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*Land of Cheese, Trees and Ocean Breeze*

# MEMO

**Date:** January 19, 2018  
**To:** Tillamook County Citizen Advisory Committees  
**From:** Sarah Absher, CFM, Director   
**Subject:** Tsunami Planning Project

The Department is pleased to announce that we are the recipients of a technical assistance grant from the Oregon Department of Land Conservation and Development (DLCD) to assist in tsunami land use planning efforts focused on minimizing risk and vulnerability of our coastal communities.

This proposal for assistance in Tillamook County's tsunami land use planning efforts is divided into two areas of focus: mapping and consideration of comprehensive plan and land use ordinance amendments to better address development within tsunami inundation areas. The "Beat the Wave" simulation maps created by the Oregon Department of Geology and Mineral Industries (DOGAMI) will offer valuable community information by identifying evacuation routes and identifying the need/quality of evacuation infrastructure improvements. A Tsunami Hazard Overlay Zone could be beneficial in identifying high risk areas, assessing the need for imposing additional land use limitations, and developing long-term relocation strategies/relocation areas of communities and essential facilities. The data/information collected can then be considered to be incorporated into Comprehensive Plan goal/policy amendments as well as amendments to the development code provisions outlined in the Tillamook County Land Use Ordinance.

Prior to any public hearings processes, the Department of Community Development is seeking preliminary community input on draft model codes DLCD has provided for Tillamook County's consideration. These model codes are meant to be a starting point and can be edited to reflect the needs of Tillamook County's communities. A copy of the model codes is included with this memorandum for your review.

The "Beat the Wave" maps for unincorporated areas of Tillamook County are scheduled to be available in draft form for inspection late February. As a reference and example, copies of "Beat The Wave Maps" created by DOGAMI for Seaside and Gearhart are also included with the memorandum. Once the Tillamook County draft maps are available for inspection, the Department will notify the CACs.

As the Department of Community Development continues to work through these planning efforts, we will also continue to provide updates (including any draft revisions) to Citizen Advisory Committees for review and comment. Any proposed amendments to the Tillamook County Comprehensive Plan (including the incorporation of updated maps) and/or Tillamook County Land Use Ordinance are subject to public hearings and the procedures outlined in Article 10 of the Tillamook County Land Use Ordinance for legislative (Type IV) actions. As mentioned previously, the model codes furnished by DLCD provide the County with a starting point. Your comments on these model codes is greatly appreciated.

If you have any questions about the information received, please do not hesitate to contact me at 503-842-3408 x 3317 or by email: [sabsher@co.tillamook.or.us](mailto:sabsher@co.tillamook.or.us). Thank You!

## Tillamook County Draft Tsunami Resilience Comp Plan Policies

### Comprehensive Plan Provisions

This document includes a set of sample (model) plan policies related to this effort and a sample (model) tsunami related text section that can be included within the Goal 7 (Natural Hazards) section of the community's comprehensive plan. The comprehensive plan text section can be used as it is or modified and tailored to better meet the needs of a specific community. The comprehensive set of draft plan policies can be reviewed, tailored, and used to support development code provisions identified for community use. ***The suggested policy concepts are intended to cover the entire spectrum of possible policy options, with the idea that communities can pick and choose from among these ideas based on their individual circumstances.***

### Sample Comprehensive Plan Natural Hazards Chapter Text

This section includes sample tsunami related text that can be included as a tsunami-oriented subsection within the Goal 7 (Natural Hazards) section of the local comprehensive plan. Its intent is to provide general information related to community tsunami risk, preface the applicable tsunami plan policies, and support the community's land use resilience program. Sample text follows.

#### 0.0 TSUNAMI

**0.01 Description of the Hazard:** The Oregon coast is well known for its spectacular scenery and natural resources. However, because the coast lies at the interface between land and the Pacific Ocean, it also is a zone of great instability and vulnerability. Over time, we have gained a greater awareness of our coast's geologic hazards and its risks to people and property.

Coastal Oregon is not only vulnerable to chronic coastal hazards such as coastal erosion from winter storms and sea level rise, but it is also subject to the potentially catastrophic effects of a Cascadia earthquake event and related tsunamis. These types of powerful and devastating earthquakes of magnitude 9+ are generated at the Cascadia Subduction Zone where the eastward-moving Juan de Fuca tectonic plate dives under the westward-moving North American plate just off the Oregon coast.

These large earthquakes will occur under the ocean just offshore of our coast and will produce extremely destructive tsunamis that can strike the coast as soon as 15 minutes after the earthquake, leaving devastation in their path. It is likely that in most Oregon coast communities, including Tillamook County, the only warning of an approaching tsunami will be the earthquake itself.

The geologic record shows that the largest of these large Cascadia Subduction Zone earthquakes and accompanying tsunamis occur about every 500 years, plus or minus 200 years. The last such earthquake and tsunami occurred over 300 years ago, on the evening of January 26th, 1700. This means that we are in the time window where a destructive Cascadia earthquake and tsunami could occur and the probability of that occurrence will continue to increase over time. This time the stakes are much higher as the great earthquake and catastrophic tsunami could occur when tens of thousands of Oregonians and visitors are enjoying coastal beaches and towns. To address this increasing risk and substantially increase resilience within our community, Tillamook County is proactively addressing tsunami preparedness and mitigation

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within its land use program. Land use planning that addresses tsunami risk is an essential tool to help increase resilience to a potentially catastrophic tsunami event within Tillamook County.

**0.02 Tsunami Hazard Maps:** The Department of Geology and Mineral Industries (DOGAMI) has developed Tsunami Inundation Maps (TIMs) which provide the essential information for defining tsunami risk along the Oregon coast. Tillamook County has adopted the TIM's applicable to its coastal unincorporated areas as a part of its comprehensive plan hazard inventory. These maps are also referenced within this natural hazards element of the comprehensive plan and are the basis for establishing the boundaries of Tillamook County's Tsunami Hazard Overlay Zone. The TIMs are referenced in the tsunami related plan policies and within the overlay zone for purposes of differentiating between areas of higher versus lower risk.

**0.03 Tsunami Related Policies:** Tillamook County has adopted a set of comprehensive plan policies related to tsunami preparedness and recovery that are included within this and other applicable sections of the comprehensive plan. These policies have been developed to address the resilience goals of the County. They are designed to support the County's resilience efforts within the comprehensive plan and implementing codes.

**0.04 Zoning:** Tsunami Hazard Overlay Zone (THO): Tillamook County has adopted an overlay zone which utilizes the applicable DOGAMI Tsunami Inundation Maps (TIMs). The overlay zone includes all areas identified as subject to inundation by the largest (XXL) local source tsunami event which ensures that life safety and evacuation route planning and development are adequately addressed. Other land use resilience strategies and requirements included within the overlay zone, which are not life safety or evacuation related, are applied within a subset of the overlay to smaller inundation scenario areas. These measures are included within the overlay zone provisions and reflect the community's risk tolerance, application of mitigation measures, and ORS 455.446-447 requirements. The overlay zone boundary has been adopted as an amendment to the official zoning map for Tillamook County.

**0.05 Evacuation Route Plan Maps:** The County, as part of its land use program for tsunami preparedness, has also adopted a comprehensive evacuation route plan. The evacuation route plan identifies designated evacuation routes, assembly areas and other components of the local evacuation system. The plan is a key component of the County's efforts to reduce risk to life safety by planning for a comprehensive evacuation system and developing the detailed information necessary to establish land use requirements to implement evacuation measures and improvements. This plan and associated map(s) have been incorporated into the County [*comprehensive plan natural hazard element/ transportation system plan*].

### Sample Comprehensive Plan Tsunami Related Policies

This section includes a set of sample comprehensive plan policies related to tsunami preparedness and recovery that can be included within the Goal 7 (Natural Hazards) section, and other applicable sections of the community's comprehensive plan. The sample comprehensive plan policies should be used and tailored to meet the needs of a specific community. They are designed to be used with and support the sample development code provisions and/or other strategies within the Tsunami Land Use Guide. The sample policies are as indicated below.

**Commented [MR1]:** Given the tight grant deadline for completing this project - I would suggest tabling this idea of developing a comprehensive evacuation route plan. If the County is interested in doing, we can focus on this after completing the THOZ.

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### Goal 7: Areas Subject to Natural Hazards

#### **General Policies**

To protect life, minimize damage and facilitate rapid recovery from a local source Cascadia Subduction Zone earthquake and tsunami, the County will:

1. Support tsunami preparedness and related resilience efforts.
2. Take reasonable measures to protect life and property to the fullest extent feasible, from the impact of a local source Cascadia tsunami.
3. Use the Oregon Department of Geology and Mineral Industries (DOGAMI) Tsunami Inundation Maps applicable to the County to develop tsunami hazard resiliency measures.
4. Adopt a Tsunami Hazard Overlay Zone for identified tsunami hazard areas to implement land use measures addressing tsunami risk.
5. Enact design or performance implementing code components in identified tsunami hazard areas.
6. Implement land division provisions to further tsunami preparedness and related resilience efforts.
7. Consider potential land subsidence projections to plan for post Cascadia event earthquake and tsunami redevelopment.
8. Require a tsunami hazard acknowledgement and disclosure statement for new development in tsunami hazard areas.
9. Identify and secure the use of appropriate land above a tsunami inundation zone for temporary housing, business and community functions post event
10. As part of a comprehensive pre-disaster land use planning effort, consistent with applicable statewide planning goals, identify appropriate locations above the tsunami inundation for relocation of housing, business and community functions post event.

#### **Evacuation Policy Concepts**

To facilitate the orderly and expedient evacuation of residents and visitors in a tsunami event, the County will:

1. Adopt a tsunami evacuation route plan that identifies current and projected evacuation needs, designates routes and assembly areas, establishes system standards, and identifies needed improvements to the local evacuation system.
2. Identify and secure the use of appropriate land above a tsunami inundation zone for evacuation, assembly, and emergency response.
3. Ensure zoning allows for adequate storage and shelter facilities.
4. Provide development or other incentives to property owners that donate land for evacuation routes, assembly areas, and potential shelters.
5. Require needed evacuation route improvements, including improvements to route demarcation (way finding in all weather and lighting conditions) and vegetation management, for new development and substantial redevelopment in tsunami hazard areas.
6. Work with neighboring jurisdictions to identify inter-jurisdictional evacuation routes and assembly areas where necessary.
7. Provide for the development of vertical evacuation structures in areas where reaching high ground is impractical.

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8. Evaluate multi-use paths and transportation policies for tsunami evacuation route planning.
9. Encourage suitable structures to incorporate vertical evacuation capacity in areas where evacuation to high ground is impractical.
10. Install signs to clearly mark evacuation routes and implement other way finding technologies (e.g. painting on pavement, power poles and other prominent features) to ensure that routes can be easily followed day or night and in all weather conditions.
11. Prepare informational materials related to tsunami evacuation routes and make them easily available to the public.

### Policies Related to Reducing Development Risk in High Tsunami Risk Areas

The County will:

1. Prohibit comprehensive plan or zone map amendments that would result in increased residential densities or more intensive uses in tsunami hazard areas unless adequate mitigation is implemented. Mitigation measures should focus on life safety and tsunami resistant structure design and construction.
2. Encourage open space, public and private recreation and other minimally developed uses within the tsunami inundation zone area.
3. Prohibit the development of those essential facilities and special occupancy structures identified in ORS 455.446 and ORS 455.447 within the *[select L XL or XXL tsunami inundation area as determined by the community]* tsunami inundation area.

*Note: Currently, the area within which the limitation on the placement of new essential facilities and special occupancy structures is defined by the inundation line specified in ORS 455.446. The adoption of a new line for purposes of ORS 455.446 and ORS 455.447, based on the new TIMs, is being considered by the DOGAMI governing board. The jurisdiction can be more restrictive if it chooses.*

4. Consider the use of transferrable development credits as authorized by ORS 94-531-94.538 to facilitate development outside of tsunami inundation zones.
5. Encourage, through incentives, building techniques that address tsunami peak hydraulic forces which will minimize impacts and increase the likelihood that structures will remain in place.
6. Protect and enhance existing dune features and coastal vegetation to promote natural buffers and reduce erosion.

### Hazard Mitigation Planning

The County will:

1. Address tsunami hazards and associated resilience strategies within the community's FEMA approved hazard mitigation plan.
2. Incorporate and adopt relevant sections of the hazard mitigation plan by reference into the comprehensive plan.
3. Ensure hazard mitigation plan action items related to land use are implemented through the

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comprehensive plan and implementing ordinances.

### Tsunami Awareness Education and Outreach

The County will:

1. Encourage and support tsunami education and outreach, training, and practice.
2. Implement a comprehensive and ongoing tsunami preparedness community education and outreach program. *(Note: Some communities have utilized Community Emergency Response Teams (CERT) or CERT-like organizations as a part of that ongoing community education and outreach.)*
3. Collaborate with local, state and federal planners and emergency managers for the purpose of developing a culture of preparedness supporting evacuation route planning and other land use measures that minimize risk and maximize resilience from tsunami events.

### Debris Management

The County will:

1. Identify and work to secure the use of suitable areas within the Tsunami Inundation Zone for short and long-term, post-disaster debris storage, sorting and management.
2. Work with other public and private entities to establish mutual aid agreements for post-disaster debris removal and otherwise plan for needed heavy equipment in areas which may become isolated due to earthquake and tsunami damage.

### Hazardous Materials

The County will:

1. Limit or prohibit new hazardous facilities as defined in ORS 455.447 within tsunami inundation zones. Where limiting or prohibiting such facilities is not practical, require adequate mitigation measures consistent with state and federal requirements.

### Goal 11: Public Facility and Services

The County will:

1. Consider and address tsunami risks and evacuation routes and signage when planning, developing, improving, or replacing public facilities and services.
2. Update public facility plans to plan, fund, and locate future facilities outside of the tsunami inundation zone, whenever possible.

### Goal 12: Transportation

The County will:

1. Develop multi-use paths that both enhance community livability and serve as tsunami evacuation routes.
2. Coordinate evacuation route and signage planning in conjunction with existing or proposed transportation system plan pedestrian and bicycle route planning efforts.
3. Locate new transportation facilities outside the tsunami inundation zones where feasible.
4. Where feasible design and construct new transportation facilities to withstand a Cascadia event

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earthquake and be resistant to the associated tsunami.

### Goal 14: Urbanization

The County will:

1. Limit the allowable uses on property in the tsunami hazard area vacated as the result of an urban growth boundary expansion to relocate existing development. Such limitations shall include permitting only low risk uses, or requiring uses which implement adequate protection or mitigation measures for seismic and tsunami hazards.
2. Restrict the development of lodging facilities and higher density residential housing in tsunami inundation zones or require the implementation of protective measures.
3. Plan for the location or relocation of critical facilities outside of tsunami hazard area when conducting the land needs analysis.
4. Include pre- and post-tsunami disaster planning as part of urban reserve planning processes.

### Map Amendments

The comprehensive plan and development code text amendments developed using this Land Use Guide will need to be accompanied by associated map amendments. The following maps should be adopted or otherwise incorporated into the appropriate elements of the local comprehensive plan and implementing regulations:

- a. DOGAMI Tsunami Inundation Map (TIM): Communities should adopt the map, or maps in the DOGAMI Tsunami Inundation Map (TIM) Series applicable to their jurisdiction as a part of the comprehensive plan inventory, as they provide the essential information for defining tsunami risk. The TIMs include five inundation scenario areas including small, medium, large, extra-large, and extra extra-large tsunami events. The TIMs will typically be referenced in the natural hazards element of the comprehensive plan, and will also be used as the basis for establishing the boundaries of a Tsunami Hazard Overlay zone. The TIMs may also be referenced in plan policies and/or the overlay zone for purposes of differentiating between areas of higher versus lower risk. For example, the official ORS 455 tsunami inundation zone (which is currently being considered for updating based on the current TIMs), will identify the area to which ORS 455 development restrictions will apply.
- b. Tsunami Hazard Overlay Zone Map (THO): The overlay zone map(s) should be developed using the applicable DOGAMI Tsunami Inundation Maps or TIMs. In developing the overlay map it is recommended that the overlay area include all five inundation scenarios identified on the TIMs (S, M, L, XL, and XXL) which would ensure that life/safety and evacuation route planning and development are adequately addressed. Other land use resilience strategies and requirements included within the overlay zone, which are not life safety or evacuation related, may be applied within a subset of the overlay to smaller inundation scenario areas subject to the community's risk tolerance, application of mitigation measures, and ORS 455.446-447 requirements. The map(s) should be adopted in the form of an amendment to the official zoning map for the community.
- c. A community may also coordinate with DOGAMI to develop water depth mapping associated with various tsunami inundation scenarios found on the TIMs which could be used to further define or

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clarify areas where land use provisions would apply.

- d. Evacuation Route Plan Maps: The Evacuation Route Plan will typically include a map or maps that identify designated evacuation routes, assembly areas and other components of the local evacuation system. This map would be included in the adoption of the overall Evacuation Route Plan. The Evacuation Route Plan should, in turn, be incorporated into the community's comprehensive plan or transportation system plan, as appropriate.

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# Tillamook County DRAFT Tsunami Hazard Overlay Zone

## Tsunami Hazard Overlay Zone

The Tsunami Hazard Overlay zone is designed to serve as the principal implementation mechanism for land use measures addressing tsunami risk. As the name indicates, it is designed to be applied in the form of an overlay zone, i.e. in combination with underlying base zones. The boundaries of the overlay would correspond to the area of the jurisdiction subject to inundation from a local source tsunami as indicated in Section 4.1.2 below. In form and application, it is similar to the flood hazard overlay zones in place in most jurisdictions. ***In general, most of the individual sections of the overlay zone are “severable,” that is they can be used on an individual basis, or in any combination, when being adapted for use in a community’s land use code.***

The model overlay focuses on three main approaches to reducing risk and increasing resilience:

1. *Placing restrictions and limitations on certain categories of uses.* These limitations apply primarily to uses which present a high potential for life safety risk, or to uses which provide an essential function during and after a disaster event. ORS 455, which is implemented through the state building code, currently prohibits certain facilities and structures in the tsunami inundation zone as defined by the Oregon Department of Geology and Mineral Industries (DOGAMI) as indicated in Section 4.1.2 below. The model overlay incorporates these requirements, and also provides examples for local jurisdictions which may choose to limit other uses, or provide a higher margin of safety for some essential facilities.
2. *Integrating the development and improvement of evacuation infrastructure into the land use and development review process.* These provisions establish requirements to incorporate appropriate evacuation measures and improvements in most new development, consistent with an overall evacuation plan for the community. It is important to note that effectiveness of this component of the overlay is largely dependent upon the development and adoption of an Evacuation Route Plan. This plan identifies evacuation needs, designates routes, establishes system standards, and identifies needed improvements to the local evacuation system. Such a plan is essential to the implementation of evacuation route development/improvement in conjunction with the land use review and approval process. Evacuation route plans may be simple or more complex, depending on the circumstances and needs of the jurisdiction. Every jurisdiction is urged to develop such a plan as a tool to enhance the development of evacuation infrastructure. Please see Chapter 6 of the Tsunami Land Use guide for detailed guidance on the development of an Evacuation Route Plan.
3. *Providing incentives for development designs which reduce risk and increase resiliency.* The overlay incorporates an optional development process which would permit modifications to many code standards when an overall design incorporates higher degrees of risk reduction. Similar in concept to a planned development, this approach permits deviation from the standard, prescriptive dimensional requirement of the code in order to encourage designs and development measures that achieve higher levels of risk reduction.

# *Tillamook County DRAFT Tsunami Hazard Overlay Zone*

## 4.1.1 Tsunami Hazard (TH) Overlay Zone

### **1.100 Definitions for Section 1.110**

As used in Section 1.110:

1. “Essential Facilities” means:
  - a. Hospitals and other medical facilities having surgery and emergency treatment areas;
  - b. Fire and police stations;
  - c. 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;
  - d. Emergency vehicle shelters and garages;
  - e. Structures and equipment in emergency preparedness centers; and
  - f. Standby power generating equipment for essential facilities.
2. “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.
3. “Special occupancy structures” means
  - a. Covered structures whose primary occupancy is public assembly with a capacity greater than 300 persons;
  - b. Buildings with a capacity of greater than 250 individuals for every public, private or parochial school through secondary level or child care centers;
  - c. Buildings for colleges or adult education schools with a capacity of greater than 500 persons;
  - d. Medical facilities with 50 or more resident, incapacitated persons not included in subsection (a) through (c) of this paragraph;
  - e. Jails and detention facilities; and
  - f. All structures and occupancies with a capacity of greater than 5,000 persons.

*(Note: The above definitions are taken from ORS 455.446)*

4. “Substantial improvement” means any repair, reconstruction, or improvement of a structure which exceeds 50 percent of the real market value of the structure.
5. “Tsunami vertical evacuation structure” means a building or constructed earthen mound that is accessible to evacuees, has sufficient height to place evacuees above the level of tsunami inundation, and is designed and constructed with the strength and resiliency needed to withstand the effects of tsunami waves.
6. “Tsunami Inundation Maps (TIMs)” means the map, or maps in the DOGAMI Tsunami Inundation Map (TIM) Series, published by the Oregon Department of Geology and Mineral Industries, which cover(s) the area *within Tillamook County*.

# Tillamook County DRAFT Tsunami Hazard Overlay Zone

## 4.1.2 Tsunami Hazard Overlay Zone

1. Purpose. The purpose of the Tsunami Hazard Overlay Zone is to increase the resilience of the community to a local source (Cascadia Subduction Zone) tsunami by establishing standards, requirements, incentives, and other measures to be applied in the review and authorization of land use and development activities in areas subject to tsunami hazards. The standards established by this section are intended to limit, direct and encourage the development of land uses within areas subject to tsunami hazards in a manner that will:
  - a. Reduce loss of life;
  - b. Reduce damage to private and public property;
  - c. Reduce social, emotional, and economic disruptions; and
  - d. Increase the ability of the community to respond and recover.

Significant public and private investment has been made in development in areas which are now known to be subject to tsunami hazards. It is not the intent or purpose of this section to require the relocation of or otherwise regulate existing development within the Tsunami Hazard Overlay Zone. However, it is the intent of this section to control, direct and encourage new development and redevelopment such that, over time, the community's exposure to tsunami risk will be reduced.

2. Applicability of Tsunami Hazard Overlay Zone. All lands identified as subject to inundation from the XXL magnitude local source tsunami event as set forth on the applicable Tsunami Inundation Map(s) (TIM) published by the Oregon Department of Geology and Mineral Industries (DOGAMI) are subject to the requirements of this section.

*Note: The overlay zone should include all of the area subject to inundation by the highest local source tsunami event, XXL, depicted on the DOGAMI TIMs. By using the limits of the XXL event, all of the area subject to tsunami risk will be included. However, the regulatory and other standards may be applied differentially within the overlay, based on the different levels of risk for the five modeled events, the purpose of the standard, and overall community objectives.*

3. Uses. In the Tsunami Hazard Overlay Zone, except for the prohibited uses set forth in subsection (4), all uses permitted pursuant to the provisions of the underlying zone may be permitted, subject to the additional requirements and limitations of this section.
4. Prohibited Uses. Unless authorized in accordance with subsection (6), the following uses are prohibited in the specified portions of the Tsunami Hazard Overlay Zone:

*Note: Under ORS 455.446, the uses listed in subsection (a) are prohibited within the tsunami inundation zone as adopted by the DOGAMI governing board, currently the Tsunami Regulatory Maps or "SB 379 Maps." The governing board is reconsidering the limit of the prohibition area and may choose the "L" local source event as the regulatory area in the future. Based on individual circumstances and overall risk to the community, local governments may consider*

## Tillamook County DRAFT Tsunami Hazard Overlay Zone

*establishing further limits on uses based on the need to reduce exposure to tsunami risk. This could include extending the prohibition to include other important and/or high risk uses, expanding the area subject to the prohibition by specifying a larger (e.g. XXL) design event, or some combination of these methods. The provisions of subsection (b) provide one example of an approach to extending use limitations beyond the minimum prohibitions of ORS 455.446. In any case, use prohibitions and/or limitations beyond the minimum requirements of ORS 455.446 should be based on the risk tolerance, overall exposure to risk, and individual needs of the community.*

- a. In areas identified as subject to inundation from the [*specify design event; see ORS 455.446 for the minimum*] magnitude local source tsunami event as set forth on the Tsunami Inundation Map (TIM), the following uses are prohibited:
  - i. Hospitals and other medical facilities having surgery and emergency treatment areas.
  - ii. Fire and police stations.
  - iii. Structures and equipment in government communication centers and other facilities required for emergency response.
  - iv. Buildings with a capacity greater than 250 individuals for every public, private or parochial school through secondary level or child care centers.
  - v. Buildings for colleges or adult education schools with a capacity of greater than 500 persons.
  - vi. Jails and detention facilities.

*Note: The following Essential Facilities and Special Occupancy Structures are currently permitted in the tsunami inundation zone, subject to consultation with DOGAMI regarding mitigation for tsunami risks. See ORS 455.447(4). It is recommended that local governments evaluate these uses and relative levels of risk to determine whether it is appropriate to place additional limitations on these uses in higher risk areas, as provided in the example below.*

- b. In areas identified as subject to inundation from the [*choose design event; recommend "M"*] magnitude local source tsunami event as set forth on the Tsunami Inundation Map (TIM), the following uses are prohibited:
  - i. 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.
  - ii. Emergency vehicle shelters and garages.
  - iii. Structures and equipment in emergency preparedness centers.
  - iv. Standby power generating equipment for essential facilities.
  - v. Covered structures whose primary occupancy is public assembly with a capacity of greater than 300 persons.
  - vi. Medical facilities with 50 or more resident, incapacitated patients.

## Tillamook County DRAFT Tsunami Hazard Overlay Zone

*Note: The following uses are not subject to regulation or review under ORS 455.446-447, but in adopting land use standards for tsunami risk reduction, it is suggested that local governments consider placing limitations on some or all of these uses, particularly in higher risk areas (e.g. M event), based on the overall needs of their community.*

- vii. Residential uses, including manufactured home parks, of a density exceeding 10 units per acre.
  - viii. Hotels or motels with more than 50 units.
- c. Notwithstanding the provisions of [*cite non-conforming use section of code*], the requirements of this subsection shall not have the effect of rendering any lawfully established use or structure nonconforming.

*Note: The Tsunami Hazard Overlay is, in general, not intended to apply to or regulate existing uses or development. A provision such as (c) is recommended to preclude the application of nonconforming use restrictions.*

5. Use Exceptions. A use listed in subsection (4) of this section may be permitted upon authorization of a Use Exception in accordance with the following requirements:
- a. Public schools may be permitted upon findings that there is a need for the school to be within the boundaries of a school district and fulfilling that need cannot otherwise be accomplished.
  - b. Fire or police stations may be permitted upon findings that there is a need for a strategic location.
  - c. Other uses prohibited by subsection (4) of this section may be permitted upon the following findings:
    - i. There are no reasonable, lower-risk alternative sites available for the proposed use;
    - ii. Adequate evacuation measures will be provided such that life safety risk to building occupants is minimized; and,
    - iii. The buildings will be designed and constructed in a manner to minimize the risk of structural failure during the design earthquake and tsunami event.
  - d. Applications, review, decisions, and appeals for Use Exceptions authorized by this subsection shall be in accordance with the requirements for a Type III procedure as set forth in Section [*cite administrative/procedural section of code*].
6. Evacuation Route Improvement Requirements. Except single family dwellings on existing lots and parcels, all new development, substantial improvements and land divisions in the Tsunami Hazard Overlay Zone shall incorporate evacuation measures and improvements, including necessary vegetation management, which are consistent with and conform to the adopted Evacuation Route Plan. Such measures shall include:

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*Note: The following provisions are largely dependent upon an adopted Evacuation Route Plan that identifies evacuation needs, designates routes, establishes system standards, and identifies needed improvements to the local evacuation system. Such a plan is essential to the implementation of evacuation route development/ improvement in conjunction with the land use review and approval process. Evacuation route plans may be simple or more complex, depending on the circumstances and needs of the community. Every jurisdiction is urged to develop such a plan as a tool to enhance the development of evacuation infrastructure. Please see Chapter 6 of the Tsunami Land Use Guide for detailed guidance on the development of an Evacuation Route Plan.*

- a. On-site improvements:
  - i. Improvements necessary to ensure adequate pedestrian access from the development site to evacuation routes designated in the Evacuation Route Plan in all weather and lighting conditions.
  - ii. Frontage improvements to designated evacuation routes that are located on or contiguous to the proposed development site, where such improvements are identified in the Evacuation Route Plan. Such improvements shall be proportional to the evacuation needs created by the proposed development.
  - iii. Where identified in the Evacuation Route Plan as the only practicable means of evacuation, tsunami evacuation structure(s) of sufficient capacity to accommodate the evacuation needs of the proposed development.
- b. Off-site improvements: Improvements to portions of designated evacuation routes that are needed to serve, but are not contiguous to, the proposed development site, where such improvements are identified in the Evacuation Route Plan. Such improvements shall be proportional to the evacuation needs created by the proposed development.
- c. Evacuation route signage consistent with the standards set forth in the Evacuation Route Plan. Such signage shall be adequate to provide necessary evacuation information consistent with the proposed use of the site.
- d. Evacuation route improvements and measures required by this subsection shall include, at a minimum, the following:
  - i. Improved streets and/or all-weather surface paths of sufficient width and grade to ensure pedestrian access to designated evacuation routes in all lighting conditions;
  - ii. Improved streets and paths shall provide and maintain horizontal clearances sufficient to prevent the obstruction of such paths from downed trees and structure failures likely to occur during a Cascadia earthquake; and
  - iii. Such other improvements and measures identified in the Evacuation Route Plan.
- e. When it is determined that improvements required by this subsection cannot be practicably accomplished at the time of development approval, payment in lieu of identified improvements shall be provided in accordance with [cite applicable section of code establishing standards and requirements for payment-in-lieu].

## Tillamook County DRAFT Tsunami Hazard Overlay Zone

### 7. Tsunami Evacuation Structures

- a. All tsunami evacuation structures shall be of sufficient height to place evacuees above the level of inundation for the XXL local source tsunami event.

*Note: Depending on individual circumstances, some communities may find that building evacuation structures to the elevation of the XXL event is impracticable. In such cases, communities may choose to consider a case-by-case process to allow for exceptions to this elevation requirement. It is recommended that tsunami evacuation structures not be permitted to a standard lower than the L local source tsunami event and anything below XXL may be at some risk.*

- b. Tsunami evacuation structures are not subject to the building height limitations of this chapter.

### 8. Flexible Development Option

- a. The purpose of the Flexible Development Option is to provide incentives for, and to encourage and promote, site planning and development within the Tsunami Hazard Overlay Zone that results in lower risk exposure to tsunami hazard than would otherwise be achieved through the conventional application of the requirements of this chapter. The Flexible Development Option is intended to:
  - i. Allow for and encourage development designs that incorporate enhanced evacuation measures, appropriate building siting and design, and other features that reduce the risks to life and property from tsunami hazard; and
  - ii. Permit greater flexibility in the siting of buildings and other physical improvements and in the creation of new lots and parcels in order to allow the full realization of permitted development while reducing risks to life and property from tsunami hazard.
- b. The Flexible Development Option may be applied to the development of any lot, parcel, or tract of land that is wholly or partially within the Tsunami Hazard Overlay Zone.

*Note: Subsection (c) is intended to provide maximum flexibility for development and for achieving risk reduction by permitting any type or mix of uses, notwithstanding the underlying zoning. Local governments should evaluate this allowance to determine if it is appropriate for application within their jurisdiction. The other provisions of this section may still be fully utilized without including this provision.*

- c. The Flexible Development Option may include any uses permitted outright or conditionally in any zone, except for those uses prohibited pursuant to subsection (4) of this section.
- d. Overall residential density shall be as set forth in the underlying zone or zones. Density shall be computed based on total gross land area of the subject property, excluding street right-of-way.

## *Tillamook County DRAFT Tsunami Hazard Overlay Zone*

- e. Yards, setbacks, lot area, lot width and depth, lot coverage, building height and similar dimensional requirements may be reduced, adjusted or otherwise modified as necessary to achieve the design objectives of the development and fulfill the purposes of this section.
- f. Applications, review, decisions, and appeals for the Flexible Development Option shall be in accordance with the requirements for a Type II [*or Type III*] procedure as set forth in Section [*cite administrative/procedural section of code*].
- g. Approval of an application for a Flexible Development Option shall be based on findings that the following criteria are satisfied:
  - i. The applicable requirements of sub-paragraphs (b) and (d) of this subsection are met; and
  - ii. The development will provide tsunami hazard mitigation and/or other risk reduction measures at a level greater than would otherwise be provided under conventional land development procedures. Such measures may include, but are not limited to:
    - 1. Providing evacuation measures, improvements, way finding techniques and signage at a level greater than required by subsection (6) of this section;
    - 2. Providing tsunami evacuation structure(s) which are accessible to and provide capacity for evacuees from off-site;
    - 3. Incorporating building designs or techniques which exceed minimum structural specialty code requirements in a manner that increases the capacity of structures to withstand the forces of a local source tsunami; and
    - 4. Concentrating or clustering development in lower risk portions or areas of the subject property, and limiting or avoiding development in higher risk areas.

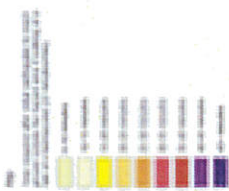




CLATSOP COUNTY  
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# Modelled Pedestrian Evacuation Times at 4 Feet per Second During an XXL1 Local Tsunami Event Seaside and Gearhart, Clatsop County, Oregon All Bridges Intact

OFFICE FIELD REPORT 10-01-08  
PROJECT: Seaside and Gearhart Local Tsunami Evacuation Times  
DATE: 10/1/08



- Evacuation Start Area
- Highway
- Major Road
- Local Road
- Waterway
- Water
- Outside Hazard Area
- Inside Hazard Area
- Evacuation Route
- Evacuation Direction
- Evacuation Point

**EVACUATION TIMES (MINUTES)**

These evacuation times are based on a model that assumes a constant walking speed of 4 feet per second. This is a conservative estimate of the time required for an individual to evacuate a building and reach a safe area. The model does not take into account factors such as the number of people in a building, the availability of exits, or the condition of the individual. The evacuation times are shown on the map as a color-coded grid. The colors range from yellow (0-5 minutes) to dark purple (95-100 minutes). The evacuation times are generally highest in the areas closest to the beach and lowest in the areas furthest from the beach. The evacuation times are also affected by the layout of the streets and the location of buildings.

**EVACUATION ROUTES**

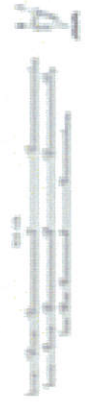
The evacuation routes are shown on the map as black arrows. The routes generally follow the main roads and lead away from the beach area. The evacuation routes are shown for both Seaside and Gearhart. The evacuation routes are generally shown as a grid of streets that lead away from the beach area.

**EVACUATION POINTS**

The evacuation points are shown on the map as small circles. The evacuation points are generally located at the ends of the evacuation routes. The evacuation points are shown for both Seaside and Gearhart. The evacuation points are generally located at the ends of the evacuation routes.



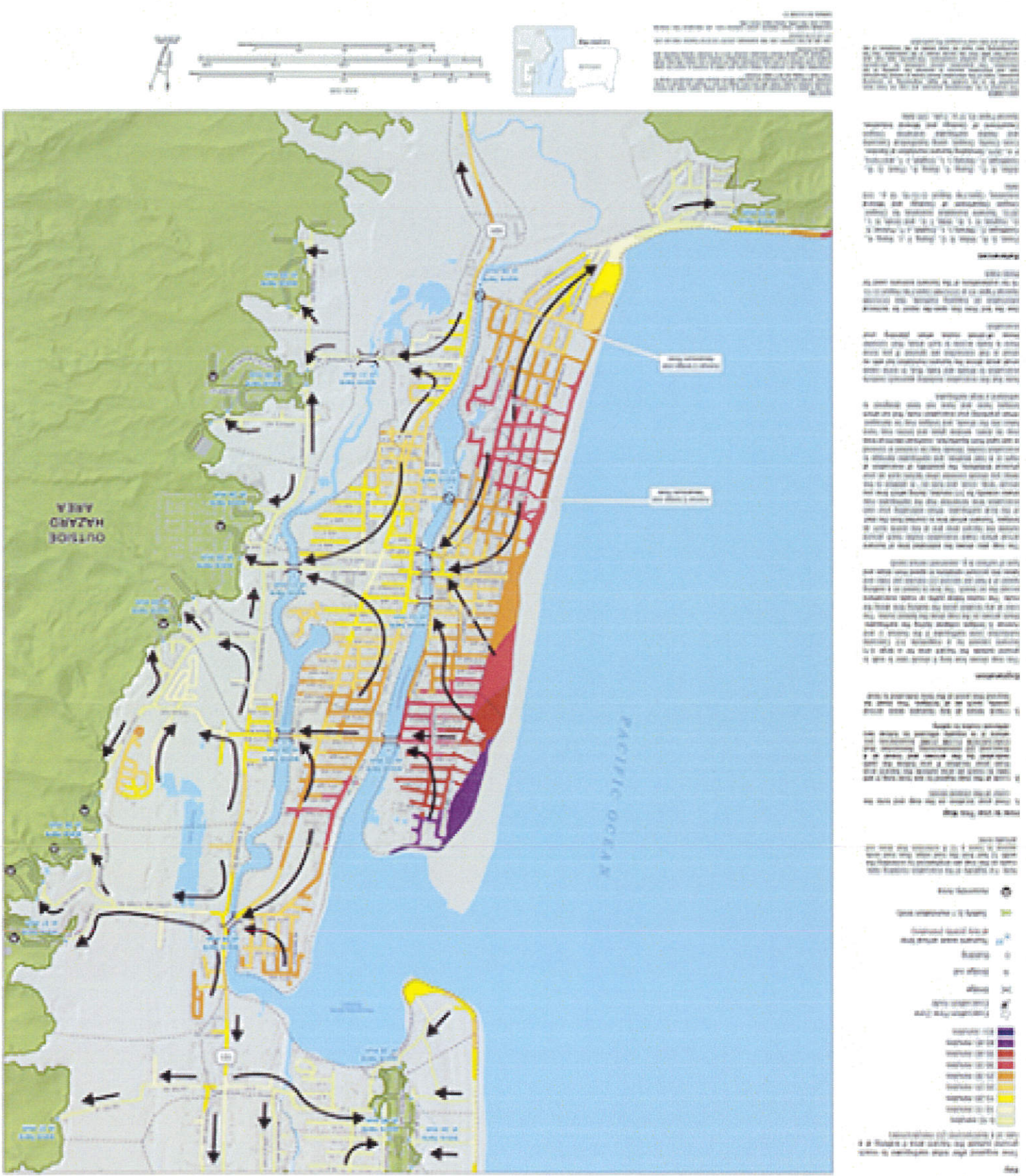
PREPARED BY: CLATSOP COUNTY EMERGENCY MANAGEMENT AGENCY  
DATE: 10/1/08  
PROJECT: Seaside and Gearhart Local Tsunami Evacuation Times



CLATSOP COUNTY EMERGENCY MANAGEMENT AGENCY  
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## Modeled Pedestrian Evacuation Times at 4 Feet per Second During an L1 Local Tsunami Event, Seaside, Clatsop County, Oregon Avenue U and Avenue Q Bridges Removed

**OPEN FILE REPORT 0-11-02**  
 This Technical Report, prepared by the Oregon Department of Transportation, is available for public review and copying. It is intended to provide information on the results of the modeling and analysis performed for this project. It is not intended to be used for any other purpose without the written consent of the Oregon Department of Transportation.



# Modeled Pedestrian Evacuation Times at 4 Feet per Second During an LI Local Tsunami Event Seaside and Gearhart, Clatsop County, Oregon All Bridges Intact



- 0 - 5 minutes
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  - Evacuation Time
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  - Evacuation Line
  - Evacuation Point
  - Evacuation Area
  - Evacuation Time
  - Evacuation Direction
  - Evacuation Start
  - Evacuation End
  - Evacuation Path
  - Evacuation Line



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