) includes the following beach and**  
34 **dune areas:**  
35

1. **The beach, which extends from extreme low tide landward to the Statutory Vegetation Line established and described in ORS 390.770, or the line of established upland shore vegetation, whichever is further inland;**
2. **The dune hazard area, which extends From the Statutory Vegetation Line established and described by ORS 390.770 or the line of established upland shore vegetation, which ever is further inland, landward to the construction setback line.**

**The construction setback line is established as follows:**

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- A. A line 570 feet landward of the Statutory Vegetation Line established and described by ORS 390.770 for the area north of Surf Pines to the Columbia River south jetty.
  - B. The Pinehurst construction setback line, established and described in Ordinance 92-90; and
  - C. The Surf Pines construction setback line, established and described in Ordinance 83-17 and extended north to include T7N, R10W, Section 16C, Tax Lot 300 (Charlton Property).
3. The dune construction area, which extends from the construction setback line as defined in the section above, landward to the eastern limit of Highway 101.

**Section 4.043. Relationship to the Underlying Zone.** Uses and activities permitted in the Beach and Dune Overlay zone(BDO) are subject to the provisions and standards of the underlying zone and this chapter. Where the provisions of this district and the underlying zone conflict, the provisions of this district shall apply.

**Section 4.044 State Parks and Recreation Department Regulated Uses.** Uses and activities permitted on the beach, as defined in Section 4.042(1), are those permitted subject to review and approval by the Oregon Parks and recreation Department consistent with ORS 390.605-390.725 and OAR Divisions 20-30.

**Section 4.043-5. Permitted Development and Uses-Permitted.** The following developments and ~~uses their accessory developments~~ are permitted under a Type I procedure subject to applicable **specific** development standards.

**1. In the dune hazard area as defined in Section 4.042(2),**

- ~~1. Use of equipment needed to help stabilize and maintain the vegetation of the dune.~~
- ~~2. Scientific study of natural and cultural systems such as dunes, dune stabilization, aquifer monitoring wells, archeological remains.~~
- ~~3. Wildlife sanctuary.~~
- ~~4. Low intensity recreation.~~
- 5.A. Maintenance and repair of existing structures, and including roads and subsurface disposal systems.**
- ~~6. Subsurface sewage disposal systems except for areas designated as a Flood Hazard Overlay District (/FHO).\*~~
- ~~7. Private beach access.\*~~
- B. Drainage improvements, including storm water outfall.**
- C. Foredune breaching, where:**
  - 1). The breaching is required to replenish sand supply in interdune areas, or is undertaken on a temporary basis for emergency**

- purposes such as fire control or the alleviation of a flood hazard.
- 2). There are no other reasonable alternatives to alleviate the emergency.
  - 3). The breaching does not endanger existing development.
  - 4). The area affected by the breaching is restored according to an approved restoration plan prepared by a registered professional geologist or certified engineering geologist, where the restoration plan shall include appropriate revegetation; and
  - 5). At a minimum, foredunes shall be restored to a dune profile which provides flood protection equivalent to that prior to breaching.
- D. Remedial grading, in the following cases:
- 1). Clearing of sand which is inundating houses or commercial buildings and their associated improvements. Sand may be graded up to thirty-five feet from a building's foundation subject to the following conditions:
    - (a). The area to be graded constitutes open sand dunes or the back slope of a foredune,
    - (b). There is no modification to the crest of a foredune,
    - (c). At a minimum, the area graded shall maintain the one hundred year flood elevation as established by the county's Flood Insurance Rate Map (FIRM), and
    - (d). No grading shall occur seaward of the Statutory Vegetation Line, except for placement of material removed from the structure in question;
  - 2). Excavation necessary for the purpose of placing a beachfront protective structure;
  - 3). Clearing of sand which is inundating a public street and is interfering with vehicular
  - 4). Excavation of sand necessary to alleviate stormwater build-up;
  - 5). Minor reshaping of the forward portion of a dune necessary to provide an even slope for the planting of stabilizing vegetation; and
  - 6). Where feasible, all graded sand shall be placed on the beach or foreslope portion of the adjoining dune. Where not feasible, then sand shall be placed at a location approved by the county. In no event shall sand be removed from the beach and dune system.
- E. Maintenance of existing riparian vegetation, including the planting of additional riparian vegetation.

2. In the dune construction area defined in Section 4.042(3), any permitted uses allowed in the underlying zone subject to the applicable standards of that zone and the applicable general standards of Section 4.049.

Section 4.0446. Development and Uses Permitted with Review. The following developments and their accessory developments ~~uses~~ are permitted under a Type II procedure, and Sections 5.040 to 5.050, subject to the applicable criteria and general

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development and use standards and site plan review of Section 4.049.

1. Beachfront protective structures seaward of the Statutory Vegetation Line established and described by ORS 390.770 or the line established upland shore vegetation, whichever is further inland require a permit from the Oregon Parks and Recreation Department and the County. The County's review of beachfront protective structures shall be coordinated with the Oregon Parks and Recreation Department.

2. The emergency placement of riprap on the beach, as defined above and in Section 4.042(1) requires a permit from the Oregon Parks and Recreation Department (OPRD).

3. No construction is permitted prior to the issuance of an OPRD permit.

4. On the beach, as defined in Section 4.042(1), and in the dune hazard area as defined in section 4.042(2), and in the dune construction area as defined in section 4.042(3):

**A. Pedestrian and Equestrian Trail.**

- 1). To minimize the loss of vegetation, fencing adjacent to the trail may be required in order to restrict traffic to the designated trail, and
- 2). Subdivisions or other developments of ten or more dwelling units shall provide public trails to the beach.

**B. Structural shoreline stabilization**

- 1). The priorities for beachfront protection, from highest to lowest, are:
  - (a). Proper maintenance of existing vegetation.
  - (b). Planting of riparian vegetation.
  - (c). Rip-rap.
  - (d). Bulkhead or seawall.
- 2). Proposals for rip-rap, bulkheads, or seawalls shall demonstrate that:
  - (a). The beachfront protective structure is located in an area where the county has identified that development existed on or before January 1, 1977.
  - (b). The development is being threatened by erosion hazard.
  - (c). Non-structural means of shoreline stabilization cannot provide adequate erosion protection.
  - (d). The structure is the minimum necessary to provide for the level of protection that has been identified.
  - (e). The structure is placed as far landward as is practical, consistent with maintaining existing riparian vegetation.
  - (f). Potential adverse impacts on adjacent property are minimized.

- (g). Existing public access is preserved. The county may require that the shoreline stabilization incorporate steps or other improvements to enhance public access to the beach.
- (h). Visual impacts are minimized.
- (i). Any rip-rap shall be covered with sand and revegetated with beach grass, willow or other appropriate vegetation.

#### **C. Sand stabilization program**

- 1). The program shall be prepared by a qualified individual approved by the County
  - 2). The program shall be based on an analysis of the area subject to accretion or erosion. The area selected for management shall be found, based on the analysis, to be of sufficient size to successfully achieve the program objectives.
  - 3). The program shall include specifications on how identified activities are to be undertaken. The specifications should address such elements as: the proposed type of vegetation to be planted or removed; the distribution, required fertilization and maintenance of vegetation to be planted; the location of any sand fences; and the timing of the elements of the proposed program.
  - 4). Fire-resistant species are the preferred stabilizing vegetation within twenty-five feet of existing dwellings or structures. Fire resistant vegetation should only be planted when the foreslope and crest of the dune are adequately stabilized to prevent significant accumulation of windblown sand.
  - 5). Where the placement of sand fences is proposed, evidence shall be provided that the planting of vegetation alone will not achieve the stated purpose of the sand stabilization program. Fencing may be permitted on a temporary basis to protect vegetation that is being planted as part of the program, or to control the effects of pedestrian beach access on adjacent areas.
5. In the dune construction area as defined in section 4.042 (3), any permitted uses allowed in the underlying zone subject to the applicable standards of that zone and the applicable standards of Section 4.049.

Section 4.0457. Conditional Development and Use. The following developments and ~~uses their accessory developments~~ may be permitted under a Type IIa procedure, and Sections 5.010 to 5.025, subject to the applicable general criteria and development and use standards and site plan review of Section 4.049.

~~1. Public beach access.~~

- 1. On the beach, as defined in section 4.042(1), and in the dune hazard area as

defined in section 4.042(2):

**A. Foredune grading**

Foredune grading for view enhancement or to prevent sand inundation may be allowed only in foredune areas that were committed to development on or before January 1, 1977 and where an overall plan for foredune grading is prepared.

- 1). A foredune grading plan shall be prepared by a qualified expert approved by the County.
- 2). A foredune grading plan shall be based on an consideration of factors affecting the stability of the shoreline to be managed including sources of sand, ocean flooding, and patterns of accretion and erosion (including wind erosion), and the effects of beachfront protective structures and jetties.
- 3). The foredune grading plan shall:
  - (a) Cover an entire beach and foredune area subject to an accretion problem, including adjacent areas potentially affected by changes in flooding, erosion or accretion as a result of dune grading;
  - (b) Specify minimum dune height and width requirements to be maintained for protection from flooding and erosion. The minimum height for flood protection is four feet above the one hundred year flood elevation established by the FEMA flood insurance studies;
  - (c). Identify and set priorities for low and narrow dune areas which need to be built up;
  - (d). Prescribe standards for redistribution of sand and temporary and permanent stabilization measures including the timing of these activities; and
  - (e). Prohibit removal of sand from the beach-foredune system.

2. In the dune construction area as defined in section 4.042(3), any conditional uses allowed in the underlying zone subject to applicable standards of that zone and the applicable general standards of Section 4.049.

**Section 4.048 Prohibited Activities.** The following activities are prohibited in all areas within the beach and dune overlay (BDO) as defined in Section 4.042:

1. Removal of sand from the beach or dune system.
- 2 Removal of stabilizing vegetation, except in conjunction with a permitted development or use.

**Section 4.0469. General Development and Use Criteria.** ~~The Beach and Dune Areas~~

~~Requirements of Section S4.100 to S4.138 of Chapter 4 of the Development and Use Standards Document and the following requirements shall apply to all development.~~  
The following criteria are applicable to developments **and uses in the BDO, in addition to those specific standards identified** listed in Sections 4.044 through and 4.0457.

~~1. The following requirements may be made as conditions of approval to a development permit:~~

- ~~a. prescribing the extent of vegetation removal;~~
- ~~b. prescribing the time, amounts and types of materials and the methods to be used in restoration of dune vegetation;~~
- ~~c. prescribing setbacks greater than required in the underlying zone in order to comply with the intent of the Clatsop County Comprehensive Plan and this Ordinance, and~~
- ~~d. prescribing the location, design and number of proposed developments; and~~

~~2. Public need must be shown for the establishment of State public beach access points. If it is found that there is a public need, the State must satisfactorily prove why this location for the proposed beach access, when compared with other locations, best serves the public need.~~

**1. For development located in all areas in the BDO as defined by Section 4.042, other than older stabilized dunes, findings shall address the following:**

- A. The adverse effects the proposed development might have on the site and adjacent areas;**
- B. Temporary and permanent stabilization proposed and the planned maintenance of new and existing vegetation;**
- C. Methods for protecting the surrounding area from any adverse effects of the development;**
- D. Hazards to life, public and private property, and the natural environment which may be caused by the proposed use.**
- E. How the proposed development will not result in the draw down of the groundwater supply in a manner that would lead to:**
  - 1). The loss of stabilizing vegetation;**
  - 2). The loss of water quality;**
  - 3). Salt water intrusion into th water supply; or**
  - 4). Significant lowering of interdune water level. Building permits for single-family dwellings are exempt from this requirement if appropriate findings are provided at the time of subdivision approval.**

2. For development on the beach, as defined in section 4.042(1), and in the dune hazard area as defined in section 4.042(2) a geotechnical report in conformance with Section 4.030, shall be required by the Planning Director prior to the issuance of a development permit.
3. For development in the dune hazard area as defined in section 4.042 (2) and in the dune construction area as defined in section 4.042(3) a wind erosion control plan shall be required by the Planning Director prior to the issuance of a development permit. The purpose of the wind erosion control plan is to maintain the stability of the site during periods when the vegetative cover is removed and to ensure that adjacent properties are not adversely affected. The plan shall:
  - A. Identify areas where vegetation is to be removed and the type of vegetation to be removed;
  - B. Describe any temporary sand stabilization measures to be used during construction;
  - C. The proposed type of vegetation to be planted to stabilize the site after construction, including the density of planting, proposed fertilization, method of maintenance, and timing of the planting;
  - D. The removal of vegetation shall be kept to a minimum during site preparation and construction; and
  - E. No site clearing is permitted prior to the issuance of the development permit for the proposed development or use. Site clearing shall occur no sooner than is necessary prior to construction. The permanent revegetation of the site shall be started as soon as is practical, but in no event later than six months after the completion of construction.
- ~~3. Breaching of a sand dune on a temporary basis in an emergency must be consistent with sound principles of conservation. A restoration plan must be provided with the development permit application and must be consistent with sound principles of conservation.~~
- ~~4. Applications for installation of subsurface sewage disposal systems must be approved by the County Sanitarian and provide for adequate revegetation procedure.~~
- ~~5. All conditions shall be found by the Department of Planning and Development to provide for or protect the public health, safety or general welfare, protect the dune, and protect adjacent properties both present and in the future.~~
- ~~6. Conditions of approval shall be sufficient to protect the property from erosion by wind or water or both, the dune from the loss of stabilizing vegetation, and the~~



permanent drawdown of the groundwater supply.

7. ~~Site specific investigations by a qualified person such as a geologist, soils scientist, or geomorphologist shall be required by the Planning Director prior to the issuance of development permit in areas that the Planning Director feels may be subject to wind erosion or other hazard potential.\*~~

~~Section 4.047. Warning and Disclaimer of Liability. The degree of protection from erosion or accretion required by this Ordinance is considered reasonable for regulatory purposes. Erosion is occurring from the south jetty of the Columbia River south approximately three miles. Erosion of the dunes may occur south of this area sometime in the future.~~

~~This Ordinance does not imply that land outside the ADO district or developments permitted within such areas will be free from erosion or accretion. This Ordinance shall not create a liability on the part of Clatsop County or by an officer or employee thereof for any damages due to erosion or accretion that result from reliance on this Ordinance or any administrative decision lawfully made thereafter.~~

~~Section 4.048. Procedure. Application for the construction of all structures and construction of developments permitted subject to conditions in Section 4.046 are required and shall be made to the Planning Director or his designate on forms prescribed by Clatsop County. The applicant shall be required to provide at least the following information:~~

- ~~1. a map showing the location of the proposed development and surrounding developments including structures, vegetation, etc.~~
- ~~2. description of the extent to which a sand dune will be altered as a result of the proposed development; and~~
- ~~3. other such information as is needed to determine conformance with this Ordinance.~~

~~Section 4.049. Guarantee of Performance. The applicant for the development permit shall be required to post a performance bond to insure that safeguards recommended in the detailed site investigation report are in fact provided. The method of guarantee, inspection and certification and release of guarantee are specified in Section 10.110 of this Ordinance.~~

~~Section 4.050. Time Limits. Prior to approval of the permit the subdivider or developer and the Department of Planning and Development shall agree upon a deadline for the completion of the required improvements, such deadline not to exceed one year from the time of the permit. The County shall have the power to extend the deadline for improvements for one additional year when the subdivider or developer can present~~

~~substantial reason for doing so.~~

~~The subdivider or developer shall restore the vegetation within the first planting season (October to April) using the amounts and types of materials and methods as prescribed by the Department of Planning and Development.~~

~~The timing of the permits should be made so that restoration may be started as early in the planting season as possible.~~

- II. Amend Section 4.060 Beaches and Dunes Overlay District, by deleting this section in its entirety.

~~Section 4.060. Beaches and Dunes Overlay District (/BDO)\*.~~

~~Section 4.061. Purpose.~~ ~~The intent of this section is to regulate actions in those areas identified as coastal beaches and dunes including built and committed active dunes for which an Exception to Goal 18 Beaches and Dunes has been taken but not for other active dunes in order to:~~

- ~~(1) ————— Ensure the protection and conservation of coastal beach and dune resources.~~
- ~~(2) ————— Prevent economic loss by encouraging development consistent with the natural capability of beach and dune landforms.~~
- ~~(3) ————— Provide for clear procedures by which the natural capability of dune landforms can be assessed prior to development.~~
- ~~(4) ————— Prevent cumulative damage to coastal dune resources due to the incremental effects of development.~~
- ~~(5) ————— Provide for such protection of beach and dune resources above and beyond that provided by the underlying zoning district.~~

~~Section 4.062. Mapping.~~ ~~The /BDO District is applied to all coastal beach and dune landforms, except active dunes but including active dunes for which a built and committed Exception has been taken. The Beach and Dune forms are identified in the Clatsop County Comprehensive Plan.~~

~~Section 4.063. Intent.~~ ~~The requirements imposed by the /BDO District shall be in addition to those imposed by the underlying zone district. Where the requirements of the /BDO District conflict with those of the underlying zoning district, the more restrictive requirements shall apply.~~

~~Section 4.064. Development and Use Permitted.~~ ~~Any permitted or conditional development and use allowed in the underlying zone is permitted subject to applicable~~

~~standards except as may be provided otherwise in Section 4.065.~~

~~Section 4.065. Special Uses. The following specified developments and uses, and no others, may be permitted under a Type I procedure subject to applicable development criteria and standards:~~

~~(1) (a) Uses.~~

~~(i) Buried fuel tanks.~~

~~(b) Criteria.~~

~~(i) The tanks are entirely free of leaks and have an impermeable coating,~~

~~(ii) The tank is located, to the greatest extent feasible, in a well-drained area,~~

~~(iii) The tank is not on active dunes or other foredunes which are conditionally stable and that are subject to ocean undercutting or wave overtopping.~~

~~(iv) and meets DEQ standards.~~

~~(2) (a) Uses.~~

~~(i) Hiking, equestrian, and nature trails.~~

~~(ii) Prescribing the time, amounts and types of materials and the methods to be used in restoration of dune vegetation.~~

~~(iii) Prescribing setbacks greater than required in the underlying zone in order to comply with the intent of the Clatsop County Comprehensive Plan and this Ordinance.~~

~~(iv) Prescribing the location, design and number of proposed developments.~~

~~Section 4.066. Other Special Uses.\* The following developments and their accessory development may be permitted as a Conditional Development and Use under a Type IIa\* procedure and Sections 5.010 to 5.025 subject to applicable criteria and development standards and site plan review:~~

~~(1) (a) Uses.~~

~~(i) Public beach access.~~

~~(b) Criteria.~~

~~(i) Public need must be shown for the establishment of State public beach access points. If it is found to be needed, the State~~

must satisfactorily prove why this location for the proposed beach access, when compared with other locations, best serves the public need.

(2) Uses.

(i) Commercial removal of sand.

(b) Criteria.

(i) The area is not an ocean beach.

(ii) Historic surplus accumulations of sand exist.

(iii) A Site Investigation Report, as specified by Section 4.069 below is conducted.

(iv) Removal of surplus sand can be accomplished without significant impairment of the natural functions of the beach and dune system, and hydraulic processes, according to the Site Investigation Report and a Conditional Development and Use Permit has been granted.

(3) Uses.

(i) Foredune breaching.

(b) Criteria and Conditions.

(i) The breaching is required to replenish sand supply in interdune areas; or

(ii) Emergencies on a temporary basis.

(iii) Such breaching does not endanger existing development.

(iv) The breaching does not adversely impact critical wildlife habitat or Coastal Lake or Freshwater Wetland zone areas.

(v) The areas affected by the breaching are restored according to an approved restoration plan.

(4) Uses.

(i) Commercial drift log removal from beaches.

(b) Criteria.

(i) The removal will result in significant public benefit, improved recreational access, improved scenic values, or protection of wildlife habitat.

(ii) The removal will not result in increased beach or foredune erosion which will endanger existing development.

(iii) Secure approval of a permit from the State (Oregon Department of Transportation).

(5) Uses.

- ~~(l) Beachfront protective structures.~~
- ~~(b) Criteria.~~
  - ~~(l) The structure is to protect development existing on January 1, 1977.~~
  - ~~(ii) Visual impacts are minimized.~~
  - ~~(iii) Public access is preserved.~~
  - ~~(iv) Negative impacts on adjacent property are minimized.~~
  - ~~(v) Long term or recurring costs to the public are avoided.~~
  - ~~(vi) There is a demonstration that the development is being threatened by erosion hazard.\*~~
  - ~~(vii) There is a demonstration that maintenance of existing riparian vegetation and/or planting of new riparian vegetation will not provide adequate protection.\*~~

~~Section 4.067. Additional Site and Development Requirements. The Beach and Dune Area Requirements of Sections S4.100 to S4.138 of Chapter 4 of the Development and Use Standards Document\* and the following requirements apply to all development except the harvesting of timber as allowed by the District with which the /BDO District is combined. Timber harvesting activities shall conform to Oregon Forest Practices rules regulating logging practices in dune areas:~~

- ~~(1) Development shall not result in the clearance of natural vegetation in excess of that which is necessary for the structures, required access, fire safety requirements and the required septic and sewage disposal system.~~
- ~~(2) Vegetation-free areas which are suitable for development shall be used instead of sites which must be artificially cleared.~~
- ~~(3) Areas cleared of vegetation during construction in excess of those indicated in Section 4.064-4.066 above shall be replanted within nine months of the termination of major construction activity.~~
- ~~(4) Sand stabilization shall be required during all phases of construction and post construction as specified by standards set forth in the Standards Document or by Soil Conservation Service.~~
- ~~(5) Developments shall result in the least topographic modification of the site as is possible.~~
- ~~(6) All conditions shall be found by the Department of Planning and Development to provide for or protect the public health, safety or general welfare, protect the dune, and protect adjacent properties both present and in the future.~~
- ~~(7) Conditions of approval shall be sufficient to protect the property from erosion by wind or water or both, the dune from the loss of stabilizing~~

vegetation, and the permanent drawdown of the groundwater supply.  
~~Section 4.068. Procedures.~~ Application for the construction of all structures and construction of developments permitted subject to conditions in ~~Section 4.064-4.066~~ are required and shall be made to the Planning Director or his designate on forms prescribed by Clatsop County. The applicant shall be required to provide at least the following information:

- ~~1. a map showing the location of the proposed developments and surrounding developments including structures, vegetation, etc.~~
- ~~2. description of the extent to which a sand dune will be altered as a result of the proposed development; and~~
- ~~3. other such information as is needed to determine conformance with this Ordinance.~~

~~Section 4.069. Site Investigation Report.~~ A site specific investigation report performed by a qualified person such as a geologist, soils scientist, or geomorphologist shall be required by the Planning Director prior to the issuance of a development permit in areas that the Planning Director feels may be subject to wind erosion or other hazard potential.

~~Section 4.070. Guarantee of Performance.~~ The applicant for the development permit shall be required to post a performance bond to insure that safeguards recommended in the detailed site investigation report are in fact provided if the Planning Director determines that such bond is necessary. The method of guarantee, inspection and certification and release of guarantee are specified in ~~Section 10.110~~ of this Ordinance.

~~Section 4.071. Time Limits.~~ Prior to approval of the permit the subdivider or developer and the Department of Planning and Development shall agree upon a deadline for the completion of the required improvements, such deadline not to exceed one year from the time of the permit. The County shall have the power to extend the deadline for improvements for one additional year when the subdivider or developer can present substantial reason for doing so.

~~The subdivider or developer shall restore the vegetation within the first planting season (October to April) using the amounts and types of materials and methods prescribed by the Department of Planning and Development.~~

~~The timing of the permits should be made so that restoration may be started as early in the planting season as possible.~~

~~Section 4.072. State and Federal Permits.~~ Any use authorized by the provisions of this overlay district shall also require the securing of any necessary State or Federal permit, lease, easement or similar type of authorization.

- III. Amend the Standards Document, Beach and Dune Area Requirements, Section S4.100 - 4.138 by deleting it in its entirety.

~~S4.100. Special Requirements for Beach and Dune Areas. The special requirements applicable in the Active Dune Overlay (/ADO) and Beaches and Dunes Overlay\* (/BDO) District set forth in S4.100 to S4.134 are in addition to the other requirements for the kind of development proposed. The general procedures and requirements for approving developments in the district are contained in Sections 4.060 to 4.072 of the Clatsop County Land and Water Development and Use Ordinance #80-14. The standards of S4.102 to S4.136 shall be used in conducting such approvals.~~

~~S4.102. Active Dune Stabilization Plan. Development in the Active Dune Overlay and Beaches and Dunes (/BDO)\* Overlay Districts requires a stabilization plan be approved by the Planning Director.~~

~~S4.104. Beaches and Dunes\* Development Standards.~~

- ~~1. A minimum amount of vegetation should be disturbed during site preparation. The removal of vegetation from a dune for the purpose of construction shall not occur more than 10 days prior to the start of construction. Dunes which have their vegetation removed for purposes of construction and/or areas of the dune where construction has ceased, shall be seeded immediately following construction.\*~~

~~Adequate methods should be taken to prevent sand movement on all fills, excavations, or other disturbed areas. Methods of stabilization include:~~

- ~~a. Areas that contain beach grass.~~
- ~~Apply 200 lbs. per acre of commercial fertilizer (21-0-0) to the disturbed area to encourage quick recovery of the remaining vegetation.~~
- ~~b. Areas that do not contain beach grass.~~
- ~~Critically exposed areas with expected sand movement should have 1 1/2-2 tons per acre (70-90 lbs. per 1,000 sq.ft.) straw, grass, or waste hay incorporated into the surface of the sand and then planted to European beach grass between December and March 15th. Beach grass should be fertilized in April with 200 lbs. per acre of commercial fertilizer (21-0-0).~~
- ~~On less critical areas incorporate 1 1/2 to 2 tons per acre of straw or grass~~



~~mulch into the surface of the sand immediately following grading. Seed the area to Astoria bent grass 2#/ac., creeping red fescue at 10#/ac., and perennial rye grass 8#/ac. at the earliest planting season (March to May or mid-August to mid-September).~~

- ~~2. Any combination of disturbed areas larger than 3,000 sq.ft. to be cleared of vegetation should have a detailed stabilization plan approved by the Clatsop Soil and Water Conservation District prior to start of work. The Conservation District should be informed at the start of work and also upon major completion of stabilization.~~
- ~~3. Adequate setbacks for structures must be provided by considering the rate of erosion together with the anticipated life of any structure.\*~~
- ~~4. Residential, commercial and industrial developments shall be prohibited on active foredunes, on other foredunes which are conditionally stable land that are subject to ocean undercutting or wave overtopping, and the interdune area (deflation plains) that are subject to ocean flooding, except for areas where lands have already been committed by either building upon or surrounding land use patterns.\*~~
- ~~5. No intensive development on top of dune ridges shall be permitted. Residential developments should be located on the sides of dunes, in order to maintain stability and vegetation cover of the dune. The tops of narrow and steep sloped dunes shall be preserved for open space. Development shall not be permitted on the ridge tops.\*~~
- ~~6. No filling shall be permitted which would raise the grade level of any structure and subvert the intent of the height restriction along beach front lots.\*~~
- ~~7. The unnecessary removal of vegetation shall be prohibited. After construction is completed, the dune shall be replanted and stabilized as much as possible to its pre-construction state. The number of cross plantings shall be determined by:  

~~1. The type of vegetation used.~~  
~~2. Slope of the dune.~~  
~~3. Degree of wind erosion.~~~~

~~The criteria above shall be subject to approval by the State of Oregon, Fish and Wildlife Department\*.~~

- ~~8. All areas that are bare of vegetation between October 1 and March 31 shall immediately be temporarily covered with 1 1/2 to 2 tons per acre of straw or~~

~~grass mulch punched into the sand or covered with a matting to prevent sand movement\*.~~

9. ~~All beach access trails are to be perpendicular to the beach. Trails wider than 4 feet or any trails that start to blow must be hard surfaced with planks, asphalt, concrete, gravel bound with clay, or other material of like character\*.~~

~~On active dunes and conditionally stable dunes vehicular traffic shall be confined to hard surfaced roads. Recurring pedestrian or equestrian traffic shall be confined to roads and trails. Where appropriate, developers may be required to dedicate easement for public access to public beaches\*.~~

10. ~~Decisions on plans, ordinances and land use actions in beach and dune areas, other than older stabilized dunes, shall be based on findings that include:~~

- ~~a. The type of use proposed and adverse effects it might have on the site or adjacent areas.~~
- ~~b. Temporary and permanent stabilization programs and the planned maintenance of the new and existing vegetation.~~
- ~~c. Methods of protecting the surrounding area from any adverse effects of the development, and~~
- ~~d. Hazards to the natural environment which may be caused by the proposed use; and~~
- ~~e. Adequate protection of the development from any geologic hazards, wind erosion, undercutting, ocean flooding and storm waves; or a finding that the development is of minimal value\*.~~

11. ~~Comprehensive Plan changes, zone changes, subdivisions, partitions, planned developments and conditional use permits shall require a certified hydrologist report showing that the proposed development or activities will not result in the drawdown of the groundwater supply which could lead to any of the following:~~

- ~~a. The loss of stabilizing vegetation.~~
- ~~b. The loss of water quality.~~
- ~~c. Salt water intrusion into the freshwater table.~~
- ~~d. The permanent drawdown of the dune lakes\*.~~

~~S4.110. Site Investigation Report for Beach and Dune Area. The following standards will be used:~~

1. ~~When the Active Dune Overlay and Beaches and Dunes\* Overlay District boundaries are proposed to be changed; or~~
2. ~~When the Planning Director or Planning Commission feel the development being proposed under S4.102 and S4.104 may impact an area larger than the actual proposal and/or potentially result in any or all of the following:~~
  - a. ~~erosion~~
  - b. ~~loss of stabilizing vegetation,~~
  - c. ~~loss of water quality,~~
  - d. ~~salt water intrusion into the water supply,~~
  - e. ~~the permanent drawdown of the dune lakes,~~
  - f. ~~a structure which might modify current or wave patterns or the beach sand supply, or~~
  - g. ~~the placement of a structure that might be subject to ocean or wind hazards.~~

~~The site investigation report provides information on the site of the development and adjacent land that is likely to be affected by a proposed development. The initial phase of the site investigation may provide information calling for an adjustment of the boundaries of the investigation area. Unless the Director determines specific items are not required, the report shall include the information described in S4.112 to S4.124 together with appropriate identification of information sources and the date of the information. Before a development permit can be issued, the site investigation report must be approved as part of the development permit approval process. The approved site investigation report shall be referred to in the deed and other documents of sale and shall be recorded with the record of deeds.~~

S4.112. Background Data in Report. ~~The site investigation report shall contain the following background information:~~

1. ~~The methods used in the investigation and the approximate number of man-hours spent on the site.~~
2. ~~A general analysis of the local and regional topography and geology including the faults, folds, geologic and engineering geologic units and any soil, rock and structural details important to engineering or geologic interpretations as well as beach and dune forms and their relative activity.~~
3. ~~A history of the problems on and adjacent to the site, which may be derived from discussions with local residents and officials and the study of old photographs, reports and newspaper files.~~

4. ~~The extent of the surface soil formation and its relationship to the vegetation of the site, the activity of the land form and the location of the site.~~
5. ~~The following ground photographs of the site with information showing the scale and date of the photographs and their relationship to the topographic map and profiles:~~
  - ~~a. a view of the general area.~~
  - ~~b. The site of the proposed development.~~
  - ~~c. Any features which are important to the interpretation of the hazard potential of the site, including all sites of erosion or accretion.~~
  - ~~d. Unusual natural features and important wildlife habitat.~~
  - ~~e. Views of the windward and leeward sites of the foredune.~~

~~S4.114. Dune Topography Map. a topographic map of (1 to 100) scale and with a contour of interval of (two feet) shall be prepared identifying the following features and shall be accompanied by reference to the source and date of information used.~~

- ~~1. The position of the lot line.~~
- ~~2. The boundaries of the property.~~
- ~~3. The vegetation line and beach zone line.~~
- ~~4. Each dune classification type.~~
- ~~5. The crest of the foredune.~~
- ~~6. Areas of open sand and the boundaries and species identification of major plant communities.~~
- ~~7. Any springs, streams, marshy area of standing bodies of water.~~
- ~~8. Areas subject to flooding, including those shown on the flood hazard maps prepared under the HUD National Flood Insurance Program.~~
- ~~9. Wave cut terraces, erosion scraps and areas exhibiting significant erosion due to improper drainage and runoff concentration.~~
- ~~10. Geological information, including lithologic and structural details important to engineering and geologic interpretation.~~

~~S4.116. Dune Profiles. The site investigation report shall contain dune profiles extending across the site and area of impact parallel to the direction of major elevation change on the site and passing through the intended position of any structure. Vertical and horizontal scale shall be sufficient to show important details accurately or shall be at a scale of \_\_\_\_\_. Each profile shall show where applicable:~~

- ~~1. Elevations in relation to mean sea level.~~
- ~~2. The position of the beach zone line.~~
- ~~3. The position of the vegetation line.~~

4. ~~Sites of erosion and accretion.~~
5. ~~The position of the crest, leeward and windward edges of the foredune, the deflation plain and any open sand areas crossed by a profile.~~

~~S4.118. Dune Subsurface Analysis. If upon initial investigation it appears there are critical areas where the establishment of geologic conditions at depth is required, a subsurface analysis obtained by drill holes, well logs and other geophysical techniques shall be conducted by the person responsible for the site investigation report to include the following data as appropriate.~~

1. ~~The lithology and compaction of all subsurface horizons to bedrock.~~
2. ~~The depth, width, slope and bearing of all horizons containing significant amounts of silt and clay and any other subsurface layers which could reduce the infiltration of surface waters.~~
3. ~~The depth, bearing and capacity of seasonal and permanent aquifers.~~
4. ~~Underlying areas of buried vegetation.~~

~~S4.120. Dune Development Proposal. The site investigation report shall include the following information on the proposed development as applicable. The information will be shown on the maps described in S4.114 and S4.116 or appropriately referenced.~~

1. ~~Plans and profiles showing the position and height of each structure, paved area and area where cut and fill is required for the construction.~~
2. ~~The percent and location of the surface of the site which will be covered by impermeable and semi-permeable surfaces.~~
3. ~~Points to preserve for public access to the beach.~~
4. ~~A description of the impact of the development on any critical biological habitats.~~
5. ~~A dune stabilization program for the development describing:~~
  - ~~a. The stability and movement of sand and shoreline.~~
  - ~~b. How much of the site will be exposed during construction and what measures will be taken to reduce wind erosion and sand movement during construction.~~
  - ~~c. a revegetation program designed to return open sand areas, both pre-existing and newly created, to a stable condition as soon as possible following construction and the period of time during which revegetation maintenance.~~
  - ~~d. The time of commencement of revegetation planting. If this does not fall within the optimal revegetation period of November through April, special~~

~~care of the planting shall be provided for until they are well established.~~

- ~~6. For a logging or farming operation, areas to be protected from vegetation loss or groundwater pollution shall be identified and means for protection described.~~
- ~~7. A beach or sand dune removal or other mining operation shall only be permitted if the site investigation report establishes that a historic surplus of sand exists at the site and that it can be removed without substantial impairment of the natural functions of the beach and dune system, water circulation and littoral drift.~~

~~S4.122. Special Review for Water Supply or Sewerage. If a well or an on-site sewage disposal system is planned, the proposed location shall be described and the following shall be determined:~~

- ~~1. The maximum and minimum levels (seasonal extremes) in water table height.~~
- ~~2. The expected water needs of the proposed development.~~
- ~~3. The water supply capacity of the dune systems and the expected effect of the increased water consumption on the water table drawdown, taking into account water use rates to meet present and future needs of adjacent properties.~~
- ~~4. Any detrimental contamination of the groundwater, lakes or marshes that may occur.~~

~~S4.124. Conclusions in the Dune Report.~~

- ~~1. The site investigation report shall contain conclusions stating the following:
  - ~~a. How the intended use of the land is compatible with the conditions.~~
  - ~~b. Any existing or potential hazards noted during the investigation.~~
  - ~~c. The manner for achieving compliance with the standards.~~~~
- ~~2. Mitigating recommendations for specific areas of concern shall be included.~~
- ~~3. Conclusions shall be based on data included in the report, and the sources of information and facts shall be specifically referenced.~~

~~S4.126. Restrictions in Active Dune Area.~~

- ~~1. No land partitioning or subdivision shall sever an active foredune from property to the rear unless, in making the severance, the foredune is restricted by provisions in the deed to prohibit future construction of structures.~~

2. ~~The height of a foredune shall not be lowered except that modification of a foredune is permissible when authorized as part of the following:~~
  - a. ~~An emergency breaching\*.~~
3. ~~Stabilization of ocean deposits of accreted sand is allowable only if necessary for the maintenance of a jetty or groin.~~
4. ~~A beach front protection structure that is to the landward side of the zone line and therefore does not require a permit from the Oregon Department of Transportation shall be designed by a registered engineer and shall comply with the same standards as the Oregon Department of Transportation complies to such a structure on the ocean side of the zone line.~~

~~S4.128. Restrictions on Development in Dune Area. In a beach and dune special purpose district, the following development restrictions shall be observed:~~

1. ~~Clearing or other development activity by fire shall not lead to destabilization of a stable or conditionally stable dune system.~~
2. ~~The method of removal of sand, gravel, timber, driftwood or vegetation shall not threaten the survival of adjacent plant communities.~~
3. ~~The removal of groundwater from the dune area is limited to levels which provide a safe sustainable yield without causing the water table drawdown to be injurious to dune vegetation.~~
4. ~~An open sand area shall be planted and maintained for stabilization purposes unless the site investigation report has provided for its retention as an open sand area.~~
5. ~~Utilities shall be located underground with any excavated areas stabilized except that, where existing development and the small size of the new development make underground installation impractical, an aboveground location shall be approved if the installation will not disrupt the stability of the area.~~
6. ~~Development for human occupancy in an area with the highest annual water table or an impermeable subsurface soil within (five) feet of the ground surface shall take place only where sanitary sewer and public water systems are available.~~



7. ~~Development in an active sand area shall only take place after the area has been stabilized by vegetative planting.~~
8. ~~Modification of dunes shall not create unnaturally homogeneous and visually unappealing shoreline configurations or lead to scars, flooding or blowout in the dunes areas.~~

~~S4.130. Standards for Open Land Activities in Dune Area. In a beach and dune special purpose district, the activities shall be conducted consistent with the following standards:~~

1. ~~Livestock grazing and other farming shall be permitted only in areas inland from the foredunes and then only if vegetation or groundwater will not be damaged. Grazing is restricted and shall not cause destruction of vegetation sufficient to cause erosion.~~
2. ~~Logging activities within a dune area shall be conducted so that watershed runoff is maintained at the preexisting quality, volume and rate of flow and natural vegetation is retained along the coastal beach and foredunes and adjacent to streams, ponds and marshes.~~
3. ~~Except for privately owned open sand areas or a stabilized area which is authorized for reactivation, dunes property shall not be used for the following:~~
  - a. ~~Vehicle travel of approved roads unless a development permit has specifically authorized off road travel.~~
  - b. ~~Concentrated or directed pedestrian or animal movement on a foredune except over an improved access route.~~

~~S4.132. Standards for Building Construction in Dune Area. Building construction shall be approved under conditions that do not adversely affect sand movement patterns or vegetation. The grading of land and the orientation and design of a building shall avoid creating conditions that will cause erosion or accretion of sand. Where there is some risk of these conditions occurring, a "qualified sand expert" shall certify that the design and control measures will comply with this standard.~~

~~S4.143. Standards for an Access Route in Dune Area. An access route within a dune area of the beach and dune special purpose district shall comply with the following:~~

1. ~~A road or trail shall be stabilized by planking, gravel or pavement.~~
2. ~~A land division or development involving more than two dwelling units for each (200) feet of shoreline or development or activity that serves (ten) or more~~

~~persons shall have common beach access trails to serve building sites near the beach no more frequent than each (200) feet.~~

- ~~3. Vehicle access points to the beach shall be spaced the maximum distance that still permits reasonable access and shall be located and designed to preserve the natural form and profile of the beach and dune affected by the access point.~~
- ~~4. The owner of a development or activity that provides beach access for more than (one/two families) shall provide and maintain a trash container at the access point.~~

~~S4.136. Site Investigation Report Review. The Planning Director, Planning Commission or Board of Commissioners may want to have a technical site investigation report reviewed including the methods actually used to avoid hazards. The Planning Director, Planning Commission or Board of Commissioners may request the owner or developer to pay for a portion or all of the review on behalf of the County.~~

~~S4.138. Qualifications. The site investigation report shall be conducted by a person which should have the equivalent of professional registration with a demonstrated competence in evaluating coastal processes and deposits (refer to Stability of Coastal Dunes Clatsop County, Oregon by Leonard Palmer).~~

**Words and phrases in bold are to be added to the existing text**

~~Words and phrases that are struck out are to be deleted from the existing text~~

(WP) bdordant

**CSLU**  
**CITIZENS FOR SENSIBLE LAND USE**  
33360 Surf Pines Lane, Seaside, OR 97138  
Phone 738-5869 or 738-5422

Chair  
Clatsop County Planning Commission  
800 Exchange St., Suite 100  
Astoria, OR 97103

June 15, 2003

RE: Clatsop County Comprehensive Plan  
Natural Hazards County-wide, Beaches and Dunes for Clatsop Plains area.

Dear Chair:

The Citizens for Sensible Land Use (CSLU) Board of Directors met Tuesday, June 10, 2003 to discuss the proposed changes in regulations for use of land in the Clatsop Plains area. CSLU represents seventy-six land owners in the area impacted by the proposed land use changes.

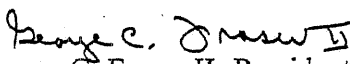
Our Board of Directors reviewed the eighty-eight page report and have a number of concerns. We have two consulting geologists researching the floods hazard and geologic hazard proposed changes.

In addition, our attorney is reviewing the provisions of ORS 390.770, 390.605, 390.725, and OAR Divisions 20-30 to determine the effects your proposed changes will have. We have concerns in all of these areas, and find it difficult to understand how the Planning Commission can expect landowners in the Clatsop Plains area to adequately review and evaluate the proposed changes in the 88-page proposal.

Therefore, we are formally voicing our concerns and reserve the right to appeal any action taken by the Planning Commission relative to this proposal. Mr. Paul See, Secretary/Treasurer of CSLU, should be the party to receive any notice of decision. Incidentally, Mr. See and family have owned land on Clatsop Plains for over 120 years, yet he did not receive the public hearing notice mailed to others on May 20.

Thank you for your consideration of our request.

Sincerely,

  
George C. Fraser II, President  
cc: Paul See, Secretary/Treasurer  
Board of Directors, CSLU  
Ross Day, Dir. of Legal Affairs, Oregonians in Action



**Exhibit D**  
**Codified Amendments Proposed**  
**For Adoption**  
**Section 1 Geological Amendments**  
**Section 2 Floodplain Amendments**  
**Section 3 Beaches and Dunes**  
**And by reference the report entitled**  
***Coastal Erosion Hazard Zones***  
***Along the Clatsop Plains, Oregon***  
***Gearhart to Fort Stevens***  
**By Jonathan C Allan and George R. Priest**

## Section 1 Geological Hazard Amendments

D

## PROPOSED AMENDMENTS COMPREHENSIVE PLAN

### NATURAL HAZARD POLICIES

1. The County shall seek to minimize or avoid development in areas where flooding, geologic and other natural conditions can create circumstances that are hazardous to life and/or property. Natural hazards regulated under Statewide Planning Goal 7 shall include floods (coastal and riverine), landslides, earthquakes and related hazards, tsunamis, coastal erosion, and wildfires.
2. The County shall avoid development in hazard areas where the risk to people and property cannot be mitigated.
3. In adopting policies and implementing measures to protect people and property from natural hazards, the County will consider:
  - a. the benefits of maintaining natural hazard areas as open space, recreation and other low density uses;
  - b. the beneficial effects that natural hazards can have on natural resources and the environment; and
  - c. the effects of development and mitigation measures in identified hazard areas on the management of natural resources.
4. The County shall give special attention to emergency access when considering development in identified hazard areas.
5. Where development in potentially hazardous areas is permitted, the County shall require a site-specific hazard investigation, by appropriate licensed and registered professionals, to establish construction feasibility and make recommendations to mitigate conditions that are potentially hazardous. The investigation shall evaluate the risk to the site as well as the risk the proposed development may pose to other properties.
6. The County shall prohibit the siting of essential facilities, major structures, hazardous facilities, and special occupancy structures, as defined in the state building code (ORS 455.447(1)(a)(b)(c) and (e)), in identified hazard areas, where the risk to public safety cannot be mitigated, unless an essential facility is needed within a hazard area in order to provide essential emergency response services in a timely manner.
7. The County shall encourage cluster development where clustering will avoid, or minimize the development of potentially hazardous areas.
8. Development, particularly that occurring on moderately to steeply sloped land, should be planned to minimize grading and the resultant loss of vegetative cover.
9. The County shall implement an erosion and sedimentation control program in order to minimize potential geologic hazards and maintain stream quality.
10. The siting of septic tanks and drainfields should take into consideration any adverse geologic impacts their functioning might have.
11. The County will develop an educational program to inform the public of the risks associated with development in natural hazard areas of the county.
12. The County encourages the vacation or replatting of old unimproved subdivisions located in steeply sloped areas, or other areas with identified geologic hazards. The County will consider waiving applicable fees as an incentive.



13. The County has established a riparian vegetation protection buffer along streams and rivers. The County shall rely on this buffer to protect and stabilize stream banks and to provide for the location of structures in a manner that minimizes the risks associated with stream bank erosion.
14. The Department of Environmental Qualities best management practices for agriculture shall be supported to reduce erosion and sedimentation of streams
15. The County shall review state and federal permits for shoreline stabilization measures to ensure that potential adverse impacts on adjacent property are minimized and/or mitigated.
16. The County shall work with federal and state agencies to identify and map flood hazards, and to manage development in those areas to protect people and property from flooding.
17. The County should coordinate its land use comprehensive plan and decisions with its emergency preparedness, response, recovery, and mitigation programs.
18. The County shall respond to new inventory information on natural hazards within 36 months after being notified by the Department of Land Conservation and Development (DLCD), unless that time is extended by DLCD.
19. Upon receiving notice of new hazard information from the Department of Land Conservation and Development, the County shall:
  - A. Evaluate the risk to people and property based on the new inventory information and an assessment of:
    1. the frequency, severity and location of the hazard;
    2. the effects of the hazard on existing and future development;
    3. the potential for development in the hazard area to increase the frequency and severity of the hazard; and
    4. the types and intensities of land uses to be allowed in the hazard area.
  - B. Allow an opportunity for citizen review and comment on the new inventory information and the results of the evaluation and incorporate such information into the comprehensive plan, as necessary.



EXISTING POLICIES - SOUTHWEST COMMUNITY PLAN DELETED AS FOLLOWS:

POLICIES

Landslides/Erosion

1. ~~Chapter 70 of the Uniform Building Code should be applied to all development within the Southwest Coastal planning area.~~

**Discussion:** This concept is covered by propose policy 5.

2. ~~In addition to where required in Chapter 70 of the Uniform Building Code, favorable site-specific investigations (conducted by qualified geotechnical experts at the developer's expense) shall be prerequisites for the issuance of building or excavation permits in any area recognized as geologic hazard area as shown on the Hazards map included herein.~~

Growth Policies

3. ~~Chapter 70 of the Uniform Building Code shall be enacted and enforced to control filling and grading.~~

**Discussion:** This concept is covered by proposed policy 5.

CLATSOP PLAINS COMMUNITY PLAN POLICIES

General Landscape Units

~~Policy 1. Excavations in sedimentary highlands (toms) should be properly engineered to assure against slope failure.~~

~~Policy 2 Proposed projects involving modifications of established drainage patterns should be evaluated in terms of potential for altering land stability~~

~~Policy 3. Loss of ground cover fro moderately to steeply sloping land may cause erosion problems by increasing runoff velocity and land slumpage. Vegetative cover for moderately to steeply sloping areas shall be maintained.~~

**Discussion:** These concepts are covered by proposed policy 2, 4 & 5.

Alluvial Lowlands Policy

~~Development on peat and other compressible soils shall be discouraged. In those areas where development has already occurred on peat and other compressible soils, policies on those soils in the County-wide Element shall apply.~~

**Discussion:** This concept is covered by proposed policy 1 &2 .

## ELSIE JEWELL COMMUNITY PLAN POLICIES

### Alluvial Lowlands Policy 1

~~1. Development on peat and other compressible soils shall be discouraged. In those areas where development has already occurred on peat and other compressible soils, policies on those soils in the County-wide Element shall apply.~~

**Discussion:** This concept is covered by proposed policy 1 &2.

Words and phrases that are highlighted are to be added to the text

~~Words and phrases that are struck out are to be deleted from the text.~~

**BACKGROUND REPORT**  
**NATURAL HAZARDS:**

Clatsop County is subject to a variety of natural hazards. Catastrophic hazards are regional in scale and scope. Cascadia Subduction Zone earthquakes, and the ground shaking, subsidence, landsliding, liquefaction, and tsunamis that accompany them, fall into the catastrophic hazard category. Chronic hazards are those, which are local in scale and scope. Chronic hazards include landsliding and sloughing; high groundwater and compressible soils; streambank erosion and deposition; riverine flooding; and wildfire. Wave overtopping and undercutting; inlet migration; and sand inundation are chronic hazards unique to the coast. A variety of human activities, such as the construction of jetties and seawalls or site excavation, may enhance chronic hazard potential. Being local in nature, the threats to human life and property that arise from chronic hazards are generally less severe than those associated with catastrophic hazards. However, their wide distribution and frequent occurrence makes chronic hazards a more immediate concern.

**CATASTROPHIC HAZARDS**

Oregon is in a geologic setting where a continental plate, the North American Plate, and an oceanic plate, the Juan de Fuca Plate, are converging. The North American Plate is moving westward and the Juan de Fuca Plate is moving toward the northeast and below the North American Plate along a fault termed the Cascadia Subduction Zone. The Cascadia Subduction Zone is approximately 700 miles long and parallels the Oregon, Washington and Northern California coasts.

Earthquakes in Oregon are associated with the movement of these plates. Crustal earthquakes occur along relatively short and shallow faults within the North American Plate. Intraplate earthquakes occur along faults located deep within the descending Juan de Fuca Plate. These types of earthquake can occur anywhere off the Oregon coast, beneath the Coast Range, or in the Willamette Valley. Typically they have not exceeded magnitude 6. However they are capable of being in excess of magnitude 7.

Subduction zone earthquakes occur along the boundary between the two plates, as the strain that has accumulated within the subduction zone is suddenly and dramatically released. There has been no subduction zone earthquakes recorded since the European settlement of the Northwest. However, a body of scientific evidence collected since the late 1980's have confirmed their existence. Based on an analysis of over 400 years of detailed records of damage-causing tsunamis that have been kept by the Japanese, Satake et al. (1996) have concluded that the last Cascadia Subduction Zone earthquake was a Magnitude 9 event that occurred at about 9:00 P.M. on January 26, 1700. This is consistent with Native American legends that say the earthquake occurred on a winter night (Komar, 1997). Scientists estimate that as

many as thirteen major earthquake events have occurred on the northern portion of the Oregon coast during the past 7,700 years. The intervals between earthquakes range from 300 to 1,000 years, with the average return interval for such an event being on the order of every  $400 \pm 200$  years. Summarizing the work of a number of investigators, DOGAMI (1995) suggest that Oregon could experience a Magnitude 8-9 subduction zone earthquake in the near future. Specifically, they report that there is a 10-20% chance that such a great earthquake event could occur in the next 50 years.

More detailed information on potential seismic risk can be found in DOGAMI 1996's GMS-100 Earthquake Hazard Maps for Oregon and DOGAMI's 1999 IMS-10 Relative Earthquake maps of Selected Urban Areas in Western Oregon, the latter of which includes a map for the Astoria-Warrenton area of Clatsop County.

Considering the potential magnitude, a subduction zone earthquake would significantly affect Clatsop County. The extent of damage from such an event will depend not only upon its magnitude, but also where along the subduction zone the earthquake occurs and whether the entire fault ruptures, or it ruptures in segments. Damage would include that resulting from ground shaking, as well as that from earthquake-induced liquefaction, landsliding, subsidence, and tsunamis. Madin (1992) has outlined a generalized subduction zone earthquake scenario. At the onset, severe ground shaking occurs for several minutes. During this time, amplification and liquefaction effects occur in areas of unconsolidated, saturated sediment. Massive ancient landslides are reactivated. Rapid, coast-wide subsidence on the order of 2 to 6 feet also occurs in association with the release of accumulated strain during the earthquake. Although flooding associated with subsidence would occur immediately in some low-lying areas, the effects of subsidence are more likely to be manifest over the long term as increased flooding and coastal erosion during storms.

This scenario is further complicated by the likely occurrence of a locally generated tsunami expected to arrive about 30 minutes after the initial earthquake and to continue to arrive at intervals over a period of several hours. Shorelines of bays, estuaries, and low-lying sand barriers would experience immediate flooding and erosion. DOGAMI's Open File Report O-95-67 and accompanying maps O-95-09 to O-95-16 project tsunami elevations along the Clatsop County coastline that range from 15 feet at the low end to as much as 40 feet at the high end. DOGAMI's 1997 IMS-3: Tsunami Hazard Map of the Seaside-Gearhart Area, Clatsop County, Oregon; 1999 IMS-11 Tsunami Hazard Map of Astoria Area, Clatsop County, Oregon; 1999 IMS-12 Tsunami Hazard Map of Warrenton Area, Clatsop County Oregon provide more detailed information on projected tsunami elevations but over a limited area. Projected elevations shown on these detailed maps are comparable to those noted above from their earlier work.

#### **CHRONIC HAZARDS: Landsliding and Sloughing**

Mass movement is the slow or rapid down-slope movement of rock, soil, or fill under the influence of

gravity. Mass movement includes landsliding or slumping, sloughing, debris or mudflows, rock fall, and soil creep. Sloughing refers to smaller-scale, simpler, surficial mass movement. Landsliding/slumping refers to larger-scale, more complex, deeper-seated mass movement. The term landsliding is generally applied to translational mass movement, or motion that occurs along a more or less planar surface. The term slumping is generally applied to rotational mass movement, or motion that occurs about an axis. Most large mass movements possess both translational and rotational components of motion.

A number of factors affect slope stability by acting to increase driving forces and/or reduce resisting forces. Material composition is a primary control on slope stability. Hard headland-forming basalts for example, while not immune to mass wasting, do not readily give way. In contrast, soft bluff-forming sandstones and mudstone are highly susceptible to slope movement. Prolonged winter rains saturate these porous bluff materials, both loading the slope and lowering cohesive strength, to further decrease slope stability. The geometry and structure of bluff materials also affects slope stability. They define lines of weakness and control surface as well as subsurface drainage for example. By removing sediment from the base of bluffs and by cutting into the bluffs themselves, processes of wave attack may also affect slope stability. The extent to which the beach fronting the bluff acts as a buffer is important in this regard.

Two reports done by Oregon Department of Geology and Mineral Industries form the basis for many of the areas subject to the geologic hazard overlay zone provisions of the county's development code: Environmental Geology of Inland Tillamook and Clatsop Counties (Bulletin 79) and Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties (Bulletin 74). As part of these reports, landslide topography and steep slopes were mapped for the entire County at a scale of 1 inch to 1 mile. These reports include a classification of landslide topography by age. Active landslides are defined as "areas where ground movement is continuous or periodic or areas in which historic, within about 100 years, movement has taken place. Such areas include debris and rockfalls on headlands, shallow slump failures along terraces fronting the ocean and bays, and areas of local slump in upland areas." Inactive geologic landslides are defined to "include areas characterized by erosion-modified headscarps and hummocky, poorly drained topography, but show no evidence of recent movement such as tilted trees, cracks, back-tilted blocks, and sag ponds." Old landslide topography is defined as "large areas of irregular hummocky ground having disrupted drainage and not well-defined headscarps. Such areas lack evidence of historic movement, and postulated landslide movement within them may have occurred from several hundred to several thousand years ago. Old land slide topography is typified by well-rounded ridges and well-established although irregular drainage patterns."

The reports referenced above indicate that extensive areas of Clatsop County have been, or are subject to slope movement. The majority of these areas are in the mountainous interior of the county, an area used almost exclusively for forestry and thus beyond the regulatory authority of the county. However, there are other areas within the County that are subject to landslide hazards, such as rural areas along the

## Columbia River and the Southwest Coastal Planning Area.

The Southwest Coastal Planning Area is the coastal area south of Cannon Beach to the Tillamook County Line. The geology of this bluff-backed segment of shoreline is characterized by the contact between marine terrace deposits of coastal lowlands and the older sedimentary rocks of the uplands. This area has a history of major landslide activity including the Silver Point and Ecola landslides. Because high mass movement potential and active landslides existed in an urbanizing area, Clatsop County contracted with Martin Ross, geologist, in 1978, to identify and map geologic hazards and develop policies and recommendations regarding future development. In his report "A Field Inventory of Geologic Hazards From Silver Point to Cove Beach, Clatsop County, Oregon" Ross mapped active landslides, areas of soil creep, areas of ocean undercutting, and geologic rock units. He found that the entire coastline within the study area was retreating landward at varying rates as a result of slope movement exacerbated by wave undercutting. Ross's recommendations form the basis of the County's policies included in the Southwest Coastal Community Plan for development in this area.

The observed impacts of the 1982-83 El Niño event in the Southwest Coastal Planning Area support Ross's observations. During this period, there was a severe depletion of sand from the beaches south of Hug Point and a marked widening of the beaches north of Silver Point, particularly in the vicinity of Chapman Point. The loss of the wave buffering sand from the beach in the Cove Beach -Falcon Cove area, resulted in bluff retreat and the loss of at least one oceanfront dwelling and the need to move several others.

Recent geologic site investigations performed in this area by Tom Horning also support Ross's observations. Horning, in site investigation reports prepared for the Cove Beach area, estimates that during the 1982-83 El Niño event, and the two following years, the shoreline in the south-central portion of Cove Beach receded 20 to 25 feet. Before the El Niño event, annual shoreline retreat was only on the order of 1 foot per year, or about 5% of that which was experienced as a result of El Niño. Conversely, Rosenfeld, in his report "Cannon Beach: An Integrated Approach to Sand Management" (1997) estimates that at the end the El Nino event fully 30% of the sand in the entire Falcon Point- Chapman Point littoral cell was contained in the area between Ecola Creek and Chapman Point.

While believed to be much the same, details of the impacts of the 1997-98 El Niño event on bluff retreat in the Southwest Coastal Planning Area is not available at the time of this writing. El Niño impacts are considered further below under the heading of wave overtopping and undercutting.

Another source of information regarding areas with landslide potential is the detailed soils mapping by the Soil Conservation Service (SCS). In 1979-80, Don Leach, District Conservationist, and Phil Smith, Soil Scientist of the SCS, prepared an inventory of soils, which have the potential to become hazardous at

certain slopes in relation to slumping, creeping and landslides. In 1988 a complete soil survey of Clatsop County was completed by the SCS. The soil survey changed the names of soil types used. 'Table 2' lists soil types, identified by Leach and Smith as having landslide potential, but utilizing the 1988 soil survey names. This conversion was done by John Shipman of the Natural Resources Conservation Service in 1999.

**Table 2: Soils Hazardous in Relation to Mass Movement**

Soils	Mapping Symbol	Slopes at which becomes hazardous
Templeton	60D, 61E	20%
Skipanon	58D, 58E	20%
Rinearson	56D, 56E, 56F	20%
Scaponia	57E	20%
Svensen loam	59D, 59E, 59F	20%
Humitropepts	27	25%
Necanicum	50E, 50F	50%
Klistan	31E, 31F	50%
Astony	1E, 1F	50%
Ascar	3F	60%
Harslow	22F	60%
Kilchis	29F	60%
Grindbrook (bedrock substratum)	21D	20%
Braun	7D, 7E	20%
Ecola	16D, 16F	20%

#### **CHRONIC HAZARDS: High Groundwater and Compressible Soils**

High ground water was one of the geologic hazards identified by Bulletin 74. In the alluvial lowland areas near streams and rivers and in the interdune areas of the Clatsop Plains, the groundwater table is at or near the ground surface much of the year. Potential problems associated with high ground water identified in Bulletin 74 are health hazards associated with the location of septic tanks and drainfields, engineering problems associated with underground storage tanks, and engineering problems associated with excavations for utilities and foundations. High ground water can also create problems for emergency access where roads are located in low-lying areas. 'Table 3' lists soils exhibiting high ground water levels, utilizing 1988 soil survey names.

**Table 3: Soils Exhibiting High Ground Water Levels**

Soils	Detailed Soils Map Symbol
Loconda	39A, 40A, & portion of 73A



Heceta	Portion of 24C
Braillier mucky peat	5A
Coquille-Clatsop complex	11A, 12A
Warrenton	72A

Compressible soils are another geologic hazard identified by Bulletin 74. Compressible soils include peat and organic soils. They occur in tidal flats areas such as those associated with the Columbia, Skipanon, Lewis and Clark, and John Day Rivers, and in interdune areas on the Clatsop Plains. Compressible soils undergo a significant decrease in volume when subject to loading and can cause differential settlement if proper engineering is not employed in the design of the construction project. 'Table 4' lists compressible soils, utilizing 1988 soil survey names.

**Table 4: Compressible Soils**

Soils	Detailed Soils Map Symbol
Peat	21A
Braillier mucky peat	5A
Bergsvik mucky peat	6A
Loconda	39A, 40A, & portion of 73A
Coquille-Clatsop complex	11A, 12A

Much of the area in Clatsop County with high ground water and compressible soils consists of dike tidelands and floodplains, which have been committed to Exclusive Farm Use.

#### **CHRONIC HAZARDS: Streambank Erosion and Deposition**

Streambank erosion is a geologic hazard identified by Bulletin 79. The report notes that areas in the immediate vicinity of stream and river channels are subject to undercutting and stream-bank erosion. The report states that the areas of most active stream bank erosion are those with steep slopes, little vegetative cover, and a position on the outside of river or stream channel curves. The North Fork of the Nehalem River is cited as the area in Clatsop County where stream bank erosion is most common. In addition to the loss of land, stream erosion is responsible for deterioration of water quality, destruction of fish spawning grounds and estuary productivity and silt deposition, which results in the clogging of the streams and estuaries.

The outer banks along channel curves are the most susceptible to this hazard because it is there that the momentum of the water carries it against the bank with the most force. Erosion can begin as a result of flooding and then continue during periods of normal flow after protective vegetation has been removed. The building up of a gravel bar can divert the stream into a bank and initiate erosion.

Streambank erosion is a special hazard in diked areas. Much of the problem may be due to wave action caused by tug and other boat traffic.

According to a report by the State Soil and Water Conservation Commission, both direct and indirect measures must be accomplished if this hazard is to be controlled. Direct actions would include the installation of riprap, groins, jetties, and baffles. Planting of the streambank is another direct stabilizing method. Indirect methods of control are an attempt to get at the causes of erosion and are often the most difficult. Control of logging activity to reduce the amount of sediment and debris in the water is one major concern in the study area.

Maintaining trees along stream banks (except where they are on undercut banks) is essential to general the health of the stream health generally. Restricting the activity of livestock in areas of present and potential erosion has proven valuable in other areas. The imposition of speed limits on rivers could be a preventive step for erosion in diked areas.

#### **CHRONIC HAZARDS: Wave Overtopping and Undercutting**

The Clatsop Plains is the coastal area between Gearhart and Warrenton. A dune-backed shoreline characterizes this area. Extreme wave and water levels associated with storm events is the primary factor affecting the stability of dune-backed shorelines. Tides, storm surges, barometric pressure effects, temperature effects, and baroclinic currents all affect mean water level. Superimposed upon these longer term elevations in mean water level are short-term variations associated with the passage of waves and expressed at the shoreline as runup. Extreme water surface elevations achieved during storms result from the simultaneous occurrence of individual maxima within this range of forcing events. In terms of flooding, or wave overtopping, it is the magnitude of the storm water level that is of particular interest. In terms of erosion, or wave undercutting, storm duration and direction as well as magnitude need to be considered.

DOGAMI's June 2001 Report, Coastal Erosion Hazard Zones along the Clatsop Plains, Oregon, provides a thorough review of factors affecting Clatsop County shoreline stability, including a detailed analysis of shoreline change. This report, and its accompanying maps and geospatial data, also identify potential landward erosion zones along the Clatsop Plains shoreline using a geometric model developed by Komar et al 1999. For the three identified scenarios, the higher risk scenario yields landward retreat distances on the order of 350 +/- 100 feet and the lower risk scenarios yields distances in excess of 600 feet.

Another source of information are the FEMA Flood Insurance Rate Maps.

#### **CHRONIC HAZARDS: Inlet Migration**

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Inlet-affected shorelines are also significantly affected by the processes of wave attack. In this setting waves interact with tidal and fluvial forces to control patterns of inlet migration. The Columbia River Jetties effectively fix the location of the Columbia River Mouth. Recent work completed by the Washington Department of Ecology considers the extent to which the jetties, as well as other human activities, have had and may continue to have a significant impact on patterns and trends of shoreline change both north and south of the Columbia River mouth. Natural inlets in Clatsop County, such as at the mouth of the Necanicum River and Ecola Creek, are small compared to the Columbia River. Still, inlet dynamics may be important locally.

#### **CHRONIC HAZARDS: Sand Inundation**

The El Niño winter of 1997-98 and the La Niña storms of 1998-99 have focused attention on the threats posed by beach and dune erosion along the Oregon coast. However, even in association with these erosion episodes and particularly following them, there are segments of the Oregon coast where too much sand is the problem. Conforming to a pattern of littoral cell circulation and sedimentation, these areas tend to be located at the north ends of headland bounded segments of shoreline. Growth in the height and width of the foredune in these areas has enhanced ocean flood/erosion protection potential, but rapid heavy sand accumulation has also resulted in the inundation of dwellings, restriction of ocean views, and loss of beach access.

El Nino events are associated with strong storms, an elevated sea-level and a northward shift of beach sand with a specific littoral cell. During the 1982-83 period, there was a severe deletion of sand from the beaches south of Hug Point and a marked widening of the beaches north of Silver Point, particularly in the vicinity of Chapman Point. The loss of the wave buffering sand from the beach in the Cove Beach -Falcon Cove area, resulted in shoreline retreat and the loss of at least one oceanfront dwelling and the need to move several others. In the area of Breakers Point, north of Ecola Creek sand accretion lead to the growth of large active foredunes.

Conversely, Rosenfeld, in his report "Cannon Beach: An Integrated Approach to Sand Management" (1997) estimates that at the end the El Nino event fully 30% of the sand in the entire Falcon Point-Chapman Point littoral cell was contained in the area between Ecola Creek and Chapman Point.

Wind and wave erosion hazards are discussed further in the DOGAMI Technical Report "Coastal Erosion Hazard Zones Along the Clatsop Plains, Oregon: Gearhart to Fort Stevens" (Open File Report 0-01-04).

#### **CHRONIC HAZARDS: Human Activities**

Human activities affect the stability of all types of shoreline. At longer time and larger space scales jetty construction and maintenance dredging are factors that affect shoreline stability. This is particularly true along dune-backed and inlet-affected shorelines. Cumulative effects of shoreline hardening and the

planting of European Beachgrass can also be considered in this context. The latter activity has markedly affected shoreline stability along dune-backed shorelines of the Oregon coast.

Examples of human activities that affect shoreline stability over shorter time and smaller space scales include those associated with residential and commercial development, such as grading and excavation, surface and subsurface drainage alterations, vegetation removal, and vegetative as well as structural shoreline stabilization. With the exception of the latter two, these activities tend to be a particular concern along bluff-backed shorelines. Typically associated with heavy recreational use, pedestrian and vehicular traffic are other types of human activities that affect shoreline stability over shorter time and smaller space scale. Because these activities may result in the loss of fragile vegetation cover, they are a particular concern along dune-backed shorelines. Along bluff-backed shorelines graffiti carving can be added to the list of human activities that affect shoreline stability and are associated with heavy recreational use.

Structures and facilities are subject to severe damage or complete destruction over time from moving masses of earth. This movement may be initiated or accelerated in a relatively stable area by man's activities. Excavations, cuts, fill and drainage modifications may decrease the stability of an area and initiate sliding. Water introduced into the subsurface by drain fields, and improper handling of runoff may also initiate slides. Excavations may steepen the slopes at the top of an old earth flow or slump making it unstable. Cutting the toe of an old slide can make it unstable and reactivate movement.

## References

DOGAMI 1995

DOGAMI. 1996 "GMS-100 Earthquake Hazard Maps for Oregon"

DOGAMI Open File Report O-95-67

DOGAMI Maps O-95-09 to O-95-16

DOGAMI. 1997. "IMS-3: Tsunami Hazard Map of the Seaside-Gearhart Area, Clatsop County, Oregon"

DOGAMI. 1999 "IMS-10: Relative Earthquake maps of Selected Urban Areas in Western Oregon"

DOGAMI. 1999. "IMS-11: Tsunami Hazard Map of Astoria Area, Clatsop County, Oregon"

DOGAMI. 1999. "IMS-12: Tsunami Hazard Map of Warrenton Area, Clatsop County, Oregon".

DOGAMI. "Environmental Geology of Inland Tillamook and Clatsop Counties" (Bulletin 79)

DOGAMI. "Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties" (Bulletin 74)

DOGAMI. June 2001. "Coastal Erosion Hazard Zones Along the Clatsop Plains, Oregon: Gearhart to Fort Stevens" (Open File Report O-01-04).

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DRAFT  
February 25, 2003

Komar, P.D. 1997

Madin, I. 1992. *Seismic Hazards on the Oregon Coast*, in *Coastal Natural Hazards: Science, Engineering and Public Policy*. Corvallis: Oregon Sea Grant.

Ross, Martin. 1978. "A Field Inventory of Geologic Hazards From Silver Point to Cove Beach, Clatsop County, Oregon."

Rosenfeld. 1997. "Cannon Beach: An Integrated Approach to Sand Management."

Satake et al. (1996)

U.S. Department of Agriculture, Soil Conservation Service. January 1973. General Soil Map with Soil Interpretations for Land Use Planning, Clatsop County, Oregon.

U.S. Department of Agriculture, Soil Conservation Service. February 1988. Soil Survey of Clatsop County, Oregon.

U.S. Department of Housing and Urban Development, Federal Insurance Administration. January 1978. Flood Insurance Study, Clatsop County, Oregon, Unincorporated Areas.

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**PROPOSED AMENDMENTS**  
**Land and Water and Development and Use Ordinance (80-14)**

**GEOLOGIC HAZARD OVERLAY ZONE**

**Amend the Development Ordinance, Geologic Hazard Overlay District to read as follows:**

Section 4.030 Geologic Hazards Overlay Zone (GHO)

Section 4.031 Purpose

The intent of the geologic hazards overlay is to minimize building hazards and threats to life and property that may be created by landslides, ocean flooding and erosion, weak foundation soils, and other hazards as identified and mapped by the County. This purpose is achieved by basing County decisions on accurate geologic and soils information prepared by qualified professionals.

Section 4.032 Applicability

This section applies to all development in the following potentially hazardous areas:

1. Areas subject to mass wasting including:
  - a. Active landslides, inactive landslides, landslide topography and mass movement topography identified in the Oregon Department of Geology and Mineral Industries (DOGAMI) Bulletins 74 and 79;
  - b. Faults including definite, indefinite, inferred and concealed in the Oregon Department of Geology and Mineral Industries (DOGAMI) Bulletins 74 and 79;
  - c. All areas identified in the report, "A Field Inventory of Geologic Hazards from Silver Point to Cove Beach, Clatsop County, Oregon", prepared by Martin Ross in 1978, as needing site specific investigations;
2. Areas subject to wave attack, including
  - a. All oceanfront lots; and
  - b. The beach and dune hazard area as defined in Section 4.042.
3. Areas with compressible soils identified in the Soil Survey of Clatsop County (SCS) and referenced in Clatsop County's Comprehensive Plan Background Report, Natural Hazards.
4. The determination of whether a property is located in one of the above referenced potentially hazardous areas shall be made at the sole discretion of the Director. The mapping that forms the basis for the identification of the above areas may be generalized in nature. A specific site may not include the characteristics for which it is mapped. In these circumstances, the Director may grant a waiver from the requirements of Section 4.030. The waiver shall be in the form of a written finding. The finding shall be based on a report, from a professional specified in Section 4.034, detailing the basis for the determination that the site does not contain the identified potentially hazardous geologic condition.

#### Section 4.033 Geologic Hazard Permit Requirements.

All persons proposing any activity requiring a development permit on property located in potentially hazardous areas identified in Section 4.032 shall obtain a geologic hazard permit.

1. Application for a geologic hazard permit shall be on forms provided by the County and shall include a geotechnical report prepared in conformance with the requirements of Section 4.034.
2. Before a development permit can be issued, the geotechnical report must be approved as part of the development permit approval process.
  - a. Where a geotechnical report recommends that additional site investigations, such as borings or test pits, are undertaken, application for geologic hazard permit will be deemed incomplete until the results of those investigations have been provided to the County.
  - b. Where an application is made for a conditional use permit, a variance, a subdivision, a partition, or a planned development located in an area identified in Section 4.032, a geotechnical report in conformance with Section 4.034 shall be prepared. The Director may also require a geotechnical report in conjunction with a proposed zone change.
3. Application for a geologic hazard permit may be made concurrently with an application for a development permit.
4. The approved site investigation report shall be referred to in deed and other documents of sale and shall be recorded with the record of deeds

#### Section 4.034 Geotechnical Report Requirements

For areas identified in Section 4.032 (1) and 4.032 (2), the geotechnical report shall be prepared by a certified engineering geologist or a registered professional geologist. If a geotechnical report is prepared by a geologist and structural recommendations are incorporated into that report, those recommendations, must be made in consultation with an engineering geologist, structural engineer, or civil engineer.

1. For areas identified in Section 4.032 (1), the geotechnical report shall:
  - a. Identify the hazards to life, public and private property which may be caused by mass movement (landsliding and sloughing), soil erosion or deposition, and earthquakes;
  - b. Identify the hazards to life, public and private property, and the natural environment which may be caused by the proposed use and other human activities;
  - c. Describe how the proposed development or use will be adequately protected from geologic hazards, including landsliding and sloughing, soil erosion or deposition, and earthquakes; and
  - d. Describe how the proposed development is designed to minimize the adverse effects it might have on the site and adjacent areas.
2. For areas identified in Section 4.032 (2), and in addition to the standards identified in Section 4.034 (2), the geotechnical report shall identify the hazards to life, public and private property which may be caused by wind erosion or accretion, wave undercutting (erosion), and ocean overtopping (flooding, including tsunami),



3. For areas identified in Section 4.032 (1) and 4.032 (2), the geotechnical report shall describe how the proposed development provides for temporary and permanent stabilization and the planned maintenance of new and existing vegetation. Existing stabilizing vegetation, particularly trees, shall not be removed on slopes of 20% or greater.
4. For areas identified in Section 4.032 (1) and 4.032 (2), the geotechnical report shall be prepared in conformance with the document "Clatsop County – Geotechnical Report Content Standards".
5. For areas identified in Section 4.032 (3), the geotechnical report shall be prepared by a certified engineering geologist, soils engineer, or civil engineer. Geotechnical reports prepared for areas identified in Section 4.032 (3) shall incorporate specific construction and structural recommendations to address the soil characteristics of the site. Where pertinent, the discussion of specific construction and structural recommendations shall include: site preparation such as compaction or replacement of existing soils, bearing loads and the corresponding amount of settlement, steps to be taken with respect to ground and surface water, special foundation requirements, and foundation recommendations based on bearing capacity, design criteria, and the effect of adjacent loads.
6. For all areas identified in Section 4.032, the geotechnical report shall be prepared in conformance with the document "Clatsop County – Geotechnical Report Content Standards".

Section 4.035 Geologic Hazard Permit Review.

An application for a geologic permit shall be reviewed under a Type I procedure.

1. A geologic hazard permit shall be approved by the Director if:
  - a. The conclusions of the geotechnical report supports a finding that there are no adverse effects of the site's geologic characteristics on the proposed development and the proposed site modifications will not adversely affect geologic conditions and processes in the immediate area:  
or
  - b. The conclusions of the geotechnical report supports a finding that if specified actions are taken to address an identified potential hazard then the effects of the site's geologic characteristics on the proposed development will be at an acceptable level and the effects of the proposed site modifications on the geologic conditions and processes in the immediate area are at an acceptable level.
2. Specific recommendations contained in the geologic report shall be incorporated into the approved geologic hazard permit. Based on content, recommendations and conclusions of the geotechnical report, the Director may apply other conditions to the issuance of a geologic hazard permit.
3. The specific recommendations contained in the geotechnical report, and conditions applied to the geologic hazard permit shall be incorporated into the plans and specifications of the development which is the subject of the development permit.
4. Where there is not a concurrent application for a geologic hazard permit and a development permit for a specified development, the person(s) who prepared the geotechnical report shall submit a letter to the Director verifying that the proposed plans, details, and

specifications of the proposed development have been reviewed and are in keeping with the recommendations contained in the geotechnical report that formed the basis for the issuance of the geologic hazard permit, or they shall make recommendations or changes that are needed in the proposed development in order to bring it into conformance with the recommendations contained in the geotechnical report.

5. When a geotechnical report submitted in conjunction with a development permit that is more than two years old, a letter shall be submitted to the Director from the person(s) who prepared the report. The letter shall provide verification that the geotechnical report is still valid for the proposed project.

#### Section 4.036 Independent Review

The Director, at his discretion and at the applicant's expense, may require an evaluation of a geotechnical report by another expert of his choosing. As part of its review of a land use application located in an area subject to Section 4.032, the Hearings Officer, Planning Commission, or Board of Commissioners may also require, at the applicant's expense, an evaluation of a geotechnical report that was prepared in conjunction with the land use application. The results of that evaluation shall be used in making the final decision on the effected land use permit.

Section 4.040 Standards The review and approval of development permits in the geologic hazard overlay district shall be based on the conformance of the proposed development plans with the following grading standards. Conditions of approval may be imposed on the development permit to assure that the development plan meets the standards of this section and to prevent the creation of a hazard to public or private property.

1. **Site Plan Information Required.** In addition to the information required for a development permit, the site plan shall show where clearing, grading, excavation or filling is to occur, the area where existing vegetative cover will be retained, the location of any streams and wetland areas on immediately adjacent to the property, and the general direction of slopes. A statement shall be provided summarizing the extent of land clearing and grading and the quantity of cut and/or fill material involved.
2. **Preparation of Grading Plan** Based on the findings and conclusions of the geotechnical report, or the nature of the proposed development, The Planning Director, at his sole discretion, may require that a grading plan prepared by a registered engineer be submitted with the application for a development permit. The Planning Director may require that such a grading plan, in addition to information required by Section 4.040.1 include the following additional information:
  - a. Existing and proposed contours of the property, at two-foot contour intervals;
  - b. The location of the existing structures and building, including those within twenty-five feet of the property;
  - c. The location of all surface and subsurface drainage devices to be constructed; and
  - d. Design details of proposed retaining walls.

3. General Standards. The proposed development plans shall meet the following general standards:
  - a. Natural vegetation will be protected and retained wherever possible; ~~and~~
  - b. To the extent possible, roads and driveways shall follow the natural contours of the site; and
  - c. An erosion control plan shall be prepared and implemented in conformance with the requirements of Section S2.500.
4. Cuts. Proposed cuts shall meet the following standards:
  - a. The site development shall be design to minimize the need for cuts.
  - b. The slope of cut surfaces shall not be steeper than is safe for the intended use and shall not be steeper than two horizontal to one vertical unless an engineering report finds that a cut at a steeper slope will be stable and not create a hazard to public or private property;
  - c. Cuts shall not remove the toe of any slope where a potential for landslide exists;
  - d. Cuts shall be setback from property lines so as not to endanger or disturb adjoining property; and
  - e. Retaining walls shall be constructed in accordance with the Oregon State Structural Specialty Code.
5. Fills. Proposed fills shall meet the following standards:
  - a. The site development shall be designed to minimize the need for fill.
  - b. The slope of fill surfaces shall not be steeper than is safe for the intended uses and shall not be steeper than two horizontal to one vertical unless an engineering report finds that a steeper slope will be stable and not create a hazard to public or private property. Fill slopes shall not be constructed on natural slopes steeper than two horizontal to one vertical.
  - c. Fill shall be setback from property lines so as not to endanger or disturb adjoining property.
  - d. The ground surface shall be prepared to receive fill by removing vegetation, noncomplying fill, topsoil and other unsuitable materials, and scarifying to provide a bond with the new fill.
  - e. Structural fill shall be designed by a registered civil engineer in accordance with standard engineering practices.
6. Drainage. The following standards shall be met:
  - a. Proposed grading shall not alter drainage patterns so that additional storm water is directed onto adjoining property.
  - b. Cut and fill slopes shall be provided with subsurface drainage as necessary for stability.
  - c. The site grading and drainage improvements shall be designed to carry both concentrated water and surface sheet flow water to the nearest practical drainage way, as specified by the Planning Director.

CLATSOP COUNTY  
STANDARDS FOR THE PREPARATION OF GEOTECHNICAL REPORTS

I. GENERAL INFORMATION

The following items should be addressed:

- A. Client or party that commissioned the report
- B. Name(s) of geologists who did the mapping and other investigation on which the report is based, and dates when the work was done.
- C. Location and size of area, and its general setting with respect to major or regional geographic and geologic features.
- D. Purpose and scope of the report and geologic investigation, including the proposed use of the site. Also, identify level of the study, i.e., feasibility, preliminary, final, etc.
- E. Topography and drainage within or affecting the area.
- F. General nature, distribution, and abundance of exposures of earth materials within the area
- G. Nature and source of available subsurface information and geologic reports or maps. Suitable explanations of the available data should provide a technical reviewer with the means of evaluating the reliability. Reference to cited works or field observations should be made, to substantiate opinions and conclusions.
- H. Disclosure of known or suspected geologic hazards affecting the area, including a statement regarding past performance of existing facilities (such as buildings or utilities) in the immediate vicinity.
- I. Locations of test holes and excavations (drill holes, test pits, and trenches) shown on maps and sections and described in the text of the report. 'Be actual data, or processed data upon which interpretations are based, should be included in the report to permit technical reviewers to make their own assessments regarding reliability and interpretation.
- J. All field and laboratory testing procedures (by ASTM designation, if appropriate) and test results
- K. Disclosure statement of geologist's financial interest, if any, in the project or the client's organization.
- L. The signature and seal of the certified engineering geologist who prepared the report.

## II. GEOLOGIC MAPPING AND INVESTIGATION

- A. Geologic mapping of the area should be done at a scale which shows sufficient detail to adequately define the geologic conditions present. For many purposes, available published geologic maps are unsuitable to provide a basis for understanding the site conditions, so independent geologic mapping is needed. If available published geologic maps are used to portray site conditions, they must be updated to reflect geologic or topographic changes which have occurred since map publication. It may be necessary for the geologist to extend mapping into adjacent areas to adequately define significant geologic conditions.
- B. Mapping should be done on a suitable topographic base or aerial photograph, at an appropriate scale with satisfactory horizontal and vertical control. The date and source of the base should be included on each map or photo.
- C. The geologist doing the investigation and preparing the map should report the nature of bedrock and surficial materials, the structural features and relationships, and the three-dimensional distribution of earth materials exposed and inferred within the area. A clear distinction should be made between observed and inferred features and relationships.
- D. The report should include one or more appropriately positioned and scaled cross sections to show subsurface relationships that cannot be adequately described in words alone. Fence or block diagrams may also be appropriate.

## III. GEOLOGIC DESCRIPTIONS

The report should contain brief but complete descriptions of all natural materials and structural features recognized or inferred within the subject area. Where interpretations are added to the recording of direct observations, the basis for such interpretations should be clearly stated. Describe all field mapping and exploration procedures (surface geologic reconnaissance, drilling, trenching, geophysical survey, etc.).

The following checklist may be used as a general, though not necessarily complete, guide for descriptions:

- A. Bedrock
1. Identification of rock types
  2. Relative and absolute age and, where possible, correlation with named formations and other stratigraphic units.
  3. Surface and subsurface expression, areal distribution, and thickness.
  4. Pertinent physical characteristics (e.g., color, grain size, nature of stratification, strength, variability).

5. Distribution and extent of zones of weathering; significant differences between fresh and weathered rock.
  6. Special engineering geologic characteristics or concerns (e.g., factors affecting proposed grading, construction, and land use).
- B. Structural features-stratification, faults, discontinuities, foliation, schistosity, folds
1. Occurrence, distribution, dimensions, orientation and variability; both within and projecting into the area.
  2. Relative ages, where pertinent.
  3. Special features of faults (e.g., topographic expression, zones of gouge and breccia, nature of offsets, age of movements, youngest faulted unit and oldest unfaulted unit).
  4. Other significant structural characteristics or concerns.
- C. Surficial deposits-alluvial, colluvial, eolian, glacial, lacustrine, marine, residual, mass movement, volcanic (such as cinders and ash), and fill.
1. Identification of material, grain size, relative age, degree of activity of originating proms.
  2. Distribution, dimensional characteristics, variations in thickness, degree of soil development, surface expression.
  3. Pertinent physical and engineering characteristics (e.g., color, grain size, lithology, compactness, cementation, strength, thickness, variability).
  4. Special physical or chemical features (e.g., indications of volume change or instability, such as expansive clays or peat).
  5. Other significant engineering geologic characteristics or concern.
- D. Surface and shallow subsurface hydrologic conditions, including groundwater, springs, and streams and their possible effect on the site. Indicate how conditions may be affected by variations in precipitation, temperature, etc.
1. Distribution, occurrence, and variations (e.g., drainage courses, ponds, swamps, springs, seeps, aquifers).
  2. Identification and characterization of aquifers; depth to groundwater and seasonal fluctuations, flow direction, gradient, recharge and discharge areas.
  3. Relationships to topographic and geologic features.

4. Evidence for earlier occurrence of water at localities now dry (e.g., vegetation, mineral deposits, historic records).
5. Other significant engineering geologic characteristics or concerns, such as fluctuating water table and the effects of proposed modifications on future hydrologic processes.

E. Seismic considerations.

1. Description of the seismotectonic setting of the area (including size, frequency, and location of historic earthquakes), current seismic zoning, and expected seismic risk.
2. Potential for area to be affected by surface rupture (including sense and amount of displacement, and width of surface deformation zone).
3. Probable response of site to likely earthquakes (estimated ground motion).
4. Potential for area to be affected by earthquake-induced landslides or liquefaction,
5. Potential for area to be affected by regional tectonic deformation (subsidence or uplift).

#### IV. ASSESSMENT OF GEOLOGIC FACTORS

Assessment of existing geologic conditions and processes with respect to intended use of the site constitutes the principal contribution of the report. It involves 1) the effects of the geologic features upon the proposed grading, construction, and land use, and 2) the effects of these proposed modifications upon future geologic conditions and processes in the area.

The following checklist includes topics that ordinarily should be considered in discussions, conclusions and recommendations in geologic reports:

A. General suitability of proposed land use to geologic conditions

1. Areas to be avoided, if any, and mitigation alternatives
2. Topography and slope
3. Stability of geologic units.
4. Flood and tidal inundation, erosion, and deposition.
5. Problems caused by geologic features or conditions in adjacent properties
6. Other general problems.



B. Identification and extent of known or probable geologic conditions which may result in risk to the proposed land use (such as flood inundation, shallow groundwater, storm surge, surface- and groundwater pollution, snow avalanche, landslide, debris flow, rock fall, expansive soil, collapsible soil, subsidence, erosion, deposition, earthquake shaking, fault rupture, tectonic deformation, liquefaction, seiche, tsunami, volcanic eruption).

C. Recommendations for site grading.

1. Prediction of what materials and structural features will be encountered in proposed cuts.
2. Prediction of stability based on geologic factors; recommended avoidance or mitigation alternatives to cope with existing or potential landslide masses.
3. Excavation considerations (hard or massive rock, groundwater flows)
4. General considerations of proposed fill masses in canyons or on sidehills
5. Suitability of on-site material for use as compacted fill
6. Recommendations for positioning fill masses, provision for subdrainage, buttressing, and the need for erosion protection on fill slopes.
7. Other recommendations required by the proposed land use, such as the angle of cut slopes, position of drainage terraces, need for rock-fall and/or erosion protection on cut slopes.

D. Drainage considerations

1. Protection from inundation or wave erosion along shorelines
2. Soil permeability, suitability for septic systems.
3. Protection from sheet flood or gully erosion, and debris flows or mud flows.

E. Limitations of study, and recommendations for additional investigations. Considering the scope of work and intended use of the site, provide a statement of the limitations of the study and the need for additional studies outside the stated scope of work.

1. Borings, test pits, and/or trenches needed for additional geologic information
2. Percolation tests needed for design
3. Program of subsurface exploration and testing that is most likely to provide data needed by the soils or civil engineer.
4. Program for long-term monitoring of the site to evaluate geologic conditions (survey hubs, inclinometers, extensometers, etc.).

## Section 2 Floodplain Hazard Amendments

PROPOSED AMENDMENTS  
BACKGROUND REPORT  
NATURAL HAZARDS  
FLOOD HAZARD RELATED MATERIAL

FLOOD HAZARDS

Clatsop County may experiences flooding from three different sources: stream flooding, ocean flooding and tsunamis.

Stream and Normal Ocean Flooding

Stream flooding in the upland areas of the County is much less severe than in the low, flat coastal and estuary areas. The extent of flooding in the upland areas is most times limited by the narrowness of the stream valleys, an exception being the broader floodplains in the Elsie-Jewell area. Some of the rivers have built up terraces along their banks, which constricts many of the floods to the channel. The major hazard associated with upland flooding is streambank erosion.

The most extensive flooding occurs in the low lying coastal and estuary areas. Coastal streams respond quickly to the rapid runoff caused by the steep topography and low bedrock permeability of the uplands. Flooding is the greatest when stream flooding occurs in conjunction with ocean flooding from high tides and winter storms. Storms that produce the storm surges also bring heavy rains. High tides hold back the high river flows and greatly aggravate lowland flooding along streams.

Ocean flooding also affects diked areas bordering the Columbia River and Youngs Bay when high tides and river flows close the tide gates. While tide gates are closed, storm runoff accumulates and floods the flat, low lying floodplain areas. This flooding is temporary, however, as the water drains through the tide gates on the next low tide.

Tsunami

The other type of coastal flooding hazard is the tsunami. Tsunami is the term applied to waves generated at sea by earthquakes. There are two types of tsunami events, near shore tsunamis and distant tsunamis. Tsunamis have the potential to be by far the most destructive flooding event. The inundation of low lying coastal areas can result in the loss of both property and lives. A near shore tsunamis will be generated by a Cascadia Subduction Zone earthquake (See the Earthquakes section). Scientists estimate that such an earthquake will generate a tsunami with wave runup heights of 16 to 30 feet above the prevailing seas. The first tsunami crest will arrive within 15 - 30 minutes after the earthquake is felt. Multiple waves will occur, with later crests having the potential to be higher than the initial event. After the earthquake and tsunami event, a significant amount of beach erosion can occur as beaches seek to reestablish equilibrium with the new lower elevations of the coastline.

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1  
2 In 1996, the Oregon Department of Geology and Mineral Industries (DOGAMI), pursuant to  
3 ORS 455.446 and 455.447, prepared maps showing the tsunami inundation zone for the Oregon  
4 coast based on a magnitude 8.8 subduction zone earthquake. The base map for this mapping is  
5 the USGS 7.5 minute maps which are at a scale of 1:24,000. Pursuant to the Oregon Revised  
6 Statutes referenced above, the mapped inundation zone identifies areas where the construction of  
7 certain types of essential facilities and special occupancy structures is restricted.

8  
9 In 1998, DOGAMI completed tsunami hazard mapping for the Seaside-Gearhart area. The study  
10 area extended from north of the Highlands Road to an area in the vicinity of the Johnson rock  
11 quarry south of Peterson Point. The study identified areas of moderate, high and extreme risk  
12 associated with a major Cascadia Subduction Zone earthquake.

13  
14 Tsunamis from earthquakes located at transoceanic sites (e.g., Alaska, Japan, Chile) are termed  
15 distant tsunamis. Researchers have found the wave height of distant tsunamis to be directly  
16 related to the magnitude of the earthquake with which it is associated. The most recent  
17 significant distant tsunami in Clatsop County was the 1964 Good Friday tsunami caused by a  
18 submarine earthquake that occurred off the south coast of Alaska. The tsunami caused  
19 considerable damage to the cities of Warrenton, Seaside, and Cannon Beach. Warrenton suffered  
20 \$20,000 damage, particularly to docks and log rafts in the mill area. Seaside was struck by a wall  
21 of water estimated to be more than 10 feet high, which flowed up the Necanicum River, doing  
22 \$40,000 damage as far inland as the golf course. The surge of water in Cannon Beach was so  
23 great it swept the 200-foot long Elk Creek highway bridge 1/4 mile upstream. Motels along Elk  
24 Creek were badly damaged and much of the business district was flooded.

25  
26 The Federal government has established a warning system that notifies local emergency  
27 preparedness personnel in the event of a far shore tsunami. Generally, 4 to 15 hours of notice can  
28 be given.

### 29 30 Flood Damage and Protection

31  
32 Flood damage is greatest in areas of fast flowing currents. The force of these currents can cause  
33 damage by smashing floating objects against stationary structures, by scouring out channels  
34 under or around structures, eroding away foundations and washing out roads and bridges.

35  
36 Although not an immediate threat to life, flooding in areas outside of rapidly moving water can  
37 cause loss to buildings, equipment, and facilities from water and mud damage. A danger to  
38 safety is contamination of well and drinking water supplies.

39  
40 The federal flood insurance program differentiates between the two types of flood areas  
41 mentioned above by the terms "floodway" and "area of special flood hazard". The floodway is  
42 the flood channel that carries the fast moving floodwater. Areas of special flood hazard are areas  
43 of rising floodwaters without rapid flow.

1 Clatsop County has participated in the National Flood Insurance Program since 1974. A  
2 floodplain ordinance and final maps establishing elevations, boundaries of floodways and special  
3 flood hazard areas was adopted June 21, 1978. Regulations for floodplains and floodways were  
4 adopted in relation to the degree of hazard. No structures for human habitation are allowed in  
5 floodways. In other flood areas, structures must be flood proofed or elevated above the level of a  
6 flood which has a 1% or greater chance of happening in any one year (100 year flood). The flood  
7 elevations determined in coastal areas took coastal flooding and tsunamis into consideration.  
8

9 In addition, Clatsop County, in its planning process, has taken flood hazards into consideration  
10 when determining land use designations. Most of the diked tideland and areas of the County  
11 with broad floodplains have been placed in Exclusive Farm Use (EFU) zones. The EFUs zones  
12 protect agricultural uses which is are compatible with flood areas while limiting the number of  
13 residential and commercial structures  
14

15 The Department of Environmental Quality has rules whereby a sanitarian can deny approval for  
16 an on-site treatment system based on excessive saturation, if frequent flooding occurs, or based  
17 on high groundwater if the water table rises from below. These rules are intended to ensure that  
18 on-site treatment systems function without creating a health hazard or water pollution.  
19  
20

Table 1.

## Flooding in Clatsop County: 1953 - 1977

Date	Description	Damage (thousands of dollars)
Memorial Day, 1953	Vanport Flood	N/A
February, 1960	Freak Wave	N/A
January, 1964	River Flooding; Astoria - 4.32" of rain in 24 hours	N/A
March, 1964	Tsunami Heavy damage to homes and bridge washout in Cannon Beach. Heavy damage to homes in 6 block area of north Seaside and washouts of 12 th Street, Railroad, and Hwy. 101 bridges.	City of Warrenton 20 City of Seaside 20 private property in Seaside 235 TOTAL for County 1,000
December, 1964 January 1965	Flooding of the Columbia and Nehalem Rivers Damages on Columbia River (Oregon side from Willamette River to mouth of Columbia River)  Damages on Nehalem River (including Tillamook County)	TOTAL 1,181 Businesses 275 Flood fight & Rehab. 370 Physical Damage 536 Emergency Relief 41 TOTAL 328
December, 1966	Flooding on Necanicum River. Seaside, 3.35" of rain in 48 hours	N/A
December, 1967	High winds and freak wave (damage and overtopping of dikes on Lewis & Clark River, Youngs River, Brownsmead, Knappa, Blind Slough and Gnat Creek. Cannon Beach was declared a special disaster area.)	Cannon Beach 125 Seaside 7 County- mainly agricultural damages 200
December, 1970	Flooding on Neawanna Creek. Seaside, 3.65 " of rain in 48 hours. Crown Camp, 5.6 " of rain in 48 hours with 20-32" of snow in hills.	N/A
January, 1971	High storm tides and heavy rains (100 mph winds reported at Cannon Beach). Seaside - 1.53" of rain in 24 hours with 15-26" snowmelt in hills.	Cannon Beach 75 County- mainly agricultural damages 216.5
December, 1972	High storm tide (+12 feet). Overtopping of dikes caused flooding in Alderbrook (Astoria) and in Brownsmead causing dike and tidegate washout.	N/A Brownsmead damages 13
	High storm tides and river flooding (tide 2-3 feet above normal). Flooding on the Nehalem River.	TOTAL 203.3

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Date	Description	Damage (thousands of dollars)
January, 1974	State of Oregon declared disaster area.	(estimated total county damages)
December, 1975	Stream flooding. Clatsop Airport - 8.99" of rain in 6 days. Floodgate washout on Skipanon River.	N/A
February, 1976	Storm tides (sea swells were reported as 12-18 feet).	Arch Cape and Cannon Beach 75
December, 1977	High tide and river flooding. Astoria - 3.28" of rain in 24 hours. Overtopping of dikes on Youngs River, Lewis & Clark River, Brownsmead and Svensen Island. Tidegate and road washout occurred on Lewis & Clark Road. Extremely hazardous surf conditions on all beaches.	Damages 80

Sources: The Daily Astorian, U.S. Dept. of Agriculture, Soil Conservation Service, U.S. Army Corps of Engineers, and the National Weather Service.



1 Since 1979, the most severe flooding event occurred in February of 1996. A damage survey  
2 report prepared for the Federal Emergency Management Agency by Clatsop County estimated  
3 that the damage to public facilities, roads and individual property was approximately 2.65  
4 million. Actual damage probably exceeded this figure. Flood damage was heaviest in rural  
5 Clatsop County, especially in the Nehalem River Valley, where the river crested 14 feet above  
6 flood stage. A log jam destroyed a bridge on the Lower Nehalem River, leaving the  
7 neighborhood of Sha-Ne-Mah without any road access. A section of Highway 202 was damaged  
8 resulting in an O-DOT road modification project with an estimated cost of one million dollars.  
9 The Columbia River flooded diked lands in the Brownsmead, Burnside and Svensen island area.  
10 The railroad access to western Clatsop County was closed by a landslide at Aldrich Point. (By  
11 1999, the slide had not been removed). Emergency personnel evacuated residents around the  
12 county, with between 200 and 300 residents being evacuated in the Nehalem River Valley.  
13 National Guard troops distributed sandbags in Westport, Wauana, Seaside and at the Tongue  
14 Point Job Corps Center in Astoria.

15  
16 Although the majority of property owners located in flood hazard areas do not have flood  
17 insurance, claims filed under the Federal Flood Insurance Program can provide some information  
18 on the extent of flood damage and where it is located. Since 1977, 29 property loss claims have  
19 been filed with FEMA; only one of these claims is considered to be a repetitive loss claim. Of  
20 the 29 claims, 14 were filed in the early part of 1996 and are assumed to have been associated  
21 with the February 1996 flood. Although the effect of the 1996 flood was significant, the  
22 information on claims filed under the Federal Flood Insurance Program indicate that flooding has  
23 not been a major problem in the county over the last two decades.

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**PROPOSED AMENDMENTS**  
**COMPREHENSIVE PLAN**  
**FLOOD HAZARD POLICIES**

Goal 7 - Natural Hazards

Goal

To protect life and property from natural disasters and hazards.

Flood Hazard Policies

1. Clatsop County recognizes the value of an integrated flood hazard management program in order to protect life and property and shall continue participation in the Federal Flood Insurance Program.
2. Through an integrated flood hazard management program, the county will implement and administer appropriate land use planning techniques and construction standards.
3. The County will develop and maintain educational efforts regarding the public benefit derived from an integrated flood hazard management program.
4. The County shall limit land uses in the floodplain to those uses identified by the adopted floodplain regulations as suitable.
5. The County shall strive to make flood hazard information, including that related to tsunamis, available to the public to insure that owners and potential buyers of flood prone land are aware of the hazard.
6. To provide continued flood protection, the County encourages the maintenance and repair of existing flood control structures. The construction of new dikes, for the purpose of establishing future development in floodplain areas, shall be discouraged.

- 1 7. Agriculture, forestry, open space and recreation shall be the preferred uses of  
2 flood prone areas.
- 3
- 4 8. The County shall prohibit the placement of hospitals, public schools, nursing  
5 homes, and other similar public uses within areas subject to flooding.
- 6
- 7 9. Subdivisions occurring within floodplain areas shall be encouraged to cluster land  
8 uses outside of the floodplain area leaving the floodplain in open space.
- 9
- 10 10. For specified areas, the County will consider the adoption of regulations requiring  
11 the preparation and implementation of a drainage plan as part of its review and  
12 approval of conditional use permits and development permits.
- 13

## 14 II. Ocean and Coastal Lake Shorelands Policies

- 15

### 16 1. Implementation Policy 2

- 17

18 The County will provide a detailed review of development permit applications to  
19 ensure compliance with adopted county policies and standards. This review will  
20 include application for State and Federal permits.

- 21

## 22 III. Southwest Coastal Community Plan

- 23

### 24 A. Coastal and Stream Shorelands Policy 2

- 25

- 26 2. In order to provide the greatest view potential for properties throughout the  
27 RURAL LANDS\* and RURAL SERVICE AREA, the Design Review Committee  
28 shall review the effects of new building plans on adjacent property in the RSA.  
29 The building height shall be limited to 26 feet through the Community Plan area,  
30 with ocean front property limited to 18 feet subject to variances approved by the  
31 County Planning Commission.<sup>a</sup>
- 32

### 33 B. Stream/Ocean Flooding

- 34

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<sup>a</sup> The Rural Community Plans proposed for adoption , Periodic Review Work Task No. 3 will amend this rule to conform to the rural community zones, e.g. Arch Cape Rural Community Residential.

1 There are several creeks in the area which could be subject to flash flooding, the  
2 largest of which is Arch Cape Creek. Areas along the coast, which are subject to  
3 the 100-year flood, have been mapped under the National Flood Insurance  
4 Program and are designated on Flood Insurance Rate Maps.  
5

6 C. Landslides/Erosion Policy 7  
7

8 7. Shoreline protective devices such as seawalls, revetments or dikes shall be  
9 evaluated for their impacts on adjacent property, visual impacts, impact on public  
10 access, and potential public costs. Beachfront protective devices shall be  
11 evaluated, both those located east and west of the State Zone Line.  
12

13 D. Landslides/Erosion Policy (8 is deleted)  
14

15 E. Growth Policy 4  
16

17 4. Cut and fill techniques of land development shall be discouraged. Filling  
18 of lots or property shall be carried out only after a site investigation to  
19 insure that adjacent property will not be affected by drainage or storm  
20 water, erosion or visual intrusion onto other property.  
21  
22

floodpolicy

**PROPOSED AMENDMENTS**  
**Land And Water And Development And Use Ordinance (80-14)**

**FLOOD HAZARDS**

**Amend the Development Code, Flood Hazard Overlay District to read as follows:**

**Section 4.000. Flood Hazard Overlay District (/FHO)**

**Section 4.010. Purpose**

The purpose of the flood hazard overlay district is to identify those areas of the County subject to the hazards of periodic flooding and establish standards and regulations to reduce flood damage or loss of life in those areas. This district shall apply to all areas of special flood hazards within the unincorporated areas of Clatsop County as identified on Flood Insurance Rate Maps (FIRM) and Flood Boundary and Floodway Maps. In advancing these principles and the general purposes of the Clatsop County Comprehensive Plan, the specific objectives are:

1. To promote the general health, welfare and safety of the County.
2. To prevent the establishment of certain structures and land uses unsuitable for human habitation because of the danger of flooding, unsanitary conditions or other hazards.
3. To minimize the need for rescue and relief efforts associated with flooding.
4. To help maintain a stable tax base by providing for sound use and development in flood-prone areas and to minimize prolonged business interruptions.
5. To minimize damage to public facilities and utilities located in flood hazard areas.
6. To insure that potential home and business buyers are notified that property is in a flood area.

**Section 4.011. Definitions**

The following words and phrases shall be interpreted so as to give them the meanings they have in common usage and to give this chapter its most reasonable application:

**"Area of shallow flooding"** means a designated AO or AH zone on the Flood Insurance Rate Map (FIRM). The base flood depth range is from one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

**"Area of special flood hazard"** means the land in the flood plain subject to a

one percent or greater chance of flooding in any given year. Designation on maps always includes the letter A or V.

**"Base flood"** means the flood having a one percent chance of being equaled or exceeded in any given year.

**"Basement"** means any area of the building having its floor subgrade (below ground level) on all sides.

**"Breakaway wall"** means a wall that is not a 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.

**"Coastal high-hazard area"** means the area subject to high velocity waters, including but not limited to, storm surge or tsunamis. The map is designated on a FIRM (Flood Insurance Rate Map) as zone V, V1, V30 or VE zone.

**"Critical facilities"** means those structures or facilities which produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials; hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood; police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood; and public and private facilities that are vital to maintaining or restoring normal services to flooded areas before, during and after a flood.

**"Development"** means any manmade change to improved or unimproved real property, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of special flood hazard.

**"Existing manufactured home park or subdivision"** means one in which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed is completed before the effective date of Clatsop County's floodplain management regulations (1980). The "construction of facilities" includes, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads.

**"Flood" or "flooding"** means a general and temporary condition of partial or complete inundation of normally dry land areas from:

1. The overflow of inland or tidal waters; and/or
2. The unusual and rapid accumulation of runoff of surface waters from any source.

**"Flood Hazard Boundary Map"** means the official map used by the Federal Emergency Management Agency (FEMA) where the boundaries of the areas of special flood hazard have been designated.

**"Flood Insurance Rate Map (FIRM)"** means the official map on which the Federal Emergency Management Agency (FEMA) has delineated areas of special flood hazards.

**"Flood insurance study"** means the official report provided by the Federal Emergency Management Agency (FEMA) that includes flood profiles, the flood boundary-floodway map and the water surface elevation of the base flood.

**"Flood proofing"** means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

**"Highest adjacent grade"** means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

**"Lowest floor"** means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure, usable solely for parking of 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 chapter.

**"Manufactured home"** 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 connected to the required utilities. The term manufactured home does not include a recreational vehicle.

**"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.

**"Mean sea level (MSL)"** means the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on the flood insurance rate map are referenced.

**"New construction"** means the structures for which the "start of construction" commenced on or after the effective date of the ordinance codified in this section.

**"New manufactured home park or subdivision"** means a manufactured home park or subdivision for which the construction of facilities for serving the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of the adoption of this chapter.

**"Recreation vehicle"** means a vehicle which is (1) built on a single chassis, (2) four hundred square feet or less when measured at the largest horizontal projection, (3) designed to be self-propelled or permanently towable by a light-duty truck, and (4) primarily designed as temporary living quarters for recreational, camping, travel or seasonal use and not for use as a permanent dwelling.

**"Regulatory 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 a designated height.

**"Special flood hazard area (SFHA)"** means areas subject to inundation from the waters of a one-hundred-year flood.

**"Start of construction"** includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement or other improvement was within one hundred eighty days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of a slab or footings, the installation of piles, the construction of columns or any work beyond the stage of excavation; or the placement of a

manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and walkways; nor does it include excavation for a basement, footings, piers or foundation or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure.

For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

**"Structure"** means a walled and roofed building including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

**"Substantial damage"** means the damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damage condition would equal or exceed fifty percent of the market value of the structure before the damage occurred.

**"Substantial improvement"** means any combination of repair, reconstruction, or improvement of a structure, taking place during the life of the structure the cumulative cost of which equals or exceeds 50 percent of the market value of the structure either: (1) before the improvement or repair is started; or (2) if the structure has been damaged and is being restored, before the damage occurred.

For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either: (1) 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 (2) any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

#### Section 4.012. Establishment of Flood Zones

The areas of special flood hazard identified by the Federal Insurance Administration through a scientific and engineering report entitled "Flood Insurance Study" for Clatsop County dated July 3, 1978 with accompanying Flood Insurance Rate Maps (FIRM) and Flood Boundary Maps and any revisions thereto are hereby adopted by reference and declared to be part of this Ordinance.

#### Section 4.013 Requirements For a Development Permit

A development permit shall be required in conformance with the provisions of this chapter and processed pursuant to Section 4.014. The permit shall be for all structures including manufactured homes, as set forth in Section 4.011 "Definitions" and for all other development including fill and other activities, also as set forth in the Section 4.011 "Definitions". Application for a Development Permit shall be made to the Planning Director on forms furnished by him and shall specifically include the following information:

1. Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures.
2. Elevation in relation to mean sea level to which any structure has been flood proofed.
3. Certification by a registered professional engineer or architect that any non-residential flood proofed structure meets the flood proofing criteria in Section 4.030.2.
4. Description of the extent to which any water course will be altered or relocated as a result of proposed development.

#### Section 4.014 Development and Use Permitted

Development permits shall be subject to the standards of Section 4.028 -4.036 and be processed as a Type I procedure.

#### Section 4.015 Duties and Responsibilities

The duties of the Planning Director shall include, but not be limited to the following:

1. Review all applications to determine that the permit requirements of this ordinance have been satisfied.
2. Review all applications to insure that all necessary permits have been obtained from those Federal, State or local governmental agencies from which prior approval is required.
3. Review all applications in the area of special flood hazard to determine if the proposed development adversely affects the flood-carrying capacity of the special flood hazard area.

#### Section 4.016 Use of Other Base Flood Data

When base flood elevation data has not been provided in accordance with Section 4.012, the Planning Director shall obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, as criteria for requiring that new construction, substantial improvements, or other development

comply with Section 4.030.

Section 4.018 Information to be Obtained and Maintained by Planning Director

Where base flood elevation data is provided through the flood insurance study or obtained as provided in Section 4.016, the Planning Director shall:

1. Verify and record the actual elevations (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures and whether or not the structure contains a basement.
2. For all new or substantially improved flood proofed structures:
  - A. Verify and record the actual elevation (in relation to mean sea level), to which the structure was flood proofed, and
  - B. Maintain the flood proofing certifications required in Section 4.013.3
3. Maintain for public inspection all records pertaining to the provisions of this ordinance.
4. In coastal high hazard areas, certification shall be obtained from a registered professional engineer or architect that the structure is securely anchored to adequately anchored-pilings or columns in order to withstand velocity waters.

Section 4.019 Compliance

No structure or land shall be located, extended, converted or altered without full compliance with the terms of the ordinance codified in this chapter and other applicable regulations.

Section 4.020 Alteration of Water Courses

The Planning Director shall:

1. Notify adjacent communities and the Oregon Department of Land Conservation and Development prior to any alteration or relocation of a water course, and submit evidence of such notification to the Federal Emergency Management Agency.
2. Require that maintenance is provided within the altered or relocated portion of said water course so that the flood carrying capacity is not diminished.

Section 4.022 Interpretation of FIRM Boundaries

The Planning Director shall make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretations as provided in this Ordinance.

Section 4.024 Warning and Disclaimer of Liability

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The degree of flood protection required by this Ordinance is considered reasonable for regulatory purposes and is based on engineering and scientific 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 a liability on the part of Clatsop County or by an officer, or employee thereof for any flood damages that result from reliance on this Ordinance or any administrative decision lawfully made there under.

#### Section 4.025 Appeals

An appeal of a Planning Director decision pursuant to this chapter may be appealed in accordance with Section 2.230

#### Section 4.026 Variances

A request for a variance from a standard contained in this chapter shall be reviewed in accordance with the procedures of Section 5.130 - 5.134. The following standards are applicable to a variance request, not those of Section 5.132:

1. Variances shall only be issued upon:
  - A. a showing of good and sufficient cause,
  - B. a determination that failure to grant the variance would result in exceptional hardship to the applicant, and
  - C. 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 or conflict with existing local laws or ordinances.
2. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
3. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
4. Variances may be issued for the repair or rehabilitation of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure without regard to the procedures set forth in the remainder of this section. The criteria of Section 4.026.1 shall not be applied to historic structures.

5. When a variance is granted, the county shall give written notice to the property owner within five days after the decision is final. The notice shall state that: (a) the structure or manufactured home will be allowed to be built or placed with the lowest floor elevation at or below the base flood elevation, and (b) that the issuance of the variance to construct a structure below the base flood level will result in increased premium rates for flood insurance as high as twenty-five dollars for every one hundred dollars of insurance coverage, and (c) such construction below the base flood level increases the risk to life and property. The above notification shall be maintained with a record of all variance actions.
6. Variance Time Limit. Authorization of a variance shall conform to the requirements of Section 5.134.

#### Section 4.028 General Standards

In all areas of special flood hazards as presented on the FIRM, the following standards shall apply for all new construction and substantial improvements:

1. Anchoring:
  - A. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure.
  - B. All manufactured homes shall be anchored to resist flotation, collapse, or lateral movement by providing over-the-top and frame ties to ground anchors. Specific requirements shall be that:
    - 1) Over-the-top ties be provided at each end of the manufactured home, with two additional ties per side at intermediate locations and manufactured homes less than fifty (50) feet long requiring one additional tie per side.
    - 2) Frame ties be provided at each corner of the home with five additional ties per side at intermediate points and manufactured homes less than fifty (50) feet long requiring four additional ties per side.
    - 3) All components of the anchoring system be capable of carrying a force of 4,800 pounds; and
    - 4) Additions to the manufactured home be similarly anchored.
  - C. An alternative method of anchoring may involve a system designed to withstand a wind force of ninety (90) miles per hour or greater. Certification must be provided to the Building Official that this standard has been met.
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 or substantial improvements shall be constructed by methods and practices that minimize flood damage.
  - C. Electrical, heating, ventilation, plumbing and air conditioning equipment and

other service facilities shall be elevated to one foot above flood level 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 discharges from the systems into flood waters.
- C. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

4. Subdivision Proposals:

- A. All subdivision proposals shall be consistent with the need to minimize flood damage.
- B. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.
- C. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage.
- D. Base flood elevation data shall be provided for subdivision proposals and other proposed developments of fifty lots or greater or five acres, whichever is less.

5. Critical Facilities: Critical facilities shall be constructed on properly compacted fill and have the lowest floor (including basement) elevated at least one foot above the elevation of the 500-year flood.

6. Review of Development Permits: Where elevation data is not available, either through the flood insurance study or from other administrative source, applications for development permits 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 to at least two feet above grade in these zones may result in higher insurance rates.

Section 4.030 Specific Standards

In all areas of special flood hazards where base flood elevation data has been provided, the following provisions are required:

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1. **Residential Construction:** New construction or substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to one foot above the base flood elevation. Fully enclosed areas below the lowest floor that are subject to flooding 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: a) a minimum of two openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided; b) the bottom of all openings shall be no higher than one (1) foot above grade; and c) openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic flow of floodwaters in both directions.
2. **Non-Residential Construction:** New construction or substantial improvement of any commercial, industrial, or other non-residential structure shall either have the lowest floor, including basement, elevated to one (1) foot above the base flood elevation or, together with attendant utility and sanitary facilities, shall: a) be flood proofed so that below this level the structure is water tight with walls substantially impermeable to the passage of water; b) have structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and c) be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with standards of practice for meeting provisions of this section based on their development and/or review of the structural design, specifications and plans. Such certification shall be provided as set forth in Section 4.018.2. Fully enclosed areas below the lowest floor that are subject to flooding 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: a) a minimum of two openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided; b) the bottom of all openings shall be no higher than one (1) foot above grade; and c) openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic flow of floodwaters in both directions.
3. **Foundation Protection:** A registered professional civil engineer shall develop or review the structural design, specifications and plans for the foundation of the building and shall certify that the design and methods of construction are in

accordance with accepted practices to withstand flotation, collapse, lateral movement, erosion and scour, undermining, and the effects of water and wind acting simultaneously on all building components during the base flood.

4. **Protection of Floodplain Storage Capacity:** Whenever any portion of a floodplain is authorized for development, the volume of space occupied by the authorized fill below the base flood elevation shall be compensated for and balanced by a hydraulically equivalent volume of excavation taken from below the base flood elevation. Any such excavations shall be constructed to drain freely to the watercourse. No area below the waterline of a pond or other body of water can be credited as a compensating excavation.
5. **Manufactured Homes:**
  - A. Manufactured homes that are to be placed or substantially improved on sites within Zone A1-A30, AH, and AE and located: i) outside of a manufactured home park or subdivision, ii) in a new manufactured home park or subdivision iii) in an expansion of an existing manufactured home park or subdivision or iv) in an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the result of a flood shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to one foot above the base flood elevation and securely anchored to an adequately anchored foundation system to resist flotation collapse and lateral movement.
  - B. Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A1-30, AH and AE that are not subject to provision of 5.A above shall be elevated so that either: i) the lowest floor of the manufactured home is elevated to one foot above the base flood elevation and securely anchored to an adequately anchored foundation system to resist flotation collapse and lateral movement; or ii) the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.
  - C. No manufactured home shall be placed in a coastal high hazard area, except in an existing manufactured home park or existing manufactured home subdivision.

6. **Recreation Vehicle:** All recreational vehicles to be placed on sites within zone A1-30, AH, AO and AE shall either: a) be on the site for fewer than 180 consecutive

days and be fully licensed and ready for highway use; or, b) meet the permit requirements of Section 4.013 and the elevation and anchoring requirements for manufactured homes listed in Section 4.030.5. A recreation vehicle is ready for highway use if it is 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.

## 7. Standards for Accessory Structures and Uses

- A. Residential accessory structures shall require a development permit pursuant to Section 4.013. If the accessory structure is valued at more than 10% of the residential structure, all requirements of the flood hazard overlay district shall apply. Otherwise, the applicant need not satisfy the submittal requirements of Section 4.013.1 - 4 or the standards of Sections 4.028 and 4.030, provided that:
- 1) The floor area of all floors of the accessory structure totals 600 square feet or less.
  - 2) The accessory structure shall be used only for parking and storage.
  - 3) The accessory structure shall be designed to have low flood damage potential.
  - 4) The accessory structure shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of flood waters.
  - 5) The accessory structure shall be firmly anchored to prevent flotation that may result in damage to other structures.
  - 6) All service facilities, such as electrical and heating equipment associated with the accessory structure, shall be elevated to a height of one foot above the base flood elevation.
- B. When accessory structures built under the provisions of this section exceed a value greater than ten (10) percent of the value of the principal residential structure, substantial increases in insurance rates may result.

### Section 4.032 Floodway

Located within areas of special flood hazard are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, erosion potential, the following provisions apply:

- 1A. Encroachments, including fill, new construction, substantial improvements, and other development is prohibited unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge. A

registered civil engineer shall certify all analysis.

- 1B. Fish enhancement structures shall be permitted where a qualified hydraulic or hydrology professional provides a feasibility analysis and certification that the project was designed to keep any rise in 100-year flood levels as close to zero as practicable and that no structure will be impacted by the development. In making the determination that the project was designed to keep any rise in 100-year flood levels as close to zero as practicable and that no structure will be impacted by the development, the analysis shall have considered the cumulative impact of the proposed project in conjunction with other developments that have been approved in the floodway in the vicinity of the proposed project.
2. The county may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the county first applies for a conditional FIRM and floodway revision, fulfils the requirements for such revisions and receives the approval of the Federal Emergency Management Agency.
3. If Section 4.032 (1)A or (2) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 4.028 and 4.030.
4. Where no regulatory floodway is designated, no new construction, substantial improvement, or other development, including fill, shall be permitted within the A1-30 and AE zones unless it is demonstrated that the cumulative effect of the proposed development, when combined with other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point in the community.

#### Section 4.034 Coastal High Hazard Area

Coastal high hazard areas (Zones V1-30, VE and V) are located within the areas of special flood hazard. These areas have special flood hazards associated with high velocity waters from tidal surges, and therefore, in addition to meeting all applicable provisions in this chapter, the following provisions shall also apply:

1. All new construction and substantial improvements 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 to 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 any given year (one-hundred-year mean recurrence interval);
- C. 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 subsections (1)(A) and (1)(B) above.
2. The Planning Department shall 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 and whether or not such structures contain a basement. A record of all such information shall be retained.
  3. All new construction shall be located landward of the reach of mean high tide.
  4. All new construction and substantial improvements shall have the space below the lowest floor either free of obstruction or constructed with nonsupporting breakaway walls, open wood latticework 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 ten and no more than twenty pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of twenty 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 a 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 (one-hundred-year mean recurrence interval).
  5. 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.
  6. The use of fill for structural support of buildings is prohibited.
  7. Manmade alteration of sand dunes which would increase potential flood damage is prohibited.

8. No manufactured home shall be placed in a coastal high hazard area, except in an existing manufactured home park or existing manufactured home subdivision. Such a manufactured home shall be placed in conformance with the requirements of Section 4.030.5.B.
9. Recreational vehicles shall be placed on the site for fewer than 180 consecutive days and be fully licensed and ready for highway use. A recreation vehicle is ready for highway use if it is 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.

#### Section 4.036 Specific Standards for Areas of Shallow Flooding (AO and AH Zone)

In all areas of special flood hazards designated as areas of shallow flooding, the following provisions shall apply:

1. All new construction and substantial improvements of residential structures shall have the lowest floor including basement elevated to one foot plus the depth number specified on the FIRM above the highest adjacent grade on the property. The adjacent grade is defined to be the natural or existing grade of the site prior to the proposed site alteration. If no depth number is specified on the FIRM, the lowest floor including basement shall be elevated to at least two feet above the highest adjacent grade.
2. All construction and substantial improvement of non-residential structures shall:
  - A. Have the lowest floor including basement elevated to one foot plus the depth number specified on the FIRM above the highest adjacent grade on the property. The adjacent grade is defined to be the natural or existing grade of the site prior to the proposed site alteration. If no depth number is specified on the FIRM, the lowest floor including basement shall be elevated to at least two feet above the highest adjacent grade; or
  - B. Together with attendant utility and sanitary facilities be completely flood proofed to meet the flood proofing standard of Section 4.030.2
3. Provide adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.
- II. Amend the Standards Document, Section S3.650- 3.660, Flood Hazard Requirements by deleting the section in its entirety and replacing Section S3.650 with Tsunami Inundation Zone, Review Required.

#### Section S.3.650 Tsunami Inundation Zone, Review Required

Pursuant to OAR 632-05-050 Tsunami Inundation Zone, persons proposing new construction of or the conversion to essential facilities, hazardous facilities, major

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structures, or special occupancy structures are required to contact the Oregon Department of Geology and Mineral Industries (DOGAMI) at the earliest reasonable date for a consultation regarding the requirements of ORS 455.446 and 455.447 that pertain to their proposed facility or structure. As used in this section, "essential facility" means hospitals and other medical facilities having surgery and emergency treatment areas, fire and police stations, tanks or other structures containing housing or supporting water or fire suppression materials or equipment required for the protection of essential or hazardous facilities or special occupancy structures, emergency vehicle shelters and garages, structures and equipment in emergency-preparedness centers, standby power generating equipment for essential facilities, and structures and equipment in government communication centers and other facilities required for emergency response. As used in this section, "hazardous facility" means structures housing supporting or containing sufficient quantities of toxic or explosive substances to be of danger to the safety of the public if released. As used in this section, "special occupancy structure" means covered structures whose primary occupancy is public assembly with a capacity greater than 300 persons, buildings with a capacity greater than 250 individuals for every public, private or parochial school through secondary level or child care centers, buildings for colleges or adult education schools with a capacity greater than 500 persons, medical facilities with 50 or more resident, incapacitated patients not included in facilities mentioned above, jails and detention facilities, and all structures and occupancies with a capacity greater than 5,000 persons.

#### Section S. 3.655 Verification of Review

Prior to the issuance of a development permit for a regulated structure or facility, the developer of that structure or facility shall present verification of consultation with DOGAMI, or verification of an exception.



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## PROPOSED AMENDMENTS TO THE LWDUO FOR SPECIAL DISTRICTS

**Section 3.030. Special Purpose Districts.** A special purpose district is an overlay district which may be combined with any portion of any zone as appropriate to the purpose of the district. The regulations of a special purpose district consists of additional sections of this Ordinance and additional standards. Some of these regulations are supplementary and other preempt the regulations of the underlying zone, and the regulations of the special purpose district and the zone shall all apply. Where these regulations conflict the regulations that are more restrictive shall control the boundaries of special purpose districts, except as indicated below are shown on the Clatsop County Land and Water Development Map and Columbia River Estuary Resource Base Maps.

1. The boundaries of the Flood Hazard Overlay (FHO) district shall be the areas of flood hazards identified by the Federal Insurance Administration in a report entitled: Flood Insurance Study, Clatsop County, Oregon Unincorporated Areas, dated January, 1978 and accompanying Flood Insurance Rate Maps (FIRM) and Flood Boundary and Floodway maps dated effective July 3, 1978. This report and maps are hereby adopted by this reference as a part of this Ordinance.
2. The boundaries of the Geologic Hazards Overlay (GHO) district are identified in the geologic hazard overlay zone:
3. The boundaries of the Beaches and Dunes Overlay (/BDO) District shall be the areas of all beach and dune landforms to the eastern limit of Highway 101
4. The boundaries of the Dredged Material Disposal (/DMD) Overlay District, Mitigation Site Overlay Reserve (/MIT) District and Restoration Inventory Sites (/RI) Overlay District shall be the areas of Dredged Material disposal, Mitigation and Restoration identified on the Columbia River Estuary Resource Base Maps dated September 30, 1983. These maps are hereby adopted by reference as a part of this Ordinance.
5. The boundary of the Coastal Shorelands boundary shall be the following:
  - a. Elk Creek Estuary Coastal Shorelands boundary as identified on the Elk Creek Estuary Map of the Elk Creek Estuary section of the Estuarine Resources and Coastal Shorelands Element of the Clatsop County Comprehensive Plan dated September 30, 1983; and
  - b. Necanicum River Estuary Coastal Shorelands boundary as identified on the Elk Creek Estuary Map of the Elk Creek Estuary section of the Estuarine Resources and Coastal Shorelands Element of the Clatsop County Comprehensive Plan dated September 30, 1983; and
  - c. Columbia River Estuary Coastal Shorelands boundary as identified on the Columbia River Estuary Resource Maps dated September 30, 1983; and
  - d. Coastal Shorelands boundary as identified on the Ocean and Coastal Lake Shorelands Maps of the Ocean and Coastal Lake Shorelands of the

Estuarine Resources and Coastal Shorelands Element of the Clatsop  
County Comprehensive Plan dated September 30, 1983.

These maps are hereby adopted by this reference as a part of this Ordinance.

Each special purpose district and the abbreviated designation suffix are listed in Table 3.030.

Table 3.030

<u>Special Purpose Districts</u>	<u>Abbreviated Designations</u>
Flood Hazard Overlay	/FHO
Geologic Hazard Overlay	/GHO
Beaches and Dunes Overlay	/BDO
Shorelands Overlay	/SO
Planned Development Overlay	/PDO
Site Design Review Overlay	/SDRO
Aquifer Reserve Overlay	/ARO
Sensitive Bird Habitat Overlay	/SBHO
Dredged Material Disposal Overlay	/DMD
Mitigation Site Overlay Reserve	/MIT
Restoration Inventory Overlay	/RI
Destination Resort Overlay	/DRO
Quarry and Mining Overlay	/QMO

## Section 3 Beaches and Dunes Amendments

PROPOSED AMENDMENTS  
COMPREHENSIVE PLAN  
BEACHES AND DUNES POLICIES

Goal 18 - Beaches and Dunes

Goal

To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas; and

To reduce the hazard to human life and property from natural or man-induced actions associated with these areas.

Beaches and Dunes Policies

1. Uses permitted on the beach, the area located west of the statutory Vegetation Line as established and described by ORS 390.770, or the line of established upland shore vegetation, whichever is further inland, shall be consistent with the requirements ORS 390.605 - 390.725 and Oregon Administrative Rules adopted pursuant thereto. The County will coordinate its actions in beach areas with the Oregon Department of Parks and Recreation. Residential development and commercial and industrial buildings are prohibited.
2. Uses permitted on active foredunes, on other foredunes which are conditionally stable and are subject to ocean undercutting or wave overtopping, and on interdune areas (deflation plains) that are subject to ocean flooding shall be limited to low intensity uses which have minimal impact on the dune system and which have a minimal monetary value. Residential developments and commercial and industrial buildings are prohibited.
3. The County, in making land use decisions in beach and dune areas, other than older stabilized dunes, shall consider the impact of the proposed development on the site and on adjacent areas, and the methods that are proposed for protecting the site and adjacent areas from any potential adverse effects of the proposed development.
4. The stability of all types of dunes, in relationship to the potential for wind erosion, is based on the maintenance of its vegetative cover. For this reason, the county shall implement a wind erosion control program that minimizes site disturbance, provides for temporary and permanent sand stabilization, and requires the continued maintenance of newly established vegetation.
5. On active and conditionally stable dunes, pedestrian, bicycle, equestrian and vehicular circulation shall be managed to minimize adverse impacts to dunes and their stabilizing vegetation

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PROPOSED AMENDMENT  
COMPREHENSIVE PLAN BACKGROUND REPORT  
BEACHES AND DUNES

I. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes, Background (Inventory) Data, Section 2 Beach and Dune Formation, Accretion, Erosion and Migration, codified form as follows:

The report titled "Coastal Erosion Hazard Zones Along the Clatsop Plains Oregon: Gearhart to Fort Stevens," prepared by Jonathan Allen and George Priest in 2001 provides the following description of the Clatsop Plains:

*The Clatsop Plains are a barrier-beach ridge system that has prograded (advanced) seaward over the past 4000 years. Between 4050 years BP and AD 1700, the coastline is estimated to have accreted an average rate of 0.7 m/yr. (2.3 ft/yr.) (Woxell, 1998). From 1700 (when the last major subduction zone earthquake occurred), to 1885 (Prior to jetty construction), the Clatsop plains accreted at a slightly reduced rate of 0.5 m/yr. (1.6 ft/yr.), with an average rate of 3.3 m/yr. (10.8 ft/yr.) (Woxell). During the last 120 years the Clatsop Plains have continued to prograde seaward, but at rates exceeding several meters per year due to large sand supplies from the Columbia River, and as a result of jetty construction at the mouth of the Columbia River (Gelfenbaum and others 1999). These rates ranged from 2.0 to 5.8 m/yr. (6.6 to 19 ft/yr.), with an average rate of 3.3 m/yr. (10.8 ft/yr.) (Woxell, 1998). Since about the mid-1920s the rate of coastal erosion advance slowed, while erosion has been the dominant shoreline response along the northern end of the Clatsop Plains (i.e. about 6 km (3.7 miles) of Clatsop Spit is presently eroding. The recent phase of erosion may be a function of either: a. change in the sedimentation budget of the Columbia River cell. . . periodic climate shifts (e.g. the Pacific Decadal Oscillation) which cause sediments to be re-distributed along the coast (e.g. 25 years of relatively persistent El Nino conditions since the mid-1790s), or as a result of an increase in the frequency and magnitude of storms in the North Pacific (e.g. Graham and Diaz, 2002) an hence [increased] wave energies along the Oregon coast (e.g. Allen and Komar, 2000a 2000b).*

II. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes , Background (Inventory) Data, Section 2 Beach and Dune Formation, Accretion, Erosion and Migration, fourth and fifth paragraph to read as follows as follows: D

The beaches and dunes were first inventoried and classified according to their stability in the document, Beaches and Dunes of the Oregon Coast developed by the USDA Soil Conservation Service and the Oregon Coastal Conservation and Development Commission (OCCDC March, 1975). The OCCDC report mapped the dunes into three broad associations: active dunes, recently stabilized dunes, and older stabilized dunes. The extent, distribution and mapping of these dune forms are found in Beaches and Dunes of the Oregon Coast. Interdune areas or deflation plains were included in OCCDC mapping but not as a separate association. They were updated in a subsequent study, Significant Shoreland and Wetland Habitats in the Clatsop Plains by Duncan Thomas.

In the past, Clatsop County has relied upon the following documents for its inventory and classification of beaches and dunes:

1. Beaches - - Beaches and Dunes of the Oregon Coast, by USDA Soil Conservation Service and OCCDC, March 1975.
2. Dunes -
  - a. Beaches and Dunes of the Oregon Coast by USDA Soil Conservation Service for Older Stabilized Dune and Recently Stabilized Dune Forms;
  - b. Stability of Coastal Dunes, Clatsop County, Oregon, by Leonard Palmer 1978 for Active Dune forms;
  - c. Significant Shoreland and Wetland Habitats in the Clatsop Plains, by Duncan Thomas for Interdune (or Deflation Plain) Forms; and
  - d. Horning Geosciences Report, by Tom Horning September 22, 1998 (Ordinance No.02-05).

These documents formed the basis for the Goal Exceptions that the county adopted in conjunction with establishing the Surf Pines construction setback line (Ordinance 83-17) and the analysis that formed the basis for establishing the Pinehurst construction line by Ordinance 92-90. The Horning Report established the portions of Tax Lot 300, the Charlton property, which were no longer within the active dune area.

Since the publication of the above reports, a new and more detailed report analyzing the characteristics of the Clatsop Plains has been prepared. That report "Coastal Erosion Hazard Zones Along the Clatsop Plains Oregon: Gearhart to Fort Stevens," prepared by Jonathan Allen and George Priest in 2001 is briefly discussed here and is adopted by reference into this document. As described in the executive summary of the report:

*" This report describes and documents a range of coastal hazard zones distinguished for the Clatsop Plains. In particular, the report focuses on identifying maximum potential erosion distances for dune-backed shorelines using the geometric model developed by Komar and others (1999). Four hazard zones have been identified for the Clatsop Plains, an active hazard zone high, moderate and low risk zones that respectively depict decreasing risks of becoming active the next 60-100 years. The landward boundary of the low hazard zone defines the outermost limit of expansion of the active hazard zone associated with a catastrophic event such as a great earthquake on the Cascadia subduction zone, coupled with severe storms."*

The findings and scenarios contained in the report, "Coastal Erosion Hazard Zones Along the Clatsop Plains Oregon: Gearhart to Fort Stevens," have been used to establish the parameters of the county's regulations for beach and dune areas on the Clatsop Plains.

III. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes, Background (Inventory) Data, Section 3 Dune Classification and Limitations by deleting this section in its entirety.

IV. Amend Section 18 of the Clatsop County Comprehensive Plan, Beaches and Dunes, Background (Inventory) Data, by deleting the Map titled "Generalized Beaches and Dunes Clatsop Plains Planning Area."



PROPOSED AMENDMENTS  
LAND AND WATER AND DEVELOPMENT AND USE ORDINANCE (80-14  
BEACHES AND DUNES

- I. Amend Section 4.040, Active Dune Overlay District to read as follows:

Section 4.040. Beach and Dune Overlay District (A /BDO).

Section 4.041. Purpose. The intent of the beach and dune overlay is to regulate uses and activities in the affected areas in order to: ensure that development is consistent with the natural limitations of the oceanshore; ensure that identified recreational, aesthetic, wildlife habitat and other resources are protected; conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of beach and dune areas; and to reduce the hazards to property and human life resulting from both natural events and development activities.

Section 4.042. Applicability The beach and dune overlay (BDO) includes the following beach and dune areas:

1. The beach, which extends from extreme low tide landward to the Statutory Vegetation Line established and described in ORS 390.770, or the line of established upland shore vegetation, whichever is further inland;
2. The dune hazard area, which extends From the Statutory Vegetation Line established and described by ORS 390.770 or the line of established upland shore vegetation, which ever is further inland, landward to the construction setback line.

The construction setback line is established as follows:

- A. A line 570 feet landward of the Statutory Vegetation Line established and described by ORS 390.770 for the area north of Surf Pines to the Columbia River south jetty.
  - B. The Pinehurst construction setback line, established and described in Ordinance 92-90;and
  - C. The Surf Pines construction setback line, established and described in Ordinance 83-17 and extended north to include T7N, R10W, Section 16C, Tax Lot 300 (Charlton Property).
3. The dune construction area, which extends from the construction setback line as defined in the section above, landward to the eastern limit of Highway 101.

Section 4.043. Relationship to the Underlying Zone. Uses and activities permitted in the Beach and Dune Overlay zone(BDO) are subject to the provisions and standards of the underlying zone and this chapter. Where the provisions of this district and the underlying zone conflict, the provisions of this district shall apply.

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1  
2 Section 4.044 State Parks and Recreation Department Regulated Uses. Uses and  
3 activities permitted on the beach, as defined in Section 4.042(1), are those permitted  
4 subject to review and approval by the Oregon Parks and recreation Department  
5 consistent with ORS 390.605-390.725 and OAR Divisions 20-30.  
6

7 Section 4.045. Permitted Development and Uses. The following developments and  
8 uses are permitted under a Type I procedure subject to specific development standards.  
9

10 1. In the dune hazard area as defined in Section 4.042(2),  
11

- 12 A. Maintenance and repair of existing structures, including roads and subsurface  
13 disposal systems.
- 14 B. Drainage improvements, including storm water outfall.
- 15 C. Foredune breaching, where:
  - 16 1). The breaching is required to replenish sand supply in interdune areas, or  
17 is undertaken on a temporary basis for emergency purposes such as fire  
18 control or the alleviation of a flood hazard.
  - 19 2). There are no other reasonable alternatives to alleviate the emergency.
  - 20 3). The breaching does not endanger existing development.
  - 21 4). The area affected by the breaching is restored according to an approved  
22 restoration plan prepared by a registered professional geologist or certified  
23 engineering geologist, where the restoration plan shall include appropriate  
24 revegetation; and
  - 25 5). At a minimum, foredunes shall be restored to a dune profile which  
26 provides flood protection equivalent to that prior to breaching.
- 27 D. Remedial grading, in the following cases:
  - 28 1). Clearing of sand which is inundating houses or commercial buildings and  
29 their associated improvements. Sand may be graded up to thirty-five feet  
30 from a building's foundation subject to the following conditions:
    - 31 (a). The area to be graded constitutes open sand dunes or the back slope  
32 of a foredune,
    - 33 (b). There is no modification to the crest of a foredune,
    - 34 (c). At a minimum, the area graded shall maintain the one hundred year  
35 flood elevation as established by the county's Flood Insurance Rate Map  
36 (FIRM), and
    - 37 (d). No grading shall occur seaward of the Statutory Vegetation Line,  
38 except for placement of material removed from the structure in question;
  - 39 2). Excavation necessary for the purpose of placing a beachfront protective  
40 structure;
  - 41 3). Clearing of sand which is inundating a public street and is interfering with  
42 vehicular
  - 43 4). Excavation of sand necessary to alleviate stormwater build-up;
  - 44 5). Minor reshaping of the forward portion of a dune necessary to provide an  
45 even slope for the planting of stabilizing vegetation; and

1           6).     Where feasible, all graded sand shall be placed on the beach or foreslope  
2                     portion of the adjoining dune. Where not feasible, then sand shall be  
3                     placed at a location approved by the county. In no event shall sand be  
4                     removed from the beach and dune system.

5     E.     Maintenance of existing riparian vegetation, including the planting of additional  
6             riparian vegetation.

7  
8     2. In the dune construction area defined in Section 4.042(3), any permitted uses  
9     allowed in the underlying zone subject to the applicable standards of that zone and the  
10    applicable general standards of Section 4.049.

11  
12   Section 4.0446. Development and Uses Permitted with Review. The following  
13    developments and uses are permitted under a Type II procedure, Sections 5.040 to  
14    5.050, subject to the applicable general standards of Section 4.049.

15  
16    1. Beachfront protective structures seaward of the Statutory Vegetation Line established  
17    and described by ORS 390.770 or the line established upland shore vegetation,  
18    whichever is further inland require a permit from the Oregon Parks and Recreation  
19    Department and the County. The County's review of beachfront protective structures  
20    shall be coordinated with the Oregon Parks and Recreation Department.

21  
22    2. The emergency placement of riprap on the beach, as defined above and in Section  
23    4.042(1) requires a permit from the Oregon Parks and Recreation Department (OPRD).

24  
25    3. No construction is permitted prior to the issuance of an OPRD permit.

26  
27    4. On the beach, as defined in Section 4.042(1), and in the dune hazard area as  
28    defined in section 4.042(2), and in the dune construction area as defined in section  
29    4.042(3):

30  
31       A. Pedestrian and Equestrian Trail.

32  
33       1). To minimize the loss of vegetation, fencing adjacent to the trail may be  
34       required in order to restrict traffic to the designated trail, and

35       2). Subdivisions or other developments of ten or more dwelling units shall  
36       provide public trails to the beach.

37  
38       B. Structural shoreline stabilization

39  
40       1). The priorities for beachfront protection, from highest to lowest, are:

41           (a). Proper maintenance of existing vegetation.

42           (b). Planting of riparian vegetation.

43           (c). Rip-rap.

44           (d). Bulkhead or seawall.

- 1           2).   Proposals for rip-rap, bulkheads, or seawalls shall demonstrate that:  
2           (a).   The beachfront protective structure is located in an area where the  
3                county has identified that development existed on or before  
4                January 1, 1977.  
5           (b).   The development is being threatened by erosion hazard.  
6           (c).   Non-structural means of shoreline stabilization cannot provide  
7                adequate erosion protection.  
8           (d).   The structure is the minimum necessary to provide for the level of  
9                protection that has been identified.  
10          (e).   The structure is placed as far landward as is practical, consistent  
11                with maintaining existing riparian vegetation.  
12          (f).   Potential adverse impacts on adjacent property are minimized.  
13          (g).   Existing public access is preserved. The county may require that  
14                the shoreline stabilization incorporate steps or other improvements  
15                to enhance public access to the beach.  
16          (h).   Visual impacts are minimized.  
17          (i).   Any rip-rap shall be covered with sand and revegetated with beach  
18                grass, willow or other appropriate vegetation.

19  
20       C. Sand stabilization program

- 21  
22       1). The program shall be prepared by a qualified individual approved by the  
23       County  
24       2). The program shall be based on an analysis of the area subject to accretion  
25       or erosion. The area selected for management shall be found, based on the  
26       analysis, to be of sufficient size to successfully achieve the program objectives.  
27       3). The program shall include specifications on how identified activities are to be  
28            undertaken. The specifications should address such elements as: the  
29       proposed type of vegetation to be planted or removed; the distribution, required  
30       fertilization and maintenance of vegetation to be planted; the location of any sand  
31       fences; and the timing of the elements of the proposed program.  
32       4). Fire-resistant species are the preferred stabilizing vegetation within twenty-  
33       five feet of existing dwellings or structures. Fire resistant vegetation should only  
34       be planted when the foreslope and crest of the dune are adequately stabilized to  
35       prevent significant accumulation of windblown sand.  
36       5). Where the placement of sand fences is proposed, evidence shall be provided  
37       that the planting of vegetation alone will not achieve the stated purpose of the  
38       sand stabilization program. Fencing may be permitted on a temporary basis to  
39       protect vegetation that is being planted as part of the program, or to control the  
40       effects of pedestrian beach access on adjacent areas.

41  
42       5. In the dune construction area as defined in section 4.042 (3), any permitted uses  
43       allowed in the underlying zone subject to the applicable standards of that zone and the  
44       applicable standards of Section 4.049.  
45

1 Section 4.047. Conditional Development and Use. The following developments and  
2 uses may be permitted under a Type IIa procedure Sections 5.010 to 5.025, subject to  
3 the applicable general of Section 4.049.  
4

- 5 1. On the beach, as defined in section 4.042(1), and in the dune hazard area as  
6 defined in section 4.042(2):  
7

8 A. Foredune grading

9 Foredune grading for view enhancement or to prevent sand inundation may be  
10 allowed only in foredune areas that were committed to development on or before  
11 January 1, 1977 and where an overall plan for foredune grading is prepared.  
12

13 1). A foredune grading plan shall be prepared by a qualified expert approved by  
14 the County.

15 2). A foredune grading plan shall be based on an consideration of factors  
16 affecting the stability of the shoreline to be managed including sources of sand,  
17 ocean flooding, and patterns of accretion and erosion (including wind erosion),  
18 and the effects of beachfront protective structures and jetties.

19 3). The foredune grading plan shall:

20 (a) Cover an entire beach and foredune area subject to an accretion  
21 problem, including adjacent areas potentially affected by changes in  
22 flooding, erosion or accretion as a result of dune grading;

23 (b) Specify minimum dune height and width requirements to be  
24 maintained for protection from flooding and erosion. The minimum height  
25 for flood protection is four feet above the one hundred year flood elevation  
26 established by the FEMA flood insurance studies;

27 (c). Identify and set priorities for low and narrow dune areas which need to  
28 be built up;

29 (d). Prescribe standards for redistribution of sand and temporary and  
30 permanent stabilization measures including the timing of these activities;  
31 and

32 (e). Prohibit removal of sand from the beach-foredune system.  
33

- 34 2. In the dune construction area as defined in section 4.042(3), any conditional uses  
35 allowed in the underlying zone subject to applicable standards of that zone and  
36 the applicable general standards of Section 4.049.  
37

38 Section 4.048 Prohibited Activities. The following activities are prohibited in all areas  
39 within the beach and dune overlay (BDO) as defined in Section 4.042:  
40

- 41 1. Removal of sand from the beach or dune system.  
42 2 Removal of stabilizing vegetation, except in conjunction with a permitted  
43 development or use.

1  
2 Section 4.049. General Development and Use Criteria. The following criteria are  
3 applicable to developments and uses in the BDO, in addition to those specific standards  
4 identified in Sections 4.044 through 4.047.  
5  
6

- 7 1. For development located in all areas in the BDO as defined by Section 4.042,  
8 other than older stabilized dunes, findings shall address the following:  
9  
10 A. The adverse effects the proposed development might have on the site and  
11 adjacent areas;  
12 B. Temporary and permanent stabilization proposed and the planned  
13 maintenance of new and existing vegetation;  
14 C. Methods for protecting the surrounding area from any adverse effects of  
15 the development;  
16 D. Hazards to life, public and private property, and the natural  
17 environment which may be caused by the proposed use.  
18 E. How the proposed development will not result in the draw down of the  
19 groundwater supply in a manner that would lead to:  
20 1). The loss of stabilizing vegetation;  
21 2). The loss of water quality;  
22 3). Salt water intrusion into the water supply; or  
23 4). Significant lowering of interdune water level. Building permits for  
24 single-family dwellings are exempt from this requirement if appropriate  
25 findings are provided at the time of subdivision approval.  
26  
27 2. For development on the beach, as defined in section 4.042(1), and in the dune  
28 hazard area as defined in section 4.042(2) a geotechnical report in conformance  
29 with Section 4.030, shall be required by the Planning Director prior to the  
30 issuance of a development permit.  
31  
32 3. For development in the dune hazard area as defined in section 4.042 (2) and in the  
33 dune construction area as defined in section 4.042(3) a wind erosion control plan  
34 shall be required by the Planning Director prior to the issuance of a development  
35 permit. The purpose of the wind erosion control plan is to maintain the stability of the  
36 site during periods when the vegetative cover is removed and to ensure that  
37 adjacent properties are not adversely affected. The plan shall:  
38 A. Identify areas where vegetation is to be removed and the type of  
39 vegetation to be removed;  
40 B. Describe any temporary sand stabilization measures to be used during  
41 construction;  
42 C. The proposed type of vegetation to be planted to stabilize the site after  
43 construction, including the density of planting, proposed fertilization,

- 1 method of maintenance, and timing of the planting;  
2 D. The removal of vegetation shall be kept to a minimum during site  
3 preparation and construction; and  
4 E. No site clearing is permitted prior to the issuance of the development  
5 permit for the proposed development or use. Site clearing shall occur no  
6 sooner than is necessary prior to construction. The permanent  
7 revegetation of the site shall be started as soon as is practical, but in no  
8 event later than six months after the completion of construction.  
9

10 II. Amend Section 4.060 Beaches and Dunes Overlay District, by deleting this  
11 section in its entirety.  
12

13 III. Amend the Standards Document, Beach and Dune Area Requirements, Section  
14 S4.100 - 4.138 by deleting it in its entirety.  
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PROPOSED AMENDMENTS to the Clatsop County Land And Water and Development and Use Ordinance 80-14 (LWDUO) and Standards Document. Proposed new text is shown in bold as follows:

## OCEANFRONT AVERAGING

- I. Amend the Development Ordinance, Section 1.030 Definitions, by adding a new definition of ocean yard to read as follows:

**Ocean yard means a yard measured horizontally and at a right angle from the Statutory Vegetation Line established and described by ORS 390.770 to the nearest point of a building, as building is defined in Section 3.015. An ocean yard may be a front yard, rear yard, or a side yard.**

- II. Amend the LWDUO, Section 3.108 RSA-Single Family Residential Zone (RSA-SFR) and the LWDUO Standards, by adding a new subsection 8, Oceanfront Setback to read as follows, and renumbering subsequent subsections:

**8. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- III. Amend the LWDUO, Section 3.150 Coastal Residential Zone (CR) and LWDUO Standards, by adding a new subsection 8, Oceanfront Setback to read as follows, and renumbering subsequent subsections:

**8. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- IV. Amend the LWDUO, Section 3.260 Rural Community Residential Zone (RCR) and the LWDUO Standards, by adding a new subsection 8, Oceanfront Setback to read as follows, and renumbering subsequent sections:

**8. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- V. Amend the LWDUO, Section 3.332(5) Tourist Commercial Zone (TC) and the LWDUO Standards, Setbacks by adding a new subsection (f) to read as follows:

**f. For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line established by Section 3.015 Oceanfront Setback.**

- VI. Amend the LWDUO Standards Document to read as follows:

**Section 3.015 Oceanfront Setback.** For lots abutting the oceanshore, the ocean yard shall be determined by the oceanfront setback line.

1. The location of the oceanfront setback line for a given lot depends on the location of buildings on lots abutting the oceanshore in the vicinity of the proposed building site and:
  - A. For the Clatsop Plains area the location and orientation of the following reference lines
    - 1) Described as the construction setback line in section 4.042: A line 570 feet landward of the Statutory Vegetation Line established and described by ORS 390.770, or the circa 1920's shoreline, whichever is further inland for the area north of Surf Pines to Columbia River south Jetty.
    - 2) Described as the Pinehurst construction setback line, in Ordinance 92-90; and
    - 3) Described as the Surf Pines construction setback line, in Ordinance 83-17 and extended north to include T7N, R10W, Section C Tax Lot 300 (the Charlton property).
  - B. For the Southwest Coastal Planning Area and elsewhere along the Clatsop County coast, the location and orientation of the Statutory Vegetation Line
2. For the purpose of determining the oceanfront setback line, the term "building" refers to a permanent residential or commercial structure attached to a fixed foundation on a lot. The term "building" does not include accessory structures or uses.
3. The oceanfront setback line that is established shall be parallel with the reference lines established in the preceding Section 3.015 (1) and measurements from buildings shall be perpendicular to these reference lines.
4. The setback of a building from these reference lines is measured from the most seaward point of the buildings foundation. A building's foundation excludes decks, porches, and similar building additions.
5. The oceanfront setback line for a parcel is determined as follows:
  - A. If there are legally constructed buildings within 200 feet of the exterior boundary (side lot lines) of the subject property to both the north and south, the oceanfront setback line for the subject property is the average oceanfront setback of the nearest buildings to the north and south.
  - B. If there are legally constructed buildings within 200 feet of the exterior boundary (side lot lines) of the subject property in only one direction, either the north or south, the oceanfront setback line for

1 the subject property is that of the nearest building.

2 C. If there are no legally constructed buildings within 200 feet of the  
3 exterior boundary (side lot lines) of the subject property, the  
4 oceanfront setback line for the subject property shall be established  
5 by the geotechnical report.  
6

7 6. Notwithstanding the above provisions, the Director shall require a  
8 greater oceanfront setback where information in a geotechnical report  
9 prepared pursuant to Section 4.030 indicates that a greater oceanfront  
10 setback is required to protect the proposed building from an identified  
11 coastal erosion hazard.  
12

**Exhibit E**  
**Planning Commission**  
**Resolution and Order and**  
**~~Draft~~ Minutes from the June 24, 2003 Public Hearing**

IN THE PLANNING COMMISSION  
FOR CLATSOP COUNTY, OREGON

IN THE MATTER OF LEGISLATIVE )  
AMENDMENTS TO THE )  
CLATSOP COUNTY COMPREHENSIVE PLAN )  
AND THE LAND AND WATER AND )  
DEVELOPMENT AND USE ORDINANCE 80-14 )  
AND STANDARDS DOCUMENT )  
A PERIODIC REVIEW WORK TASK NO. 2 )  
GEOLOGICAL AND FLOODPLAIN HAZARDS )  
AND BEACHES AND DUNES HAZARDS AND )  
RECOMMENDATION OF APPROVAL TO THE )  
BOARD OF COUNTY COMMISSIONERS )

RESOLUTION & ORDER

Recording Date: July 8, 2003

THE ABOVE ENTITLED MATTER came before the Planning Commission at its meeting of June 24, 2003 for public hearing and recommendation to the Board of County Commissioners; and

IT APPEARING TO THE PLANNING COMMISSION that the Planning Commission considered the proposed above request; and

IT FURTHER APPEARING TO THE PLANNING COMMISSION from reports and information provided by the Community Development Department staff that the three proposed requests as described in Exhibit "A" Staff Report Geological Hazards, Exhibit "B" Staff Report Floodplain Hazards and Exhibit "C" Staff Report Beaches and Dunes Hazards, attached hereto and by this reference made a part hereof, should be APPROVED by the County for the reasons set out in the Staff Report dated June 17, 2003; and

IT FURTHER APPEARING TO THE PLANNING COMMISSION from the oral and written testimony submitted by interested parties at the public hearings, and upon further review by the Planning Commission the recommendations include revisions to the Comprehensive Plan and the Land and Water and Development and Use Ordinance, and are codified as provided in Exhibit "D" attached herein; and

Minutes of June 24, 2003  
Clatsop County Planning Commission Regular Session  
800 Exchange Building, Suite 300  
Astoria, Oregon 97103

Chair Lynne Leland called the June 24, 2003 Planning Commission Regular Meeting to order at 1:00 pm. Planning Commissioners (P.C.) present: John Altstadt, Bruce Francis, Lynne Leland, Jeff Martin, Joe Bakkensen, and Chuck Switzer.

Staff present: Veronica Smith, Sr. Planner; Teri Allen, Planner; Rainmar Bartl, Contract Land Use Planner; and Patricia Getchell, Planning Technician.

There were no minutes to approve.

Chair Leland postponed the public forum to the end of the meeting there were no objections.

**Quasi-judicial hearing on Ft. Clatsop Combine Comprehensive Plan and Zoning Map Amendment (Teri Allen, Project Manager)**

Chair Leland opened the Quasi-Judicial hearing on Ft. Clatsop Combined Comprehensive Plan and Zoning Map Amendment. There were no ex-parte contacts, no conflicts, and no objections to the jurisdiction.

Teri Allen presented the staff report to amend the Clatsop County Comprehensive Plan/Zoning Map from F-80 (Forest 80) and M-I (Marine Industrial) to OPR (Open Space, Parks and Recreation) on property located between Lewis and Clark River and Ft. Clatsop Road in Warrenton (T7N R10W Section 1 Taxlot 1203). The staff report was submitted as "Exhibit #1", a letter dated 6/23/03 from Weyerhaeuser was submitted as Exhibit #2". Staff recommends adoption as the applicant has provided sufficient evidence to support the change and requests support for adoption by emergency clause. This change would allow for timely efficient development of the property.

The applicant is Chip Jenkins, Superintendent of Ft. Clatsop National Monument. The agent is Stacey Goldstein from Otak, Inc. Mr. Jenkins mentioned the difficulties in development in split zones, how the increased visitation will be handled with little impact to the river day use area, the scope of the planned transportation hub, ticket availability via internet and other locations, the reduction of road hazards and congestion, the biological assessment of the site completed by the state with public involvement that indicates no significant impact to the site, and showed a map of the site. The Superintendent advised that the shuttle will operate during peak summer months, that the shuttle service will be handicapped accessible, and that adjustments will be made as needed when the operations begin.

Stacey Goldstein of Otak, Inc. of 17355 S. W. Boones Ferry Rd, Lake Oswego, Oregon is with the engineering and architecture firm is available for questions. Per Superintendent



1 Jenkins the site will be used in a different way after the peak tourist activity in 2004-  
2 2006. There was a mapping error and it will be corrected per Stacey Goldstein.

3  
4 Chair Leland opened the public testimony. She advised that failure to raise an issue with  
5 sufficient specificity to afford the decision maker and the parties an opportunity respond  
6 to the issue precludes appeal to the Board based on that issue. Everyone was asked to  
7 sign in, and state their name and address before speaking.

8  
9 There were no public agency comments.

10  
11 Chair Leland called for proponents. Jan Mitchell of 362 Duane, Astoria, Oregon is a  
12 planner and works as a volunteer on bicentennial issues. She chairs a group planning a  
13 weeklong event in November of 2005 in Clatsop County, which is one (1) of fifteen (15)  
14 signature events. National attention for Ft. Clatsop has been hard won. On behalf of the  
15 bicentennial Pacific County Friends of Lewis and Clark I hope you do all you can to  
16 facilitate this project for Ft. Clatsop.

17  
18 Chair Leland called for opponents. Jay Kiddle of 91359 Ft. Clatsop Road, Astoria,  
19 Oregon commented that it appeared a park and ride was being developed not a day park.  
20 He questioned the zoning for a park and ride in the OPR zone and asked if there was  
21 another park and ride developed like this. He believed that several land uses had not  
22 been met such as citizen involvement. The neighbors saw what was being proposed a  
23 couple of weeks ago. He mentioned the traffic problems with the fair two years ago and  
24 parking at the Lee farm. He supports park and ride for the park, just not located in the  
25 park. He supports the day use area. The Lewis and Clark Fire Chief said that he had not  
26 been approached at all. There were factual errors in the submission as there is no water to  
27 the site. The Lewis and Clark Water District is not adequate to push into the Fort. He  
28 recommends saving the open lands as that is what parks are for and this proposal defeats  
29 that purpose. Once the County gives their approval they have no say over what the park  
30 does. He is asking for a delay to allow feedback from the neighbors and mentioned that  
31 the trail to the main Fort goes across private property. PC Francis asked if alternative  
32 sites had been considered for the park and ride.

33  
34 Vickie Sjostrom of 91429 Ft. Clatsop, Astoria, Oregon lives beside the new park and  
35 would like a fence so tourists won't walk onto her property. She just found out that the  
36 trailhead to the beach is there now. She did not like the idea of the park being next to her  
37 property and the overflow parking going into her property. She said the wetlands have  
38 dried up because of existing activity and wildlife may disappear but probably will come  
39 back. She has concerns about the facility now as high school kids go down and drink and  
40 there are drive by shootings. If picnic tables are there will fires be permitted and how  
41 will it affect us?

42  
43 Chair Leland asked if there were questions of the applicant. There are no plans for  
44 concession stands. There was a discussion with the previous superintendent about nature  
45 kayak tours, there is nothing currently planned.



1 Pete Field, Federal Highway Administration (FHWA) of 610 East 5<sup>th</sup> Street, Vancouver,  
2 Washington explained the bus schedules. There are two separate buses one for the River  
3 Day Use Area to the Fort which transports 150 people an hour. This bus is an ultra quiet  
4 diesel. There are nine (9) bus runs in an hour coming from the north end of the park.  
5 Additional buses feed from Gearhart, Seaside, Ft. Stevens, and Warrenton to the River  
6 Day Use Area. Two buses an hour (30 minute run) will run from Astoria, which are 4  
7 trips an hour. The buses hold 30 people that remove 10 people from the car. People park  
8 and take the bus to the Fort. Buses don't go to the southern end of the park. The  
9 Superintendent advised that they will employ the Sunset Empire District and ODOT and  
10 will not advertise parking at the park. The message is "Take the Bus". The goal is to use  
11 the parking at the Fort as little as possible. This is an attempt to control the experience so  
12 people can experience the Fort. The peak time for tourists is 2005/2006 the decline after  
13 this will still be higher than visitors today. An option is to run the bus on the weekends  
14 and during peak events. PC Francis asked if the overflow (north) parking would be used  
15 after 2006. The Superintendent said that is the plan. PC Francis asked if other sites were  
16 looked at for parking. The Superintendent replied that an environmental assessment was  
17 done and public meetings were held last fall. One letter was received in support. This  
18 was the best site.

19  
20 PC Bakkensen asked how the numbers of day tourist cars (50) in and out every hour, plus  
21 9 bus trips compared to 40 trips an hour currently. The counts were taken by Public  
22 Works. If there are only 10 cars more per hour why not use the existing facility? The  
23 idea is to preserve the site as people are visiting so they don't hear the cars. Pete Fields  
24 explained the park and ride alternatives (airport, county industrial sites, and private sites).  
25 There will be marketing to get the message out and a grant has been received to write the  
26 marketing plan. Ticketing will be controlled by the number of visitors and available at  
27 various locations. There will be restrooms and drinking fountains, but no concession  
28 stands. The issue of the pedestrian trail to the north is still to be worked out as to  
29 purchasing the property if it is available.

30  
31 Ms. Smith, Senior Planner responded to a question raised that the process about statewide  
32 planning goals was not met. Our process is clear on how to provide public input.  
33 Written notice was sent to property owners so they have an opportunity to be here and  
34 comment. There are no additional requirements for notice. The use in an OPR zone is a  
35 lesser impact than the MI zone. Other types of development are not germane to the zone  
36 change. As a courtesy we provide notice to other agencies. Ms. Allen advised that there  
37 were no letters received from agencies except Division of State Lands (DSL). State Park  
38 regulations determine if campfires are permitted. As long as a use is allowed in the zone  
39 there is no additional review. With a National Park it is logical to assume that it would  
40 attract people from outside of the area; and they should provide adequate parking.

41  
42 PC Altstadt asked staff if there was water drainage assessment to the site. Ms. Smith  
43 advised that a Type I permit looks at Erosion Control and Design. There is very little  
44 regulation to limit the type of water run off and no design review. The permeable surface  
45 that is not paved is 2.9 of 3.1 acres. Run off will go into a ditch, which is regulated by

1 DEQ. Permits are required by DSL and the Corps of Engineers and proof of water  
2 availability is a condition required at the time the development permit is signed off.

3  
4 Chair Leland closed the public testimony and called for discussion from the Planning  
5 Commission Members. PC Bakkensen asked when the Board of Commissioners would  
6 hear this proposal? There will be a public hearing on this July 23, 2003.

7  
8 **Chuck Switzer moved and Joe Bakkensen seconded that we approve the**  
9 **recommended zone change including adoption of the request by emergency clause.**  
10 **The motion carried unanimously.**

11  
12 Chair Leland opened the Legislative hearing on Periodic Review Work Task No. 2:  
13 Natural Hazards, Geologic Hazard Overlay Zone and Oceanfront Averaging; Flood  
14 Hazard, Overlay District; Beaches and Dunes. There were no conflicts, and no objections  
15 to the jurisdiction. Chair Leland called for the staff report.

## 16 17 **NATURAL HAZARDS**

### 18 **Beaches and Dunes (Rainmar Bartl, Project Manager)**

19 Mr. Bartl presented the staff report on the Periodic Review focusing on Natural Hazards.  
20 Goal 18 Statewide and Comprehensive Plan Goals and Policies addressing the Beaches  
21 and Dunes issues. The changes will make it consistent with statewide planning goals and  
22 with the existing language. Staff recommends approval subject to changes.

23  
24 The following exhibits were entered into the record:

25 **A** (Proposed Comprehensive Plan Background Report Amendments)

26 **B** (Proposed Amendments to Comprehensive Plan Beaches and Dunes Policies)

27 **C** (Proposed Amendments to Comprehensive Plan Beaches and Dunes Policies-  
28 Annotated)

29 **D** (Proposed Amendments to Land and Water Use and Development Code and Standards  
30 Document-Beaches and Dunes Overlay Zone)

31 **E** (Proposed Amendments to Land and Water Use and Development Code and Standards  
32 Document-Annotated)

33  
34 Amendments to the background material include new methodology. The Palmer Report is  
35 replaced by a report by Jonathan Allan and George Priest. The proposed amendments to  
36 the comprehensive plan policies consolidate all the county's beaches and dunes policies  
37 in one location. It establishes the construction zone set back lines; the two existing are  
38 Surf Pines (83-17) and Pinehurst (92-90).

39  
40 A letter from John McGowan dated 6/24/03 was submitted into the record as Exhibit F.

### 41 42 **Flood Hazards, Overlay District (Rainmar Bartl, Project Manager)**

43 The next area is the Flood Hazards Overlay listed under Goal #7 Natural Hazards with  
44 amendments to make the plan consistent with statewide planning goals. He recommends  
45 approval of this amendment to the Board. The proposed changes implement the FEMA  
46 flood program. The changes are technical in nature and cover construction techniques.

1 The changes are minor technical changes and combine the development code and  
2 standards into one document.

3  
4 **Geologic Hazard Overlay Zone and Oceanfront Averaging (Rainmar Bartl, Project  
5 Manager)**

6 Mr. Bartl presented the staff report for Geologic Hazards, which are covered in Goal #7.  
7 They bring the comp plans and goals and policies into one document and make them  
8 consistent with the statewide planning goals. He recommends approval to the Board.  
9 This is updated information since the last review when DLCD amended Goal 7 language  
10 and all of it is included in the proposal. The GHO zone language regarding existing  
11 structures allows the Development Director more authority to require less detailed site  
12 investigations in areas where there is no hazard. This proposal is recommending  
13 changing from a Type 2 procedure to Type I. The Oceanfront Averaging section is new  
14 and will be established by a construction line. This will use an ocean view equity  
15 approach.

16  
17 Chair Leland asked if there were questions of staff. There were none. There were  
18 changes made during the work meeting which include the following:

19  
20 Beaches and Dunes

21 Exhibit B, Page 1, Line 23 Delete repeat of the phrase "residential development"

22  
23 Staff Report, Page 7, Line 23 Review of all shore

24  
25 Appendix D, LWDUO, Page 4, Section 4.046 (2) (i) any rip rap covered with sand  
26 (delete)

27  
28 Natural Hazards

29 Exhibit C, Page 1, Line 35, GHO, Policy #7 County shall encourage cluster development

30  
31 Ocean Front Averaging

32 Exhibit E, GHO, Page 2, Line 22, 3.015 statutory vegetation line, not upward shore  
33 vegetation

34  
35 Exhibit E, Page 2, Line 39 eliminate 38 & 39 "or is of minimal value" delete

36  
37 Chair Leland opened the hearing for public testimony. Failure to raise an issue with  
38 sufficient specificity to afford the decision maker and the parties an opportunity to  
39 respond to the issue precludes an appeal to the Board or to LUBA based on that issue.  
40 All speakers were asked to sign in and state their name and address before speaking.

41  
42 Chair Leland called for public agency comments. There were none.

43  
44 John McGowan of 33104 Malarkey Lane, Surf Pines, Warrenton, Oregon said that his lot  
45 overlooks tax lot 300. He is interested in what happens with this property and felt  
46 development would be negative for those overlooking this property. He has a great deal

1 of respect for Jonathon Allen. He feels that it is assumed there is a static sand supply.  
2 Zones recommended could be adversely affected by the sand supply diminishing. This  
3 proposal doesn't address the tsunami hazard. He discussed the land dropping 3 to 4 feet  
4 on top of storm waves of 30-40 feet and getting another 16 feet of tsunami waves; when  
5 they are all added together they could be over the tops of the dunes. Subduction  
6 earthquakes occur every 350-500 years. Mr. McGowan recommends avoiding  
7 development where the risk cannot be mitigated. He hopes the county would consider  
8 the factors of tsunami risk and sand supply erosion of the coast.

9  
10 Norma Keever of 89026 Ocean Drive, Surf Pines, Warrenton, Oregon owns ocean front  
11 property and is just curious for now. All property owners on the oceanfront are interested  
12 in the dune modification program. Does this have any impact or bearing in any way?

13  
14 Delores Nasson Smith of 89880 Ocean Drive, Surf Pines, Warrenton, Oregon has had her  
15 house for sale for four (4) years and can't sell it as people say they can't see the water.  
16 Can the dune come down to that point? She may want to appeal.

17  
18 Pete Fields of 91610 Columbia River Rd, Westport, Oregon has property that may be  
19 sold soon at 90054 Ocean Drive, Surf Pines, Warrenton, Oregon. As you consider lines  
20 get a technical definition where that line is. Consider deed restrictions in Surf Pines as  
21 another line that is there. Consider where the deed line is and make an exception to that  
22 line in considering that. There are 100 plus lots and some don't have deed restrictions,  
23 this is a great way to get consistency.

24  
25 Chair Leland called for rebuttal by staff. Deed restrictions on property are enforced by  
26 non-governmental agency. Leave it this way. Action should be pursued and followed by  
27 property owners. Delores and Norma asked questions about fore dune grading. Fore  
28 dune grading for view enhancement is a conditional use Type IIa procedure with specific  
29 requirements involved. Large areas can be phased over time and sand cannot be removed  
30 from the area.

31  
32 Mr. Allen's report assumes static sand supply there are many references to the variability  
33 of sand supply and interaction with the Columbia River.

34  
35 The question on tsunami was a good one. The county is addressing coastal erosion  
36 hazards, shoreline retreat, and severe storms, not tsunami with Subduction zone  
37 earthquakes. This proposal is not designed to deal with tsunami. Mr. Bartl gave a  
38 scenario of tsunami effects on the land.

39  
40 Chair Leland closed the public testimony and called for discussion of Planning  
41 Commission Members. PC Switzer said this is an improvement and clarification over  
42 what we have had in the past. PC Bakkensen commented that there would be a  
43 construction line. Include a map for future reference of the construction lines.

44  
45 **PC Francis moved to recommend to the Board Of Commissioners that they approve**  
46 **LWDUO 80-14 Flood Hazards, Geologic Hazards and Oceanfront Averaging and**

1 **amp the line discussed in the Beaches and Dunes Task #2 under Periodic Review.**  
2 **The vote was unanimous. The motion passed.**

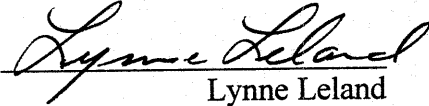
3  
4 The Board of Commissioners will hear this proposed amendment soon.

5  
6 Chair Leland called for Public Testimony. There was none.

7  
8 PC Bakkensen advised he would be unavailable the 2<sup>nd</sup> week of August. Chair Leland  
9 advised she would be gone most of August and September.

10  
11 There being no further business the meeting was adjourned at 2:50 p.m.

12  
13  
14 Respectfully submitted,

15  
16  
17   
18 Lynne Leland  
19 Chair, Planning Commission  
20  
21  
22

Minutes of June 24, 2003  
Clatsop County Planning Commission Work Session  
800 Exchange Building, Suite 300  
Astoria, Oregon 97103

Chair Lynne Leland called the June 24, 2003 Planning Commission Work Meeting to order at 9:00 am. Planning Commissioners (P.C.) present: John Altstadt, Bruce Francis, Lynne Leland, Jeff Martin, Joe Bakkensen, and Chuck Switzer.

Staff present: Veronica Smith, Sr. Planner (9:45 am); Teri Allen, Planner; Rainmar Bartl, Contract Land Use Planner; and Patricia Getchell, Planning Technician.

**Quasi-judicial hearing on Ft. Clatsop Combine Comprehensive Plan and Zoning Map Amendment (Teri Allen, Project Manager)**

Teri Allen presented the staff report regarding a quasi-judicial zone change request to amend the Clatsop County Comprehensive Plan/Zoning Map from F-80 (Forest 80) and M-I (Marine Industrial) to OPR (Open Space, Parks and Recreation) on property located between Lewis and Clark River and Ft. Clatsop Road in Warrenton (T7N R10W Section 1 Taxlot 1203). She summarized the intent of the zone change. This plan and zone change will allow for a more timely and efficient development of the subject parcel. Staff recommends approval of this request to the Board of Commissioners and requested that the motion include support for the adoption of the request by emergency clause. Everything proposed is an outright use in the OPR zone. Ms. Smith mentioned that an exception to forest rules is normally required. Doug White from DLCD met with the state solutions team to assist in getting this adopted and decided the level of proposed development would not require an exception. This is a good faith effort by DLCD. Other permits are still required such as wetland delineations.

Items discussed were the water taxi docking, car parking, ADA accessibility and fill permits. The pieces of property on the other side of the road will not be included. DSL is the only letter received regarding this request. Randy Trevillian, Public Works Director has been involved in the preapplication discussions regarding road access and turn lanes.

**Planning Commission Discussion Items**

Chair Leland asked for discussion items from the commission members. Chair Leland asked that any additional correspondence received be distributed to the Planning Commission members at the beginning of the work session to allow time to read the information. Ms. Smith said that she would make sure it happens as requested.

PC Francis mentioned that he heard an organization is setting up para towing on Sunset and Del Rey beaches. The towing is done with a pick up and speeds range from 25-30 miles per hour. Per Ms. Smith the beaches are under the jurisdiction of State Parks. Mr. Bartl commented that this type of activity is not currently regulated under the zoning code. Cannon Beach has some rules for this type of activity. There was more discussion about FAA regulations and business licenses. Staff was directed to discuss this with the

1 State Parks and the County Administrator's office (licensing). Ms. Smith will follow up  
2 on this issue as requested.

3  
4 PC Bakkensen mentioned road access to the beach from the north end of Camp Rilea.  
5 Per Chair Leland the Recreation Lands Sub-Committee is investigating the possibilities  
6 of the road access. Nothing has been accomplished to date.

7  
8 **Flood Hazards, Overlay District (Rainmar Bartl, Project Manager)**

9 Rainmar Bartl presented the flood hazard Overlay District staff report that included  
10 changes in the background report and policies. He mentioned the major changes and  
11 advised he would focus on the changes to the text of the zone, as this is the nuts and bolts  
12 of the changes. The purpose is to bring the ordinance up to date with the latest edition of  
13 the FEMA flood hazards regulations. The last update was done in the mid 1980's. There  
14 are no changes to maps or flood designations or the elevations. The changes are mostly  
15 in the technical information. There was discussion about critical facilities being built in a  
16 flood zone and the criteria required. Mr. Bartl mentioned that the definition of critical is  
17 the one that FEMA uses.

18  
19 He discussed the standards required on substantial improvements and said that there is a  
20 grandfather clause. Foundation protection is a critical part of flood protection. A  
21 Registered Professional Engineer shall review the foundation design. There was  
22 discussion regarding basement flood proofing, the benefits of using fill versus piling, the  
23 salmon enhancement program using large woody debris in streams, and the use of  
24 breakaway walls. The FHO is being consolidated into the development code.

25  
26 **Natural Hazards, Geologic Hazard Overlay Zone and Oceanfront Averaging**  
27 **(Rainmar Bartl, Project Manager)**

28 Mr. Bartl mentioned that there are no changes to the current standards. The background  
29 information has been updated. A new section was added to allow the Director to waive  
30 extensive site investigation if the geologists walk through says there are no hazards. A  
31 short statement that the site doesn't meet the criteria may be filed. The Geologic Hazard  
32 is now a Type II Procedure and it is recommended to be a Type I Procedure.

33  
34 It was recommended to take out the proposed amendment on Exhibit E, Page 2, Line 39  
35 regarding "minimal value". It will be taken out and the sentence will end after  
36 "earthquakes". Cluster developments, ocean front averaging, and statutory vegetation  
37 lines were discussed.

38  
39 **Beaches and Dunes (Rainmar Bartl, Project Manager)**

40 Mr. Bartl discussed the background report including the different types of dunes (active  
41 foredunes, stabilized dunes, older stabilized dunes), rip rap, accretion, and erosion. This  
42 report will replace the Palmer report, but it will be referenced in the new report. The  
43 members reviewed the map and discussed the difference between the mapped line and the  
44 description of the line. The building lines in ordinance 92-90 and 83-17 for Surf Pines  
45 and Pinehurst still need to be mapped. Further discussion included structural vs. plants  
46 erosion control methods, plants which minimize fire hazard, interdunal lakes and their



1 lifespan (lily pads), and some discussion regarding the TSP update (some progress made  
2 with minor changes to implementation).

3  
4 The following changes were requested:

5  
6 Exhibit B, page 1, Line 21 and 23 are repeated.

7 Exhibit D, page 4 will delete "I"

8  
9 The meeting recessed at 11:02 a.m. and reconvened at 11:13 a.m.

10  
11 **Review of Arch Cape Short Term Rental Ordinance (Veronica Smith, Senior**  
12 **Planner)**

13 Ms. Smith had distributed revisions to the Arch Cape Short Term Rental. She discussed  
14 the revisions in Section 3.470 (grandfather clause for guest houses) and Section 3.472  
15 (revocable permit). She has discussed the changes with Dan Kearns and Greg Winterowd  
16 and they agreed with them.

17  
18 **Periodic Review Updates**

19 Ms. Smith has met with Laren Wooley regarding the deadline for periodic review. Work  
20 Task # 1 is completed. A \$20,000 grant is receivable from DLCD when all five (5) work  
21 tasks are completed by the deadline. DLCD asked for a letter with anticipated deadlines  
22 requesting an extension. It is an aggressive schedule with meetings twice a month. Ms.  
23 Smith will work with Blair Henningsgaard, County Counsel, to complete Work Task # 5  
24 (District Agreements). The schedule for upcoming meetings was discussed.

25 Work Task #2 Planning Commission 7/8 meeting

26 Work Task #3 Planning Commission 7/8 meeting

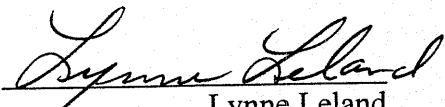
27 Work Task #3a Suggested moving to the board with Arch Cape Short Term Rental

28 Work Task #4 CREST will be advising status (DLCD following up)

29  
30 Ms. Smith mentioned a new project in a TC (Tourist Commercial Zone) in Arch Caper  
31 for a possible cluster development.

32  
33 There being no further business the meeting was adjourned at 11:37 a.m.

34  
35  
36 Respectfully submitted,

37  
38  
39 

40 Lynne Leland  
41 Chair, Planning Commission  
42  
43  
44