

### STATEWIDE PLANNING

#### GOAL 7:

To protect people and property from natural hazards.

### CLATSOP COUNTY GOAL 7:

To protect people and property in Clatsop County from natural hazards.

## OVERVIEW

Statewide Planning Goal 7 requires local comprehensive plans to address Oregon's natural hazards. Protecting people and property from natural hazards requires knowledge, planning, coordination, and education. Goal 7 recognizes the following natural hazards:

- Floods
- Landslides
- Earthquakes
- Tsunamis
- Coastal erosion
- Wildfires

Clatsop County has been planning for some of Oregon's natural hazards for over 40 years. River and coastal floods, landslide, wildfires, and coastal erosion are a consistent presence in Oregon and in Clatsop County. In recent years, more awareness has been developing about the possibility of a major earthquake and tsunami from the Cascadia Subduction Zone (CSZ). Good planning does not put buildings or people in harm's way. Planning, especially for the location of essential services like schools, hospitals, fire and police stations, is done with sensitivity to the potential impact of nearby hazards.

In order to address natural hazards in its comprehensive land use plan the County must adopt a natural hazard inventory, and supporting plans and policies.

In Clatsop County two departments focus on natural hazards planning: Emergency Management and Community Development. State partners with the County in the natural hazards planning area include:

- Oregon Department of Emergency Management
- Oregon Department of Land Conservation and Development
- Oregon Department of Geology and Mineral Industries

## HISTORICAL PERSPECTIVE

When Clatsop County's first comprehensive plan was adopted in 1980, consideration was given to the suitability of various land for development. Physical characteristics that were hazardous or limiting were analyzed and regulations were developed for those areas to minimize loss of life and property and to avoid expensive and burdensome corrective measures. Historically, natural hazards of concern in Clatsop County were identified as:

- Flooding
- Tsunamis
- Mass movement (landslides)
- Earthquakes
- High groundwater and compressible soils
- Erosion and deposition

The following tables document the historical incidents of each of the natural hazards within Clatsop County.

**Table 1: Historic Coastal Erosion Events**

Date	Location	Description	Notes
Jan. 2018 (01/18/2018)	N. Oregon Coast	Flood, Coastal Erosion	Severe beach erosion and damage to trails near the Peter Iredale Shipwreck eroded and swept out to sea. Logs and other debris washed
1980-2018	Falcon Cove	High Waves, Coastal Erosion	Five homes lost to coastal erosion.
1997-1998	N. Oregon Coast	High Waves, Coastal Erosion	El Niño events
1982-1983	N. Oregon Coast	High Waves, Coastal Erosion	El Niño events
1978	Nestucca Spit	High Waves, Coastal Erosion	Winter storm caused beach and cliff erosion
1972	Siletz Spit	High Waves, Coastal Erosion	Winter storm caused beach and cliff erosion

Source: C.Dice, 2019; NOAA Storm Events Database, <https://www.ncdc.noaa.gov/stormevents/>, accessed 12/2/2019.

### Cascadia Subduction Zone

When Clatsop County first developed its Goal 5 plan, the community looked at the Goal 5 resources that occurred locally and were important to address. The County then reviewed land uses allowed on

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or near each resource site that might have a negative impact on the resource. It then

### ***Tsunami Inundation Zone Overlay***

The "Goal 5 Process" starts with an inventory of Goal 5 resources. Resource sites are assessed and significant state scenic water ways

### ***Winter Storms***

### ***Flooding***

### ***Landslides***

### ***Coastal Erosion***

## CURRENT CONDITIONS

Clatsop County and the larger community has a robust and complex history of geohazard policy development that has informed its consideration of all hazards. The emergence of scientific knowledge and understanding of the risk of earthquakes in the Pacific Northwest in the past four decades has put Clatsop County in the spotlight as the north coast of Oregon has become widely understood to be at very high risk of a tsunami in the event of a Cascadia earthquake event. Further, the proximity to the Columbia River and its estuary and extensive coast line present the risk of coastal erosion and flooding, but not in a manner that is easy to predict or as severe as could be expected due to the protective nature of the beachhead and the upstream dams controlling the river flow.

### **2021 MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN (MJNHMP)**

Each of Clatsop County's communities is subject to some or all of the natural hazards listed in Statewide Planning Goal 7. Beginning in 2019, Clatsop County, with technical assistance from the Department of Land Conservation and Development (DLCD) undertook an update of its 2015 Natural Hazards Mitigation Plan. The scope of the 2021 update also included the following jurisdictions and entities:

- Cities of Astoria, Cannon Beach, Gearhart, Seaside and Warrenton
- Port of Astoria
- Arch Cape Domestic Water Supply District
- Arch Cape Sanitary District
- Cannon Beach Rural Fire Protection District
- Clatsop Community College
- Falcon Cove Beach Domestic Water Supply District
- Knappa-Svensen-Burnside Rural Fire Protection District
- Lewis and Clark Rural Fire Protection District

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- Seaside School District
- Sunset Empire Transportation District

In addition to the six natural hazards identified in Statewide Planning Goal 7, the MJNHMP also analyzed impacts from drought, volcanic ash fall, and wind/winter storms. The MJNHMP also included mitigation actions for each jurisdiction to address those impacts.

The following is an overview of the hazards that can impact Clatsop County.

### ***Coastal Erosion***

Coastal erosion occurs through a complex interaction of many geologic, atmospheric, and oceanic factors. Beaches, sand spits, dunes and bluffs are constantly affected by waves, currents, tides, and storms resulting in chronic erosion, landslides, and flooding. Changes may be gradual over a season or many years. Changes may also be drastic, occurring during the course of a single storm event. Two important natural variables for coastal change are the beach sand budget (balance of sand entering and leaving the system) and processes (waves, currents, tides, and wind) that drive the changes. Erosion becomes a hazard when human development, life, and safety are threatened.

Coastal erosion occurs via the following mechanisms:

- Beach, dune and bluff erosion caused by wind, waves, runoff, and disturbance;
- Mass wasting of sea cliffs in the form of landslides and slumps due to gravity, constant wave and tidal effects, and geologic instability;
- Storm surges, high ocean waves and the flooding of low-lying lands during major storms;
- Sand inundation;
- Erosion due to the occurrence of El Niño's and from rip current embayments; and
- Recession of coastal bluffs due to long-term changes in mean sea level and the magnitude and frequency of storm systems.

Clatsop County's, and all of Coastal Oregon's, erosion is largely driven by major storm events that can produce waves 20 to 50 feet in height. The large waves coupled with high water levels from storm swash allow the waves to reach much higher elevations (Allan, 2017). Coastal bluffs comprised of uplifted marine terrace deposits and sand dunes are especially vulnerable to erosion. Beaches and dunes are highly susceptible to erosion, especially during large storms coupled with high ocean water levels (Williams, M. C., Anthony L. H., & O'Brien, F. E., 2020). Vegetated dunes have eroded back as much as 50 meters in just one or two winters in some areas. Unlike bluff-backed shorelines, dunes can accrete back during cycles of decreased storm activity, which may erase signs of long-term erosion rates, and mask the potential for catastrophic erosion events (Allan, 2017).

Human activities also influence, and in some cases, intensify the effects of erosion and other coastal hazards. Major actions such as jetty construction and maintenance dredging can have long-term effects on large sections of the coast. This is particularly true along dune-backed and

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inlet-affected shorelines such as the Columbia River littoral cell. The planting of European bunchgrass since the early 1900s has locked up sand in the form of high dunes. This in turn has contributed to the net loss of beach sand and increased beach erosion. Residential and commercial development can affect shoreline stability over shorter periods of time and in smaller geographic areas. Activities such as grading and excavation, surface and subsurface drainage alterations, vegetation removal, and vegetative as well as structural shoreline stabilization can all reduce shoreline stability.

Finally, heavy recreational use in the form of pedestrian and vehicular traffic can affect shoreline stability over shorter time frames and smaller spaces. Because these activities may result in the loss of fragile vegetative cover, they are a particular concern along dune-backed shorelines. Graffiti carving along bluff-backed shorelines is another byproduct of recreational use that can damage fragile shoreline stability.

According to the regional risk assessment for the Oregon Coast, the following assets and locations are generally the most vulnerable to coastal erosion (Oregon DLCD, 2015):

- Buildings, parks, and infrastructure along low-lying areas adjacent to bays or the ocean and at higher elevations where buildings and infrastructure have been located on readily erodible materials (e.g., consolidated sand, weakly cemented sandstone, siltstone, etc.).
- Areas subject to flooding with wave action—while few of Clatsop County’s coastal developments are within FEMA-designated Velocity (V) zones, those that appear to be constructed according to V- zone standards which fall under the regulatory purview of local jurisdictions compliant with the National Flood Insurance Program (NFIP).
- Coastal highways are strongly impacted by coastal erosion. In Clatsop County much of the problem is linked to the local geology. Bedrock conditions change abruptly within very short distances. This results in an inconsistent highway foundation; some sections are more susceptible to erosion than others and require continuous maintenance.

Coastal erosion is increasingly affecting people due to development near the beach or coastal bluffs. Structures and infrastructure that serve vacation homes are the primary vulnerability of this hazard. People who purchase real estate in areas subject to coastal erosion are the primary individuals at personal risk of this hazard, although first responders and other emergency personnel are likely at greater hazard as they will be required to assist in coastal erosion-related rescues in recreational settings. Typically, shoreline stabilization efforts using riprap are not an effective long-term mitigation (Stimely and Allan, 2014). Whether it is a gradual process or in the form of landslides, coastal erosion can cause loss of property (Williams et al, 2020).

This summary and figure identify the coastal erosion risks to the segment of Clatsop County analyzed in the MJNHMP (Source: Williams et al, 2020, p.34.):

- Number of buildings: 349
- Exposure value: \$135,900,000
- Percentage of exposure value: 3.6%

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- Critical facilities exposed: 0
- Potentially displaced population: 104

In the table below, coastal erosion risk for unincorporated communities is included in the “Clatsop County (rural)” category.

**Table 2: Coastal Erosion Exposure by Clatsop County Community**  
Percentage of Building Value Exposed to Coastal Erosion



Source: DOGAMI 2019, p.34. Note: Beyond the designated communities, in unincorporated Clatsop County, building values total \$2.5 million in areas of very high coastal erosion hazard, \$2.6 million in areas of high hazard, and \$16 million in areas of moderate hazard.

### Drought

Droughts are not uncommon in the State of Oregon, nor are they just an “east of the mountains” phenomenon. They occur in all parts of the state, in both summer and winter. There are no records of a severe drought in Clatsop County. Drought is averted as a result of the County’s high rainfall from moist air masses moving onto land from the Pacific Ocean, especially during winter months.

### Earthquake

Seismic events were once thought to pose little or no threat to Oregon communities. However, recent earthquakes and scientific evidence indicate that the risk to people and property is much greater than previously thought. Oregon is rated third highest in the nation for potential losses due to earthquakes. This is due in part to the fact that until recently Oregon was not considered to be an area of high seismicity, and consequently the majority of buildings and infrastructure were not designed to withstand the magnitude of ground shaking that would occur in conjunction with a major seismic occurrence.

### Flood

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Oregon has a detailed history of flooding with flood records dating back to the 1860s. The principal types of flood that occur in Clatsop County include: (1) riverine and (2) ocean flooding from high tides and wind-driven waves or tsunami event. There are two distinct periods of riverine flooding in this region, winter and late spring. The most serious flooding occurs during December, January, and February. The situation is especially severe when riverine flooding, caused by prolonged rain and melting snow, coincides with high tides and coastal storm surges.

### **Landslide**

Landslides are a major geologic threat in almost every state in the United States. In Oregon, a significant number of locations are at risk from dangerous landslides and debris flows. While not all landslides result in property damage, many landslides do pose serious risk to people and property. Rain-induced landslides and debris flows can potentially occur during any winter in Clatsop County.

### **Tsunami**

Tsunamis have historically been rare in Oregon. Since 1812, Oregon has experienced about a dozen tsunamis with wave heights greater than 3 feet; some of these were destructive. The City of Seaside is the most vulnerable city due to its low elevation and high number of residents and tourist population within the predicted inundation zone. Although many communities have evacuation maps and evacuation plans, many casualties are expected. The built environment in the inundation zone will be especially hard hit.

### **Volcanic Event**

The Cascade Range of the Pacific Northwest has more than a dozen active volcanoes. These snow-clad peaks are part of a 1,000 mile-long chain of mountains, which extend from southern British Columbia to northern California. Although there are no active volcanoes in Clatsop County it is important for counties to know the potential impacts of nearby volcanoes. While immediate danger area around a volcano is approximately 20 miles, ash fall problems may occur as much as 100 miles or more from a volcano's location; therefore, ash fall may affect Clatsop County.

### **Wildfire**

Fire is an essential part of Oregon's ecosystem, but it is also a serious threat to life and property particularly in the state's growing rural communities. Wildfires are fires occurring in areas having large areas of flammable vegetation that require a suppression response. Areas of wildfire risk exist throughout the state with areas in central, southwest and northeast Oregon having the highest risk.

### **Windstorms & Severe Winter Storms**

Destructive wind and winter storms that produce ice, rain and freezing rain, and high winds have a long history in Clatsop County. Severe storms affecting Oregon with snow and ice typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March. Destructive windstorms are less frequent, and their pattern is fairly well known. They form over the North Pacific during the cool months (October



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through March), move along the coast and swing inland in a northeasterly direction. Wind speeds vary with the storms. Gusts exceeding 100 miles per hour have been recorded at several coastal locations

### OTHER ON-GOING PLANNING EFFORTS

#### ***Tsunami Evacuation Facilities Improvement Plan (TEFIP)***

On August 22, 2019, the County received an award letter from the Oregon Transportation and Growth Management Program to prepare a Tsunami Evacuation Facilities Improvement Plan (TEFIP). This plan will augment existing efforts by the Emergency Management Division of Clatsop County, which in past years has installed “You are Here” signs at a majority of beach access points. An emphasis will be placed on identifying trails and paths that can provide year-round recreational opportunities while also functioning as evacuation routes in the event of a disaster. The project began in January 2020 and is expected to be completed in early 2022.

## FUTURE CONDITIONS

### ***Climate Change***

In February 2020 the Oregon Climate Change Research Institute published a report entitled *Future Climate Projects Clatsop County*. This report was prepared for the Oregon Department of Land Conservation and Development in conjunction with grant assistance to Clatsop County to prepare an update to its Natural Hazard Mitigation Plan. The county-specific future climate projections were derived from 10-20 global climate models and two scenarios of future global greenhouse gas emissions – early 21<sup>st</sup> Century (2010-2039) and mid-21<sup>st</sup> century (2040-2069).

While the State has not yet mandated policies or actions that local governments must undertake to mitigate or adapt to climate change, it is probable that such requirements will be codified within the 20-year planning horizon. In 2021, the Oregon Department of Land Conservation and Development released its *Oregon Climate Change Adaptation Framework 2021*, which details actionable adaptation strategies and approaches based on six themes:

- Economy
- Natural World
- Built Environment and Infrastructure
- Public Health
- Cultural Heritage
- Social Relationships and Systems

Clatsop County should continue to monitor discussions at the state level and adapt policies and requirements to address specific climate change-related concerns and issues within the county.

As part of this comprehensive plan update process, a sub-committee of the Countywide Citizen Advisory Committee utilized strategies from the *Regional Framework for Climate Adaptation*

### GOAL 7: AREAS SUBJECT TO NATURAL HAZARDS – DRAFT 1



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*Clatsop and Tillamook Counties* to develop recommended policies specific to Clatsop County.

### **FEMA Biological Opinion (BiOp)**

The [National Flood Insurance Program](#) (NFIP) provides flood insurance for homeowners and property owners. The NFIP is administered by the Federal Emergency Management Agency (FEMA). FEMA sets standards for local governments participating in the NFIP, including requirements for local floodplain development ordinances. The Department of Land Conservation and Development (DLCD) is designated as Oregon's NFIP coordinating agency and assists local governments with implementation of the federal standards.

Because the NFIP has a direct effect on development that occurs in areas adjacent to local streams, rivers, and waterbodies, it is important for the NFIP to consider its effects on endangered species. Marine and anadromous species are protected by the Endangered Species Act (ESA) which is administered by the National Marine Fisheries Service (NMFS), a branch of the National Oceanic Atmospheric Administration (NOAA). This branch is also known as NOAA-Fisheries. The ESA provides for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The ESA requires federal agencies to ensure that actions they authorize, fund, or carry out do not jeopardize the continued existence of any ESA listed species.

For several years, the NMFS and FEMA have been discussing measures that could be used to reduce negative impacts from the National Flood Insurance Program (NFIP) on salmon, steelhead and other species listed as threatened under the Endangered Species Act (ESA). In April 2016, NMFS delivered a jeopardy Biological Opinion (BiOp) to FEMA, stating that parts of the NFIP could have a negative impact on the habitat of endangered salmon species.

Local governments that participate in the NFIP, including Clatsop County, will likely need to change their review process for floodplain development permits. FEMA Region X, State and local government staff have been meeting since 2016 to respond to the finding and recommendations in the BiOp and to determine the best ways to implement the interim measures described in the Reasonable and Prudent Alternative (RPA). In October 2021, FEMA released a draft of its [Oregon Implementation Plan for NFIP-ESA Integration](#).

### ***Demand for Housing***

## OBJECTIVES AND POLICIES

### GENERAL NATURAL HAZARD POLICIES

**Policy A:** The County should develop a centralized County 911 system.

**Policy B:** In coordination with the cities and appropriate visitor and tourism agencies,

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the County should develop a pre-plan of how to accommodate visitors to the coast following a major disaster.

**Policy C:** The County shall develop post-disaster recovery plans for unincorporated communities and areas within Clatsop County.

**Policy D:** In order to facilitate recovery efforts, the County shall develop a debris management plan.

**Policy E:** The County should continue to analyze the costs and risks associated with maintaining critical county-owned public safety facilities within the tsunami inundation zone.

**Policy F:** The County should develop emergency shelter facilities through the County.

**Policy G:** The County should create and maintain an inventory of available generators and fuel distribution sites.

**Policy H:** The County should continue to conduct outreach and education efforts to community organizations active in disasters and that may have control over structures and areas that may be designated as relief sites during periods of emergency response and recovery.

### COASTAL EROSION POLICIES

### FLOOD POLICIES

**Policy A:** 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.

**Policy B:** Through an integrated flood hazard management program, the county will implement and administer appropriate land use planning techniques and construction standards.

**Policy C:** The County will develop and maintain educational efforts regarding the public benefit derived from an integrated flood hazard management program.

**Policy D:** The County shall limit land uses in the floodplain to those uses identified by the adopted floodplain regulations as suitable.

**Policy E:** The County shall strive to make flood hazard information, including that related to tsunamis, available to the public to ensure that owners and potential buyers of flood prone land are aware of the hazard.

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- Policy F:** 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.
- Policy G:** Agriculture, forestry, open space and recreation shall be the preferred uses of flood prone areas.
- Policy H:** The County shall prohibit the placement of hospitals, public schools, nursing homes, and other similar public uses within areas subject to flooding.
- Policy I:** Subdivisions occurring within floodplain areas shall be encouraged to cluster land uses outside of the floodplain area leaving the floodplain in open space.
- Policy J:** For specified areas, the County will consider the adoption of regulations requiring the preparation and implementation of a drainage plan as part of its review and approval of conditional use permits and development permits.
- Policy K:** Clatsop County should explore public support for becoming a Community Rating System (CRS) community.
- Policy L:** The county should engage and support the Diking Districts in respect to accreditation of the County's levees.

### LANDSLIDE POLICIES

- Policy A:** The County shall recognize the development limitations imposed by areas of mass movement potential.
- Policy B:** Mass movement hazards do not necessitate disapproval of development, but higher development standards can be expected in order to minimize potential damage and property loss.
- Policy C:** Clustering of development on stable or less steep portions of sites is encouraged in order to maintain steeper or unstable slopes in their natural conditions.
- Policy D:** Closely spaced septic tanks and drainfields should be restricted from moderately to steeply sloping areas because of the potential for sliding.
- Policy E:** Projects which include plans for modifying the topography of sloping areas or established drainage patterns shall be evaluated in terms of the effect these changes would have on slope stability.
- Policy F:** The presence of faults in an area may constitute justification for restricting development in areas of landslide topography.

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- Policy G:** Structures should be planned to preserve natural slopes. Cut and fill construction methods shall be discouraged. Structures should be planned to preserve natural slopes. Cut and fill construction methods shall be discouraged.
- Policy H:** Access roads and driveways shall follow slope contours to reduce the need for grading and filling, reduce erosion, and prevent the rapid discharge of runoff into natural drainageways.
- Policy I:** Loss of ground cover for moderately to steeply sloping lands may cause land slippage and erosion problems by increasing runoff velocity. Development on moderate to steep slopes should generally leave the natural topography of the site intact. Existing vegetation, particularly trees, should be retained on the site.
- Policy J:** The County, in coordination with appropriate state and local agencies should identify and develop alternative transportation routes around slide-prone areas within the county.
- Policy K:** The County shall utilize the Department of Geology and Mineral Inventories' Statewide Landslide Information Layer for Oregon (SLIDO), dated XXXX to determine properties that are in the moderate to very high landslide susceptibility category. Development on properties within the moderate to very high category shall be required to subject a geologic hazard report or request a waiver from that requirement.

### EARTHQUAKE POLICIES

- Policy A:** The County shall develop and implement a program to retrofit County bridges that are identified by a seismic vulnerability assessment.
- Policy B:** Structures and public facilities owned and/or operated by Clatsop County should be seismically retrofitted.
- Policy C:** The County should work with private land owners to identify lifelines routes that can be utilized following a seismic event.
- Policy D:** The County should develop incentive programs to encourage homeowners to perform seismic retrofits to existing structures.

### TSUNAMI POLICIES

- Policy A:** The County should identify viable sites for vertical evacuation construction.

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**Policy B:** Clatsop County should implement a Tsunami Hazard Inundation overlay and develop regulations and maps for hazard mitigation planning.

**Policy C:** The County shall establish long-term supply and staging areas outside of inundation zones

**Policy D:** Clatsop County shall continue to upgrade and improve tsunami evacuation routes.

### WILDFIRE POLICIES

**Policy A:** Clatsop County should develop informational materials to inform the community about how to protect themselves and their assets from wildfire.

### DROUGHT POLICIES

### VOLCANIC ASH FALL POLICIES

### WIND / WINTER STORM POLICIES

### STREAMBANK EROSION AND DEPOSITION POLICIES

**Policy A:** The County shall encourage the stabilization of the outside faces of dikes to prevent erosion as part of the regular maintenance of existing dikes.

**Policy B:** A buffer of riparian vegetation along streams and rivers should be encouraged in order to protect and stabilize the banks.

**Policy C:** The DEQ's best management practices for agricultural areas shall be supported to reduce erosion and sedimentation of streams.

**Policy D:** The County encourages appropriate agencies to work to obtain and enforce speed limits for boats in areas where dikes are affected by wave erosion.

**Policy E:** Clatsop County supports strict enforcement of the Forest Practices Act to reduce sedimentation of streams.

**Policy F:** Problems from natural erosion or the creation of situations where erosion would be increased due to actions on or adjacent to the river banks shall be avoided by carefully reviewing state and federal permits for shoreline stabilization to minimize impacts on adjacent land.

### HIGH GROUNDWATER AND/OR COMPRESSIBLE SOILS POLICIES

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- Policy A:** The County shall recognize the development limitations of lands with high groundwater and compressible soils during its planning process.
- Policy B:** All new development on compressible soils shall be engineered, as required by state and local building codes, to address structural issues associated with construction on compressible soils.
- Policy C:** The County should update its compressible soils and high water table maps as detailed soils information becomes available.

### IMPLEMENTING OREGON ADMINISTRATIVE RULES (OAR):

None

### COORDINATING STATE AGENCIES:

Oregon Department of Emergency Management (OEM)  
Department of Geology and Mineral Inventories (DOGAMI)  
Oregon Department of Land Conservation and Development (DLCD)  
Federal Emergency Management Agency (FEMA)

### BACKGROUND REPORTS AND SUPPORTING DATA:

[Clatsop County Multi-Jurisdictional Hazard Mitigation Plan 2021](#)

[Future Climate Projects Clatsop County](#) (Oregon Climate Change Research Institute, February 2020)