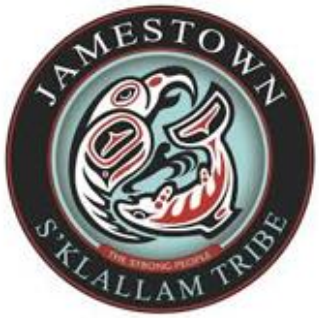
Clallam County Multi-Jurisdictional Hazard Mitigation Plan



















2019 Plan Update

Prepared by:

Clallam County Emergency Management

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MEMORANDUM OF TRANSMITTAL

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PLAN ADOPTION AND APPROVAL

44 CFR §201.6(c)(5) 44 CFR §201.7(c)(6) require that the Clallam County Multi-Jurisdictional Hazard Mitigation Plan be formally adopted by the Board of County Commissioners and all participating cities, tribes, and special districts (participating jurisdictions). The Hazard Mitigation Plan has been adopted by each jurisdiction as of the following dates. The plan adoption resolution follows.

Jurisdiction	Adopting Body	Adoption Date
Clallam County	Board of County Commissioners	
City of Port Angeles	City Council	
City of Sequim	City Council	
City of Forks	City Council	
Lower Elwha Klallam Tribe	Tribal Council	
Jamestown S'Klallam Tribe	Tribal Council	
Peninsula College		
Clallam County Public Utilities District No. 1		
Port of Port Angeles	Port Commission	

This plan was approved by the Federal Emergency Management Agency on January 28, 2020. The official approval letter follows.

U.S. Department of Homeland Security
FEMA Region 10
130 – 228th Street, SW
Bothell, Washington 98021

FEMA

January 29, 2020

The Honorable Mark Ozias
Chair, Board of Clallam County Commissioners
223 East 4th Street, Suite 4
Port Angeles, Washington 98362

Dear Chair Ozias:

On January 28, 2020, the United States Department of Homeland Security's Federal Emergency Management Agency (FEMA) Region 10, approved the Clallam County Multijurisdictional Hazard Mitigation Plan as a multi-jurisdictional local plan as outlined in Code of Federal Regulations Title 44 Part 201. This approval provides the below jurisdictions eligibility to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's, Hazard Mitigation Assistance (HMA) grants projects through January 27, 2025, through your state:

Clallam County Port of Port Angeles

FEMA individually evaluates all application requests for funding according to the specific eligibility requirements of the applicable program. Though a specific mitigation activity or project identified in the plan may meet the eligibility requirements, it may not automatically receive approval for FEMA funding under any of the aforementioned programs.

Over the next five years, we encourage your communities to follow the plan's schedule for monitoring and updating, and to develop further mitigation actions. To continue eligibility, jurisdictions must review, revise as appropriate, and resubmit the plan within five years of the original approval date.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact Kevin Zerbe, State Mitigation Strategist with Washington Emergency Management Division, at (253) 512-7467, who coordinates and administers these efforts for local entities.

Sincerely,

Mark Carey, Director
Mitigation Division

cc: Tim Cook, Washington Emergency Management Division

Enclosure

JS:vl

www.fema.gov

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ACKNOWLEDGEMENTS

The development of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan was made possible by the tireless work of the Mitigation Planning Team. Over the course of 12 months, the team held five formal workshops and met informally many other times. This cross-sector team identified the hardest hitting hazards, described their risks and cascading impacts, and developed a comprehensive mitigation strategy to reduce risk to community members and their property. The following individuals are acknowledged for their efforts to develop an effective plan and sustainable program.

Name	Title	Department/Agency
Ron Cameron	Undersheriff, Emergency Manager	Clallam County Emergency Management Department
Anne Chastain	EOC Coordinator	Clallam County Emergency Management Department
Jamye Wisecup	Emergency Management	Clallam County Emergency Management Department
Rod Fleck	City Attorney/Planner	City of Forks
David Garlington	Public Works Director	City of Sequim Public Works Department
Ann Soule	Resource Manager	City of Sequim Public Works Department
Peter Tjemsland	Utilities Manager	City of Sequim Public Works Department
Jim Buck	Volunteer	Clallam County Emergency Management Department
Luke Strong-Cvetich	Tribal Planner	Jamestown S'Klallam Tribe
Glen Roggenbuck	Emergency Management Coordinator	Lower Elwha Klallam Tribe
Marty Martinez	Campus Safety Operations Manager	Peninsula College
Ken Dubuc	Fire Chief	Port Angeles Fire Department
Dan Gase	Airport & Real Estate Manager	Port of Port Angeles
Dan Shea	Operations Supervisor	Port of Port Angeles
Larry Morris	Safety Manager	Public Utilities District No. 1

Support for the 2019 update of the Clallam County Hazard Mitigation Plan was provided under contract by Ecology and Environment, Inc.

RECORD OF PLAN UPDATE AND APPROVAL

The Clallam County Multi-Jurisdictional Hazard Mitigation Plan is required to be updated once every five years and submitted to the Board of County Commissioners for adoption and the Washington State Emergency Management Division and the Federal Emergency Management Agency for approval. The County may update the plan on a more frequent basis as needed without approval.

Refer to Chapter 7 for more information on Plan Implementation guidance.

Date of Update	Date of Adoption	Date of FEMA Approval
2010	August 14, 2011	August 14, 2011
2020	January 14, 2020	January 28, 2020

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Special Hazard Districts Annex

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ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
COOP	Continuity of Operations
County	Clallam County
CRS	Community Rating System
CWPP	Community Wildfire Protection Plan
CSZ	Cascadia Subduction Zone
DMA 2000	Disaster Mitigation Act of 2000
DEC	Department of Ecology
DEM	Department of Emergency Management
DFIRM	Digital Flood Insurance Rate Map
DNR	Washington State Department of Natural Resources
E & E	Ecology and Environment, Inc.
FEMA	Federal Emergency Management Agency
FIRMs	Flood Insurance Rate Maps
EMD	Emergency Management Division
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazards Mitigation Plan
LEPC	Local Emergency Planning Committee
M	magnitude

mph	miles per hour
MPT	Mitigation Planning Team
NFIP	National Flood Insurance Program
NHMP	Natural Hazards Mitigation Plan
PHMSA	Pipeline and Hazardous Materials Safety Administration
PUD	Public Utility District
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988
USDA	United States Department of Agriculture
USGS	United State Geological Survey
WERP	Wind Energy Research Program
WSDA	Washington State Department of Agriculture
WSDOT	Washington State Department of Transportation
WUI	Wildland-Urban Interface

1 INTRODUCTION

Chapter 1 describes the authorities and principles that provide the basis for Clallam County's (County's) mitigation program as well as provides a description of the program's organization and how the plan is organized to support it.

1.1 Authority

The Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act), as amended by the Disaster Mitigation Act of 2000 (DMA 2000), Public Law 106-390, and its implementing Code of Federal Regulations (CFR) provisions, 44 CFR § 201, provide the legal authority for local hazard mitigation planning. The DMA 2000 requires state, local, and tribal governments to develop a Hazard Mitigation Plan (HMP) that identifies the jurisdiction's natural hazards, risks, vulnerabilities, and mitigation strategies. The planning process requirements mandated by the Federal Emergency Management Agency (FEMA) (outlined in 44 CFR §201.6) include the following activities:

- Document the planning process;
- Provide stakeholders with an opportunity to participate;
- Conduct and document public involvement;
- Incorporate existing plans and reports;
- Discuss continued public participation and plan maintenance; and
- Provide a method for monitoring, evaluating, and updating the HMP.

Once complete, the HMP must be submitted to FEMA for approval. FEMA's approval of an HMP is a prerequisite for federal Hazard Mitigation Assistance (HMA) grant program eligibility (outlined in 42 CFR §5165(a)).

The Clallam County Multi-Jurisdictional Hazard Mitigation Plan (HMP) was prepared in accordance with the requirements of the Stafford Act, as amended by the DMA 2000, and the implementing 44 CFR § 201 provisions. The County and all participating communities will integrate appropriate Americans with Disabilities Act (ADA) standards into mitigation projects and actions implemented as a part of the planning process. For example, alterations to existing facilities, such as seismic retrofits, will comply with all applicable federal accessibility requirements.

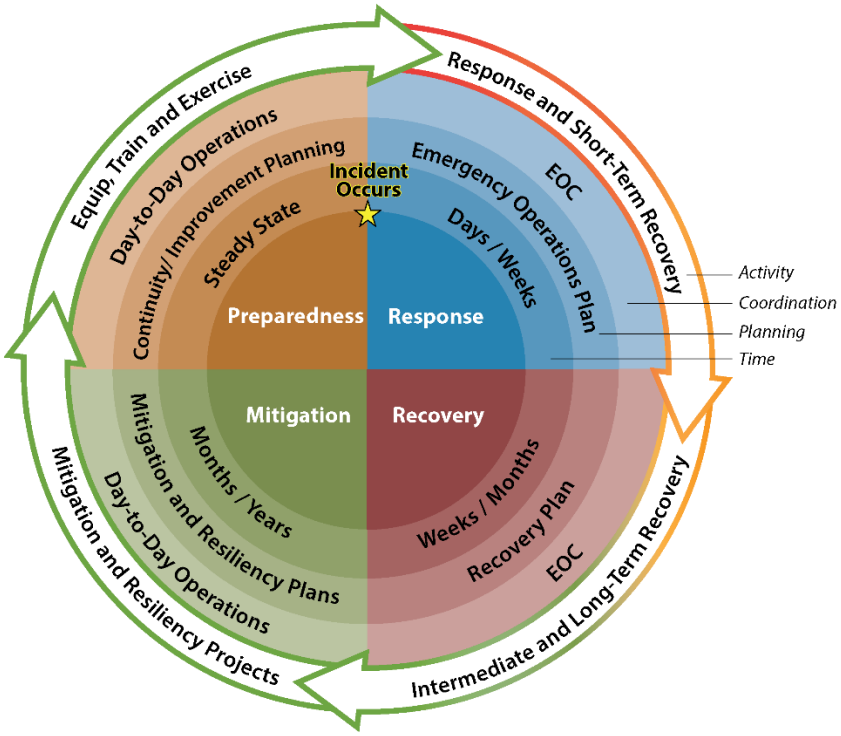
1.2 What is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property posed by hazards (44 CFR §201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.

Additionally, hazard mitigation planning is one of the five mission areas presented in the National Preparedness Goal: Mitigation, Prevention, Protection, Response, and Recovery (see Figure 1-1). The Clallam County HMP is an integral piece of the County's comprehensive approach to emergency

management and is designed to align and integrate with other existing plans and emergency management activities.

Figure 1-1 Emergency Management Cycle



Mitigation planning is important because it not only encourages communities to become more flexible and adapt to change more easily, but it also:

- Guides mitigation activities in a coordinated and efficient manner;
- Integrates mitigation into existing County plans/programs;
- Considers future growth and development trends;
- Makes the community more disaster-resilient; and
- Ensures eligibility for grant funding.

1.3 Purpose and Scope

1.3.1 Purpose

The Clallam County HMP assesses the potential impact of all prioritized hazards to community members and property and provides mitigation strategies and actions to reduce such risks. The HMP prioritizes these strategies and includes an implementation plan to ensure strategic actions are carried out. The 2019 HMP is the required update of the County's 2010 HMP, expanded to account for both natural and human-caused hazards. The updated HMP ensures community members have access to the most up-to-date hazard risk information and maintains the County and participating communities' eligibility to receive federal mitigation funding.

1.3.2 Scope

While the HMP is focused on community members and property, strategies for broader community risk reduction are included. The County represents a geographically large area with communities throughout. The HMP attempts to account for all areas of risk concern and address the needs of each participating jurisdiction. The HMP is designed to integrate with other planning efforts and neighboring county mitigation plans. The Clallam County HMP is designed to be multi-jurisdictional and represents the efforts of the following participating jurisdictions:

- Clallam County
- City of Port Angeles
- City of Sequim
- City of Forks
- Jamestown S'Klallam Tribe
- Lower Elwha Klallam Tribe
- Makah Tribe (not formally involved in process)
- Quileute Tribe (not formally involved in process and maintains standalone HMP)

In addition to this HMP Basic Plan, each participating jurisdiction has developed standalone Jurisdictional Annexes that identify unique capabilities, risks, and mitigation strategies to lead their mitigation programs.

Refer to each Jurisdictional Annex for additional community-specific details.

1.4 Clallam County Hazard Mitigation Program

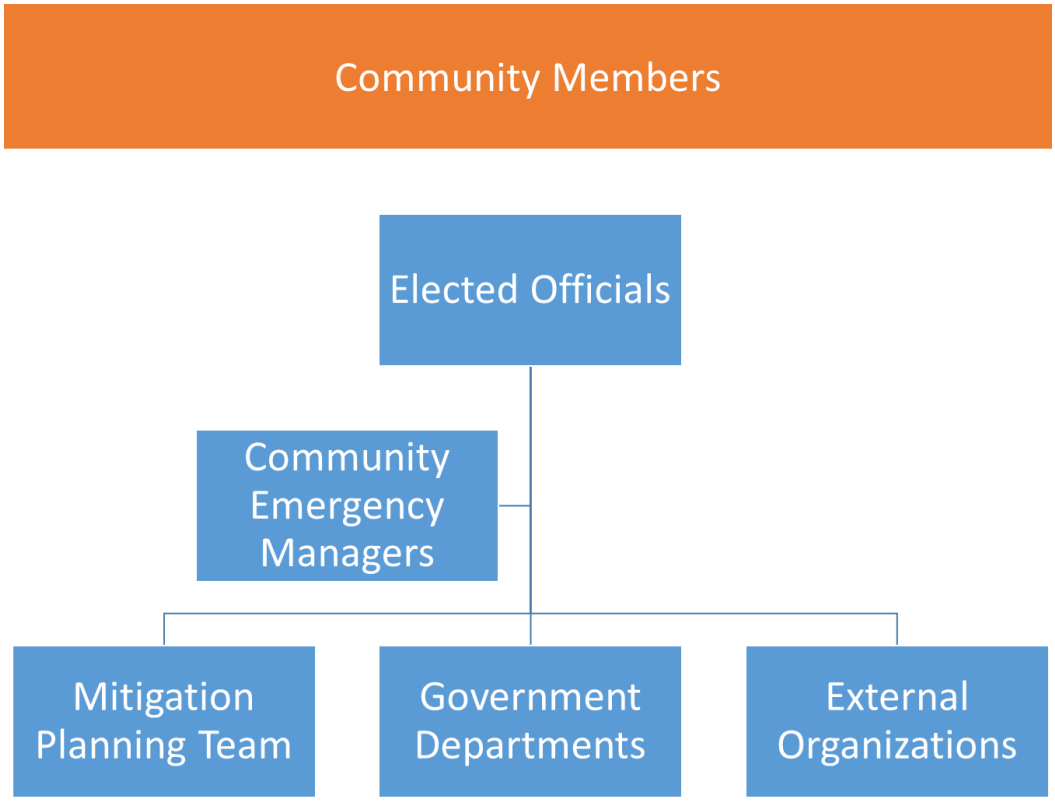
The HMP is one component of the County's approach to hazard mitigation. While not as heavily populated as many counties within Western Washington, the County and its partners maintain capabilities to ensure all elements of the participating communities are able to support hazard mitigation activities (see Chapter 5).

See Chapter 6 for details on ongoing implementation of the County's mitigation program.

1.4.1 Organization

Figure 1-2 illustrates how the County organizes to ensure an engaged and collaborative approach to mitigation planning and program implementation. This organization is informally referred to in this plan as the County's mitigation program.

Figure 1-2 Clallam County Multi-Jurisdictional Mitigation Program Organization



1.4.2 Roles and Responsibilities

The HMP exists as a framing document for the County's overall mitigation program. All community members, governmental entities, and businesses play a role in mitigation, and this section outlines those roles and responsibilities.

1.4.2.1 Community Members

Prepared and educated community members are a critical aspect of the County's resiliency, and the County and participating communities actively encourages its members to participate in efforts to minimize vulnerability to hazards by engaging in the following activities:

- Participate in preparedness programs. More information can be found in newsletters, Facebook pages, and through direct engagement; and
- Engage in personal and family preparedness and mitigation activities at home and at work.

1.4.2.2 Elected Officials

Elected leadership plays a key role in the County's mitigation program. As the local decision makers, they are responsible for balancing budgetary needs with the need to reduce risks. Participating

community elected officials perform the following activities in support of the County's mitigation program:

- Develop and set policy guidance and direction for the County's hazard mitigation program;
- Pass required ordinances to support the hazard mitigation program;
- Provide resources, funding, and direction for protecting and enhancing the lives of community members, and protecting cultural and natural resources;
- Adopt the HMP; and
- Approve funding and projects outlined in the HMP.

1.4.2.3 Jurisdictional Emergency Managers

Each participating jurisdiction employs an emergency manager or emergency management department. These community emergency managers serve as the lead coordinator for the community mitigation program. The emergency manager facilitates mitigation activities, including updates to the HMP, and provides technical assistance to other departments. Key responsibilities of the emergency managers include the following:

- Facilitate the jurisdiction's hazard mitigation program;
- Provide technical support to departments regarding integration of hazard mitigation into department activities; and
- Keep elected officials apprised of the status of the County's hazard mitigation program.

1.4.2.4 Mitigation Planning Team

The Mitigation Planning Team (MPT) includes representatives from each participating jurisdiction and was developed to ensure the HMP was reflective of capabilities, resources, and concerns throughout the County. Moving forward, the MPT will regularly convene to monitor, evaluate, and implement the County's mitigation program. Additional key responsibilities of the MPT include the following:

- Support ongoing implementation of the County's hazard mitigation program (see Chapter 7);
- Meet quarterly to address progress made on mitigation actions to date; and
- Provide input and technical support for updating and maintaining the HMP.

Refer to Chapter 2 for a discussion of the role of the MPT in the 2019 update of the Clallam County HMP.

1.4.2.5 Governmental Departments and Agencies

The success of the County's mitigation program is dependent on mitigation being a shared endeavor across all organizational elements of the governmental departments of each participating jurisdiction. Departments are strongly encouraged to incorporate hazard mitigation into their plans and programs and be active participants in the County's efforts to enhance resiliency. Key responsibilities of County departments include the following:

- Implement actions identified in the HMP;

- Incorporate hazard mitigation into other departmental planning efforts; and
- Assign a representative to serve as a liaison to the MPT.

1.4.2.6 Community Partners and Neighboring Jurisdictions

The County is committed to a collaborative mitigation program that strives to integrate with other community efforts to mitigate the impacts of hazards. While the scope of the HMP primarily includes participating jurisdiction departments, the County will continue to look for opportunities to partner with neighboring jurisdictions, private industry, nonprofit organizations, and community- and faith-based organizations in its mitigation program. In particular, the County will coordinate with Jefferson and Grays Harbor Counties, the State of Washington, and FEMA Region X among others, on an ongoing basis to ensure its hazard mitigation program considers the resources and implications on neighboring jurisdictions. Key responsibilities of community partners include the following:

- Incorporate hazard mitigation into organizational and business activities; and
- To the greatest extent possible, coordinate hazard mitigation activities with those of the County and other community partners.

Refer to Chapter 2 for a discussion of how community partners were engaged in the 2019 update of the Clallam County HMP.

1.5 Plan Organization

The 2019 update of the HMP is organized into the following chapters:

- **Chapter 1 – Introduction.** Identifies the authorities on which the plan is based, describes the plan's purpose and scope, describes how the plan is organized, and identifies changes to the plan since 2010.
- **Chapter 2 – Planning Process.** Describes the process used to update the plan, including data sources and plan integration activities, outreach and engagement strategies, MPT activities, and plan development milestones.
- **Chapter 3 – Community Profile.** Provides a summary community profile for the County including geographic, demographic, and economic characteristics that make the area unique.
- **Chapter 4 – Hazard Profiles and Vulnerability Assessments.** Contains a summary of the hazards that could potentially impact the community, including a hazard-ranking table.
- **Chapter 5 – Capability Assessment.** Identifies the existing mitigation capabilities of departments and organizations and highlights mitigation accomplishments over the last planning cycle.
- **Chapter 6 – Mitigation Strategy.** Provides updated goals and objectives for the County's mitigation program and identifies a comprehensive set of prioritized mitigation actions that would contribute to the County's resiliency.
- **Chapter 7 – Program Implementation.** Describes the County's plan for monitoring, evaluating, and updating the Clallam County HMP over the next five-year period.
- **Chapter 8 – References.** Identifies sources of data used to inform HMP.

In addition to the base document, the HMP is supported by a series of appendices that provide documentation of the planning process, expanded map sets, and additional data supporting the Risk and Vulnerability Assessment.

1.6 What's New in the 2019 Update?

The 2019 Clallam County Multi-Jurisdictional HMP serves as a continuation of the County's long-standing mitigation efforts. Throughout the update planning process, the MPT has sought to ensure that the process is more inclusive with more engagement and planning team consideration to what the plan's content means for its actual functionality. The County desires to go beyond creating an approved HMP and instead continue to develop its County-wide mitigation program that is constantly integrating hazard mitigation into daily operations.

The 2019 update of the HMP includes the following major revisions to the 2010 plan:

- A streamlined Basic Plan that is designed to be user-friendly and improve readability;
- An expanded public involvement process designed to solicit wide-ranging feedback on hazard mitigation planning from local jurisdictions. This included an online survey that was disseminated through social media and three interactive public workshops held in Port Angeles, Forks, and Sequim over the course of the plan development process (Chapter 2.5);
- Incorporation of additional hazards, including human-induced hazards (Chapter 4);
- Expanded hazard profiles that includes discussion of the impact of climate change on each hazard (Chapter 4);
- Focused mitigation strategy and prioritization methodology (STAPLEE) (Chapter 6); and
- Jurisdictional annexes that delve into the concerns of local and tribal governments, including tailored hazard rankings and risk assessments.

Additionally, to aid in plan review and to ensure that all FEMA planning requirements are met, text box callouts have been inserted into the plan that identify the planning element, based on FEMA's mitigation plan review tool, that is addressed in that particular section of the plan. The plan also strives to make robust use of internal call outs to ensure that plan users can easily find related information. For example, in Chapter 2, which addresses the planning process, the following text box appears:

FEMA	**A1.** Does the Plan document the planning process, including how it was prepared and who was involved in the process for [Clallam County]? (Requirement §201.6(c)(1))

See Appendix E for the completed FEMA Local Plan Mitigation Review Tool for the Clallam County HMP.

2 PLANNING PROCESS

Chapter 2 provides a narrative description of the planning process the County conducted to ensure that the County's mitigation strategy was informed by input from key departments, community partners, and community members. The process was based on strategies for inclusive engagement and integration with existing planning efforts.

FEMA	**A1.** Does the Plan document the planning process, including how it was prepared and who was involved in the process for [Clallam County]? (Requirement §201.6(c)(1))

A HMP's organization is driven by the needs of the County. The following priorities were used to steer development of the HMP:

- Communicate priorities and values through mitigation strategies;
- Build community through a comprehensive and inclusive planning process; and
- Engage community members, elected officials, and our partners to ensure an equitable plan and mitigation program.

FEMA recommends nine tasks for developing or updating local HMPs (see Figure 2-1). Tasks 1 through 3 include the people and process involved in the all-hazards mitigation plan development or update; Tasks 4 through 8 focus on the analytical and decision steps that need to be taken; and Task 9 includes suggestions for plan implementation.

Figure 2-1 FEMA-Recommended Mitigation Planning Tasks



Source: FEMA Local Mitigation Planning Handbook, March 2013

2.1 Planning Area

Clallam County is uniquely positioned as a gateway to the Olympic Peninsula. As a result, the County faces mitigation planning challenges as it becomes an increasingly popular destination to live and recreate, while maintaining its historical communities and industries. While the County is not densely populated, visitors and seasonal residents result in large population expansions over short periods of time. Visitors and new residents may not be acquainted with the ways natural hazards impact a county that is not densely populated and whose services are limited along a few transportation corridors.

Much of the planning area is encompassed by the Olympic National Park; in all, the federal government owns approximately 523,000 acres (30.6 %) of land within Clallam County (Peninsula Daily News 2018).

This makes mitigation planning unique, as the County and local jurisdictions may be affected by natural hazards originating from federally managed lands.

See Figure 2-2 for a map of the planning area.

2.2 Data Collection and Incorporation of Existing Plans

FEMA	**A4.** Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(1))

Data collection efforts for the Clallam County HMP focused on documents pertaining to the planning area. The primary source documents for the plan update were the 2010 HMP and Geographic Information System (GIS) data. Additionally, related emergency management plans; current local, tribal, county, and state HMPs; and plans with relevant hazard mitigation topics were reviewed as part of the data collection efforts. Examples of hazard mitigation planning best practices were also reviewed for their applicability to the HMP, including the State of Washington Enhanced HMP, Clallam County Community Wildfire Protection Plans (CWPPs), and others.

2.2.1 2010 Clallam County Multi-Jurisdictional Hazard Mitigation Plan

As part of the 2019 plan update, the following actions were taken to ensure that the update reflected progress in the County's mitigation efforts and any changes in priorities:

- Review and refinement of 2010 plan goals and objectives by the hazard mitigation planning team;
- Update of department mitigation capabilities; and
- Update of status for all mitigation actions identified in the 2010 plan.

Refer to Chapter 6, Table 6-5 for a review of the status of all mitigation actions identified in the 2010 plan update.

2.2.2 State of Washington Enhanced Hazard Mitigation Plan (2015)

The State of Washington Enhanced HMP identifies and prioritizes potential actions throughout the state that would reduce the state's vulnerability to natural hazards. In addition, the plan satisfies the requirements of FEMA to ensure the state is eligible to receive hazard mitigation and disaster assistance funds from the federal government. The current version of plan was approved on October 1, 2018 as an enhanced plan and is effective through 2023.

2.2.3 Integration of Geographic Information Systems Data

Efforts were made to ensure the HMP incorporates the most up-to-date and comprehensive data available. These data were used to develop maps contained within the HMP and develop comprehensive risk assessments that describe exposure to risk in terms of dollar amount and provide property counts (where available).

Refer to Appendix B for a comprehensive list of all GIS source data.

2.3 Coordination with Other Planning Efforts

FEMA	**A5.** Does the plan include a discussion on how the planning process was integrated to the extent possible with other ongoing County planning efforts as well as other FEMA programs and initiatives? (Requirement §201.6(c)(1)(iv))

The County has sought to incorporate its hazard mitigation planning into the planning efforts of local jurisdictions, tribal governments, and other entities:

- Other County-wide emergency plans, including the recent update of the Comprehensive Emergency Management Plan.
- Local comprehensive planning, including the City of Forks 2018 – 2038 Comprehensive Plan.
- Statewide emergency planning efforts involving exercises and trainings, including participation in the 2016 Cascadia Rising Functional Exercise.
- Washington State 2018 Enhanced HMP, which is a multi-agency statewide document.

Clallam County Emergency Management has developed operational areas throughout Clallam County that are separated geographically. This division allows emergency plans to be developed and risks evaluated based on the unique situations in those areas.

2.4 Mitigation Planning Team

The County began preparing for the update of the HMP by preparing an application to receive FEMA funding via the Pre-Disaster Mitigation Grant Program. Funding was received in April 2018, which allowed for the planning process to commence with contract support provided by Ecology and Environment, Inc. (E & E). The County Emergency Manager initiated the planning process through pre-planning via internal meetings and email exchanges with MPT members.

The MPT was convened at the start of the HMP update project to facilitate department and community member input into the HMP update. The MPT aided in the revision of mitigation goals and objectives, determination of risks and vulnerabilities, identification of mitigation strategies, refinement of mitigation review criteria, and prioritization and implementation of mitigation strategies. This planning process focused on improving intergovernmental coordination to ensure that the resulting document met the needs of all participating jurisdiction departments.

2.4.1 MPT Members

The MPT was led and organized by the County Emergency Manager. The members of the MPT who participated in the plan update and their associated organizations and departments are listed in Table 2-1. Each of these individuals participated in one or more workshops.

Table 2-1 Mitigation Planning Team Members

Name	Title	Agency
Bill Wheeler	Volunteer	American Red Cross
Rod Fleck	City Attorney/Planner	City of Forks

Table 2-1 Mitigation Planning Team Members

Name	Title	Agency
James Burke	Utilities & Public Works Director	City of Port Angeles
David Garlington	Public Works Director	City of Sequim Public Works Department
Ann Soule	Resource Manager	City of Sequim Public Works Department
Jennifer Chenoweth	Environmental Coordinator	Clallam County
Mark Ozias	District 1 Commissioner	Clallam County
Bill Peach	District 3 Commissioner	Clallam County
Jen Garcelon	Environmental Health Director	Clallam County
Jim Buck	Volunteer	Clallam County Emergency Management Department
Mark Lane	Chief Financial Officer	Clallam County Finance Department
Bill Paul	District Chief	Clallam County Fire District #1
Paul Howard	Firefighter	Clallam County Fire District #2
Jake Patterson	Deputy Chief	Clallam County Fire District #2, Rescue
Dan Orr	Assistant Chief	Clallam County Fire District #3
Greg Waters	Fire Chief	Clallam County Fire District $4
Tom Reyes	Deputy Director HR & Risk Management	Clallam County Human Resources
Tom Shindler	Geographic Information System (GIS) Coordinator	Clallam County Information Technology
Monicka Anderson	Information Systems Specialist	Clallam County Information Technology
Ross Tyler	Public Works Director	Clallam County Road Department
Kevin Gallacci	Acting General Manager	Clallam Transit System
David Bingham	Superintendent	Crescent School District
Leanne Jenkins	Tribal Planning Director	Jamestown S'Klallam Tribe
Luke Strong-Cvetich	Tribal Planner	Jamestown S'Klallam Tribe
Glen Roggenbuck	Emergency Management Coordinator	Lower Elwha Klallam Tribe
Joseph Schooler	Regional Outreach and Training Manager	Master Sergeant, Washington Army National Guard, 10th Homeland Regional Response Force
Julie Black	Director of Support Services	Olympic Medical Center
Marty Martinez	Campus Safety Operations Manager	Peninsula College
Robert Seavey	Volunteer	Pet Posse
Shari Hamilton	Volunteer	Port Angeles Pet Posse
Ken Dubuc	Fire Chief	Port Angeles Fire Department
Dan Gase	Airport & Real Estate Manager	Port of Port Angeles
Dan Shea	Operations Supervisor	Port of Port Angeles
Larry Morris	Safety Manager	Public Utilities District No. 1
Bill Henderson	Maintenance & Facilities Manager	Quileute School District
Sheri Crain	Chief of Police	Sequim Police Department
Ron Cameron	Undersheriff, Emergency Manager	Clallam County Emergency Management Department
Anne Chastain	EOC Coordinator	Clallam County Emergency Management Department
Jamye Wisecup	Emergency Management	Clallam County Emergency Management Department
Zane Beall	Contract Support, Project Manager	Ecology and Environment, Inc.
Manique Talaia-Murray	Contract Support, Emergency Planner/Project Manager	Ecology and Environment, Inc.
Tyler Chatriand	Contract Support, Engineer	Ecology and Environment, Inc.

1 *See Appendix A for full MPT member contact information and meeting participation.*

2.4.2 MPT Meetings

Plan needs were discussed, and key deliverables were reviewed at the MPT's formal meetings. The MPT convened for a series of six meetings over the course of the project (see Table 2-2), where representatives from key departments and other stakeholders had the opportunity to provide project insights, engage with the contractors, and collaboratively work on plan content. MPT members were informed of meetings via email reminders and conference call-in lines were provided for those unable to attend meetings.

The MPT meetings served as the primary data gathering mechanism throughout the planning process, and the importance of these meetings cannot be overstated. While contract support to develop the plan was provided by E & E, community members and government employees within the MPT crafted every concept outlined in the HMP. This includes data collection, determination of goals and objectives, articulation of specific hazards and risks, and development of a comprehensive mitigation strategy. MPT meeting outputs are referred to throughout each chapter of the HMP, indicated by MPT Meeting Deliverable graphic displayed to the right.



Table 2-2 Mitigation Planning Team Meeting Schedule

Mitigation Planning Team (MPT) Meeting	Date	Objectives
Meeting #1: Project Kickoff Workshop	11/6/2018	Project kickoff, including review of the planning process, ranking of hazards, determination of goals and objectives, and information gathering.
Meeting #2: Risk Assessment Workshop	1/29/2019	Review of updated risk assessment and development of additional risk characteristics (held concurrently with Public Meeting #1 in Port Angeles).
Meeting #3: Mitigation Strategy Workshop	3/27/2019	Development and prioritization of mitigation strategies (held concurrently with Public Meeting #2 in Forks).
Meeting #4: Data Gaps Review	7/15/2019 – 7/17/2019	Resolution of data gaps. MPT Meeting held in Port Angeles, with follow-up meetings with jurisdictions (held concurrently with Public Meeting #3 in Sequim).
Meeting #5: Draft Plan Review	10/8/2019	Draft plan review for MPT and community members (Webinar).
Meeting #6: Final Presentation	[TBD]	Final plan review, MPT approval

See Appendix A for documentation of all MPT activities.

In addition to six MPT meetings, the MPT was engaged through follow-up emails and requests to provide additional information pertaining to internal capabilities, department-specific risks, and

mitigation strategy development. MPT members unable to attend meetings were consulted after all meetings to ensure all inputs and perspectives were represented in the final HMP.

2.5 Inclusive Outreach and Public Engagement

FEMA	**A2.** Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2)) **A3.** Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

A critical component of the HMP update effort is a robust stakeholder engagement process that provides "an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval" (44 CFR §201.6). While providing an opportunity for public comment on the draft plan is one opportunity to engage with the public around hazard concerns, the planning team wanted to ensure the public had a meaningful way to participate in the process, which is outlined in the following sections.

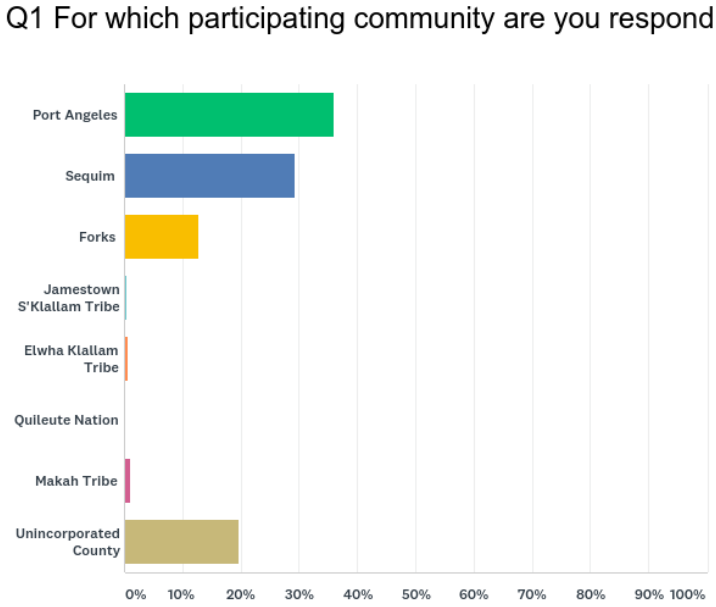
2.5.1 Inclusive Outreach and Public Engagement Plan

Inclusive public engagement was key throughout the County hazard mitigation process. The County provided multiple venues in which community members could participate in plan development. The use of online tools, interactive public meetings, and attendance at community events ensured there were a diversity of options to educate the public on the principles of hazard mitigation planning and to allow them to weigh in on the vulnerability of their communities.

2.5.1.1 Online Outreach

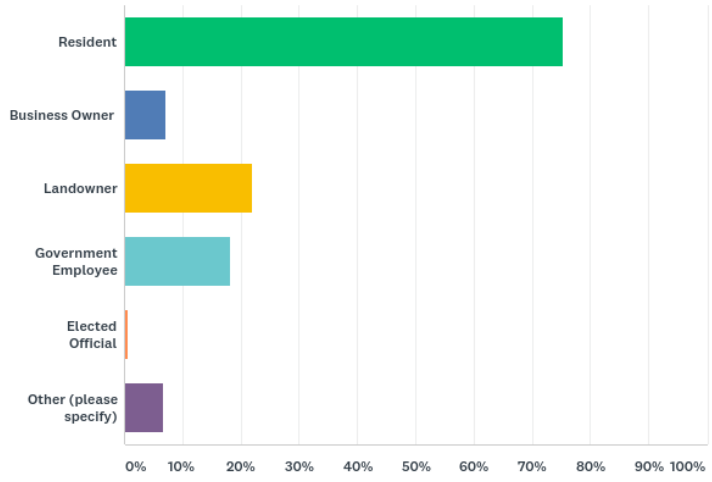
Public engagement was initiated soon after the HMP Kickoff Meeting (MPT Meeting #1). An online survey was developed to learn more about the public's initial concerns prior to plan development. The initial online survey was socialized through social media (e.g., Facebook, Next Door, etc.) beginning on December 6, 2018. Over the course of two months, over 550 individuals had responded to the survey and provided their feedback. The following figures indicate some of the key findings of the initial survey.

See Appendix A for complete survey results.



1

The initial survey was not nearly as effective at engaging tribal partners in the process, which informed future outreach efforts.



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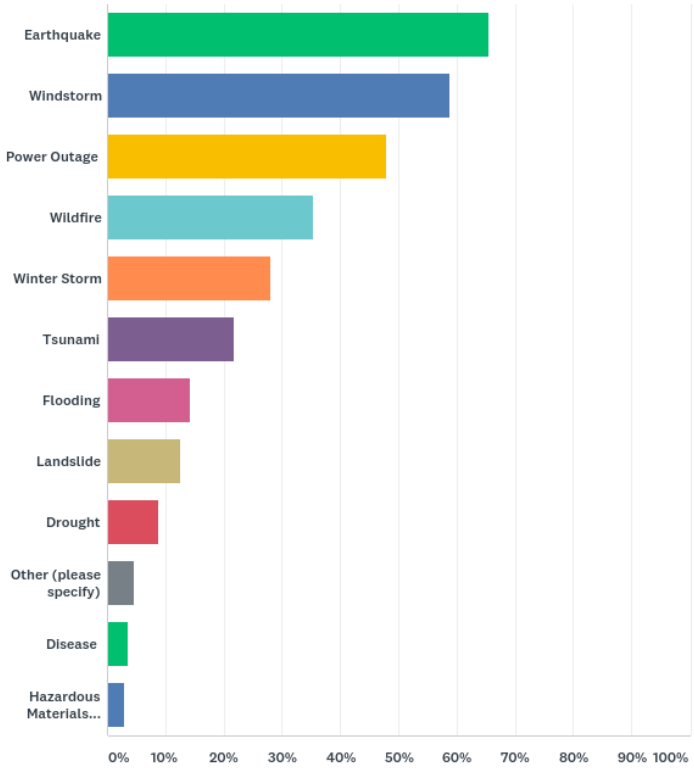
3

Survey respondents came from all walks of life and confirmed that it was not simply reaching government employees already engaged in the effort.

Q6 Please selected the top THREE (3) hazards you think are the GREATEST THREAT to your community, considering both frequency of occurrence and potential for severe damage



The public's initial hazard rankings were very similar to the MPT's (see Section 4.2), but also exposed potential areas of perceived risk that the MPT had not yet considered.

2.5.1.2 Public Meetings

The MPT hosted a series of public meetings to ensure additional stakeholders were reached who may not routinely respond to online surveys. To avoid the issues associated with traditional public meetings (e.g., low attendance, one-way communication), the MPT embraced an open house meeting concept that allowed the public to learn and discuss different HMP components in an interactive setting. As an example, the first Public Open House contained the following workstations for engagement:

- *What is Hazard Mitigation?* – Educational material related to the planning process.
- *Risk Assessment Mapping* – Access to a computer/projector to allow for participatory mapping/GIS.
- *Storytelling* – A table established specifically for the public to tell the County Emergency Manager about their experience with disasters.
- *Mitigation Ideas* – Access to a computer/projector to allow the public to share their ideas on mitigation projects and discuss the potential costs and benefits.

The following table provides a summary of public meetings held during the HMP update process.

Table 2-3 Public Meeting Schedule

Outreach Event	Date	Objectives	Attendance
Public Open House – Peninsula College, Port Angeles, WA	1/29/2019	Open house workshop dedicated to gathering feedback around major plan components including risk assessment, hazard information, and initial mitigation ideas.	50 members of the public participated.
Public Open House – Forks High School, Forks, WA	3/27/2019		17 members of the public participated.
Public Open House – Sequim, WA	7/17/2019		22 members of the public participated.

See Appendix A for additional public meeting documentation.

2.5.1.3 Community Events

The MPT engaged with the community beyond public meetings by attending community events to reach more members of the community and educate the public about the HMP and process. The MPT was present at the following community events:

- Clallam County Home Show: March 16-17, 2019
- Clallam County Fair: August 15-18, 2019

2.5.1.4 Plan Review

Community members were provided with the draft HMP from October 27, 2019 to the present on County and City websites and informed through various social media (e.g., Facebook and NextDoor).

An initial public comment period was held from October 27 through November 29, 2019. Members of the public were invited to share their thoughts about what hazards concern them most, and how they think the County and participating jurisdictions should prioritize activities to reduce hazard risks. During this time period, 7 public comments were received from the following entities:

- Olympic Climate Action
- KSQM 91.5FM
- Clallam County Department of Community Development
- Jamestown S'Klallam Tribe
- 2 community-members

See Appendix A for a summary of outreach and engagement activities.

Table 2-3 Stakeholder and Public Outreach Activities Schedule

Outreach Event	Date	Objectives
Online Survey Outreach	12/13/2018-3/30/2019	Online survey developed to solicit input from community members regarding hazards of concerns.
Public Open House – Port Angeles	1/29/2019	Open house workshop dedicated to gathering feedback around major plan components including risk assessment, hazard information, and initial mitigation ideas.
Public Open House – Forks	3/27/2019	Open house workshop dedicated to gathering feedback around major plan components including risk assessment, hazard information, and initial mitigation ideas.
Public Open House - Sequim	7/17/2019	Open house workshop dedicated to gathering feedback around major plan components including risk assessment, hazard information, and initial mitigation ideas.
Community Member Review Period	10/27/2019 – 11/29/2019	Public review of draft plan available on jurisdiction websites.
Final Hazards Mitigation Plan Approval	[TBD]	Planning Team Members provided with opportunity to provide input on plan prior to Federal Emergency Management Agency review.

2.5.2 Neighboring Jurisdiction and Partner Engagement Strategies

Clallam County represents a large geographic area, which requires the coordination of many external stakeholders to support the community's needs. These partners were invited to participate in the MPT Meetings to ensure the HMP properly identified risks that county, city, and tribal agencies may not be as familiar with. Other entities in attendance included:

- American Red Cross;
- Clallam County Public Utility District;
- Clallam Transit;
- Crescent School District;
- Peninsula College;
- Port of Port Angeles;
- Quileute School District;
- Olympic Medical Center; and
- Washington Army National Guard.

In addition, the partners provided feedback to the draft HMP, which was provided to the following jurisdictions and agencies at operational area meetings during the initial review period discussed above:

- Jefferson County Department of Emergency Management;
- Olympic Climate Action;
- Washington State Department of Corrections (Clallam Bay Prison);
- Cape Flattery School District;

- Quillayute School District;
- Forks Community Hospital;
- Crescent School District;
- Port Angeles School District;
- Clallam Transit.

2.6 Plan Development and Review

FEMA	**A6.** Does the plan include a description of the method and schedule for keeping the plan current (monitoring, evaluating, and updating the mitigation plan within the plan update cycle)? (Requirement §201.6(c)(4)(i))

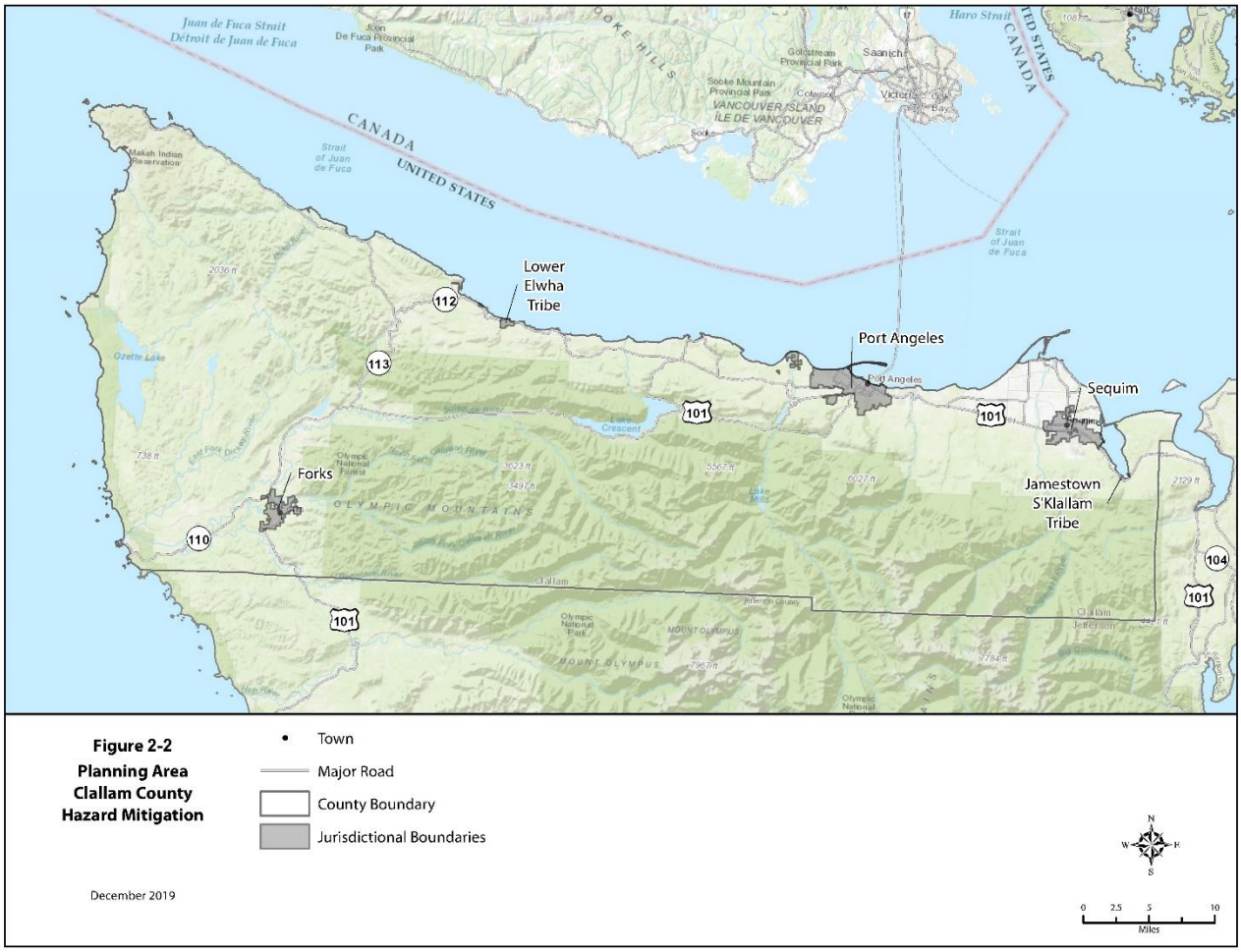
The HMP development was conducted according to the process outlined above and described in detail in FEMA's Local Mitigation Planning Handbook. The MPT reviewed the previous plan during the Project Kickoff Workshop and identified sections that required revision.

Updating the County's risk profiles and mitigation strategies were treated as the plan's primary purpose and the plan serves as the written record of the comprehensive planning process. In addition, the HMP reflects the County's current needs and hazard concerns. The development of the HMP update occurred over a 11-month period from November 2018 to October 2019. The plan development was conducted through a series of seven steps as detailed in Table 2-4. Many of the steps occurred concurrently. Table 2-4 also illustrates the corresponding FEMA local mitigation planning task for each HMP development milestone. The requisite State Hazard Mitigation Officer and FEMA review periods occurred during the draft and final HMP steps.

Table 2-4 Clallam County HMP Update Milestones and Timeline

Clallam County Hazards Mitigation Plan (HMP) Update Development Milestone	Corresponding FEMA-Recommended Mitigation Planning Task	Timeline	Updates Made? (Yes/No)
1. Data Collection and Document Review	Task 1 – Determine the Planning Area and Resources Task 5 – Conduct a Risk Assessment	October 2018-December 2018	Yes
2. Mitigation Planning Team Coordination	Task 2 – Build the Planning Team	November 2018-July 2019	Yes
3. Stakeholder Engagement and Outreach	Task 3 – Create an Outreach Strategy	January 2019-July 2019	Yes
4. Hazard Mitigation Strategy Update	Task 4 – Review Capabilities Task 6 – Develop a Mitigation Strategy	March 2019-August 2019	Yes
5. Draft Hazard Mitigation Plan[1]	Written documentation of the planning process (all tasks)	November 2018-October 2019	Yes
6. Final Hazard Mitigation Plan	Written documentation of the planning process (all tasks)	January 2020	Yes
7. Plan Adoption	Task 8 – Review and Adopt the Plan	January 13, 2020	Yes

Figure 2-2 Clallam County HMP Planning Area



3 COMMUNITY PROFILE

Chapter 3 provides a summary of the County's key features. The County's mitigation strategy is designed to be reflective of the County's unique components.

3.1 Governance

Three County commissioners oversee governance of three districts: District 1 (East), District 2 (Central), and District 3 (West). The departments are as follows:

- Assessor
- Auditor
- Board of Equalization
- Boundary Review Board
- Community Development
- Cooperative Extension
- Clerk of Superior Court
- District I Court (East/Port Angeles)
- District II County (West/Forks)
- Health & Human Services
- Human Resources (Personnel)
- Information Technology
- Juvenile and Family Services
- Parks, Fair and Facilities
- Prosecuting Attorney
- Public Works
- Sheriff
- Superior Court
- Treasurer

3.2 Geography and Climate

Clallam County is endowed with a striking natural setting. The mild, maritime climate and amazing diversity of natural landscapes create a uniquely desirable place to live and work. The County is an elongated area 80 miles in length and 36 miles wide, located on the northern side of Washington State's Olympic Peninsula. Because of the Olympic Mountain range, transportation routes are restricted to a narrow portion of the coastal shelf. A single two-lane highway (U.S. Highway 101) transects the County from east to west, with an additional two-lane highway connecting with the northwest portion (State Routes 110, 112, 113, and 117). Various county roads and city streets make up the remainder (Clallam County 2010).

The geography includes coastal plains and the Olympic Mountains. The Olympic Mountains reach elevations of nearly 8,000 feet and are deeply incised by rivers. The area is impacted by winter storms that move inland from over the ocean, resulting in frequent heavy precipitation and winds of gale force. Wind velocities in the lower elevations can be expected to reach 90 to 100 miles per hour once every 100 years. Wind velocities in excess of 100 miles per hour occur in the higher elevations almost every winter (Clallam County 2010).

The "rainforest" area along the western slopes of the Olympic Mountains receives the heaviest precipitation in the continental United States. Annual precipitation ranges from 70 to 100 inches over the Coastal Plains to 150 inches or more along the windward slopes of the mountains. Winter season snowfall ranges from 10 to 30 inches in the lower mountainous elevations and between 250 to 500 inches at higher elevations. In midwinter, the snowline in the Olympic Mountains is between 1,500 and 3,000 feet above sea level (Clallam County 2010).

The Olympic "rainshadow" includes the lower elevations along the northeastern slope of the Olympic Mountains extending east along the Strait of Juan de Fuca from Port Angeles, east to Whidbey Island, and then north to the Strait of Juan de Fuca. The Olympic Mountains and the extension of the Coastal Range on Vancouver Island in the north shield this area from winter storms moving inland from the ocean. The area within the rainshadow is the driest in western Washington (Clallam County 2010).

Out of the three incorporated cities in Clallam County, Forks had the greatest average annual precipitation levels (119.7 inches) from 1981 to 2010. Sequim and Port Angeles are both located within the rainshadow of the Olympic Mountains and had the least precipitation on average during that time span (Sequim: 16 inches). Annual maximum and minimum average temperature were roughly equivalent between Port Angeles, Forks, and Sequim, with the maximum average temperatures typically occurring in June, July, August, and September (Western Regional Climate Center 2010). In Port Angeles the maximum average annual temperature from 1981 to 2010 was 59°F, and the minimum average annual temperature was 42°F for the same time period.

3.3 Population and Demographics

According to the 2010 Census, the population of Clallam County was 71,404. The percent population growth from 2010 to 2017 was approximately 5.7%, resulting in an estimated 2017 population of 75,474 (US Census 2017).

Table 3-1 Clallam County Population and Demographics

Population	Clallam County	Washington State (2016)
Population by age, 2017		
Under 5 years old	4.7%	6.2%
Under 18 years old	17.3%	22.4%
65 years and older	28.8%	14.8%
Women, 2017	50.6%	50.0%
Race/Ethnicity, 2017		
White	87.3%	80.0%
Black	1.2%	4.1%
American Indian, Alaskan Native	5.6%	1.9%
Asian, Native Hawaiian, other Pacific Islander	2.0%	9.4%
Hispanic or Latino, any race	6.3%	12.4%

Source: United States Census Bureau Quick Facts for Clallam County, WA (2017)

As of 2017, an estimated 14.3% of Clallam's County population under the age of 65 years is disabled, and 8.9% of the County population under age 65 do not have health insurance. The median household income from 2013 to 2017 was $48,002, with 16.4% of the County population living in poverty. In the time range between 2013 and 2017, approximately 5% of persons age 5 years or greater spoke a language other than English at home (U.S. Census 2017).

Between 2013 and 2017, Clallam County had 36,912 housing units, of which 69.6% are owner-occupied. The median value of owner-occupied homes is $227,400. During this time, 87% of households owned a computer, and 80% had a broadband internet subscription (U.S. Census 2017).

3.4 Economy

The following text is sourced from the Clallam County profile developed by the Washington State Employment Security Department (2017):

Around 1851, the first white settlers staked their claims in the area. Clallam County was created in 1854 from bordering Jefferson County. The county's name is derived from the Klallam or S'Klallam people who continue to play a significant role in the county. In 1890, Port Angeles was named the county seat. Sequim and Forks are the other two incorporated cities in the county.

Initially, logging was the primary industry, and benefitted greatly when railroads made it possible to reach further and further into the great conifer stands. Hydroelectric power from the Elwha River dam spurred the first large sawmill in the area. The "Big Mill" was the largest employer in the county for the next 25 years. World War I fueled the need for spruce, which was vital to building the first airplanes. In the 1920s, pulp production took off in Port Angeles, providing the growing need for newsprint and cellulose.

After World War II, growth continued in timber and agriculture. Commercial and sport fishing activities became increasingly important. In the 1960s, Clallam County tribes reclaimed traditions and reasserted tribal rights to shares of fish harvests. The Jamestown S'Klallam tribe won federal recognition in 1981, and received trust land at Blyn on Sequim Bay, which now houses a tribal center and casino.

The service sector has been experiencing growth over the past decade. In 2016 is accounted for 88.7% of all non-farm employment. The county houses two prisons, a hospital and school district, which are top employers. The City of Forks continues to be a tourist attraction after the Twilight movies put it on the map.

Other new industries have moved into the county in the past decade. Advanced composites manufacturing has been established in and around the Port Angeles area, providing manufactured parts to the aerospace and marine industries. Advanced Composites resulting is also continuing with the new Composites Recycling Technology Center developments.

Over the past 20 years, the economy in Clallam County has experienced slow but steady growth. This economic growth has been shaped by a vibrant port district in the county's major coastal city of Port Angeles. New in-migration is also on the rise as many retirees are attracted to Sequim's "sunbelt" climate. (WA ESD 2017)

3.5 Land Use

Table 3-2 contains the Clallam County land use designations as defined in the Comprehensive Plan (Clallam County 2019a). The majority (58%) of lands are designated natural resource lands and include commercial forest and agricultural lands. The designated Urban Growth Areas (UGAs) account for only 2% of the total county and include both incorporated and unincorporated areas of Port Angeles, Forks, and Sequim.

Table 3-2 Clallam County General Comprehensive Plan Land Use Designations

General Land Use Designation	Acres	% of County
Urban Growth Areas (UGA)[1]	**21,579 ac. (Total)**	**1.94% (Overall)**
Sequim UGA	5,219 ac.	0.47%
Port Angeles UGA	9,193 ac.	0.83%
Forks UGA	4,867 ac.	0.44%
Carlsborg UGA	557.8 ac.	0.05%
Clallam Bay-Sekiu UGA	1,386 ac.	0.12%
Joyce UGA	357 ac.	0.03%
Natural Resource Lands[2]	**640,743 ac. (Total)**	**57.63% (Overall)**
Commercial Forest	634,569 ac.	57.08%
Agricultural Retention	6,168 ac.	0.55%
Rural Lands	**100,765ac. (Total)**	**9.06% (Overall)**
Rural	92,176 ac.	8.29%
Residential "limited area of more intensive rural development" (LAMIRD)	6,224 ac.	0.56%
Commercial and Mixed Use LAMIRDs	2,364 ac.	0.21%
Public Lands[3]	**4,734 ac.**	**0.40%**
Other Lands[4]	**343,858 ac. (Total)**	**30.93% (Overall)**
Olympic National Park	312,685 ac.	28.13%
Tribal Reservation & Trust	31,173 ac.	2.80%

Notes:
[1] The Forks, Port Angeles and Sequim UGA's include both unincorporated and incorporated areas.
[2] Commercial forest lands are also designated under the comprehensive plan as mineral resource lands of long-term commercial significance.
[3] Excludes public land designations within UGA's. The Public Land designations include county and state parks, the Dungeness Wildlife Refuge, and some other public ownerships not otherwise designated as Natural Resource and Rural Lands.
[4] Olympic National Park and Tribal Reservation and Trust lands are not subject to the GMA or County comprehensive plan and development regulations.

3.6 Transportation & Commuting Patterns

Forty percent of residents live in the incorporated cities of Forks, Port Angeles, and Sequim. Other unincorporated communities inside Clallam Bay – Sekiu, Neah Bay, and Joyce. The population density per square mile is 41.1 individuals, as of the 2010 U.S. Census (Clallam County 2010).

Transportation routes are restricted to the coastal shelf because of the Olympic Mountain range. U.S. Highway 101, a two-lane highway, is the main east-west transportation route across the County and is vulnerable to multiple hazards. Additional State Routes 110, 112, 113, and 117, and various county roads and city streets, are also important transportation routes. Every winter, landslides, erosion,

standing water, and fallen trees affect the population's ability to travel throughout the County. Most people commute to and from work in their private cars. Clallam County Transit provides economical and efficient transport throughout the County unless they are impacted by natural hazards. ParaTransit provides services to disabled individuals by appointment (Clallam County 2010).

Airports with hard surface runways are located in Port Angeles, Sequim, Forks, Diamond Point, Sekiu, Quillayute, and the US Coast Guard station on Ediz Hook. The Port Angeles harbor is classified as a deep-water seaport. There are 180 miles of open coastline adjacent to major international shipping lanes, all shipping en route to Seattle, Tacoma, upper Puget Sound, and Vancouver, B.C., Canada (Clallam County 2010).

4 HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 4 contains hazard profiles and vulnerability assessments to determine the potential impact of hazard to the people, economy, and built and natural environments of Clallam County. They have been streamlined to increase the effectiveness and usability of the HMP. Additional detail is contained within Appendix C.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [Clallam County]? (Requirement §201.6(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [Clallam County]? (Requirement §201.6(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the planning area? [44 CFR § 201.6(c)(2)(ii)]

4.1 General

The County has received 20 major disaster declarations, including 5 since the previous HMP update. Table 4-1 identifies these declarations.

Table 4-1 Past FEMA Disaster Declarations

DR #	HM Program Declared	Title	Incident Begin Date	Incident End Date
4418	Yes	SEVERE WINTER STORMS, STRAIGHT-LINE WINDS, FLOODING, LANDSLIDES, MUDSLIDES, TORNADO	12/10/2018	12/24/2018
4253	Yes	SEVERE WINTER STORM, STRAIGHT-LINE WINDS, FLOODING, LANDSLIDES, MUDSLIDES, AND A T	12/1/2015	12/14/2015
4249	Yes	SEVERE STORMS, STRAIGHT-LINE WINDS, FLOODING, LANDSLIDES, AND MUDSLIDES	11/12/2015	11/21/2015
4242	Yes	SEVERE WINDSTORM	8/29/2015	8/29/2015
4056	Yes	SEVERE WINTER STORM, FLOODING, LANDSLIDES, AND MUDSLIDES	1/14/2012	1/23/2012
1825	Yes	SEVERE WINTER STORM AND RECORD AND NEAR RECORD SNOW	12/12/2008	1/5/2009
1817	Yes	SEVERE WINTER STORM, LANDSLIDES, MUDSLIDES, AND FLOODING	1/6/2009	1/16/2009
1734	Yes	SEVERE STORMS, FLOODING, LANDSLIDES, AND MUDSLIDES	12/1/2007	12/17/2007
1682	Yes	SEVERE WINTER STORM, LANDSLIDES, AND MUDSLIDES	12/14/2006	12/15/2006
1641	Yes	SEVERE STORMS, FLOODING, TIDAL SURGE, LANDSLIDES, AND MUDSLIDES	1/27/2006	2/4/2006
3227	No	HURRICANE KATRINA EVACUATION	8/29/2005	10/1/2005
1499	Yes	SEVERE STORMS AND FLOODING	10/15/2003	10/23/2003
1361	Yes	EARTHQUAKE	2/28/2001	3/16/2001

Table 4-1 Past FEMA Disaster Declarations

DR #	HM Program Declared	Title	Incident Begin Date	Incident End Date
1172	No	HEAVY RAINS, SNOW MELT, FLOODING, LAND & MUD SLIDES	3/18/1997	3/28/1997
1159	Yes	SEVERE WINTER STORMS, LAND & MUDS SLIDES, FLOODING	12/26/1996	2/10/1997
1079	Yes	SEVERE STORMS, HIGH WIND, AND FLOODING	11/7/1995	12/18/1995
1037	No	THE EL NINO (THE SALMON INDUSTRY)	5/1/1994	10/31/1994
883	Yes	SEVERE STORMS & FLOODING	11/9/1990	12/20/1990
757	Yes	SEVERE STORMS & FLOODING	1/16/1986	1/19/1986
623	Yes	VOLCANIC ERUPTION, MT. ST. HELENS	5/21/1980	5/21/1980
612	No	STORMS, HIGH TIDES, MUDSLIDES & FLOODING	12/31/1979	12/31/1979

Source: FEMA 2019a. Disaster Declarations by State and County. https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties.

The hazard profiles and vulnerability assessments contained in this chapter represent a considerable amount of work performed by the MPT. MPT members ranked hazards using a number of key considerations, followed up by activities to validate hazard analysis results and identify specific areas of risk. Table 4-2 displays the hazards that MPT selected for further assessment.

Table 4-2 Hazards Addressed in Plan

Hazard Type	Hazard Name
Natural Hazards	Earthquake Wildfire Windstorm Winter Storm Landslide Flooding Tsunami Drought
Human-Caused Hazards	Disease Active Threat Hazardous Materials Incident

4.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on MPT feedback during MPT Meeting #1. Participants were asked to rank hazards on a scale of 1 (lowest concern) to 5 (highest concern) based on five key attributes:

- **Probability:** Likelihood of the hazard occurring.
- **Magnitude:** Areas potentially impacted, the overall impacts, and the chance of one hazard triggering another hazard, thus causing a cascading effect.
- **Onset:** The time between recognition of an approaching hazard and when the hazard begins to affect the community.
- **Duration:** The length of time the hazard remains active, the length of time emergency operations continues after the hazard event, and the length of time that recovery will take.
- **Frequency:** How often a hazard has resulted in an emergency or disaster.



Following the individual hazard ranking activity, the results were added up and aggregated to show an average score for the MPT members from each participating jurisdiction. The aggregate results were shared with the MPT at MPT Meeting #2 and the final rankings were adopted for the HMP and are available in Table 4-3.

The hazard ranking findings for each participating jurisdiction are available within the Jurisdictional Annexes.

Table 4-3 Hazard Ranking Table

Clallam County - Local Hazards							
	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Cascadia Earthquake	4.75	4.83	3.08	1.25		3.48	1
Earthquake	4.33	4.67	3.17	1.42		3.40	2
Disease	3.58	3.17	3.83	2.82		3.35	3
Power Outages	1.75	4.50	2.83	4.17		3.31	4
Wildfire	2.25	4.00	3.25	2.75		3.06	5
Windstorm	1.92	3.50	2.33	4.42		3.04	6
Winter Storm	2.00	3.25	2.75	4.00		3.00	7
Active Shooter	2.92	5.00	2.17	1.42		2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83		2.83	10
Landslide	1.50	4.42	2.58	2.67		2.79	11
Flooding	1.67	3.33	2.42	3.25		2.67	12
Tsunami	3.25	4.08	2.17	1.08		2.65	13
Drought	1.83	1.58	3.92	2.67		2.50	14
Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure.							

Refer to Appendix B for individual hazard ranking results.

4.3 Hazard Considerations

Hazards cannot be simply viewed in a vacuum. Each community interacts with hazards according to several place-specific values.

4.3.1 Limitations of Mitigation

Mitigation plans speak to the need to reduce the risks associated with hazards. However, not all risks can always be reduced. Whether mitigation actions are too expensive or otherwise unfeasible, certain aspects to hazards have been removed from this plan as the County views them as unattainable.

4.3.2 Future Conditions

We often think of hazards as having a linear occurrence interval. This notion is being challenged by a changing climate. Hazards such as flood that were once considered linear in nature are now being witnessed in a non-linear and irregular pattern.

Our natural and built environment is shaped by climate—humidity, precipitation, temperature, wind and seasons. Changes to these elements over an extended period of time are referred to as climate change, which is driven by an increase in average global temperatures due to the accumulation of greenhouse gasses in the earth's atmosphere.

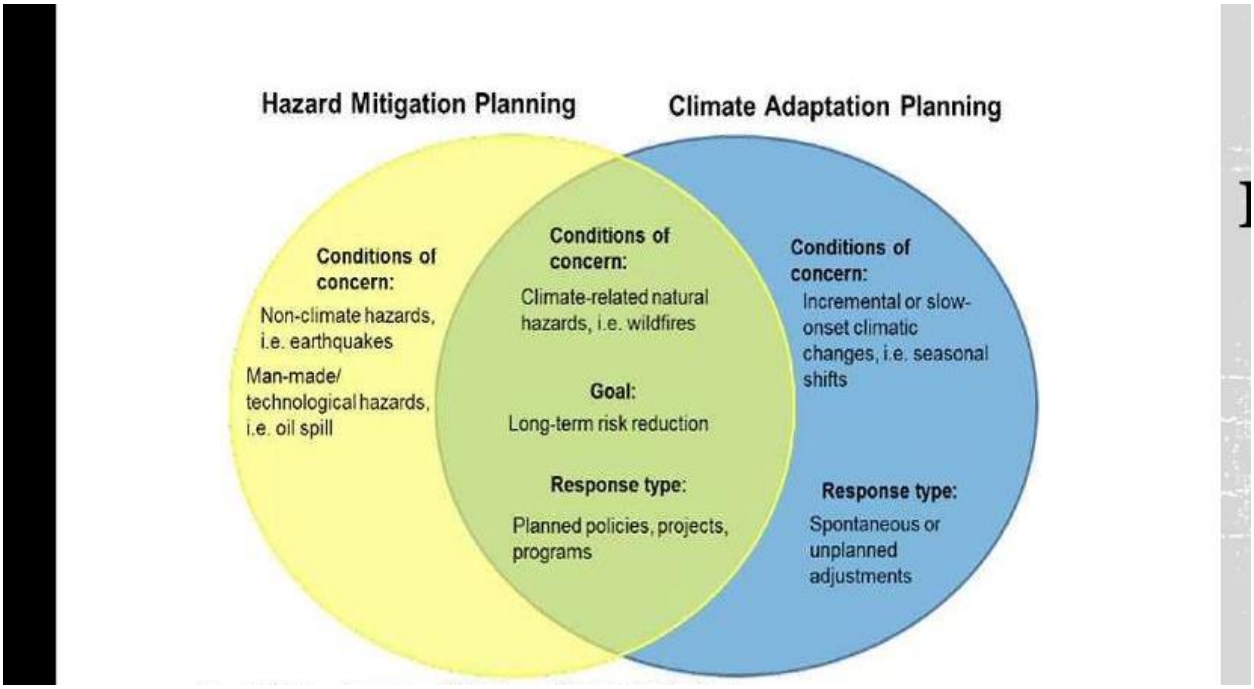
Potential impacts of future climate conditions include increased average temperatures, decreased snow accumulation, and increased peak stream flow. The increasing average temperature is expected to be more pronounced during summer months, and decreased summer precipitation is expected to accompany this shift. The frequency and magnitude of extreme precipitation events is also expected to increase, particularly in the winter. In short, what is currently viewed as a 100-year event, may soon be reconsidered as a 50-year event or even a 10-year event. This would place further stress onto storm drainage systems and natural stream systems; placing community members at an increased risk for flooding (IPCC 2001).

Furthermore, changing precipitation and temperature may impact potable water and first food availability. If precipitation falls during a shorter period of the year, with a longer, drier, hotter summer, the need for water storage may grow. Decreased water availability combined with increased demand may exacerbate water rights conflicts (Local 2020 2019).

Finally, changing climate conditions can impact ecosystems, with complicated feedbacks that may affect ecosystem services that the public relies on for recreation, water quality, and overall well-being.

Impacts from climate change effect the ways that communities are able to mitigate hazards, because the trends of the past are not necessarily aligned with future climate conditions. Mitigation planning and climate adaptation planning are linked, by necessity (Figure 4-1).

Figure 4-1 Climate Adaptation in Mitigation Planning



4.3.3 Cascading Impacts

Hazards do not occur in a vacuum and the occurrence of one hazard has the potential to cause multiple other hazards and adverse effects. As such, the County has attempted to take the risk assessment one step further by identifying the potential cascading, or secondary impacts that may be generated by a hazard. In better understanding these cascading impacts, the County will be better prepared to holistically address their risks and vulnerabilities.

4.4 Risk-Driven Planning

The risk assessments discussed in this section were developed through a combination of stakeholder feedback and comprehensive GIS analyses. The combined findings shaped a risk-driven planning process that resulted in mitigation strategies focused on the real risks and vulnerabilities that the County faces.

4.4.1 Stakeholder Feedback

In addition to the hazard ranking activity identified in Section 4.2, MPT participants were also engaged during MPT Meeting #2 to provide insights regarding the risk assessment portion of the HMP. As part of the workshop, participants were asked to review each hazard based on the following attributes (which are very closely aligned with the attributes identified in Section 4.5):

- **Geographic Scope:** A description of the locations most likely to be impacted by the hazard.
- **Health Impacts:** A description of the potential short- and long-term human health complications related to the hazard.

- **Displacement:** A description of the hazard's likelihood to cause the displacement of residents or visitors accompanied by an estimate on the anticipated displacement duration.
- **Economic Impacts:** A description of the potential economic and financial losses related to the hazard.
- **Environmental Impacts:** A description of the potential impacts that may adversely affect natural systems.
- **Structural Impacts:** A description of the scale and scope of potential building and infrastructure damages related to the hazard.
- **Critical Services:** A summary of the County departments and functions most likely to be taxed following the hazard.
- **Cascading Effects:** A brief overview of potential secondary hazards caused by the onset of the initial hazard in question.

See Appendices B-1 and B-2 for the results of the MPT Risk Assessment Activity.

4.4.2 GIS Analyses

CASCADING IMPACT EXAMPLE

An earthquake stands as a singular hazard presenting unique risks, but an earthquake in and of itself is likely to cause secondary hazards for the community such as:

- Landslides
- Utility Failure
- Urban Fires
- Transportation Accidents

Numerous risk assessments are supported by maps and tables generated through comprehensive GIS analyses. A series of processes were performed to identify areas in which County properties intersect with mapped hazards and estimate the potential economic losses associated with such losses. This project relied heavily upon publicly available data compiled by the Washington State Department of Natural Resources (DNR). The data is newly updated and represents some of the best data available in the United States, providing a locally, sourced reference for hazard information. Table 4-4 indicates the data sources used to estimate such losses.

Table 4-4 GIS Data Sources

Data Grouping	Specific Data Files
Hazard Data	Earthquake Fault Lines
	Cascadia Subduction Zone Peak Ground Acceleration
	Fire Hazard Ratings
	Flood Hazard Zones
	Hazardous Materials Storage
	Environmental Cleanup Sites
	Other Hazardous Materials Sources
	Historic Landslides
	Landslide Deposits
	Landslide Susceptibility

Table 4-4 GIS Data Sources

Data Grouping	Specific Data Files
	Liquefaction Susceptibility
Jurisdictional Data	Parcels/Properties
	Building Footprints
	Land Use
	Vegetation
Additional Asset Data	Education Facilities
	Hospitals and Medical Facilities
	Fire Stations
	Other Infrastructure
Base Map Data	Arterials and Highways
	Waterways and Streams
	County Administrative Lines
	Railways
	City Outlines

See Appendix C-1 for GIS Data Sources.

4.5 Hazard-Specific Profiles and Risk Assessments

The following section profiles each hazard identified in Section 4.2 and assesses the risk associated with each. Each risk assessment considers the following attributes:

- **Hazard Description:** A brief introduction to the mechanisms behind the hazard.
- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Similar to Location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Potential Impacts from Future Climate Conditions:** A brief overview indicating ways in which the hazard profile may change over time due to a changing climate, if applicable.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Cascading Impacts:** A brief overview of secondary hazards often associated with the hazards.
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends impact on the County's vulnerability to each hazard since the 2010 plan development (increased, decreased, unchanged).

To enhance the usability of the HMP, risk assessments have been streamlined to provide only critical information within the body of this section. Additional information including detailed, close-up maps can be found in Appendix C.

In addition, the hazards have been organized into three sub-sections (high-, medium-, and low-priority) to illustrate the risk-driven nature of the HMP. Each hazard has been given serious consideration of all attributes discussed within. However, low-priority hazards may be shorter in length and with less quantitative analyses, as a lack of usable data is frequently present when considering low-likelihood or low-magnitude events. The three sub-sections below represent County MPT representatives' hazard prioritization:

- **High-Priority:** Cascadia Earthquake, Earthquake, Disease, Power Outages.
- **Medium-Priority:** Wildfire, Windstorm, Winter Storm, Active Shooter, Hazardous Materials Incident.
- **Low-Priority:** Landslide, Flooding, Tsunami, Drought.

4.5.1 Earthquake

Earthquake

Hazard	Magnitude	Onset	Duration	Frequency	Average	Rank
Cascadia Earthquake	4.75	4.83	3.08	1.25	3.48	1
Earthquake (other)	4.33	4.67	3.17	1.42	3.40	2

Hazard Description

An earthquake is the movement of the earth's surface following a tectonic shift. This can be caused by dislocation or volcanic eruption. While it is difficult to predict when an earthquake will happen, they do often reoccur along the same fault zones, meaning we know where they are most likely to occur. The County is most likely to be widely impacted by movement along the Cascadia Subduction Zone (CSZ) (where the Juan de Fuca plate is being pushed beneath the North American plate), deep earthquakes along the Juan de Fuca plate, and shallow crustal faults. The CSZ extends from northern California to southern British Columbia and is located 100 miles from Washington's outer coast. An earthquake could occur along this zone when built-up pressure causes the plates to slide rapidly past each other (Clallam County 2013).

The shallower, crustal earthquakes may also cause widespread damage. The Lake Creek – Boundary Creek fault is one of at least nine upper-plate active faults in the Puget Lowland region (Seismological Society of America 2017). The epicenters of these earthquakes will be closer to population centers. Studies in the vicinity of the Lake Creek-Boundary Creek fault shows there have been at least three earthquakes over the past 8,000 years in the eastern section of the fault and there is evidence for multiple earthquakes on the western section of the fault (DNR 2012).

Tectonic action can also result in soil liquefaction (when strong earthquake shaking causes soil to rapidly lose its strength and behave like quicksand), tsunami (when deep-sea tectonic action causes long wavelength, small amplitude waves that grow in height as water becomes shallower), and landslides or bluff failure.

Location

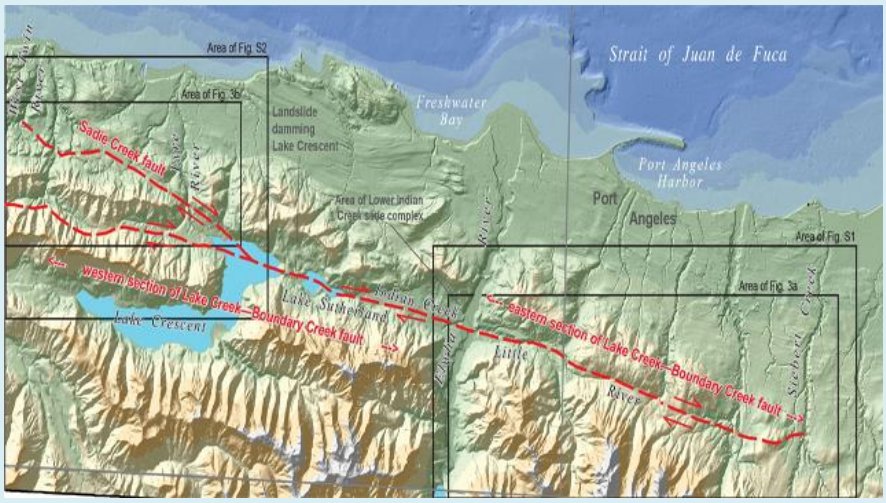
The CSZ poses a great risk to all coastal communities along its length. Earthquakes have the potential to damage critical infrastructure, such as bridges and roads, cutting off county and tribal communities from outside aid in the aftermath of an event and forming isolated "micro-islands."

The relatively shallow Lake Creek-Boundary Creek Fault runs east-west through Clallam County, approximately from the vicinity of Lake Crescent to Siebert Creek. An earthquake along a shallow crustal fault such as the Lake Creek – Boundary Creek Fault could potentially lead to more widespread shaking and damage in the population centers of Port Angeles and Sequim.

See Section 4.5.11 for the localities at risk for tsunami. Liquefaction typically occurs in areas with artificial fill or of loose sandy soils that are saturated with water (e.g., low-lying coastal areas, lakeshores, and river valleys). Areas that contain soils with high risk of liquefaction include (but are not limited to) the Quillayute River basin from La Push to Forks; parts of the Sol Duc River basin; along the north shore of Lake Ozette; the communities of Neah Bay, Clallam Bay, and Pysht; coastal Port Angeles; and much of Sequim (DNR 2004).

See *Appendix C-1 for more details.*

Earthquake



Eastern and western section of Lake-Creek Boundary Creek fault (Nelson et al., BSSA, 2017)

Previous Occurrence/History

The most recent earthquake that damaged Clallam County was the 2001 Nisqually Earthquake. Small earthquakes occur regularly throughout the region and go unnoticed by residents. Over the last 135 years, there have been nine earthquakes with a magnitude (M) greater than 6.0 in the area that we consider the Northwest. Five of those large quakes (including the Nisqually earthquake) directly impacted the Olympic Peninsula, according to eye-witness accounts (Clallam County 2010).

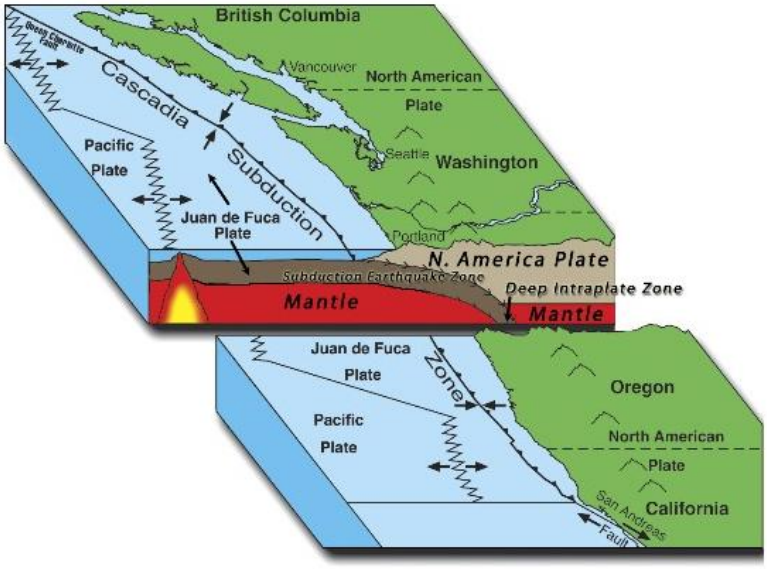
- 1700, CSZ Earthquake, M9.0
- 1909, San Juan Island, M6.0
- 1939, Vashon Island, M6.1
- 1949, Olympia, M7.1
- 1965, Seattle – Tacoma, M6.5
- 2001, Nisqually, M6.8

Potential Impacts from Future Climate Conditions

Future climate conditions are unlikely to have any effect on earthquake magnitude, severity, or probability.

Earthquake

Cascadia Subduction Zone



Source: Oregon Office of Emergency Management, http://www.oregon.gov/oem/hazardsprep/Pages/Cascadia-Subduction-Zone.aspx

Extent and Probability

Earthquakes pose a widespread hazard along the north side of the Olympic Mountains. The cascading impacts of earthquakes, such as tsunami and liquefaction, are dependent on geography and soil type, as detailed above.

The CSZ has produced earthquakes measuring M8.0 and above at least seven times in the past 3,500 years. The time intervals between these events has varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.

A comprehensive study of faults along the northern Olympic Mountains concluded that "there were three to five large, surface-rupturing earthquakes along the faults within the last 13,000 years" (Seismological Society of America 2017). The study notes that while the time intervals between earthquakes on shallow, or upper-plate, faults are thousands of years, "…the chances of a damaging earthquake on one of those many faults is higher than it is for a megathrust earthquake, at least on average, over the last few thousands of years" (Seismological Society of America 2017).

Future Probability Trend – Future weather and development trends play no known role in the probability of future earthquake events. However, both may play a role in the magnitude of earthquake impacts, as increased development may push populations into higher risk areas.

Earthquake

Cascading Impacts

- Landslides
- Tsunamis
- Utility failure
- Infrastructure failure
- Conflagration
- Food, water, medical supply shortages
- Economic disruption

Vulnerability

Vulnerability posed by earthquakes to Clallam County is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of this plan, the following County-wide infrastructure types are classified as a **high to severe** combined earthquake hazard level (including earthquake shaking hazard and liquefaction potential):

- Airports and Runways (8 structures)
- Electric Power Systems (42 structures)
- Hazardous Materials Facilities (17 structures)
- Propane Systems (4 structures)
- Water Supply (64 structures)
- Wastewater and Sewer Systems (24 structures)
- Communication Systems (19 structures)
- Hospitals and Clinics (17 structures)
- Public Safety Facilities (21 structures)
- Roads and Bridges (15 structures)
- Schools (22 structures)
- Local Government and Law Enforcement Buildings (50 structures)
- Shelters (120 structures)
- Commercial Buildings (11 structures)

Awareness of the County's vulnerability to a CSZ earthquake has increased with participation in regional drills and public outreach efforts and more structures are being designed to be resilient to tectonic activity. However, development has increased in areas on the West End that are particularly vulnerable to a Cascadia event. Furthermore, the Lake Creek Fault is located near the growing population centers of Port Angeles and Sequim. Given these changes, the vulnerability of Clallam County to earthquakes has remained **unchanged.**

See Appendix B for full Risk Exposure Tables and Appendix C for additional maps.

1

4.5.2 Disease

Disease

Magnitude	Onset	Duration	Frequency
3.58	3.17	3.83	2.82

Average	Rank
3.35	3

Hazard Description

Although chronic disease has placed a lasting strain on the healthcare system, acute infectious diseases are a greater immediate threat to the system's capacity. Infectious diseases may be caused by pathogenic bacteria, viruses, fungi, or parasites, and many are characterized by symptoms such as fever, diarrhea, fatigue, muscle aches, coughing and other respiratory symptoms, and rashes (Mayo Foundation for Medical Education and Research 2019). Infectious disease outbreak has the potential to paralyze socioeconomic activity and critical government functions. Various acute disease concerns are discussed below.

- Some diseases, such as Salmonella and E. coli infections, can be spread quickly through food and water sources. Though these diseases are treatable they can lead to severe symptoms or death if not addressed quickly. Containing the spread of these diseases requires identifying and addressing the source of contamination of the food or water supply and communicating risks and safety measures to the public.
- Diseases spread through animal vectors (i.e., living organisms that can transmit infectious diseases) are constantly evolving, and diseases that were previously unknown to affect humans may evolve the ability to infect human hosts. For example, West Nile virus is an emerging pandemic that has affected communities across the country. West Nile is transmitted through mosquito bites and can be spread to birds, horses, and humans, causing severe symptoms or death.
- Diseases that affect livestock, such as West Nile virus or mad cow, aside from their potential to infect humans, can rapidly spread through livestock flocks or herds, sometimes requiring entire flocks/herds to be put down and causing significant financial hardship.

Many potentially devastating diseases are spread through physical contact, ingestion, insect bites, and inhalation. Airborne diseases and those spread through physical contact pose higher risks to the community because they are difficult to isolate and control. Diseases such as influenza, pertussis, tuberculosis, and meningitis are spread by these pathways and pose a significant threat to communities.

The Clallam County Public Health Services administers public health awareness programs to provide information on diseases influencing the County population. The following facilities are communicable disease testing sites:

- Private healthcare provider offices
- Clinicare Walk-In Clinic
- Volunteers in Medicine of the Olympics Clinic for uninsured/low income
- Planned Parenthood for sexually transmitted diseases, human immunodeficiency viruses, and Hepatitis C
- Clallam County Public Health Section on a limited, case by case basis.

Disease

Previous Occurrence/History

- February 2015: A kindergartner was diagnosed with measles in the City; a total of 5 people in Clallam County were diagnosed with measles; 1 fatality (Seattle Times 2015).

Potential Impacts from Future Climate Conditions

- Changing weather patterns resulting in changing disease outbreak patterns

Extent and Probability

Although it is impossible to predict the next infectious disease outbreak, history shows that outbreaks are not uncommon and can devastate communities. Infectious diseases can affect the County's entire population. Diseases may also infect livestock herds and can potentially be communicated from animal vectors to humans. Recent medical advancements increase our ability to counteract such outbreaks and limit their extent, but additional concerns related to diseases building resistance to drugs is an ongoing concern.

Future Probability Trend – Based on potential changing weather patterns, the County may be impacted by an **increase** in the probability of emerging infectious disease.

Cascading Impacts

- Loss of revenues – fear of infection or lack of workforce availability
- Disease mutations
- Social unrest
- Transportation route closures and supply chain disruption
- Lack of food, water, and medical resources

Vulnerability

Epidemic and pandemic diseases have been known to spread quickly throughout communities. Many diseases spread through close contact, meaning that highly populated areas are more prone to widespread outbreaks; a lot of public activities are centered out of the Port Angeles and Sequim area. However, compared to a metropolitan area, the smaller relative population density of the two major County communities decreases the likelihood of a widespread outbreak in comparison to a more densely populated area.

The rural nature of much of the County also presents a key vulnerability: Healthcare resources and hospitals are in short supply and would likely become overburdened immediately following a disease outbreak.

Given the expansion of population centers such as Port Angeles and Sequim, the vulnerability of the County to disease has **increased**.

4.5.3 Utility Failure

Utility Failure

Magnitude	Onset	Duration	Frequency
1.75	4.50	2.83	4.17

Average	Rank
3.31	4

Hazard Description

A utility failure is defined as an abrupt pause to the availability of utility services. A utility failure represents any occurrence in which vital utilities or services are rendered inoperable. A utility failure may be caused by electrical blackouts, pipeline or pump malfunction, or an unanticipated surge in demand. A utility failure may impact any of the following services:

- Electric Power Systems (Clallam Public Utility District [PUD], Port Angeles City Light, US Bonneville Power Administration)
- Water Supply (Clallam PUD, Crescent Water Association, Diamond Point Private Water System, City of Port Angeles Water System, City of Sequim Water System, Sunland Water System)
- Wastewater and Sewer Systems (Clallam PUD, City of Port Angeles, Clallam Bay Correction Center, Sunland Water System, City of Sequim Water System, City of Forks)
- Communications Systems (Amateur Radio Emergency Services, Marine Band, Air Band, Simplex line-of-sight-only repeaters, portable satellite systems, military internal tactical communications)

Source: Buck 2016

Location

Numerous County properties are at risk of being affected by utility failures. Rural and populated areas alike are known to experience power outages during winter and windstorms that can last anywhere from several hours to several weeks. In addition, the Clallam County PUD operates extensive utility and information technology networks that could be at a risk to exposure of a hazard that could lead to a utility failure. In the County, power outages are mostly focused west of the Elwha River. Forks, Lapush, Clallam Bay, and Neah Bay are often without power due to windstorms.

Previous Occurrence/History

Historically, utility disruptions and failures have been caused by natural disasters and human-caused accidents but have not been recorded in a way that is publicly accessible. Numerous utility failures occur every year, most frequently in the form of electricity outages that may last as short as hours or as long as weeks. Most recently, the County faced widespread utility failures during the December 2018 windstorms and during Hurricane Songda in 2016.

Potential Impacts from Future Climate Conditions

- Increased demand during high-intensity heat could result in widespread outages

Utility Failure

Downed Power Lines



Extent and Probability

It is difficult to predict the impacts of future utility failures, but they have the potential to impact all government and business operations and cause extensive economic losses among other impacts. Due to the sporadic nature of failures, it is also difficult to estimate how frequently such failures will occur or their duration. Various parts of Clallam County generally deal with power outages multiple times per year with many of them only lasting a matter of hours. Every several years, a large utility failure is experienced.

Future Probability Trend – Based on potential increases in heat waves and increasing development trends resulting in greater demand, the County may be impacted by an increase in the probability of future utility failure. However, mitigation actions outlined in this HMP are designed to decrease such strain on utility systems.

Cascading Impacts

- Human health impacts
- Revenue losses

Vulnerability

Electric Power Systems

Power facilities in Clallam County are generally protected from wildland/urban interface fires by defensible space. A limited number are threatened by tsunami, flood, and landslide hazards. All facilities are threatened to varying degrees by destructive earthquakes.

Water Supply

- There are numerous water districts and at least two private water systems in Clallam County that supply customers in their areas with water. Many are threatened by tsunami, flood, wildland/urban interface fire and landslides. All of these districts are expected to sustain some type of damage and/or outage immediately following a destructive earthquake.
- Most water service ceases to function if electrical power is unavailable.
- Service main and line breaks will cause reduced water pressure in affected areas. Pressure reductions could reduce firefighting capability.
- Water utilities will shut down system components to mitigate damage from pressure loss, pipe leaks and breaks inside of buildings.
- To mitigate possible public health threats in both urban and rural areas, public health authorities may issue boil water advisories. Following repair, systems will require quality testing and system flushing to ensure safety.

Utility Failure

Wastewater and Sewer Systems

- There are six public and one private wastewater treatment systems in the County. None are subject to floods, wildland/urban fire or landslides. All systems are threatened by destructive earthquake hazards. Most waste-water service ceases to function if electrical power is unavailable.
- Wastewater and sewer system damage will include cracked pipe walls, pipe section collapse, and separation between pipe joints. Liquefaction may push some pipes out of the ground, reducing the downward gradient of the system, causing it to stop flowing and/or backup in some areas. Sewer pump stations and their pressure mains will suffer varying damage. Some will require complete replacement. As a result, it is possible that effluent will flow in streets, ditches and waterways. This will cause a severe public health hazard.
- Wastewater and sewer breaks will occur near damaged potable water lines putting the potable water systems at risk. Authorities may issue boil water notices to mitigate public health threats.
- Septic systems requiring power will not work. Those and gravity systems may fail due to broken pipes contaminating wells and surface water.

Communications Systems

- Urban facilities will not be subject to tsunami, flood, wildland/urban interface fires or landslides. Rural facilities may be subject wildland/urban interface fires and landslides to the facility sites or access roads. All facilities are subject to damage from major earthquakes.
- All primary and secondary forms of communication will be intermittent and unreliable due to power failure. Systems affected include cell phones, land lines, internet via fiber lines, cable television, AM/FM (amplitude modulation/frequency modulation radio stations). Power to transmit will have to be supplied by Backup generators.

Source: Buck 2016

With the expansion of utilities systems with new development in recent years, the County's vulnerability to utility failure has **increased**.

4.5.4 Wildfire

Wildfire

Magnitude	Onset	Duration	Frequency
2.25	4.00	3.25	2.75

Average	Rank
3.06	5

Hazard Description

Agricultural – Fires burning in areas where the primary fuels are flammable cultivated crops, such as hay and pasture. This type of fire tends to spread very rapidly but is relatively easy to suppress if adequate resources are available. Structures threatened are usually few and generally belong to the property owner. There may be significant losses in terms of agricultural products from such fires.

Wildfire

Forest – The classic wildfire; these fires burn in fuels composed primarily of timber and associated fuels, such as brush, grass, and logging residue. Due to variations of fuel, weather, and topography, this type of fire may be extremely difficult and costly to suppress. In wilderness areas these types of fires are often monitored and allowed to burn for the benefits brought by the ecology of fire, but also pose a risk to private lands when these fires escape these wilderness areas.

Wildland-Urban Interface (WUI) – These fires occur in areas where urbanization and natural vegetation fuels are mixed together. This mixture may allow fires to spread rapidly from natural fuels to structures and vice versa. Such fires are known for the large number of structures simultaneously exposed to fire. Especially in the early stage of WUI fires, structural fire suppression resources may be quickly overwhelmed, which may lead to the destruction of many structures. Nationally, wildland interface fires have frequently resulted in catastrophic structure losses.

Wildland fire protection is provided by federal, state, county, city and private fire protection agencies and private timber companies. Factors affecting the risk of wildland fires include rainfall, type of vegetation, number of snags, amount of old growth timber and proximity to firefighting agencies. Fire damage to watersheds may increase the vulnerability to flooding.

Smoke from regional fires also may present a hazard; diminished air quality impacts vulnerable populations in particular.

Location

According to the *Clallam County CWPP* (Clallam County 2009a), large fires in western Washington typically occur on steep south-facing slopes, and often result from a combination of circumstances including a source of ignition in areas of dry, heavy fuels, an extended period of drought, and dry east winds. Forest fires in this area usually occur during the dry summer months of July, August, and early September, but they can occur anytime between April and October given the right conditions. Fire hazard increases in the late summer and early fall when hot, dry east winds (subsidence winds) occur more frequently and the area has experienced the low point of the annual precipitation cycle. The portion of the Peninsula with the highest potential for major fires is the area between Port Angeles and Hood Canal, though as residents of Forks can attest, large forest can occur anywhere on the Peninsula (Clallam County 2010).

Forks is surrounded by commercial forests and is particularly susceptible to WUI fires. Many of the older structures in the County, such as in Port Angeles, may be vulnerable to urban fires because of their construction prior to modern fire codes and fire resistive materials, including electrical wiring. The Port Angeles Fire Department indicated many of the fire damages represent commercial structures, with a large portion in any year representing a single large fire (Clallam County 2010).

Wildfire

Previous Occurrence/History

Previous wildland fires that have affected Clallam County include "The Great Forks Fire of 1951," 1955 in the West Twin River area, and 2002 in the Clallam Bay area. The fires in 1951 began near Lake Crescent and burned into and around Forks. Approximately 30 buildings and between 33,000 and 38,000 acres of timber were lost. The 1955 fire burned approximately 5000 acres of timber. The 2002 fire started as slash burnings on private land. In July 2004, a wildfire ignited near Joyce at Striped Peak, burning between three and four acres of private hillside land. Joyce experienced another wildfire in May 2006 when a controlled burn near the town grew into a five-acre wildfire. From January 2008 to August 2009, 38 different wildfire incidents have occurred within Clallam County, outside of Olympic National Park (Clallam County 2010).

In December 2003, the City of Port Angeles experienced a significant fire at the Elks Naval lodge, one of the City's largest structures located in the downtown core (Clallam County 2010).

See Appendix C for more detail.

Potential Impacts from Future Climate Conditions

- Reduced snowpack
- Prolonged drought and heat
- Stressed and weakened forest ecology
- Increase in insect infestation of trees
- Drier vegetation or lower water content in vegetation leading to faster and hotter burning fires



March 13, 2015—Garage fire east of Port Angeles (Photo courtesy of Peninsula Daily News)

Wildfire

Extent and Probability

A Headwaters Economics study found that Clallam County has more square miles of developed land within the wildland-urban interface than any other county in Washington State (72 square miles) and the fifth most area in the WUI in the entire United States. The same study found that 13,271 homes were located within the WUI throughout the County (Headwaters Economics 2013).

Weather conditions greatly influence the impact and extent of wildfires. Drought, high temperatures, and wind contribute to a dynamic and changing conditions of wildfires. Fuel load and vegetation contribute to the size and intensity of wildfires.

Wildfires are frequent and inevitable. Within the region, most wildfires burn during the June to October time period.

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, the County may be impacted by an **increase** in the probability of future fires.

Cascading Impacts

- Landslides, washouts, erosion, and potential re-burns
- Degraded water quality and damage to fisheries
- Power outages and communications disruptions
- Degraded air quality
- Health effects from smoke, including asthma

Wildfire

Vulnerability

Wildfires in Clallam County generally occur in the lower lying, WUI areas, particularly near Forks, Sequim and Blyn. The City of Forks is vulnerable to fires because of its location near multiple east-west river valleys and the fact that it is surrounded by commercial forest lands. Large fires are likely to start in the east and burn down the valley, toward Forks.

Due to the limited number of land-based evacuation routes, the County may become isolated during a wildfire—limiting access to healthcare facilities, shelters, and other resources. Other critical infrastructures vulnerable to wildfires include water systems, refined fuel systems, communications systems.

Vulnerability posed by wildfires (particularly WUIF) to Clallam County is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of this plan, the following County-wide infrastructure types are classified as being vulnerable to WUIF:

- Communication Systems (9 structures)
- Electric Systems (13 structures)
- Fire Department (5 structures)
- Government Buildings (3 structures)
- Hazardous Materials Storage (4 structures)
- Medical Facilities (5 structures)
- Propane (1 structure)
- School (1 structure)
- Shelter (16 structures)
- Water systems (17 structures)

Since the 2010 County Hazard Mitigation Plan, development in Clallam population centers has expanded further into the WUI; therefore, the vulnerability has **increased**.

See Appendix B for full Risk Exposure Tables and C for additional maps.

4.5.5 Windstorm

Windstorm

Magnitude	Onset	Duration	Frequency
1.92	3.50	2.33	4.42

Average	Rank
3.04	6

Hazard Description

A windstorm is a short duration event involving straight-line winds and/or gusts in excess of 50 miles per hour (mph). Windstorms can affect areas of Clallam County with significant tree stands, as well as areas with exposed property, major infrastructure, and above ground utility lines. Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, and uprooted and/or knocked down trees. Windstorms are most common from October to March, which is why they are often associated with winter storms (Clallam County 2010).

Location

All county and tribal properties and structures can be affected by windstorms. Properties with infrastructures, utilities, and tree stands can have more damaging impacts during windstorms, especially in coastal areas where winds speeds can reach 40 to 60 mph during the winter months.

Previous Occurrence/History

Recent windstorms occurring in Clallam County resulting in major damage include:

- 17 December 2018 – Clallam and East Jefferson Counties Windstorm
- 15-16 October 2016 – Typhoon Songda
- 14 December 2006 – "Hanukkah Eve" Windstorm
- 20 January 1993 – "Inaugural Day" Storm

These windstorms have caused damage to County structures and housing; extensive utilities damage; restricted access to public lands; and required increased strain on the government's operations.

Windstorm



December 14, 2018—Wood debris at Lincoln Park in Port Angeles (Photo courtesy of Peninsula Daily News)

Potential Impacts from Future Climate Conditions

- Warmer winters, which can change meteorological patterns
- More severe and extreme weather patterns and phenomenon

Extent and Probability

Coastal areas of Clallam County experience higher winds than other areas. However, windstorms can occur anywhere throughout the County. Windstorms can damage buildings, structures, utilities, and tree stands, causing millions of dollars' worth of damage.

Future Probability Trend – Future weather conditions have the potential to lead to an increase in severe and extreme weather patterns, leading to an **increase** in the probability of a windstorm. In addition, increased development has the potential to expose more assets to the impacts of windstorms.

Cascading Impacts

- Human health risks (i.e., respiratory illness)
- Utility failures
- Fuel loading for potential forest fires
- Landslides from downed trees
- Transportation issues

Windstorm

Vulnerability

The County's vulnerability to severe windstorms are related to power outages and debris blocking land-based transportation routes. Because nearly all social and economic activity is dependent on transportation, damage from windstorms can have a serious impact.

Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. More rural communities located in the foothills are particularly vulnerable to road outages and face longer delays in debris removal. Additionally, vehicle accidents rise among those who try to drive during windstorms (United States Department of Transportation 2018).

Power outages can result from physical damage to electrical infrastructure as a result of downed trees and blown debris. Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe windstorms. Additionally, persons with electric-based health support systems are vulnerable to power outages everywhere.

Since the 2010 plan, the County's vulnerability to windstorms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

1

4.5.6 Winter Storm

Winter Storm

Magnitude	Onset	Duration	Frequency
2.00	3.25	2.75	4.00

Average	Rank
3.00	7

Hazard Description

Severe winter storms can produce rain, freezing rain, ice, snow, cold temperatures, and wind. Severe winter storms affecting Clallam County lands typically originate in the Gulf of Alaska and the central Pacific Ocean and are most common between October and March. Much of northeastern Clallam County is in the rain shadow of the Olympic Mountains, resulting in less precipitation than average compared to other parts of Western Washington. The amount of precipitation a location receives during winter storms largely depends on elevation, with areas at higher elevations (particularly along the western coast) receiving more precipitation (over 100 inches annually in some places). Winter season snowfall ranges from ten to thirty inches in the lower elevations and between 250 to 500 inches in the higher mountains. In the lower elevations, snow melts rather quickly and depths seldom exceed six to fifteen inches.

Location

While much of the County can be affected by winter storms, the higher elevation and western coastal areas are exposed to the more damaging impacts of winter storms. Furthermore, many of the communities along the western coast of Clallam County are very remote and have limited road infrastructure that can quickly become compromised during a winter storm.

Previous Occurrence/History

Recent winter storms occurring in Clallam County resulting in major damage include (snowstorms listed below; see Section 4.5.5, Windstorms, for other types of winter weather):

- 9 February 2019 – North Olympic Peninsula severe winter weather
- 14 March 2014 – Sequim/Port Angeles Blizzard
- 27 December 1996 – Christmas Snowstorm

Potential Impacts from Future Climate Conditions

- Potential for warmer, wetter winters
- Potential decrease in snow events, but increase in ice events

Winter Storm

Extent and Probability

Severe freezes, when daily high temperatures remain below freezing for five or more days, occur on average every three to five years in Clallam County. Winter storm weather is common in the winter, but typically lasts a short time; ice storms (sleet and freezing rain) likewise are typically brief events.

Winter storms may be more extreme during La Niña weather years, such as the 1996 flooding associated with the 1996-1997 La Niña pattern.

Future Probability Trend – The impact of changing weather patterns may have an impact on the probability of future winter storm events. Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, it would seem the County may be impacted by a **decrease** in the probability of future winter storms. However, it is also possible that changing weather patterns could result in an increased likelihood of precipitation during sub-zero temperatures, resulting in an **increase** in the probability of winter storms.

Cascading Impacts

- Human health risks (i.e., respiratory illness)
- Vehicular accidents
- Hypothermia
- House fires
- Utility failure
- Agricultural die-off

Winter Storm

Vulnerability

The County's primary vulnerability from severe weather is from power outages and impairment of transportation. Because nearly all social and economic activity is dependent on transportation, snow can have a serious impact.

Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive. Power outages can result from physical damage to electrical infrastructure as a result of ice or snow or increases in demand beyond the capacity of the electrical system.

Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe winter weather events. Persons who are older, are isolated or have disabilities may be more vulnerable, especially those that may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Power losses during winter storms have resulted in deaths from carbon monoxide poisoning if people attempt to keep warm by lighting charcoal fires or operating backup generators indoors.

Snowstorms also slow the local economy, but there is a debate about whether these slowdowns cause permanent revenue losses. Productivity and sales may decline but often accelerate after a storm. Some permanent effects may occur if some areas in the region are accessible and some are not.

For workers, snow can be a hardship, especially for those who lack benefits and vacation time. For local governments, responding to snowstorms can be a major unbudgeted expense. Some have even had to issue emergency bonds to cover snowstorm recovery costs.

Since the 2010 plan, the County vulnerability to winter storms has **increased** as weather patterns change due to climate change and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

4.5.7 Active Threat

Active Threat

Magnitude	Onset	Duration	Frequency
2.92	5.00	2.17	1.42

Average	Rank
2.88	9

Hazard Description

An active threat is any situation that presents an immediate and ongoing danger to the safety of people in the community. In addition to individuals using firearms, other types of weapons and erratic behavior can create active threat situations.

Location

Any populated area can be impacted by active threat. These areas include, but are not limited to, shopping structures, clinics, schools, government offices and buildings, and residential areas.

Previous Occurrence/History

There have been no active threat incidents in Clallam County's recent history, however there was one potential incident.

In 1999, a confirmed terrorist attempted to enter the U.S. from Canada with materials to create an explosive. Although destined to be used in a more populated effort, the threat was discovered in Clallam County.

Potential Impacts from Future Climate Conditions

There are no direct connections between active threat and future climate conditions.

Extent and Probability

With no existing records of recent active threat directly impacting the County, it is difficult to estimate the extent or probability of its occurrence. Nonetheless, it can be deduced that active threat could affect all populated areas in Clallam County; government facilities and schools may be most likely targeted.

Future Probability Trend – Future weather conditions have no direct connections to active threats. However, increased development and urbanization have the potential to **increase** the probability of a future active threat.

Cascading Impacts

- Long term trauma and mental health issues
- Political and social divisions

Active Threat

Vulnerability

No estimates are available to determine potential losses associated with active threat. However, we can assume that if an active threat were to be directed at the County, schools and government buildings would likely be a top target. Active threats could have an impact on the community in the following ways: loss of human life, damage to buildings and structures, temporary displacement during the threat and/or investigation, stress on medical and security services, loss of hospitality business during the event, and an increased need for emergency services and funding.

Since the 2010 plan, there more public awareness about how to respond in the event of an active threat. School districts and police departments hold drills to practice response actions. The County's vulnerability to an Active Threat is **unchanged.**

4.5.8 Hazardous Materials Incident

Hazardous Materials Incident

Magnitude	Onset	Duration	Frequency
1.92	4.92	2.67	1.83

Average	Rank
2.83	10

Hazard Description

Accidental releases of petroleum, toxic chemicals, gases and other hazardous materials occur frequently throughout the state. Even small releases can have the potential to endanger public health and contaminate groundwater, surface water, and soils. Environmental damage from such releases depends on the material spilled and the extent of contamination. Many are releases of small quantities that are contained and cleaned up quickly with little damage to the environment. In other instances, material releases seep through the soil and eventually into the groundwater, this can make water supplies unsafe to drink. Vapors from spilled materials can become inhalation hazards and collect in houses and businesses, creating fire and explosion hazards.

Transportation corridors that carry hazardous materials include highways and navigable waterways.

Washington State Department of Ecology (Ecology) regulates three classes of facilities related to the spills program (Ecology 2019):

- Class 1: Large, fixed shore-side facilities such as refineries and refueling terminals. This definition includes facilities that transfer to or from tank vessels and pipelines.
- Class 3: Mobile facilities, such as tank trucks and portable tanks.
- Class 4: Small tank farms and terminals that transfer oil to non-recreational vessels that have a fuel capacity of 10,500 gallons or more. This definition does not include facilities that transfer to tank vessels and pipelines, as they are Class 1 facilities.

Location

Numerous fixed-location storage sites exist near County properties but have rarely caused an incident. Therefore, the County views the most likely hazardous materials incident to be caused by a traffic accident along Highway 101 or the railroad corridor. The Port of Port Angeles is also a major

Hazardous Materials Incident

shipping facility with an increased potential for hazardous materials incident. Furthermore, the Strait of Juan de Fuca is a major thoroughfare for oil tankers.

There are 6 state-regulated marine spills program facilities in Clallam County (Ecology 2019):

- U.S. Coast Guard Station, Quillayute River, Class 4 Facility (Diesel/Marine Gas Oil, Gasoline)
- U.S. Coast Guard Station, Neah Bay, Class 4 Facility (Gasoline, Diesel/Marine Gas Oil)
- U.S. Coast Guard Station, Port Angeles, Class 4 Facility (Gasoline, Diesel/Marine Gas Oil)
- John Wayne Marina, Class 4 Facility (Gasoline, Diesel/Marine Gas Oil)
- Port of Port Angeles, Class 3 Facility (Gasoline, Diesel/Marine Gas Oil)
- Tesoro Marine SVS, Port Angeles, Class 1 Facility (Bunker Oil/HFO, Diesel/Marine Gas Oil)

Previous Occurrence/History

Since 2015, the majority of oil spills in Clallam County have involved volumes less than 100 gallons released from commercial or recreational fishing vessels (Ecology 2019). The three largest oil spills (volumes greater than 100 gallons) since 2015 are listed below:

- May 20, 2019, Strait of Jan de Fuca, 122 gallons of diesel/marine gas oil from an unknown vessel
- April 5, 2016, Port of Neah Bay, 500 gallons of diesel/marine gas oil from a fishing vessel
- December 17, 2015, 38 miles off La Push, 250 gallons of diesel/marine gas oil from a fishing vessel

The Port Angeles Harbor experienced the following oil spills:

- 1985, ARCO Anchorage Spill, 270,000 gallons
- 2001, ATC Prince William Sound, 500 gallons
- 2003, GA2 Diamond, 500 gallons

Hazardous Materials Incident

A review of the Pipeline and Hazardous Materials Safety Administration incident reporting database showed the following hazardous materials incidents along transportation corridors since 1975 (PHMSA 2019):

Incident Route	Incident City	Date of Incident	Quantity Released	Unit	Commodity Long Name
MM-196	Forks	2/23/2011	4300	LGA	Diesel Fuel
	Forks	8/8/1984	8	LGA	Fuel Oil
	Forks	3/17/1982	20	LGA	Combustible Liquid
	Forks	7/11/1978	100	LGA	Fuel Oil
707 MAIN ST	La Push	6/25/1991	0.5	LGA	Isopropynol or Isopropyl Alcohol
3216 EAST HIGHWAY 101	Port Angeles	8/11/2014	0.25	LGA	Corrosive Liquids
3216 EAST HIGHWAY 101	Port Angeles	4/21/2011	0		Aerosols, Flammable
224 Easy St	Port Angeles	1/7/2011	1	LGA	Corrosive Liquids
	Port Angeles	2/7/2003	100	LGA	Phosphoric Acid Solution
MARINE ROAD	Port Angeles	2/1/2001	0.5	LGA	Corrosive Liquids
MARION DRIVE	Port Angeles	3/1/1993	0.125	LGA	Corrosive Liquids
MARINE DRIVE BOX 271	Port Angeles	4/15/1992	6	LGA	Sodium Hydroxide, Solution
	Port Angeles	11/16/1989	5	LGA	Sulfur Dioxide
	Port Angeles	6/5/1979	344	LGA	Gasoline
W/B SR 101 MILE POST 275.80	Sequim	11/3/2011	0		Gasoline
HWY 101 M.P. 275	Sequim	7/31/2000	0		Fuel Oil
HIGHWAY 101	Sequim	7/11/1990	0.06684	GCF	Sulfur Dioxide
	SEQUIM	2/24/1981	200	LGA	Gasoline
	SEQUIM	12/13/1975	0		Gasoline

Key:
LGA = Liquid – gallon
GCF = gallons per cubic foot

No fatalities resulted from these incidents.

Potential Impacts from Future Climate Conditions

- Increased precipitation events causing an increase in traffic accidents.

Hazardous Materials Incident

Extent and Probability

The uncontrolled release of hazardous materials during transport can result in death or injury to people and damage to property and the environment through the material's flammability, toxicity, corrosiveness, chemical instability, and/or combustibility. Individuals may be exposed to hazardous materials at acute or chronic levels. In the event of a marine oil spill, ecological systems could be damaged from the pollution and recreational activities subsequently limited.

Future Probability Trend – Increased development trends and potential increase in high-intensity precipitation events present the potential for an increase in hazardous materials passing through the area and traffic accidents, respectively. Each presents the potential for an **increase** in future hazardous materials incidents.

Cascading Impacts

- Long-term health and environmental monitoring costs
- Contamination of water and air
- Conflagration (urban fire)
- Long-term economic impacts to tourism or fishing

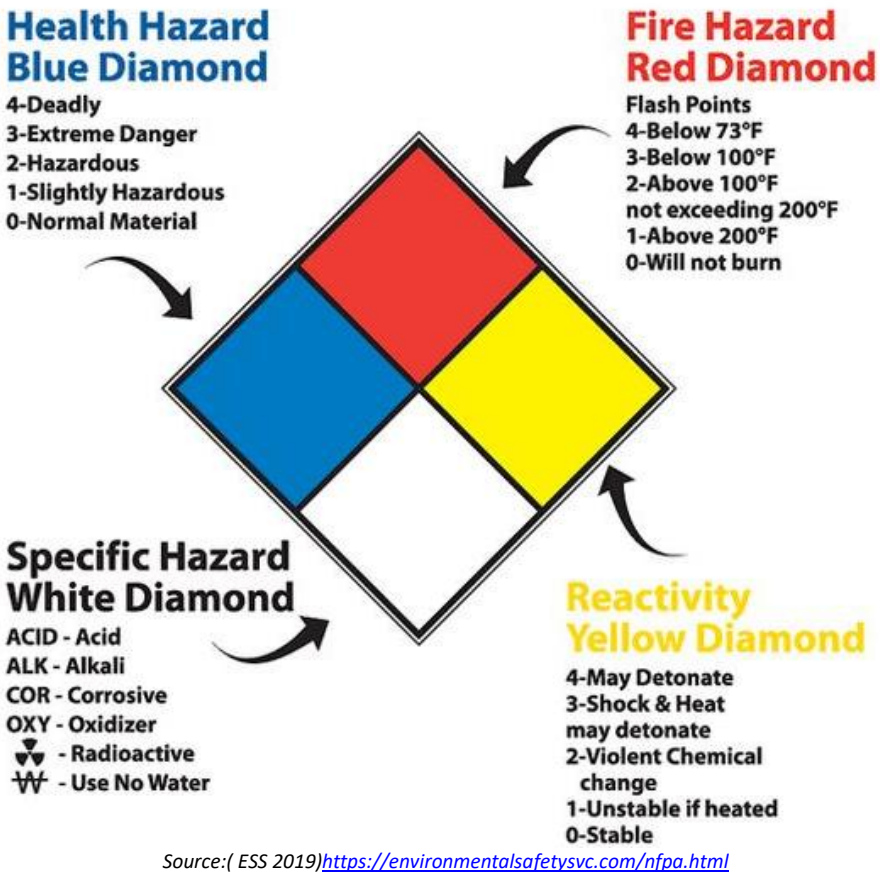
Vulnerability

The County's hazardous materials threats stem from facilities that include gas stations, marinas, propane storage sites, port facilities, and the Nippon Paper Plant. Much of the County's population and most of its assets are located near to these facilities.

Since the 2010 plan, the County's vulnerability to hazardous materials incidents has **increased**.

Refer to Appendix B for the complete hazard profile and Appendix C for GIS mapping of hazardous materials incidents.

Hazardous Materials Placard



Source:(ESS 2019)https://environmentalsafetysvc.com/nfpa.html

4.5.9 Landslide

Landslide

Magnitude	Onset	Duration	Frequency
1.50	4.42	2.58	2.67

Average	Rank
2.79	11

Hazard Description

Landslides (or mass movement) are caused by a combination of geological and climatological conditions. A landslide is the movement of a mass of rock, earth, or debris down a slope. Landslides may be small or very large and can move at slow to very high speeds. They can be initiated by storms, earthquakes, fires, volcanic eruptions, and human modification of the land. The factors that directly cause a landslide include one or a combination of the following:

- Change in slope gradient or increased weight through development
- Shocks and vibrations (particularly earthquake)
- Change in water content
- Weathering of rocks
- Removal of (for example, by wildfire or through grading) or change in the type of vegetation covering slopes

Landslide failures in Clallam County result from failures along planes in sedimentary bedrock, shoreline erosion, shallow landslides in soil deposits that overlie bedrock, and landslides and mass wasting in the upper watersheds and forest lands (such as at abandoned logging roads). Slope failure along the bedrock bedding planes is prevalent along the Strait of Juan de Fuca and Lake Crescent. Landslides may be triggered by earthquakes or undercutting the toe of the slope.

According to Washington State DNR (2019):

> "*In general landslides can be categorized as shallow or deep-seated and this difference can determine their speed and size. Shallow landslides typically occur during the winter months in western Washington and during the summer months in eastern Washington but are possible any time. Deep-seated landslides can also occur at any time. Many of the landslide areas in Washington are a mixture of different landslide types.*"

Location

The following are particular areas of County-wide concern for landslides (STARR 2013):

- Along major roadways, including Highway 101 and SR 112
- Areas along major rivers, including the Quillayute River
- Lower Elwha roads are vulnerable to landslides
- Along the Port Angeles marine bluff
- The Olympic Discovery Trail
- Bluff area along Sequim Bay, Johnson Creek and Bell Creek

Landslide

Previous Occurrence/History

Historically, the damages with the highest consequence, either related to the value of the repair or by the impact on human activities, include slides that have closed U.S. Highway 101 and slides in Port Angeles (one of which caused a fatality in 1998) (Clallam County 2010).

Bluff erosion and/or ravine erosion has damaged or threatens residences in developments located in Clallam Bay-Sekiu, Port Angeles, and in the county east of Port Angeles. Drainage was rerouted to the base of the bluff at Diamond Point, where several houses at the base of a bluff were damaged or destroyed by a bluff failure in the late 1990s. Since the County's critical areas codes that affect new building require provisions for building setbacks and drainage (including roof drainage and septic issues), new structures have not been damaged. Historically, smaller, residential lots platted years ago near bluffs in Clallam County have had the most problems with bluff failure (Clallam County 2010).

The Presidentially declared storm event of October 2003 also caused landslide and erosion hazards in Clallam County. Near the Makah Reservation in the northwest portion of the County, both lanes of Highway 112 closed after a sinkhole one hundred and fifty feet wide and forty feet deep washed out the highway (Clallam County 2010). A mudslide at Lake Crescent blocked Highway 101. The mudslide pushed a log truck into the lake and the driver escaped by swimming to shore (Clallam County 2010).

During the 2008 disaster, the City of Forks became isolated after a landslide blocked Highway 101 to the north and south. In response, gasoline was rationed, and propane was on the verge of being rationed due in part to hospital requests for the increasingly scarce fuel. The highway was partially reopened after three days but portions of the community continued to be isolated for an extended period (Clallam County 2010).

A landslide obstructed the Olympic Discovery Trail in 2014 (Peninsula Daily News 2014).

Potential Impacts from Future Climate Conditions

- Increased intense precipitation events leading to increased water content on hillsides
- Increased drought and fire risk combined with intense precipitation to lead to slope instability

Landslide

Extent and Probability

The following is excerpted from the hazard assessment conducted by Clallam County Emergency Management Division (EMD) as part of the 2016 Cascadia Rising Exercise:

"It is very difficult to make quantitative predictions of the likelihood or the size of a future landslide event. An accurate understanding of the landslide hazard for a given facility requires a detailed landslide hazard evaluation by a geotechnical engineer. Such site-specific studies evaluate the slop, soil/rock and groundwater characteristics. Such assessments may require drilling to determine subsurface soil/rock characteristics. In some cases, landslide hazard assessments by more than one geotechnical engineer may reach confliction opinions.

Landslides in Clallam County frequently cover or undermine Highway 112 between Mileposts 1 and 9 and Mileposts 32 and 39. Highway 101 and East Beach Road are subject to debris flows and rockfalls along Lake Crescent. Piedmont Road, Joyce Access Road, and Waterline Road are all at risk of landslides as are residences around Lake Sutherland and Lake Crescent. Highway 101 may be subject to landslides in Indian Valley between Lake Crescent and the Elwha River during major destructive earthquakes. There is concern that neighborhoods in Port Angeles downhill from Peninsula College may be subject to block or creep slides during an earthquake." (Buck 2016)

Due to the geology and likelihood of landslide-triggering storms in Clallam County, the probability of future occurrence of landslides is high.

Future Probability Trend – Based on potential increases in drought and wildfires, as well as potentially higher intensity precipitation events, the County may be impacted by an **increase** in the probability of future landslides. In addition, as the County increases its land ownership and development, landslides may pose a greater risk on disturbed soils.

Cascading Impacts

- Tsunami
- Utility failure
- Economic loss
- Water quality impacts
- Transportation accidents

Landslide

Vulnerability

The landslides and erosion in upper watersheds and forest lands are causing damage and disruption to important County roadways. Sedimentation from these areas is accumulating in the rivers and streams, causing flooding and habitat degradation. It is uncertain what the precise causes of mass wasting are; whether the roads form a conduit, the failures originate from side cast, or a combination of factors is involved.

Vulnerability posed by landslides to Clallam County is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of this plan, the following County-wide infrastructure types are classified as being susceptible to landslides:

- Electric systems (1 structure)
- Government buildings (2 structures)
- Hazardous Materials Storage (3 structures)
- Medical Facilities (1 structure)
- Shelters (13 structures)
- Water systems (9 structures)

Since the 2010 plan, the County's vulnerability to landslides is **unchanged**.

See Appendix B for full Risk Exposure Tables and Appendix C for additional maps.

4.5.10 Flooding

Flooding

Magnitude	Onset	Duration	Frequency
1.67	3.33	2.42	3.25

Average	Rank
2.67	12

Hazard Description

A flood is the temporary inundation of land that is normally dry. It is a natural event for rivers and streams to overflow from river channels into adjacent floodplains. Floodplains are lowlands areas adjacent to rivers and lakes that are subject to regular flooding. Most floodplains are mapped by FEMA for their Flood Insurance Rate Maps (FIRMs) as part of the National Flood Insurance Program (NFIP). FEMA defines several types of floodplains:

- A 100-year flood zone is an area that is subject to a 1% chance of flooding annually, whereas
- A 500-year flood zone has a 0.2% chance of flooding annually.

Floods may result from a variety of sources, including natural causes such as high intensity or long duration of rain or snow, rapid spring snowmelt, or ice jams inhibiting a river's flow. Man-made hazards such as dam failures are also a concern in the County. Various types of floods can have different risk levels associated with them. The highest risk flood event is a flash flood because of the low predictability, rapid development, and high-water flow rates associated with them. These floods are often associated with intense weather such as unexpected large rainstorms, and large thunderstorms. However, historically, flash floods pose a low likelihood within the region.

Location

The primary riverine hazards are associated with the following rivers and streams, general from west to east: Quillayute River, Bogachiel River, Calawah River, Sol Duc River, East Dickey Creek, Sekiu River, Hoko River, Clallam River, Reed Creek, Elwha River, Morse Creek and Dungeness River. Riverine hazards extend across the County but are primarily located near the mouths of the rivers in the northern portion of the County, and in the central and western portions of the County, along the extent of Highways 101, 110, and 110 Spur. Data from the *Dungeness River Comprehensive Flood Hazard Management Plan* (Clallam County 2009b) indicate a trend of increasing peak flows for the Dungeness and Elwha Rivers in Clallam County between 1924 and 2002 (Clallam County 2010).

Ediz Hook and parts of Port Angeles, and the Gibbon and Travis spits in the mouth of Sequim Bay may become inundated with high tides and storm surges. Much of the Clallam, Elwha and Dungeness tidal areas may be impacted by high tides and river flooding. Strong winds on Lake Crescent can cause flooding of the lake shorelines (Clallam County 2010).

Kinkade Island is highly vulnerable to flooding and erosion during high flows as it is in the flood plain and meander hazard zone. Houses were built on the island in the years before Clallam County issued building permits. Several flow paths throughout Kinkade Island receive flow from groundwater and surface water. During the 2001-2002 seasons, a Kinkade Island home and its access bridge were washed away in two separate flood events (Clallam County 2010).

Flooding

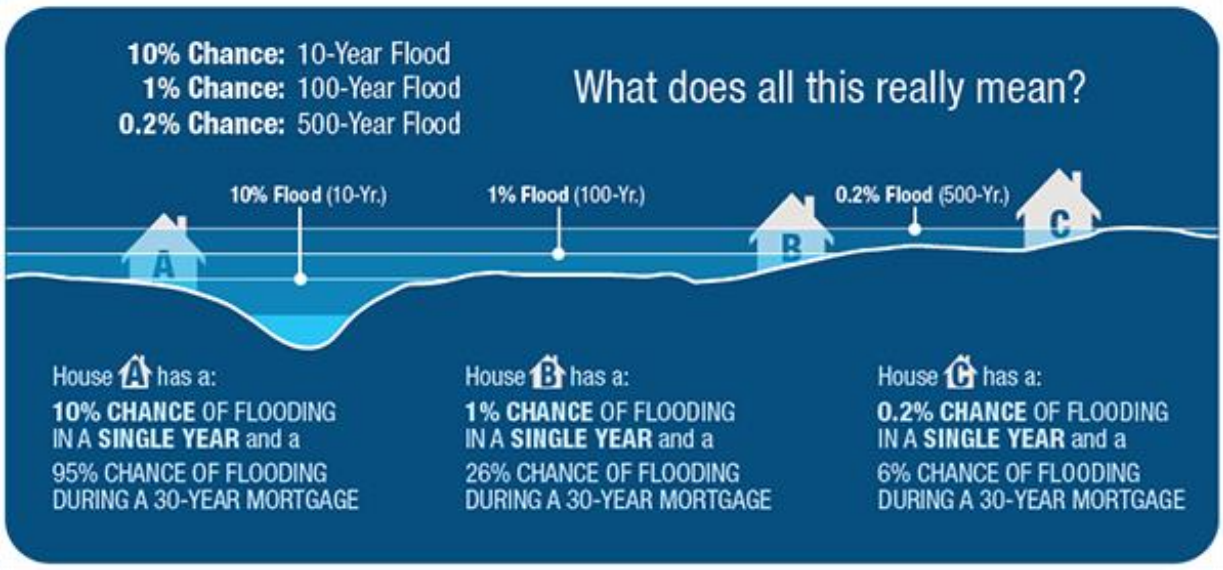
Previous Occurrence/History

Flood damages with the highest consequence, either related to the cost to repair or by the impact on human activities, were incurred during the 1979, 1990, 1996/1997 and 2008/2009 flood and severe storm events. Historically, the most damage to life or property has occurred from flooding of the Bogachiel River, and flooding of the Kinkade Island and River's End segments of the Dungeness River.

Jimmycomelateley Creek and the lower Sequim delta was also an area of historic flooding. The Jamestown S'Klallam Tribe, the Clallam Conservation District, Clallam County, and other stakeholders completed a restoration project to return the functionality of the creek's floodplain and to improve fish passage. As of 2009, flooding has largely been remedied (Jamestown S'Klallam 2011).

Potential Impacts from Future Climate Conditions

- Increased high-intensity precipitation events in winter months
- Increased intensity of winter storms
- Changing flood regimes and return patterns



Source: https://www.bulldogadjusters.com/types-of-claims/water-damage/floods/

Flooding

Extent and Probability

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property. Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by United State Geological Survey (USGS) stream gauges located throughout the area. It can also be measured by past damages of flooding.

The region experiences some flooding twice a year at minimum, while larger floods occur once a decade and major flood events occurring every 30-50 years.

The County has an extensive network of flood management solutions that have evolved as attitudes toward flood management have changed in Washington State. As part of the *Dungeness River Comprehensive Flood Management Plan* (2009), the County and partners conducted an inventory of levees and dikes on the lower Dungeness River to ascertain whether hard armoring could be removed without resulting in damage to private property. The Upper and Lower Elwha Dams on the Elwha River were removed in 2014 as part of an effort to restore the floodplain to its historic condition and revitalize wildlife habitat along the river (Lower Elwha Klallam Tribe 2019).

Future Probability Trend – Based on potential increase in high-intensity precipitation events and increased development trends (resulting in additional impervious surfaces and stormwater runoff), the County may be impacted by an **increase** in the probability of future floods.

Cascading Impacts

- Landslides, washouts, and erosion
- Degraded water quality due to flooding of water treatment facilities
- Damage to fisheries
- Increase in traffic accidents
- Communications disruptions

Flooding

Vulnerability

As part of the County's most recent Biennial Report submitted to the FEMA, it was estimated there were 700 lots in Clallam County containing residential or accessory structures that either: 1) contain 95% or more flood hazard areas; or 2) contain less than 0.5 acres of land outside of flood hazard areas. It is estimated that some or all the structures on these 700 lots are located within or in proximity to flood hazard areas depicted on the FIRMs (Clallam County 2010).

Clallam County, local jurisdictions, and Tribes do not currently participate in the NFIP Community Rating System (CRS) (the Lower Elwha/Klallam Tribe has rescinded participation). In Clallam County's first Hazard Mitigation Plan accepted in 2004, Clallam County identified participation in the CRS under NFIP as a project area. In 2005, the County undertook an evaluation into the potential benefits of participating in CRS. It was concluded that CRS would offer benefit to a small percentage of County landowners. This benefit was not enough to offset CRS program costs to County in terms of CRS enrollment requirements and long-term costs and staff resources associated with CRS administration (e.g., reporting, documentation) and implementation (Clallam County 2010).

Vulnerability posed by flooding to Clallam County is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of this plan, the following County-wide infrastructure types are classified as being vulnerable to flooding:

- Fire Department (1 structure)
- Government Building (4 structures)
- Hazardous Materials Storage (2 structures)
- Shelter (1 structure)
- Water systems (2 structures)

Since the 2010 plan, the County's vulnerability to nuisance flooding has **increased** as precipitation patterns shift due to climate change. However, the County and partners are taking active steps to mitigate the impacts through floodplain restoration activities.

See Appendix B for full Risk Exposure Tables.



Flood plain restoration and improved fish passage at Jimmycomelately Creek along State Highway 101. (Washington State Department of Transportation 2004: https://www.flickr.com/photos/wsdot/4017841128)

4.5.11 Tsunami

Tsunami

Magnitude	Onset	Duration	Frequency
3.25	4.08	2.17	1.08

Average	Rank
2.65	13

Hazard Description

A tsunami is a succession of giant waves that are generated after a natural event (such as deep-sea tectonic movement, volcanic eruptions, landslides, and even meteorites) triggers underwater movement (FEMA n.d.). The waves radiate in all directions from the area of disturbance. The waves can travel in the open ocean as fast as 500 miles per hour and have a very long wavelength. In other words, in deeper waters, the waves could be indistinguishable from other wave action. However, as the waves approach shallower waters, the waves slow and begin to grow in energy and height as the tops of the waves move faster than their bottoms do, causing them to rise precipitously. Most tsunamis (about 80%) occur within the Pacific Ocean's "Ring of Fire," a geologically active area where tectonic shifts make volcanoes and earthquakes common (National Geographic 2019a).

A key feature of tsunami is the interaction of the wave trough (the low point beneath the wave's crest) and the shoreline. This part of the wave often reaches shore first and produces a vacuum effect that 'sucks' coastal water seaward, exposing harbor and sea floors. It is important to recognize this phenomenon because the wave crest – and a huge volume of water – will typically hit the shore five minutes or so later (National Geographic 2019b).

A tsunami is typically composed of a series of waves, or wave train, so its force is compounded as successive waves reach the shore. It is very important that communities experiencing a tsunami wait until official word has been issued that it is safe to return to vulnerable locations, because danger may not have passed with the first wave.

Location

Tsunami hazard areas in Clallam County are concentrated around Cape Flattery, along the Pacific Coast, and sporadically along the coastline of the Strait of Juan de Fuca, including the Sekiu-Clallam Bay community, the Lower Elwha Klallam Tribal lands, Ediz Hook and downtown Port Angeles, and the low-lying area north of Sequim.

Appendix B contains Washington State DNR mapping of tsunami hazard in Clallam County population centers. The modeling was conducted to demonstrate the flooding scenario associated with a rupture of the Cascadia Subduction Zone (DNR 2017).

Tsunami

Previous Occurrence/History

Based on the geological record and first-hand accounts, tsunami from locations across the Pacific Ocean basin and from the CSZ off the Washington coast have hit Washington State coastal communities at least 7 times in the last 3,500 years. The largest of the nearby triggers, the CSZ, produced the most recent great tsunami in 1700 AD (Lange 2003). Washington State's tsunamis also include a Puget Sound tsunami from the Seattle Fault between 900 AD and 930 AD, a Tacoma Narrows tsunami from a landslide in 1949, and a fatal wave from a rockfall into the Columbia River in 1965 (WA EMD 2012).

- 2006 Kuril Islands, Japan Tsunami (La Push, 0.52 feet; Neah Bay, 0.01 feet; Port Angeles, 0.39; Westport, 0.16 feet)
- 1964 Alaskan Tsunami (Neah Bay, 0.7 feet)
- 1960 Chilean Tsunami (Neah Bay, 1.2 feet)
- 1700 Cascadia Tsunami (Washington Coast, 33 feet)

Potential Impacts from Future Climate Conditions

Future climate conditions are unlikely to have any effect on tsunami magnitude, severity, or probability.

Extent and Probability

Tsunami pose a widespread hazard throughout coastal Clallam County.

The Ring of Fire will continue to generate tectonic triggers. The CSZ has produced earthquakes measuring M8.0 and above at least seven times in the past 3,500 years. The time intervals between these events has varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.

Future Probability Trend – Great earthquakes in the Pacific Ocean basin generate tsunamis that impact Washington's outer coast and the Strait of Juan de Fuca at a rate of about six every 100 years. In the CSZ, there is a 10 to 14% percent chance of a M9.0 earthquake and tsunami in the next 50 years so the likelihood of recurrence would be low.

Cascading Impacts

- Flooding
- Utility failure

Tsunami

Vulnerability

In 2008, the USGS and the Washington Military Department of Emergency Management (DEM) assessed the vulnerability of 24 communities along the Strait of Juan du Fuca and outer coasts (Wood and Soulard 2008). A summary from the Clallam County DEM outlines the following conclusions:

"…the unincorporated areas of Clallam County include 0.5 square miles of developed land in the tsunami hazard zone. This is only 2% of the total amount of developed land, but it is home to 1,126 people, more than a quarter of whom are over the age of 65. Many may need help to prepare for and respond to a tsunami." (Clallam County 2013)

Vulnerability of Unincorporated Areas of Clallam County			
People/Assets	Number or Amount in Tsunami Zone	% of Community Total in Tsunami Zone	% of Those in Tsunami Zone
All residents	1,126	3%	---
Residents under age 5	41	2%	4%
Residents over age 65	321	3%	29%
Renters	123	4%	23%
Employees	66	1%	---
Businesses	30	2%	---
Sales volume	$10,037,000	1%	---

How Vulnerable is Clallam County to Tsunamis? Excerpted table from Clallam County Emergency Management Department Fact Sheet (2013).

Vulnerability posed by tsunami to Clallam County is ultimately measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of this plan, the following County-wide infrastructure types are classified as being vulnerable to tsunami:

- Airport (1 structure)
- Communication Systems (4 structures)
- Electric Systems (2 structures)
- Fire Departments (3 structures)
- Government Buildings (11 structures)
- Hazardous Materials Storage (16 structures)
- Medical Facilities (2 structures)
- Propane (1 structure)
- Schools (2 structures)
- Shelter (18 structures)
- Wastewater System (3 structures)
- Water Systems (2 structures)

Since the 2010 plan, the vulnerability of the County to tsunami hazard has **increased** in certain geographic areas as property development along the coastlines has increased. Of concern are Sequim and Blyn. Some vulnerability posed by tsunami to human life may be offset due to increased public awareness of the hazard itself and improved public warning systems.

4.5.12 Drought

Drought

Magnitude	Onset	Duration	Frequency
1.83	1.58	3.92	2.67

Average	Rank
2.50	14

Hazard Description

Droughts can be characterized by the dominant impact caused by increased demand or decreased supply. Drought is a slow-onset phenomenon that usually takes at least three months to develop and may last for several seasons or years.

In the early 1980s, researchers with the National Drought Mitigation Center and the National Center for Atmospheric Research located more than 150 published definitions of drought. There clearly was a need to categorize the hazard by "type of drought." The following definitions are a response to that need. However, drought cannot always be neatly characterized by the following definitions, and sometimes all four definitions can be used to describe a specific instance of drought (Wilhite and Glanz 2985).

Meteorological: Defined on the basis of the degree of dryness - in comparison to a regional or local definition of normal or average dryness - and the duration of the dry period.

Agricultural: The linkage of meteorological (or hydrological) drought to impacts on agriculture, with focus on precipitation shortages, soil water deficits, reduced groundwater or reservoir levels, differences between actual and potential evapotranspiration, and other factors.

Hydrological: Associated with the effects of periods of precipitation shortfalls (including snowfall) on surface or subsurface water supply (i.e., streamflow, reservoir and lake levels, groundwater). Frequency and severity of hydrological drought may be defined on a watershed or river basin scale. While all droughts originate with a deficiency of precipitation, this definition is associated more closely with how the deficiency impacts the hydrologic system.

Socioeconomic: Associated with the supply and demand of economic goods with elements of the droughts mentioned above. Socioeconomic drought occurs when the demand for economic goods is greater as a result of a weather-related shortfall.

Drought

Clallam County is increasingly vulnerable to the impacts of snow drought - a subset of hydrological drought. Abnormally low snowpack reflects either below-normal cold season precipitation or a lack of snow accumulation, despite near-normal precipitation, resulting from warmer atmospheric temperatures and precipitation falling as rain rather than snow. Snow drought can impact summer water availability, winter water management, outdoor recreation, and ecosystems (NIDIS 2019). Clallam County has a maritime climate characterized by a cool, dry summers and mild, wet winters. Higher elevations are usually covered with snow from November until June, with depths ranging from 10 to 15 feet. The County relies on the snowpack to maintain the natural environment for protection of vegetation, wildlife, and waterways (Clallam County 2010).

Years of low precipitation and snowpack has jeopardized the County source of power and drinking water. Three energy curtailments, during drought periods prior to 1977, caused temporary unemployment (Clallam County 2010).

Location
Drought widely influences the County. The eastern portion of the County historically has low rainfall and is experiencing rapid development and population increase.

Previous Occurrence/History

During the summer of 2007, the Makah Indian Reservation had a declared emergency due to a water shortage and used rationing and a desalination plant on loan from the Navy to weather the crisis. Since that time, they have increased their water storage capacity and have not suffered any further shortage.

Drought animations over time are available at: http://droughtmonitor.unl.edu/Maps/Animations.aspx

Potential Impacts from Future Climate Conditions

- Decreased snowpack
- Wildfires resulting from abnormally low precipitation, including snowfall)
- Longer, hotter, and dryer summers
- Availability of first foods and habitat

Drought

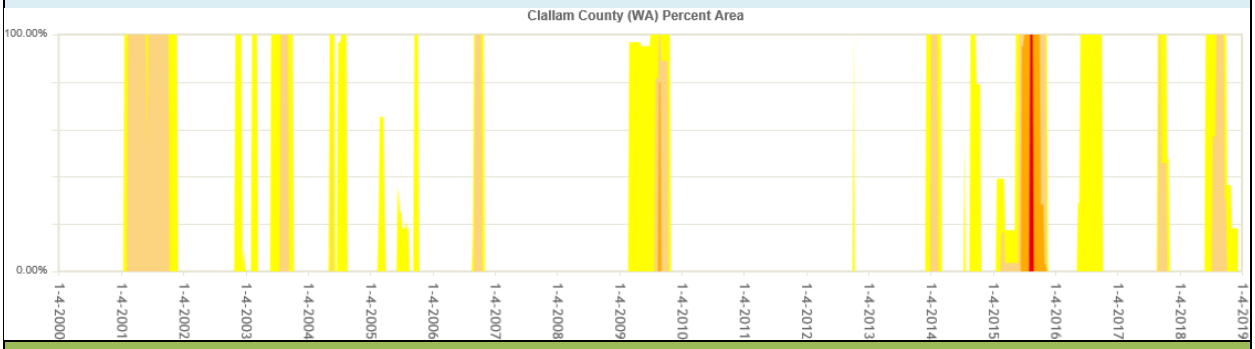
Extent and Probability

Northeast Clallam County, which is in the rainshadow of the Olympic Mountains, is the most vulnerable to the effects of drought (Desisto et al. 2009).

The Dungeness and Elwha watersheds are particularly vulnerable to the impacts of snow drought. Bullman Beach (Neah Bay) water systems are also increasingly vulnerable as winter precipitation patterns change.

As the graph below indicates, there has been one period of extreme drought within Clallam County over the last 17 years (United States Drought Monitor 2019). During a two-month period in 2015, 100% of the County's area was marked by D3 to D4 droughts (the most intense forms of drought). Additionally, in 2001, 2003, 2006, 2009, 2014, 2017, and 2018, areas of the County experienced moderate to extreme drought. As of May 2019, a drought emergency was declared in the Elwha-Dungeness, Lyre-Hoko, and Soleduc watersheds, which encompass the entirety of Clallam County (Governor of Washington 2019).

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of prolonged heat, the County may be impacted by an **increase** in the probability of future droughts.



Cascading Impacts

- Communications disruptions
- Heat-borne diseases
- Water quality impacts
- Crop/wildfire/forestry loss
- Utility failure
- Production loss

Drought

Vulnerability

Droughts impact individuals (farm owners, tenants, and farm laborers), the agricultural industry, and other agriculture-related sectors. Lack of snowpack has forced ski resorts into bankruptcy. There is increased danger of forest and wildland fires. Millions of board feet of timber have been lost. Loss of forests and trees increases erosion causing serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Problems of domestic and municipal water supplies are historically corrected by building another reservoir, a larger pipeline, a new well, or some other facility. Short-term measures, such as using large capacity water tankers to supply domestic potable water, have also been used. Low stream flows have created high temperatures, oxygen depletion, disease, and lack of spawning areas for our fish resources.

The County's vulnerability to drought has **increased** since 2010, as the demand has grown, and historic water supply shifts due to climate change and other factors.

4.6 Vulnerability Assessment

A vulnerability assessment estimates the extent of exposure that may result from specific hazard events of a given intensity in the HMP's planning area. The assessment provides quantitative and qualitative data to identify and prioritize mitigation actions (identified in Chapter 6). According to the DMA 2000, the vulnerability assessment should include:

- A summary of the County's vulnerability to each hazard;
- Identification of types and numbers of properties, buildings, infrastructure, and critical facilities in the identified hazard areas; and
- If available, an estimate of the potential dollar losses to vulnerable structures and the methodology used to provide the estimate.

To improve the readability of the HMP, vulnerability assessments have been incorporated into each hazard profile within Section 4.5 and supported by further documentation in Appendix E.

4.6.1 Identifying Critical Infrastructure

A single listing of facilities that are critical to maintaining the life safety, property, environment and economy of Clallam County was generated initially as part of the 2016 Cascadia Rising Exercise (Buck 2016). During the exercise, the list was submitted to FEMA and Washington EMD for review. Clallam County EMD also provided feedback on the list of critical infrastructure. Each facility was evaluated either in person or using GIS mapping capabilities to ascertain addresses and vulnerability to various hazards.

The critical infrastructure is divided into the following categories:

- Airports and runways
- Electric power systems
- Hazardous materials threats
- Propane systems

- Water supply
- Wastewater and sewer systems
- Refined fuel systems
- Communications systems
- Hospitals and clinics
- Public safety facilities
- Roads and bridges
- Schools
- Local government and law enforcement buildings
- Shelters

Following the completion of the Cascadia Rising Exercise, the list of critical infrastructure was expanded to include a hazard analysis utilizing soil site class, as well as liquefaction, flood, landslide, tsunami, and WUI mapping.

Appendix B-3 and B-4 contain the complete list of critical infrastructure, the vulnerability assessment and associated methodology.

4.6.2 Data Limitations

Due to a lack of data, numerous risk assessments relied on limited and/or qualitative analyses of risk. The risk assessments provided within this section used the best available data and methodologies to estimate risk. However, large gaps exist within the available datasets and that impacted the ability to provide, with full certainty, accurate estimations of several hazard concerns.

The following pertinent gaps may be missing within the available asset inventory:

- **Market Value:** The County lacks a comprehensive database of market values associated with the critical infrastructure identified in the vulnerability assessment. This limits the County's ability to estimate the potential dollar losses associated with vulnerable structures.
- **Additional Hazards:** The vulnerability assessment quantitatively evaluates the threat to critical infrastructure by earthquakes, tsunami, floods, WUIF, and landslides. The analysis also accounts for damage to critical infrastructure during widespread utility failure. However, the vulnerability assessment does not account for other hazards that were prioritized by the HMP, including disease, windstorm, winter storm, active threat, hazardous materials incident, and drought. These hazards were evaluated quantitatively and qualitatively through other means, but not through the same unified approach of assessing the risk posed to specific critical infrastructure types.

4.6.3 Repetitive Loss Properties

FEMA	**B4.** Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

A repetitive loss structure is defined as an NFIP-insured structure that has had at least two paid flood losses of more than $1,000 each in any 10-year period since 1978 (FEMA 2019b).

A severe repetitive loss building is any building that:

- Is covered under a Standard Flood Insurance Policy made available under this name;
- Has incurred flood damage for which:
  - Four or more separate claim payments have been made under a Standard Flood Insurance Policy, with the amount of each claim exceeding $5,000, and with the cumulative amount exceeding $20,000; or
  - At least two separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceeding the fair market value of the insured building on the day before each loss. (FEMA 2019b)

Two properties in Clallam County meet the definition of "severe repetitive loss buildings," as of January 31, 2018. Table 4-1 below contains the properties, their location, and the valuation of the total flood claims.

Table 4-5 Severe Repetitive Loss Structures in Clallam County

FEMA ID	City	Occupancy	Flood Zone	Property Value	Building Value	Contents Value	Paid	Date of Payment	Date of First Loss
11317	SEQUIM	SINGLE FMLY	C	100000	101766.51	11820.28	113586.79	01/31/2018	02/04/1991
88393	FORKS	SINGLE FMLY	A	64512	67956.19	58422.94	126379.13	01/31/2018	12/15/1999

Source: FEMA Severe Repetitive Loss Properties, Compiled by the Houston Chronicle (2018). https://data.world/houstonchronicle/severe-repetitive-loss-properties-flood-games

4.6.4 Exposure Assessment

Impacts associated with mappable hazards are indicated in the risk assessments identified in Section 4.5 and Appendix B.

Note: Not all considered hazards can be mapped for vulnerability. Those risk assessments that cannot be mapped have qualitative data associated within their relative section.

4.7 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

Clallam County's comprehensive plan was first developed and adopted in 1967. The most recent review of the plan was in 2019, to comply with the periodic review requirement outlined in Washington State's Growth Management Act (Clallam County 2019b). The County has grown approximately 6% since 2010, mainly in the population centers of Sequim and Port Angeles; however, Forks has also increased in population in that time.

No potential developments are actively being considered in known hazard areas. Vulnerability changes have been measured by accounting for shifts in land use and public awareness since the adoption of the 2010 County HMP. Each measure has been identified as having an increased, decreased, or unchanged

vulnerability. Table 4-6 provides a snapshot of how vulnerability has changed since development of the 2010 HMP.

Table 4-6 Vulnerability Changes Since 2010

Hazard	Status
Earthquake	+/-
Disease	+
Utility Failure	+
Wildfire	+/-
Windstorm	+
Winter Storm	+
Active Threat	=
Hazardous Materials Incident	+
Landslide	=
Flooding	+/-
Tsunami	+/-
Drought	+

Key:
+ Increased vulnerability
- Decreased vulnerability
+/- Increased vulnerability, but actions taken to decrease vulnerability
= Unchanged vulnerability

5 CAPABILITY ASSESSMENT

Chapter 5 identifies the County's existing mitigation capabilities. These are the plans and policies, programs, and projects that are currently in place to reduce the County's vulnerability to hazards. It also includes key mitigation accomplishments that have been completed since the last plan update in 2010. As mitigation actions identified in the County's mitigation strategy (Chapter 6) are completed, they become new mitigation capabilities.

FEMA	**C1.** Does the plan document [Clallam County's] existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? [Requirement §201.6(c)(3)]

5.1 General

The County will implement its mitigation strategy through several internal and external capabilities. These human, financial, and regulatory capabilities form the baseline for the County's ability to reduce known risks.

MPT Meeting Deliverable

Refer to Jurisdictional Annexes for Capability Assessments for each participating jurisdiction.

5.2 Human and Technical Resources

Table 5-1 describes the County's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 5-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
Board of Commissioners	Commissioners	Oversee the adoption and implementation of the hazard mitigation program.
Director of Emergency Management	Sheriff's Office	Oversee mitigation program and encourage integration of mitigation planning into all County activities
Director of Public Works	Public Works/Roads	Manage operations and maintenance for County-operated wastewater systems, solid waste management systems. The Roads Division builds and maintains the County's motorized and non-motorized transportation system.
Director of Health & Human Services	Health & Human Services	Environmental health, human services, public health.
Director of Information Technology	Information Technology	Maintains and provides public access to the County website and publicly available hazard data.
GIS Manager	Information Technology	Personnel skilled in Geographic Information Systems (GIS).
Land Surveyors	Roads Division	Personnel skilled in surveying County properties.
Grants Management	Emergency Planning	Oversees grants associated with emergency planning and management.
Other		

Table 5-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
Planners or engineers	Public Works/Roads	Integrate risk assessments and mitigation tactics into ongoing projects
Risk Management	Risk Management	Staff with education or expertise to assess vulnerability to hazards.
Hazardous Materials Planning	Sheriff's Office and Fire Departments	Develop capacity for local jurisdictions to prepare for and respond to hazardous materials incidents

CAPABILITY HIGHLIGHT

The County's Director of Emergency Management is housed under the Sheriff's Office. The Director of Emergency Management has been tasked with developing a County-wide emergency management program and facilitated the inclusion of emergency management into the workings of all departments. The Director of Emergency Management serves as the lead for the County's hazard mitigation program.

5.3 Financial Resources

The County maintains many fiscal and financial resources to support its mitigation program. Table 5-2 identifies specific resources accessible for use.

Table 5-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	Yes
Capital Improvement Project Funding	Yes
Insurance	Yes, general liability and business line insurance
User fees for utility services	Yes, through Public Utility District (PUD)
Incur debt	Yes
State-sponsored grant programs	Yes

Table 5-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP.

Table 5-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Pre-Disaster Mitigation Program	Federal Emergency Management Agency (FEMA)	Provides funding to develop hazard mitigation plans and implement mitigation actions contained within.
Hazard Mitigation Grant Program	FEMA	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	FEMA	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by floods.

Table 5-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Community Development Block Grant Program	U.S. Department of Housing and Urban Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.
Emergency Management Performance Grants Program	FEMA/Washington Department of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.
Flood Mitigation Assistance	FEMA/Washington Department of Emergency Management	Provides funding to support development of the flood hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program (NFIP).
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program Interagency Coordinating Committee	Funds activities including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
National Fire Plan	U.S. Forest Service	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
Strategic Economic and Community Development Grant	United States Department of Agriculture (USDA)	Provides funding in rural areas for multi-jurisdictional plan development and with a community development focus. Available only to rural areas outside of urbanized zone of any city with a population greater than 50,000.
Coastal Ecosystem Resiliency Program	National Oceanic and Atmospheric Administration	Provides funding for ecosystem restoration. Governor must approve project funds prior to award and there is a 2:1 cost-sharing ratio.
State		
Washington State Department of Transportation (WSDOT) Avalanche Forecasting and Control	WSDOT	Avalanche forecasting determines the potential risk along a particular mountain slope. When an avalanche hazard develops, WSDOT uses artillery, or explosives to trigger the avalanche. In addition to active avalanche control, WSDOT also uses passive control methods to control snow slides.
Washington Sea Grant	Washington Sea Grant	Washington Sea Grant provides funding opportunities through State and National competitions, program development services, and sponsorships.
Water Resources Program	Washington Department of Ecology (DEC)	DEC's Water Resources Program provides support in monitoring water supply, managing water supply projects, overseeing water rights, performing streamflow restoration, protecting streamflow, regulating well construction and licensing, and ensuring dam safety.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.

Table 5-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock industry and receives no general fund dollars.
Washington Local Emergency Planning Committee Program	Washington Emergency Management Division (EMD)	Washington EMD provides funding support to ensure Local Emergency Planning Committees (LEPCs) can be implemented across the state.
Washington Pipeline Safety Program	Washington Utilities and Transportation Commission	The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington State; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).
State Water Pollution Control Revolving Fund	Washington DEC	This program provides funds to local governments to set up low-interest loan programs to repair or replace failing on-site sewage systems. Property owners unable to qualify for conventional bank loans and marine waterfront property owners can use the program to get loans to fix or replace their systems where failures might directly affect Puget Sound. Both the Clean Water State Revolving Fund and the Centennial Clean Water Program.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.
Thriving Resilient Communities	Threshold Foundation	Wide-ranging resiliency project funding.
Kresge Foundation Environmental Grants	Kresge Foundation	Provides funding for climate adaptation and mitigation, as well as sustainable water resources management.

5.4 Legal and Regulatory Resources

Table 5-4 describes the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations.

Table 5-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All

Table 5-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
	Disaster Recovery Plan	Establishes procedures to mitigate cyber and IT disruptions.	▪ Improved collaboration between IT and Emergency Management	Cyber security, utility failure
	Comprehensive Plan	The County's Comprehensive Plan establishes Urban Growth Areas, natural resource lands, rural lands, and public lands.	▪ Updated zone mapping	All
	Floodplain Management Plan	The County has developed a Dungeness River Comprehensive Flood Hazard Management Plan to study the risk of flooding along the river.	▪ Plan was approved by Washington Department of Ecology in 2010	Flooding
	Stormwater Management Plan (Draft)	The Stormwater Management Plan is established to improve the quality of stormwater runoff, reduce speed and volume of stormwater flows, and raise public awareness of stormwater issues.	▪ Plan updated in 2014 to address new areas of flooding risk ▪ Draft, not adopted	Flooding
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions.	▪ Collaboration between State and County	All
	Capital Improvements Plan	Identifies capital improvement projects to be undertaken by the County over the next five-year period.	▪ Inclusion of hazard mitigation and maintenance projects	All
	Continuity of Operations (COOP) Plan	Outlines the County's procedures for establishing continuity of critical services following a disruption.	▪ Update of plan currently in progress – aligns COOP procedures for all County partners	All
Policies	Local Operating Plan/Agreement with Bureau of Land Management (BLM) and U.S. Forest Service	Increased capability and capacity through partnership.	▪ Signed into agreement	Wildfire
	Zoning Ordinance	Provides land use regulation in the unincorporated portions of the County.	▪ Current code through Ordinance 957, passed August 13, 2019	All
	Subdivision Ordinance	Incorporated into zoning ordinance, establishes regulations around subdivision of properties.	▪ Current code through Ordinance 957, passed August 13, 2019	All

Table 5-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
	Flood Damage Prevention Ordinance	The County's floodplain management ordinance incorporated into the Critical Areas ordinance is designed to protect and conserve the environmental attributes of the County and add to the quality of life for residents.	▪ Inclusion of wetland buffers ▪ Fish and wildlife habitat conservation areas ▪ Identification of frequently flooded areas	Flooding
	National Flood Insurance Program (NFIP)	The National Flood Insurance Program aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participating in NFIP	Flooding
	Building Codes	Building permits are issued by the Department of Community Development and aligned with ICC 2015 building codes.	▪ Adoption of 2015 ICC codes	All

5.5 FEMA Funded Hazard Mitigation Projects

The County has received funding for several hazard mitigation projects to date. Table 5-5 outlines past FEMA funded hazard mitigation projects.

Table 5-5 FEMA Funded Hazard Mitigation Projects

Disaster ID#	Program	Project Title	Sub Grantee
1361	Hazard Mitigation Grant Program (HMGP)	Clallam Hazard Mitigation Plan	Clallam County
1037	HMGP	Bogachiel/La Push Road Bank Stabilization	Clallam County
4056	HMGP	Quileute Tribal Hm Plan - Amend #1	Quileute Indian Reservation
1734	HMGP	Amendment 1 -Jamestown S'Klallam Tribe Hazard Mitigation Plan	Jamestown Reservation
4242	HMGP	QVSD Earthquake and Multi-Hazard Resiliency	Quillayute Valley School District #402
1734	HMGP	Makah Tribe Tribal-Level All Hazard Mitigation Plan - DEOBLIGATION Closeout	Makah Indian Reservation
1682	HMGP	Lower Elwha Klallam Tribal Hazard Mitigation Plan - Closeout and Demobilization	Lower Elwha Indian Reservation
1159	HMGP	Culvert Installation	Agnew Irrigation District
4243	HMGP	Clallam County Hazard Mitigation Plan	Clallam County
	Pre-Disaster Mitigation	Quileute Tribe Management Costs Application FY 18	Quileute Tribe
1079	HMGP	Bourassa Property Acquisition	Lower Elwha Indian Reservation
1963	HMGP	Amend 1: Clallam County - GIS Data Enhancement and HAZUS Analysis	Clallam County

5.6 Continuity of Operations Planning

Continuity of government and continuity of operations (COOP) planning is an integral piece to any mitigation program. Ensuring the County has the ability to operate following an incident immediately mitigates the magnitude of many hazards.

5.7 Coordination with Community Partners

Many of these community partners participated in the HMP update process and collaborate with the County on an ongoing basis.

- **Education**
  - Cape Flattery School District
  - Quillayute Valley School District
  - Crescent School District
  - Port Angeles School District
  - Sequim School District
- **Business and Industry**
  - Local Chambers of Commerce
- **Healthcare**
  - Olympic Medical Center
  - Forks Community Hospital
- **Utilities**
  - Clallam County PUD (Water, Sewer, and Power)
  - Diamond Point Water System
  - Crescent Water Association

5.8 National Flood Insurance Program Participation

FEMA	**C2.** Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(iii))

Clallam County, Forks, Port Angeles, and Sequim maintain active NFIP policies. The Lower Elwha Klallam Tribe also maintains active policies. The Jamestown S'Klallam Tribe is covered under the Clallam County policies.

In addition to the Federally administered NFIP, the County's flood hazard management program is composed of the Clallam County floodplain elevation determination, Critical Areas Ordinance, the Shoreline Master Program, and Building Codes.

Frequently flooded areas in unincorporated Clallam County are regulated through County Code, Chapter 27 (Environment) and Chapter 21 (Building and Construction). In Chapter 21, the ordinance states that the County has adopted the 2015 International Building Code, International Residential Construction Code, and the International Existing Building Code. Each of these codes contain provisions for

construction in flood-prone areas. FEMA states that the "floodplain provisions of the I-Codes (2009 edition and later) are consistent with the NFIP minimum requirements for buildings and structures in flood hazard areas."

These County statutes/regulations establish policies, standards, and permitting requirements to guide, limit, and regulate new development within floodplains and floodways as required by the State Growth Management Act, State Shoreline Management Act, and NFIP.

More specifically, the Clallam County Critical Areas Code (Chapter 27.12) identifies and protects critical areas, including floodplains, and regulates their use. Table 5-6 contains a summary of Clallam County's regulation of flood hazard areas in the Clallam County Critical Areas Ordinance (as of January 2009).

Table 5-6 Clallam County Critical Areas Ordinance and Flood Hazard Management

Critical Areas Category:	Definition and applicability to Dungeness	CAO jurisdiction	What are some of the protection standards for development?
Frequently flooded areas	Includes the floodway, floodplain, and special flood hazard areas (any area with > 1% chance of flooding in any given year.)	Floodway and 100-Year Floodplain mapped by FEMA	• Structures are subject to special construction codes and elevation requirements. • Land disturbing activities require engineering certification to ensure they do not increase flood levels. • Repairs and improvements to existing structures are limited in size and value. • Recreational vehicle sites are allowed subject to some conditions but are prohibited in critical area buffers. • Land divisions require a minimum of 1-acre buildable area outside of the flood plain.
Geologically Hazardous Areas	Includes the Channel Meander Hazard Area.	200 feet from edge of landslide hazard areas, included channel meander hazard areas.	• Requires a buffer of 50 feet from the Channel Meander Hazard Area. • Creation of new lots must show at least one building site outside of buffers, and that such sites will be stable under normal geologic or hydrologic conditions.

Table 5-6 Clallam County Critical Areas Ordinance and Flood Hazard Management

Critical Areas Category:	Definition and applicability to Dungeness	CAO jurisdiction	What are some of the protection standards for development?
Aquatic and Wildlife Habitat Conservation Areas	Aquatic and Wildlife Habitat Conservation Areas include streams and designated critical habitat for threatened and endangered species. All of the lower 11 miles of the Dungeness River are designated critical habitat and are regulated as Class I wildlife habitat conservation areas.	200 feet from the Ordinary High-Water Mark (OHWM) or Known Locations of Class I Wildlife Habitat of endangered, threatened and sensitive species.	• Aquatic Habitat Buffers measured from OHWM: -150 ft (new land divisions & major development) -75 ft (minor development, includes most single-family development) -May increase to 300 feet to protect endangered and threatened species where a habitat management plan (HMP) indicates a larger buffer is necessary to protect habitat values, or where development is located within landslide and erosion hazard areas. -Buffer averaging may be permitted where protection criteria met. • Creation of new lots must show at least one building site outside of buffers. • Clallam County requires new development within 200 feet of all Class I Wildlife Habitat Areas to have prepared a habitat management plan by a qualified professional. Applicants can use County's pre-approved, HMP guidelines for threatened species of salmonids.
Wetlands	See CCC 27.12 Part 2	200 feet of regulated wetlands	• Varies by type of development and wetland classification. See CCC 27.12 Part 2
Crit. Aquifer Recharge Areas	See CCC 27.12 Part 6	Delineated on maps at Clallam County DCD	• See CCC27.12.615 for performance standards for certain development activities.

Table 5-7 contains a summary of participating jurisdiction's total coverage and losses under the NFIP.

Table 5-7 National Flood Insurance Program Coverage and Losses

Community Name (Number)	Total Coverage (in Thousands)	Total Dollars Paid
CLALLAM COUNTY * (530021)	$97,187	$903,327
FORKS, CITY OF (530022)	$400	$--
LOWER ELWHA KLALLAM TRIBE (530316)	$1,715	$--
PORT ANGELES, CITY OF (530023)	$6,001	$75,632
SEQUIM, CITY OF (530301)	$2,148	$55,798

Source: FEMA NFIP Policy and Loss Data by Geography (2019c) https://www.fema.gov/policy-claim-statistics-flood-insurance

5.9 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into the County's daily operations and ongoing planning activities is a priority of the County's mitigation program. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization;
- Reduction in duplication or contradiction between County and jurisdictional plans; and
- Maximization of planning resources through linked or integrated planning efforts.

The County is encouraged to consider integration actions into planning mechanisms including:

- Budget decision-making;
- Building and zoning ordinances and decision-making;
- Emergency planning mechanisms; and
- Economic developing planning and decision-making.

5.9.1 Existing Plans

FEMA	**C6.** Does the Plan describe a process by which the local government will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(iii))

The following existing plans provide ongoing opportunity for integration of hazard mitigation and the County will work with plan owners and stakeholders to consider hazard mitigation data and principles when these plans are updated. Table 5-7 contains a summary of the County's existing plans and how each incorporates the hazard mitigation planning.

Table 5-8 Summary of Clallam County Plans

County Plan	Hazard Mitigation Components
Comprehensive Emergency Management Plan (2016)	Outlines hazard mitigation roles and responsibilities.
Disaster Airlift Response Plan (2017)	Response and preparedness associated with hazard mitigation efforts.

Continuity of Operations Plan (Update in Progress)	Prioritizes county duties and responsibilities and establishes procedures for county departments to set up and operate in remote locations in times of emergency.
Comprehensive Plan (2019)	Identifies designated land uses and areas of economic and environmental value.
Floodplain Management Plan (2009)	Outlines strategies that directly or indirectly mitigate the risks posed by flood hazards.
Capital Improvements Program	Identifies large capital projects to reduce risks to key County infrastructure.
Historic Preservation Plan (a component of Critical Areas)	Identifies areas of cultural value that may be vulnerable to hazards.

5.9.2 Future Planning

The County is also determined to integrate mitigation planning into future efforts. One of the County's major endeavors is to continue implementing consistent land use policies for future development. Additional integration of mitigation strategies will vary from project to project, but all future planning will consider the following:

- Develop County-wide COOP Plan with an emphasis on risks and human capabilities to minimize their impacts;
- Consider the implications of future development on hazard risks and risk reduction requirements;
- Integrate risk assessments into tribal decision-making processes;
- Continued community-member input into the decision-making process;
- Incorporate the mitigation actions outlined in the HMP into future planning; and
- Integrate climate action and adaptation plans into future planning.

6 MITIGATION STRATEGY

6.1 General

Chapter 6 describes the County's mitigation strategy which is the primary focus of the County's mitigation planning efforts. This strategy represents the blueprint for the approach chosen by the County to reduce or prevent losses flowing from hazards identified in the Section 4.

The strategy is made up of three main required components: mitigation goals and objectives, mitigation actions, and a mitigation action plan for implementation (see Figure 6-1). These components provide the framework to identify, prioritize, and implement actions to reduce risk from hazards.

Figure 6-1 Mitigation Strategy Process



6.2 Mitigation Goals

FEMA	**C3.** Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))

Mitigation goals are intended to represent what the County seeks to achieve through mitigation plan implementation. The goals are general guidelines and provide a framework for identifying more detailed objectives and actions. The MPT reviewed the goals and objectives from the 2010 plan update and refined determined the need to significantly reframe them for the 2019 update to improve their ability to implement the mitigation strategy.

MPT Meeting Deliverable

The County has identified the following goals for the 2019 update of the HMP:

- **Goal 1:** Maintain and expand transportation routes across the County, during and after key hazards events.
- **Goal 2:** Maintain emergency services capabilities by providing redundancy.
- **Goal 3:** Maintain key communications to ensure connectivity during and after key hazard events.

- **Goal 4:** Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events.
- **Goal 5:** Minimize property damage and reduce repetitive losses to property from key hazards.
- **Goal 6:** Increase public participation and responsibility in reducing their risks.

6.3 Mitigation Actions

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [Clallam County] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementation of mitigation actions helps achieve the County's mitigation goals and reduce vulnerability to threats and hazards identified in the plan. Mitigation plan regulations require the County to identify and analyze a comprehensive range of specific mitigation actions and projects to reduce the impacts identified in the County's risk assessment.

6.3.1 Review of 2010 Hazard Mitigation Actions



As part of the mitigation strategy update, all mitigation actions identified in the 2010 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2019 plan update. The MPT worked through each previous action in advance of and during MPT Meeting #3 to document steps taken to fulfill the action. The status of the 2010 Mitigation Actions is outlined in Table 6-5.

See Table 6-5 for an overview of the status of all actions from the 2010 plan update.

6.3.2 Identification and Analysis of Mitigation Actions



In order to achieve the mitigation goals identified above, the County has identified a comprehensive series of mitigation objectives and supporting actions that are focused on reducing vulnerability and maximizing loss reduction. The actions can typically be broken out into the following types of activities which are indicated in Table 6-1:

- **Plans and Regulations**: Regulatory actions or planning processes that reduce vulnerability to hazards.
- **Infrastructure/Capital Project**: Actions that involve modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area.
- **Natural Systems Protection**: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Education and Awareness**: Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

- Preparedness and Response: Actions that protect people and property during and immediately after a hazard or hazard event.

Table 6-1 2019 Mitigation Actions by Group

Mitigation Group	Related Mitigation Actions
Plans and Regulations	PA05, JSK13, PUD05, LEK06, PC05
Infrastructure/Capital Project	FR02, FR03, PA01, PA02, PA03, PA04, PA06, PA07, PA08, PA09, PA10, SQ01, SQ02, SQ04, SQ05, SQ06, SQ07, SQ09, SQ10, SQ12, SQ13, CC01, CC02, CC05, CC07, CC08, CC13, CC14, CC15, JSK02, JSK04, JSK12, JSK16, JSK17, PUD01, PUD02, PUD03, PUD04, PUD06, LEK01, LEK02, PC01, PC02, PC03, PC04, POPA01, POPA02, POPA03, POPA04, POPA05
Natural System Protection	CC11, CC15, JSK03, JSK06, JSK08, JSK09
Education and Awareness	JSK07, JSK11, JSK14, JSK18, LEK14, SQ14, SQ18
Preparedness and Response	FR01, SQ03, SQ08, SQ11, SQ15, SQ16, SQ17, SQ19, CC03, CC04, CC06, CC09, CC10, CC12, CC16, CC17, JSK01, JSK05, JSK10, JSK15, JSK19, LEK03, LEK04, LEK05, LEK07, LEK08, LEK09, LEK10

All mitigation actions identified in the plan are addressed in the mitigation implementation plan provided in Section 6.5. The actions include both interim- and long-term strategies for reducing vulnerability to hazard and are characterized as such in the 'life of action' column of the implementation plan.

6.3.3 2019 Mitigation Actions by Hazard

All mitigation actions identified in the plan address at least one priority hazard outlined in Chapter 4 of the HMP. Table 6-2 indicates which mitigation actions address which hazards.

Table 6-2 2019 Mitigation Actions by Hazard

Hazard*	Related Mitigation Actions
All Hazards	PA04, PA08, PA09, PA10, SQ09, CC01, CC02, CC03, CC04, CC08, CC10, JSK02, LEK04, LEK07, LEK08, LEK09, LEK10, PC01, PC02, PC03, PC04, PC05, POPA04, SQ11, SQ16, SQ17, SQ18, SQ19
Cascadia Earthquake/Earthquake	PA03, PA07, SQ01, SQ07, SQ12, SQ13, SQ14, CC05, CC07, CC12, JSK01, PUD03, LEK02, LEK03, LEK05, POPA01, POPA02, POPA05, CC13
Disease	
Utility Failure	PA01, PA02, PA04, SQ01, SQ05, SQ06, SQ07, SQ12, POPA03
Wildfire	SQ07, SQ10, SQ15, CC06, JSK18, JSK19, LEK02
Windstorm	FR02, SQ01, JSK11, JSK12, PUD02, PUD06, POPA01, POPA02, POPA05
Winter Storm	FR02, PA06, SQ01, SQ04, SQ08, SQ13, JSK11, JSK12, PUD01, PUD02, PUD06, LEK02, POPA02, POPA03
Active Threat	
Hazardous Materials Incident	
Landslide	FR03, PA01, JSK08, JSK09, PUD04, LEK02, SQ13

Table 6-2 2019 Mitigation Actions by Hazard

Hazard*	Related Mitigation Actions
Flooding	FR01, FR02, FR03, PA01, PA05, PA06, SQ01, SQ04, SQ08, SQ10, SQ13, CC09, CC11. JSK03, JSK04, JSK05, JSK06, JSK07, JSK16, JSK17, PUD01, LEK02, LEK03, LEK06, CC14
Tsunami	SQ01, JSK01, JSK04, JSK14, JSK15, JSK16, JSK17, LEK01, LEK02, LEK03, LEK05, POPA01, POPA02, POPA03, POPA05, CC14
Drought	SQ06, SQ07, SQ10, JSK13, PUD05, POPA01, POPA05, CC15, CC16, C17

6.4 Evaluating and Prioritizing Mitigation Actions

Once mitigation actions were identified, the MPT during MPT Meeting #3, and other key stakeholders went through the exercise of evaluating and prioritizing each action to determine which actions are most suitable for the County to implement. A mitigation action worksheet was developed for each action that included the following information:



Description of the Action	***Specific*** – Target a specific area for improvement. ***Measurable*** – Quantify or at least suggest an indicator of progress. ***Assignable*** – Specify who will do it. ***Realistic*** – State what results can be achieved realistically, given available resources. ***Time-related*** – Specify when the result(s) can be achieved.
Action Status	***New*** – The action is new and will be included for the first time in the 2019 plan update. ***Existing*** – The action was implemented prior to the 2019 plan update but is ongoing and additional or ongoing action is required for completion. ***Complete*** – The action has been completed.
Type of Action	***Plans and Regulations*** ***Infrastructure/Capital Project*** ***Natural Systems Protection*** ***Education and Awareness*** ***Preparedness and Response***
Lead and supporting departments	***County agencies*** ***Local or Tribal agencies*** ***Others***
Timeline for Implementation and Expected Life of the Action	***Less than 1 year*** ***1 to 3 years*** ***3 to 5 years***
Other	Hazards Addressed by the Action Anticipated Cost and Funding Source Mitigation Goals Supported by the Action

A complete mitigation implementation plan is provided in Table 6-5.

See Appendix D-1 for a sample worksheet, Appendix D-2 for worksheet instructions, and Appendix D-3 completed worksheets for all actions identified in the plan.

6.4.1 Maximizing Loss Reduction

The County's mitigation strategy is directed by the mitigation goals identified in Section 6.2. However, equally important, the County seeks to prioritize actions that lead to the greatest return on investment. The ultimate goal of this plan is to maximize loss reduction, and this perspective is baked into the County's mitigation strategy.

6.4.2 STAPLEE Analysis

In addition to the information noted above, each action was self-evaluated using STAPLEE criteria as described in Table 6-3. Evaluators were asked to rate each STAPLEE criteria to come up with a total score that determined the relative suitability of each action.

Table 6-3 STAPLEE Criteria

STAPLEE Criteria	Evaluation Rating
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0
T: Is it Technically feasible and potentially successful?	
A: Does the responsible agency/department have the Administrative capacity to execute this action?	
P: Is it Politically acceptable?	
L: Is there Legal authority to implement?	
E: Is it Economically beneficial?	
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)	
Will historic structures or key cultural resources be saved or protected?	
Could it be implemented quickly?	

6.4.3 Mitigation Effectiveness Analysis

In addition to the STAPLEE analysis, MPT members were asked to rate the effectiveness of each action as described in Table 6-4.

Table 6-4 Mitigation Effectiveness Criteria

Mitigation Effectiveness Criteria	Evaluation Rating
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1

6.5 2019-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [Clallam County]? (Requirement §201.6(c)(3)(iv); Requirement §201.6(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the County. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix D for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for each action listed in Table 6-5.

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
City of Forks													
FR01	City of Forks Culvert Assessment Study/Report	2010 Action - Ongoing	5	Public Works and Planning Departments	2010-2011	$15,000	Yes	Grant funding, Street Department funding	Flooding	20	8	28	1
FR02	Storm-related Roof Damage Mitigation Assessment	2010 Action - Ongoing	5	Planning Department	2010-2011	$15,000	No	FEMA HMA, CDBG, Energy conservation dollars	Flooding, Winter Storms, Wind Storms	18	4	22	2
FR03	Palmer Road Stormwater Detention Pond and Conveyance System	2010 Action – Property has been purchased; preliminary design work was undertaken by the County Road division. Project funding has slowed.	4,5	Utilities Department	1-3 years	UNK	Yes, partial funding.	City of Forks, Clallam County Public Works, FCAAP (DOE)	Flooding, landslides	16	4	20	3
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	N/A	All hazards				
City of Port Angeles													
PA01	Protect/Reinforce Sole Source Water Main from Elwha River against slide failure	2010 Action - Ongoing	4	Public Works	1-3 years	$250,000	Yes	FEMA, CFP	Flooding, Utility Failure, Landslide	18	6	24	4
PA02	Protect/Reinforce Sole Source Water Main from City to Eastern Customers and to PUD's Roundtree Reservoir	2010 Action - Ongoing	4	Public Works	1-3 years	$400,000	Yes	FEMA, CFP	Flooding, Utility Failure, Landslide	18	6	24	5
PA03	Peabody Heights Reservoir Earthen Dam Reinforcement	2010 Action - Ongoing	4,5	Public Works	1-3 years	$175,000	Yes	FEMA, CFP	Earthquake	13	10	23	7
PA04	Sewer Pump Station Power Upgrades	2010 Action - Ongoing	4	Public Works Wastewater	1-3 years	$165,000	Yes	FEMA, CFP	All hazards/Utility Failure	18	6	24	6

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
PA05	Update Flood Assessment	2010 Action - Ongoing	5	Community & Economic Development Department	1-5 years	UNK	Yes	FEMA/DOE	Flooding	17	6	23	8
PA06	Upgrade to Shorelines	2010 Action - Ongoing	5	Community & Economic Development Department/Public Works and Utilities	1-5 years	$150,000	Yes	FEMA/Department of Natural Resources/Grants/ Private funding	Flooding, winter storms	15	6	21	10
PA07	Tumwater Street Bridge Approach Improvement	2010 Action - Ongoing	1,5	Public Works	1-5 years	$223,000	Yes	FEMA/DOT	Earthquake	20	10	30	1
PA08	Install Backup Power for City Corp Yard	2010 Action - Ongoing	3,4	Public Works Utilities	1-5 years	$150,000	Yes	FEMA, CFP	All hazards, utility failure	19	6	25	2
PA09	Install Backup Power for Light Operations Facility	2010 Action - Ongoing	3,4	Public Works Electric Utility	1-3 years	$150,000	Yes	FEMA, CFP	All hazards, utility failure	19	6	25	3
PA10	Fiber Optic Network Upgrade	2010 Action - Ongoing	3	Public Works Utilities	1-5 years	$315,000	Yes	FEMA, NTIA Grant	All hazards, utility failure	19	4	23	9
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed – Re-adopting updated 2019 HMP		Department of Community Development, City Council	1 year	N/A	Yes	N/A	All hazards				
City of Sequim													
SQ01	Build fuel station at City Public Works Yard to supply fuel to City departments and all emergency responders.	New	2,4	City Public Works, Police Department	1-3 years	$850,000	Yes	FEMA	Earthquake, Flood, Utility Failure, Winter Storm, Tsunami, Windstorm	19	6	25	10
SQ02	Replace 3-mile 12" water main from Ranney Will (infiltration gallery) beginning near the Dungeness River and ending at the Reservoir Road Reservoirs.	New	4,5	Public Works Department	1 – 3 years	Unknown	Yes	FEMA	Floods, Utility Failure, Winter Storm,	12	6	18	1
SQ03	Purchase a portable water purification system and small tanks. Prepare multiple sites and equipment to operate water purification	New	4,5	Public Works Department	2 years	Unknown	Yes	Drinking Water State Revolving Fund (DWSRF), FEMA	Earthquake, flooding, tsunami	18	6	24	8
SQ04	Locate location for new water reservoir, purchase property, design and construct.	New	4,5	Public Works Department	3-5 years	Unknown	No	City of Sequim general fund, property owners, developers, PUD	Winter storms, flooding	15	8	23	4
SQ05	Reroute/reconfigure electrical supply to the City of Sequim Water Reclamation Facility at	2010 Action - Ongoing	4,5	Public Works Department, PUD	3-5 years	Unknown	No	Drinking Water State Revolving	Utility Failure	19	4	23	5

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
	247 Schmuck Road by bringing new power source into the facility and using existing supply as backup.							Fund (DWSRF), FEMA					
SQ06	Construct deep water well (>600 feet) to increase resiliency and reliability within water system.	New	4,5	Public Works Department	1-3 years	Unknown	Anticipated	Drinking Water State Revolving Fund (DWSRF), FEMA	Utility Failure, Drought, Water Shortage	17	4	21	2
SQ07	Connect and extend City water mains to improve looping, during water main replacements and developer projects.	New	4,5	Public Works Department	3-5 years	Unknown	Anticipated	Drinking Water State Revolving Fund (DWSRF), Developers	Earthquakes, Excessive Heat, Utility Failure, Water Shortages, Wildfires	17	4	21	3
SQ08	Purchase Additional Heavy Equipment for Use during Severe Storms	2010 Action - Ongoing	2,4	Public Works Department	0-5 years	UNK	Yes	City of Sequim general fund	Winter storms, flooding	19	8	27	15
SQ09	Develop Reliable Backup Program for Critical City Data Entry Post-Disaster	2010 Action - Ongoing	2,3	Finance Department (Information Technology)	2 years	UNK	Yes	City of Sequim general fund	All hazards	19	6	25	11
SQ10	Capture stormwater in the County southwest of Sequim city limits and re-infiltrate using green stormwater infrastructure to benefit the watershed.	New	4,5	City of Sequim Public Works, Clallam County Public Works	<1 year	Capture & Infiltration project ~ $1.23M total. Match of $154k will be 97% met by land acquisition, the rest by staff time.	Anticipated	Application submitted to FEMA Hazard Mitigation Program	Flooding, Drought, Wildfire	18	6	24	9
SQ11	Install an energy storage microgrid for storing solar energy for use in the EOC and Civic Center during power outage emergencies.	New	4.5	Public Works Department	1-3 years	Unknown	No	Washington State Department of Commerce	All hazards	19	4	23	6
SQ12	Replace mid-1900s AC pipe running through the City with earthquake-resistant pipe.	New	4	Public Works Department	3-5 years	$6-8 million	No	City Budget, Grant	Earthquake, Utility Failure	18	8	26	14
SQ13	Protect/reinforce Johnson Creek Trestle for the Olympic Discovery Trail west of Whitefeather Way	New	1,4	Public Works Department	3-5 years	$100,000	No	City Budget, Grant	Earthquake, Flooding, Landslide, Winter Storm	19	4	23	7
SQ14	Train City staff to perform seismic assessments of City properties	New	2,6	Public Works Department	1-3 years	Minimal	Yes	Staff time	Earthquakes	19	8	27	16

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
SQ15	Conduct wildfire risk assessment for City of Sequim and Fire District 3	New	4,5	Public Works Department and Clallam Co. Fire District 3	1-3 years	$20,000-$40,000	No	Grant	Wildfire	19	6	25	12
SQ16	Implement asset management using GIS for all capital facilities	New	4	Public Works Department	1-3 years	$20,000 per year plus staff time	No	Existing Budget	All Hazards	19	8	27	17
SQ17	Coordinate Emergency Management/Incident Response trainings for North Olympic Peninsula jurisdictions	New	2	Sequim Police Department	<1 year	Negligible	Yes	Existing Budget	All Hazards	19	8	27	18
SQ18	Public education of potential hazards, local agency response, and preparedness	New	6	Sequim Police Department	<1 year	Negligible	Yes	Existing Budget	All Hazards	17	8	25	13
SQ19	Develop risk assessment and response plan for vulnerable populations regarding excessive heat, cold, smoke inhalation – including loss of power and/or ability to transport	New	6	Sequim Police Department	<1 year	$20,000	No	Existing Budget, Grant	All Hazards	19	8	27	19
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	N/A	All hazards				
Clallam County													
CC01	Relocate Public Works/Roads from tsunami zone	New	4,5	EMD, Public Works/Roads	3-5 years	$2,000,000	No	FEMA, Capital Funds	All hazards	17	6	23	15
CC02	Move EOC from seismically unstable area to new location	Ongoing	2,3,6	EMD, PA Fire Department, City Parks, Port of PA	1-3 years	$6 to 8 million approximately	In development	FEMA, Community Fund-matching	All hazards	20	10	30	1
CC03	Identify and organize County hazard GIS data so that it is readily available in the event of a hazard.	New	3	County Information Technology, EMD	<1 year	Minimal	Yes	Existing budget	All hazards	18	4	22	17
CC04	Establish a system of real-time hazard mapping to communicate conditions on the ground to staff and public.	New	3,6	County Information Technology, EMD	Immediate	Minimal	Yes	Existing budget	All hazards	17	6	23	16
CC05	Reinforce/retrofit Fire District 2 facilities for seismic stability.	New	2,5	Clallam Fire District 2, Rescue	3-5 years	$1,000,000	No	FEMA	Earthquake	18	10	28	5
CC06	Hire a consultant to conduct a wildfire risk assessment profile of Fire District 2 facilities.	New	2	Clallam Fire District 2 Rescue	1-3 years	$20,000 - $40,000	No	FEMA, Bond/Levy	Wildfire	19	6	25	7
CC07	Build new Fire District 4 station that is seismically sound.	New	2	Clallam Fire District 4	1-3 years	Approx. $1.6 – $2 million	In development	FEMA, 25% match from FD	Earthquake	18	10	28	6

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
CC08	Establish back-up link for OPSCAN in Forks.	2010 Action – Ongoing	3	County Sheriff's Office	1-3 years	Minimal	Yes	OPSCAN Operations	All hazards	17	8	25	8
CC09	Inventory dikes, levees, and flood protection structures on Clallam County Rivers	2010 Action – Ongoing. Completed for Lower Dungeness River.	4,5	DCD, Public Works, USACE, WDFW, WSDOT	2-4 years	Unknown	Partial	FEMA	Flooding	21	8	29	2
CC10	Inventory public utilities including water supplies, sewer systems, and solid-waste handling facilities.	2010 Action – Ongoing	4	Sequim, Forks, Port Angeles, and Clallam County Public Works Departments, Environmental Health Division, WSDOH, WDOE.	1-3 years	Unknown	Partial	Grants, Operating budgets	All hazards	21	8	29	3
CC11	Setback of USACE dike located in lower reach of Dungeness River.	2010 Action – Ongoing, funds procured	5	DCD, USACE, Clallam County Public Works	Ongoing over 5 years+	$1.2 million	Yes	Puget Sound Acquisition and Restoration Fund	Flooding	21	8	29	4
CC12	Seismic study of newer portion of Clallam County Courthouse	2010 Action - Ongoing	2,5	Clallam County Public Works Maintenance and Facilities	1-3 years	$20,000 - $40,000	Yes	County capital project funds, FEMA	Earthquakes	19	6	25	9
CC13	Re-locate Fire Station 33, which is currently located in a liquefaction zone.	New	2,5	Clallam County Fire District 3	1-3 years	$3,150,000 or $400 per square foot	No	Grant, Bond/Levy	Earthquakes	16	8	24	10
CC14	Re-locate Fire Station 31, which is currently located in a tsunami hazard zone.	New	2,5	Clallam County Fire District 3	1-3 years	$3,150,000 or $400 per square foot	No	Grant, Bond/Levy	Earthquakes, Flooding, Tsunami	16	8	24	11
CC15	Install off-channel reservoir adjacent to Dungeness River, to store high Dungeness River flows and storm flows for release later for aquifer recharge and irrigation purposes.	New	4,5	Clallam County Department of Community Development	3-5 years	$25-35 million for construction	Partial funding available ($4.1 million of total construction cost)	County funds, FEMA	Drought, Water Shortages	17	8	24	12
CC16	Hire contractor to conduct assessment to identify coastal areas vulnerable to sea level rise. Conduct water quality assessment of wells throughout the County to evaluate saltwater intrusion.	New	4,5	Clallam County Department of Community Development	3-5 years	Phase I of II - $170,000 (Paying for well water analytical samples, sea water intrusion susceptibility maps, and conducting education and	No	County has proposed a Near Term Action to obtain funding to assess sea level rise and storm surge susceptibility along the coast and to monitor groundwater along	Drought, Water Shortages	17	8	24	13

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
						outreach for landowners).		the coast to assess saltwater intrusion.					
CC17	Investigate alternative water sources in areas where water quantity and quality have declined due to climate change.	New	4,5	Clallam County Department of Community Development	3-5 years	Unknown	TBD	County, FEMA	Drought, Water Shortages	17	8	24	14
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	Loan, private or public fee increases	All hazards				
Jamestown S'Klallam Tribe													
JSK01	Seismic assessment of Tribal facilities	New	3,4,5	Tribe	1-3 years	$10,000 - $20,000	No	FEMA	Tsunami, Earthquakes	19	6	25	11
JSK02	Improve communications in Blyn Basin, including building cellular tower and installing fiber internet.	New	1	Tribe	1 year	$400,000 for cellular tower	Yes	Tribe	All hazards	20	6	26	5
JKS03	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	2015 Action – Ongoing, funding secured, and removal of dikes and levees continues.	5	Tribe, Clallam County, WDFW	5 years	$10 million	Yes	WA Floodplains by Design, Construction funding from ACOE	Flooding	20	8	28	3
JSK04	Structure elevation and/or relocation of Tribal facilities and infrastructure	2015 Action – Ongoing, Tribe is reducing investment in nearshore properties and moving sewers upgradient of flood-prone areas.	5	Tribe	Variable	TBD	Yes	HMGP	Flooding, Tsunami	19	8	27	4
JSK05	Coordinate with County on the implementation of the NFIP Program	2015 Action – Ongoing, Jimmycomelately Creek is still not mapped correctly by FEMA after reconstruction. Buildings are mapped in former floodplain. New Casino expansion may be in new floodplain.	5	FEMA, Tribe, County	Ongoing	Operations costs	Yes	FEMA, Tribe	Flooding	12	8	20	19

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
JSK06	Encourage native vegetation on shorelines and formation of dunes	2015 Action – Ongoing, Three Crabs area has been revegetated (2018). This is an ongoing focus for future flood plain restoration projects.	5	Tribe	Ongoing	Minimal	Yes	PDM, USDA	Flooding	21	4	25	12
JSK07	Public education around flood mitigation, floodplain functions, emergency service procedures, and potential hazards.	2015 Action – Ongoing. The Tribe is building an educational center, tsunami signage is complete in Blyn. The evacuation plan is unchanged, but some elements will change with the addition of overnight guest facilities at Casino.	6	Tribe	Ongoing	Staff time	Yes	PDM	Flooding	18	6	24	13
JSK08	Limit removal of vegetation in areas prone to ground failure. Plan ground cover where appropriate.	2015 Action – Ongoing.	5	Tribe, County	Variable	Minimal	Yes	Tribe	Landslide	18	4	22	15
JSK09	Encourage residents and landowners to leave natural erosion barriers, such as driftwood logs on the shore, in place to reduce shoreline erosion.	2015 Action – Ongoing.	5,6	Tribe	Variable	Minimal, staff time.	Yes	Tribe	Landslide	18	4	22	16
	StormReady	2015 Action – Complete	5,6	Clallam County, State, Tribe	Ongoing	Staff time, in-kind services	Yes	Tribe	Winter storm, windstorm	20	6	26	6
JSK11	Conduct severe weather awareness activities.	2015 Action – Ongoing. Main objective of creating home emergency kit was completed. Public communication is ongoing.	5,6	Clallam County, Tribe	Ongoing	Staff time, in-kind services	Yes	Tribe	Winter storm, windstorm	20	6	26	7
JSK12	Develop alternate water supplies to provide reserve water sources to be used in	2010/2015 Action – New for this 2019 Plan because of recent rapid	4	Tribe	1-3 years	$1,000,000	Yes	HUD Indian Community Development Grand Program	Winter storm, windstorm, drought	18	4	22	17

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
	event of drought or water shortage.	population growth in Blyn.											
JSK13	Create and expand water efficiency/conservation programs.	2015 Action – Ongoing and Active.	5,6	Tribe	5 years	Up to $25,000	Yes	Tribe, Grants	Drought	18	4	22	18
JSK14	Continue to participate in TsunamiReady with Clallam County	2015 Action – Ongoing	6	Clallam County, Tribe	Ongoing	Staff or volunteer time, in-kind services	Yes	Minimal	Tsunami	20	6	26	8
JSK15	Develop advanced warning systems	2015 Action – Ongoing, continue to communicate with WEMD, Great Shakeout Official Partners, locations of AHAB have been determined.	3	Clallam County, Tribe	Ongoing	Staff or volunteer time, in-kind services	Yes	Minimal	Tsunami	20	6	26	9
JSK16	Study and implement wellhead protection measures to ensure continued water supply for the Jamestown Beach community in the event of tsunami or extreme flooding.	2015 Action – Ongoing. Accessed funds, hired consultant, and study will be complete in 2019.	4	Tribe	1 year	<$5,000	Partial	CDBG-GP Grand, EPA Grants, USDA Rural Development Loans or Grants	Flooding, Tsunami	20	6	26	10
JSK17	Explore feasibility of incorporating elevated tsunami shelters or vertical evacuation structures in future construction plans in vulnerable zones in Blyn (7 Cedars Resort Casino & Tribal Government).	2015 Action – Not complete, especially with continued development in Blyn and expansion of Casino.	4	Tribe	1-3 years	Unknown	Yes	FEMA	Flooding, Tsunami	20	10	30	1
JSK18	Fuel reduction projects and defensible space around structures	2015 Action – Ongoing	5	Tribe and County	1-5 years	Unknown	Yes	US Forest Service Grants	Wildfire	19	10	29	2
JSK19	Promote FireWise building design for construction in the Vision Master Plan and Housing Programs	2015 Action – Ongoing	5,6	Tribe and County	Ongoing	Staff Time	Yes	ICDBG, US Forest Service, BLM	Wildfire	17	6	23	14
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	N/A	All hazards				
Clallam County Public Utilities District No. 1 (PUD)													
PUD01	Establish Reliable Power Source for Battelle Industries	2010 Action - Ongoing	High	PUD, Battelle	3-5 years	TBD	No	City of Sequim general fund, property owners, developers, PUD	Winter Storms, Flooding	13	6	19	6

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
PUD02	Move overhead powerlines underground in select areas.	2010 Action – Ongoing. Areas of continued focus are the North Shore of Lake Crescent, South Shore Lake Sutherland, Diamond Point Road, Deer Park Road, and Hoko Ozette Road	4	PUD	1-5 years	TBD	Yes	PUD operating budget	Windstorm, Winter Storms	15	10	25	3
PUD03	Replace Asbestos-Cement Pipe throughout County	2010 Action – Ongoing	4,5	PUD	1-5 years	TBD	Yes	PUD operating budget	Earthquake	18	10	28	1
PUD04	Replace ultra-high-risk water mains in the event of erosion or landslide.	2010 Action – Ongoing. Areas that have been reviewed are: water main from Morse Creek to Treatment Plant to Deer Park; water main from Hoko-Ozette Road to Eagle Point Road; Water Main to Upper Sekiu Reservoir; Replace Buried Creek crossing with bridge crossing in 4 Seasons Park; Replace buried creek crossing in 4 Seasons Ranch and eliminate White Creek crossing to Lower LUD #3 Pump Station.	4,5	PUD	Ongoing	TBD	Yes	PUD operating budget	Landslide	18	8	26	2
PUD05	Fairview – Morse Creek Drought Plan	2010 Action – Ongoing as conditions worsen at Morse Creek.	5	PUD	Ongoing	TBD	Yes	PUD operating budget	Drought	16	6	22	5
PUD06	Additional tree trimming in high risk wind areas to protect overhead lines.	2010 Action - Ongoing	3,4,5	PUD	Ongoing	TBD	Yes	PUD operating budget	Winter storm, Windstorms	17	8	25	4

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	N/A	All hazards				
Lower Elwha Klallam Tribe													
LEK01	Move the tribal center from the tsunami inundation zone where it is currently located.	New	4,5	Lower Elwha Police Department, Emergency Management Division	3-5 years	Unknown	No	FEMA	Tsunami	14	10	24	6
LEK02	Widen and strengthen Lower Elwha Road from Stratton Road to Kacee Way.	New	1	Lower Elwha Police Department, Emergency Management Division	3-5 years	Unknown	No	FEMA	Earthquake, Flood, Landslide, Winter Storm, Tsunami, Wildfire	17	6	23	10
LEK03	Evaluate options to make new hotel in Port Angeles tsunami resistant.	New	4,5	Lower Elwha Police Department, Emergency Management Division	1-3 years	Unknown	No	FEMA	Earthquake, Flood, Tsunami	20	10	30	1
LEK04	Identify Elders and other vulnerable populations to prioritize for mitigation and disaster assistance	2011 Action – Ongoing. Started in 2018 in collaboration with Tribal Council and Elwha Health Clinic	5,6	Lower Elwha Klallam Emergency Management, Tribal Police, Enrollment, Tribal Clinic	1 year	Staff time	Yes	Operating Budgets	All hazards	20	6	26	4
LEK05	Create new, and expand existing Evacuation Routes, including better signage	2011 Action – Ongoing. Kacee Way has been completed and one new Tsunami Evacuation Route sign was added on Lower Elwha Road.	1,6	Lower Elwha Klallam Emergency Management	1 year	Unknown	Yes	FEMA	Tsunami, Earthquake	20	6	26	5
LEK06	Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	2011 Action – Ongoing. Construction on the new building for the school and Head Start programs began in 2019. The new building is sited on high ground.	5	Lower Elwha Klallam Emergency Management	1 -5 years	Varies depending on property. FEMA Cost Benefit Analysis software will be used to prioritize which structures to relocate.	No	PDM grant, HUD grants, USDA development grants	Flooding	14	10	24	7

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
LEK07	Continue and expand disaster training programs such as Community Emergency Response Team (CERT) to train Tribal members and the local community to respond to an emergency	2011 Action – Ongoing. The new CERT team has been started; training continues.	2,5	Lower Elwha Klallam Emergency Management	Annual	$10,000-20,000 per year	Yes	EMPG grants, regional homeland security grants, Citizens Corps funding and other sources	All hazards	20	8	28	3
LEK08	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	2011 Action – Ongoing. The Evacuation Plan is complete. Tribal Records Protection Plan and COOP will be developed.	2,5,5	Tribal Council, Lower Elwha Klallam Emergency Management	1-5 years	Staff time to prepare plans, $30,000 - $80,000	Yes	Emergency Mgt Performance Grants, Dept of Health Grants, Regional Homeland Security funds and other sources	All hazards	19	10	29	2
LEK09	Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	2011 Action – Ongoing.	5,6	Lower Elwha Klallam Emergency Management	Ongoing	Staff time	Yes	FEMA, Tribal Operating Budget	All hazards	18	6	24	8
LEK10	Develop a system to protect and maintain historical and archival Tribal records	2011 Action – Ongoing. Work on COOP will commence in 2020.	5,6	Tribal Council	1-3 years	Unknown	Yes	Tribal Operating Budget	All hazards	18	6	24	9
LEK11	Implement Vegetation and other natural resource management practices to reduce landslides and coastal erosion	2011 Action – Status unknown.	5										
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP	High	Planning Department	1 year	N/A		N/A	All hazards				
Peninsula College													
PC01	Renovate/Replace N Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	1
PC02	Renovate/Replace J Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	2
PC03	Renovate/Replace Q Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	3-5 years Approx.	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	3
PC04	Renovate/Replace P Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	4
PC05	Incorporate hazard mitigation into Master Plan	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	5

Table 6-5 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP	High	Planning Department	1 year	N/A		N/A	All hazards				
Port of Port Angeles													
POPA01	Strengthen airport runway to facilitate landing of large emergency aircraft.	New	4,5	Port of Port Angeles	1-3 years	$2,000,000	No	FEMA Grant, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	Earthquakes, Tsunami, Water Shortages, Windstorm	20	8	28	1
POPA02	Install protective safety glass in the windows of the airport terminal building complex to hold shattered glass in place in the event of a major windstorm or earthquake.	New	4,5	Facilities Maintenance/Airport - Port of Port Angeles	<1 year	$2,500	No	FEMA Grant, Operating Budget	Earthquakes, Winter Storm, Tsunami, Windstorm	19	6	25	3
POPA03	Purchase fuel tanks and build a fuel transfer station at the Port's newly constructed and located shop outside of the tsunami zone.	New	4,5	Facilities Maintenance - Port of Port Angeles	1-3 years	$10,000 - $20,000	Yes	Operating Budget, Grant	Utility Failure, Winter Storm, Tsunami	18	8	26	2
POPA04	Build a portable emergency water supply.	New	4,5	Facilities Maintenance - Port of Port Angeles	1-3 years	$1,500	No	Operating Budget	All Hazards	18	6	24	4
POPA05	Strengthen airport taxiway to increase weightbearing capacities for emergency aircraft.	New	4,5	Port of Port Angeles	1-3 years	$2,000,000	No	FEMA Grant, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	Earthquakes, Tsunami, Water Shortages, Windstorm	20	8	28	1

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7 PROGRAM IMPLEMENTATION

Chapter 7 provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

The HMP is intended to be a "living" document that will help inform all interested parties about the County's multi-jurisdictional hazard mitigation policies and projects. It will be reviewed and updated on a regular basis. The mitigation strategy identified will act as a guide for tribal departments in determining projects for which to seek FEMA assistance and other mitigation funds from outside sources.

7.1 Plan Adoption

FEMA	**E1.** Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5)) **E2.** For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))

44 CFR §201.6(c)(5) requires that the HMP be formally adopted by the Board of Commissioners and elected officials from each participating jurisdiction, which formally adopted the 2019 update of the Clallam County Multi-Jurisdictional HMP on January 13, 2020.

This HMP was approved by FEMA on January 28,2020.

See the front matter of this plan for adoption and approval materials. Appendix F contains the Adoption Resolutions for each participating jurisdiction.

7.2 Plan Update and Review

FEMA	**A6.** Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

7.2.1 Annual Review

The County Emergency Manager is responsible for coordinating annual review of the HMP and making appropriate revisions. On an annual basis, the County Emergency Manager will convene the MPT to conduct a comprehensive review of the plan to ensure that all information is current. The review and update processes are below.

The MPT will meet to consider:

- Progress made on plan recommendations during the previous 12 months;
- Mitigation accomplishments in projects, programs, and policies;

- Actual losses avoided by implementation of mitigation actions;
- Emerging disaster damage trends and repetitive losses;
- Identification of new mitigation needs;
- Cancellation of planned initiatives, and the justification for doing so; and,
- Changes in membership to the MPT.

The County Emergency Manager will request input from other departments and outside entities not represented on the MPT on issues listed above. A special effort will be made to gather information on non-capital projects and programs important to mitigation.

7.2.2 Following a Major Disaster

Within a reasonable period after a major disaster warranting a Presidential Disaster Declaration, and as determined necessary for a smaller event, the County Emergency Manager will convene the MPT. Because recovery is a long process and the full impact of a disaster may not be known for many months, this initial meeting may be followed by additional meetings over time.

The annual update process described above will also be used following a major disaster. However, post-disaster deliberations will also consider the following:

- "Lessons Learned" from the disaster and what new initiatives should be added to the plan to help reduce the likelihood of similar damage in the future;
- Follow-up needed on items relevant to mitigation from any after-action reports produced by the County; and
- Integration of mitigation into the recovery process and coordination with County recovery planning efforts.

7.2.3 Formal Plan Update

Every five years, the plan will be re-submitted for adoption to the Board of County Commissioners and elected officials for each participating jurisdiction. Prior to this, the County Emergency Manager will use the following process to make sure that all relevant parties are involved:

- Conduct regular reviews of the plan as described above and incorporate feedback from those reviews into the planning document;
- Conduct public engagement activities and initiate meetings with identified groups of interested parties and outside organizations to gain input and feedback;
- Integrate relevant feedback and circulate revised plan to MPT for approval;
- Submit plan to the Board of County Commissioners for adoption by resolution;
- Submit the revised plan to FEMA.

It is anticipated that the next full update of this plan will take place in 2024 for the planning period of 2025 through 2029.

7.3 Monitoring Project Implementation

FEMA	**A6.** Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(ii))

Mitigation projects and project closeouts will be monitored and updated through the use of the quarterly reporting forms for FEMA-funded projects, provided by FEMA Region X. The County's EOC Manager will ensure project reporting is completed within specified timeframes. The Mitigation Project Progress Report will be requested annually by the Emergency Management Director to determine progress made to-date and track final closeout tasks. The County will comply with all applicable federal statutes and regulations in effect with respect to the periods which it receives grant funding, in compliance with 44 CFR 13.11(c).

7.3.1 Grant Management Process

The County's protocols for grant management are outlined in the Grant Management Policy and Procedure 562 to "ensure that County departments are accountable for proper grant documentation, administration, and activities."

The grant management process is outlined in the Procedure as follows:

- All grant contracts will be approved in accordance with the County's contracting policy and procedures.
- Grant applications may be completed, signed, and submitted by County Officials after direction from the Board of Commissioners or County Administrator.
- Prior to application for any new grant or renewal of any existing grant, the requesting department will complete the pre-application questionnaire. Signature of County Official is required.
- The pre-application questionnaire will be maintained by the department and attached to the grant contract with the Board considers the contract for approval.
- County Officials are responsible for compliance with all aspects of grant requirements including monitoring to ensure that grant activities are properly accomplished, grant accounting and tracking, and ensuring that requests for reimbursement are accurate and submitted on time.
- The Budget Analyst will establish revenue accounts. The Budget Analyst will create and maintain revenue numbers that ensure identification of grants, separate direct from indirect costs, and provide for tracking of accruals.
- For grant applications that require the completion and submittal of a signature authorization form, the following signature authorities should be included:
    - Applications/revised applications – County Official
    - Contracts/contract modifications – Chair of a Board of Commissioners and the County Administrator
    - Vouchers – The County Official and his/her designee

- Authorizing authority – Chair of Board of Commissioners

7.3.2 Mitigation Action Status and Tracking Loss Reduction

All departments are tasked with tracking the ongoing status of those mitigation actions for which they are the lead. Departments should track the following:

- Project progress including status of project funding and ongoing needs;
- Actual losses mitigated by project implementation; and
- Project needs that may be addressed in the next mitigation planning cycle.

Refer to Appendix G for a sample Mitigation Action Plan Annual Progress Report.

7.4 Incorporation of Existing Planning Mechanisms

As part of the Director of Emergency Management's day-to-day plan monitoring efforts, they will coordinate with departments that have jurisdiction over mitigation action implementation areas to incorporate the plan into standard policies and procedures as well as long-term planning documents and budgets.

Short-term governmental operation changes that address and consider hazard mitigation may include updates to job descriptions, work plans, site reviews, and staff training. Long-term changes may include revisions to existing comprehensive plans, capital improvement plans, zoning and building codes, permitting, and other planning tools.

The Director of Emergency Management will also work with departments to include mitigation projects in annual budgets, rather than relying solely upon grant programs, and integrate hazard mitigation in future land use and strategic planning.

Refer to Section 5.9 for more information on the incorporation of mitigation planning into existing plans.

7.5 Continued Public Involvement

FEMA	**A5.** Is there discussion of how the [County] will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

Public involvement is a key component of the plan implementation and update process. As described above, the County will prepare and make available via the internet a Mitigation Progress Report providing an update on the implementation of the current mitigation plan. This report, along with specific reports for each mitigation measure being implemented and all stakeholder comments received, will be assessed to make improvements in the plan update released every five years.

In addition to the ongoing input collected and compiled throughout implementation of the previous plan, the MPT, as mentioned above, will review aspects of the draft update plan. Comments received from the public will also be considered and incorporated where appropriate into annual updates of the plan.

Community members will also be engaged on an ongoing basis through outreach at public events and activities to ensure participation is incorporated outside of the five-year plan update process.

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JURISDICTIONAL ANNEXES

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APPENDIX B RISK ASSESSMENT

APPENDIX C GIS MAPPING

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APPENDIX E FEMA REGION 10 LOCAL MITIGATION PLAN REVIEW TOOL

APPENDIX F PLAN ADOPTION RESOLUTION

APPENDIX G MITIGATION ACTION PROGRESS REPORT

1

1

City of Forks Jurisdiction-Specific Annex – Clallam County Hazard Mitigation Plan



2019 Plan Update

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1 INTRODUCTION

1.1 City of Forks Hazard Mitigation Program

Throughout the hazard mitigation planning process, City Attorney and Planner Rod Fleck was the point of contact for the City of Forks (referred to herein as 'City' or 'Forks'). Bill Henderson, the Quileute School District Maintenance & Facilities Manager also attended one or more MPT meetings. A public meeting was held in Forks on March 27, 2019.

The City of Forks participated in the 2010 Clallam County Multi-Jurisdictional Hazard Mitigation Plan (HMP).

See Appendix E for the completed Federal Emergency Management Agency (FEMA) Local Plan Mitigation Review Tool for the City of Forks.

2 COMMUNITY PROFILE

2.1 Governance

The City of Forks was incorporated in 1945. The City Council is comprised of elected officials who serve as the governing body alongside an elected mayor. The following is excerpted from the City of Forks 2019 – 2039 Comprehensive Plan:

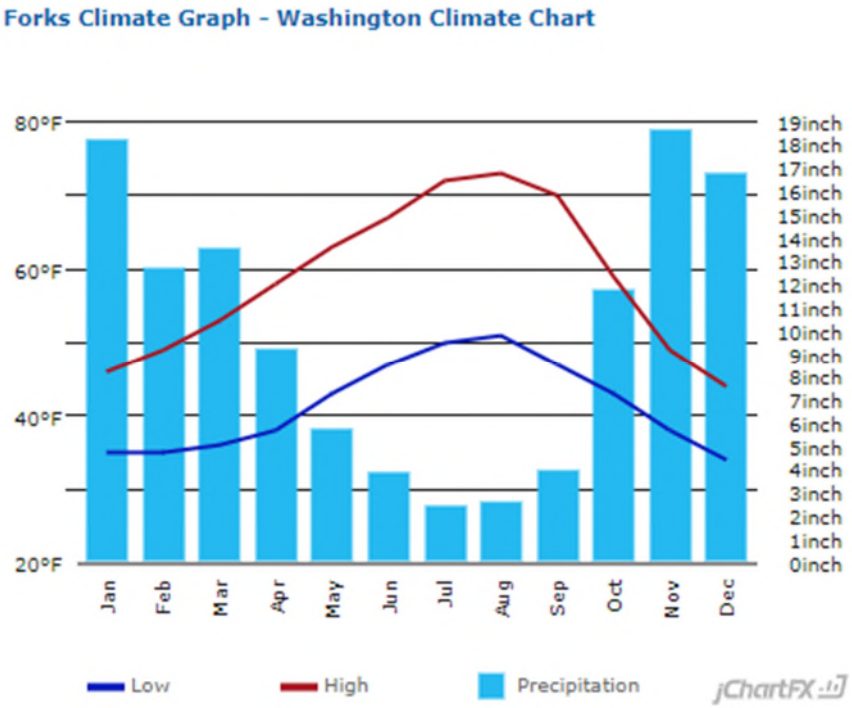
> "Forks utilizes the 'strong mayor' form of government with the Mayor having the supervision of all executive and administrative aspects of the City. Day to day operations are undertaken by the City's department managers in consultation with the Mayor. The elected City Council positions are unpaid and consist of 4-year terms. All council positions are at-large and, along with the major position, require residency within city limits." (City of Forks 2019)

The City departments are as follows:

- City Clerk/Treasurer
- Legal & Planning
- Public Works & Utilities
- Police & Corrections

2.2 Geography and Climate

Forks is located in the western Olympic Peninsula, or "West End," at the base of the flanks of the Olympic Mountains in the relatively flat Forks Prairie (City of Forks 2019). The town lies between the Bogachiel, Sol Duc, and Calawah Rivers before they join to flow west to the Pacific Ocean. The average high annual temperature is 58.6 °F and the average low annual temperature is 41.4°F (U.S. Climate Data 2019). The average annual rainfall is 119.73 inches, with the maximum rainfall occurring in the months of November, December, and January (U.S. Climate Data 2019).



Climate Data for Forks (1981 - 2010 normalized).
Source: www.usclimatedata.com/climate/forks/washington/united-states/uswa0149

2.3 Population and Demographics

As of 2017, the U.S. Census estimated population for Forks was 3,748 individuals, which is a 6% increase from 2010.

As of 2018, the U.S. Census estimated population for Forks was 3,832 individuals, which is an 8.5% increase from 2010 (U.S. Census Bureau 2017). Approximately 7.1% of the City population is younger than 5 years of age. Approximately 20% of the City population is 60 years of age and older (U.S. Census Bureau 2017).

According to Census data, 86.3% of the City's population is white alone, 4.6% of the City is Black or African American, and 4.1% of the City's population is American Indian or Alaska Native. Also, 4% of the City's population is two or more races and 18.2% of the population is Hispanic or Latinx.

2.4 Economy

The following is excerpted from the City of Forks 2019 – 2039 Comprehensive Plan:

> "Forks' traditional economic base of timber harvesting was seriously undermined in the late 1980s as a result of judicial and executive actions concerning the Endangered Species Act (ESA). The Forks Economic Development Steering Committee (FEDSC) proposed creation of industrial park centered around timber products and actively marketing the industrial park to other manufacturers.

> The U.S. Forest Service, Washington State Department of Natural Resources (DNR), Quillayute School District, and the Clallam Bay Correctional Facilities are major employers, employing hundreds of people from the Forks [Urban Growth Area]. The Forest Service, Quillayute School District, and the DNR saw a reduction in staff during the 1990s and 2000s, as a result of declining state and federal budgets. In addition, the continued pressure on state budgets continues to require the community to spend significant political efforts to maintain both services and jobs associated with those state-funded agencies. The Clallam Bay Correctional Facilities, however, has increased staff and believes this trend will continue for the foreseeable future.
>
> Tourism has grown to be a significant, important source of economic growth with numerous small, family-owned businesses being the source of such growth. Concern remains however, about ensuring that the tourism sector is one that does not become entrenched in lower-wage jobs or cyclical employment." (City of Forks 2019)

2.5 Transportation and Commuting

According to the City of Forks Comprehensive Plan, "[the] City of Forks lies on the relatively flat Quillayute Prairie running generally west and east of US-101, which is called South Forks Avenue within Forks city limits. In 1992, the City had 15.3 miles of roadway, with 2.8 miles classified as arterial streets" (City of Forks 2019).

US-101 is the only regional highway with access directly to the City. SR-110/La Push Road runs from US-101 at the northern end of the City to the Quileute Reservation at La Push and the confluence of the Quillayute River (City of Forks 2019).

Figure 2-1 City of Forks

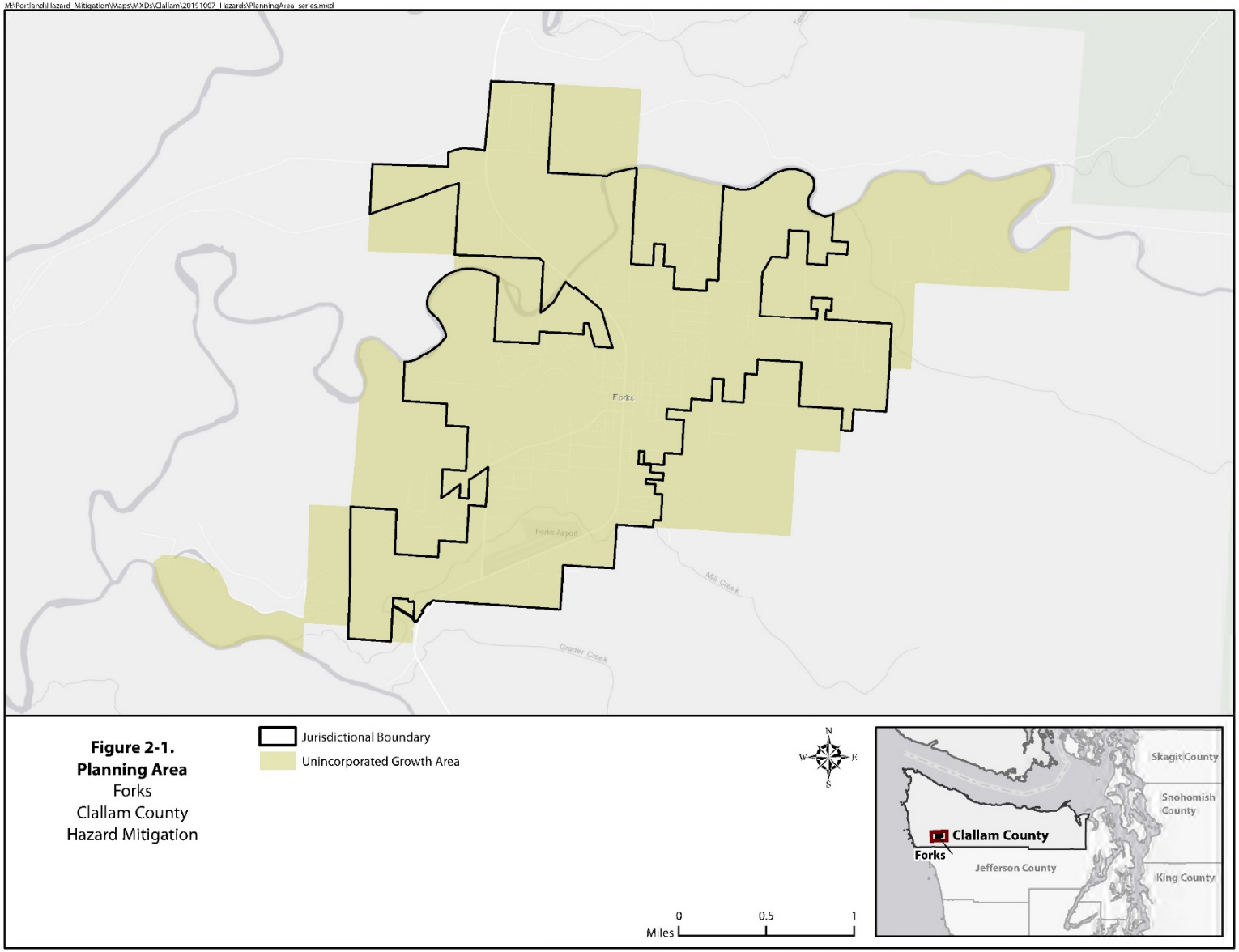


Figure 2-1.
Planning Area
Forks
Clallam County
Hazard Mitigation

3 HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 3 contains hazard profiles and vulnerability assessments to determine the potential impact of hazard to the people, economy, and built and natural environments of the City of Forks. They have been streamlined to increase the effectiveness and usability of the HMP.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Forks]? (Requirement §201.6(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the City of Forks]? (Requirement §201.6(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the planning area? [44 CFR § 201.6(c)(2)(ii)]

3.1 General

The City has been impacted by many of the County-wide disaster declarations, as shown in Table 3-1.

Table 3-1 Past FEMA Disaster Declarations

DR #	HM Program Declared	Title	Incident Begin Date	Incident End Date
4418	Yes	SEVERE WINTER STORMS, STRAIGHT-LINE WINDS, FLOODING, LANDSLIDES, MUDSLIDES, TORNADO	12/10/2018	12/24/2018
4253	Yes	SEVERE WINTER STORM, STRAIGHT-LINE WINDS, FLOODING, LANDSLIDES, MUDSLIDES, AND A T	12/1/2015	12/14/2015
4249	Yes	SEVERE STORMS, STRAIGHT-LINE WINDS, FLOODING, LANDSLIDES, AND MUDSLIDES	11/12/2015	11/21/2015
4242	Yes	SEVERE WINDSTORM	8/29/2015	8/29/2015
4056	Yes	SEVERE WINTER STORM, FLOODING, LANDSLIDES, AND MUDSLIDES	1/14/2012	1/23/2012
1825	Yes	SEVERE WINTER STORM AND RECORD AND NEAR RECORD SNOW	12/12/2008	1/5/2009
1817	Yes	SEVERE WINTER STORM, LANDSLIDES, MUDSLIDES, AND FLOODING	1/6/2009	1/16/2009
1734	Yes	SEVERE STORMS, FLOODING, LANDSLIDES, AND MUDSLIDES	12/1/2007	12/17/2007
1682	Yes	SEVERE WINTER STORM, LANDSLIDES, AND MUDSLIDES	12/14/2006	12/15/2006
1641	Yes	SEVERE STORMS, FLOODING, TIDAL SURGE, LANDSLIDES, AND MUDSLIDES	1/27/2006	2/4/2006
3227	No	HURRICANE KATRINA EVACUATION	8/29/2005	10/1/2005
1499	Yes	SEVERE STORMS AND FLOODING	10/15/2003	10/23/2003
1361	Yes	EARTHQUAKE	2/28/2001	3/16/2001
1172	No	HEAVY RAINS, SNOW MELT, FLOODING, LAND & MUD SLIDES	3/18/1997	3/28/1997
1159	Yes	SEVERE WINTER STORMS, LAND & MUDS SLIDES, FLOODING	12/26/1996	2/10/1997

Table 3-1 Past FEMA Disaster Declarations

DR #	HM Program Declared	Title	Incident Begin Date	Incident End Date
1079	Yes	SEVERE STORMS, HIGH WIND, AND FLOODING	11/7/1995	12/18/1995
1037	No	THE EL NINO (THE SALMON INDUSTRY)	5/1/1994	10/31/1994
883	Yes	SEVERE STORMS & FLOODING	11/9/1990	12/20/1990
757	Yes	SEVERE STORMS & FLOODING	1/16/1986	1/19/1986
623	Yes	VOLCANIC ERUPTION, MT. ST. HELENS	5/21/1980	5/21/1980
612	No	STORMS, HIGH TIDES, MUDSLIDES & FLOODING	12/31/1979	12/31/1979

3.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on Mitigation Planning Team (MPT) feedback during MPT Meeting #1 and #2.

Following the individual hazard ranking activity, the results were added up and aggregated to show an average score for the all City of Forks MPT members and are available in Figure 3-1.

Figure 3-1 City of Forks Hazard Rankings

City of Forks - Local Hazard Rankings

	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Average*	*Rank*
Cascadia Earthquake	5	5	3	1	4	1
Windstorm	1	4	3	4	3	2
Wildfire Smoke	2	3	3	4	3	3
Heat Events	2	3	3	4	3	4
Power Outages	1	1	3	5	3	5
Drought	1	2	3	4	3	6
Storm Surges/Tides	1	1	2	4	2	7
Flooding	2	2	2	1	2	8

3.3 Hazard-Specific Profiles and Risk Assessments

The following section profiles each hazard identified in Section 3.2 and assesses the risk associated with each. Each risk assessment considers the following attributes:

- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Similar to location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends impact on the City's vulnerability to each hazard since the 2010 plan development (Increased, decreased, unchanged).

Note: Hazard Descriptions, Potential Impacts from Future Climate Conditions, and Cascading Impacts can be found in Chapter 4 of the HMP Basic Plan, as these are not jurisdiction specific.

In addition, the hazards have been organized into three sub-sections (high-, medium-, and low-priority) to illustrate the risk-driven nature of the HMP. Each hazard has been given serious consideration of all attributes discussed within. However, low-priority hazards may be shorter in length and with less quantitative analyses, as a lack of usable data is frequently present when considering low-likelihood or low-magnitude events. The three sub-sections are as follows:

- **High-Priority:** Cascadia Earthquake
- **Medium-Priority:** Windstorm, Fire, Extreme Heat and Drought, Power Outage
- **Low-Priority:** Storm Surge/Tides, Flooding

3.3.1 Cascadia Earthquake

Cascadia Earthquake

	Magnitude	Onset	Duration	Frequency	Average	Rank
Cascadia Earthquake	5	5	3	1	4	1

Location

The Cascadia Subduction Zone (CSZ), where the Juan De Fuca plate slides underneath the North American plate poses a great risk to the City and all communities in the Pacific Northwest. A large earthquake would cause significant impacts to properties with a structure, and liquefaction may pose a risk, specifically along US-101 (the liquefaction risk in the area is graded as moderate to high). The area is at relatively low risk for other crustal earthquakes.

Previous Occurrence/History

While few written or oral histories have been located of the area's experience following the 1700 CSZ earthquake, tribes in the area have illustrated the vast impact the event had on life. Thousands of earthquakes have occurred in Washington, but very few have caused significant damage to the area.

Cascadia Earthquake

The following notable earthquakes impacted the City or would likely have an impact if they were to occur today:

- 1700, CSZ, magnitude (M) 9.0

Extent and Probability

The Washington State DNR Geologic Information Portal estimates that the most intense shaking associated with a CSZ earthquake would be focused on the West End.

A CSZ earthquake has a recurrence interval of 500 to 600 years, with gaps as little as 200 years and as great as 1,000 years. Estimates vary, but some state there is a 17-20% chance of a M 8.0 or greater in the next 50 years.

In the event of a CSZ event, Forks and the West End would experience the greatest shaking intensity (Modified Mercalli Intensity Scale 8) (DNR 2019).

Future Probability Trend – Future weather and development trends play no known role in the probability of future earthquake events. However, both may play a role in the expected vulnerability of earthquake impacts.

Vulnerability

Vulnerability posed by earthquakes to the City of Forks is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Base Plan, the following infrastructure types are classified as a high to severe combined earthquake hazard level (including earthquake shaking hazard and liquefaction potential):

- Airports (2 structures)
- Commercial Buildings (1 structure)
- Communication Systems (2 structures)
- Electric Systems (5 structures)
- Fire Departments (3 structures)
- Government Buildings (6 structures)
- Hazardous Materials Storage (2 structures)
- Medical Facilities (6 structures)
- Natural Gas (1 structure)
- Schools (1 structure)
- Shelters (11 structures)
- Wastewater systems (1 structures)

Similar to the County level, the City's awareness to a CSZ earthquake has increased with participation in regional drills and public outreach efforts and more structures are being designed to be resilient earthquakes. However, development has increased in areas on the West End that are particularly vulnerable to a Cascadia event. Given these changes, Forks' vulnerability to earthquakes has remained **unchanged**.

See Appendix C for Hazard Mapping.

1

3.3.2 Windstorm

Windstorm

Magnitude	Onset	Duration	Frequency
1	4	3	4

Average	Rank
3	2

Location
All City properties and structures can be affected by windstorms. Properties with infrastructures, utilities, and tree stands can have more damaging impacts during windstorms, especially in coastal areas where winds speeds can reach speeds of greater than 100 miles per hour (mph) during the winter months.

Previous Occurrence/History

In January 1921, winds with speeds greater than 100 mph hit the West End and flattened approximately 20% of the forest in the Forks area. Another windstorm that resulted in wide-spread destruction hit Forks in 1962. In the spring of 2016, a windstorm with the windspeeds and wind directions similar to a hurricane passed over Forks (City of Forks 2019). Windstorms that result in power outages happen biennial to yearly. These storms happen so often that they go under- and un-reported.

Extent and Probability

The mountainous areas around the City of Forks experience higher winds than other areas. Windstorms can damage buildings, structures, utilities, and tree stands, which can cause millions of dollars' worth of damage.

Future Probability Trend – Future weather conditions have the potential to lead to an increase in severe and extreme weather patterns, leading to an **increase** in the probability of a windstorm. In addition, increased development has the potential to expose more assets to the impacts of windstorms.

Vulnerability

The City's primary vulnerability from severe windstorms are power outages and impairment of transportation. Because nearly all social and economic activity is dependent on transportation, particularly along US-101, damage from windstorms can have a serious impact. Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive. Power outages can result from physical damage to electrical infrastructure as a result of downed trees and blown debris. Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe windstorms (Clallam County 2010).

The City's vulnerability to windstorms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.3 Wildfire Smoke and Wildfire

Wildfire Smoke and Wildfire

	Magnitude	Onset	Duration	Frequency	Average	Rank
Wildfire Smoke	2	3	3	4	3	5
Wildfire	2	3	3	2.5	2.625	8

Location

Fires are a high risk in many areas in the vicinity of Forks. The greatest areas for concern are those within the Wildland Urban Interface (WUI), namely the areas outside of Forks, Sekiu, La Push, and Clallam Bay, where many community members live in rural homes, and areas in the Olympic Mountain foothills where there is ongoing logging activity. These locations represent potentially large economic losses following a fire.

The West End may also be impacted by wildfire incidents occurring in Canada and eastern Washington. Air quality impacts result in unhealthy levels of particulate matter and smoke.

Previous Occurrence/History

The image below contains the distribution of wildfires since 2008. The largest of these fires occurred in 2017 and burned a total of 80 acres. Catastrophic fires have occurred on a 300 to 500 year rotation, with the last one happening sometime in the 1600s or 1700s.



Another hazard to the West End has been diminished air quality caused by smoke originating from elsewhere in the Pacific Northwest. In the summer of 2018, Clallam County was impacted by unhealthy levels of particulate matter in the air.

See Appendix C for more hazard mapping.

Wildfire Smoke and Wildfire

Extent and Probability

West End communities are scattered across a large geographic area. These communities are primarily rural with small- to mid-sized population centers near wild lands. The extent wildfire can impact the public is wide and varied. With two droughts in less than five years, the systematic drying out of forests is a concern. Local large timber holdings are significant concerns related to fires. In addition, a fire within the surrounding region would likely have a negative impact on the area's hospitality enterprises.

Weather conditions greatly influence the impact and extent of wildfires. Drought, high temperatures, and wind contribute to a dynamic and changing conditions of wildfires. Fuel load and vegetation contribute to the size and intensity of wildfires.

Wildfires are frequent and inevitable. Within the region, the vast majority of wildfires burn during the June to October time period. The MPT rated the probability of fire and wildfire smoke air quality impacts as some of the most likely hazards to impact the West End, which generally experiences the effects of wildfire every year.

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, the West End may be impacted by an **increase** in the probability of future fires.

Vulnerability

Children, the elderly, and individuals with respiratory illnesses are particularly vulnerable to the negative impacts of smoke and particulate inhalation. As stated previously, approximately 7.1% of the City population is younger than 5 years of age. Approximately 20% of the City population is 60 years of age and older (U.S. Census Bureau 2017).

Vulnerability posed by wildfires (particularly WUI fires) to the City of Forks is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Base Plan, the following local infrastructure types are classified as being vulnerable to WUI fires:

- Communication Systems (1 structure)
- Electric Systems (3 structures)
- Fire Department (1 structure)
- Government Buildings (1 structure)
- Hazardous Materials Storage (1 structures)
- Medical Facilities (5 structures)
- Natural Gas (1 structure)
- Shelters (11 structures)

Since the 2010 County HMP, development in Forks has expanded further into the WUI; therefore, the vulnerability has **increased**. Additionally, as the fire season continues to grow in other parts of the Pacific Northwest, the vulnerability to Forks from wildfire smoke has **increased**.

3.3.4 Heat Events and Drought

Extreme Heat & Drought

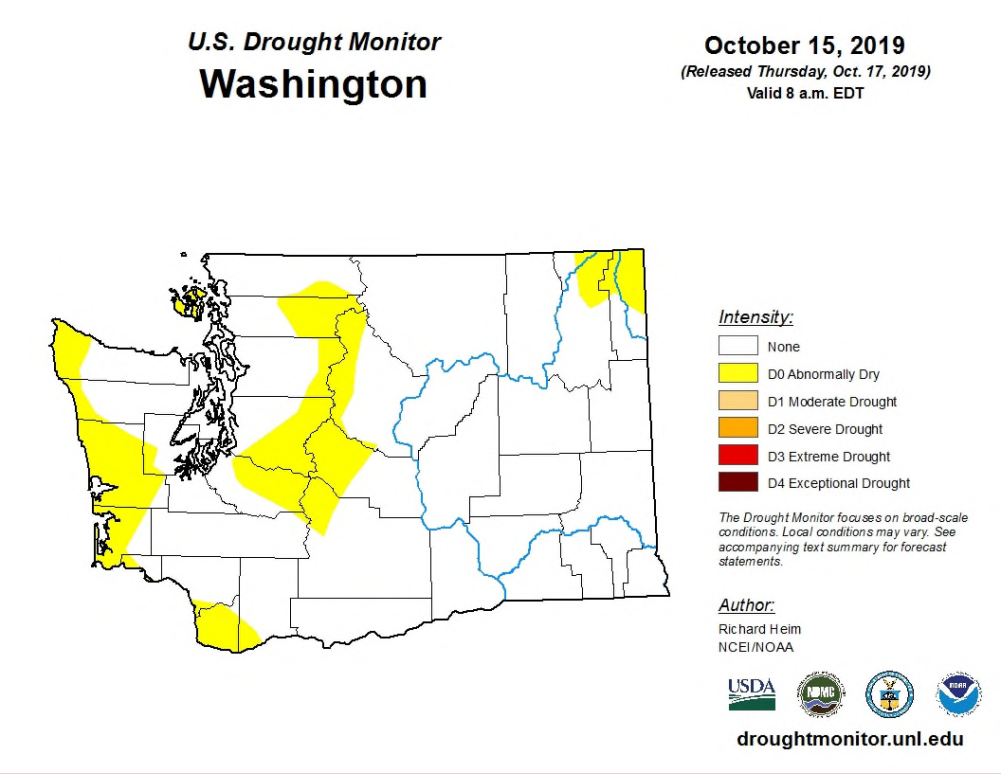
	Magnitude	Onset	Duration	Frequency	Average	Rank
Heat Events	2	3	3	4	3	5
Drought	1	2	3	2	2	14

Location
Drought could impact all West End properties that use water to a certain extent.

Previous Occurrence/History

During the summer of 2007, the Makah Indian Reservation had a declared emergency due to a water shortage and used rationing and a desalination plant on loan from the Navy to weather the crisis. Since that time, they have increased their water storage capacity and have not suffered any further shortage (Clallam County 2010).

In 2015 and 2019, the City experienced state-declared droughts that required the City to access Drought Relief funds. Most recently, drought was declared in Clallam County in May 2019 and western Clallam County remains Abnormally Dry.



Drought status in Washington State as of October 2019 (U.S. Drought Monitor 2019b).

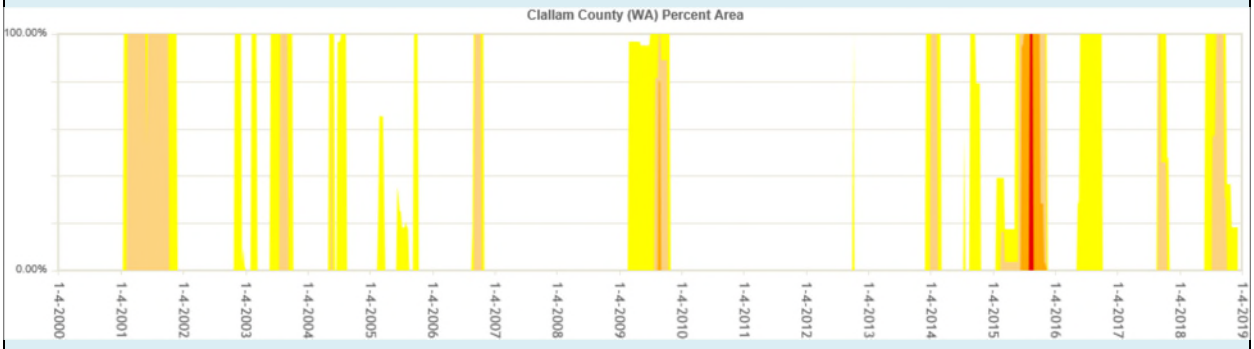
Extreme Heat & Drought

Extent and Probability

Forks and other West End communities are not as vulnerable to extreme heat events and drought as northeast Clallam County due to the proximity of the deciduous rain forest; however, diminishing snowpack in the Olympic Mountains can result in long-term water shortages and has resulted in water shortages in recent years.

As the graph below indicates, there has been one period of extreme drought within Clallam County over the last 17 years (United States Drought Monitor 2019). During a two-month period in 2015, 100% of the County's area was marked by D3 to D4 droughts (the most intense forms of drought – red and orange in the figure below). Additionally, in 2001, 2003, 2006, 2009, 2014, 2017, and 2018, areas of the County experienced moderate to extreme drought. As of May 2019, a drought emergency was declared in the Elwha-Dungeness, Lyre-Hoko, and Soleduc watersheds, which encompass the entirety of Clallam County (Governor of Washington 2019).

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of prolonged heat, the County may be impacted by an **increase** in the probability of future droughts.



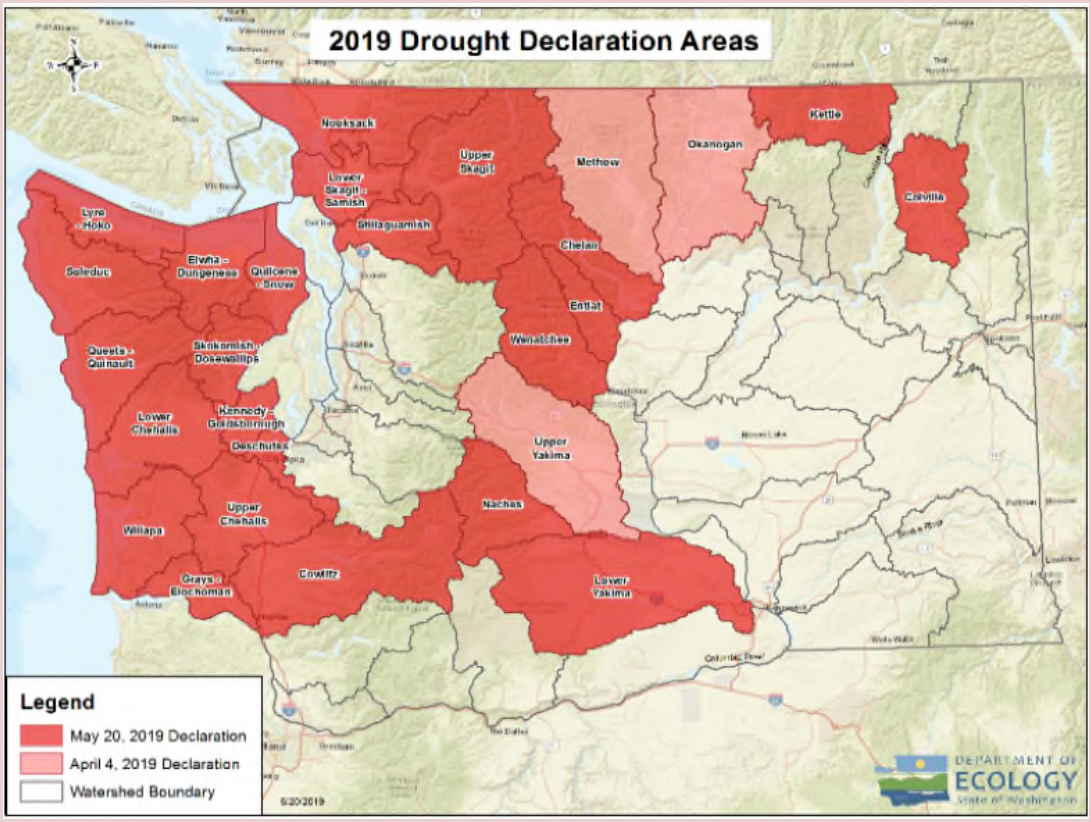
Drought animations over time are available at: http://droughtmonitor.unl.edu/Maps/Animations.aspx (U.S. Drought Monitor 2019a).

Extreme Heat & Drought

Vulnerability

Droughts impact individuals (farm owners, tenants, and farm laborers), the agricultural industry, and other agriculture-related sectors. Lack of snowpack has forced ski resorts into bankruptcy. There is increased danger of forest and wildland fires. Millions of board feet of timber have been lost. Loss of forests and trees increases erosion causing serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Problems of domestic and municipal water supplies are historically corrected by building another reservoir, a larger pipeline, a new well, or some other facility. Short-term measures, such as using large capacity water tankers to supply domestic potable water, have also been used. Low stream flows have created high temperatures, oxygen depletion, disease, and lack of spawning areas for our fish resources (Clallam County 2010).



Washington State 2019 Drought Declaration Areas, Department of Ecology. https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Statewide-conditions/Drought-2019.

3.3.5 Utility Failure

Utility Failure

Magnitude	Onset	Duration	Frequency
2	3.5	3	4

Average	Rank
3.125	4

Location
Numerous West End properties are at risk of being affected by utility failures. Housing in the foothills of the Olympics are known to experience power outages during winter and wind storms that can last anywhere from several hours to several weeks. In addition, utility networks, information technology networks, and telecommunications systems are very vulnerable and could be at a risk to exposure of a hazard that could lead to a utility failure.

Previous Occurrence/History

Historically, utility disruptions and failures have been caused by natural disasters and human-caused accidents but have not been recorded in a way that is publicly accessible. Numerous utility failures occur every year, most frequently in the form of electricity outages that may last as short as hours or as long as weeks. Previous utility failures have led to an increase in welfare check-ins and overall community member needs, as well as having negatively impacted the West End's economic interests.

Extent and Probability

It is difficult to predict the impacts of future utility failures, but they have the potential to impact all government and business operations and cause extensive economic losses among other impacts. Due to the sporadic nature of failures, it is also difficult to estimate how frequently such failures will occur or their duration. The West End generally deals with power outages multiple times per year with many of them only lasting a matter of hours. Every several years, a large utility failure is experienced.

Future Probability Trend – Based on potential increases in heat waves and increasing development trends resulting in greater demand, the West End may be impacted by an **increase** in the probability of future utility failure. However, mitigation actions outlined in this HMP are designed to decrease such strain on utility systems.

Vulnerability

Electric Power Systems

Power facilities in Clallam County, and much of Forks, are generally protected from wildland/urban interface fires by defensible space. A limited number are threatened by tsunami, flood, and landslide hazards. All facilities are threatened to varying degrees by destructive earthquakes.

Water Supply

- There are nine water districts and at least two private water systems in Clallam County that supply customers in their areas with water. Many are threatened by tsunami, flood, wildland/urban interface fire and landslides. All of these districts are expected to sustain some type of damage and/or outage immediately following a destructive earthquake.
- Most water service ceases to function if electrical power is unavailable.

Utility Failure

- Service main and line breaks will cause reduced water pressure in affected areas. Pressure reductions could reduce firefighting capability.
- Water utilities will shut down system components to mitigate damage from pressure loss, pipe leaks and breaks inside of buildings.
- To mitigate possible public health threats in both urban and rural areas, public health authorities may issue boil water advisories. Following repair, systems will require quality testing and system flushing to ensure safety.

Wastewater and Sewer Systems

- There are six public and one private wastewater treatment systems in the County. None are subject to floods, wildland/urban fire or landslides. All systems are threatened by destructive earthquake hazards. Most wastewater service ceases to function if electrical power is unavailable.
- Wastewater and sewer system damage will include cracked pipe walls, pipe section collapse, and separation between pipe joints. Liquefaction may push some pipes out of the ground, reducing the downward gradient of the system, causing it to stop flowing and/or backup in some areas. Sewer pump stations and their pressure mains will suffer varying damage. Some will require complete replacement. As a result, it is possible that effluent will flow in streets, ditches, and waterways. This will cause a severe public health hazard.
- Wastewater and sewer breaks will occur near damaged potable water lines putting the potable water systems at risk. Authorities may issue boil water notices to mitigate public health threats.
- Septic systems requiring power will not work. Those and gravity systems may fail due to broken pipes contaminating wells and surface water.

Communications Systems

- Urban facilities with not be subject to tsunami, flood, wildland/urban interface fires, or landslides. Rural facilities may be subject wildland/urban interface fires and landslides to the facility sites or access roads. All facilities are subject to damage from major earthquakes.
- All primary and secondary forms of communication will be intermittent and unreliable due to power failure. Systems affected include cell phones, land lines, internet via fiber lines, cable television, and amplitude modulation/frequency modulation (AM/FM) radio stations. Power to transmit will have to be supplied by backup generators.

Source: Buck 2016

With the expansion of utilities systems with new development in recent years, the City's vulnerability to utility failure has **increased**.

1

3.3.6 Storm Surge and Tides

Storm Surge and Tides

Magnitude	Onset	Duration	Frequency
1	1	2	4

Average	Rank
2	14

Location
The low-lying rocky coastlines of La Push, Neah Bay, Sekiu, and Clallam Bay are vulnerable to the impacts of tidally influenced storm surges.

Previous Occurrence/History

Storm surges and extreme tides are a relatively common occurrence near the Forks, although these hazards tend to impact coastal communities more directly. As recently as January 2018, coastal Washington experienced flooding and giant waves.

Extent and Probability

West End coastal communities are particularly vulnerable to tidally influenced storm surges, particularly Neah Bay, Clallam Bay, La Push, and Sekiu.

Future Probability Trend – Sea level rise presents an ongoing threat to the West End coastal communities that are in low-lying areas. According to the Washington State Enhanced HMP, "in addition to inundating low-lying coastal areas, rising sea level will **increase** coastal flooding caused by storm surges, tsunamis and extreme astronomic tides. Likewise, episodic storm surges of a given height will likely experience shortened recurrence intervals" (WA EMD 2018).

Vulnerability

For the purposes of this vulnerability assessment, it was assumed that critical infrastructure that are vulnerable to tsunami will likely also be vulnerable to storm surges and extreme tides. Based on the methodology outlined in Section 4.6 of the Base Plan, the following infrastructure types in Forks are vulnerable to tsunami and storm surges/tides:

- Government Buildings (1 structures)
- Hazardous Materials Storage (1 structure)

Since the 2010 plan, the vulnerability of the City to storm surges and tides is **unchanged**. Property development along certain shorelines has increased, while the vulnerability may be offset due to increased public awareness of the hazard itself and the improved public warning systems. One big issue would be the City providing support to respond, rescue, recover and reconstruct from any significant storm surge/tidal event.

3.3.7 Flooding

Flooding

Magnitude	Onset	Duration	Frequency
1.5	3	2	3

Average	Rank
2.375	10

Location

The Forks Prairie is a low-lying feature containing three major rivers and, as a result, sections of Forks will flood regularly during winter storms. The flooding on the prairie is predominately from creeks that cross the prairie and merge with the rivers. The practice fields east of Forks High School and Russell Road to the south of Bogachiel Way are problem areas (City of Forks 2019).

Previous Occurrence/History

Comprehensive historical flooding on local properties is unknown. Most of the flooding in the area of Forks is persistent, nuisance flooding associated with waterways in the Forks Prairie. Historically, the most damage to property in Forks has occurred from flooding of the Bogachiel River. These occurrences are seasonal and tied to winter storm events.

Extent and Probability

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property (more likely). Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by U.S. Geological Survey stream gauges located throughout the area. It can also be measured by past damages of flooding.

Future Probability Trend – Due to the implementation of a County-wide Comprehensive Floodplain Management Plan and associated flood mitigation actions, the City expects to experience a **decrease** in flooding, even as precipitation may increase as a result of climate change.

Vulnerability

County-wide, the damages with the highest consequence, either related to the cost to repair or by the impact on human activities, were incurred during the 1979, 1990, 1996/1997, and 2008/2009 flood and severe storm events.

Vulnerability posed by flooding to the City of Forks is measured by accounting for the critical infrastructure that are at risk. Flood events can affect the transit center, the elementary school and parts of Russell Road. Based on the methodology outlined in Section 4.6 of the Base Plan, the following infrastructure types are classified as vulnerable to flood hazard:

- Government Building (1 structure)

Flooding frequency and intensity is changing as the climate changes; however, the City is making more effort to manage floodplains. Therefore, the vulnerability of Forks to flood hazards is **unchanged** since 2010.

3.4 Vulnerability Assessment

3.4.1 Identifying Critical Infrastructure and Asset Inventory

Critical infrastructure was identified for the City of Forks following the methodology outlined in Section 4.6 of the Base Plan.

Appendix B contains the complete vulnerability assessment and associated methodology.

3.4.2 Repetitive Loss Properties

As outlined in the Base Plan, a single National Flood Insurance Program (NFIP)-identified repetitive loss structure is in the City of Forks (Table 3-2).

Table 3-2 NFIP Severe Repetitive Loss Properties

FEMA ID	City	Occupancy	Flood Zone	Property Value	Building Value	Contents Value	Paid	Date Of Payment	Date Of First Loss
88393	FORKS	SINGLE FMLY	A	64512	67956.19	58422.94	126379.13	01/31/2018	12/15/1999

Source: FEMA Severe Repetitive Loss Properties, Compiled by the Houston Chronicle (2019). https://data.world/houstonchronicle/severe-repetitive-loss-properties-flood-games

3.4.3 Exposure Assessment

Table 3-3 contains a summary of the critical infrastructure associated with Forks (Buck 2016). The vulnerability of each structure to earthquake, tsunami, flooding, WUI fires, and landslides is assessed.

Table 3-3 Forks Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ Shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUI Fires	Landslides
Quillayute Airport	500 East Division St	Forks	Airport	80%	C	Low/Mod	Low	Very High	NO	NO	NO	NO
City of Forks	S Forks Ave	Forks	Airport	80%	C	Low/Mod	Low	Very High	NO	NO	NO	NO
Forks Office	31 Spartan Ave	Forks	Electric System	80%	B	Low	Low	High	NO	NO	NO	NO
Forks Warehouse	441 W E St	Forks	Electric System	80%	B	Low	Low	High	NO	NO	NO	NO
Calawah Substation	513 Calawah Way	Forks	Electric System	80%	C	Mod	Low	High	NO	NO	YES	NO
Forks Substation 1	441 w East St	Forks	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Forks Substation 2	441 w East St	Forks	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Port of La Push	71 Main St.	Forks	Hazardous Materials Storage	80%	D/E	Very	Very	Very	Yes	NO	YES	NO
Masco Petroleum	231 Industrial Ctr.	Forks	Hazardous Materials Storage	80%	C/D	High	Low	High	NO	NO	NO	NO
Ferrell gas	451 N Forks Ave	Forks	Natural Gas	80%	B	High	Low	Very	NO	NO	YES	NO
Treatment Plant	Confidential	Forks	Wastewater System	80%	B	High	Very Low	High	NO	NO	NO	NO
KFKB Radio 1490 (KBDB FM 96.7)	260 Cedar St, Forks	Forks	Communications System	80%	B	High	High	High	NO	NO	YES	NO
City of Forks	500 E Division St	Forks	Communications System	80%	B	High	High	High	NO	NO	NO	NO
Bogachiel Clinic	530 Bogachiel Way	Forks	Medical Facility	80%	C	High	Low	High	NO	NO	YES	NO

Table 3-3 Forks Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ Shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUI Fires	Landslides
Calawah Medical Clinic	5th Ave	Forks	Medical Facility	80%	C	High	Low	High	NO	NO	YES	NO
Forks Women's Clinic	231 Lupine Ave	Forks	Medical Facility	80%	C	High	Low	High	NO	NO	YES	NO
Family Medical Center	461 G St	Forks	Medical Facility	80%	C	High	Low	High	NO	NO	YES	NO
West End Outreach Services	530 Bogachiel Way	Forks	Medical Facility	80%	C	High	Low	High	NO	NO	YES	NO
Forks	11 Spartan Ave	Forks	Fire Department	80%	C	High	Low	High	NO	NO	YES	NO
Mora	7810 La Push Rd	Forks	Fire Department	80%	C	High	Low	High	NO	NO	YES	NO
DNR HQ, Forks	411 Tillicum Ln, Forks	Forks	Fire Department	80%	C	High	Low	High	NO	NO	NO	NO
Forks Elementary & HS	261 Spartan Ave	Forks	School	80%	C	High	Low	High	NO	NO	NO	NO
Office Building and Jail	500 E Division Street	Forks	Government Building	80%	C	High	Low	High	NO	NO	NO	NO
Tilicum Park	1411 S Forks Ave	Forks	Government Building	80%	C	High	Low	High	NO	NO	NO	NO
Maintenance	500 E Division Street	Forks	Government Building	80%	C	High	Low	High	NO	NO	NO	NO
HOH Administrative Center	2269 Lower Hoh Rd	Forks	Government Building	80%	E	Very High	Very High	Very High				
Mora ranger Station	Mora Road	Forks	Government Building	80%	D/F	Very High	Very High	Very High	YES	YES	YES	NO
Forks Police Department	500 E Division St	Forks	Government Building	80%	C	High	Low	High	NO	NO	NO	NO
Forks Jail	500 E Division St	Forks	Government Building	80%	C	High	Low	High	NO	NO	NO	NO

Table 3-3 Forks Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ Shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUI Fires	Landslides
Assembly Of God, Forks	81 Huckleberry Lane	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Baptist	651 S Forks Ave	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Forks Elementary & HS	301 S Elderberry	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Forks Motel	351 Forks Ave S	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Grange - Forks Prairie		Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Latter Day Saints - Forks	1301 Calawah Way	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Olson's Vacation Cabin	2423 Mora Rd	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Olympic Natural Resource Center	1455 S Forks Ave	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Olympic Suites Motel	800 Olympic View Dr	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Pacific Inn Motel	Forks Ave & C	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Seventh Day Adventist - Forks	E Division	Forks	Shelter	80%	C	High	Low	High	NO	NO	YES	NO
Grocery & Hardware, Ace	950 S Forks Ave	Forks	Commercial	80%	C	High	Low	High	NO	NO	NO	NO

Key:
EQ = Earthquake
PGA = Peak Ground Acceleration
WUIF = Wildland Urban Interface Fire

3.5 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

The City of Forks recently reviewed and update their Comprehensive Plan to comply with the periodic review requirement outlined in Washington State's Growth Management Act (City of Forks 2019). The City has seen a 6% population growth since 2010, and the City's land use has reflected these changes as development expands.

No potential developments are actively being considered in known hazard areas. Vulnerability changes have been measured by accounting for shifts in land use and public awareness since the adoption of the 2010 County HMP. Each measure has been identified as having an increased, decreased, or unchanged vulnerability. Table 3-4 provides a snapshot of how vulnerability has changed since development of the 2010 HMP.

Table 3-4 Vulnerability Changes Since 2010

Hazard	Status
Cascadia Earthquake	+/-
Windstorm	+
Wildfire Smoke and Wildfire	+
Extreme Heat and Drought	+
Utility Failure	+
Storm Surges and Tides	=
Flooding	+/-

Key:
+ Increased vulnerability
- Decreased vulnerability
+/- Increased vulnerability, but actions taken to decrease vulnerability
= Unchanged vulnerability

4 CAPABILITY ASSESSMENT

FEMA	**C1.** Does the plan document [the City of Forks'] existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? [Requirement §201.6(c)(3)]

4.1 Human and Technical Resources

Table 4-1 describes the City's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 4-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
Public Works Director	Public Works & Utilities	Planners with knowledge of land development and land management practices
Building Inspector	Buildings & Permits Department	Engineers or professionals trained in construction practices relate to buildings and/or infrastructure
City Attorney/Planner	Legal & Planning Department	Ongoing participation in hazard mitigation planning process.

4.2 Financial Resources

The City maintains many fiscal and financial resources to support its mitigation program. Table 4-2 identifies specific resources accessible for use.

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	Yes
Capital Improvement Project Funding	Yes
Insurance	Yes
User fees for utility services	Yes, Water & Sewer inside the Forks Urban Growth Area
Incur debt	Yes
State-sponsored grant programs	Yes

Table 4-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Pre-Disaster Mitigation Program	Federal Emergency Management Agency (FEMA)	Provides funding to develop hazard mitigation plans (HMPs) and implement mitigation actions contained within.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Hazard Mitigation Grant Program	FEMA	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	FEMA	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by floods.
Community Development Block Grant Program	U.S. Department of Housing and Urban Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.
Emergency Management Performance Grants Program	FEMA/Washington Department of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.
Flood Mitigation Assistance	FEMA/Washington Department of Emergency Management	Provides funding to support development of the flood hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program (NFIP).
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program Interagency Coordinating Committee	Funds activities including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
National Fire Plan	U.S. Forest Service	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
Strategic Economic and Community Development Grant	U.S. Department of Agriculture	Provides funding in rural areas for multi-jurisdictional plan development and with a community development focus. Available only to rural areas outside of urbanized zone of any city with a population greater than 50,000.
Coastal Ecosystem Resiliency Program	National Oceanic and Atmospheric Administration	Provides funding for ecosystem restoration. Governor must approve project funds prior to award and there is a 2:1 cost-sharing ratio.
State		
Washington State Department of Transportation (WSDOT) Avalanche Forecasting and Control	WSDOT	Avalanche forecasting determines the potential risk along a particular mountain slope. When an avalanche hazard develops, WSDOT uses artillery, or explosives to trigger the avalanche. In addition to active avalanche control, WSDOT also uses passive control methods to control snow slides.
Washington Sea Grant	Washington Sea Grant	Washington Sea Grant provides funding opportunities through State and National competitions, program development services, and sponsorships.
Ecology Water Resources Program	Washington Department of Ecology (DEC)	DEC's Water Resources Program provides support in monitoring water supply, managing water supply projects, overseeing water rights, performing streamflow restoration, protecting streamflow,

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
		regulating well construction and licensing, and ensuring dam safety.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock industry and receives no general fund dollars.
Washington Local Emergency Planning Committee Program	Washington Emergency Management Division (EMD)	WA EMD provides funding support to ensure Local Emergency Planning Committees (LEPCs) can be implemented across the state.
Washington Pipeline Safety Program	Washington Utilities and Transportation Commission	The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington State; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).
State Water Pollution Control Revolving Fund	Washington DEC	This program provides funds to local governments to set up low-interest loan programs to repair or replace failing on-site sewage systems. Property owners unable to qualify for conventional bank loans and marine waterfront property owners can use the program to get loans to fix or replace their systems where failures might directly affect Puget Sound. Both the Clean Water State Revolving Fund and the Centennial Clean Water Program.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.
Thriving Resilient Communities	Threshold Foundation	Wide-ranging resiliency project funding.
Kresge Foundation Environmental Grants	Kresge Foundation	Provides funding for climate adaptation and mitigation, as well as sustainable water resources management.

4.3 Legal and Regulatory Resources

Table 4-4 describes the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations.

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
Plans	City of Forks Capital Improvement Plan (2020 – 2026)	Identifies capital improvement projects to be undertaken by the City over the next seven-year period. Includes water systems, sewer treatment systems, flood management, city structures, parks & recreation, airports, technology center, transit center, collaboration with other agencies.	▪ Updated plan for 2020 – 2026, including flood management projects.	Flooding
	2019 – 2039 Forks Comprehensive Plan	The City's Comprehensive Plan establishes Urban Growth Areas, natural resource lands, rural lands, and public lands.	▪ Updated plan for 2019 - 2039	N/A
	Transportation Improvement Plan (Six-Year Street Plan 2020 – 2025)	Lists transportation projects for a six-year period.	▪ Updated for 2020 to 2025.	N/A
	Forks Comprehensive Flood Management Program	Conducted in tandem with capital improvements planning	▪ N/A	Flooding
Policies	Forks Municipal Code	Title 14 and 15 relate to Environment (including flood management) and Buildings and Construction (fire district).	▪ Current through Ordinance 643, passed June 24, 2019.	Flood, fire
	Local Operating Plan/Agreement with Bureau of Land Management (BLM) and U.S. Forest Service	Increased capability and capacity through partnership.	▪ Signed into agreement	Wildfire
	Zoning Ordinance	Provides land use regulation in the unincorporated portions of the County.	▪ Current code through Ordinance 957, passed August 13, 2019	All
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participating in NFIP	Flooding

4.4 Coordination with Community Partners

The City works alongside their community partners to address issues pertaining to emergency management and hazard mitigation. Many of these community partners participated in the HMP update process and collaborate with the City on an ongoing basis.

- **Education**

- Forks School District
- Peninsula College – Forks Branch

- **Business and Industry**
  - Local Chambers of Commerce
- **Healthcare**
  - Forks Community Hospital
  - Washington State Department of Social and Health Services – Forks Branch
- **Utilities**
  - Clallam Public Utility District
- **Transportation**
  - Washington Department of Transportation
  - Clallam Transit

4.5 National Flood Insurance Program Participation

The City maintains an active NFIP policy.

Chapter 14.05 of the Municipal Code regulates the City's flood management program, which is administered by the Public Works Department and the Building Inspector. The City is working with the Quileute Tribe and FEMA to update the FIRM mapping. The City developed a Flood Management Plan in 1996 to assist in the prioritization of flood management projects in tandem with capital improvements planning.

Table 4-5 contains a summary of County-wide participating jurisdiction's total coverage and losses under the NFIP.

Table 4-5 National Flood Insurance Program Coverage and Losses

Community Name (Number)	Total Coverage (in Thousands)	Total Dollars Paid
CLALLAM COUNTY * (530021)	$97,187	$903,327
FORKS, CITY OF (530022)	$400	$--
LOWER ELWHA KLALLAM TRIBE (530316)	$1,715	$--
PORT ANGELES, CITY OF (530023)	$6,001	$75,632
SEQUIM, CITY OF (530301)	$2,148	$55,798

Source: FEMA NFIP Policy and Loss Data by Geography (2019c) https://www.fema.gov/policy-claim-statistics-flood-insurance

4.6 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into the City's daily operations and ongoing planning activities is a priority of the City's mitigation program. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization; and

- Maximizing planning resources through linked or integrated planning efforts.

The City is encouraged to consider integration actions into planning mechanisms including:

- Budget decision-making;
- Building and zoning ordinances and decision-making;
- Emergency planning mechanisms; and
- Economic developing planning and decision-making.

4.6.1 Existing Plans

FEMA	**C6.** Does the Plan describe a process by which the local government will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(iii))

The following existing plans provide ongoing opportunity for integration of hazard mitigation and the City will work with plan owners and stakeholders to consider hazard mitigation data and principles when these plans are updated. Table 4-5 contains a summary of the County's existing plans and how each incorporates the hazard mitigation planning.

Table 4-6 Summary of Clallam County Plans

County Plan	Hazard Mitigation Components
Comprehensive Emergency Management Plan (2016)	Outlines hazard mitigation roles and responsibilities.
Continuity of Operations Plan	In development through County
Comprehensive Land Use Plan	Identifies designated land uses and areas of economic and environmental value.
Floodplain Management Plan	Outlines strategies that directly or indirectly mitigate the risks posed by flood hazards.
Capital Improvements Plan	Identifies large capital projects to reduce risks to key County infrastructure.
Historic Preservation Plan (a component of Critical Areas)	Identifies areas of cultural value that may be vulnerable to hazards.

5 MITIGATION STRATEGY

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [City of Forks] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

5.1 Review of 2010 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2010 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2019 plan update. The MPT worked through each previous action during MPT Meeting #1 to document steps taken to fulfill the action.

See Table 5-1 for an overview of the status of all actions from the 2010 plan update.

Table 5-1 Status of 2010 Mitigation Actions

Action No.	Mitigation Action	Action Status	Timeline	Lead Department	Priority
1	Russel Road Culvert Replacement	Completed	2009-2010	Public Works Department	Extremely High
2	Culvert Assessment Study/Report	2010 Action - Ongoing	2010-2011	Public Works and Planning Departments	Medium
3	Storm-related Roof Damage Mitigation Assessment	2010 Action - Ongoing	2010-2011	Planning Department	Medium
4	Palmer Road Stormwater Detention Pond and Conveyance System	2010 Action – Property has been purchased; preliminary design work was undertaken by the County Road division. Project funding has slowed.	2013	Utilities Department	Medium
5	Adopt 2010 Hazard Mitigation Plan	Completed	2010	Planning Department	High

5.2 Identification and Analysis of New Mitigation Actions

In order to achieve the County-wide mitigation goals, the City has identified a comprehensive series of mitigation objectives and supporting actions that are focused on reducing vulnerability and maximizing loss reduction. The actions can typically be broken out into the following types of activities, which are indicated in Table 5-2.

Table 5-2 2019 Mitigation Actions by Group

Mitigation Group	Related Mitigation Actions
Plans and Regulations	FR02, FR03
Infrastructure/Capital Project	FR01, FR04
Natural System Protection	
Education and Awareness	
Preparedness and Response	

All mitigation actions identified in the plan are addressed in the mitigation implementation plan provided in Section 5.3. The actions include both interim- and long-term strategies for reducing vulnerability to hazard and are characterized as such in the 'life of action' column of the implementation plan.

5.2.1 2019 Mitigation Actions by Hazard

All mitigation actions identified in the plan address at least one priority hazard outlined in Chapter 3 of the HMP. Table 5-3 indicates which mitigation actions address which hazards.

Table 5-3 2019 Mitigation Actions by Hazard

Hazard	Related Mitigation Actions
All Hazards	
Cascadia Earthquake	
Windstorm	FR03
Wildfire Smoke and Wildfire	
Extreme Heat and Drought	
Utility Failure	
Storm Surge and Tides	
Flooding	FR01, FR02, FR03, FR04

5.3 2019-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the City of Forks]? (Requirement §201.6(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the City. The implementation plan includes both short-term strategies that focus on planning and assessment activities and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards. The STAPLEE Score and Mitigation Effectiveness Score methodologies are outlined in Section 6 of the Base Plan.

See Appendix D for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for each action listed in Table 5-4.

Table 5-4 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
City of Forks													
FR01	City of Forks Culvert Assessment Study/Report	2010 Action – Ongoing	5	Public Works and Planning Departments	2010-2011	$15,000	Yes	Grant funding, Street Department funding	Flooding	20	8	28	1
FR02	Storm-related Roof Damage Mitigation Assessment	2010 Action – Ongoing	5	Planning Department	2010-2011	$15,000	No	FEMA HMA, CDBG, Energy conservation dollars	Flooding, Winter Storms, Windstorms	18	4	22	2
FR03	Palmer Road Stormwater Detention Pond and Conveyance System	2010 Action – Property has been purchased; preliminary design work was undertaken by the County Road division. Project funding has slowed.	4,5	Utilities Department	1-3 years	UNK	Yes, partial funding.	City of Forks, Clallam County Public Works, FCAAP (Ecology)	Flooding	16	4	20	3
Adopt the Hazard Mitigation Plan (HMP)	Adopt the HMP	Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	N/A	All hazards				

Key:
CDBG - Community Development Block Grants
FCAAP (Ecology) - Flood Control Assistance Account Program (Washington State Department of Ecology)
HMA - Hazard Mitigation Assistance
STAPLEE - Strategy and Prioritization Methodology

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Jamestown S'Klallam Tribal Annex – Clallam County Hazard Mitigation Plan

2019 Plan Update

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1 INTRODUCTION

1.1 Jamestown S'Klallam Tribal Hazard Mitigation Program

Throughout the hazard mitigation planning process, the Tribal Planner Luke Strong-Cvetich and Tribal Planning Director Leanne Jenkins were the main points of contact for the Jamestown S'Klallam Tribe (herein referred to as 'Jamestown' or 'Tribe'). They each attended one or more Mitigation Planning Team (MPT) meetings.

The Jamestown S'Klallam Tribe adopted a Tribal Multi-Hazard Mitigation Plan (HMP) in 2011 and updated the HMP in 2015.

For the purposes of the HMP, "public" is defined as Tribal Citizens and employees. During the HMP process, input from the Tribe was solicited through outreach on the Tribe's Facebook page and at Tribal gatherings. Furthermore, Tribal staff in Natural Resources, Public Safety and Enforcement, and Administration were engaged throughout the planning process and provided department-specific input at the Draft stage. The Tribal Council was continuously updated throughout the process and provided valuable input. A copy of the Draft HMP, including the Tribal annex, was provided on the Tribe's website during the County-wide public commenting period. The Tribal Council was updated regularly on the status of the HMP also provided feedback on the draft informally during working sessions and formally at Tribal Council meetings.

The tribe makes a concerted effort to participate in the planning process of the surrounding jurisdictions. These include the following:

- Clallam County planning, specifically Clallam County Multi-Jurisdictional Hazard Mitigation Plan;
- Clallam County Comprehensive Emergency Management Plan – Sequim Operational Area;
- Clallam County Emergency Management Community Outreach Meetings;
- Clallam County Risk Mapping, Assessment, and Planning (Risk MAP with STARR and FEMA); and
- Statewide emergency planning efforts including exercises and trainings, including participating in the 2016 Cascadia Rising Functional Exercise.

1.1.1 Hazard Mitigation and Other Tribal Planning Efforts

Since completion of the Tribe's first Multi-Hazard Mitigation Plan, we have completed other complementary and related plans, programs and projects that, to help implement and strengthen this plan. In particular, we have engaged in community-based planning for climate change, which identified additional potential impacts and responsive strategies related to flooding and severe weather hazards which have been incorporated into this plan.

With funding from the Federal Emergency Management Agency (FEMA) through the Washington State Emergency Management Division, we developed an Emergency Management Strategic Plan that identifies how we practice to protect our personnel, facilities, and citizens in an emergency or disaster. Specifically, how we continue operations during, and recover from natural, technological, and human-caused emergencies. The program consists of three plans: the Emergency Management Strategic Plan; the

Emergency Operations and Coordination Plan; and the Emergency Preparedness Plan. These plans will likely need to be updated after our incorporation into the Clallam County Multi-jurisdiction Hazard Mitigation Plan is fully realized and complete.

We continue to implement our Emergency Preparedness Program and have received previous funding from the Federal Emergency Management Agency (FEMA) through the Washington State Emergency Management Division. Three emergency/disaster preparedness sessions were presented by the coordinator from the Clallam County Office of Emergency Management. We have conducted building evacuation drills with Tribal governmental staff and have provided each staff person with a 72-hour emergency desk kit, and information about when and how to safely evacuate their work space. In addition, each building has an emergency evacuation kit on wheels (backpack-style) and one individual designated to coordinate evacuation. We also participate each year in the Great Washington ShakeOut drill for earthquake preparedness.

Integration with FEMA programs and initiatives

Pre-disaster Mitigation Competitive Grant Program (PDMC): The Tribe successfully applied for the Pre-disaster Mitigation Competitive Grant to support internal hazard mitigation planning objectives but decided to terminate the grant prior to initiating work, incurring expenditures and receiving federal funds. Subsequently, the Tribe joined the Clallam County Multi-jurisdiction Hazard Mitigation Plan.

Emergency Management Performance Grant (EMPG): The Emergency Management Performance Grant Program plays an important role in the implementation of the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient Nation. In 2012, the Tribe received EMPG funds through the Washington State Emergency Management Department to develop an Emergency Preparedness Planning and Program, including supplies and training for Tribal campus. Under this program, we produced a two-part plan:

1.) *Emergency Management Strategic Plan* to implement an integrated systems approach to emergency management and continuity of operations that will assist the Tribe not only in preparing to respond to emergencies, but in identifying opportunities to mitigate risk and prevent loss; and in establishing continuity of operations and recovery strategies for all types of emergencies; and

2.) *Emergency Preparedness Plan*, identifying internal responsibilities, potential risks in the immediate vicinity of the Tribal campus, and preparedness and action checklists and resources. Specific training and exercise options that support the goals of the Emergency Management Strategic Plan were also identified. In 2013, with additional EMPG funds, the Tribe purchased 12 Team Leader emergency supply kits and approximately 200 72-hour kits for each staff desk and conducted evacuation drills.

Furthermore, the Tribe's casino and resort is actively developing an Emergency Response Plan with their own funds and for their specific needs. The intended date of completion prior to the May 2020 grand opening.

Risk Mapping and Assessment: In 2013, at the invitation of FEMA Region X staff, we began participating in the FEMA-STARR (Strategic Alliance for Risk Reduction) Risk Mapping and Assessment initiative to assist

FEMA in a coastal flood study in Clallam County. Our staff met with FEMA staff and provided GIS data to FEMA during the discovery phase. We have entered into a formal partnership agreement for the project. Through the Risk MAP effort, FEMA is updating the nation's coastal Flood Insurance Studies (FISs) and FIRMs, where appropriate, and publishing new FIRMs in densely populated areas that were not previously mapped.

The information provided by this project can be used by the Tribe to enhance existing hazard mitigation plans, make informed decisions to improve resilience to natural hazards, and raise awareness about local risks to hazards so that the Tribe and our citizens are better informed and prepared to take actions to reduce their risk from natural hazards. Most Recently, Tribal staff participated in the Clallam County Community Coordination (CCO) Preliminary Flood Map Meeting on December 18th, 2019 along with other stakeholders from our area.

National Flood Insurance Program (NFIP): Indian tribes are considered communities by the National Flood Insurance Program and can join the program even if no flood hazard map exists that covers all tribal lands. The Jamestown S'Klallam Tribe does not currently participate in the NFIP for lands in Reservation/Trust status but nonetheless participates in meetings and stays up to date on the latest maps.

Outreach

Our community is not necessarily locally-based, so our outreach for planning and implementation purposes does not always consist of face-to-face interaction via traditional "public involvement" meetings. We exchange information at General Citizen meetings, attended by approximately 50 individuals, and at Tribal Council meetings, but we also provide information and updates to both citizens and staff through Tribal newsletters, Annual Reports, and other publications:

Social Media and Tribal Webpage Announcements

Tribal Community Newsletters

- Preparing for Floods
- Home Fire Safety
- Drought
- Fireworks Safety
- "Weathering the Storm"

Staff Newsletter Emergency Preparedness articles:

- Home Fire Safety
- Drought
- Winter Storms
- Fireworks Safety
- Water Safety
- Earthquake Drill

Public Health Crisis: Because our citizens live under the jurisdiction of other county and municipal governments, we have deferred to our local public health district for public health emergency response and preparedness.

In the event of an emergency that affects the health of our community, Clallam County Health and Human Services responsibility is to:

- Identify ways to reduce health risks, including the use of vaccinations and medications;
- Investigate communicable diseases and work to stop their spread;
- Provide local health care providers with urgent health information, treatment guidelines and access to vaccinations and medications;
- Communicate health information and advice to the public;
- Assist agencies in hazardous material spills; and
- Help state and federal agencies monitor air, food, and water supplies to ensure they are safe.

Our role would be communication and support for these efforts.

Obstacles: One obstacle to implementation is the limited capacity for funding Tribes through the Washington State Emergency Management Department, which allocates Emergency Management Planning Grant (EMPG) funding amounts based on a formula related to the percentage of an agency's operating budget. Each agency receives an EMPG award amount that corresponds to the resulting percentage of their operating budget. *For example, if a local agency had an emergency management operating budget of $30,000 and the percentage for that year was calculated at 20%, then the agency would receive an EMPG award for $6,000.* For Tribes with little or no pre-existing or established operating budget, this formula presents a disadvantage against large county and municipal public works programs. This formula was established through a change in the Washington Administrative Code without government-to-government consultation with Tribes.

On January 29, 2013, President Obama signed the Sandy Recovery Improvement Act of 2013, which amended the Stafford Act. The Act included a provision to provide federally recognized Indian tribal governments the option to request a Presidential emergency or major disaster declaration independent of a state. This plan is required in order for the Tribe to be eligible under the Stafford Act. For Public Assistance, the minimum level of damages must reach $1 million. When a severe weather/flood event occurred in 2015, with damage to the Railroad Trestle that was predicted within this plan, we were not eligible to declare a disaster because the event did not cause $1 million in damage. Yet the replacement of the trestle ultimately cost the Tribe $1.53 million. The $1 million threshold is under consideration by FEMA for effectiveness of the Act for Tribes.

See Appendix E for the completed Federal Emergency Management Agency (FEMA) Local Plan Mitigation Review Tool for the Jamestown S'Klallam Tribe.

1.2 What's New in the 2019 Update?

This 2019 Jamestown S'Klallam Tribal Hazard Mitigation jurisdictional annex serves as a continuation of the Tribe's mitigation efforts. This annex includes the following major revisions to the 2015 plan:

- Incorporation into the larger County-wide hazard mitigation planning process, which represents the collaborative relationship between the Tribal and County planning teams;
- Incorporation of additional hazards, including human-induced hazards (Chapter 3);
- Updated vulnerability assessment built on the critical infrastructure established in the 2015 planning process (Chapter 3); and
- Focused mitigation strategy and prioritization methodology (STAPLEE) (Chapter 5).

Additionally, to aid in plan review and to ensure that all FEMA Tribal planning requirements are met, text box callouts have been inserted into the plan that identify the planning element, based on FEMA's mitigation plan review tool, that is addressed in that particular section of the plan. The plan also strives to make robust use of internal call outs to ensure that plan users can easily find related information. For example, in Chapter 4, which addresses the capability assessment, the following text box appears:

FEMA	**C1.** Does the plan include a discussion of the tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas? (Requirement §201.7(c)(3)(iv))

2 COMMUNITY PROFILE

2.1 Tribal Sovereignty and Governance

The 2016 Jamestown S'Klallam Comprehensive Plan details the structure of the Tribal government:

> "The Jamestown S'Klallam Tribe is governed by a five-member Tribal Council elected to four-year terms on a staggered basis. All enrolled Tribal citizens over 18 years are eligible to vote and those who live within the Tribal service area are eligible to run for office. The Tribal constitution was drafted and adopted in 1975. Tribal governmental programs receive overall direction from the Tribal Council through the Chief Executive Officer. We adhere to the practice of separation of Tribal government and Tribal administration to provide continuity and stability in its day-to-day operations. The Council sets policy, considers community input, and relies upon the administrative staff to effectively carry out its policies.
>
> Since achieving recognition in 1981, the Council and staff have worked hard to set up basic operational structures to administer governmental policies and provide services, programs and activities for the Tribal citizenship. This structure has allowed the Tribe to create programs to assist Tribal citizens as well as begin building a strong economic base for future needs." (Jamestown S'Klallam Tribe 2016)

Tribal self-governance is key to the Tribe's ability to restructure programs and address Tribal priorities and needs:

> "Self-Governance is premised on the government-to-government relationship that exists between Indian Tribes and the United States as sovereign nations. Indian Tribes have always been recognized as independent sovereign nations with the authority to conduct their affairs under their inherent powers. In 1988, Congress authorized a demonstration project called Self-Governance which allowed for many programs and services formally administered by the Bureau of Indian Affairs (BIA) to be transferred to the Tribes themselves. The Jamestown S'Klallam Tribe was one of the first seven Tribes in the nation to participate in this project." (Jamestown S'Klallam 2018a).

2.2 Geography and Climate

The following is an excerpt from the 2016 Jamestown S'Klallam Comprehensive Plan:

> "The Jamestown S'Klallam Tribal community is located on the northern portion of the Olympic Peninsula of Washington State, approximately 70 miles northwest of the city of Seattle. The Peninsula is a distinct and relatively isolated geographic region that is separated from Seattle by two bodies of water.
>
> Two counties, Clallam and Jefferson, comprise the bulk of the Olympic Peninsula. The Peninsula is bounded by the Pacific Ocean to the west, the Strait of Juan de Fuca to the

north, by Hood Canal on the east and by the Olympic Mountain range to the south. A large part of the two counties is densely timbered wilderness or undeveloped areas characterized by rugged mountains, steep slopes and rain forests. Annual precipitation varies widely on the Peninsula, from over 100 inches annually on the west end to only 17 inches in the Sequim area. Major towns in the area are the county seat in Port Angeles (population 18,984), Sequim (population 5,688), and Port Townsend (population 9,134). The area known as "Jamestown" is not an incorporated village, nor does it have a commercial center." (Jamestown S'Klallam 2016)

2.3 Population and Demographics

The 2016 Jamestown S'Klallam Comprehensive Plan details the Tribal population profile:

"As of January 2016, the Jamestown S'Klallam Tribe has 569 enrolled citizens in 434 households. Because [the Tribe] never had a traditional reservation, Tribal citizens and their families live within the communities of Clallam and Jefferson counties, throughout Washington State, as well as in many other states across the nation. Depending upon where citizens live, some benefits of Tribal citizenship may not be available; [the Tribe is] limited to providing certain Federally-funded benefits only to those residing within [the Tribal] Service Area. The following text…is based on 2015 data.

- The *local* population of Tribal citizens consists of 207 enrolled citizens living inside the Tribe's designated Service Area. There are 105 males and 102 females. Currently, 47.3% of the population is 55 years or older, thus qualifying them as "Elders." Within the next ten years, 20 additional citizens will advance to age 55 years.
- The *global* population of Tribal members consists of 569 enrolled citizens living both inside and outside of the Tribe's designated Service Area. There are 269 males and 300 females. Currently, 46.2% of the population is 55 years or older, thus qualifying them as "Elders." Within the next ten years, 63 additional citizens will advance to age 55 years and older." (Jamestown S'Klallam Tribe 2016)

2.4 Tribal Enterprises

The 2016 Jamestown S'Klallam Comprehensive Plan details Tribal economic development:

"Promotion of economic development and opportunities is not new to our citizens. In the 1800's, Tribal citizens used their initiative and developed a strong trading relationship with the immigrant European settlers. This enabled them to amass some financial resources, sufficient to acquire property in 1874 to start rebuilding their homeland.

A hundred years after the Tribe purchased their first property, in 1974, when Tribal citizens decided on a major push for re-recognition by the federal government, our main economic engine was our fireworks stand - and it remained so into the 1980's. The steady stream of revenue generated by it, although modest by today's standards, allowed the Tribe to start hiring staff with experience in economic development, among other things. This new staff was able to assist us in tapping into the various funding resources available for our various initiatives.

As it did in 1874, for the S'Klallams today, land still means opportunity. One of our major focuses is acquiring additional property. Some, but not all, of this property is targeted for economic development opportunities.

The Tribe has access, directly or through its business entities, to socio-economic development opportunities that most local governments and non-profit planning organizations do not have, such as the SBA 8(a) program, the HUBZONE program and, in Washington State, the Minority & Women's Business Enterprise program. All of these programs present unique opportunities and challenges that must be managed to ensure that we remain eligible for each program.

Since the Tribal economy is so closely integrated to the regional economy (there is no reservation economy to speak of, as occurs with some of the larger Tribes in the country), we will continue to utilize every opportunity for cooperation with local and regional, public and private planning groups (such as the Peninsula Development Association, the Clallam and Jefferson county planning and economic development departments, as well similar departments in other tribes) to further our economic development goals and objectives, as well as those of the region.

Economic development officials in the Tribe's local jurisdictions have identified certain areas of economic development that seem to have the best chance for success in the region. We generally agree with those findings. The key for the Tribe is to use our comparative advantages when considering development in any of the targeted industries.

Out of the list of industries that have been identified as having the highest chance of success, we have identified several areas of economic development on which to focus.

The primary growth industries which we believe will create new employment and career opportunities are tourism, high-tech businesses, healthcare and medical supplies, marine services and commercial/residential construction." (Jamestown S'Klallam Tribe 2016)

BUSINESS HIGHLIGHT

Tribal business is diverse and varied, representing an array of enterprises that operate on Tribal land and throughout Clallam County.

- Jamestown Family Health Clinic
- Jamestown Family Dental Clinic
- Northwest Native Expressions Gallery
- Jamestown Seafood
- Point Whitney Shellfish Hatchery
- The Longhouse Market and Deli and Chevron Fueling Station
- Jamestown Excavating
- Jamestown Networks (broadband services)
- Jamestown S'Klallam Tribal Library
- 7 Cedars Casino & Hotel
- House of Seven Brothers
- Napoli's Stone Fired Cuisine
- Rainforest Bar
- Cedars at Dungeness Gold Course
- Stymie's Bar and Grill
- Double Eagle Steak and Seafood
- Dungeness River Audubon Center at Railroad Bridge Park
- Carlsborg Self Storage
- JST Capital
- Cedar Greens Cannabis Shop

2.5 Tribal Lands and Ownership Trends

The 2016 Jamestown S'Klallam Comprehensive Plan details the Tribe's historic and present-day land use:

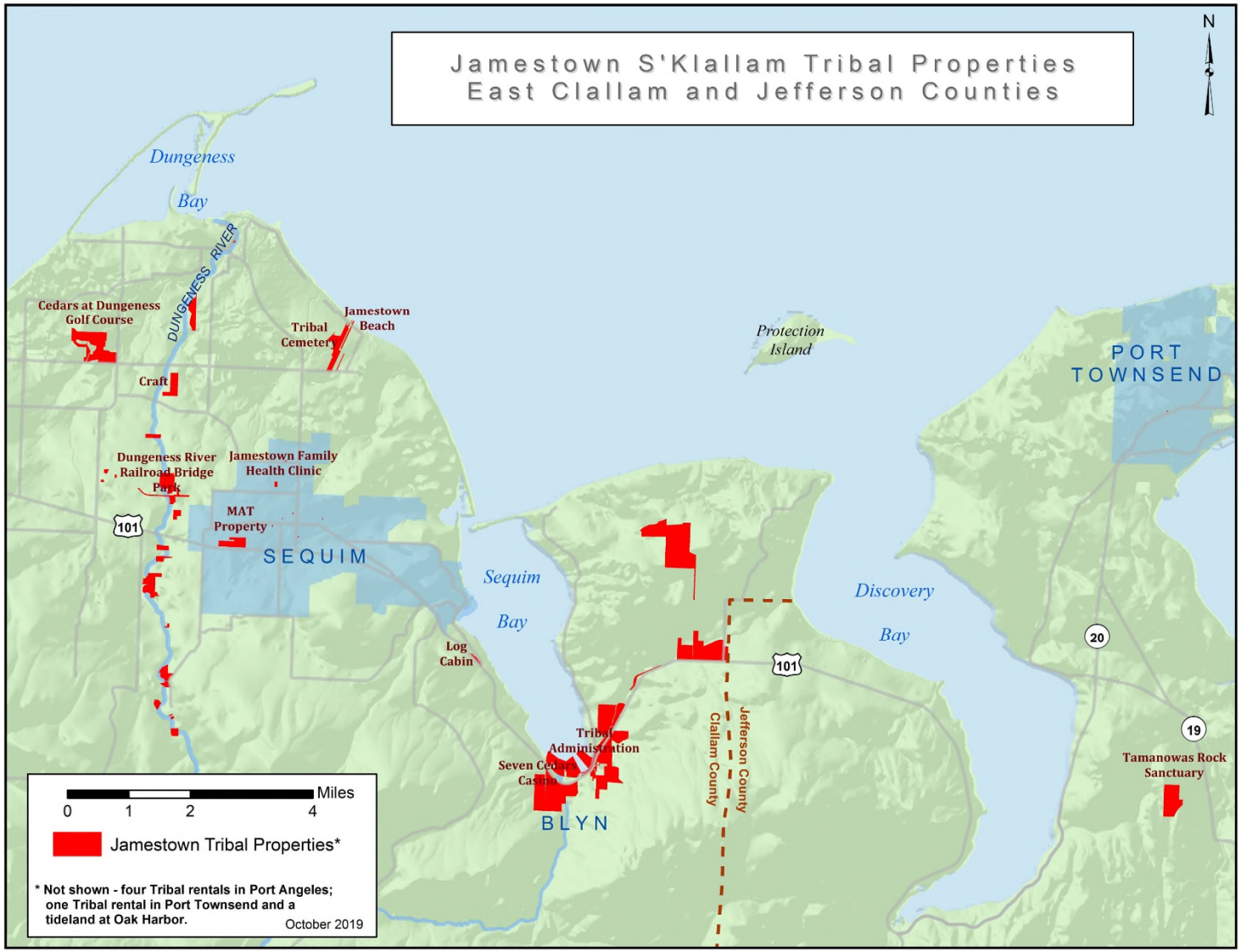
> "The Jamestown S'Klallam Tribe initially acquired roughly ten acres of fee lands in Blyn in 1986, which it then had converted to reservation land, for the Tribal Campus and future Casino. It has been the Tribe's intent from that time forward to continue acquiring lands for rebuilding the Tribe's land base and for future development as they become available; for instance, by in-filling between the Campus and the southwestern edge of the Blyn basin.
>
> The Tribe owns more than 400 acres in Blyn in a mix of reservation, trust and fee status, making it the single largest landowner in Blyn. At some time in the future, all of this property will likely be in reservation/trust status, and therefore no longer under the jurisdiction of Clallam County or the State of Washington.
>
> Although Tribes are not required to plan under Washington State's Growth Management Act, and although our reservation lands are not subject to the jurisdiction of Clallam County or the State, any decisions made by Clallam County or the State with respect to our fee lands will have an impact on our ability to utilize those lands in the future.
>
> Since acquiring initial properties in 1986, it has been the Tribe's intention to establish our Reservation in Blyn primarily (but not exclusively) for economic development and government facilities, and to acquire a land base for a variety of purposes, including housing and cultural activities." (Jamestown S'Klallam Tribe 2016)

2.6 Natural Resources

The 2016 Jamestown S'Klallam Comprehensive Plan details the Tribe's relationship with its natural resources:

> "The Jamestown S'Klallam Tribe has an extremely close and long-lasting relationship with its natural resources. Jamestown people have fished, hunted and gathered across the Olympic Peninsula landscape for thousands of years. Our usual and accustomed fishing areas stretch from the mouth throughout the length of the Strait of Juan de Fuca, the San Juan Islands, Admiralty Inlet and Hood Canal. Historically, Jamestown has been dependent on the wise use and proper management of its natural resources. Today, that dependency and care in management continues even as we increase our economic development.
>
> In modern times the relationship between the Jamestown S'Klallam Tribe and our natural resources has been framed by a treaty with the United States. In 1855 the Jamestown Tribe ceded millions of acres of land to the government while reserving rights to the natural resources on that land and in local waters, including both surface and ground water resources. Water rights are included in the property rights retained by treaty. Today we share these resources with other Tribes and the State of Washington.
>
> The Jamestown S'Klallam Tribe has maintained the right to fish, shellfish, hunt and gather. But that right is empty if there are no fish to catch, no clams to dig, no elk to hunt or berries to gather. Our greatest natural resource concern is that the environment these natural resources live in and the habitat that supports healthy populations be protected. If threatened with harm, the environment must be protected and kept in a highly productive state. If damaged, the habitat must be restored so that fish and wildlife may prosper. If natural resources are in decline, they must be improved so that future populations may thrive.
>
> When we have healthy, sustainable resources we have harvest opportunities. Harvest is important to Tribal citizens, to benefit economically from commercial harvests, to put food on our tables as a result of subsistence harvest and to have access to traditional resources for cultural purposes and for ceremonies." (Jamestown S'Klallam Tribe 2016)

Figure 2-1 Jamestown S'Klallam Tribe



3 HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 3 contains hazard profiles and vulnerability assessments to determine the potential impact of hazard to the people, economy, and built and natural environments of the Jamestown S'Klallam Tribe. They have been streamlined to increase the effectiveness and usability of the HMP.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the Jamestown S'Klallam Tribe]? (Requirement §201.7(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the Jamestown S'Klallam Tribe]? (Requirement §201.7(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.7(c)(2)(ii)]

3.1 General

Clallam County has encountered several major disaster declarations that have affected the Jamestown S'Klallam Tribe. In total, the County has experienced 21 disaster declarations since 1953. Table 3-1 identifies the disaster declarations since 2010.

Table 3-1 Clallam County FEMA Disaster Declarations

Disaster ID	Date of Declaration	Disaster Type	Incident Period
DR-1956	05-Mar-12	Severe Winter Storms, Flooding, Landslides, and Mudslides	14-Jan-12 to 23-Jan-12
DR-4242	15-Oct-15	Severe Windstorm	29-Aug-15
DR-4249	1-Jan-16	Severe Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	12-Nov-15 to 21-Nov-16
DR-4253	2-Feb-16	Severe Winter Storm, Straight-line Winds, Flooding, Landslides, Mudslides, and a Tornado	1-Dec-15 to 14-Dec-15
DR-4418	4-Mar-19	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado	10-Dec-18 to 24-Dec-18

Source: FEMA, Washington Disaster History, Major Disaster Declarations (https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties)

The hazard profiles and vulnerability assessments contained in this chapter represent a considerable amount of work performed by the MPT. MPT members ranked hazards using several key considerations, followed up by activities to validate hazard analysis results and identify specific areas of risk. Table 3-2 displays the hazards that MPT selected for further assessment.

Table 3-2 Hazards Addressed in Plan

Hazard Type	Hazard Name
Natural Hazards	Winter Storm Earthquake Flooding Windstorm Landslide Drought Fire
Human-Caused Hazards	Hazardous Material Incident Active Shooter Disease
Technological Hazards	Power Outages

3.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on MPT feedback during MPT Meeting #1 and #2. The previous Jamestown S'Klallam Hazard Mitigation Plan (2015) was consulted as well to ensure continuity of Tribal priorities.

Following the individual hazard ranking activity, the results were added up and aggregated to show an average score for both Tribal MPT members and are available in Figure 3-1.

Figure 3-1 Jamestown S'Klallam Tribe Hazard Rankings

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Relative Rank
Power Outages	1	5	3	5		3.5	1
Winter Storm	2	4	2	5		3.3	2
Tsunami	5	5	2	1		3.3	3
Cascadia Earthquake	5	5	2	1		3.3	4
Flooding	1	4	2	5		3.0	5
Windstorm	1	4	2	5		3.0	6
Earthquake	5	5	1	1		3.0	7
Active Shooter	4	5	2	1		3.0	8
Hazardous Materials Accident	3	5	2	2		3.0	9
Disease	4	2	4	2		3.0	10
Landslide	2	5	2	2		2.8	11
Drought	1	1	5	4		2.8	12
Wildfire	2	4	3	1		2.5	13

3.3 Hazard-Specific Profiles and Risk Assessments

The following section profiles each hazard identified in Section 3.2 and assesses the risk associated with each. Each risk assessment considers the following attributes:

- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Similar to location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends impact on the Tribe's vulnerability to each hazard since the 2012 plan development (Increased, decreased, unchanged).

Note: Hazard Descriptions, Potential Impacts from Future Climate Conditions, and Cascading Impacts can be found in Chapter 4 of the HMP Basic Plan, as these are not place-specific.

In addition, the hazards have been organized into three sub-sections (high-, medium-, and low-priority) to illustrate the risk-driven nature of the HMP. Each hazard has been given serious consideration of all attributes discussed within. However, low-priority hazards may be shorter in length and with less quantitative analyses, as a lack of usable data is frequently present when considering low-likelihood or low-magnitude events. The three sub-sections are as follows:

- **High-Priority:** Power Outages, Winter Storm, Tsunami, Cascadia Earthquake
- **Medium-Priority:** Flooding, Windstorm, Earthquake, Active Shooter, Hazardous Materials Accident, Disease
- **Low-Priority:** Wildfire, Landslide, Drought

3.3.1 Power Outages

Power Outages

Magnitude	Onset	Duration	Frequency
1	5	3	5

Average	Rank
3.5	1

Location
Numerous Tribal properties are at risk of being affected by utility failures. Tribal housing in the foothills of the Olympic Mountains is known to experience power outages during winter and windstorms that can last anywhere from several hours to several weeks. In addition, utility networks and information technology networks are very vulnerable and could be at a risk to exposure of a hazard that could lead to a utility failure.

Previous Occurrence/History

Historically, utility disruptions and failures have been caused by natural disasters and human-caused accidents but have not been recorded in a way that is publicly accessible. Numerous utility failures occur every year, most frequently in the form of electricity outages that may last as short as hours or as long as weeks. Previous utility failures have led to an increase in welfare check-ins and overall Tribal member needs, as well as having negatively impacted the Tribe's economic interests.

Extent and Probability

It is difficult to predict the impacts of future utility failures, but they have the potential to impact all Tribal government and business operations and cause extensive economic losses among other impacts. Due to the sporadic nature of failures, it is also difficult to estimate how frequently such failures will occur or their duration. The Tribe generally deals with power outages multiple times per year with many of them only lasting a matter of hours. Every several years, a large utility failure is experienced.

Future Probability Trend – Based on potential increases in heat waves and increasing development trends resulting in greater demand, the Tribe may be impacted by an **increase** in the probability of future utility failure. However, mitigation actions outlined in this HMP are designed to decrease such strain on utility systems.

Vulnerability

The Tribe is served by the Clallam Public Utility District (PUD) for electricity.

Electric Power Systems

Power facilities in Clallam County are generally protected from Wildland-Urban Interface Fires (WUIF) by defensible space. A limited number are threatened by tsunami, flood, and landslide hazards. All facilities are threatened to varying degrees by destructive earthquakes.

Water Supply

- The Jamestown residential area has its own well and water transmission system. This well is located in an area that could be subject to flooding.
- The Tribe has a main well and three 105,000-gallon reservoir storage tanks on Zaccardo Road that serve the main Tribal campus, the Longhouse Market, the fire station, and several

Power Outages

residences. There are also smaller wells whose primary purpose is irrigation. The 7 Cedars Casino had its own well.

- The large on-site sewage system that serves the Tribal campus has collection tanks by the shoreline. These on-site sewage tanks are being removed because the Tribal properties in Blyn and the Sequim Bay State Park are preparing to connect to the City of Sequim sewage line.
- There are nine water districts and at least two private water systems in Clallam County that supply customers in their areas with water. Many are threatened by tsunami, flood, WUIF, and landslides. All of these districts are expected to sustain some type of damage and/or outage immediately following a destructive earthquake.
- Most water service ceases to function if electrical power is unavailable.
- Service main and line breaks will cause reduced water pressure in affected areas. Pressure reductions could reduce firefighting capability.
- Water utilities will shut down system components to mitigate damage from pressure loss, pipe leaks and breaks inside of buildings.

With the expansion of utilities systems with new development in recent years, the Tribe's vulnerability to utility failure has **increased**.

3.3.2 Winter Storm

Winter Storm

Magnitude	Onset	Duration	Frequency
2	4	2	5

Average	Rank
3.3	2

Location

While much of the Tribe service area can be affected by winter storms, the western coastal areas are exposed to the more damaging impacts of winter storms. Furthermore, many of the communities along the western and northern coast of the Tribe service area are very remote and have limited road infrastructure that can quickly become compromised during a winter storm.

Previous Occurrence/History

Recent winter storms occurring in the Tribal area resulting in major damage include (snowstorms listed below; see Section 3.3.5, Windstorms, for other types of winter weather):

- 9 February 2019 – North Olympic Peninsula severe winter weather
- 17 March 2014 – Sequim/Port Angeles Blizzard
- 27 December 1996 – Christmas Snowstorm

Winter Storm

Extent and Probability

Winter storm weather is common in the winter, but typically lasts a short time; ice storms (sleet and freezing rain) likewise are typically brief events.

Winter storms may be more extreme during La Niña weather years, such as the 1996 flooding associated with the 1996-1997 La Niña pattern.

Future Probability Trend – The impact of changing weather patterns may have an impact on the probability of future winter storm events. Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, it would seem the Tribe may be impacted by a **decrease** in the probability of future winter storms. However, it is also possible that changing weather patterns could result in an increased likelihood of precipitation during sub-zero temperatures, resulting in an **increase** in the probability of winter storms.

Vulnerability

The Tribe's primary vulnerability from severe weather is from power outages and impairment of transportation. Because nearly all social and economic activity is dependent on transportation, snow can have a serious impact. Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive. Power outages can result from physical damage to electrical infrastructure as a result of ice or snow or increases in demand beyond the capacity of the electrical system.

Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe winter weather events. Persons who are older, are isolated or have disabilities may be more vulnerable, especially those that may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Power losses during winter storms have resulted in deaths from carbon monoxide poisoning if people attempt to keep warm by lighting charcoal fires or operating backup generators indoors.

Since the 2015 plan, the Tribe's vulnerability to winter storms has **increased** as weather patterns change due to climate change and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.3 Earthquake and Tsunami

Earthquake

	Magnitude	Onset	Duration	Frequency	Average	Rank
Tsunami	5	5	2	1	3.3	3
Cascadia Earthquake	5	5	2	1	3.3	4
Earthquake	5	5	1	1	3.0	7

Location

The Cascadia Subduction Zone (CSZ), where the Juan De Fuca plate slides underneath the North American plate poses a great risk to the Tribe and all communities in the Pacific Northwest. A large earthquake would cause significant impacts to all Tribal properties with a structure, and liquefaction may pose a risk to properties without a structure (though the liquefaction risk in the area is graded as

Earthquake

moderate). The region is also subject to smaller, crustal quakes near the Port Angeles/Sequim area associated with the Lake Creek Fault.

Previous Occurrence/History

The most recent earthquake that damaged the Tribe service area was the 2001 Nisqually Earthquake. Small earthquakes occur regularly throughout the region and go unnoticed by residents. Over the last 135 years, there have been nine earthquakes with a magnitude (M) greater than 6.0 in the area that we consider the Northwest. Five of those large quakes (including the Nisqually earthquake) directly impacted the Olympic Peninsula, according to eyewitness accounts.

- 1700, CSZ Earthquake, M 9.0
- 1909, San Juan Island, M 6.0
- 1939, Vashon Island, M 6.1
- 1949, Olympia, M 7.1
- 1965, Seattle – Tacoma, M 6.5
- 2001, Nisqually, M 6.8

Based on the geological record and first-hand accounts, tsunami from locations across the Pacific Ocean basin and from the CSZ off the Washington coast have hit Washington State coastal communities at least 7 times in the last 3,500 years. The largest of the nearby triggers, the CSZ, produced the most recent great tsunami in 1700 AD (Lange 2003).

- 2006 Kuril Islands, Japan Tsunami (La Push, 0.52 feet; Neah Bay, 0.01 feet; Port Angeles, 0.39; Westport, 0.16 feet)
- 1964 Alaskan Tsunami (Neah Bay, 0.7 feet)
- 1960 Chilean Tsunami (Neah Bay, 1.2 feet)
- 1700 Cascadia Tsunami (Washington Coast, 33 feet)

Extent and Probability

Earthquakes pose a widespread hazard throughout the Tribe service area. Tsunami post a widespread hazard throughout the coastal area. The cascading impacts of earthquakes, such as tsunami and liquefaction, are dependent on geography and soil type, as detailed above.

The Ring of Fire will continue to generate tectonic triggers. The CSZ has produced earthquakes measuring M 8.0 and above at least seven times in the past 3,500 years. The time intervals between these events has varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.

There is evidence of two earthquakes on the Lake Creek Fault between 2,000 and 700 years ago. An earthquake of M 6.8 along the Lake Creek Fault would produce the greatest intensity shaking in the vicinity of Port Angeles and Sequim.

Future Probability Trend – Future weather and development trends play no known role in the probability of future earthquake events. However, both may play a role in the magnitude of earthquake impacts. Great earthquakes in the Pacific Ocean basin generate tsunamis that impact Washington's outer coast and the Strait of Juan de Fuca at a rate of about six every 100 years. In the CSZ, there is a 10 to 14% chance of a M 9.0 earthquake and tsunami in the next 50 years, so the likelihood of recurrence would be low.

Earthquake

Vulnerability

Vulnerability posed by earthquakes to the Tribe is measured by accounting for the critical infrastructure that are at risk. The following infrastructure/property types are at high risk from earthquake shaking:

- Olympic Discovery Trail Dungeness River/RR Bridge Park (6 structures)
- Economic or Cultural Assets (7 structures)
- Dwellings and/or NAHASDA rental properties (19 structures)
- Casino Subarea (1 structure)
- Vulnerable populations (3 structures)
- Offices and Tribal government (8 structures)
- Water Supply (1 structure)
- Wastewater System (5 structures)
- Equipment facilities and storage (3 structures)
- Transportation (1 structure)
- Communication (1 structure)

The following infrastructure/property types are at a high risk for tsunami damage:

- Olympic Discovery Trail Dungeness River/RR Bridge Park (4 structures)
- Tribal economic/cultural asset (13 structures)
- Dwellings and/or NAHASDA rental properties (10 structures)
- Vulnerable populations (2 structures)
- Offices and Tribal government (7 structures)
- Water Supply (2 structures)
- Wastewater System (1 structure)
- Equipment facilities and storage (2 structures)

Awareness of the Tribe's vulnerability to earthquakes or tsunamis has increased with participation in regional drills and public outreach efforts. More structures are being designed to be resilient to tectonic activity. Given these changes, the vulnerability of the Tribe to earthquakes and tsunami is **unchanged**.

3.3.4 Flooding

Flooding

Magnitude	Onset	Duration	Frequency
1	4	2	5

Average	Rank
3.0	5

Location

The primary riverine hazards are associated with the following rivers and streams, general from west to east: Quileute River, Bogachiel River, Calawah River, Sol Duc River, East Dickey Creek, Sekiu River, Hoko River, Clallam River, Reed Creek, Elwha River, Morse Creek and Dungeness River. Riverine hazards extend across the Tribe service area but are primarily located near the mouths of the rivers in the northern portion of the area, and in the central and western portions of the service area, along

Flooding

the extent of US-101, 110, and 110 Spur. Data from the *Dungeness River Comprehensive Flood Hazard Management Plan* indicate a trend of increasing peak flows for the Dungeness and Elwha Rivers in the Tribe service area between 1924 and 2002 (Clallam County 2009; 2010).

Ediz Hook and parts of Port Angeles, and the Gibbon and Travis spits in the mouth of Sequim Bay may become inundated with high tides and storm surges. Much of the Clallam, Elwha, and Dungeness tidal areas may be impacted by high tides and river flooding (Clallam County 2010).

Previous Occurrence/History

Flood damages with the highest consequence, either related to the cost to repair or by the impact on human activities, were incurred during the 1979, 1990, 1996/1997, and 2008/2009 flood and severe storm events. Historically, the most damage to life or property has occurred from flooding of the Bogachiel River and flooding of the Kinkade Island and River's End segments of the Dungeness River.

Jimmycomelateley Creek and the lower Sequim delta was also an area of historic flooding. The Jamestown S'Klallam Tribe, the Clallam Conservation District, Clallam County, and other stakeholders completed a restoration project to return the functionality of the creek's floodplain and to improve fish passage. As of 2009, flooding has largely been remedied (Jamestown S'Klallam 2015).

Extent and Probability

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property. Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by U.S. Geological Survey (USGS) stream gauges located throughout the area. It can also be measured by past damages of flooding.

The region experiences some flooding twice a year at minimum, while larger floods occur once a decade and major flood events occurring every 30-50 years.

The County and Tribe have an extensive network of flood management solutions that have evolved as attitudes toward flood management have changed in Washington State. As part of the *Dungeness River Comprehensive Flood Management Plan* (2009), the County and partners conducted an inventory of levees and dikes on the lower Dungeness River to ascertain whether hard armoring could be removed without resulting in damage to private property. The Lower Elwha Dam on the Elwha River was removed in 2014 as part of an effort to restore the floodplain to its historic condition and revitalize wildlife habitat along the river (Lower Elwha Klallam Tribe 2019).

Future Probability Trend – Based on potential increase in high-intensity precipitation events and increased development trends (resulting in additional impervious surfaces and stormwater runoff), the County may be impacted by an **increase** in the probability of future floods.

Vulnerability

The Jamestown residential area has its own well and water transmission system, located in an area vulnerable to flooding.

The Tribe does not currently participate in the National Flood Insurance Program (NFIP) Community Rating System (CRS).

Vulnerability posed by flooding the Tribal service area is measured by accounting for the critical infrastructure that are at risk. The following Tribe infrastructure/property types are classified as being

Flooding

vulnerable to flooding:

- Olympic Discovery Trail Dungeness River/RR Bridge Park (6 structures)
- Dwellings (12 structures)
- Economic or Cultural Asset (22 structures)
- Critical Facilities/Infrastructure (1 structure)
- Vulnerable Populations (2 structures)
- Equipment and Storage Facilities (2 structures)
- Tribal Government and Offices (7 structures)
- Wastewater System (2 structures)
- Water Supply (2 structures)

Since the 2015 plan, the Tribe's vulnerability to nuisance flooding has **increased** as precipitation patterns shift due to climate change. However, the Tribe is taking active steps to mitigate the impacts of flooding.

3.3.5 Windstorm

Windstorm

Magnitude	Onset	Duration	Frequency
1	4	2	5

Average	Rank
3.0	6

Location
All County and Tribal properties and structures can be affected by windstorms. Properties with infrastructures, utilities, and tree stands can have more damaging impacts during windstorms, especially in coastal areas where winds speeds can reach 40 to 60 miles per hour (mph) during the winter months.

Previous Occurrence/History

Recent windstorms occurring in the Tribe service area resulting in major damage include:

- 17 December 2018 – Clallam and East Jefferson Counties Windstorm
- 15-16 October 2016 – Typhoon Songda
- 14 December 2006 – "Hanukkah Eve" Windstorm
- 20 January 1993 – "Inaugural Day" Storm

These windstorms have caused damage to County and Tribal structures and housing; extensive utilities damage; restricted access to public lands; and required increased strain on the government's and Tribe's operations.

Extent and Probability

Coastal areas of the Tribe service area experience higher winds than other areas. However, windstorms can occur anywhere throughout the area. Windstorms can damage buildings, structures, utilities, and tree stands, causing millions of dollars' worth of damage.

Future Probability Trend – Future weather conditions have the potential to lead to an increase in severe and extreme weather patterns, leading to an **increase** in the probability of a windstorm. In addition, increased development has the potential to expose more assets to the impacts of windstorms.

Vulnerability

The Tribe's vulnerability to severe windstorms are related to power outages and debris blocking land-based transportation routes. Because nearly all social and economic activity is dependent on transportation, damage from windstorms can have a serious impact.

Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. More rural communities located in the foothills are particularly vulnerable to road outages and face longer delays in debris removal. Additionally, vehicle accidents rise among those who try to drive during windstorms (U.S. Department of Transportation 2018).

Power outages can result from physical damage to electrical infrastructure as a result of downed trees and blown debris. Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe windstorms. Additionally, persons with electric-based health support systems are vulnerable to power outages everywhere.

Windstorm

Since the 2015 plan, the Tribe's vulnerability to windstorms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.6 Active Shooter

Active Shooter

Magnitude	Onset	Duration	Frequency
4	5	2	1

Average	Rank
3.0	8

Location

Any populated Tribal property can be impacted by active threat. These areas include, but are not limited to, shopping structures, casinos, clinics, schools, government offices and buildings, and Tribal housing.

Previous Occurrence/History

There have been no active threat incidents in Clallam County's recent history. A murder suspect was shot and killed by County sheriff's deputies at the Longhouse Market and Deli in 2008 after he opened fire (Seattle Times 2008).

Extent and Probability

With no existing records of recent active threat directly impacting the Tribe, it is difficult to estimate the extent or probability of its occurrence. Nonetheless, it can be deduced that active threat could affect all populated areas in the Tribe service area; government and Tribal facilities and schools may be most likely targeted.

Future Probability Trend – Future weather conditions have no direct connections to active threats. However, increased development and urbanization have the potential to **increase** the probability of a future active threat.

Vulnerability

No estimates are available to determine potential losses associated with active threat. However, we can assume that if an active threat were to be directed at the Tribe, schools and government buildings would likely be a top target. Active threats could have an impact on the community in the following ways: loss of human life, damage to buildings and structures, temporary displacement during the threat and/or investigation, stress on medical and security services, loss of hospitality business during the event, and an increased need for emergency services and funding.

Since the 2015 plan, there more public awareness about how to respond in the event of an active threat. School districts and police departments hold drills to practice response actions. The Tribe's vulnerability to an Active Threat is **unchanged.**

3.3.7 Hazardous Materials Incident

Hazardous Materials Incident

Magnitude	Onset	Duration	Frequency
3	5	2	2

Average	Rank
3.0	9

Location
Numerous fixed-location storage sites exist near Tribal properties but have rarely caused an incident. Therefore, the Tribe views the most likely hazardous materials incident to be caused by a traffic accident along US-101 or the railroad corridor. The Port of Port Angeles is also a major shipping facility with an increased potential for hazardous materials incident. Furthermore, the Strait of Juan de Fuca is a major thoroughfare for oil tankers.

Previous Occurrence/History

According to a search of the Pipeline and Hazardous Materials Safety Administration (PHMSA) incident reporting database, there have been no hazardous materials incidents associated with the Tribal service area (PHMSA 2019).

The Washington State Department of Ecology maintains records of marine oil spills since 2015; no oil spills with volumes greater than 10 gallons have been recorded in Sequim Bay (Ecology 2019)

Extent and Probability

The uncontrolled release of hazardous materials during transport can result in death or injury to people and damage to property and the environment through the material's flammability, toxicity, corrosiveness, chemical instability, and/or combustibility. Individuals may be exposed to hazardous materials at acute or chronic levels. In the event of a marine oil spill, ecological systems could be damaged from the pollution and recreational activities subsequently limited.

Future Probability Trend – Increased development trends and potential increase in high-intensity precipitation events present the potential for an increase in hazardous materials passing through the area and traffic accidents, respectively. As the expansion of Tribal enterprise continues in Blyn along the US-101 corridor, there will be increased traffic along the highway. Each factor presents the potential for an **increase** in future hazardous materials incidents.

Vulnerability

Based on the analysis of hazardous materials incidents occurring in Clallam County since 1975, most spills have occurred on the County's major highways. With the expansion of the 7 Cedars Casino and other Tribal economic enterprises in Blyn, traffic along US-101 will continue to increase in volume; thereby **increasing** the Tribe's vulnerability to hazardous materials incidents along this corridor.

3.3.8 Disease

Disease

Magnitude	Onset	Duration	Frequency	Average	Rank
4	2	4	2	3.0	10

Location

The Clallam County Public Health Services administers public health awareness programs to provide information on diseases influencing the County population. The following facilities are communicable disease testing sites:

- Private healthcare provider offices
- Clinicare Walk-In Clinic
- Volunteers in Medicine of the Olympics Clinic for uninsured/low income
- Planned Parenthood for sexually transmitted diseases (STDs), human immunodeficiency virus (HIV), & Hepatitis C
- Clallam County Public Health Section on a limited, case by case basis.

The Jamestown S'Klallam Tribe operates the Jamestown Family Health Clinic in Sequim, which provides primary healthcare services to Tribal citizens and non-tribal community members (Jamestown S'Klallam Tribe 2018b).

Previous Occurrence/History

February 2015: A kindergartner was diagnosed with measles in Port Angeles; a total of 5 people in the Tribe service area were diagnosed with measles, with 1 fatality (Seattle Times 2015).

Extent and Probability

Although it is impossible to predict the next infectious disease outbreak, history shows that outbreaks are not uncommon and can devastate communities. Infectious diseases can affect the County's entire population. Diseases may also infect livestock herds and can potentially be communicated from animal vectors to humans. Recent medical advancements increase our ability to counteract such outbreaks and limit their extent, but additional concerns related to diseases building resistance to drugs is an ongoing concern.

Future Probability Trend – Based on potential changing weather patterns, the County may be impacted by an **increase** in the probability of emerging infectious disease.

Disease

Vulnerability

Epidemic and pandemic diseases have been known to spread quickly throughout communities. Many diseases spread through close contact, meaning that highly populated areas are more prone to widespread outbreaks; a lot of public activities are centered out of the Port Angeles and Sequim area. However, compared to a metropolitan area, the smaller relative population density of the two major County communities decreases the likelihood of a widespread outbreak in comparison to a more densely populated area.

The rural nature of much of the County also presents a key vulnerability: Healthcare resources and hospitals are in short supply and would likely become overburdened immediately following a disease outbreak.

Given the expansion of population centers such as Port Angeles and Sequim, the vulnerability of the County to disease has **increased**.

3.3.9 Landslide

Landslide

Magnitude	Onset	Duration	Frequency
2	5	2	2

Average	Rank
2.8	11

Location

The following are areas that may present a landslide hazard for the Jamestown S'Klallam Tribe (STARR 2013):

- Along major roadways, including US-101 and Route 112
- Areas along major rivers, including the Lower Dungeness
- The Olympic Discovery Trail
- Blyn Basin and the surrounding hills/mountains
- Bluff area along Sequim Bay, Johnson Creek and Bell Creek

Previous Occurrence/History

Historically, the damages with the highest consequence, either related to the value of the repair or by the impact on human activities, include slides that have closed US-101 and slides in Port Angeles (one of which caused a fatality in 1998) (Clallam County 2010).

Rain and high water eroded the west end of the trestle bridge at Railroad Park Bridge in December 2009. The embankment eroded enough to compromise the concrete slab that anchored the bridge (Jamestown S'Klallam 2015). This slope failure has since been remediated.

A landslide obstructed the Olympic Discovery Trail in 2014 (Peninsula Daily News 2014).

Landslide

Extent and Probability

The following is excerpted from the hazard assessment conducted by Clallam County Emergency Management Division (EMD) as part of the 2016 Cascadia Rising Exercise (Buck 2016):

> "It is very difficult to make quantitative predictions of the likelihood or the size of a future landslide event. An accurate understanding of the landslide hazard for a given facility requires a detailed landslide hazard evaluation by a geotechnical engineer. Such site-specific studies evaluate the slop, soil/rock and groundwater characteristics. Such assessments may require drilling to determine subsurface soil/rock characteristics. In some cases, landslide hazard assessments by more than one geotechnical engineer may reach confliction opinions."

Due to the geology and likelihood of landslide-triggering storms in Clallam County, the probability of future occurrence of landslides is high in the Tribal service area.

Future Probability Trend – Based on potential increases in drought and wildfires, as well as potentially higher intensity precipitation events, the Tribe may be impacted by an **increase** in the probability of future landslides. In addition, as the Tribe increases its land ownership and development, landslides may pose a greater risk on disturbed soils.

Vulnerability

The landslides and erosion in upper watersheds and forest lands are causing recurring damage and disruption to important roadways. Sedimentation from these areas is accumulating in the rivers and streams, causing flooding and habitat degradation. It is uncertain what the precise causes of mass wasting are; whether the roads form a conduit, the failures originate from side cast, or a combination of factors is involved.

Vulnerability posed by landslides to the Tribe is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Base Plan, the following Tribal infrastructure types are classified as being susceptible to ground failure or erosion (Jamestown S'Klallam 2015):

- Olympic Discovery Trail Dungeness River/RR Bridge Park (6 structures)
- Cultural or Economic Asset (5 structures)
- Dwellings (2 structures)
- Vulnerable Populations (2 structures)
- Tribal Government and Offices (7 structures)
- Storage and Equipment Facilities (2 structures)
- Wastewater Facilities (4 structures)
- Water Supply (2 structures)
- Transportation (1 structure)

Since the 2015 plan, the Tribe's vulnerability to landslides is **unchanged**.

3.3.10 Drought

Drought

Magnitude	Onset	Duration	Frequency
1	1	5	4

Average	Rank
2.8	12

Location
Drought could impact all Tribal properties that use water to a certain extent. The western portion of the Tribe service area (Sequim) historically has low rainfall and is experiencing rapid development and population increase.

Previous Occurrence/History

During the summer of 2007, the Makah Indian Reservation had a declared emergency due to a water shortage and used rationing and a desalination plant on loan from the Navy to weather the crisis. Since that time, they have increased their water storage capacity and have not suffered any further shortage.

Drought animations over time are available at: http://droughtmonitor.unl.edu/Maps/Animations.aspx (U.S. Drought Monitor 2019).

Extent and Probability

Northeast Clallam County, which is in the rainshadow of the Olympic Mountains, is the most vulnerable to the effects of drought (Desisto et al. 2009).

As the graph below indicates, there has been one period of extreme drought within Clallam County over the last 17 years (U.S. Drought Monitor 2019). During a two-month period in 2015, 100% of the County's area was marked by D3 to D4 droughts (the most intense forms of drought). Additionally, in 2001, 2003, 2006, 2009, 2014, 2017, and 2018, areas of the County experienced moderate to extreme drought. As of May 2019, a drought emergency was declared in the Elwha-Dungeness, Lyre-Hoko, and Soleduc watersheds, which encompass the entirety of Clallam County (Governor of Washington 2019).

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of prolonged heat, the County may be impacted by an **increase** in the probability of future droughts.

Vulnerability

Droughts impact individuals (farm owners, tenants, and farm laborers), the agricultural industry, and other agriculture-related sectors. Lack of snowpack has forced ski resorts into bankruptcy. There is increased danger of forest and wildland fires. Millions of board feet of timber have been lost. Loss of forests and trees increases erosion causing serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Problems of domestic and municipal water supplies are historically corrected by building another reservoir, a larger pipeline, a new well, or some other facility. Short-term measures, such as using large capacity water tankers to supply domestic potable water, have also been used. Low stream flows have created high temperatures, oxygen depletion, disease, and lack of spawning areas for our fish resources.

Drought

The Tribe's vulnerability to drought has **increased** since 2015, as the demand has grown, and historic water supply shifts due to climate change and increased development.

3.3.11 Fire

Fire

Magnitude	Onset	Duration	Frequency
2	4	3	1

Average	Rank
2.5	13

Location

According to the *Community Wildfire Protection Plan* (CWPP), large fires in western Washington typically occur on steep south-facing slopes, and often result from a combination of circumstances including a source of ignition in areas of dry, heavy fuels, an extended period of drought, and dry east winds (Clallam County 2009a). Forest fires in this area usually occur during the dry summer months of July, August, and early September, but they can occur anytime between April and October given the right conditions. Fire hazard increases in the late summer and early fall when hot, dry east winds (subsidence winds) occur more frequently and the area has experienced the low point of the annual precipitation cycle. The portion of the Peninsula with the highest potential for major fires is the area between Port Angeles and Hood Canal, though as residents of Forks can attest, large forest can occur anywhere on the Peninsula (Clallam County 2010).

The following is an excerpt from the previous Jamestown S'Klallam Hazard Mitigation Plan (2015):

> "Wildland and Urban Interface fire can occur throughout the study area. As cool moist air moves inland from the Pacific Ocean, the mountains "dam" clouds, and uplift causes the moisture to drain out of the air and fall as precipitation in the western portion of the Peninsula. On the other side of the rainshadow, the Dungeness Watershed where much of the Jamestown S'Klallam Tribe's land holdings are located is considered one of Washington State's driest watersheds west of the Cascade Mountains. The Sequim Bay area is particularly prone to wildland urban interface fires. Natural fuels in the region range from grasslands which are very dry in the summer months to thick stands of timber with a dense understory."

Previous Occurrence/History

Previous wildland fires that have affected Clallam County include "The Great Forks Fire of 1951," 1955 in the West Twin River area, and 2002 in the Clallam Bay area. The fires in 1951 began near Lake Crescent and burned into and around Forks. Approximately 30 buildings and between 33,000 and 38,000 acres of timber were lost. The 1955 fire burned approximately 5,000 acres of timber. The 2002 fire started as slash burnings on private land. In July 2004, a wildfire ignited near Joyce at Striped Peak, burning between three and four acres of private hillside land. Joyce experienced another wildfire in May 2006 when a controlled burn near the town grew into a five-acre wildfire. From January 2008 to August 2009, 38 different wildfire incidents have occurred within Clallam County, outside of Olympic National Park (Clallam County 2010).

Fire

In December 2003, the City of Port Angeles experienced a significant fire at the Elks Naval lodge, one of the City's largest structures located in the downtown core (Clallam County 2010).

Extent and Probability

A Headwaters Economics study found that Clallam County has more square miles of developed land within the wildland-urban interface than any other county in Washington State (72 square miles) and the fifth most area in the Wildland-Urban Interface (WUI) in the entire United States. The same study found that 13,271 homes were located within the WUI throughout the County (Headwaters Economics 2013).

Weather conditions greatly influence the impact and extent of wildfires. Drought, high temperatures, and wind contribute to a dynamic and changing conditions of wildfires. Fuel load and vegetation contribute to the size and intensity of wildfires.

Wildfires are frequent and inevitable. Within the region, most wildfires burn during the June to October time period.

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, the Tribe may be impacted by an **increase** in the probability of future fires.

Vulnerability

Wildfires in Clallam County generally occur in the lower lying, WUI areas, particularly near Forks, Sequim and Blyn.

Due to the limited number of land-based evacuation routes, the County and Tribe may become isolated during a wildfire—limiting access to healthcare facilities, shelters, and other resources. Other critical infrastructures vulnerable to wildfires include water systems, refined fuel systems, and communications systems.

Vulnerability posed by wildfires (particularly WUI fire) to Clallam County is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the base plan, the following Tribal infrastructure types are classified as being vulnerable to WUI fire:

- Cultural or Economic Assets (13 structures)
- Dwellings (8 structures)
- Tribal Government and Offices (1 structure)
- Storage and Equipment Facilities (4 structures)
- Vulnerable Populations (2 structures)
- Communications (1 structure)
- Water Supply (1 structure)

Since the 2015 Tribal HMP, development in County population centers has expanded further into the WUI; therefore, the vulnerability has **increased**.

3.4 Vulnerability Assessment

3.4.1 Identifying Critical Infrastructure

Critical infrastructure was identified for this plan update using a combination of the methodology outlined in Section 4.6 of the Base Plan in addition to referring to the comprehensive list of critical infrastructure identified in the Tribe's standalone plan in 2015. This list of critical infrastructure has been updated through review by Tribal members of the MPT.

3.4.2 Severe Repetitive Loss Properties

There are no NFIP-identified severe repetitive loss properties located on Jamestown S'Klallam Tribal lands.

3.4.3 Exposure Assessment

Table 3-3 contains a summary of critical infrastructure associated with the Jamestown S'Klallam Tribe. This list was assembled and updated during the 2015 hazard mitigation planning process. The vulnerability of each structure is to earthquake, tsunami, flooding, severe weather (which includes winter storm and windstorm), fire, and landslide is assessed.

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Interpretive Building - Railroad Bridge Park Sequim, WA	Audubon/ Dungeness River	Cultural/Historical/ Educational	H	H	M	M	M	H
Olympic Discovery Trail Dungeness River/RR Bridge Park	Audubon/ Dungeness River	Transportation, tourism	H	H	H	H	H	M
Railroad Bridge Park – Picnic Structure Sequim, WA	Audubon/ Dungeness River	Visitor facilities/ recreational	H	H	M	M	M	H
Railroad Bridge Park Sequim, WA	Audubon/ Dungeness River	Cultural/Historical/ Educational/ Recreational/ Transportation	H	M	H	H	H	M
Railroad Bridge Park - Trestle Railroad Bridge Park Sequim, WA	Audubon/ Dungeness River	Cultural/Historical/ Educational/ Recreational Transportation	H	H	H	H	H	M
Restrooms Railroad Bridge Park Sequim, WA	Audubon/ Dungeness River	Visitor facilities	H	H	M	M	M	H

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Wood (no address; just north of RR Bridge Park)	Audubon/ Dungeness River	Recreational	H	H	M	M	M	H
431 Patricia Ln. Sequim, WA	Audubon/ Dungeness River	Conservation	H	H	M	M	M	H
Dungeness Meadows/Couhig	Audubon/ Dungeness River	Conservation	H	H	M	M	M	H
"House of Myths" Carving Building 991 Old Blyn Hwy, Sequim, WA	Blyn (lower)	Cultural asset/ tourism	H	H	H	H	H	L
Annex - Building 991 Old Blyn Highway Sequim, WA	Blyn (lower)	Offices	H	H	H	H	H	L
Annex - Gallery Gift Shop 991 Old Blyn Hwy, Sequim, WA	Blyn (lower)	Cultural and economic asset/ tourism	H	H	H	H	H	L
Annex - Library Collection 991 Old Blyn Hwy Sequim, WA	Blyn (lower)	Cultural assets	H	H	H	H	H	L
Campus Maintenance Bldg 1033 Old Blyn Hwy, Sequim, WA	Blyn (lower)	Equipment facility	H	H	H	H	H	L
Dental Clinic/Community Center 1031 Old Blyn Hwy Sequim WA	Blyn (lower)	Vulnerable population Essential facilities	H	H	H	H	H	L

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Display Sign 3830 West Sequim Bay, Sequim, WA	Blyn (lower)	Economic asset	L	H	H	M	M	H
Heron Hall 1033 Old Blyn Hwy, Sequim, WA	Blyn (lower)	Potentially vulnerable population	H	H	H	H	H	L
Mobile Home 271963 Hwy 101 E Sequim, WA	Blyn (lower)	Tribal Rental	H	H	M	L	L	M
Modular 2092 Old Blyn Highway Sequim, WA	Blyn (lower)	Tribal Rental	H	H	H	M	H	M
Garage 931 Old Blyn Highway, Sequim, WA	Blyn (lower)	Exercise facility/Economic	H	H	H	H	H	L
Olympic Discovery Trail Hwy 101-Log Cabin Blyn	Blyn (lower)	Transportation, tourism	H	L	H	H	M	L
Olympic Discovery Trail Hwy 101-Tribal Land Blyn	Blyn (lower)	Transportation, tourism	H	L	H	H	M	L
Rental Dwelling 1950 Old Blyn Hwy Sequim, WA	Blyn (lower)	NAHASDA	H	H	H	M	H	M

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Rental Dwelling (Knutson) 2150 Old Blyn Hwy Sequim, WA	Blyn (lower)	Tribal Rental	H	H	H	M	H	M
Rental Dwelling 1790 Old Blyn Hwy Sequim, WA	Blyn (lower)	Tribal Rental	H	H	H	M	H	M
Totems and Carved Panels Sequim, WA	Blyn (lower)	Cultural assets	M	L	H	H	M	M
Tribal Center-Administration 1033 Old Blyn Hwy, Sequim, WA	Blyn (lower)	Offices/Tribal records	M	H	H	M	H	L
Tribal Planning Office 931 Old Blyn Highway, Sequim, WA	Blyn (lower)	Tribal offices, records and archives	H	H	H	H	H	L
Tribal Wastewater Infrastructure – Lower Campus Sequim, WA	Blyn (lower)	Wastewater collection and distribution	H	L	H	H	H	L
861 Old Blyn Hwy Sequim, WA	Blyn (lower)	Tribal Government	H	L	H	H	H	L
2150 Old Blyn Hwy Sequim, WA	Blyn (lower)	Tribe rental	H	L	H	H	H	L
271391 Hwy 101 (Pullout) Sequim, WA	Blyn (lower)	Tribal Government, Tourist facilities	H	L	H	H	H	L

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
1512 Old Blyn Hwy Sequim, WA	Blyn (lower)	Tribal Government	H	L	H	H	H	L
Jensen-Simms II 1790 Old Blyn Hwy Sequim, WA	Blyn (lower)	Olympic Discovery Trail	H	L	H	H	H	L
Westrem 1083 Old Blyn Hwy Sequim, WA	Blyn (lower)	Tribal Government	H	L	H	H	H	L
Barn 263 Zaccardo Road, Sequim, WA	Blyn (upper)	Equipment storage	M	H	H	M	L	H
Canoe Shed 263 Zaccardo Road, Sequim, WA	Blyn (upper)	Cultural/Historical Asset	M	H	M	M	L	H
Deck and Cover 263 Zaccardo Road, Sequim, WA	Blyn (upper)	Residential appurtenance	M	H	H	M	L	H
Cell Tower – wireless communication facilities	Blyn (upper)	Infrastructure, economic asset	M	H	H	M	L	H
Education Center/ Children's Program Facility 233 Zaccardo Road, Sequim, WA	Blyn (upper)	Vulnerable population	M	H	M	M	L	H
Bus Barn 233 Zaccardo Road, Sequim, WA	Blyn (upper)	Vehicle storage/maintenance	M	H	M	M	L	H

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Maintenance Building 263 Zaccardo Road, Sequim, WA	Blyn (upper)	Equipment storage	M	H	M	M	L	H
Rental Dwelling (Carlson) 263 Zaccardo Road, Sequim, WA	Blyn (upper)	Tribal Rental	M	H	M	M	L	H
Scenic Pullout: Interpretive Display Bldg Hwy 101, Sequim, WA	Blyn (upper)	Cultural/Historical tourism	H	H	M	M	H	L
Scenic Pullout: Kiosk Hwy 101 Sequim, WA	Blyn (upper)	Cultural/Historical tourism	H	H	M	M	H	L
Scenic Pullout: Parking and Restrooms	Blyn (upper)	Infrastructure and tourism facilities	H	H	M	M	H	L
Social & Community 70-72 Zaccardo Road Sequim, WA	Blyn (upper)	Vulnerable populations, essential facility Offices and records	M	H	M	M	L	H
Tribal Campus Water Tower & Infrastructure 238	Blyn (upper)	Water Supply	L	H	M	H	L	M
Tribal Wastewater Infrastructure – Upper Campus	Blyn (upper)	Wastewater treatment and disposal	M	M	H	H	L	M
Storage Building (Gesdahl) 233 Zaccardo Road, Sequim, WA	Blyn (upper)	Storage	M	M	M	M	L	H

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
271754 Hwy 101 Sequim, WA	Blyn (upper)	Tribe rental	M	M	M	M	L	H
395 Correia Rd. Sequim, WA	Blyn (upper)	Tribe rental	M	M	M	M	L	H
271756 Hwy 101 Sequim, WA	Blyn (upper)	Tribe rental	M	M	M	M	L	H
272172 Hwy 101 Sequim, WA	Blyn (upper)	Tribe rental	M	M	M	M	L	H
Carlsborg Self Storage 292 Business Park Carlsborg, WA	Carlsborg	Tribal economic asset; Tribal records, and cultural artifacts and	L	M	M	L	L	L
Parrish 431 Business Park Loop (Ruth's Pl.) Carlsborg, WA	Carlsborg	EDA (JKTX shop)	L	M	M	L	L	L
Economic Development 257 Business Park Loop, Sequim, WA	Carlsborg area	Tribal economic infrastructure, future Data Center and records storage facility	L	M	M	L	L	L
Cedar Greens, 52 Sophus Rd, Sequim, WA 98382	Casino subarea	Economic asset	H	M	M	L	M	M
Dwelling 271020 Hwy 101 Sequim, WA	Casino subarea	Residence	H	H	M	L	H	M

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Dwelling/Garage 192 Correia Sequim, WA	Casino subarea	Tribal storage - TGA	H	M	H	H	M	M
Fire Station 54 Sophus Road Sequim, WA	Casino subarea	Critical facility	H	M	M	L	M	M
Well Sophus Road Sequim, WA	Casino subarea	Infrastructure	L	L	L	L	L	L
Dwelling 270934 Highway 101 Sequim, WA	Casino subarea	Tribal Rental	H	H	H	M	H	M
Public Safety and Justice Center, 110 Sophus Rd	Casino subarea	Tribal Government & popup Emergency Operations Center	H	M	M	L	M	M
Seven Cedars Resort - Casino Sequim, WA	Casino subarea	Economic asset; Critical Facility	H	M	M	L	M	H
Seven Cedars Resort - Longhouse Market and Deli 271020 Hwy 101 Sequim, WA	Casino subarea	Economic asset; Critical Facility	H	M	M	L	M	H
Seven Cedars Resort – Wastewater System Sequim, WA	Casino subarea	Wastewater infrastructure	H	M	H	H	L	M
Seven Cedars Resort – Water Tower Sequim, WA	Casino subarea	Water supply and storage infrastructure	M	M	H	H	L	M

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
TGA Office 192 Correia Sequim, WA	Casino subarea	Tribal offices and records	M	M	H	H	L	M
Dwelling 294 & 295 Woods Rd. Sequim, WA	Casino subarea	Dwelling	M	M	H	H	L	M
Pedestrian Tunnel under Highway 101	Connecting Blyn lower and upper	Transportation	M	M	H	H	L	M
Dwelling 2203 Woodcock Rd. Sequim, WA	Dungeness	Tribal Rental	L	M	H	L	L	M
Dwelling 5831 Woodcock Road Sequim, WA	Dungeness	NAHASDA Rental	M	H	H	L	M	M
Rental Dwelling (Craft) 182 Marinas Way, Sequim, WA	Dungeness	Tribal Rental; future 40 residences	H	M	M	L	L	M
Seven Cedars Resort – Cedars at Dungeness Golf Course Sequim, WA	Dungeness	Economic asset; tourism, recreation, retail, food service	H	H	M	L	L	H
Cemetery Pump House Sequim, WA	Jamestown	Water Supply	H	H	M	L	H	L
Dwelling 1272 Jamestown Rd Sequim, WA	Jamestown	Tribal Rental	H	H	H	M	H	L

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Jamestown Water System 1252 Jamestown Road, Sequim, WA	Jamestown	Water Supply	H	H	M	L	H	L
Wood I (no address)	Jamestown	Cultural/Recreational	H	H	M	L	H	L
Wood II (no address)	Jamestown	Cultural/Recreational	H	H	M	L	H	L
Woods III (no address)	Jamestown	Cultural/Recreational	H	H	M	L	H	L
593 Manyfeathers Way Sequim, WA	Jamestown	Tribe rental	H	H	M	L	H	L
Restrooms 593 Manyfeathers Way Sequim, WA	Jamestown	Community facility	H	H	M	L	H	L
Davis	Jamestown	Cultural	H	H	M	L	H	L
Davis II – Carving Shed	Jamestown	Cultural, Economic	H	H	M	L	H	L
281 Manyfeathers Way Sequim, WA	Jamestown	Tribe rental	H	H	M	L	H	L
Garage Building 244 Knapp Road, Sequim, WA	Miller Peninsula	Tribal Rental	L	M	M	L	L	H

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Olympic Discovery Trail Miller Peninsula	Miller Peninsula	Transportation, tourism	L	L	M	M	L	H
Rental Dwelling (McFarland) 244 Knapp Road, Sequim, WA	Miller Peninsula	Tribal Rental	L	M	M	L	L	H
Shannon Property Storage 274155 Highway 101, Sequim, WA	Miller Peninsula	Appurtenance	L	H	M	L	L	M
Backhaus Diamond Point Rd. Sequim, WA	Miller Peninsula Subarea	ODT, future economic enterprise	L	H	M	L	L	M
2209 E. 6th Ave. Port Angeles, WA	Port Angeles	Tribe rentals (NAHASDA)	L	H	M	L	L	M
827 W. 9th St. Port Angeles, WA	Port Angeles	Tribe rentals (NAHASDA)	L	H	M	L	L	M
1632 W. 6th St. Port Angeles, WA	Port Angeles	Tribe rentals (NAHASDA)	L	H	M	L	L	M
825 W. 9th St Port Angeles	Port Angeles	Tribe rentals (NAHASDA)	L	H	M	L	L	M
2243 W. 12th St. Port Angeles, WA	Port Angeles	Tribe rentals (NAHASDA)	L	H	M	L	L	M

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Bell Street Apts 410 W. Bell St. Sequim, WA	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
41 Anchor Cove Lane	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
43 Anchor Cove Lane	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
109 E. Prairie St. (A&B)	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
149 W. Alder St.	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
230 N. Ryser Ave.	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
286 W. Cedar St.	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
9971 Old Olympic Hwy	Sequim	Tribe rentals (NAHASDA)	M	H	H	L	L	L
Jamestown Family Health Clinic	Sequim	Medical services	M	H	H	L	L	L
Sequim Sewer Line & Pump Stations	Blyn to Sequim	Wastewater infrastructure	M	L	H	H	H	L

Table 3-3 Jamestown S'Klallam Tribe Critical Infrastructure

Property	Planning Area	Importance to Tribe	Flood	Severe Weather	Earthquake	Ground Failure or Erosion	Tsunami	Wildland Fire
Log Cabin - Resort Training 3830 West Sequim Bay, Sequim, WA	Blyn (lower)	Historical building Tribal records	L	H	H	M	M	H
Log Cabin Pump Bldg 3830 West Sequim Bay Sequim, WA	Blyn (lower)	Critical infrastructure	L	H	H	M	M	H

Key:
NAHASDA = Native American Housing and Self-Determination Act
Source: Jamestown S'Klallam 2015

3.5 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.7(d)(3))

The Tribe's Comprehensive Plan (2016) outlines its goals and priorities for continued growth and development. Through acquisitions of economic assets and expansion of existing assets, the Tribe's holdings have grown substantially since 2015.

Changes have been measured by accounting for shifts in land use and public awareness since the adoption of the 2010 County HMP and the 2015 Tribal HMP. Each hazard has been identified as having an increased, decreased, or unchanged vulnerability in this time. Table 3-4 provides a snapshot of how vulnerability has changed since the 2015 Tribal HMP.

Table 3-4 Vulnerability Changes Since 2015

Hazard	Status
Power Outages	+
Winter Storm	+
Earthquake and Tsunami	=
Flooding	+/-
Windstorm	+
Active Shooter	=
Hazardous Materials Incident	+
Disease	+
Landslide	=
Drought	+/-
Fire	+/-

Key:
+ Increased vulnerability
- Decreased vulnerability
+/- Increased vulnerability, but actions taken to decrease vulnerability
= Unchanged vulnerability

4 CAPABILITY ASSESSMENT

FEMA	**C1.** Does the plan include a discussion of the tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas? (Requirement §201.7(c)(3)(iv))

4.1 Human and Technical Resources

Table 4-1 describes the Tribe's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 4-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
Tribal Council	Government Office	Ensure mitigation program is incorporated into the Tribe's daily business
Planning Staff	Operations	Oversee mitigation program and encourage integration of mitigation planning into all Tribal activities.
Natural Resources Director	Natural Resources Department	Manage natural resources within the Tribe's properties. Capacities include environmental planning, habitat programs, and fisheries.
Construction Manager	Operations – Building Division	Repair and maintain tribal infrastructure. Oversees Tribal construction projects providing permitting, regulations and project management services.
Economic Development Authority Board of Directors and Staff	Economic Development Authority	Integrate risk reduction into Tribal economic development corporations and plan for strategic expansion.
Grant and Contract Specialist	Finance Department	Manage grant applications and project budgets for tribal programs.
GIS/Data Management Specialist	Natural Resources – Environmental Planning	Integrate hazard data into mapping capabilities of the Tribe.
Tribal Historic Preservation Officer	Operations – Tribal Historic Preservation Office	Integrate risk reduction into protection of Tribal cultural resources.
Other		
Planners or engineers	Operations	Integrate risk assessments and mitigation tactics into ongoing Tribal projects.
Construction professionals	Operations – Building Division	Manage structural mitigation activities for utility services.
Hazardous Materials Planning	Clallam County Local Emergency Planning Council	Develop capacity for local jurisdictions to prepare for and respond to hazardous materials incidents.

4.2 Financial Resources

FEMA	**C2.** Does the plan include a discussion of tribal funding sources for hazard mitigation projects and identify current and potential sources of Federal, tribal, or private funding to implement mitigation activities? (Requirement §201.7(c)(3)(iv and v))

The Tribe maintains many fiscal and financial resources to support its mitigation program. Table 4-2 identifies specific resources accessible for use.

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	Yes
Capital Improvement Project Funding	Yes
Insurance	Yes
User fees for utility services	No
Incur debt	Yes
State-sponsored grant programs	Yes

Table 4-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP. As a federally recognized tribe, the Jamestown S'Klallam Tribe can access funding directly through the federal government. In addition, funding is also available from the State of Washington and potentially through Clallam County. Funding that is annually negotiated and acquired through self-governance is used to support Tribal programs and activities, including through Indian Health Services (mental health programs, alcohol and substance abuse support, and community health programs) (Jamestown S'Klallam 2018a).

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Pre-Disaster Mitigation Program	Federal Emergency Management Agency (FEMA)	Provides funding to develop hazard mitigation plans and implement mitigation actions contained within.
Hazard Mitigation Grant Program	FEMA	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	FEMA	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by floods.
Community Development Block Grant Program	U.S. Department of Housing and Urban Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.
Emergency Management Performance Grants Program	FEMA/Washington Department of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Flood Mitigation Assistance	FEMA/Washington Department of Emergency Management	Provides funding to support development of the flood hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program (NFIP).
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program Interagency Coordinating Committee	Funds activities including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
National Fire Plan	U.S. Forest Service	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
Strategic Economic and Community Development Grant	U.S. Department of Agriculture (USDA)	Provides funding in rural areas for multi-jurisdictional plan development and with a community development focus. Available only to rural areas outside of urbanized zone of any city with a population greater than 50,000.
Coastal Ecosystem Resiliency Program	National Oceanic and Atmospheric Administration	Provides funding for ecosystem restoration. Governor must approve project funds prior to award and there is a 2:1 cost-sharing ratio.
State		
Washington State Department of Transportation (WSDOT) Avalanche Forecasting and Control	WSDOT	Avalanche forecasting determines the potential risk along a particular mountain slope. When an avalanche hazard develops, WSDOT uses artillery, or explosives to trigger the avalanche. In addition to active avalanche control, WSDOT also uses passive control methods to control snow slides.
Washington Sea Grant	Washington Sea Grant	Washington Sea Grant provides funding opportunities through State and National competitions, program development services, and sponsorships.
Water Resources Program	Washington Department of Ecology (Ecology)	Ecology's Water Resources Program provides support in monitoring water supply, managing water supply projects, overseeing water rights, performing streamflow restoration, protecting streamflow, regulating well construction and licensing, and ensuring dam safety.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock industry and receives no general fund dollars.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Washington Local Emergency Planning Committee Program	Washington Emergency Management Division (EMD)	Washington EMD provides funding support to ensure Local Emergency Planning Committees (LEPCs) can be implemented across the state.
Washington Pipeline Safety Program	Washington Utilities and Transportation Commission	The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington State; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).
State Water Pollution Control Revolving Fund	Washington DEC	This program provides funds to local governments to set up low-interest loan programs to repair or replace failing on-site sewage systems. Property owners unable to qualify for conventional bank loans and marine waterfront property owners can use the program to get loans to fix or replace their systems where failures might directly affect Puget Sound. Both the Clean Water State Revolving Fund and the Centennial Clean Water Program.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.
Thriving Resilient Communities	Threshold Foundation	Wide-ranging resiliency project funding.
Kresge Foundation Environmental Grants	Kresge Foundation	Provides funding for climate adaptation and mitigation, as well as sustainable water resources management.

4.3 Legal and Regulatory Resources

Table 4-4 describes the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations. The capabilities below are County and Tribe specific.

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2015-2019)	Hazard Mitigated
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All
	Comprehensive Plan	The Tribe's Comprehensive Plan establishes community and governance goals that guide the Tribe's self-reliance through future expansion.	▪ Develop plan to establish goals and priorities for Tribal citizens	All

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2015-2019)	Hazard Mitigated
	Floodplain Management Plan	The County has developed a Dungeness River Comprehensive Flood Hazard Management Plan to study the risk of flooding along the river. The Tribe participated in plan development as co-leaders of the Dungeness River Management Team (DRMT)	▪ Plan was approved by Washington Department of Ecology in 2010	Flooding
	Dungeness Watershed Plan: Protecting and Restoring the Waters of the Dungeness	A watershed-based plan prepared in compliance with Section 319 of the Clean Water Act.	▪ Ongoing implementation	Flooding
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions.	▪ Collaboration between State and County	All
Policies	Tribal Code Title 29: Building and Development Code	Provides code to cover the construction, renovation, and removal of buildings on, and the development of, the trust and reservation lands of the Jamestown S'Klallam Tribe.	▪ Current code May 1, 2017.	All
	Tribal Code Title 27: Building and Development Code	Tribal Environmental Policy Act (TEPA). Provides code to cover procedures for emergency construction and other activities directly related to emergencies.	▪ TEPA was approved on July 27, 2009.	All
	Coastal Zone Management Plan	Regulates development in potentially hazard prone areas.	▪ Ongoing implementation	Flooding
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participate in NFIP	Flooding

4.4 FEMA Funded Hazard Mitigation Projects

The County and Tribe have received funding for several hazard mitigation projects to date. Table 4-5 outlines past FEMA funded hazard mitigation projects.

Table 4-5 FEMA Funded Hazard Mitigation Projects

Disaster ID#	Program	Project Title	Sub Grantee
1361	Hazard Mitigation Grant Program (HMGP)	Clallam Hazard Mitigation Plan	Clallam County

Table 4-5 FEMA Funded Hazard Mitigation Projects

Disaster ID#	Program	Project Title	Sub Grantee
1037	HMGP	Bogachiel/La Push Road Bank Stabilization	Clallam County
1734	HMGP	Amendment 1 -Jamestown S'Klallam Tribe Hazard Mitigation Plan	Jamestown Reservation
4243	HMGP	Clallam County Hazard Mitigation Plan	Clallam County
1963	HMGP	Amend 1: Clallam County - GIS Data Enhancement and HAZUS Analysis	Clallam County

4.5 Continuity of Operations Planning

Continuity of government and continuity of operations (COOP) planning is an integral piece to any mitigation program. Ensuring the County has the ability to operate following an incident immediately mitigates the magnitude of many hazards. At this time, the Tribe does not have a COOP.

4.6 Coordination with Community Partners

The Tribe has longstanding relationships with community partners. As a reservation-less tribe to work alongside their community partners to address issues as they arise. Many of these community partners participated in the HMP update process and collaborate with the Tribe on an ongoing basis.

- **Education**
  - Cape Flattery School District
  - Quillayute Valley School District
  - Crescent School District
  - Port Angeles School District
  - Sequim School District
- **Business and Industry**
  - Local Chambers of Commerce
- **Healthcare**
  - Olympic Medical Center
  - Forks Community Hospital
- **Utilities**
  - Clallam County PUD (Water, Sewer, and Power)
  - Diamond Point Water System
  - Crescent Water Association

4.7 National Flood Insurance Program Participation

FEMA	**C2.** Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.7(c)(3))

Clallam County, Forks, Port Angeles, and Sequim maintain active NFIP policies. The Lower Elwha Klallam Tribe also maintains active policies. The Jamestown S'Klallam Tribe is covered under the Clallam County policies.

Table 4-6 contains a summary of Clallam County, local jurisdiction, and Tribal government total coverage and losses under the NFIP.

Table 4-6 National Flood Insurance Program Coverage and Losses

Community Name (Number)	Total Coverage (in Thousands)	Total Dollars Paid
Clallam County * (530021)	$97,187	$903,327
Forks, City Of (530022)	$400	$--
Lower Elwha Klallam Tribe (530316)	$1,715	$--
Port Angeles, City Of (530023)	$6,001	$75,632
Sequim, City Of (530301)	$2,148	$55,798

Source: FEMA NFIP Policy and Loss Data by Geography (2019) https://www.fema.gov/policy-claim-statistics-flood-insurance

4.8 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into the Tribe's daily operations and ongoing planning activities is a priority of the County's mitigation program. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization;
- Reducing duplication or contradiction between County and jurisdictional plans; and
- Maximizing planning resources through linked or integrated planning efforts.

The Tribe is encouraged to consider integration actions into planning mechanisms including:

- Budget decision-making;
- Building and zoning ordinances and decision-making;
- Emergency planning mechanisms; and
- Economic developing planning and decision-making.

4.8.1 Existing Plans

FEMA	**C6.** Does the Plan describe a process by which the tribal government will incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate? (Requirement §201.7(c)(4)(iii))

The following existing plans provide ongoing opportunity for integration of hazard mitigation and the County will work with plan owners and stakeholders to consider hazard mitigation data and principles when these plans are updated. Table 4-7 contains a summary of the Tribe's existing plans and how each incorporates the hazard mitigation planning.

Table 4-7 Summary of Tribal Plans

Tribal or County Plan	Hazard Mitigation Components
Comprehensive Emergency Management Plan (2016)	County-wide: Outlines hazard mitigation roles and responsibilities.
Comprehensive Land Use Plan (2016)	Identifies Tribal land use goals and priorities.
Lower Dungeness Flood Management Plan (2009)	Outlines strategies that directly or indirectly mitigate the risks posed by flood hazards.
Tribal Transportation Plan (2003)	Identifies strategies to move transportation goals forward. Identifies areas of potential traffic hazard.
Outdoor Recreation Plan (2010)	Prioritizes the Dungeness River as a greenway corridor for the benefit of fish, wildlife, flood protection, people and open space.

5 MITIGATION STRATEGY

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [Jamestown S'Klallam Tribe] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.7(c)(3)(ii))

5.1 Review of 2015 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2015 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2019 plan update. The MPT worked through each previous action during MPT Meeting #1 to document steps taken to fulfill the action.

See Table 5-3 for an overview of the status of all actions from the 2015 plan in addition to new actions for the 2019 update.

5.2 Identification and Analysis of New Mitigation Actions

In order to achieve the mitigation goals identified above, the Tribe has identified a comprehensive series of mitigation objectives and supporting actions that are focused on reducing vulnerability and maximizing loss reduction. The actions can typically be broken out into the following types of activities, which are indicated in Table 5-1.

Table 5-1 2019 Mitigation Actions by Group

Mitigation Group	Related Mitigation Actions
Plans and Regulations	JSK01, JSK05, JSK16
Infrastructure/Capital Project	JSK02, JSK03, JSK04, JSK12, JSK17
Natural System Protection	JSK03, JSK06, JSK08, JSK09
Education and Awareness	JSK07, JSK09, JSK11, JSK13
Preparedness and Response	JSK14, JSK15, JSK16, JSK18, JSK19

All mitigation actions identified in the plan are addressed in the mitigation implementation plan, provided in Section 5.3. The actions include both interim- and long-term strategies for reducing vulnerability to hazard and are characterized as such in the 'life of action' column of the implementation plan.

5.2.1 2019 Mitigation Actions by Hazard

All mitigation actions identified in the plan address at least one priority hazard outlined in Chapter 4 of the HMP. Table 5-2 indicates which mitigation actions address which hazards.

Table 5-2 2019 Mitigation Actions by Hazard

Hazard	Related Mitigation Actions
All Hazards	JSK02
Power Outages	JSK11, JSK12
Winter Storm	JSK11, JSK12
Earthquake and Tsunami	JSK01, JSK04, JSK14, JSK15, JSK16, JSK17
Flooding	JSK03, JSK04, JSK05, JSK06, JSK07, JSK16, JSK17
Windstorm	JSK11, JSK12
Active Shooter	
Hazardous Materials Incident	
Disease	
Landslide	JSK08, JSK09
Drought	JSK12, JSK13
Fire	JSK18, JSK19

A complete mitigation implementation plan is provided in Table 5-3.

5.3 2019-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the City of Sequim]? (Requirement §201.7(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the Tribe. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix D for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for each action listed in Table 5-3.

Table 5-3 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
JSK01	Seismic assessment of Tribal facilities	New	3,4,5	Tribe	1-3 years	$10,000 - $20,000	No	FEMA	Tsunami, Earthquakes	19	6	25	11
JSK02	Improve communications in Blyn Basin, including building cellular tower and installing fiber internet.	New	1	Tribe	1 year	$400,000 for cellular tower	Yes	Tribe	All hazards	20	6	26	5
JKS03	Lower Dungeness River Floodplain Restoration, including 3 Crabs Rd.	2015 Action – Ongoing, funding secured, and removal of dikes and levees continues.	5	Tribe, Clallam County, Washington Department of Fish and Wildlife	5 years	$10 million	Yes	WA Floodplains by Design, Construction funding from ACOE	Flooding	20	8	28	3
JSK04	Structure elevation and/or relocation of Tribal facilities and infrastructure	2015 Action – Ongoing, Tribe is reducing investment in nearshore properties and moving sewers upgradient of flood-prone areas.	5	Tribe	Variable	TBD	Yes	HMGP	Flooding, Tsunami	19	8	27	4
JSK05	Coordinate with County on the implementation of the NFIP Program	2015 Action – Ongoing, Jimmycomelately Creek is still not mapped correctly by FEMA after reconstruction. Buildings are mapped in former floodplain. New Casino expansion may be in new floodplain.	5	FEMA, Tribe, County	Ongoing	Operations costs	Yes	FEMA, Tribe	Flooding	12	8	20	19
JSK06	Encourage native vegetation on shorelines and formation of dunes	2015 Action – Ongoing, Three Crabs area has been revegetated (2018). This is an ongoing focus for future flood plain restoration projects.	5	Tribe	Ongoing	Minimal	Yes	Pre-Disaster Mitigation Fund, U.S. Department of Agriculture	Flooding	21	4	25	12

Table 5-3 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
JSK07	Public education around flood mitigation, floodplain functions, emergency service procedures, and potential hazards.	2015 Action – Ongoing. The Tribe is building an educational center, tsunami signage is complete in Blyn. The evacuation plan is unchanged, but some elements will change with the addition of overnight guest facilities at Casino.	6	Tribe	Ongoing	Staff time	Yes	PDM	Flooding	18	6	24	13
JSK08	Limit removal of vegetation in areas prone to ground failure. Plan ground cover where appropriate.	2015 Action – Ongoing.	5	Tribe, County	Variable	Minimal	Yes	Tribe	Landslide	18	4	22	15
JSK09	Encourage residents and landowners to leave natural erosion barriers, such as driftwood logs on the shore, in place to reduce shoreline erosion.	2015 Action – Ongoing.	5,6	Tribe	Variable	Minimal, staff time.	Yes	Tribe	Landslide	18	4	22	16
	StormReady	2015 Action – Complete	5,6	Clallam County, State, Tribe	Ongoing	Staff time, in-kind services	Yes	Tribe	Windstorm, Winter Storm				
JSK11	Conduct severe weather awareness activities.	2015 Action – Ongoing. Main objective of creating home emergency kit was completed. Public communication is ongoing.	5,6	Clallam County, Tribe	Ongoing	Staff time, in-kind services	Yes	Tribe	Windstorm, Winter Storm	20	6	26	7
JSK12	Develop alternate water supplies to provide reserve water sources to be used in event of drought or water shortage.	2011/2015 Action – New for this 2019 Plan because of recent rapid population growth in Blyn.	4	Tribe	1-3 years	$1,000,000	Yes	HUD Indian Community Development Grand Program	Windstorm, Winter Storm, Drought	18	4	22	17
JSK13	Create and expand water efficiency/conservation programs.	2015 Action – Ongoing and Active.	5,6	Tribe	5 years	Up to $25,000	Yes	Tribe, Grants	Drought	18	4	22	18
JSK14	Continue to participate in TsunamiReady with Clallam County	2015 Action – Ongoing	6	Clallam County, Tribe	Ongoing	Staff or volunteer time, in-kind services	Yes	Minimal	Tsunami	20	6	26	8
JSK15	Develop advanced warning systems	2015 Action – Ongoing, continue to communicate with WEMD, Great Shakeout Official Partners, locations of AHAB have been determined.	3	Clallam County, Tribe	Ongoing	Staff or volunteer time, in-kind services	Yes	Minimal	Tsunami	20	6	26	9

Table 5-3 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
JSK16	Study and implement wellhead protection measures to ensure continued water supply for the Jamestown Beach community in the event of tsunami or extreme flooding.	2015 Action – Ongoing. Accessed funds, hired consultant, and study will be complete in 2019.	4	Tribe	1 year	<$5,000	Partial	CDBG-GP Grand, EPA Grants, USDA Rural Development Loans or Grants	Flooding, Tsunami	20	6	26	10
JSK17	Explore feasibility of incorporating elevated tsunami shelters or vertical evacuation structures in future construction plans in vulnerable zones in Blyn (7 Cedars Resort Casino & Tribal Government).	2015 Action – Not complete, especially with continued development in Blyn and expansion of Casino.	4	Tribe	5 years	Unknown	Yes	FEMA	Flooding, Tsunami	20	10	30	1
JSK18	Fuel reduction projects and defensible space around structures	2015 Action – Ongoing	5	Tribe and County	1-5 years	Unknown	Yes	U.S. Forest Service Grants	Wildfire	19	10	29	2
JSK19	Promote FireWise building design for construction in the Vision Master Plan and Housing Programs	2015 Action – Ongoing	5,6	Tribe and County	Ongoing	Staff Time	Yes	ICDBG, US Forest Service, BLM	Wildfire	17	6	23	14
Adopt the Hazard Mitigation Plan (HMP)		Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	N/A	All hazards				

Key:
STAPLEE - Strategy and Prioritization Methodology

6 PLAN MONITORING AND EVALUATION

6.1 Annual Review

FEMA	**C7.** Does the plan describe a system for reviewing progress on achieving goals as well as activities and projects identified in the mitigation strategy, including monitoring implementation of mitigation measures and project closeouts? [44 CFR §§ 201.7(c)(4)(ii) and 201.7(c)(4)(v)]

The Tribal Planner is responsible for coordinating annual review of the Jamestown S'Klallam tribal annex and making appropriate revisions. On an annual basis, the tribal planning team will be convened to conduct a comprehensive review of the plan to ensure that all information is current. The review and update processes are outlined below:

The tribal planning team will meet to consider:

- Progress made on plan recommendations during the previous 12 months;
- Mitigation accomplishments in projects, programs, and policies;
- Actual losses avoided by implementation of mitigation actions;
- Emerging disaster damage trends and repetitive losses;
- Identification of new mitigation needs;
- Cancellation of planned initiatives, and the justification for doing so; and
- Changes in membership to the MPT.

The Tribal Planner will request input from other tribal departments and outside entities on issues listed above. A special effort will be made to gather information on non-capital projects and programs important to mitigation.

6.2 Monitoring Project Implementation

FEMA	**E1.** Does the plan include assurances that the tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? [44 CFR § 201.7(c)(6)]

Mitigation projects and project closeouts will be monitored and updated through the use of the quarterly reporting forms for FEMA-funded projects, provided by FEMA Region X. The Tribe's Contract Specialist will ensure project reporting is completed within specified timeframes. The Mitigation Project Progress Report will be requested annually by the Emergency Management Director to determine progress made to-date and track final closeout tasks. The Tribe will comply with all applicable Federal statutes and regulations in effect with respect to the periods which it receives grant funding, including 2

CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes.

6.2.1 Grant Management Process

The Tribe implements a comprehensive grant management process to ensure compliance with all applicable grant requirements. The grant management process involves all key governmental entities including the Tribe's Contract Specialist, Budget Accountant, Chief Operations Officer, Chief Executive Officer, Legal Counsel, Tribal Planner and the appropriate program managers. The Tribe's internal grant management process is as follows:

I. <u>Grant Submission:</u>

1. Whether a Tribal Council Resolution will be required by the funding agency or Tribal policy.
2. Budget information, salary, benefits or other information
3. Indirect rate consistent with approved indirect or grant award limitations
4. Pass through information for financial coding purposes
5. Appropriate cost principles and allowable costs
6. Funding guidelines
   - MATCH Requirements – How much match is needed? What is the proposed source of the match? What types of match are acceptable?
7. Purchasing policies or bidding guidelines (Request for Proposal)
8. Agency funding i.e. Federal, State or Foundation
   - Federal – CFDA (Catalog of Federal Domestic Assistance #)

II. <u>Award Notification:</u>

1. Original to be submitted to accounting, copy to eCivis
2. Period of performance
3. Consulting, Travel rates and policies
4. Re-budgeting or Line Item Interchanges
5. Follow grant requirements
   a. Signed contract documents between Tribe and Contractor
   b. W-9 if contractors are used
   c. Deliverables required by granting agency to be met for reimbursement purposes
   d. Greening Policies – Waste prevention, recycling etc
   e. Contractor Rate limitations if applicable (Davis Bacon Act)
   f. How will MATCH be recorded and documented?
   g. Request for carry overfunds and/or project extension if allowed and needed.
   h. Audit Requests and Questions
   i. Billing and payment procedures

III. <u>Contracts:</u>

1. Review the contract carefully: Ensure an understanding the deliverables, milestones and timelines.
2. Review the funder's award notice and conditions
3. Make contact with the Tribe's personnel, finance, and other personnel who will be affected by the grant or will help support the project

IV. Project implementation:

1. Follow appropriate cost principles for allowable costs
2. Know regulations that affect the project, conduct environmental review if necessary
3. Review Tribe's policies and procedures for hiring, contracting, and operations
    a. confidentiality rules
    b. copyright rules
    c. cost sharing policies
    d. purchasing procedures
    e. indirect cost use rules
    f. travel reimbursement rates and policies
    g. subcontracting rules
4. Prepare bids as required to purchase equipment, material or services
5. Maintain official grant file records
6. Monitor budget expenditures
7. Document matching funds
8. Prepare and submit progress reports and forms required by the funder
9. Monitor personnel charged to the grant, including grant timesheets if necessary
10. Follow purchasing policies
11. Manage and document the process for submitting reports, and submit all required quarterly/interim/final reports

V. Closing the grant/contract

1. Understand the funder's requirements for closing out the grant, including the content of any reports or other deliverables
2. Complete and submit final progress report, stating that the project has ended, its goals and objectives have been achieved, all services have been provided and all grant conditions met. Put a copy of the report in the grant file and in the accounting file.
3. Work with Accounting to reconcile all project costs and submit final financial report.
4. Assist with preparing any necessary files, with original documentation, for auditors

The Tribe also maintains an extensive process to respond to audits. Through this process, new awards are reviewed to ensure compliance has been met and funding use aligns with the Tribe's accounting records.

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Lower Elwha Klallam Tribal Annex – Clallam County Hazard Mitigation Plan

2019 Plan Update

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1 INTRODUCTION

1.1 Lower Elwha Klallam Tribe Hazard Mitigation Program

Throughout the hazard mitigation planning process, the Emergency Management Coordinator Glen Roggenbuck was the main point of contact for the Lower Elwha Klallam Tribe (herein referred to as 'Tribe'). He attended one or more Mitigation Planning Team (MPT) meetings.

For the purposes of the HMP, "public" is defined as tribal members and employees. Tribal employees reviewed the Draft HMP. A copy of the HMP, including the tribal annex to the Multi-Jurisdictional HMP, was provided to tribal members via email, Facebook and an internal planning meeting.

The tribe makes a concerted effort to participate in the planning process of the surrounding jurisdictions. These include the following:

- Clallam County planning, specifically Clallam County Multi-Jurisdictional Hazard Mitigation Plan;
- Sequim and Port Angeles emergency planning; and
- Statewide emergency planning efforts including exercises and trainings, including participating in the 2016 Cascadia Rising Functional Exercise.

1.1.1 Hazard Mitigation and Other Tribal Planning Efforts

The tribe conducts a variety of emergency planning and preparedness activities. The tribal Emergency Management Coordinator is the lead on integrating hazard mitigation planning with other tribal and FEMA planning efforts.

The following planning activities are conducted to integrate hazard mitigation planning within the tribal community and locally:

- Hold Community Meetings regarding Emergency Preparedness and Tsunami Awareness.
- Emergency Management Safety Fair, which is open to tribal and non-tribal community members to provide information on how to prepare and survive large scale disasters.
- Emergency preparedness information is distributed to tribal employees via email and during meetings.
- Emergency preparedness information distributed to tribal members via meetings, the tribal newsletter, and social media.
- Work with the tribal Planning Department to evaluate future building sites that are outside of the tsunami inundation zone.

The following planning activities are conducted to integrate hazard mitigation planning with FEMA and state planning efforts:

- Worked with EMD to provide a Tsunami Awareness Open House for tribal and non-tribal community members.
- Participated in the Great Shakeout Earthquake Drill.

- Worked with the Department of Natural Resources to integrate climate change into emergency preparedness planning.

See Appendix E for the completed Federal Emergency Management Agency (FEMA) Local Plan Mitigation Review Tool for the Lower Elwha Klallam Tribe.

2 COMMUNITY PROFILE

2.1 Tribal Sovereignty and Governance

The following text is excerpted from the 2011 Lower Elwha Klallam Draft Tribal Hazard Mitigation Plan (HMP):

> "The Lower Elwha Klallam Tribe is a sovereign, federally-recognized Indian Nation, with its own constitution and government. The Lower Elwha Tribal Council, or Business Committee, which consists of five elected officials serving staggered three-year terms, governs the Tribe.
>
> The Business Committee has full and ultimate responsibility for management of all Tribal programs operating on an annual budget. The C.E.O. oversees and manages all functions of the Lower Elwha Klallam Tribe, which includes the Tribe's enterprises. The Community Council, comprised of the eligible voting Tribal members, enacts the laws for the governance of the land and the people under its jurisdiction. In the absence of a quorum of the Tribal Council, a quorum of the Business Committee serves this function." (Lower Elwha Klallam Tribe 2011)

The Tribal departments are listed below:

- Carnegie Museum
- Education
- Elwha Klallam Heritage Center
- Elwha Klallam Veterans
- Elwha Library
- Employment Opportunities
- Klallam Counseling Services
- Lower Elwha Family Advocacy
- Low Income Home Energy Assistance Program
- Lower Elwha Head Start and Early Head Start
- Lower Elwha Dental Clinic
- Lower Elwha Health Clinic
- Lower Elwha Police Department
- Lower Elwha Social Services
- Lower Elwha Tribal Temporary Assistance for Needy Families
- Natural Resources
- River Restoration
- Tribal Court
- Tribal Programs
- Tribal Enrollment
- Tribal Government
- Vocational Rehabilitation Program

2.2 Geography and Climate

Figure 2-1 contains an overview of the planning area. The following text is excerpted from the 2011 Lower Elwha Klallam Draft Tribal HMP regarding the geography of the planning area:

> "The Lower Elwha Tribe is located near Port Angles, Washington, on the north shore of the Olympic Peninsula about 67 miles northwest of Seattle.
>
> The Elwha Tribal lands consist of the main reservation found at the mouth of the Elwha River. Additional land in the delta was added in 2001 and 2002. The Tribe has additional Reservation and Trust lands outside of the delta for housing near Price Road. The Tribe owns two fee properties on Highway 101 near Dry Creek Road and is currently occupied for its health clinic and police department. The Tribe has scattered fee properties in Port Angeles, including land at Tse-whit-zen and Ediz Hook. Individual Trust land is located east of Pysht, on Highway 112, about 22 miles west of the Reservation. Altogether Tribal lands make up about 1,780 acres or 2.8 square miles.
>
> The Elwha Reservation is split into multiple pieces with two parcels of land holding most of the residential areas. These are usually referred to as the Upper and Lower Reservations. The Lower Reservation, located at the Elwha Valley contains most of the Tribal facilities, the Tribal Center, and has 65 [Housing and Urban Development] HUD homes.
>
> The Upper Reservation is a large parcel of land (25.63 acres) that has 32 HUD homes plus a community center called The Gathering Place." (Lower Elwha Tribe 2011)

The following text is excerpted from the 2011 Lower Elwha Klallam Draft Tribal HMP regarding the climate of the planning area:

> "The climate of the Elwha River delta region is strongly influenced by the rainshadow effect of the Olympic Mountains and the moderating influence of the ocean. Precipitation in Port Angeles, just five miles to the east, averages 26 inches per year, while precipitation in the river's headwaters 25 miles to the south may reach 220 inches per year. The Elwha Ranger Station at RM 12 averages a total of 56 inches of precipitation per year (USDA-SCS 1987). Port Angeles averages 8 inches of annual snowfall while the western slope of the Olympic mountains may receive over 300. It is not unusual to have a 100-inch snowpack remaining in spring. The extreme variance in precipitation is caused by orographic cooling, in which moist Pacific air masses coming from the southwest are forced to rise in elevation when they meet the Olympic Mountains. As the air mass rises, it cools and loses most of its moisture in the form of precipitation on the windward side of the mountains. The high rainfall tends to drain to the west side of the Peninsula and result in a corresponding rainshadow effect to the northeast.

There is a distinct pattern of precipitation in this region, with ninety per cent of all precipitation occurring in the period from October to April. Peak rainfall typically occurs between late November and the end of January. Due to the barrier created by the Olympic Mountains to the south, prevailing winds tend flow primarily in an easterly direction, with maritime air flowing from the west. Gale force and higher wind speeds often occur in winter months. High pressure zones in the continental interior may cause strong northeasterly flows across the plan area. These events are usually associated with the coldest temperatures of the year. During periods of stagnant air flow, pollution originating in urban Puget Sound is common.

Temperature extremes tend to be moderated by summer winds and maritime influences. The mean annual temperature is 49.6°F. Average maximum summer temperatures seldom exceed 75°F, while average winter lows seldom drop below freezing. Temperatures recorded in Port Angeles between 1917 and 1965 show an extreme high of 94°F (July) and a low of 6°F in December (COE 1987)." (Lower Elwha Klallam Tribe 2011)

2.3 Population and Demographics

The following text is excerpted from the 2011 Lower Elwha Klallam Draft Tribal HMP regarding the history, population, and demographics of the Tribe:

"The Tribe is a party to the 1855 Treaty of Point No Point and its members are the direct successors of the Klallam people who lived for centuries in villages along the Peninsula's north coast and southern Vancouver Island, from Port Angeles Harbor west to the Hoko River. The United States acquired the original land base in trust for the Tribe in 1936, and formally proclaimed these lands as the Lower Elwha Reservation in 1968. Today, the Lower Elwha Klallam Tribe governs the Lower Elwha Indian Reservation and adjacent trust lands, roughly 1,000 acres on the north coast of the Olympic Peninsula just 8 miles west of Port Angeles, Washington, where the Elwha River flows into the Strait of Juan de Fuca. The current enrolled Tribal membership stands at 887 members with approximately 580 living on reservation lands in the Elwha Valley and in the vicinity of Ranger Road approximately 8 miles to the west." (Lower Elwha Klallam Tribe 2011)

2.4 Cultural Resources

The following text is excerpted from the 2011 Lower Elwha Klallam Draft Tribal HMP regarding the cultural and sacred resources of the Tribe:

"The Elwha River valley is the cultural and spiritual home of the Lower Elwha Klallam Tribe. The Klallam people have continually resided here for many centuries. Cultural resources include traditional sites, structures, landscapes, archaeological, ethnographic and ethnohistoric sites (ONP 1995). The river and surrounding land fed, sheltered, and sustained the people, as well as provided access to the interior of the Olympic

Peninsula. When the Elwha Dam was completed in 1912, the ensuing loss of anadromous fish runs and the loss of access to spiritual sites devastated the Elwha Klallam people.

Beach Lake

The southern (landward) shore of Beach Lake is known to be an area of historic gravesites that were used for many generations. However, the extent of the gravesite area has never been mapped or delineated. Prof. John Albright, of the University of Washington, unearthed approximately 100 pounds of beads, bracelets, and a variety of other 'curios' (grave goods) at this site in August 1923. A brief account of this 'discovery' was published in Port Angeles Evening News on August 30, 1923. The 'collection' was transported by Professor Albright to the American Museum of Natural History of New York, where it is assumed to remain today.

S'Klallam Villages

The S'Klallam, of which the Lower Elwha Tribe is the western band, had 32 villages spread along the north shore of the Olympic Peninsula and the south shore of Vancouver Island near Becher Bay and Cape Calver, 12 miles southwest of present-day Victoria. In the immediate area of the Reservation, there are at least four village sites and two in nearby Port Angeles, Tse-whit-zen and Ennis Creek. In the late 19th and part of the 20th century, Tribal members also lived on Ediz Hook before moving to the reservation area." (Lower Elwha Klallam Tribe 2011)

Additional information on the vulnerability of these resources to hazards is detailed in Chapter 3 of this Annex.

2.5 Tribal Land Use and Ownership

The following text is excerpted from the 2011 Lower Elwha Klallam Draft Tribal HMP regarding the current land use of the Tribe:

"Land use in the planning area generally complies with Clallam County zoning and shoreline management designations…A significant portion of privately owned land has been harvested and converted for residential uses. Individual Indian allotment and reservation land in the Elwha Heights area is used for rural residential purposes.

Most of the area that is not developed is covered with brush and unmanaged second growth timber. Both [Department of Natural Resources] and corporate timberlands hold acreage adjacent to the Elwha Heights area on Ranger Road. There are also large gravel pits in the vicinity of Elwha Heights and Place Road. Washington Department of Natural Resources (DNR) lands in the study area are used primarily for timber production. These are generally stocked with conifers (Douglas-fir) on short (50 year) rotations and were last harvested in the 1960s and 70s.

[The Elwha River] provides recreational, commercial, and Native American subsistence fisheries, as well as general recreational use. Salmon and steelhead fishing are a major recreational activity. A public access and boat launch below the Elwha Road Bridge and at the private levee at Place Road are well used during the fishing season by the general public. In addition, privately owned fishing camps adjoin the river below Hunt Road and trails follow the riverbanks in less accessible areas.

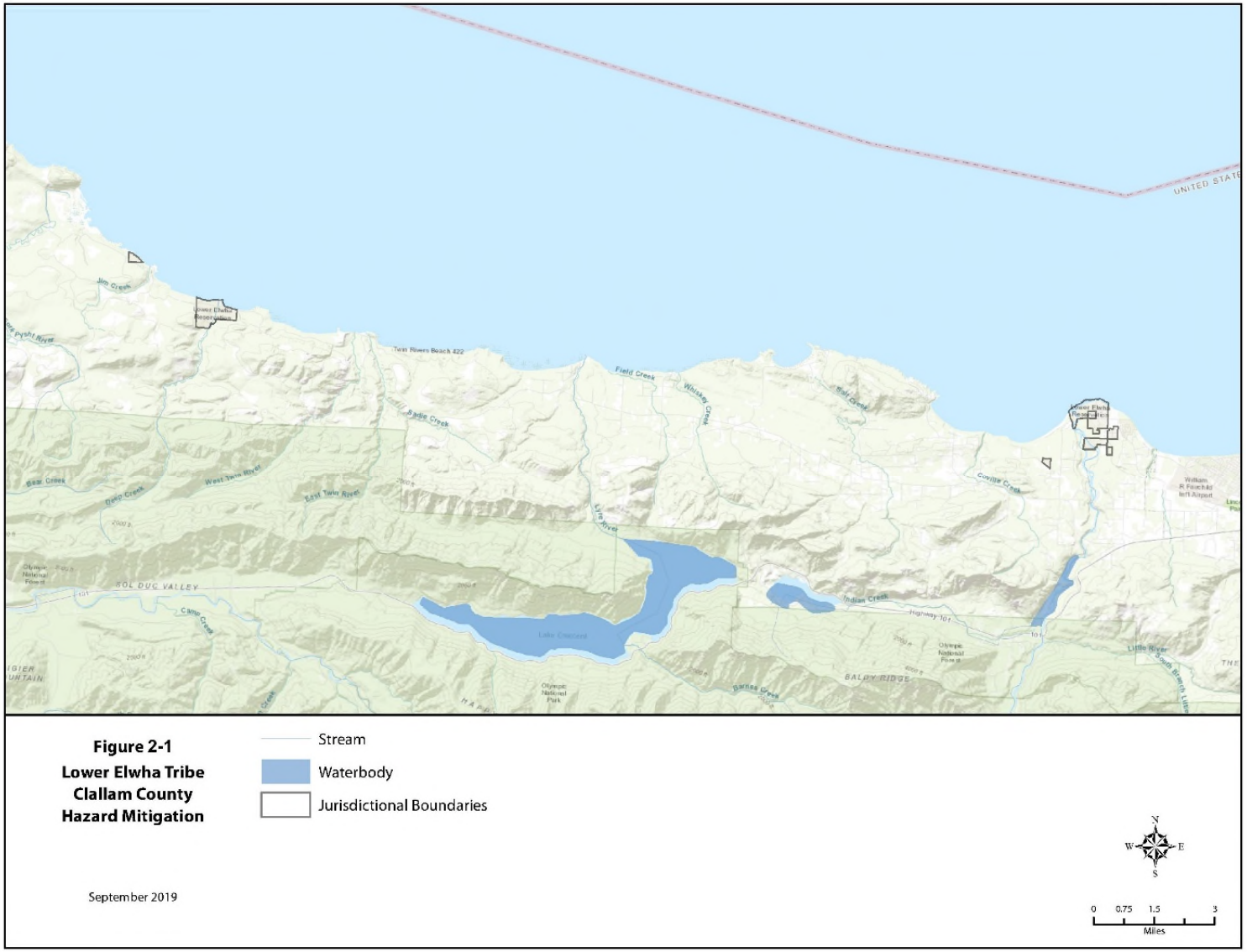
Other recreational activities include beach walking and birding, mainly by users of the public dike access on Place Road. An activity that has become popular is surfing the break on the east side of the mouth of the Elwha. Unfortunately, this has led to conflicts between Tribal members and some surfers. As a result, an ordinance was passed in 1998 that prevents non-Tribal members from accessing the beach areas without a Tribal escort.

Land use on the Lower Elwha Klallam Reservation is sharply delineated by the 7,700-foot-long levee built by the U.S. Army Corps of Engineers (USACE) in 1989. Approximately 215 acres of Trust and reservation land on the delta is protected from flooding while approximately 330 acres are dedicated to flood abatement. The Federal Flood Control Levee was constructed 400 to 3,000 feet from the existing Elwha River channel. It has since become accepted as a feature of the landscape, despite the relocation of some residents from their former homes. The landscape east of the levee is now thought of as 'the Tribal Community Side' while the land to the west belongs to 'the River.' The levee follows the 200-year flood contour, with the exception of a 450-foot opening adjacent to the beach and estuary.

The Tribal Community land to the east of the levee and above the 100-year flood elevation is held for rural residential use, agriculture, limited timber production and some industry. Agricultural use of the delta is primarily devoted to pasture: either via grazing or hay production. Much of the land formerly in pasture has, during the past decade, been converted to Tribal housing.

Tribal land within the 100-year floodplain on the River side of the levee is designated as Community Forest land and includes approximately 388 acres. Community Forest lands between the Flood Control Levee and the Elwha River are to be used for sustainable forestry practices, as directed by the L.E.K.T. Community Forest Management Plan (1996). Development is not permitted in this region." (Lower Elwha Klallam Tribe 2011)

Figure 2-1 Lower Elwha Tribe



3 HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 3 contains hazard profiles and vulnerability assessments to determine the potential impact of hazard to the people, economy, and built and natural environments of the Lower Elwha Klallam Tribe. They have been streamlined to increase the effectiveness and usability of the HMP.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the Lower Elwha Klallam Tribe]? (Requirement §201.7(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the Lower Elwha Klallam Tribe]? (Requirement §201.7(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.7(c)(2)(ii)]

3.1 General

Clallam County has encountered several major disaster declarations that have affected the Lower Elwha Klallam Tribe. In total, the County has experienced 21 disaster declarations since 1953. Table 3-1 identifies the disaster declarations since 2010.

Table 3-1 Clallam County FEMA Disaster Declarations

Disaster ID	Date of Declaration	Disaster Type	Incident Period
DR-1956	05-Mar-12	Severe Winter Storms, Flooding, Landslides, and Mudslides	14-Jan-12 to 23-Jan-12
DR-4242	15-Oct-15	Severe Windstorm	29-Aug-15
DR-4249	1-Jan-16	Severe Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	12-Nov-15 to 21-Nov-16
DR-4253	2-Feb-16	Severe Winter Storm, Straight-line Winds, Flooding, Landslides, Mudslides, and a Tornado	1-Dec-15 to 14-Dec-15
DR-4418	4-Mar-19	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado	10-Dec-18 to 24-Dec-18

Source: FEMA, Washington Disaster History, Major Disaster Declarations (https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties)

The hazard profiles and vulnerability assessments contained in this chapter represent a considerable amount of work performed by the MPT. MPT members ranked hazards using several key considerations, followed up by activities to validate hazard analysis results and identify specific areas of risk. Table 3-2 displays the hazards that MPT selected for further assessment.

Table 3-2 Hazards Addressed in Plan

Hazard Type	Hazard Name
Natural Hazards	Earthquake Cascadia Earthquake Landslide Winter Storm Windstorm Wildfire Flooding Tsunami

3.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on MPT feedback during MPT Meeting #1 and #2. The 2011 Lower Elwha Klallam Draft Tribal HMP was also consulted to ensure continuity of Tribal priorities.

Following the individual hazard ranking activity, the results were aggregated to show a final score for the Tribal MPT member. The hazard aggregate is available in Figure 3-1.

Figure 3-1 Lower Elwha Klallam Tribe Hazard Ranking

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Earthquake	5	5	5	1		4	1
Cascadia Earthquake	5	5	3	1		4	2
Landslide	2	5	3	5		4	3
Winter Storm	2	3	3	5		3	4
Windstorm	2	4	2	5		3	5
Wildfire	3	5	2	3		3	6
Flooding	1	4	2	2		2	7
Tsunami	2	4	2	1		2	8

3.3 Hazard-Specific Profiles and Risk Assessments

The following section profiles each hazard identified in Section 3.2 and assesses the risk associated with each. Each risk assessment considers the following attributes:

- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Similar to location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends impact on the Tribe's vulnerability to each hazard since the 2011 draft plan development (increased, decreased, unchanged).

Note: Hazard Descriptions, Potential Impacts from Future Climate Conditions, and Cascading Impacts can be found in Chapter 4 of the HMP Basic Plan, as these are not place-specific.

In addition, the hazards have been organized into three sub-sections (high-, medium-, and low-priority) to illustrate the risk-driven nature of the HMP. Each hazard has been given serious consideration of all attributes discussed within. However, low-priority hazards may be shorter in length and with less quantitative analyses, as a lack of usable data is frequently present when considering low-likelihood or low-magnitude events. The three sub-sections are as follows:

- **High-Priority:** Earthquake, Cascadia Earthquake, Landslide
- **Medium-Priority:** Winter Storm, Windstorm, Wildfire
- **Low-Priority:** Flooding, Tsunami

3.3.1 Earthquake

Earthquake

	Magnitude	Onset	Duration	Frequency	Average	Rank
Earthquake	5	5	5	1	4	1
Cascadia Earthquake	5	5	3	1	4	2
Tsunami	2	4	2	1	2	8

Location

The Cascadia Subduction Zone (CSZ), where the Juan De Fuca plate slides underneath the North American plate poses a great risk to the Tribe and all communities in the Pacific Northwest. A large earthquake would cause significant impacts to all Tribal properties with a structure, and liquefaction may pose a risk to properties without a structure (though the liquefaction risk in the area is graded as moderate). The region is also subject to smaller, crustal quakes near the Port Angeles/Sequim area associated with the Lake Creek Fault.

Previous Occurrence/History

The most recent earthquake that damaged the Tribe service area was the 2001 Nisqually Earthquake. Small earthquakes occur regularly throughout the region and go unnoticed by residents. Over the last 135 years, there have been nine earthquakes with a magnitude (M) greater than 6.0 in the area that we consider the Northwest. Five of those large quakes (including the Nisqually earthquake) directly impacted the Olympic Peninsula, according to eyewitness accounts.

- 1700, CSZ Earthquake, M 9.0
- 1909, San Juan Island, M 6.0
- 1939, Vashon Island, M 6.1
- 1949, Olympia, M 7.1
- 1965, Seattle – Tacoma, M 6.5
- 2001, Nisqually, M 6.8

Based on the geological record and first-hand accounts, tsunami from locations across the Pacific Ocean basin and from the CSZ off the Washington coast have hit Washington State coastal communities at least 7 times in the last 3,500 years. The largest of the nearby triggers, the CSZ, produced the most recent great tsunami in 1700 AD (Lange 2003).

- 2006 Kuril Islands, Japan Tsunami (La Push, 0.52 feet; Neah Bay, 0.01 feet; Port Angeles, 0.39; Westport, 0.16 feet)
- 1964 Alaskan Tsunami (Neah Bay, 0.7 feet)
- 1960 Chilean Tsunami (Neah Bay, 1.2 feet)
- 1700 Cascadia Tsunami (Washington Coast, 33 feet)

Earthquake

Extent and Probability

Earthquakes pose a widespread hazard throughout the Tribe service area. Tsunami post a widespread hazard throughout the coastal area. The cascading impacts of earthquakes, such as tsunami and liquefaction, are dependent on geography and soil type, as detailed above.

The Ring of Fire will continue to generate tectonic triggers. The CSZ has produced earthquakes measuring M 8.0 and above at least seven times in the past 3,500 years. The time intervals between these events has varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.

There is evidence of two earthquakes on the Lake Creek Fault between 2,000 and 700 years ago. An earthquake of M 6.8 along the Lake Creek Fault would produce the greatest intensity shaking in the vicinity of Port Angeles and Sequim.

Future Probability Trend – Future weather and development trends play no known role in the probability of future earthquake events. However, both may play a role in the magnitude of earthquake impacts. Great earthquakes in the Pacific Ocean basin generate tsunamis that impact Washington's outer coast and the Strait of Juan de Fuca at a rate of about six every 100 years. In the CSZ, there is a 10 to 14% chance of a M 9.0 earthquake and tsunami in the next 50 years, so the likelihood of recurrence would be low.

Vulnerability

Vulnerability posed by earthquakes to the Tribe is measured by accounting for the critical infrastructure that are at risk. The following infrastructure/property types are at high to very high risk from combined earthquake hazards:

- Tribal Center
- Lower Elwha Klallam Casino
- Tribal Health Clinic
- Tribal Police Station
- House of Salmon Hatchery
- Emergency Operations Center
- USACE Flood Control Levee
- Bureau of Indian Affairs Roads (37.4 miles)

Awareness of the Tribe's vulnerability to earthquakes or tsunamis has increased with participation in regional drills and public outreach efforts. More structures are being designed to be resilient to tectonic activity. Given these changes, the vulnerability of the Tribe to earthquakes and tsunami is **unchanged**.

3.3.2 Landslide

Landslide

Magnitude	Onset	Duration	Frequency		Average	Rank
2	5	3	5		3.8	3

Location

Tribal facilities are not located adjacent to any bluffs. Lower Elwha Road crosses a bluff to come out of the valley, and this area is most vulnerable to landslides. Place Road cemetery could also be damaged by a landslide from the bluffs behind (Lower Elwha Klallam Tribe 2011).

Previous Occurrence/History

Historically, the damages with the highest consequence, either related to the value of the repair or by the impact on human activities, include slides that have closed US-101 and other major thoroughfares (Clallam County 2010).

No landslides have occurred on the Lower Elwha Klallam tribal area that have resulted in substantial damage.

Extent and Probability

The following is excerpted from the hazard assessment conducted by Clallam County Emergency Management Division (EMD) as part of the 2016 Cascadia Rising Exercise (Buck 2016):

> "It is very difficult to make quantitative predictions of the likelihood or the size of a future landslide event. An accurate understanding of the landslide hazard for a given facility requires a detailed landslide hazard evaluation by a geotechnical engineer. Such site-specific studies evaluate the slop, soil/rock and groundwater characteristics. Such assessments may require drilling to determine subsurface soil/rock characteristics. In some cases, landslide hazard assessments by more than one geotechnical engineer may reach confliction opinions."

Future Probability Trend – Based on potential increases in drought and wildfires, as well as potentially higher-intensity precipitation events, the Tribe may be impacted by an **increase** in the probability of future landslides.

Vulnerability

The landslides and erosion in upper watersheds and forest lands are causing recurring damage and disruption to important roadways. Sedimentation from these areas is accumulating in the rivers and streams, causing flooding and habitat degradation. It is uncertain what the precise causes of mass wasting are; whether the roads form a conduit, the failures originate from side cast, or a combination of factors is involved.

According to the landslide susceptibility geographic information system (GIS) data, the main Tribal holdings are in an area of low landslide susceptibility. The Tribe's vulnerability to landslide hazard is **unchanged** since the previous plan.

Refer to Appendix C for landslide hazard maps.

3.3.3 Winter Storm

Winter Storm

Magnitude	Onset	Duration	Frequency	Average	Rank
2	3	3	5	3.3	4

Location

Severe weather can affect whole regions; thus, the whole of the Lower Elwha Klallam Tribal Reservation can experience severe weather. Because storms often significantly affect utility and transportation systems, power and telephone outages are a frequent result of storms and ingress and egress may be limited. Consequently, isolated areas like the Lower Elwha Klallam Indian Reservation may experience greater effects from storms. Severe local storms significantly impact driving conditions on roads, and downed power lines can cause isolation. They can also hinder police, fire, and medical responses to urgent calls (Lower Elwha Clallam Tribe 2011).

Previous Occurrence/History

Recent winter storms occurring in the Tribal area resulting in major damage include (snowstorms listed below; see Section 3.3.4, Windstorms, for other types of winter weather):

- February 2019 – North Olympic Peninsula
- 17 March 2014 – Sequim/Port Angeles Blizzard
- 27 December 1996 – Christmas Snowstorm

Extent and Probability

Winter storm weather is common in the winter, but typically lasts a short time; ice storms (sleet and freezing rain) likewise are typically brief events.

Winter storms may be more extreme during La Niña weather years, such as the 1996 flooding associated with the 1996-1997 La Niña pattern.

Future Probability Trend – The impact of changing weather patterns may have an impact on the probability of future winter storm events. Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, it would seem the Tribe may be impacted by a **decrease** in the probability of future winter storms. However, it is also possible that changing weather patterns could result in an increased likelihood of precipitation during sub-zero temperatures, resulting in an **increase** in the probability of winter storms

Winter Storm

Vulnerability

The Tribe's primary vulnerability from severe weather is from power outages and impairment of transportation. Because nearly all social and economic activity is dependent on transportation, snow can have a serious impact. Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive. Power outages can result from physical damage to electrical infrastructure as a result of ice or snow or increases in demand beyond the capacity of the electrical system.

Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe winter weather events. Persons who are older, are isolated or have disabilities may be more vulnerable, especially those that may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Power losses during winter storms have resulted in deaths from carbon monoxide poisoning if people attempt to keep warm by lighting charcoal fires or operating backup generators indoors.

Since the 2011 draft plan, the Tribe's vulnerability to winter storms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.4 Windstorm

Windstorm

Magnitude	Onset	Duration	Frequency
2	4	2	5

Average	Rank
3.3	5

Location

All County and Tribal properties and structures can be affected by windstorms. Properties with infrastructures, utilities, and tree stands can have more damaging impacts during windstorms, especially in coastal areas where winds speeds can reach 40 to 60 miles per hour (mph) during the winter months.

Previous Occurrence/History

Recent windstorms occurring in the Tribe service area resulting in major damage include:

- 17 December 2018 – Clallam and East Jefferson Counties Windstorm
- 15-16 October 2016 – Typhoon Songda
- 14 December 2006 – "Hanukkah Eve" Windstorm
- 20 January 1993 – "Inaugural Day" Storm

These windstorms have caused damage to County and Tribal structures and housing; extensive utilities damage; restricted access to public lands; and required increased strain on the government's and Tribe's operations.

Windstorm

Extent and Probability

Coastal areas of the Tribe service area experience higher winds than other areas. However, windstorms can occur anywhere throughout the area. Windstorms can damage buildings, structures, utilities, and tree stands, causing millions of dollars' worth of damage.

Future Probability Trend – Future weather conditions have the potential to lead to an increase in severe and extreme weather patterns, leading to an **increase** in the probability of a windstorm. In addition, increased development has the potential to expose more assets to the impacts of windstorms.

Vulnerability

The Tribe's vulnerability to severe windstorms are related to power outages and debris blocking land-based transportation routes. Because nearly all social and economic activity is dependent on transportation, damage from windstorms can have a serious impact.

Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. More rural communities located in the foothills are particularly vulnerable to road outages and face longer delays in debris removal. Additionally, vehicle accidents rise among those who try to drive during windstorms (U.S. Department of Transportation 2018).

Power outages can result from physical damage to electrical infrastructure as a result of downed trees and blown debris. Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe windstorms. Additionally, persons with electric-based health support systems are vulnerable to power outages everywhere.

Since the 2011 plan, the Tribe's vulnerability to windstorms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.5 Wildfire

Wildfire

Magnitude	Onset	Duration	Frequency
3	5	2	3

Average	Rank
3.3	6

Location

According to the *Community Wildfire Protection Plan* (CWPP), large fires in western Washington typically occur on steep south-facing slopes, and often result from a combination of circumstances including a source of ignition in areas of dry, heavy fuels, an extended period of drought, and dry east winds (Clallam County 2009). Forest fires in this area usually occur during the dry summer months of July, August, and early September, but they can occur anytime between April and October given the right conditions. Fire hazard increases in the late summer and early fall when hot, dry east winds (subsidence winds) occur more frequently and the area has experienced the low point of the annual precipitation cycle. The portion of the Peninsula with the highest potential for major fires is the area

Wildfire

between Port Angeles and Hood Canal, though as residents of Forks can attest, large forest can occur anywhere on the Peninsula (Clallam County 2010).

Previous Occurrence/History

Previous wildland fires that have affected Clallam County include "The Great Forks Fire of 1951," 1955 in the West Twin River area, and 2002 in the Clallam Bay area. The fires in 1951 began near Lake Crescent and burned into and around Forks. Approximately 30 buildings and between 33,000 and 38,000 acres of timber were lost. The 1955 fire burned approximately 5,000 acres of timber. The 2002 fire started as slash burnings on private land. In July 2004, a wildfire ignited near Joyce at Striped Peak, burning between three and four acres of private hillside land. Joyce experienced another wildfire in May 2006 when a controlled burn near the town grew into a five-acre wildfire. From January 2008 to August 2009, 38 different wildfire incidents have occurred within Clallam County, outside of Olympic National Park (Clallam County 2010).

Extent and Probability

A Headwaters Economics study found that Clallam County has more square miles of developed land within the wildland-urban interface than any other county in Washington State (72 square miles) and the fifth most area in the Wildland-Urban Interface (WUI) in the entire United States. The same study found that 13,271 homes were located within the WUI throughout the County (Headwaters Economics 2013).

Weather conditions greatly influence the impact and extent of wildfires. Drought, high temperatures, and wind contribute to a dynamic and changing conditions of wildfires. Fuel load and vegetation contribute to the size and intensity of wildfires.

Wildfires are frequent and inevitable. Within the region, most wildfires burn during the June to October time period.

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, the Tribe may be impacted by an **increase** in the probability of future fires.

Vulnerability

Past events indicate that wildfires would not be severe on the Lower Elwha Klallam Reservation. The Reservation is small, and thus a fire can be identified quickly. Secondly, the Reservation receives a large amount of rainfall, reducing the risk to dryness, which is an essential contribution of fires. In a worst-case scenario, a wildfire spread by heavy winds during extremely dry conditions may damage Tribal structures. DNR fire statistics indicate that a wildfire would be less than an acre in size. There are no Washington DNR WUI areas identified near the Reservation (Lower Elwha Klallam Tribe 2011).

Nonetheless, the Reservation is served by a small volunteer fire department which make take longer to deploy and fight the fire. Outside resources would also take a long time. The vegetation in the area is composed of thick forests and logging debris or beach grasses and driftwood, both of which are potential fuel sources for wildfires (Lower Elwha Klallam Tribe 2011).

According to GIS analysis, Tribal land is located in a low fire hazard area (Appendix C). The Tribe's vulnerability to wildfire is **unchanged** since the draft Tribal plan.

3.3.6 Flooding

Flooding

Magnitude	Onset	Duration	Frequency	Average	Rank
1	4	2	2	2.3	7

Location

The primary riverine hazard associated with Tribal lands is at the mouth of the Elwha River. Since the removal of the Lower Elwha Dam in 2014, the floodplain has been rejuvenated and what was formerly a constrained channel is now returning to its former state as a broad meander belt.

The land adjacent to the Elwha River is largely undeveloped because of its location within Olympic National Park.

Approximately 17 acres of land east of the flood control levee are located within the limits of the 100-year frequency floodplain (Base Flood). This parcel is located at the north end of the reservation, adjacent to the existing gap in the flood control levee (Lower Elwha Klallam Tribe 2011).

The Lower Elwha Klallam Tribal Flood Control Ordinance addresses development related concerns on this parcel. There are currently ten Tribal and two private residences located within the 100-year-frequency floodplain. Additional development within the 100-year floodplain is prohibited, unless the provisions of the Special Flood Hazard Ordinance (1999) are satisfied (Lower Elwha Klallam Tribe 2011).

On the west bank of the Elwha, a 900-foot-long private levee protects Place Road housing and about 30 acres below the bluff from the impacts of 30- to 50-year floods. Since its construction in the 1950s, the private levee has effectively prevented the shifting of the Elwha River mouth to the west and has resulted in aggradation of sediment adjacent to it (Lower Elwha Klallam Tribe 2011).

Previous Occurrence/History

The Draft Tribal HMP contains the following information about historic flood events on Tribal lands:

> "Historically, the Lower Elwha Reservation, by virtue of its location on the floodplain, has been subject to the natural meanders of the Elwha River channel and the seasonal flooding of its banks onto the floodplain. This flooding is typically bimodal in nature, with peaks associated with the late fall-early winter rains and the spring melting of the Olympic Mountain snowpack.
>
> Prior to [USACE] levee construction (1989), flooding often resulted in the temporary evacuation of floodplain occupants with very little warning. Consecutive winter flood events occurred in 1979 and 1980 causing extensive damage to Reservation residences and facilities." (Lower Elwha Klallam Tribe 2011).

Flooding

Extent and Probability

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property. Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by U.S. Geological Survey (USGS) stream gauges located throughout the area. It can also be measured by past damages of flooding.

The region experiences some flooding twice a year at minimum, while larger floods occur once a decade and major flood events occurring every 30-50 years.

The Lower Elwha Dam on the Elwha River was removed in 2014 as part of an effort to restore the floodplain to its historic condition and revitalize wildlife habitat along the river (Lower Elwha Klallam Tribe 2019).

Future Probability Trend – Based on potential increase in high-intensity precipitation events and increased development trends (resulting in additional impervious surfaces and stormwater runoff), the County may be impacted by an **increase** in the probability of future floods.

Vulnerability

All the Tribal facilities and homes in the lower valley are potentially vulnerable to flooding. At least 11 homes are in the 100-year floodplain (Lower Elwha Klallam Tribe 2011).

Since the 2011 plan, the Tribe's vulnerability to nuisance flooding has **increased** as precipitation patterns shift due to climate change. However, the Tribe is taking active steps to mitigate the impacts of flooding and is fairly protected by the USACE levee.

3.4 Vulnerability Assessment

3.4.1 Identifying Critical Infrastructure

Critical infrastructure was identified for this plan update using a combination of the methodology outlined in Section 4.6 of the Base Plan, in addition to referring to the comprehensive list of critical infrastructure outlined in the Tribe's draft plan in 2011. This list of critical infrastructure has been updated by the Tribal Emergency Management Director.

3.4.2 Severe Repetitive Loss Properties

There are no National Flood Insurance Program (NFIP)-identified severe repetitive loss properties located on Lower Elwha Klallam Tribal lands.

3.4.3 Exposure Assessment

Table 3-3 contains a summary of critical infrastructure associated with the Lower Elwha Klallam Tribe. This list was supplemented by critical infrastructure identified during the 2011 planning process. The vulnerability of each structure is to earthquake, tsunami, flooding, severe weather (which includes winter storm and windstorm), fire, and landslide is assessed.

Table 3-3 Lower Elwha Klallam Critical Infrastructure and Vulnerability Assessment

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Lower Elwha Reservation				Government Building	80%	E	Very High	Very High	Very High				
Lower Elwha Reservation	Lower Elwha Klallam Tribal Police	HWY 101 & S Dry Creek Rd, Port Angeles, WA 98363	Port Angeles	Government Building	80%	C	High	Low	High	NO	NO	NO	NO

Key:
EQ = Earthquake
PGA = Peak Ground Acceleration
WUIF = Wildland Urban Interface Fire

The following is a list of critical facilities and infrastructure located on the Lower Elwha Reservation (Lower Elwha Klallam Tribe 2011):

- Tribal Center
- Lower Elwha Klallam Casino
- Tribal Health Clinic
- Tribal Police Station
- House of Salmon Hatchery
- Emergency Operations Center
- USACE Flood Control Levee
- Bureau of Indian Affairs Roads (37.4 miles)

3.5 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.7(d)(3))

Changes have been measured by accounting for shifts in land use and public awareness since the adoption of the 2010 County HMP and the development of 2011 Draft Tribal HMP. Each hazard has been identified as having an increased, decreased, or unchanged vulnerability in this time. Table 3-4 provides a snapshot of how vulnerability has changed since the 2011 Draft Tribal HMP.

Table 3-4 Vulnerability Changes Since 2011

Hazard	Status
Earthquake	+/-
Landslide	=
Winter Storm	+
Windstorm	+
Wildfire	=
Flooding	+

Key:
+ Increased vulnerability
- Decreased vulnerability
+/- Increased vulnerability, but actions taken to decrease vulnerability
= Unchanged vulnerability

4 CAPABILITY ASSESSMENT

FEMA	**C1.** Does the plan include a discussion of the tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas? (Requirement §201.7(c)(3)(iv))

4.1 Human and Technical Resources

Table 4-1 describes the Tribe's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 4-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
Chief Executive Officer	Business Committee	Ensures the mitigation program is incorporated into the Tribe's daily business
Director of Emergency Management	Police Department	Oversee mitigation program and encourage integration of mitigation planning into all tribal activities
Natural Resources Director	Natural Resources Department	Manage natural resources within the Tribe's properties
Geographic Information System (GIS) Mapping Program Manager	Natural Resources Department	Integrate hazard data into mapping capabilities of the Tribe

4.2 Financial Resources

FEMA	**C2.** Does the plan include a discussion of tribal funding sources for hazard mitigation projects and identify current and potential sources of Federal, tribal, or private funding to implement mitigation activities? (Requirement §201.7(c)(3)(iv and v))

The Tribe maintains many fiscal and financial resources to support its mitigation program. Table 4-2 identifies specific resources accessible for use.

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	Yes
Capital Improvement Project Funding	Yes
Insurance	Yes
Incur debt	Yes
State-sponsored grant programs	Yes

Table 4-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP. As a federally recognized tribe, the Tribe can access funding directly through

the federal government. In addition, funding is also available from the State of Washington and potentially through Clallam County.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Pre-Disaster Mitigation Program	Federal Emergency Management Agency (FEMA)	Provides funding to develop hazard mitigation plans and implement mitigation actions contained within.
Hazard Mitigation Grant Program	FEMA	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	FEMA	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by floods.
Community Development Block Grant Program	U.S. Department of Housing and Urban Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.
Emergency Management Performance Grants Program	FEMA/Washington Department of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.
Flood Mitigation Assistance	FEMA/Washington Department of Emergency Management	Provides funding to support development of the flood hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program (NFIP).
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program Interagency Coordinating Committee	Funds activities including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
National Fire Plan	U.S. Forest Service	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
Strategic Economic and Community Development Grant	U.S. Department of Agriculture (USDA)	Provides funding in rural areas for multi-jurisdictional plan development and with a community development focus. Available only to rural areas outside of urbanized zone of any city with a population greater than 50,000.
Coastal Ecosystem Resiliency Program	National Oceanic and Atmospheric Administration	Provides funding for ecosystem restoration. Governor must approve project funds prior to award and there is a 2:1 cost-sharing ratio.
State		
Washington State Department of Transportation (WSDOT)	WSDOT	Avalanche forecasting determines the potential risk along a particular mountain slope. When an avalanche hazard

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Avalanche Forecasting and Control		develops, WSDOT uses artillery, or explosives to trigger the avalanche. In addition to active avalanche control, WSDOT also uses passive control methods to control snow slides.
Washington Sea Grant	Washington Sea Grant	Washington Sea Grant provides funding opportunities through State and National competitions, program development services, and sponsorships.
Water Resources Program	Washington Department of Ecology (DEC)	DEC's Water Resources Program provides support in monitoring water supply, managing water supply projects, overseeing water rights, performing streamflow restoration, protecting streamflow, regulating well construction and licensing, and ensuring dam safety.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock industry and receives no general fund dollars.
Washington Local Emergency Planning Committee Program	Washington Emergency Management Division (EMD)	Washington EMD provides funding support to ensure Local Emergency Planning Committees (LEPCs) can be implemented across the state.
Washington Pipeline Safety Program	Washington Utilities and Transportation Commission	The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington State; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).
State Water Pollution Control Revolving Fund	Washington DEC	This program provides funds to local governments to set up low-interest loan programs to repair or replace failing on-site sewage systems. Property owners unable to qualify for conventional bank loans and marine waterfront property owners can use the program to get loans to fix or replace their systems where failures might directly affect Puget Sound. Both the Clean Water State Revolving Fund and the Centennial Clean Water Program.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.
Thriving Resilient Communities	Threshold Foundation	Wide-ranging resiliency project funding.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Kresge Foundation Environmental Grants	Kresge Foundation	Provides funding for climate adaptation and mitigation, as well as sustainable water resources management.

4.3 Legal and Regulatory Resources

Table 5-4 describes the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations.

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2012-2019)	Hazard Mitigated
Plans	Lower Elwha Klallam Comprehensive Emergency Operations Plan	Contains information that may be used to protect people and property on or near the Lower Elwha Klallam Reservation.	▪ Hiring of a Director of Emergency Management ▪ Incorporation of emergency planning into tribal operations	All
	Comprehensive Flood Hazard Management Plan	Examines flood related hazards that exist on the lower Elwha River near its confluence with the Strait of Juan de Fuca.	▪	Flooding
Policies	Special Flood Hazard Ordinance	A Tribal regulatory tool to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas.	▪ Signed into agreement	Flooding
Programs	Northwest Tribal Emergency Management Council	Support tribal participation on homeland security and emergency management preparedness efforts.	▪ Joined the consortium	All
	Elwha River Restoration	Rehabilitation of formerly dammed floodplain.	▪ Removal of the Lower Elwha dams	Flooding
	National Incident Management System (NIMS) Compliance Training	Training of all tribal police officers, department heads, Board members, and relevant staff in NIMS	▪ Ongoing	All

4.4 FEMA Funded Hazard Mitigation Projects

The Tribe has not received funding for any hazard mitigation projects to date.

The County has received funding for several hazard mitigation projects to date. Table 4-5 outlines County-wide FEMA funded hazard mitigation projects.

Table 4-5 FEMA Funded Hazard Mitigation Projects

Disaster ID#	Program	Project Title	Sub Grantee
1361	Hazard Mitigation Grant Program (HMGP)	Clallam Hazard Mitigation Plan	Clallam County
1037	HMGP	Bogachiel/La Push Road Bank Stabilization	Clallam County
1734	HMGP	Amendment 1 -Jamestown S'Klallam Tribe Hazard Mitigation Plan	Jamestown Reservation
4243	HMGP	Clallam County Hazard Mitigation Plan	Clallam County
1963	HMGP	Amend 1: Clallam County - Geographic Information System (GIS) Data Enhancement and Hazus Analysis	Clallam County

4.5 Continuity of Operations Planning

Continuity of government and continuity of operations (COOP) planning is an integral piece to any mitigation program. Ensuring the County can operate following an incident immediately mitigates the magnitude of many hazards. Currently, the Tribe does not have a COOP.

4.6 Coordination with Community Partners

The Tribe works alongside their community partners to address issues as they arise. Many of these community partners participated in the HMP update process and collaborate with the Tribe on an ongoing basis.

- **Education**
  - Cape Flattery School District
  - Quillayute Valley School District
  - Crescent School District
  - Port Angeles School District
  - Sequim School District
- **Business and Industry**
  - Local Chambers of Commerce
- **Healthcare**
  - Olympic Medical Center
  - Forks Community Hospital
- **Utilities**
  - Clallam County Public Utility District (Water, Sewer, and Power)
  - Diamond Point Water System
  - Crescent Water Association

4.7 National Flood Insurance Program Participation

FEMA	**C2.** Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.7(c)(3))

Clallam County, Forks, Port Angeles, and Sequim maintain active NFIP policies. The Lower Elwha Klallam Tribe also maintains active policies.

Table 4-6 contains a summary of Clallam County, local jurisdiction, and Tribal government total coverage and losses under the NFIP.

Table 4-6 National Flood Insurance Program Coverage and Losses

Community Name (Number)	Total Coverage (in Thousands)	Total Dollars Paid
CLALLAM COUNTY * (530021)	$97,187	$903,327
FORKS, CITY OF (530022)	$400	$--
LOWER ELWHA KLALLAM TRIBE (530316)	$1,715	$--
PORT ANGELES, CITY OF (530023)	$6,001	$75,632
SEQUIM, CITY OF (530301)	$2,148	$55,798

Source: FEMA NFIP Policy and Loss Data by Geography (2019c) https://www.fema.gov/policy-claim-statistics-flood-insurance

4.8 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into the Tribe's daily operations and ongoing planning activities is a priority of the County's mitigation program. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization;
- Reducing duplication or contradiction between County and jurisdictional plans; and
- Maximizing planning resources through linked or integrated planning efforts.

The Tribe is encouraged to consider integration actions into planning mechanisms including:

- Budget decision-making;
- Building and zoning ordinances and decision-making;
- Emergency planning mechanisms; and
- Economic developing planning and decision-making.

4.8.1 Existing Plans

FEMA	**C6.** Does the Plan describe a process by which the tribal government will incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate? (Requirement §201.7(c)(4)(iii))

The following existing plans provide ongoing opportunity for integration of hazard mitigation and the County will work with plan owners and stakeholders to consider hazard mitigation data and principles when these plans are updated.

Table 4-7 contains a summary of the County's existing plans and how each incorporates the hazard mitigation planning.

Table 4-7 Summary of Tribal Plans

Tribal or County Plan	Hazard Mitigation Components
Comprehensive Emergency Management Plan (2016)	County-wide: Outlines hazard mitigation roles and responsibilities.
Lower Elwha Comprehensive Emergency Operations Plan (2005)	Describes actions that may be required for a specified hazard.
Comprehensive Flood Management Plan	The plan provides current and historical information about river morphology, flooding, storm water, and erosion and presents viable management alternatives. Tribal regulatory programs, proposed land-use activities, flood studies, and citations of available flood reduction resources are also provided.
Tribal Evacuation Plan	Evacuation planning for the Tribe in the event of a natural disaster.

5 MITIGATION STRATEGY

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [Lower Elwha Klallam Tribe] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.7(c)(3)(ii))

5.1 Review of Draft 2011 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2011 draft plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2019 plan update. Table 5-1 contains a summary of the previous mitigation actions and their 2019 status.

Table 5-1 2011 Mitigation Action Status

Action Description	2019 Status
Identify Elders and other vulnerable populations to prioritize for mitigation and disaster assistance	Started in 2018 in collaboration with Tribal Council and Elwha Health Clinic
Create new, and expand existing Evacuation Routes, including better signage	Kacee Way has been completed and one new Tsunami Evacuation Route sign was added on Lower Elwha Road
Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	Construction on the new building for School and Head Start programs began in 2019. The new building is sited on high ground
Continue and expand disaster training programs such as Community Emergency Response Team (CERT) to train Tribal members and the local community to respond to an emergency	The new CERT Team has been started
Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	Evacuation plan is done.
Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	Ongoing
Develop a system to protect and maintain historical and archival Tribal records	Work on continuation of government planning will commence in 2020
Become a tsunami ready Community	Done
Maintain Office of Emergency Management	Done

Table 5-1 2011 Mitigation Action Status

Action Description	2019 Status
Become a StormReady community	Done
Develop interlocal agreements with local agencies and other jurisdictions for disaster planning and emergency preparedness and response	Ongoing
Implement Vegetation and other natural resource management practices to reduce landslides and coastal erosion	Ongoing

5.2 Identification and Analysis of New Mitigation Actions

In order to achieve the mitigation goals identified above, the Tribe has identified a comprehensive series of mitigation objectives and supporting actions that are focused on reducing vulnerability and maximizing loss reduction. The actions can typically be broken out into the following types of activities which are indicated in Table 5-2.

Table 5-2 2019 Mitigation Actions by Group

Mitigation Group	Related Mitigation Actions
Plans and Regulations	LEK08
Infrastructure/Capital Project	LEK01, LEK02, LEK06
Natural System Protection	LEK14
Education and Awareness	LEK05
Preparedness and Response	LEK03, LEK04, LEK07, LEK09, LEK10

All mitigation actions identified in the plan are addressed in the mitigation implementation plan provided in Section 5.3. The actions include both interim- and long-term strategies for reducing vulnerability to hazard and are characterized as such in the 'life of action' column of the implementation plan.

5.2.1 2019 Mitigation Actions by Hazard

All mitigation actions identified in the plan address at least one priority hazard outlined in Chapter 4 of the HMP. Table 4-2 indicates which mitigation actions address which hazards.

Table 5-3 2019 Mitigation Actions by Hazard

Hazard*	Related Mitigation Actions
All Hazards	LEK04, LEK05, LEK07, LEK08, LEK09, LEK10
Earthquake/Tsunami	LEK02, LEK03, LEK05
Landslide	LEK02
Winter Storm	LEK02

Table 5-3 2019 Mitigation Actions by Hazard

Hazard*	Related Mitigation Actions
Wildfire	LEK02
Flooding	LEK06

A complete mitigation implementation plan is provided in Table 5-4.

5.3 2019-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the City of Sequim]? (Requirement §201.7(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the Tribe. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix D for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for each action listed in Table 5-4.

Table 5-4 2019 - 2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
Lower Elwha Klallam Tribe													
LEK01	Move the tribal center from the tsunami inundation zone where it is currently located.	New	4,5	Lower Elwha Police Department, Emergency Management Division	3-5 years	Unknown	No	Federal Emergency Management Agency (FEMA)	Tsunami	14	10	24	6
LEK02	Widen and strengthen Lower Elwha Road from Stratton Road to Kacee Way.	New	1	Lower Elwha Police Department, Emergency Management Division	3-5 years	Unknown	No	FEMA	Earthquake, Flood, Landslide, Winter Storm, Tsunami, Wildfire	17	6	23	10
LWK03	Evaluate options to make new hotel in Port Angeles tsunami resistant.	New	4,5	Lower Elwha Police Department, Emergency Management Division	1-3 years	Unknown	No	FEMA	Earthquake, Flood, Tsunami	20	10	30	1
LEK04	Identify Elders and other vulnerable populations to prioritize for mitigation and disaster assistance	2011 Action – Ongoing. Started in 2018 in collaboration with Tribal Council and Elwha Health Clinic	5,6	Lower Elwha Klallam Emergency Management, Tribal Police, Enrollment, Tribal Clinic	1 year	Staff time	Yes	Operating Budgets	All hazards	20	6	26	4
LEK05	Create new, and expand existing Evacuation Routes, including better signage	2011 Action – Ongoing. Kacee Way has been completed and one new Tsunami Evacuation Route sign was added on Lower Elwha Road.	1,6	Lower Elwha Klallam Emergency Management	1 year	$500	Yes	Operating Budget	Tsunami, Earthquake	20	6	26	5

Table 5-4 2019 - 2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
LEK06	Acquire properties in low hazard areas in order to locate new development or relocate existing vulnerable structures and critical facilities	2011 Action – Ongoing. Construction on the new building for the school and Head Start programs began in 2019. The new building is sited on high ground.	5	Lower Elwha Klallam Emergency Management	1 -5 years	Varies depending on property. FEMA Cost Benefit Analysis software will be used to prioritize which structures to relocate.	No	Pre-Disaster Mitigation grant, Housing and Urban Development grants, U.S. Department of Agriculture (USDA) development grants	Flooding	14	10	24	7
LEK07	Continue and expand disaster training programs such as Community Emergency Response Team (CERT) to train Tribal members and the local community to respond to an emergency	2011 Action – Ongoing. The new CERT team has been started; training continues.	2,5	Lower Elwha Klallam Emergency Management	Annual	$10,000-20,000 per year	Yes	Emergency Management Performance grants, regional homeland security grants, Citizens Corps funding and other sources	All hazards	20	8	28	3
LEK08	Develop and/or improve Emergency Plans such as Evacuation Plans, Tribal Records Protection Plan, Continuity of Operations Plan etc.	2011 Action – Ongoing. The Evacuation Plan is complete. Tribal Records Protection Plan and continuity of operations (COOP) will be developed.	2,5,5	Tribal Council, Lower Elwha Klallam Emergency Management	1-5 years	Staff time to prepare plans, $30,000 - $80,000	Yes	Emergency Mgt Performance Grants, Dept of Health Grants, Regional Homeland Security funds and other sources	All hazards	19	10	29	2
LEK09	Partner with local jurisdictions and agencies in developing and implementing mitigation and emergency response strategies and actions	2011 Action – Ongoing.	5,6	Lower Elwha Klallam Emergency Management	Ongoing	Staff time	Yes	FEMA, Tribal Operating Budget	All hazards	18	6	24	8
LEK10	Develop a system to protect and maintain historical and archival Tribal records	2011 Action – Ongoing. Work on COOP will commence in 2020.	5,6	Tribal Council	1-3 years	Staff time	Yes	Tribal Operating Budget	All hazards	18	6	24	9
LEK14	Implement Vegetation and other natural resource management practices to reduce landslides and coastal erosion	2011 Action – Status unknown.	5										
Adopt the Hazard Mitigation Plan (HMP)		Completed – Re-adopting updated 2019 HMP	High	Planning Department	1 year	N/A		N/A	All hazards				

1 Key:
2 STAPLEE - Strategy and Prioritization Methodology

6 PLAN MONITORING AND EVALUATION

6.1 Annual Review

FEMA	**C7.** Does the plan describe a system for reviewing progress on achieving goals as well as activities and projects identified in the mitigation strategy, including monitoring implementation of mitigation measures and project closeouts? [44 CFR §§ 201.7(c)(4)(ii) and 201.7(c)(4)(v)]

The tribal Director of Emergency Management is responsible for coordinating annual review of the Lower Elwha Klallam tribal annex and making appropriate revisions. On an annual basis, the tribal planning team will be convened to conduct a comprehensive review of the plan to ensure that all information is current. The review and update processes are outlined below:

The tribal planning team will meet to consider:

- Progress made on plan recommendations during the previous 12 months;
- Mitigation accomplishments in projects, programs, and policies;
- Actual losses avoided by implementation of mitigation actions;
- Emerging disaster damage trends and repetitive losses;
- Identification of new mitigation needs;
- Cancellation of planned initiatives, and the justification for doing so; and
- Changes in membership to the MPT.

The tribal Director of Emergency Management will request input from other tribal departments and outside entities on issues listed above. A special effort will be made to gather information on non-capital projects and programs important to mitigation.

6.2 Monitoring Project Implementation

FEMA	**E1.** Does the plan include assurances that the tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? [44 CFR § 201.7(c)(6)]

Mitigation projects and project closeouts will be monitored and updated through the use of the quarterly reporting forms for FEMA-funded projects, provided by FEMA Region X. The Tribe's Contract Specialist will ensure project reporting is completed within specified timeframes. The Mitigation Project Progress Report will be requested annually by the Emergency Management Director to determine progress made to-date and track final closeout tasks. The Tribe will comply with all applicable Federal statutes and regulations in effect with respect to the periods which it receives grant funding, including 2

CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes.

6.2.1 Grant Management Process

The Tribe implements a comprehensive grant management process to ensure compliance with all applicable grant requirements. The grant management process involves all key governmental entities including the Program managers/department directors, the Chief Executive Officer, and/or Planning Department Director, and the Tribal Council. The Tribe's internal grant management process is as follows:

1. Program manager/department director shall present the proposed project to either the LEKT Chief Executive Officer (CEO), and/or Planning Department Director, at least thirty days prior to application deadline to determine timeliness, appropriateness, and need.
    a. All prospective private, local, state, and federal grant opportunities must be provided to the CEO by the assigned department representative and must include a completed Pre-grant Application Package with all proper signatures for approval prior to proposal development.
    b. Pre-grant checklist form must be provided to tribal council secretary for approval to receive a resolution number giving authority to submit grant application on behalf of the Lower Elwha Klallam Tribe.
2. Any tribal employee wanting to apply for grant funding must get approval from their department director and are required to fill out a Pre-grant application package. This pre-grant application package includes the following:
    a. Funding agency;
    b. CFDA # (of grant you are applying for)
    c. Amount of funding requested;
    d. Length of project;
    e. Grant application due date;
    f. LEKT Department approval;
    g. Proposed designation of employee to manage grant for proposed project;
    h. Verify match requirement and if match is required identify how match will be met and CFO/CEO signature required;
    i. Verify indirect cost rate – does agency allow LEKT negotiated rate and if not, an ICR waiver must be approved by tribal council – signature required;
    j. Grant Summary Form – This summarizes the proposed project and provides information about the project for tribal council to make a decision to support the project and issue a resolution number for approving tribal resolution.
    k. Grant Summary Form – This summarizes the proposed project and provides information about the project for tribal council to make a decision to support the project and issue a resolution number for approving tribal resolution.

3. Upon approval to proceed with the development of a grant application, the Planning Department will meet with the department representative to determine the level of assistance required from the Planning Office and will immediately assign a Grant Writer/Planner to the project.
    a. If the Department does not have grant writing capacity, the Planning Office will assign a Grant Writer/Planner to work directly with the Scoping Team to formulate the grant application.
    b. The scoping teams will utilize a Scoping Meeting Form as a guide and tracking tool for grant application development.
4. Once the grant application has been completed and is ready for submission, department representatives are required to fill out a Grant Application Final Approval Form and submit with the narrative and budget to the Planning Department Office for approval (this may be done electronically – by scanning the signed copy). The planning department will have approval within a 48-hour period.
    a. The Final Grant Application that will be submitted must be attached to the Final Application Form and submitted to the Planning Office for REVIEW at least 72 hours prior to submittal. This will give the time needed for any changes that may be necessary according to the request for proposal and/or agency requirements.
    b. The Controller/Grant Administrator is the E-BIZ Point of Contact for the Lower Elwha Klallam Tribe of Washington; the E-Biz POC is identified by the organization when they register with the CCR. The Grants Manager shall be identified and named as the person on the SF 424, Section 8.f. as the “person to be contacted on matters involving this application.” The Authorized Organization Representative (AOR) for The Lower Elwha Klallam Tribe is the Planning Director, the designated official (by Tribal Council designation) by virtue of position.
5. Upon receipt of Notification of Grant Award (NOGA) and completion of budget negotiations (if necessary), the Planning Director will provide notification to the Chief Financial Officer, Grants Administrator/Comptroller, Grant Reviewer and Department Program Managers. The only individuals responsible to set up the ACH payment processing account shall be the Finance Department. The grant budget will be entered into the Tribal accounts within two weeks of acceptance.
6. The Grant Reviewer or Planning director will set up access to the Grants Management portal, which is an electronic data management system. The Grant Reviewer will be responsible to maintain a “pending file” of all grant applications and upon Grants & Self Governance receipt of Notice of Grant Award (NOGA) will move the original proposal into an “active file” and will scan into an electronic data management system developed, owned and managed by the Lower Elwha Klallam Tribe. The Grant Reviewer will set up an electronic database for all grants, data collected and will set up a notification system with the Department Program Manager and/or person responsible for the grant implementation to enhance communications in meeting the reporting guidelines of the grant award.

a. The Grant Reviewer will document all communications, reports, implementation issues, etc. A digital copy shall be sent to the specified Grant Manager. In addition, the Grant Reviewer position will develop a hard copy binder system to track all Lower Elwha Klallam Tribe grants to maintain compliance throughout the life of the grant, and to maintain a record of the grant implementation for reporting and close-outs.

The Tribe also maintains an extensive process to respond to audits. Office of Management and Budget Circular A-133 audits are performed annually. Through this process, new awards are reviewed to ensure compliance has been met and funding use aligns with the Tribe's accounting records.

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City of Port Angeles Jurisdiction-Specific Annex – Clallam County Hazard Mitigation Plan

2019 Plan Update

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1 INTRODUCTION

1.1 City of Port Angeles Hazard Mitigation Program

Throughout the hazard mitigation planning process, the following representatives from the City of Port Angeles (referred to herein as 'City' or 'Port Angeles') were present at one or more Mitigation Planning Team (MPT) meeting:

- James Burke, Utilities and Public Works Director, Former
- Ken Dubuc, Fire Chief

A public meeting was held in Port Angeles on January 29, 2019.

The City of Port Angeles participated in the 2010 Clallam County Multi-Jurisdictional Hazard Mitigation Plan (HMP).

See Appendix E for the completed Federal Emergency Management Agency (FEMA) Local Plan Mitigation Review Tool for the City of Port Angeles.

2 COMMUNITY PROFILE

2.1 Governance

Port Angeles is governed by a seven-member City Council, the membership of which includes the mayor, deputy mayor, and five councilmembers. The City Council holds regular meetings on the first and third Tuesday of each month in the City Council Chambers. The City departments are as follows:

- City Clerk
- City Manager
- Community & Economic Development
- Finance
- Fire Department
- Human Resources
- Legal Department
- Parks & Recreation
- Peninsula Communications
- Police Department
- Public Works & Utilities

2.2 General

The City of Port Angeles is in Clallam County on the northern coast of Washington's Olympic Peninsula. It is less than a three-hour drive (including a ferry ride) from Seattle Olympia. Immediately to the north is the coastal marine environment of the Port Angeles Harbor, one of the deepest naturally protected harbors on the West Coast, and the Strait of Juan de Fuca. To the south are the alpine wilderness areas of the Olympic National Park, to the east is the semi-arid climate of the Sequim-Dungeness Valley, and a two-hour drive to the west is the Hoh Rain Forests and the Pacific Coast (City of Port Angeles 2019).

Port Angeles is located in the leeward side of the Olympic Mountains, which is also known as a "rainshadow." As a result, metrological conditions in Port Angeles are relatively mile year-round, with dramatically less precipitation than interior Clallam County, or in areas along the western coast of the Olympic Peninsula. The average precipitation and temperature trends over the time period from 1933 to 2008 in Port Angeles are displayed in the table below (WRCC 2008):

Table 2-1 Average Precipitation and Temperatures (1933-2008)

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Annual
Precip. (in)	3.91	2.69	2.11	1.26	0.97	0.86	0.53	0.75	1.09	2.51	4.01	4.34	25
MAX (deg.)	45	47	50	55	60	64	68	68	65	57	50	46	56
MIN (deg.)	34	35	37	40	45	49	52	52	49	43	38	36	43

Port Angeles is in the Port Angeles Watershed, which drains 65,000 acres. A gradually descending slope from the Olympic Mountains north to the Strait of Juan de Fuca characterizes the topography of the immediate Port Angeles area. The region is bisected by streams, which flow form the mountains towards the Strait and have eroded V-shaped ravines that are much lower in elevation than the surrounding areas (City of Port Angeles 2019).

2.3 Population and Demographics

As of 2018, the U.S. Census estimated population for Port Angeles was 19,370 individuals, which is a 5.4% increase from 2010 (U.S. Census Bureau 2018). Data from the 2017 American Community Survey (ACS) 5-year estimates indicate that 6.7% of the City's population is younger than 5 years of age and 21.6% of the City's population is younger than 18 years of age. Approximately 20% of the City's population is 65 years of age and older (U.S. Census Bureau 2018).

According to the ACS, 2.3% of the City's population is black or African American alone; 2.1% of the City's population is American Indian or Alaska Native alone; 2.6% of the City's population is Asian alone, and 5.4% is Hispanic or Latinx. Approximately 88% of the City's population is white alone and 4.6% is two or more races (U.S. Census Bureau 2018).

In 2017, an estimated 23% of the City's population lived in poverty and the median population income was $41,297. An estimated 14.6% of the population under age 65 live with a disability.

2.4 Economy

Overall, the Port Angeles economy employs 7,700 individuals (DataUSA 2019). According to the U.S. Census, the largest industries in Port Angeles are retail/trade, healthcare and social assistance, and accommodations and food services. Advanced composites manufacturing has been established in Port Angeles area, supplying manufactured parts to the aerospace and marine industries.

The Port of Port Angeles, the Olympic Peninsula's only deep-water port, provides support for Clallam County industry and employs administrative and trades staff. The Port operates a 16.1-acre marina, with approximately 375 boat slips and 3,000 feet of dock for tie-ups, as well as a marine terminal and trades area, a log yard, and rental properties. The Boat Haven Marina was upgraded in 2007-2008. The Port also operates the William R. Fairchild International Airport. The Port also currently houses a composites training institute (WA ESD 2019).

Peninsula College offers programs including advanced manufacturing, community education and worker retraining. It has three campus locations in Port Angeles, Port Townsend, and Forks (ESD 2018). As of the 2017-2018 school year, between the three campuses, the College supports 4,454 enrolled students with 51 full-time teaching faculty (Peninsula College 2019).

BUSINESS HIGHLIGHT

The Port fuels the North Olympic Peninsula's economy by supporting job creation in industry and commerce. The Port's strategic position on the Strait of Juan de Fuca, its location on a deep-water harbor, the industrial facilities that support marine and air transportation, and accesses to natural resources all contribute to unique and robust economic engine (Port of PA 2019).



https://www.portofpa.com/92/About-Us

2.5 Land Use

Appendix A of the 2019 Comprehensive Plan provides an overview of historic and present-day land use trends and challenges:

> "Patterned after the plan of Cincinnati, Ohio (substituting the Harbor for the Ohio River), the streets are arranged and named the same: Front, First, Second, etc.; at right angles to these are Tumwater, Cedar, Pine, Valley, Cherry, Oak, Laurel, Vine, and Race Street.
>
> While the City has benefited greatly from that original planning with its grid-pattern street layout, various challenges were also created such as utility service provision and circulatory problems, due to the topography of the land. Six different streams, with associated ravines, travel through the community flowing north from the foothills of the Olympic Mountains as they quickly make their way to the Strait of Juan de Fuca. They are: Dry Creek, Tumwater Creek, Valley Creek, Peabody Creek, Ennis Creek, White's Creek, with Lee's Creek, and Morse Creek located within the City's Urban Growth Areas." (City of Port Angeles 2019)

The City contains 10.7 square miles of land area. The following are the designated land uses defined in the 2019 Comprehensive Plan:

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Open Space

2.6 Transportation and Commuting

The 2019 Comprehensive Plan provides the following profile regarding transportation trends in the City of Port Angeles:

> "The road network in the City of Port Angeles is characterized by a gridded street pattern that is oriented east to west (parallel to the waterfront) and north to south. This pattern shifts slightly south of Lauridsen Boulevard, where the street orientation shifts to match the platting pattern established by the County before City boundaries were expanded. The regular geometry of this pattern is generally retained, except where topography of the foothills, deep ravines or bluffs along the Strait of Juan de Fuca force road realignment. Some areas located in the western portion of the City also diverge from the grid pattern, forming a more curvilinear, suburban-style pattern.
>
> Street grades are moderate in most areas, adapting to area topography – which rises from the waterfront and gently undulates as the foothills flatten to meet the Strait of Juan de Fuca. The most unique characteristic of the City's street network is the way it is interrupted by several deep ravines, which bisect east-west street connectivity and results in a limited number of streets that run continuously from one end of the City to the other…
>
> There are five Highways of Regional Significance through the City, including:
>
> - US-101
> - State Route 117 Tumwater Truck Route
> - Race Street leading to the Olympic Park Visitor Center and Hurricane Ridge
> - The First/Front Street couplet Marine Drive from US-101 to SR 117
> - Lincoln/Laurel/Oak Streets connecting US-101 with the Coho Ferry landing on Railroad Avenue
>
> …The City of Port Angeles is served by Clallam Transit System (CTS), the Public Transportation Benefit Area (PTBA) that serves Clallam County with a combination of fixed-route, paratransit, and vanpool services…. Paratransit service is provided to all locations within the City for those who qualify. Vanpools extend the reach of the transit network and are frequently used by those commuting to locations which are difficult to serve with fixed-route service…" (City of Port Angeles 2019)

Figure 2-1 City of Port Angeles

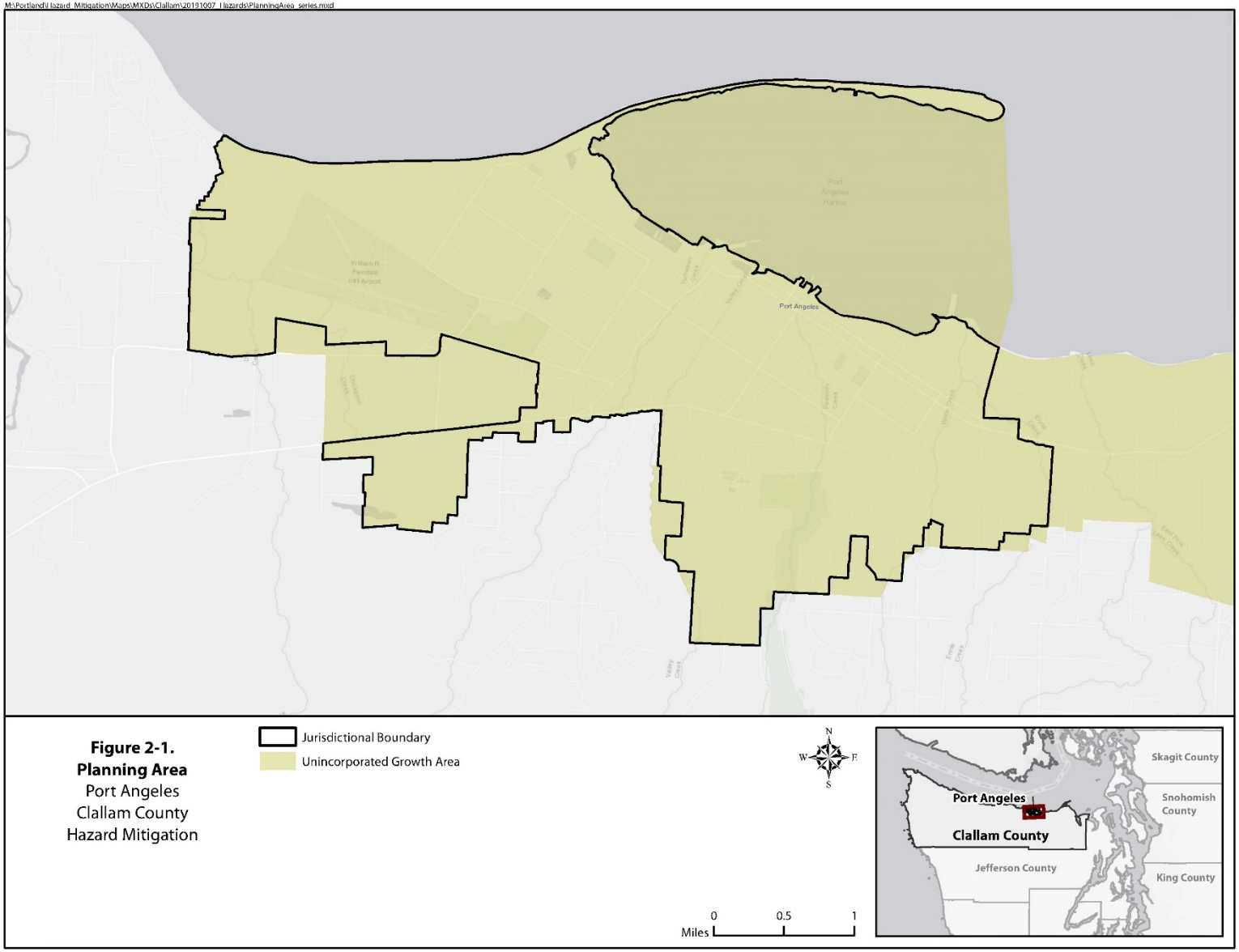

Figure 2-1.
Planning Area
Port Angeles
Clallam County
Hazard Mitigation

3 HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 3 contains hazard profiles and vulnerability assessments to determine the potential impact of hazards to the people, economy, and build and natural environments of the City of Port Angeles. They have been streamlined to increase the effectiveness and usability of the HMP.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Port Angeles]? (Requirement §201.6(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the City of Port Angeles]? (Requirement §201.6(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the planning area? [44 CFR § 201.6(c)(2)(ii)]

3.1 General

Clallam County has encountered several major disaster declarations that have affected the City of Port Angeles. In total, the County has experienced 21 disaster declarations since 1953. Table 3-1 identifies the disaster declarations since 2010.

Table 3-1 Clallam County FEMA Disaster Declarations

Disaster ID	Date of Declaration	Disaster Type	Incident Period
DR-1956	05-Mar-12	Severe Winter Storms, Flooding, Landslides, and Mudslides	14-Jan-12 to 23-Jan-12
DR-4242	15-Oct-15	Severe Windstorm	29-Aug-15
DR-4249	1-Jan-16	Severe Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	12-Nov-15 to 21-Nov-16
DR-4253	2-Feb-16	Severe Winter Storm, Straight-line Winds, Flooding, Landslides, Mudslides, and a Tornado	1-Dec-15 to 14-Dec-15
DR-4418	4-Mar-19	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado	10-Dec-18 to 24-Dec-18

Source: FEMA, Washington Disaster History, Major Disaster Declarations (https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties)

The hazard profiles and vulnerability assessments contained in this chapter represent a considerable amount of work performed by the MPT. MPT members ranked hazards using several key considerations, followed up by activities to validate hazard analysis results and identify specific areas of risk. Table 3-2 displays the hazards that MPT selected for further assessment.

Table 3-2 Hazards Addressed in Plan

Hazard Type	Hazard Name
Natural Hazards	Earthquake Disease Winter Storm Windstorm Heat Events Drought Tsunami Wildfire Flooding Landslide
Technological Hazards	Utility Failure

3.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on MPT feedback during MPT Meeting #1 and #2.

Following the individual hazard ranking activity, the results were added up and aggregated to show an average score for the all City of Port Angeles MPT members and are available in Figure 3-1.

Figure 3-1 City of Port Angeles Hazard Rankings

City of Port Angeles Hazard Ranking

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Utility Failure	2	5	4	5		4	1
Disease	4	4.5	5	2		4	2
Earthquake	4	5	4.5	1		4	3
Cascadia Earthquake	5	5	3	1		4	4
Winter Storm	1.5	3.5	3	5		3	5
Windstorm	1.5	3.5	2.5	5		3	6
Wildfire Smoke	2	3	3	4		3	7
Heat Events	2	3	3	4		3	8
Tsunami	3	4	3.5	1		3	9
Wildfire	1.5	4	3.5	2.5		3	10
Flooding	2	3	3	2		3	13
Landslide	1.5	4.5	1.5	1		2	14
Drought	1.5	1	3	2.5		2	15

3.3 Hazard-Specific Profiles and Risk Assessments

The following section profiles each hazard identified in Section 3.2 and assesses the risk associated with each. Each risk assessment considers the following attributes:

- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Like location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends impact on the City's vulnerability to each hazard since the 2010 plan development (increased, decreased, unchanged).

Note: Hazard Descriptions, Potential Impacts from Future Climate Conditions, and Cascading Impacts can be found in Section 4 of the HMP Base Plan, as these are not place-specific.

In addition, the hazards have been organized into three sub-sections (high-, medium-, and low-priority) to illustrate the risk-driven nature of the HMP. Each hazard has been given serious consideration of all attributes discussed within. However, low-priority hazards may be shorter in length and with less quantitative analyses, as a lack of usable data is frequently present when considering low-likelihood or low-magnitude events. The three sub-sections are as follows:

- **High-Priority:** Cascadia Earthquake, Earthquake, Utility Failure, Disease
- **Medium-Priority:** Winter Storm, Wildfire Smoke, Windstorm, Heat Events, Tsunami, Wildfire, Flooding
- **Low-Priority:** Drought, Landslide

3.3.1 Utility Failure

Utility Failure

Magnitude	Onset	Duration	Frequency	Average	Rank
2	5	4	5	4	1

Location
Numerous City properties are at risk of being affected by power outages/utility failures. Rural and populated areas alike are known to experience power outages during winter and windstorms that can last anywhere from several hours to several weeks. In addition, the Clallam County Public Utility District (PUD) operates extensive utility and information technology networks that could be at a risk to exposure of a hazard that could lead to a utility failure.

Previous Occurrence/History

Historically, utility disruptions and failures have been caused by natural disasters and human-caused accidents but have not been recorded in a way that is publicly accessible. Numerous utility failures occur every year, most frequently in the form of electricity outages that may last as short as hours or as long as weeks.

Extent and Probability

It is difficult to predict the impacts of future utility failures, but they have the potential to impact all government and business operations and cause extensive economic losses among other impacts. Due to the sporadic nature of failures, it is also difficult to estimate how frequently such failures will occur or their duration. The City generally deals with power outages multiple times per year with many of them only lasting a matter of hours. Every several years, a large utility failure is experienced.

Future Probability Trend – Based on potential increases in severe winter storms, heat waves and increasing development trends resulting in greater demand, the City may be impacted by an **increase** in the probability of future utility failure. However, mitigation actions outlined in this HMP are designed to decrease such strain on utility systems.

Vulnerability

Port Angeles City Light operates 11 electrical facilities within the City that are vulnerable to failure due to an array of hazards. Additionally, there is one natural gas facility, 3 water system facilities, and 2 wastewater systems that are vulnerable to hazards.

Power facilities in Clallam County are generally protected from wildland/urban interface fire by defensible space. A limited number are threatened by tsunami, flood and landslide hazards. All facilities are threatened to varying degrees by destructive earthquakes.

Since the 2010 County HMP, development in Port Angeles has expanded further into the Wildland-Urban Interface (WUI); therefore, the vulnerability has **increased**.

3.3.2 Disease

Disease

Magnitude	Onset	Duration	Frequency
4	4.5	5	2

Average	Rank
4	2

Location

The City has multiple medical clinics and one primary hospital, the Olympic Medical Center.

The Clallam County Public Health Services administers public health awareness programs to provide information on diseases influencing the County population. The following facilities are communicable disease testing sites:

- Private healthcare provider offices
- Clinicare Walk-In Clinic
- Volunteers in Medicine of the Olympics Clinic for uninsured/low income
- Planned Parenthood for sexually transmitted diseases (STDs), human immunodeficiency virus (HIV), & Hepatitis C
- Clallam County Public Health Section on a limited, case by case basis.

Previous Occurrence/History

- February 2015: A kindergartner was diagnosed with measles in the City; a total of 5 people in Clallam County were diagnosed with measles; 1 fatality (Seattle Times 2015).

Extent and Probability

Although it is impossible to predict the next infectious disease outbreak, history shows that outbreaks are not uncommon and can devastate communities. Infectious diseases can affect the City and County's entire population. Diseases may also infect livestock herds and can potentially be communicated from animal vectors to humans. Recent medical advancements increase our ability to counteract such outbreaks and limit their extent, but additional concerns related to diseases building resistance to drugs is an ongoing concern.

Future Probability Trend – Based on potential changing weather patterns, the City may be impacted by an **increase** in the probability of emerging infectious disease.

Vulnerability

Epidemic and pandemic diseases have been known to spread quickly throughout communities. Many diseases spread through close contact, meaning that highly populated areas are more prone to widespread outbreaks; a lot of public activities are centered out of the Port Angeles area. However, compared to a metropolitan area, the smaller relative population density of the City decreases the likelihood of a widespread outbreak in comparison to a more densely populated area.

Port Angeles is a relatively small city, with just under 20,000 individuals. Vulnerable populations include the 6.7% that is 5 years of age and younger and 20% that is 65 years of age and older (U.S. Census Bureau 2018). An estimated 23% of the City's population lived in poverty, and an estimated 14.6% of the population under the age of 65 live with a disability. These vulnerability factors may indicate an increased probability for infection and outbreaks.

Disease

The rural nature of the City also presents a key vulnerability: healthcare resources and hospitals are in short supply and would likely become overburdened immediately following a disease outbreak.

Given the expansion of population centers such as Port Angeles and Sequim, the vulnerability of the County to disease has **increased**.

3.3.3 Earthquake & Tsunami

Earthquake & Tsunami

	Magnitude	Onset	Duration	Frequency	Average	Rank
Earthquake	4	5	4.5	1	4	3
Cascadia Earthquake	5	5	3	1	4	4
Tsunami	3	4	3.5	1	3	9

Location

The Cascadia Subduction Zone (CSZ), where the Juan De Fuca plate slides underneath the North American plate poses a great risk to the City and all communities in the Pacific Northwest. A large earthquake would cause significant impacts to all City properties with a structure, and liquefaction may pose a risk to properties without a structure (though the liquefaction risk in the area is graded as moderate). The region is also subject to smaller, crustal quakes near the Port Angeles/Sequim area associated with the Lake Creek Fault.

Only 3% of Port Angeles is in the tsunami hazard zone, mainly along the waterfront and the Ediz Hook.

Previous Occurrence/History

The most recent earthquake that damaged Clallam County was the 2001 Nisqually Earthquake. Small earthquakes occur regularly throughout the region and go unnoticed by residents. Over the last 135 years, there have been nine earthquakes with a magnitude (M) greater than 6.0 in the area that we consider the Northwest. Five of those large quakes (including the Nisqually earthquake) directly impacted the Olympic Peninsula, according to eyewitness accounts.

- 1700, CSZ Earthquake, M 9.0
- 1909, San Juan Island, M 6.0
- 1939, Vashon Island, M 6.1
- 1949, Olympia, M 7.1
- 1965, Seattle – Tacoma, M 6.5
- 2001, Nisqually, M 6.8

The most recent tsunami in Port Angeles area as follows:

- 2006 Kuril Islands, Japan Tsunami (Port Angeles, 0.39 feet)
- 1700 Cascadia Tsunami (Washington Coast, 33 feet)

Extent and Probability

Earthquakes pose a widespread hazard throughout Clallam County, including Port Angeles. Tsunami post a widespread hazard throughout the coastal area. The cascading impacts of earthquakes, such as

Earthquake & Tsunami

tsunami and liquefaction, are dependent on geography and soil type, as detailed above.

The Ring of Fire will continue to generate tectonic triggers. The CSZ has produced earthquakes measuring M 8.0 and above at least seven times in the past 3,500 years. The time intervals between these events has varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.

There is evidence of two earthquakes on the Lake Creek Fault between 2,000 and 700 years ago. An earthquake of M 6.8 along the Lake Creek Fault would produce the greatest intensity shaking in the vicinity of Port Angeles and Sequim.

Future Probability Trend – Future weather and development trends play no known role in the probability of future earthquake events. However, both may play a role in the magnitude of earthquake impacts. Great earthquakes in the Pacific Ocean basin generate tsunamis that impact Washington's outer coast and the Strait of Juan de Fuca at a rate of about six every 100 years. In the CSZ, there is a 10 to 14% chance of a M 9.0 earthquake and tsunami in the next 50 years so the likelihood of recurrence would be low.

Vulnerability

Vulnerability posed by earthquakes to the City of Port Angeles is measured by accounting for the critical infrastructure that are at risk. The following infrastructure types are at high to very high risk from earthquake shaking:

- Commercial (1 building)
- Communication System (2 buildings)
- Electric System (1 building)
- Fire Stations (1 building)
- Government Structures (3 buildings)
- Hazardous Materials Storage (11 buildings)
- Medical Facilities (1 building)
- Natural Gas Facilities (1 building)
- Schools (1 building)
- Shelters (7 buildings)
- Wastewater Systems (2 buildings)
- Water Systems (3 buildings)

The following infrastructure types are at high to very high risk from liquefaction:

- Commercial (1 buildings)
- Communication Systems (2 buildings)
- Electric Systems (3 buildings)
- Fire Stations (1 building)
- Government Structures (2 buildings)
- Hazardous Materials Storage (11 buildings)
- Medical Facilities (1 building)
- Natural Gas Facilities (1 building)
- Schools (2 buildings)
- Shelters (1 building)
- Wastewater Systems (2 buildings)

Earthquake & Tsunami

The following infrastructure types are at a high risk for tsunami damage:

- Airport (U.S. Coast Guard [USCG])
- Electric Systems (1 building)
- Government Structures (1 building)
- Hazardous Materials Storage (11 buildings)
- Natural Gas Facilities (1 building)
- Shelters (2 buildings)

Awareness of the City's vulnerability to earthquakes or tsunamis has increased with participation in regional drills and public outreach efforts. More structures are being designed to be resilient to tectonic activity. Given these changes, the vulnerability of Port Angeles to earthquakes and tsunami is **unchanged**.

3.3.4 Winter Storm

Winter Storm

Magnitude	Onset	Duration	Frequency
1.5	3.5	3	5

Average	Rank
3	5

Location

While much of the County can be affected by winter storms, the western coastal areas are exposed to the more damaging impacts of winter storms. Furthermore, many of the communities along the western and northern coast of Clallam County, including the City, are very remote and have limited road infrastructure that can quickly become compromised during a winter storm.

Previous Occurrence/History

Recent winter storms occurring in Port Angeles resulting in major damage include (snowstorms listed below; see Section 4.5.5, Windstorms, for other types of winter weather):

- 17 March 2014 – Sequim/Port Angeles Blizzard
- 27 December 1996 – Christmas Snowstorm

Extent and Probability

Winter storm weather is common in the winter, but typically lasts a short time; ice storms (sleet and freezing rain) likewise are typically brief events.

Winter storms may be more extreme during La Niña weather years, such as the 1996 flooding associated with the 1996-1997 La Niña pattern.

Future Probability Trend – The impact of changing weather patterns may have an impact on the probability of future winter storm events. Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, it would seem the City may be impacted by a **decrease** in the probability of future winter storms. However, it is also possible that changing weather patterns could result in an increased likelihood of precipitation during sub-zero temperatures, resulting in an **increase** in the probability of winter storms.

Winter Storm

Vulnerability

The City's primary vulnerability from severe weather is from power outages and impairment of transportation. Because nearly all social and economic activity is dependent on transportation, snow can have a serious impact. Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive. Power outages can result from physical damage to electrical infrastructure as a result of ice or snow or increases in demand beyond the capacity of the electrical system.

Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe winter weather events. Persons who are older, are isolated or have disabilities may be more vulnerable, especially those that may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Power losses during winter storms have resulted in deaths from carbon monoxide poisoning if people attempt to keep warm by lighting charcoal fires or operating backup generators indoors.

Snowstorms also slow the local economy, but there is a debate about whether these slowdowns cause permanent revenue losses. Productivity and sales may decline but often accelerate after a storm. Some permanent effects may occur if some areas in the region are accessible and some are not. For workers, snow can be a hardship, especially for those who lack benefits and vacation time. For local governments, responding to snowstorms can be a major unbudgeted expense. Some have even had to issue emergency bonds to cover snowstorm recovery costs.

Since the 2010 plan, the City vulnerability to winter storms has **increased** as weather patterns change due to climate change and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.5 Windstorm

Windstorm

Magnitude	Onset	Duration	Frequency
1.5	3.5	2.5	5

Average	Rank
3	6

Location
All County and City properties and structures can be affected by windstorms. Properties with infrastructures, utilities, and tree stands can have more damaging impacts during windstorms, especially in coastal areas where winds speeds can reach 40 to 60 miles per hour (mph) during the winter months.

Previous Occurrence/History

Recent windstorms occurring in Clallam County resulting in major damage include:

- 17 December 2018 – Clallam and East Jefferson Counties Windstorm
- 15-16 October 2016 – Typhoon Songda
- 14 December 2006 – "Hanukkah Eve" Windstorm
- 20 January 1993 – "Inaugural Day" Storm

These windstorms have caused damage to County structures and housing; extensive utilities damage; restricted access to public lands; and required increased strain on the government's operations.

Extent and Probability

Coastal areas of Clallam County, including the north side of Port Angeles, experience higher winds than other areas. Windstorms can damage buildings, structures, utilities, and tree stands, causing millions of dollars' worth of damage.

Future Probability Trend – Future weather conditions have the potential to lead to an increase in severe and extreme weather patterns, leading to an **increase** in the probability of a windstorm. In addition, increased development has the potential to expose more assets to the impacts of windstorms.

Vulnerability

The City's vulnerability to severe windstorms are related to power outages and debris blocking land-based transportation routes. Because nearly all social and economic activity is dependent on transportation, damage from windstorms can have a serious impact.

Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive during windstorms (U.S. Department of Transportation 2018).

Power outages can result from physical damage to electrical infrastructure as a result of downed trees and blown debris. Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe windstorms. Additionally, persons with electric-based health support systems are vulnerable to power outages everywhere.

Windstorm

Since the 2010 plan, the City's vulnerability to windstorms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.6 Fire

Fire

	Magnitude	Onset	Duration	Frequency
Wildfire Smoke	2	3	3	4
Wildfire	1.5	4	3.5	2.5

Average	Rank
3	7
3	10

Location

According to the *Clallam County Community Wildfire Protection Plan* (CWPP), large fires in western Washington typically occur on steep south-facing slopes, and often result from a combination of circumstances including a source of ignition in areas of dry, heavy fuels, an extended period of drought, and dry east winds (Clallam County 2009). Forest fires in this area usually occur during the dry summer months of July, August, and early September, but they can occur anytime between April and October given the right conditions. Fire hazard increases in the late summer and early fall when hot, dry east winds (subsidence winds) occur more frequently and the area has experienced the low point of the annual precipitation cycle. The portion of the Peninsula with the highest potential for major fires is the area between Port Angeles and Hood Canal, though as residents of Forks can attest, large forest can occur anywhere on the Peninsula (Clallam County 2010).

Many of the older structures in the County, such as in Port Angeles, may be vulnerable to urban fires because of their construction prior to modern fire codes and fire resistive materials, including electrical wiring. The Port Angeles Fire Department indicated many of the fire damages represent commercial structures, with a large portion in any year representing a single large fire (Clallam County 2010).

Previous Occurrence/History

In December 2003, the City of Port Angeles experienced a significant fire at the Elks Naval lodge, one of the City's largest structures located in the downtown core (Clallam County 2010).

Extent and Probability

Weather conditions greatly influence the impact and extent of wildfires. Drought, high temperatures, and wind contribute to a dynamic and changing conditions of wildfires. Fuel load and vegetation contribute to the size and intensity of wildfires.

Wildfires are frequent and inevitable. Within the region, most wildfires burn during the June to October time period.

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, the City may be impacted by an **increase** in the probability of future fires.

Fire

Vulnerability

Wildfires in Clallam County generally occur in the lower-lying WUI areas.

Due to the limited number of land-based evacuation routes, the City may become isolated during a wildfire—limiting access to healthcare facilities, shelters, and other resources. Other critical infrastructures vulnerable to wildfires include water systems, refined fuel systems, and communications systems.

Vulnerability posed by wildfires (particularly WUI fires) to Port Angeles is measured by accounting for the critical infrastructure that are at risk:

- Hazardous Materials Storage (2 structures)
- Shelter (1 structure)

Since the 2010 County HMP, development in Port Angeles has expanded further into the WUI; therefore, the vulnerability has **increased**.

See Appendix B for full Risk Exposure Tables and Appendix C for additional maps.

3.3.7 Heat Events and Drought

Heat Events and Drought

	Magnitude	Onset	Duration	Frequency	Average	Rank
Heat Events	2	3	3	4	3	8
Drought	1.5	1	3	2.5	2	15

Location
Drought widely influences the County. The City is located within the rainshadow of the Olympic Mountains.

Previous Occurrence/History

There has been one period of extreme drought within Clallam County over the last 17 years. During a two-month period in 2015, 100% of the County's area was marked by D3 to D4 droughts (the most intense forms of drought). Additionally, in 2001, 2003, 2006, 2009, 2014, 2017, and 2018, areas of the County experienced moderate to extreme drought. As of May 2019, a drought emergency was declared in the Elwha-Dungeness watershed which encompass the entirety of Clallam County.

The U.S. Drought Monitor classified the Olympic Peninsula region's 2019 drought as severe due to low precipitation levels (LaBrie 2019).

Drought animations over time are available at: http://droughtmonitor.unl.edu/Maps/Animations.aspx (U.S. Drought Monitor 2019).

Heat Events and Drought

Extent and Probability

Northeast Clallam County, which is in the rainshadow of the Olympic Mountains, is the most vulnerable to the effects of drought (Desisto et al. 2009).

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of prolonged heat, the City may be impacted by an **increase** in the probability of future droughts.

Vulnerability

Droughts impact individuals and industries. There is increased danger of forest and wildland fires. Millions of board feet of timber have been lost. Loss of forests and trees increases erosion causing serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Problems of domestic and municipal water supplies are historically corrected by building another reservoir, a larger pipeline, a new well, or some other facility. Short-term measures, such as using large capacity water tankers to supply domestic potable water, have also been used. Low stream flows have created high temperatures, oxygen depletion, disease, and lack of spawning areas for our fish resources.

The City's vulnerability to drought has increased since 2010, as the demand has grown, and historic water supply shifts due to climate change and other factors.

3.3.8 Flooding

Flooding

Magnitude	Onset	Duration	Frequency
2	3	3	2

Average	Rank
3	13

Location

The primary riverine hazards are associated with the Elwha River and Morse Creek. Secondary riverine hazards are associated with Valley Creek, Tumwater Creek, Dry Creek, Chickamin Creek, Peabody Creek, White Creek, Ennis Creek, Lees Creek, Bagley Creek, and Siebert Creek.

Ediz Hook and parts of Port Angeles (mainly along the waterfront) and may become inundated with high tides and storm surges. (Clallam County 2010).

Previous Occurrence/History

Flood damages with the highest consequence, either related to the cost to repair or by the impact on human activities, were incurred during the 1979, 1990, 1996/1997 and 2008/2009 flood and severe storm events.

Flooding

Extent and Probability

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property. Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by U.S. Geological Survey (USGS) stream gauges located throughout the area. It can also be measured by past damages of flooding.

The region experiences some flooding twice a year at minimum, while larger floods occur once a decade and major flood events occurring every 30-50 years.

Future Probability Trend – Based on potential increase in high-intensity precipitation events and increased development trends (resulting in additional impervious surfaces and stormwater runoff), the City may be impacted by an **increase** in the probability of future floods.

Vulnerability

Clallam County, local jurisdictions, and Tribes do not currently participate in the NFIP Community Rating System (CRS) (the Lower Elwha/Klallam Tribe has rescinded participation).

Vulnerability posed by flooding to Port Angeles is measured by accounting for the critical infrastructure that are at risk. The following City infrastructure types are classified as being vulnerable to flooding:

- Government Building (1 structure)
- Hazardous Materials Storage (2 structures)
- Shelter (1 structure)

Since the 2010 plan, the City's vulnerability to nuisance flooding has **increased** as precipitation patterns shift due to climate change. However, the City and partners are taking active steps to mitigate the impacts through floodplain restoration activities.

3.3.9 Landslide

Landslide

Magnitude	Onset	Duration	Frequency
1.5	4.5	1.5	1

Average	Rank
2	14

Location

The following are particular areas of City concern for landslides (FEMA 2013):

- Along major roadways, including US-101
- Along the Port Angeles marine bluff
- The Olympic Discovery Trail

Landslide

Previous Occurrence/History

Historically, the damages with the highest consequence, either related to the value of the repair or by the impact on human activities, include slides that have closed US-101 and slides in Port Angeles (one of which caused a fatality in 1998) (Clallam County 2010).

Bluff erosion and/or ravine erosion has damaged or threatens residences in developments located in Port Angeles. Since the County's critical areas codes that affect new building require provisions for building setbacks and drainage (including roof drainage and septic issues), new structures have not been damaged. Historically, smaller, residential lots platted years ago near bluffs have had the most problems with bluff failure (Clallam County 2010).

See Appendix C for additional detail.

Extent and Probability

The following is excerpted from the hazard assessment conducted by Clallam County Emergency Management Division (EMD) as part of the 2016 Cascadia Rising Exercise:

> "Highway 101 and East Beach Road are subject to debris flows and rockfalls along Lake Crescent. There is concern that neighborhoods in Port Angeles downhill from Peninsula College may be subject to block or creep slides during an earthquake." (Buck 2016)

Due to the geology and likelihood of landslide-triggering storms in Port Angeles, the probability of future occurrence of landslides is medium to low.

Future Probability Trend – Based on potential increases in drought and wildfires, as well as potentially higher intensity precipitation events, the City may be impacted by an **increase** in the probability of future landslides. In addition, as the City increases its land ownership and development, landslides may pose a greater risk on disturbed soils.

Vulnerability

Vulnerability posed by landslides to Port Angeles is measured by accounting for the critical infrastructure that are at risk. The following City infrastructure types are classified as being susceptible to landslides:

- Government buildings (1 structure)
- Hazardous Materials Storage (2 structures)
- Shelters (2 structures)

Since the 2010 plan, the City's vulnerability to landslides is **unchanged**.

3.4 Vulnerability Assessment

3.4.1 Identifying Critical Infrastructure and Asset Inventory

Critical infrastructure was identified for the City of Port Angeles following the methodology outlined in Section 4.6 of the Base Plan.

Appendix B contains the complete vulnerability assessment and associated methodology.

3.4.2 Repetitive Loss Properties

No properties within the City of Port Angeles meet the criteria for a severe repetitive loss.

3.4.3 Exposure Assessment

Table 3-3 contains a summary of the critical infrastructure associated with Port Angeles (Buck 2016). The vulnerability of each structure to earthquake, tsunami, flooding, WUI fires, and landslides is assessed.

Table 3-3 Port Angeles Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami	Floods	WUIF	Landslides
William F. Fairchild Intl	1402 Fairchild Airport Rd.	Port Angeles	Airport	80%	C	Low/Mod	Low	Very High	NO	NO	NO	NO
Port Angeles Coast Guard	1 Ediz Hook Rd	Port Angeles	Airport	80%	D	Mod/Hi	Mod/Hi	Severe	YES	NO	NO	NO
Olympic Medical Center Helipad	939 Caroline St	Port Angeles	Airport	80%	D	Mod	Low	Very High	NO	NO	NO	NO
City Electric Utility Main Office	1734 W Highway 101	Port Angeles	Electric System	60%	C	Mod	Low	Mod	NO	NO	NO	NO
Pole Yard, Transformer & Maint Ctr	1707 A St	Port Angeles	Electric System	60%	C	Mod	Low	Mod	NO	NO	NO	NO
A St Substation	1616 A St	Port Angeles	Electric System	60%	C	Mod	Low	Mod	NO	NO	NO	NO

Table 3-3 Port Angeles Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami	Floods	WUIF	Landslides
College Substation	1306 E Park	Port Angeles	Electric System	60%	C	Mod	Low	High	NO	NO	NO	NO
F St Substation	1604 F St	Port Angeles	Electric System	80%	C	Mod	Low	High	NO	NO	NO	NO
7th St Substation	1538 W 7th St	Port Angeles	Electric System	80%	C	Mod	Low	High	NO	NO	NO	NO
Laurel Substation	110 E 14th St	Port Angeles	Electric System	60%	C	Mod	Low	High	NO	NO	NO	NO
Washington Substation	224 S Washington St	Port Angeles	Electric System	60%	C	Mod	High	High	NO	NO	NO	NO
Valley Substation	206 S Valley St	Port Angeles	Electric System	80%	E	High	Very high	Very High	YES	NO	NO	NO
McKinley Paper	1902 Marine Dr	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Tesoro Fuel Facility	Ediz Hook Rd	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO

Table 3-3 Port Angeles Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami	Floods	WUIF	Landslides
Port of Port Angeles	Port	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Westport Shipyard	637 Marine View Dr	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Platypus Marine	102 N Cedar St	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Port Angeles Boat Haven	W Boat-haven Drive	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Port Angeles Coast Guard	1 Ediz Hook Rd	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Chevron	402 Marine Drive	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Texaco	210 E 1st St	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	NO	NO	NO
Masco Petroleum	516 Tumwater Truck Route	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	YES	YES	YES

Table 3-3 Port Angeles Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami	Floods	WUIF	Landslides
Pacific Pride	Tumwater Truck Route	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	YES	YES	YES	YES
Ferrell gas	704 Marine View Drive	Port Angeles	Natural Gas	80%	E	High	Very	Very	YES	NO	NO	NO
Water Treatment Plant	3501 W 18th	Port Angeles	Water Systems	80%	C	High	Low	High	NO	NO	NO	NO
McDougal St Pump Station	3500 McDougal St	Port Angeles	Water Systems	80%	C	High	Low	High	NO	NO	NO	NO
Wastewater Treatment	1509 Columbia St	Port Angeles	Wastewater System	80%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Pumping Station 6	933 Church Ave	Port Angeles	Wastewater System	80%	C	High	High	High	NO	NO	NO	NO
KONP Radio (KONP FM 101.7)	721 East 1st St	Port Angeles	Communications System	80%	C/D	High	High	High	NO	NO	NO	NO
Clallam Transit	830 W Lauridsen Blvd	Port Angeles	Communications System	80%	C	High	High	High	NO	NO	NO	NO

Table 3-3 Port Angeles Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami	Floods	WUIF	Landslides
Clinicare	621 Front	Port Angeles	Medical Facility	80%	C/D	High	High	High	NO	NO	NO	NO
Port Angeles	102 E 5th St	Port Angeles	Fire Department	60%	C/D	High	High	High	NO	NO	NO	NO
Clallam County Courthouse	223 E 4th St	Port Angeles	Government Building	80%	C/D	High	High	High	NO	NO	NO	YES
Port Angeles Maintenance Facility	Lauridsen Blvd	Port Angeles	Government Building	80%	C/D	High	Low	High	NO	NO	NO	NO
Port of Port Angeles Office Building	1st St	Port Angeles	Government Building	80%	E	Very High	Very High	Very High	YES	YES	NO	NO
US Customs and Border Patrol	110 S Penn	Port Angeles	Shelter	80%	D/E	High	Low	High	NO	NO	NO	YES
Jessie Webster Park	609 E 3rd St	Port Angeles	Shelter	80%	D/E	High	Low	High				
Red Lion Inn	221 N Lincoln St	Port Angeles	Shelter	80%	D/E	Very High	Very High	Very High	YES	NO	NO	NO
Grocery, Safeway 101	110 E 3rd St	Port Angeles	Commercial	80%	C	High	High	High	NO	NO	NO	NO

Key:
EQ = Earthquake
PGA = Peak Ground Acceleration
WUIF = Wildland Urban Interface Fire

1

3.5 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

The City of Port Angeles reviewed and updated their Comprehensive Plan in June of 2019 to comply with the periodic review requirement outlined in Washington State's Growth Management Act (City of Port Angeles 2019). The City has seen a 5% population growth since 2010, and the City's land use has reflected these changes as development expands.

Vulnerability changes have been measured by accounting for shifts in land use and public awareness since the adoption of the 2010 County HMP. Each measure has been identified as having an increased, decreased, or unchanged vulnerability. Table 3-4 provides a snapshot of how vulnerability has changed since development of the 2010 HMP.

Table 3-4 Vulnerability Changes Since 2010

Hazard	Status
Utility Failure	+
Disease	+
Earthquake & Tsunami	=
Winter Storm	+
Windstorm	+
Fire	+
Heat Events and Drought	+
Flooding	+/-
Landslide	=

Key:
+ Increased vulnerability
- Decreased vulnerability
+/- Increased vulnerability, but actions taken to decrease vulnerability
= Unchanged vulnerability

4 CAPABILITY ASSESSMENT

FEMA	**C1.** Does the plan document [the City of Port Angeles's] existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? [Requirement §201.6(c)(3)]

4.1 Human and Technical Resources

Table 4-1 describes the City's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 4-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
Planning Manager	Department of Community & Economic Development (DCED)	Planners with knowledge of land development and land management practices
Planning Manager	DCED and Fire Marshal	Engineers or professionals trained in construction practices relate to buildings and/or infrastructure
Planning Manager	DCED	Planners or engineers with an understanding of natural and/or human-caused hazards
Fire Chief	Fire Department	Emergency Manager
Planning Manager	DCED	Floodplain Manager
GIS Analyst	Public Works	Personnel skilled in Geographic Information Systems (GIS)
Planning Manager	DCED	Resource development staff or grant writers
Public Works Director	Public Works	Ongoing participation in hazard mitigation planning process

4.2 Financial Resources

The City maintains many fiscal and financial resources to support its mitigation program. Table 4-2 identifies specific resources accessible for use.

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	Yes
Capital Improvement Project Funding	Yes
Insurance	Yes
User fees for utility services	Yes
Incur debt	Yes
State-sponsored grant programs	Yes
Partnering arrangements/intergovernmental agreements	Yes

Table 4-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Pre-Disaster Mitigation Program	Federal Emergency Management Agency (FEMA)	Provides funding to develop hazard mitigation plans (HMPs) and implement mitigation actions contained within.
Hazard Mitigation Grant Program	FEMA	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	FEMA	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by floods.
Community Development Block Grant Program	U.S. Department of Housing and Urban Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.
Emergency Management Performance Grants Program	FEMA/Washington Department of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.
Flood Mitigation Assistance	FEMA/Washington Department of Emergency Management	Provides funding to support development of the flood hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program (NFIP).
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program Interagency Coordinating Committee	Funds activities including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
National Fire Plan	U.S. Forest Service	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
Strategic Economic and Community Development Grant	U.S. Department of Agriculture	Provides funding in rural areas for multi-jurisdictional plan development and with a community development focus. Available only to rural areas outside of urbanized zone of any city with a population greater than 50,000.
Coastal Ecosystem Resiliency Program	National Oceanic and Atmospheric Administration	Provides funding for ecosystem restoration. Governor must approve project funds prior to award and there is a 2:1 cost-sharing ratio.
State		
Washington State Department of Transportation (WSDOT) Avalanche Forecasting and Control	WSDOT	Avalanche forecasting determines the potential risk along a particular mountain slope. When an avalanche hazard develops, WSDOT uses artillery, or explosives to trigger the avalanche. In addition to active avalanche control, WSDOT also uses passive control methods to control snow slides.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Washington Sea Grant	Washington Sea Grant	Washington Sea Grant provides funding opportunities through State and National competitions, program development services, and sponsorships.
Ecology Water Resources Program	Washington Department of Ecology (DEC)	DEC's Water Resources Program provides support in monitoring water supply, managing water supply projects, overseeing water rights, performing streamflow restoration, protecting streamflow, regulating well construction and licensing, and ensuring dam safety.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock industry and receives no general fund dollars.
Washington Local Emergency Planning Committee Program	Washington Emergency Management Division (EMD)	WA EMD provides funding support to ensure Local Emergency Planning Committees (LEPCs) can be implemented across the state.
Washington Pipeline Safety Program	Washington Utilities and Transportation Commission	The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington State; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).
State Water Pollution Control Revolving Fund	Washington DEC	This program provides funds to local governments to set up low-interest loan programs to repair or replace failing on-site sewage systems. Property owners unable to qualify for conventional bank loans and marine waterfront property owners can use the program to get loans to fix or replace their systems where failures might directly affect Puget Sound. Both the Clean Water State Revolving Fund and the Centennial Clean Water Program.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.
Thriving Resilient Communities	Threshold Foundation	Wide-ranging resiliency project funding.
Kresge Foundation Environmental Grants	Kresge Foundation	Provides funding for climate adaptation and mitigation, as well as sustainable water resources management.

4.3 Legal and Regulatory Resources

Table 4-4 describes the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations.

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All
	2016 – 2036 Comprehensive Plan	The City's Comprehensive Plan establishes Urban Growth Areas, natural resource lands, rural lands, and public lands.	▪ Completion of Housing Action Plan	All
	Harbor Resource Management Plan	Provides guidance by providing a coordinated plan for the future utilization of the Port Angeles Harbor.	▪ Approval of this plan provided a framework and baseline for the SMP	Flooding
	Port Angeles School District Hazard Mitigation Plan	The plan focuses on the hazards that pose the greatest threats to the District's facilities and people: Earthquake, flood, wildlife and urban interface fire and landslide.	▪ Plan development (2015) ▪ Issuance for public comment and adoption (2016)	Earthquake, flood, WUI fire, landslide
	Shoreline Master Program	Influences uses and future development in shoreline areas and ensures protection of waterfront habitat.	▪ Adoption of the plan on October 21, 2014	Flooding, Hazardous Materials
	2020-2025 Capital Facilities Plan & Transportation Improvement Plan	Identifies capital improvement projects to be undertaken by the City over the next five-year period.	▪ Inclusion of hazard mitigation and maintenance projects	All
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions.	▪ Collaboration between State and County	All
Policies	Zoning Ordinance	Provides land use regulation in the unincorporated portions of the City.	▪ Current code through Ordinance 3619, passed February 19, 2019	All
	Subdivision Ordinance	Incorporated into zoning ordinance, establishes regulations around subdivision of properties.	▪ Current code through Ordinance 3619, passed February 19, 2019	All

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
	Flood Damage Prevention Ordinance	The City floodplain management ordinance incorporated into the Critical Areas ordinance is designed to protect and conserve the environmental attributes of the City and add to the quality of life for residents.	▪ Defines areas of special flood hazard ▪ Requirements for development within an area of special flood hazard	Flooding
	Critical and Environmentally Sensitive Areas Protection	Define and protect critical areas as required by the Growth Management Act.	Defines areas of geological hazard that are of special concern to the City.	Landslide, Earthquake, Flooding
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participating in NFIP	Flooding
	Building Codes	Building permits are issued by the Department of Community and Economic Development and aligned with ICC 2015 building codes.	▪ Adoption of 2015 ICC codes	All

4.4 Continuity of Operations Planning

The City has recognized a need for a Continuity of Operations Plan (COOP). In the City of Port Angeles 2018 Community Work Plan, an objective for developing a COOP is identified.

4.5 Coordination with Community Partners

The City works alongside their community partners to address issues pertaining to emergency management and hazard mitigation. Many of these community partners participated in the HMP update process and collaborate with the City on an ongoing basis.

- **Education**
  - Port Angeles School District
  - Peninsula College
- **Business and Industry**
  - Local Chambers of Commerce
- **Healthcare**
  - Olympic Medical Center
- **Utilities**
  - City of Port Angeles
- **Transportation**
  - Port of Port Angeles
  - Washington Department of Transportation

- Clallam Transit

4.6 National Flood Insurance Program Participation

The City maintains an active NFIP policy.

To comply with the Federally administered NFIP, the City's flood hazard management program is composed the City's protocols outlined in the Municipal Code. Floodplains and frequently flooded areas are defined in the City Municipal Code as Environmentally Sensitive Areas (ESAs). Minimum submittal requirements for ESA permitting are located in Section 15.20.060 of the Municipal Code. Additionally, the City floodplain management ordinance incorporated into the Critical Areas ordinance is designed to protect and conserve the environmental attributes of the City and add to the quality of life for residents.

Table 4-5 contains a summary of County-wide participating jurisdiction's total coverage and losses under the NFIP.

Table 4-5 National Flood Insurance Program Coverage and Losses

Community Name (Number)	Total Coverage (in Thousands)	Total Dollars Paid
CLALLAM COUNTY * (530021)	$97,187	$903,327
FORKS, CITY OF (530022)	$400	$--
LOWER ELWHA KLALLAM TRIBE (530316)	$1,715	$--
PORT ANGELES, CITY OF (530023)	$6,001	$75,632
SEQUIM, CITY OF (530301)	$2,148	$55,798

Source: FEMA NFIP Policy and Loss Data by Geography (2019c) https://www.fema.gov/policy-claim-statistics-flood-insurance

4.7 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into the City's daily operations and ongoing planning activities is a priority of the City's mitigation program. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization; and
- Maximizing planning resources through linked or integrated planning efforts.

The City is encouraged to consider integration actions into planning mechanisms including:

- Budget decision-making;
- Building and zoning ordinances and decision-making;
- Emergency planning mechanisms; and
- Economic developing planning and decision-making.

4.7.1 Existing Plans

FEMA	**C6.** Does the Plan describe a process by which the local government will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(iii))

The following existing plans provide ongoing opportunity for integration of hazard mitigation and the City will work with plan owners and stakeholders to consider hazard mitigation data and principles when these plans are updated. Table 4-6 contains a summary of the County's existing plans and how each incorporates hazard mitigation planning.

Table 4-6 Summary of Clallam County Plans

County Plan	Hazard Mitigation Components
Comprehensive Emergency Management Plan (2016)	Outlines hazard mitigation roles and responsibilities.
Continuity of Operations Plan	In development through County
Comprehensive Land Use Plan	Identifies designated land uses and areas of economic and environmental value.
Floodplain Management Plan	Outlines strategies that directly or indirectly mitigate the risks posed by flood hazards.
Capital Improvements Plan	Identifies large capital projects to reduce risks to key County infrastructure.
Historic Preservation Plan (a component of Critical Areas)	Identifies areas of cultural value that may be vulnerable to hazards.

5 MITIGATION STRATEGY

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [City of Port Angeles] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

5.1 Review of 2010 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2010 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2019 plan update. The MPT worked through each previous action during MPT Meeting #1 to document steps taken to fulfill the action.

See Table 5-1 for an overview of the status of all actions from the 2010 plan update.

Table 5-1 Status of 2010 Mitigation Actions

Action No.	Mitigation Action	Action Status	Timeline	Lead Department	Priority
1	Tumwater Street Bridge Approach Improvement	2010 Action - Ongoing	1-5 Years	Public Works Department	High
2	Nippon Log-pond Bridge	Complete	10-15 Years	Public Works and Engineering	High
3	Upgrade Backup Power to City Hall	Complete	1-5 Years	Public Works Utility, Information Services	High
4	Install Backup Power for City Corp Yard	2010 Action - Ongoing	1-5 Years	Public Works Department	High
5	Install Backup Power for Light Operations Facility	2010 Action - Ongoing	1-3 Years	Public Works Department	High
6	Upgrade Transformer at A-Street Substation for backup to Valley Substation	Complete	1-5 Years	Public Works Department	High
7	Install Second Electric Utility Supply to Olympic Medical Center	Complete	1-5 Years	Public Works Department	High
8	Install Second Electric Utility Supply to Fairchild Airport Terminal	2010 Action – No Longer Required	1-5 Years	Public Works Department	High
9	Protect/Reinforce Sole Source Water Main from Elwha River against slide failure	2010 Action - Ongoing	1-3 Years	Public Works Department	High

Table 5-1 Status of 2010 Mitigation Actions

Action No.	Mitigation Action	Action Status	Timeline	Lead Department	Priority
10	Protect/Reinforce Sole Source Water Main from City to Eastern Customers and to PUD's Roundtree Reservoir	2010 Action - Ongoing	1-3 Years	Public Works Department	High
11	Sewer Pump Station Power Upgrades	2010 Action - Ongoing	1-3 Years	Public Works Department	High
12	Peabody Heights Reservoir Earthen Dam Reinforcement	2010 Action - Ongoing	1-3 Years	Public Works Department	Medium
13	Update Flood Assessment	2010 Action - Ongoing	1-5 Years	Community & Economic Development Department	Medium
14	Fiber Optic Network Upgrade	2010 Action - Ongoing	1-5 Years	Public Works Department	Medium
15	Upgrade to Shorelines	2010 Action - Ongoing	1-5 Years	Community & Economic Development Department/Public Works Department	Medium
16	Underground Power to Ediz Hook and USCG	2010 Action – Not Feasible, Cancelled	1-5 Years	Public Works Department	Low
17	Adopt the Hazard Mitigation Plan	Completed – Re-adopting updated 2019 HMP	1 Year	Department of Community Development, City Council	High

5.2 Identification and Analysis of New Mitigation Actions

In order to achieve the mitigation goals identified above, the City has identified a comprehensive series of mitigation objectives and supporting actions that are focused on reducing vulnerability and maximizing loss reduction. The actions can typically be broken out into the following types of activities, which are indicated in Table 5-2.

Table 5-2 2019 Mitigation Actions by Group

Mitigation Group	Related Mitigation Actions
Plans and Regulations	PA05, PA06
Infrastructure/Capital Project	CC02, PA01, PA02, PA03, PA04, PA07, PA08, PA09, PA10

Mitigation Group	Related Mitigation Actions
Natural System Protection	PA06
Education and Awareness	
Preparedness and Response	CC02

All mitigation actions identified in the plan are addressed in the mitigation implementation plan provided in Section 5.3. The actions include both interim- and long-term strategies for reducing vulnerability to hazard and are characterized as such in the 'life of action' column of the implementation plan.

5.2.1 2019 Mitigation Actions by Hazard

All mitigation actions identified in the plan address at least one priority hazard outlined in Chapter 4 of the HMP. Table 5-3 indicates which mitigation actions address which hazards.

Table 5-3 2019 Mitigation Actions by Hazard

Hazard	Related Mitigation Actions
All Hazards	CC02, PA04, PA08, PA09, PA10
Drought & Heat Events	
Earthquakes	PA03, PA07
Disease	
Fires	
Flooding	PA01, PA02, PA05, PA06
Landslides	PA01
Winter Storm	PA06
Utility Failure	PA01, PA02, PA04, PA08, PA09, PA10
Windstorms	

A complete mitigation implementation plan is provided in Table 5-4.

5.3 2019-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the City of Port Angeles]? (Requirement §201.6(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the City. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix D for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for each 2019 action listed in Table 5-4.

Table 5-4 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
City of Port Angeles													
CC02	Move EOC from seismically unstable area to new location	Ongoing	2,3,6	EMD, PA Fire Department, City Parks, Port of PA	1-3 years	$6 to 8 million approximately	In development	FEMA, Community Fund-matching	All hazards	20	10	30	(1)
PA01	Protect/Reinforce Sole Source Water Main from Elwha River against slide failure	2010 Action - Ongoing	4	Public Works	1-3 years	$250,000	Yes	FEMA, CFP	Flooding, Utility Failure, Landslide	18	6	24	4
PA02	Protect/Reinforce Sole Source Water Main from City to Eastern Customers and to PUD's Roundtree Reservoir	2010 Action – Ongoing	4	Public Works	1-3 years	$400,000	Yes	FEMA, CFP	Flooding, Utility Failure, Landslide	18	6	24	5
PA03	Peabody Heights Reservoir Earthen Dam Reinforcement	2010 Action – Ongoing	4,5	Public Works	1-3 years	$175,000	Yes	FEMA, CFP	Earthquake	13	10	23	7
PA04	Sewer Pump Station Power Upgrades	2010 Action – Ongoing	4	Public Works Wastewater	1-3 years	$165,000	Yes	FEMA, CFP	All hazards/Utility Failure	18	6	24	6
PA05	Update Flood Assessment	2010 Action – Ongoing	5	Community & Economic Development Department	1-5 years	UNK	Yes	FEMA/Ecology	Flooding	17	6	23	8
PA06	Upgrade to Shorelines	2010 Action – Ongoing	5	Community & Economic Development Department/Public Works and Utilities	1-5 years	$150,000	Yes	FEMA/Department of Natural Resources/Grants/ Private funding	Flooding, winter storms	15	6	21	10
PA07	Tumwater Street Bridge Approach Improvement	2010 Action - Ongoing	1,5	Public Works	1-5 years	$223,000	Yes	FEMA/ Department of Transportation	Earthquake	20	10	30	1
PA08	Install Backup Power for City Corp Yard	2010 Action – Ongoing	3,4	Public Works Utilities	1-5 years	$150,000	Yes	FEMA, CFP	All hazards, utility failure	19	6	25	2
PA09	Install Backup Power for Light Operations Facility	2010 Action – Ongoing	3,4	Public Works Electric Utility	1-3 years	$150,000	Yes	FEMA, CFP	All hazards, utility failure	19	6	25	3
PA10	Fiber Optic Network Upgrade	2010 Action – Ongoing	3	Public Works Utilities	1-5 years	$315,000	Yes	FEMA, National Telecommunications	All hazards, utility failure	19	4	23	9

Table 5-4 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
								and Information Administration Grant					
Adopt the Hazard Mitigation Plan (HMP)	Adopt the HMP	Completed – Re-adopting updated 2019 HMP		Department of Community Development, City Council	1 year	N/A	Yes	N/A	All hazards				

Key:
STAPLEE - Strategy and Prioritization Methodology

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City of Sequim Jurisdiction-Specific Annex – Clallam County Hazard Mitigation Plan

SEQUIM
WASHINGTON

2019 Plan Update

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1 INTRODUCTION

1.1 City of Sequim Hazard Mitigation Program

Throughout the hazard mitigation planning process, the following representatives from the City of Sequim (referred to herein as 'City' or 'Sequim') were present at one or more Mitigation Planning Team (MPT) meetings:

- Sheri Crain, Chief of Police
- David Garlington, Public Works Director
- Ann Soule, Resource Manager
- Peter Tjemsland, Utilities Manager

A public meeting was held in Sequim on July 17, 2019.

The City of Sequim participated in the 2010 Clallam County Multi-Jurisdictional Hazard Mitigation Plan (HMP).

See Appendix E for the completed Federal Emergency Management Agency (FEMA) Local Plan Mitigation Review Tool for the City of Sequim.

2 COMMUNITY PROFILE

2.1 Governance

The City of Sequim was incorporated in 1913. In 1995, the city residents voted to adopt the council-manager form of government. The City Council is comprised of elected officials who serve as the governing body. The city manager is appointed by the City Council and is responsible for directing staff in the accomplishment of the City Council goals and the efficient and effective operation of city government (City of Sequim 2019a).

The City departments are as follows:

- Administrative Services
- Boards, Commissions & Committees
- City Clerk
- City Council
- City Manager
- Communications & Marketing
- Community Development
- Human Resources
- Legal Department
- Police
- Public Works

2.2 Geography and Climate

Sequim is located in the leeward side of the Olympic Mountains, which is also known as a "rainshadow." As a result, metrological conditions in Sequim are relatively mild year-round, with dramatically less precipitation than interior Clallam County, or in areas along the western coast of the Olympic Peninsula. The average precipitation and temperature trends over the time period from 1980 to 2016 are displayed in the Table 2-1.

Table 2-1 Average Precipitation and Temperature Trends (1980-2016)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temp. (F°)	46.6	48.4	51.9	55.8	61.1	65.3	69.7	70.4	66	58	50.6	45.8	57.5
Avg. Min. Temp. (F°)	31.4	31.3	33.8	36.8	42.6	47.5	50.1	49.5	44.7	38.7	34	30.9	39.3
Avg. Total Precip. (inches)	2.11	1.26	1.35	1.08	1.29	0.98	0.56	0.58	0.78	1.4	2.73	2.09	16.21
Avg. Total Snowfall (inches)	0.2	0.3	0.2	0	0	0	0	0	0	0	0	0.9	1.5

Source: WRCC 2016.

2.3 Population and Demographics

As of 2018, the U.S. Census estimated population for Sequim was 7,481 individuals, which is a 13.4% increase from 2010 (U.S. Census Bureau 2018). Data from the 2017 American Community Survey (ACS)

five-year estimates indicate that 5.2% of the City's population is younger than 5 years of age and 16.3% of the City's population is younger than 18 years of age. Approximately 40.2% of the City's population is 65 years of age and older (U.S. Census Bureau 2018).

According to the ACS, 1.7% of the City's population is black or African American alone; 1.0% of the City's population is American Indian or Alaska Native alone; 3.3% of the City's population is Asian alone; and 8.9% is Hispanic or Latinx. Approximately 85.4% of the City's population is white alone and 3.7% is two or more races (U.S. Census Bureau 2018).

In 2017, an estimated 14.4% of the City's population lived in poverty and the median population income was $38,485. An estimated 15.6% of the population under age 65 live with a disability.

2.4 Economy

The following is excerpted from the City of Sequim 2015 – 2035 Comprehensive Plan:

> "One of the City's biggest strengths is its location along State Route 101 which is a primary means of access to the Olympic National Park and to Victoria, British Columbia. Annually, approximately 1,000,000 visitors drive north-bound through Sequim to visit the variety of Olympic National Park sites or to embark on the M/V Coho in Port Angeles to travel to Victoria. In the summer, high numbers of tourists drive to Sequim to partake in Lavender and agro-tourism related activities, including but not limited to the Sequim Lavender Weekend. In addition to its adjacency to tourist destinations, Sequim itself has a beautiful setting and quaint downtown which appeals to tourists as a side trip or a base from which they enjoy recreation in the surrounding areas." (City of Sequim 2018)

2.5 Land Use and Ownership

The following is excerpted from Chapter 3 of the City of Sequim's 2015 – 2035 Comprehensive Plan:

> "Over 100 years ago, before Sequim was officially a city, a traditional urban pattern of development was already emerging. As the community grew from setting the first travel paths and property lines over the next half-century, the urban form followed the invisible lines of township, range and section – the intersection of Washington Street and Sequim Avenue is the exact corners of quarter-sections. Subdivision of land maintained the formality of the geographic grid with north-south streets following lines of longitude and east-west streets running parallel to latitude.
>
> Since 1980, Sequim has grown as a 'community of subdivisions' rather than a community of neighborhoods. None of the residential subdivisions in the past 35 years has followed the design principles that create real neighborhoods: new developments lack the features that promote safe walking, they have insufficient points of connection to adjacent districts, and they hinder emergency access and multi-modal circulation by limiting route options. Some of these "modern" subdivisions are created on terrain that is not easily developed as a grid – streets are windy, cul-de-sacs are common, and blocks

are long – but even most of these are deliberately designed not to connect to the next subdivision." (City of Sequim 2018)

2.6 Transportation and Commuting

While the City's population stands at 7,481, the population of the surrounding area is approximately 28,000. In addition, the Sequim School District serves a population of approximately 26,000 residents. The presence of so many residents near the City places greater demands on services and industries than may be expected for a similarly sized city.

US-101 is the main transportation corridor through Sequim. Clallam Transit provides public bus service throughout Clallam County, including service to and from the Bainbridge Island ferry terminal with a stop in Sequim (City of Sequim 2019b).

Sequim is also accessible by private airplane through the Sequim Valley Airport with a 3500-foot runway and fueling station. The John Wayne Marina, operated by the Port of Port Angeles, is located on the western shore of Sequim Bay. It is a full-service marina with a restaurant and 22 transient slips

Figure 2-1 City of Sequim

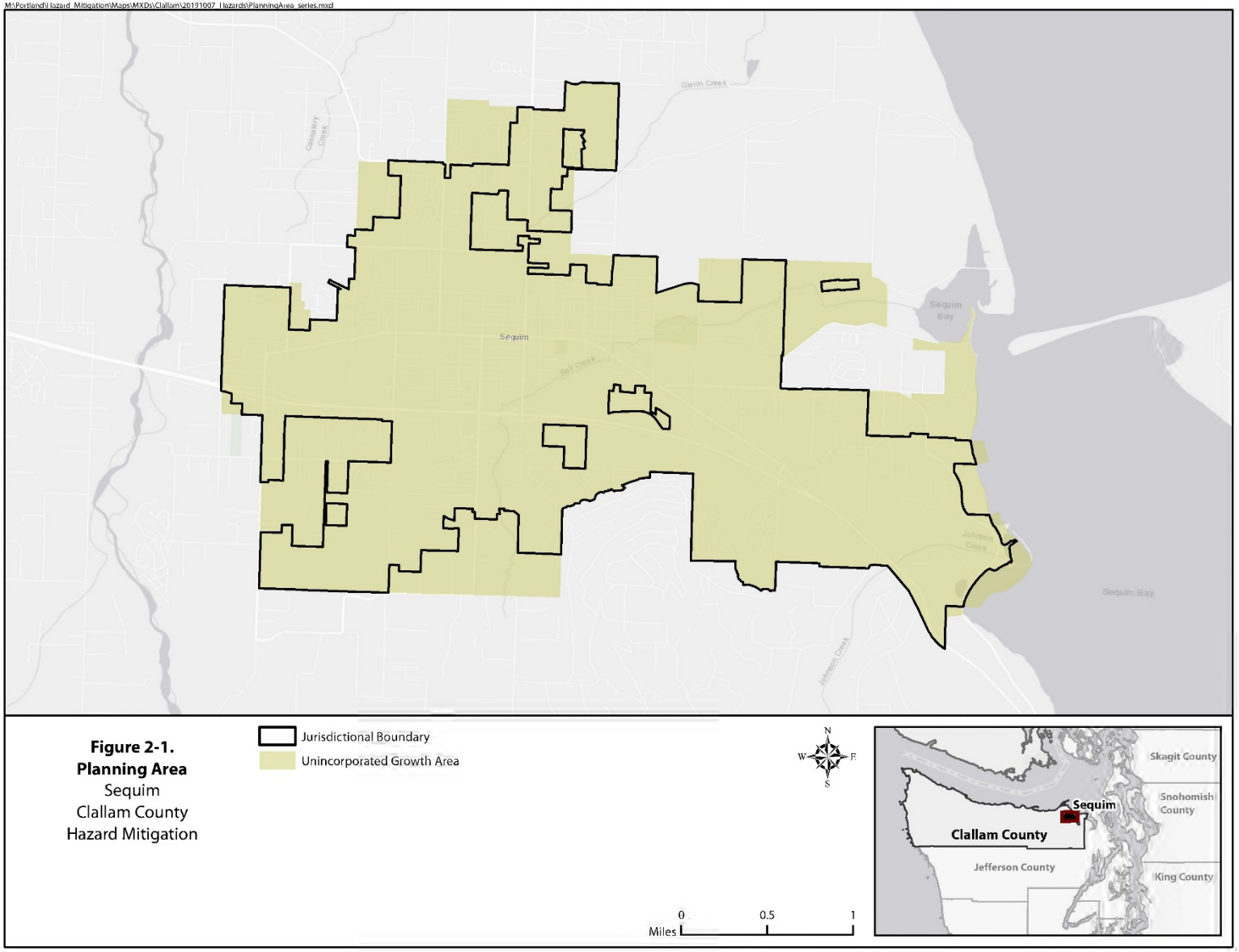

Figure 2-1.
Planning Area
Sequim
Clallam County
Hazard Mitigation

3 HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 3 contains hazard profiles and vulnerability assessments to determine the potential impact of hazards to the people, economy, and built and natural environments of the City of Sequim. They have been streamlined to increase the effectiveness and usability of the HMP.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Sequim]? (Requirement §201.6(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the City of Sequim]? (Requirement §201.6(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the planning area? [44 CFR § 201.6(c)(2)(ii)]

3.1 General

Clallam County has encountered several major disaster declarations that have affected the City Sequim. In total, the County has experienced 21 disaster declarations since 1953. Table 3-1 identifies the disaster declarations since 2010:

Table 3-1 Disaster Declarations (2010 to Present)

Disaster ID	Date of Declaration	Disaster Type	Incident Period
DR-1956	05-Mar-12	Severe Winter Storms, Flooding, Landslides, and Mudslides	14-Jan-12 to 23-Jan-12
DR-4242	15-Oct-15	Severe Windstorm	29-Aug-15
DR-4249	1-Jan-16	Severe Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	12-Nov-15 to 21-Nov-15
DR-4253	2-Feb-16	Severe Winter Storm, Straight-line Winds, Flooding, Landslides, Mudslides, and a Tornado	1-Dec-15 to 14-Dec-15
DR-4418	4-Mar-19	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado	10-Dec-18 to 24-Dec-18

Source: FEMA, Washington Disaster History, Major Disaster Declarations (https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties)

The hazard profiles and vulnerability assessments contained in this chapter represent a considerable amount of work performed by the MPT. MPT members ranked hazards using several key considerations, followed up by activities to validate hazard analysis results and identify specific areas of risk. Table 3-2 displays the hazards that MPT selected for further assessment.

Table 3-2 Hazards Addressed in Plan

Hazard Type	Hazard Name
Natural Hazards	Cascadia Earthquake Power Outages

Table 3-2 Hazards Addressed in Plan

Hazard Type	Hazard Name
	Wildfire and Wildfire Smoke Heat Events and Drought Windstorm Flooding Landslide
Human-Caused Hazards	Hazardous Material Incident Active Shooter

3.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on MPT feedback during MPT Meeting #1 and #2.

Following the individual hazard ranking activity, the results were added up and aggregated to show an average score for Sequim-area-based MPT members and are available in Figure 3-1. These rankings are relative to enable general prioritization of hazards.

Figure 3-1 Sequim-Area Hazard Rankings

City of Sequim - Local Hazard Rankings

	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Average*	*Rank*
Cascadia Earthquake	5	5	3	1	3.5	1
Earthquake	4	5	3	1.5	3.375	2
Active Shooter	2.5	5	2.5	3	3.25	3
Power Outages	2	3.5	3	4	3.125	4
Wildfire Smoke	2	3	3	4	3	5
Heat Events	2	3	3	4	3	5
Windstorm	2	3	2.5	3.5	2.75	7
Wildfire	2	3	3	2.5	2.625	8
Hazardous Materials Accident	1.5	5	2	2	2.625	8
Flooding	1.5	3	2	3	2.375	10
Winter Storm	1.5	2.5	2.5	3	2.375	10
Tsunami	1.5	4.5	2	1.5	2.375	10
Disease	2.5	2	3	1.5	2.25	13
Landslide	1	2.5	2.5	2	2	14
Drought	1	2	3	2	2	14
Storm Surges/Tides	1	1	2	4	2	14

3.3 Hazard-Specific Profiles and Risk Assessments

The following section profiles each hazard identified in Section 3.2 and assesses the risk associated with each. Each risk assessment considers the following attributes:

- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Like location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends' impact on the City's vulnerability to each hazard since the 2010 plan development (increased, decreased, unchanged).

Note: Hazard Descriptions, Potential Impacts from Future Climate Conditions, and Cascading Impacts can be found in Chapter 4 of the HMP Basic Plan, as these are not jurisdiction specific.

In addition, the hazards have been organized into three categories (high-, medium-, and low-priority) to illustrate the risk-driven nature of the HMP. Each hazard has been given serious consideration of all attributes discussed within. However, low-priority hazards may be shorter in length and with less quantitative analyses, as a lack of usable data is frequently present when considering low-likelihood or low-magnitude events. The three sub-sections are as follows:

- **High-Priority:** Cascadia Earthquake, Earthquake, Active Shooter, Power Outages, Wildfire Smoke, Heat Events.
- **Medium-Priority:** Windstorm, Wildfire, Hazardous Materials Accident, Flooding, Winter Storm, Tsunami, Disease.
- **Low-Priority:** Landslide, Drought.

For this jurisdictional annex, several of these hazards have been grouped to streamline the hazard profiles. For a complete overview of the County-wide hazards that may also impact the City of Sequim, refer to the Base Plan.

3.3.1 Earthquake

Earthquake

	Magnitude	Onset	Duration	Frequency	Average	Rank
Cascadia Earthquake	5	5	3	1	3.5	1
Earthquake	4	5	3	1.5	3.375	2
Tsunami	1.5	4.5	2	1.5	2.375	10

Location

The Cascadia Subduction Zone (CSZ) poses a great risk to all coastal communities along its length. Earthquakes have the potential to damage critical infrastructure, such as bridges and roads, cutting off county and tribal communities from outside aid in the aftermath of an event and forming isolated "micro-islands." Other active faults, such as the Seattle fault and the Southern Whidbey Island fault, zone cross under major cities and pose a significant hazard (DNR 2019).

The Sequim fault is an exposed fault that is less than 15,000 years old and runs east-west along Sequim's Happy Valley Road. Radiocarbon dating of charcoal fragments from the area suggests a possible earlier surface-faulting earthquake less than 5,000 years ago. The Sequim fault may be an extension of the Lake Creek Fault, which runs east-west in the vicinity of Port Angeles.

See Section 4.5.11 of the HMP for the localities at risk for tsunami. The John Wayne Marina and private land along the bluffs are two areas that are of particular concern for the City of Sequim.

Liquefaction typically occurs in areas with artificial fill or of loose sandy soils that are saturated with water (e.g., low-lying coastal areas, lakeshores, and river valleys). Areas that contain soils with high risk of liquefaction include (but are not limited to) the coastal Port Angeles; and much of the City of Sequim and the Sequim area (DNR 2004).

Previous Occurrence/History

The most recent earthquake that affected Clallam County was the 2001 Nisqually Earthquake. Small earthquakes occur regularly throughout the region and go unnoticed by residents. Over the last 135 years, there have been nine earthquakes with a magnitude (M) greater than 6.0 in the area that we consider the Northwest. Five of those large quakes (including the Nisqually earthquake) directly impacted the Olympic Peninsula, according to eyewitness accounts.

- 1700, CSZ Earthquake, M 9.0
- 1909, San Juan Island, M 6.0
- 1939, Vashon Island, M 6.1
- 1949, Olympia, M 7.1
- 1965, Seattle – Tacoma, M 6.5
- 2001, Nisqually, M 6.8

Extent and Probability

Earthquakes pose a widespread hazard throughout Clallam County, including Sequim. The cascading impacts of earthquakes, such as tsunami and liquefaction, are dependent on geography and soil type, as detailed above.

Earthquake

The CSZ has produced earthquakes measuring M 8.0 and above at least seven times in the past 3,500 years. The time intervals between these events has varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.

There is evidence of two earthquakes on the Lake Creek Fault between 2,000 and 700 years ago. An earthquake of M 6.8 along the Lake Creek Fault would produce the greatest intensity shaking in the vicinity of Port Angeles and Sequim.

Future Probability Trend – Future weather and development trends play no known role in the probability of future earthquake events. However, both may play a role in the magnitude of earthquake impacts.

Vulnerability

Vulnerability posed by earthquakes to the Sequim area is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.4 of the HMP Basic Plan, the following infrastructure types are at high to very high risk from earthquake impacts (Buck 2016):

- Commercial facilities (6 properties)
- Communications Systems (1 property)
- Electric Systems (10 properties)
- Fire Departments (7 properties)
- Government Buildings (4 properties)
- Hazardous Materials Storage (1 property)
- Medical Facilities (3 properties)
- Natural Gas Facilities (2 properties)
- Schools (7 properties)
- Shelters (37 properties)
- Wastewater Systems (5 properties)
- Water Systems (21 properties)

The following infrastructure types are at high to very high risk from liquefaction:

- Commercial Facilities (6 properties)
- Communication Systems (1 property)
- Electric Systems (11 properties)
- Fire Department (5 properties)
- Government Buildings (4 properties)
- Hazardous Materials Storage (1 property)
- Medical Facilities (3 properties)
- Natural Gas Facilities (2 properties)
- Schools (7 properties)
- Shelters (37 properties)
- Wastewater Systems (5 properties)
- Water Systems (10 properties)

These facilities are outlined in their entirety in Section 3.4.3 of this Annex.

Earthquake

Awareness of the City's vulnerability to earthquakes or tsunamis has increased with participation in regional drills and public outreach efforts. More structures are being designed to be resilient to tectonic activity. However, development has increased in areas that are vulnerable to an event along the Sequim fault. The Lake Creek Fault is also located near Sequim, which is a growing population center. Given these changes, the vulnerability of Sequim to earthquakes and tsunami is **unchanged**.

See Appendix B for full Risk Exposure Tables and Appendix C for additional maps.

3.3.2 Active Shooter

Active Shooter

Magnitude	Onset	Duration	Frequency
2.5	5	2.5	3

Average	Rank
3.25	3

Location

Any populated area can be impacted by active shooter incidents. These areas include, but are not limited to, shopping structures, clinics, schools, government offices and buildings, and housing.

Previous Occurrence/History

There have not been any recent active shooter events in the City of Sequim.

Extent and Probability

With no existing records of recent active shooter events directly impacting the City, it is difficult to estimate the extent or probability of its occurrence. Nonetheless, it can be deduced that an active shooter events would most likely impact government facilities and schools.

Future Probability Trend – Future weather conditions have no direct connections to active shooters. However, increased development and urbanization have the potential to **increase** the probability of a future active shooter event.

Vulnerability

No estimates are available to determine potential losses associated with active shooter events. However, we can assume that if an active shooter event were to be directed at the City, schools and government buildings would likely be a top target. Active shooters could have an impact on the community in the following ways: loss of human life, damage to buildings and structures, temporary displacement during the threat and/or investigation, stress on medical and security services, loss of hospitality business during the event, and an increased need for emergency services and funding.

Since the 2010 plan, there is more public awareness regarding how to respond in the event of an active shooter. School districts and police departments hold drills to practice response actions. The City's vulnerability to an active shooter event is **unchanged.**

3.3.3 Power Outages

Power Outages

Magnitude	Onset	Duration	Frequency
2	3.5	3	4

Average	Rank
3.125	4

Location

Numerous City properties are at risk of being affected by utility failures. Rural and populated areas alike are known to experience power outages during winter and windstorms that can last anywhere from several hours to several weeks. In addition, the Clallam County Public Utility District (PUD) operates extensive utility and information technology networks that could be at a risk to exposure of a hazard that could lead to a utility failure.

The Bonneville power line, operated by the PUD, is a major power source for the entire Olympic Peninsula.

Previous Occurrence/History

Historically, utility disruptions and failures have been caused by natural disasters and human-caused accidents but have not been recorded in a way that is publicly accessible. Numerous utility failures occur every year, most frequently in the form of electricity outages that may last as short as hours or as long as weeks.

Extent and Probability

It is difficult to predict the impacts of future utility failures, but they have the potential to impact all government and business operations and cause extensive economic losses among other impacts. Due to the sporadic nature of failures, it is also difficult to estimate how frequently such failures will occur or their duration. Various parts of the City generally deal with power outages multiple times per year with many of them only lasting a matter of hours. Every several years, a large utility failure is experienced.

Future Probability Trend – Based on potential increases in severe winter storms and increasing development trends resulting in greater demand, the City may be impacted by an **increase** in the probability of future utility failure. However, mitigation actions outlined in this HMP are designed to **decrease** such strain on utility systems.

Vulnerability

The Clallam PUD operates 15 electrical facilities within the Sequim area that are vulnerable to failure due to an array of hazards. These facilities are outlined further in Section 3.4.3 of this Annex. Additionally, there are 31 wastewater and general water systems that are also vulnerable to failure. Two natural gas facilities are also vulnerable to failure.

These facilities are primarily vulnerable to earthquakes and associated hazards (liquefaction and tsunami); however, several facilities are also vulnerable to wildland fires.

Since the 2010 County HMP, development in Sequim has expanded further into the Wildland-Urban Interface (WUI); therefore, the vulnerability to power outages has **increased**.

3.3.4 Wildfire

Wildfire & Wildfire Smoke

	Magnitude	Onset	Duration	Frequency	Average	Rank
Wildfire Smoke	2	3	3	4	3	5
Wildfire	2	3	3	2.5	2.625	8

Location

Wildland fire protection is provided by federal, state, county, city and private fire protection agencies and private timber companies. Factors affecting the risk of wildland fires include rainfall, type of vegetation, number of snags, amount of old growth timber, and proximity to firefighting agencies. Fire damage to watersheds will increase the vulnerability to flooding. City of Sequim water system includes a shallow gallery well under the Dungeness River which is vulnerable to sediment runoff in the upper watershed; if a wildfire occurred in the watershed, water supply would have to be shut down.

Wildfires within the broader region can cause air quality degradation that is particularly harmful to children and the elderly populations in the City of Sequim.

Previous Occurrence/History

Wildfire smoke from outside of Clallam County has disrupted public health and commerce as recent as 2017 and 2018.

Historically, the City of Sequim has not been directly at risk from a wildland fire, and so the previous occurrences are discussed below on a County-wide basis.

Previous wildland fires that have affected Clallam County include “The Great Forks Fire of 1951,” 1955 in the West Twin River area, and 2002 in the Clallam Bay area. The fires in 1951 began near Lake Crescent and burned into and around Forks. Approximately 30 buildings and between 33,000 and 38,000 acres of timber were lost. The 1955 fire burned approximately 5,000 acres of timber. The 2002 fire started as slash burnings on private land. In July 2004, a wildfire ignited near Joyce at Striped Peak, burning between three and four acres of private hillside land. Joyce experienced another wildfire in May 2006, when a controlled burn near the town grew into a five-acre wildfire. From January 2008 to August 2009, 38 different wildfire incidents have occurred within Clallam County, outside of Olympic National Park (Clallam County 2010).

Wildfire & Wildfire Smoke

Extent and Probability

A Headwaters Economics study found that Clallam County has more square miles of developed land within the WUI than any other county in Washington State (72 square miles) and the fifth most area in the WUI in the entire United States. The same study found that 13,271 homes were located within the WUI throughout the County (Headwaters Economics 2013).

Weather conditions greatly influence the impact and extent of wildfires. Drought, high temperatures, and wind contribute to a dynamic and changing conditions of wildfires. Fuel load and vegetation contribute to the size and intensity of wildfires.

Wildfires are frequent and inevitable. Within the region, many wildfires burn during the June to October time period.

Future Probability Trend – Based on expected decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, the City may be impacted by an **increase** in the probability of future fires.

Vulnerability

As the population of the City continues to grow, development may extend further into the WUI, rendering the City more vulnerable to wildfires and wildfire smoke.

While the City has not been as vulnerable to WUI fire as other jurisdictions in Clallam County, increased encroachment of development into the WUI in recent years may result in greater vulnerability. Therefore, the City's vulnerability to wildfire has **increased** since the 2010 plan.

3.3.5 Heat Events and Drought

Heat Events & Drought

	Magnitude	Onset	Duration	Frequency	Average	Rank
Heat Events	2	3	3	4	3	5
Drought	1	2	3	2	2	14

Location

The City is located within the rainshadow of the Olympic Mountains and within the Dungeness Watershed.

The Dungeness Watershed is currently experiencing a "snowpack drought," which occurs when total precipitation may be near normal levels, but the snowpack in local mountains is significantly below normal.

Heat Events & Drought

Previous Occurrence/History

There has been one period of extreme drought within Clallam County over the last 17 years. During a two-month period in 2015, 100% of the County's area was marked by D3 to D4 droughts (the most intense forms of drought). Additionally, in 2001, 2003, 2006, 2009, 2014, 2017, and 2018, areas of the County experienced moderate to extreme drought. As of May 2019, a drought emergency was declared in the Elwha-Dungeness Watershed, which encompasses the entirety of the Sequim planning region.

Drought animations over time are available at: http://droughtmonitor.unl.edu/Maps/Animations.aspx (U.S. Drought Monitor 2019).

Extent and Probability

Northeast Clallam County, including the City of Sequim, which is located in the rainshadow of the Olympic Mountains, is the most vulnerable to the effects of drought.

Future Probability Trend – Based on continuing decreases in annual snowpack and increases in the frequency and magnitude of prolonged heat, the City will be impacted by an **increase** in the probability of future droughts.

Vulnerability

Drought impacts individuals (including farm owners, tenants, and farm laborers), the agricultural industry, and other agriculture-related sectors. Lack of snowpack has forced ski resorts into bankruptcy. Declining snowpack results in low snowmelt flows in local streams, affecting instream resources important to commerce as well as the ecosystem. There is increased danger of wildfires and the associated wildfire hazards.

Problems of domestic and municipal water supplies are historically corrected by building another reservoir, a larger pipeline, a new well, or some other facility. Future preparedness will depend on underground or reservoir water storage. Stormwater capture and filtration through green infrastructure is a proven method for improving water management and long-term resiliency of the aquifer system. Short-term measures, such as using large-capacity water tankers to supply domestic potable water, have also been used. Low stream flows have created high temperatures, oxygen depletion, disease, and lack of spawning areas for our fish resources. More frequent low stream flows result in declining recharge to the aquifer system that the population in eastern Clallam County depends on for drinking water.

The City's vulnerability to drought has **increased** since 2010, as the demand has grown, and historic water supply shifts due to climate change and increased development.

See Appendix C for maps.

3.3.6 Windstorm

Windstorm

Magnitude	Onset	Duration	Frequency
2	3	2.5	3.5

Average	Rank
2.75	7

Location
All City properties and structures can be affected by windstorms. Properties with infrastructures, utilities, and tree stands can have more damaging impacts during windstorms, especially in coastal areas where winds speeds can reach 40 to 60 miles per hour (mph) during the winter months.

Previous Occurrence/History

Recent windstorms occurring in Clallam County resulting in major damage include:

- 17 December 2018 – Clallam and East Jefferson Counties Windstorm
- 15-16 October 2016 – Typhoon Songda
- 1-14 December 2015 – Severe Winter Storm, winds, flooding, landslides, mudslides, and a tornado
- 12-21 November 2015 – Severe Storms, winds, flooding, landslides, and mudslides
- 29 August 2015 – Severe Windstorm
- 14 December 2006 – "Hanukkah Eve" Windstorm
- 20 January 1993 – "Inaugural Day" Storm

These windstorms have caused damage to County structures and housing; extensive utilities damage; restricted access to public lands; and required increased strain on the government's operations.

Extent and Probability

Coastal areas of Clallam County, including the outskirts of Sequim, experience higher winds than other areas. However, windstorms can occur anywhere throughout the County. Windstorms can damage buildings, structures, utilities, and tree stands, causing millions of dollars' worth of damage.

Future Probability Trend – Changing weather conditions are likely to lead to an increase in severe and extreme weather patterns, leading to an **increase** in the probability of a windstorm.

Vulnerability

The City's primary vulnerability from severe windstorms are power outages and impairment of transportation. Because nearly all social and economic activity is dependent on transportation, damage from windstorms can have a serious impact.

Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. More rural communities located in the foothills are particularly vulnerable to road outages and face longer delays in debris removal. Additionally, vehicle accidents rise among those who try to drive during windstorms (USDOT 2018).

Power outages can result from physical damage to electrical infrastructure as a result of downed trees and blown debris. Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe windstorms. Additionally, persons with electric-based health support systems are vulnerable to power outages everywhere.

Windstorm

Since the 2010 plan, the City's vulnerability to windstorms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.7 Hazardous Materials Accident

Hazardous Materials Accident

Magnitude	Onset	Duration	Frequency
1.5	5	2	2

Average	Rank
2.625	8

Location

Numerous fixed-location storage sites exist near City properties but have rarely caused an incident. Therefore, the City views the most likely hazardous materials incident to be caused by a traffic accident along US-101 or the railroad corridor.

The John Wayne Marina is an area of high commercial and public vessel traffic. Furthermore, the Strait of Juan de Fuca is a major thoroughfare for oil tankers.

Previous Occurrence/History

According to a review of PHMSA's hazardous materials incident reporting database, the following incidents have occurred in Sequim (PHMSA 2019):

- November 3, 2011, US-101, gasoline spill
- July 31, 2000, US-101, fuel oil spill
- July 11, 1990, US-101, sulfur dioxide spill
- February 24, 2981, no location (highway), ethyl alcohol spill
- December 13, 1975, no location (highway), ethyl alcohol spill

There were no fatalities associated with these incidents, but two of the incidents (2011, 1981) were serious bulk releases of material.

Extent and Probability

The uncontrolled release of hazardous materials during transport can result in death or injury to people and damage to property and the environment through the material's flammability, toxicity, corrosiveness, chemical instability, and/or combustibility. Individuals may be exposed to hazardous materials at acute or chronic levels. In the event of a marine oil spill, ecological systems could be damaged from the pollution and recreational activities subsequently limited.

Future Probability Trend – Increased development trends and potential increase in high-intensity precipitation events present the potential for an increase in hazardous materials passing through the area and traffic accidents, respectively. Each presents the potential for an **increase** in future hazardous materials incidents.

Hazardous Materials Accident

Vulnerability

The City's hazardous materials threats stem from facilities that include gas stations, marinas, propane storage sites, port facilities, and transportation thoroughfares. US-101, the John Wayne Marina, and the Pacific Northwest National Laboratory are areas of concern for the City of Sequim.

Since the 2010 plan, the City's vulnerability to hazardous materials incidents has **increased**.

See Appendix C for additional hazard maps.

3.3.8 Winter Storm

Winter Storm

Magnitude	Onset	Duration	Frequency	Average	Rank
1.5	1.5	2.5	3.00	2.735	7

Location
While much of the County can be affected by winter storms, the higher elevation and western coastal areas are exposed to the more damaging impacts of winter storms. Furthermore, many of the communities along the western coast of Clallam County are very remote and have limited road infrastructure that can quickly become compromised during a winter storm.

Previous Occurrence/History

Recent winter storms occurring in Clallam County resulting in major damage include (snowstorms listed below; see Section 3.3.6, Windstorms, for other types of winter weather):

- 9 February 2019 – North Olympic Peninsula severe winter weather
- 14 March 2014 – Sequim/Port Angeles Blizzard
- 27 December 1996 – Christmas Snowstorm

Extent and Probability

Severe freezes, when daily high temperatures remain below freezing for five or more days, occur on average every three to five years in Clallam County. Winter storm weather is common in the winter, but typically lasts a short time; ice storms (sleet and freezing rain) likewise are typically brief events.

Winter storms may be more extreme during La Niña weather years, such as the 1996 flooding associated with the 1996-1997 La Niña pattern.

Future Probability Trend – The impact of changing weather patterns may have an impact on the probability of future winter storm events. Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, it would seem the County may be impacted by a **decrease** in the probability of future winter storms. However, it is also possible that changing weather patterns could result in an increased likelihood of precipitation during sub-zero temperatures, resulting in an **increase** in the probability of winter storms.

Winter Storm

Vulnerability

The City's primary vulnerability from severe weather is from power outages and impairment of transportation. Because nearly all social and economic activity is dependent on transportation, snow can have a serious impact.

Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive. Power outages can result from physical damage to electrical infrastructure as a result of ice or snow or increases in demand beyond the capacity of the electrical system.

Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe winter weather events. Persons who are older, are isolated or have disabilities may be more vulnerable, especially those that may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines. Power losses during winter storms have resulted in deaths from carbon monoxide poisoning if people attempt to keep warm by lighting charcoal fires or operating backup generators indoors.

Snowstorms also slow the local economy, but there is a debate about whether these slowdowns cause permanent revenue losses. Productivity and sales may decline but often accelerate after a storm. Some permanent effects may occur if some areas in the region are accessible and some are not.

For workers, snow can be a hardship, especially for those who lack benefits and vacation time. For local governments, responding to snowstorms can be a major unbudgeted expense. Some have even had to issue emergency bonds to cover snowstorm recovery costs.

Since the 2010 plan, the City vulnerability to winter storms has **increased** as weather patterns change due to climate change and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

1

2

3.3.9 Flooding

Flooding

Magnitude	Onset	Duration	Frequency
1.5	3	2	3

Average	Rank
2.375	10

Location

The main flooding impacts for the City of Sequim originate when there is a major storm or when rapid snowmelt cannot infiltrate at a fast-enough rate. Additionally, irrigation ditches will impact the baseflow of major drainages. Levees protect many of the Sequim-area resources. For example, a levee protects the gravity-fed water supply for the City's Ranney well system (Clallam County 2009).

According to the City of Sequim Stormwater Management Needs Assessment (City of Sequim 2014), the following areas within City drainages are prone to repeat flooding:

- Bell Creek: where it flows south of downtown Sequim, E. Washington Street, N. Blake Avenue, and throughout Carrie Blake Park.
- West Happy Valley (a.k.a. West Fork Bell Creek): where it flows near Falcon and Silberhorn Roads, E. Cobblestone and US 101, and multiple locations in central Sequim when irrigation ditches carry high flows from storms.
- Highland Irrigation Main Channel

Previous Occurrence/History

Flood damages with the highest consequence, either related to the cost to repair or by the impact on human activities, were incurred during the 1979, 1990, 1996/1997, and 2008/2009 flood and severe storm events. Historically, the most damage to property are in the Lower Dungeness area.

Extent and Probability

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property. Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by U.S. Geological Survey stream gauges located throughout the area. It can also be measured by past damages of flooding.

Future Probability Trend – Based on potential increase in high-intensity precipitation events and increased development trends (resulting in additional impervious surfaces and stormwater runoff), the City may be impacted by an **increase** in the probability of future floods.

Vulnerability

Vulnerability posed by flooding to the City of Sequim is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Basic Plan, there are no critical infrastructure types that are vulnerable to flood hazards in the City of Sequim.

Flooding frequency and intensity is changing as the climate changes; however, the City is making more effort to manage floodplains and stormwater runoff through stormwater capture close to its source and infiltration via green infrastructure (City of Sequim 2016). Therefore, the vulnerability of Sequim to flood hazards is **unchanged** since 2010.

3.3.10 Landslide

Landslide

Magnitude	Onset	Duration	Frequency
1	2.5	2.5	2

Average	Rank
2	14

Location

The following are areas of concern for landslides in the Sequim area (FEMA 2013):

- Along major roadways, including US-101 and Route 122
- Olympic Discovery Trail
- Bluff area along West Sequim Bay Road, Johnson Creek, and Bell Creek
- Along Chicken Coop Road in Blyn

Previous Occurrence/History

Historically, the damages with the highest consequence, either related to the value of the repair or by the impact on human activities, include slides that have closed US-101 and slides in Port Angeles (one of which caused a fatality in 1998) (Clallam County 2010).

A landslide obstructed the Olympic Discovery Trail in 2014 (Peninsula Daily News 2014).

Extent and Probability

The following is excerpted from the hazard assessment conducted by Clallam County Emergency Management Division (EMD) as part of the 2016 Cascadia Rising Exercise:

> "It is very difficult to make quantitative predictions of the likelihood or the size of a future landslide event. An accurate understanding of the landslide hazard for a given facility requires a detailed landslide hazard evaluation by a geotechnical engineer. Such site-specific studies evaluate the slop, soil/rock and groundwater characteristics. Such assessments may require drilling to determine subsurface soil/rock characteristics. In some cases, landslide hazard assessments by more than one geotechnical engineer may reach confliction opinions." (Buck 2016)

Due to the geology and likelihood of landslide-triggering storms in Clallam County, the probability of future occurrence of landslides is high.

Future Probability Trend – Similarly to the entire County, due to expected increases in drought and wildfires, as well as presumed higher intensity precipitation events, the City may be impacted by an **increase** in the probability of future landslides. However, with Critical Areas ordinances, some of the hazard may be offset.

Landslide

Vulnerability

Vulnerability posed by flooding to the City of Sequim is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Basic Plan, there are no critical infrastructure that are at risk due to landslide.

Since the 2010, the City's vulnerability to landslides is **unchanged.** While there may be an increase in probability of a landslide occurring due to natural causes, the County and City have Critical Areas ordinances that regulate construction or tree removal in geologically hazardous areas, thereby offsetting the vulnerability.

3.4 Vulnerability Assessment

3.4.1 Identifying Critical Infrastructure and Asset Inventory

Critical infrastructure was identified for the City of Sequim following the methodology outlined in Chapter 4.6 of the Basic Plan.

Appendix B contains the complete vulnerability assessment and associated methodology.

3.4.2 Repetitive Loss Properties

As outlined in the Basic Plan, a single National Flood Insurance Program (NFIP)-identified repetitive loss structure is in the City of Sequim (Table 3-3).

Table 3-3 NFIP Severe Repetitive Loss Properties

FEMA ID	City	Occupancy	Flood Zone	Property Value	Building Value	Contents Value	Paid	Date of Payment	Date of First Loss
11317	SEQUIM	SINGLE FMLY	C	100000	101766.51	11820.28	113586.79	01/31/2018	02/04/1991

Source: FEMA Severe Repetitive Loss Properties, Compiled by the Houston Chronicle (2019). https://data.world/houstonchronicle/severe-repetitive-loss-properties-flood-games

3.4.3 Exposure Assessment

Table 3-4 contains a summary of the critical infrastructure associated with the Sequim area (Buck 2016). The vulnerability of each structure to earthquake, tsunami, flooding, WUI fires, and landslides is assessed.

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Sequim Valley Airport	468 Dorothy Hunt Ln	Sequim	Airport	60%	D	Mod	Mod	Very High	NO	NO	NO	NO
Diamond Point Airstrip	Airport Way	Sequim	Airport	60%	C	Low/Mod	Low	Very High	NO	NO	NO	NO
PUD Main Office	104 Hooker Road, Carlsborg	Sequim	Electric System	60%	C	Mod	Mod	High	NO	NO	NO	NO
Carlsborg Warehouse	100 Hooker Rd, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Carlsborg Operations Center, Engineering, crew, shop and storage	110 Idea Pl, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Carlsborg Substation	112 Idea Pl, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Carlsborg Utility Services	83 Idea Place, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Blyn Substation	83 Zaccardo Rd	Sequim	Electric System	60%	C	Mod	Mod	High	NO	NO	YES	NO
Johnson Creek Substation	400 Washington Harbor Loop	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Sequim Substation	150 N. Govan Ave.	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Sunland Substation	1971 Sequim-Dungeness Way	Sequim	Electric System	60%	D	High	High	High	NO	NO	NO	NO
Prairie Power Substation	670 S 3rd Ave	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Evergreen Substation	9701 Old Olympic Hwy	Sequim	Electric System	60%	C	High	Very High	Very High	NO	NO	NO	NO
Dungeness Substation	761 Hogback Rd	Sequim	Electric System	60%	C	Mod	High	High	NO	NO	NO	NO
Olympic Substation	630 Carlsborg Rd	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
John Wayne Marina	2577 W Sequim Bay Rd	Sequim	Hazardous Materials Storage	60%	D	Very	Very	Very	Yes	NO	NO	NO
Longhouse Market & Deli	271020 US-101	Sequim	Hazardous Materials Storage	60%	D/E	Very	Very	Very	Yes	NO	NO	NO
Ferrell gas	646 3rd Ave South	Sequim	Natural Gas	60%	C/D	Very	Very	Very	NO	NO	NO	NO
Pioneer Propane	931 Carlsborg Rd.	Sequim	Natural Gas	60%	C/D	Very	Very	Very	NO	NO	NO	NO
Carlsborg Reservoir	110 Frost Rd	Sequim	Water Systems	60%	C/D	High	Very High	High	NO	NO	NO	NO
Carlsborg Well & Pump Station	315 Business Park Loop	Sequim	Water Systems	60%	C/D	High	Very High	High	NO	NO	NO	NO
Smithfield Dr Well & Pump Station	161 Smithfield Dr	Sequim	Water Systems	60%	C/D	High	Very High	High	NO	NO	NO	NO
Carlsborg Warehouse Facility	100 Hooker Rd	Sequim	Water Systems	60%	C/D	High	Very High	High	NO	NO	NO	NO
Loma Vista Well, Pump & Reservoir	100 Burnt Mountain Pl	Sequim	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO
Duxbury Reservoir & Pump Station	2294 S 7th Ave	Sequim	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO
Raven's Ridge Reservoir & Pump Station	8932 Raven's Ridge Rd	Sequim	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO
Stampede Dr Reservoir	1120 Stampede Dr	Sequim	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Haller Well	2510 Doe Run Rd	Sequim	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO
Holgerson Well & Pump Station	70 Coyote Meadow Rd	Sequim	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO
Ranney Well System	175 Kincaid Rd	Sequim	Water Systems	60%	D/E	High	High	High	NO	NO	NO	NO
Silberhorn Well Field	130 W Silberhorn	Sequim	Water Systems	60%	D/E	High	High	High	NO	NO	NO	NO
Port Williams Well Field	702 Port Williams Rd	Sequim	Water Systems	60%	D/E	High	High	High	NO	NO	NO	NO
Reservoir 1.7 MG Steel	553 Reservoir Rd	Sequim	Water Systems	60%	C	High	Low	High	NO	NO	NO	NO
Reservoir 250 KG Tank	553 Reservoir Rd	Sequim	Water Systems	60%	C	High	Low	High	NO	NO	NO	NO
Reservoir 500 KG Pond	553 Reservoir Rd	Sequim	Water Systems	60%	C	High	Low	High	NO	NO	NO	NO
Reservoir Rd Pump Station	553 Reservoir Rd	Sequim	Water Systems	60%	C	High	Low	High	NO	NO	NO	NO
5th & McCurdy Pump Station	803 S 5th	Sequim	Water Systems	60%	D/E	High	High	High	NO	NO	NO	NO
Solana Lower Pump Station	262 Simdars Rd	Sequim	Water Systems	60%	C	High	High	High	NO	NO	NO	NO
Solana Lower Pump Station	213 Tamerlane Loop	Sequim	Water Systems	60%	C	High	High	High	NO	NO	NO	NO
Water System	5433 Woodcock Rd	Sequim	Wastewater System	60%	D/E	High	Very High	Very high	NO	NO	NO	NO
Reclamation Facility	247 Schmuck Road	Sequim	Wastewater System	60%	D/E	High	Very High	Very high	NO	NO	NO	NO
Pumping Station 1	702 ½ Port Williams Road	Sequim	Wastewater System	60%	D/E	High	Very High	Very high	NO	NO	NO	NO
Pumping Station 2	480 DOE Run Road	Sequim	Wastewater System	60%	D/E	High	Very High	Very high	NO	NO	NO	NO

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Pumping Station 3	East Lobelia Street	Sequim	Wastewater System	60%	D/E	High	Very High	Very high	NO	NO	NO	NO
Pumping Station 4	Jones Farm Road	Sequim	Wastewater System	60%	D/E	High	Very High	Very high	NO	NO	NO	NO
KSQM FM 91.5	609 W Washington St, Suite 17	Sequim	Communications System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Sequim Campus	#1500, 840 N 5th Ave	Sequim	Medical Facility	60%	C/D	High	High	High	NO	NO	NO	NO
Sequim Medical Plaza	777 N 5th Ave	Sequim	Medical Facility	60%	C/D	High	High	High	NO	NO	NO	NO
Olympic Medical Cancer Center	844 N 5th Ave	Sequim	Medical Facility	60%	C/D	High	High	High	NO	NO	NO	NO
Dungeness – Station 31	4721 Sequim Dungeness Way	Sequim	Fire Department	60%	F	High	Very High	Very High	YES	NO	NO	NO
R-Corner – Station 32	256702 Hwy 101	Sequim	Fire Department	60%	C	High	Low	High	NO	NO	NO	NO
Sequim – Station 34, HQ	323 N 5th Avenue	Sequim	Fire Department	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Carlsborg - Station 33 And Maintenance Facility	70 Carlsborg Rd	Sequim	Fire Department	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Diamond Point Station – Station 35	121 Sunshine Ave	Sequim	Fire Department	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Lost Mountain – Station 36	269160 Hwy 101	Sequim	Fire Department	60%	C	High	Low	High	NO	NO	YES	NO
Blyn Station – Station 37	Hwy 101	Sequim	Fire Department	60%	F	High	Very High	Very High	YES	NO	NO	NO
Grey Wolf School	171 Carlsborg Rd	Sequim	School	60%	D/E	Very	Very High	Very	NO	NO	NO	NO

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Haller School	350 W Fir St	Sequim	School	60%	D/E	Very	Very High	Very	NO	NO	NO	NO
High School, Sequim	601 N Sequim Ave	Sequim	School	60%	D/E	Very	Very High	Very	NO	NO	NO	NO
Middle School, Sequim	301 W Hendrickson	Sequim	School	60%	D/E	Very	Very High	Very	NO	NO	NO	NO
Sequim Community School	220 West Alder	Sequim	School	60%	D/E	Very	Very High	Very	NO	NO	NO	NO
Mountain View Christian	255 Medsker Rd	Sequim	School	60%	D/E	Very	High	Very	NO	NO	NO	NO
Olympic Christian – O'Brien	43 O'Brien Rd	Sequim	School	60%	D/E	Very	High	Very	NO	NO	NO	NO
Office Building	152 W Cedar Street	Sequim	Government Building	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Maintenance	169 W. Hemlock	Sequim	Government Building	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Carrie Blake Park	202 N Blake Ave	Sequim	Government Building	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Sequim Police Department	152 W Cedar St	Sequim	Government Building	80%	D/F	Very High	Very High	Very High	NO	NO	NO	NO
Sequim Transit Center (City EOC)	190 W Cedar Street	Sequim	Government Building	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
American Legion - Sequim	107 E PRAIRIE ST	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
First Baptist Church of Sequim	1323 Sequim Dungeness Way	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Carrie Blake Park	202 N Blake Ave	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Catholic, St. Josephs	121 E Maple St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Dungeness Community Church	45 Eberle Lane	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Elks - Sequim 2642	143 Port Williams Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Episcopal, St Lukes	525 N 5th	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Grange - Macleay Hall	290 Macleay Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Greywolf Elementary	Carlsborg Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Groveland Cottage	4861 Sequim-Dungeness Way	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Haller Elementary School	350 W Fir St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Juan de Fuca Cottages	182 Marine View Dr	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Kingsway 4 Square Church	1023 Kitchen Dick Road	Sequim	Shelter	60%	C	High	High	High	NO	NO	NO	NO
Latter Day Saints - Sequim	815 W Washington St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Lutheran, Dungeness ELCA	925 N Sequim Ave	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Lutheran, Faith Lutheran Church-Missouri Synod	382 W Cedar	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Masonic Temple, Sequim	700 S 5th Ave	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Methodist, Trinity United	100 Blake Ave	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Mountain View Christian	255 Medsker Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Nazarene, Sequim Valley	481 Carlsborg Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Pioneer Park Clubhouse	387 E Washington St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Presbyterian, Community	950 N 5th Ave	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Quality Inn & Suites	134 River Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Ramada Limited	1095 East Washington	Sequim	Shelter	60%	C	High	High	High	NO	NO	NO	NO
Ramble-Wood Retreat Center	Sequim Bay State Park	Sequim	Shelter	60%	C	High	High	High	NO	NO	NO	NO
Senior Center - Sequim	921 E Hammond St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Sequim Bay Lodge	268522 Hwy 101	Sequim	Shelter	60%	C	High	High	High	NO	NO	NO	NO
Sequim Bay Resort	2634 W Sequim Bay Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	YES	NO	NO	NO
Sequim Bay Yacht Club	2577 W Sequim Bay Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	YES	NO	NO	NO
Sequim Boys & Girls Club	400 Fir St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Sequim Community School	220 W Alder	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Sequim High School	601 N Sequim Ave	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Sequim Middle School	301 Hendrickson Rd	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Sequim West Inn	740 W Washington St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO

Table 3-4 Sequim-Area Critical Infrastructure

Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 years - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Tsunami Hazard	Floods	WUIF	Landslides
Seventh Day Adventist - Sequim	30 Sanford Lane	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
VFW #4760	169 E Washington St	Sequim	Shelter	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Grocery, Safeway	680 W Washington Street	Sequim	Commercial	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Warehouse-Costco	955 W Washington Street	Sequim	Commercial	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Grocery, Walmart	1110 W Washington Street	Sequim	Commercial	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Home Depot	1145 Washington Street	Sequim	Commercial	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Grocery, QFC	990 E Washington St	Sequim	Commercial	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO
Warehouse Grocery Outlet	1045 W Washington Street	Sequim	Commercial	60%	D/E	Very High	Very High	Very High	NO	NO	NO	NO

Key:
EQ = Earthquake
PGA = Peak Ground Acceleration
WUIF = Wildland Urban Interface Fire

3.5 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

The City of Sequim recently reviewed and update their Comprehensive Plan to comply with the periodic review requirement outlined in Washington State's Growth Management Act (City of Sequim 2018). The City has seen a 13% population growth since 2010, and the City's land use has reflected these changes as development expands.

Changes have been measured by accounting for shifts in land use and public awareness since the adoption of the 2010 County HMP. Each measure has been identified as having an increased, decreased, or unchanged vulnerability. Table 3-5 provides a snapshot of how vulnerability has changed since development of the 2010 HMP.

Table 3-5 Vulnerability Changes Since 2010

Hazard	Status
Earthquake	+/-
Active Shooter	+/-
Power Outages	+
Wildfire	+
Heat Events and Drought	+
Windstorm	+
Hazardous Materials Accident	+
Flooding	+
Winter Storm	+
Landslide	+/-

Key:
+ Increased vulnerability
- Decreased vulnerability
+/- Increased vulnerability, but actions taken to decrease vulnerability
= Unchanged vulnerability

4 CAPABILITY ASSESSMENT

FEMA	**C1.** Does the plan document [the City of Sequim's] existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? [Requirement §201.6(c)(3)]

4.1 Human and Technical Resources

Table 4-1 describes the City's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 4-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
Community Development Director	Community Development	Oversees community development and update of strategic planning relating to land use
Community Development Senior Planner	Community Development	Planner with knowledge of land development and land management practices
Director of Public Works	Public Works Department	Engineers and/or professionals trained in construction practices related to City buildings and/or infrastructure
City Engineer	Public Works Department	
Project Engineer	Public Works Department	
Resource Manager	Public Works Department	Geologist with an understanding of natural and/or human-caused hazards in the area. Additionally, serves as resource development lead and grant writer.
Police Chief	City of Sequim Police Department	Serves as a liaison for County emergency management and planning.
GIS/Engineering Technician II	Public Works Department	Personnel skilled in Geographic Information Systems (GIS)

4.2 Financial Resources

The City maintains many fiscal and financial resources to support its mitigation program. Table 4-2 identifies specific resources accessible for use.

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	No
Special Purpose Taxes	Yes, Transportation Benefit District
Insurance	Yes
User fees for utility services	No
Incur debt	Yes
Development Impact Fees	Yes

General Obligation, Revenue, and/or Special Tax Bonds	Yes
Partnering arrangements or intergovernmental agreements	Yes

Table 4-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Pre-Disaster Mitigation Program	Federal Emergency Management Agency (FEMA)	Provides funding to develop hazard mitigation plans (HMPs) and implement mitigation actions contained within.
Hazard Mitigation Grant Program	FEMA	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	FEMA	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by floods.
Community Development Block Grant Program	U.S. Department of Housing and Urban Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.
Emergency Management Performance Grants Program	FEMA/Washington Department of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.
Flood Mitigation Assistance	FEMA/Washington Department of Emergency Management	Provides funding to support development of the flood hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program (NFIP).
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program Interagency Coordinating Committee	Funds activities including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
National Fire Plan	U.S. Forest Service	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
Strategic Economic and Community Development Grant	U.S. Department of Agriculture	Provides funding in rural areas for multi-jurisdictional plan development and with a community development focus. Available only to rural areas outside of urbanized zone of any city with a population greater than 50,000.
Coastal Ecosystem Resiliency Program	National Oceanic and Atmospheric Administration	Provides funding for ecosystem restoration. Governor must approve project funds prior to award and there is a 2:1 cost-sharing ratio.
State		

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Washington State Department of Transportation (WSDOT) Avalanche Forecasting and Control	WSDOT	Avalanche forecasting determines the potential risk along a particular mountain slope. When an avalanche hazard develops, WSDOT uses artillery, or explosives to trigger the avalanche. In addition to active avalanche control, WSDOT also uses passive control methods to control snow slides.
Washington Sea Grant	Washington Sea Grant	Washington Sea Grant provides funding opportunities through State and National competitions, program development services, and sponsorships.
Ecology Water Resources Program	Washington Department of Ecology (DOE)	DOE's Water Resources Program provides support in monitoring water supply, managing water supply projects, overseeing water rights, performing streamflow restoration, protecting streamflow, regulating well construction and licensing, and ensuring dam safety.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock industry and receives no general fund dollars.
Washington Local Emergency Planning Committee Program	Washington Emergency Management Division (EMD)	WA EMD provides funding support to ensure Local Emergency Planning Committees (LEPCs) can be implemented across the state.
Washington Pipeline Safety Program	Washington Utilities and Transportation Commission	The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington State; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).
State Water Pollution Control Revolving Fund	Washington DOE	This program provides funds to local governments to set up low-interest loan programs to repair or replace failing on-site sewage systems. Property owners unable to qualify for conventional bank loans and marine waterfront property owners can use the program to get loans to fix or replace their systems where failures might directly affect Puget Sound. Both the Clean Water State Revolving Fund and the Centennial Clean Water Program.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.
Thriving Resilient Communities	Threshold Foundation	Wide-ranging resiliency project funding.
Kresge Foundation Environmental Grants	Kresge Foundation	Provides funding for climate adaptation and mitigation, as well as sustainable water resources management.

4.3 Legal and Regulatory Resources

Table 4-4 describes the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations.

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All
	2015 – 2035 Comprehensive Plan	The City's Comprehensive Plan establishes Urban Growth Areas, natural resource lands, rural lands, and public lands.	▪ Updated zone mapping	All
	Stormwater Management Needs Assessment	Sequim Public Works identified "problem areas" and documented physical and operational stormwater management.	▪ Major findings of the Needs Assessment project were presented to City Council at a study session on March 10, 2014.	Flooding
	Storm & Surface Water Master Plan	The Storm & Surface Water Master Plan is established to improve the quality of stormwater runoff, reduce speed and volume of stormwater flows, and raise public awareness of stormwater issues.	▪ Plan adopted by Council in April 2016	Flooding
	2019 – 2024 Capital Improvement Plan	Identifies capital improvement projects to be undertaken by the City over the next five-year period.	▪ Inclusion of hazard mitigation and maintenance projects (updated annually)	All
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions.	▪ Collaboration between State and County	All
Policies	Zoning Ordinance	Provides land use regulation in the unincorporated portions of the City.	▪ Current code through Ordinance 2019-012, passed July 8, 2019	All
	Subdivision Ordinance	Incorporated into zoning ordinance, establishes regulations around subdivision of properties.	▪ Current code through Ordinance 2019-012, passed July 8, 2019	All

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
	Flood Damage Prevention Ordinance	The City floodplain management ordinance incorporated into the Critical Areas ordinance is designed to protect and conserve the environmental attributes of the City and add to the quality of life for residents.	▪ Defines areas of special flood hazard ▪ Requirements for development within an area of special flood hazard ▪	Flooding
	Critical and Environmentally Sensitive Areas Protection	Define and protect critical areas as required by the Growth Management Act.	Defines areas of geological hazard that are of special concern to the City.	Landslide, Earthquake, Flooding
	National Flood Insurance Program (NFIP)	NFIP aims to reduce the impact of flooding on private and public structures.	▪ All participating jurisdictions currently participating in NFIP	Flooding
	Building Codes	Building permits are issued by the Department of Community Development and aligned with ICC 2015 building codes.	▪ Adoption of 2015 ICC codes	All
	Sustainability and Resiliency Resolution	A resolution adopting policies that improve the city's sustainability and resiliency	▪ Prioritized city resiliency and sustainability	All

4.4 Coordination with Community Partners

The City works alongside their community partners to address issues pertaining to emergency management and hazard mitigation. Many of these community partners participated in the HMP update process and collaborate with the City on an ongoing basis.

- **Public**
  - Sequim School District
  - Fire Department
- **Business and Industry**
  - Local Chambers of Commerce
  - Sequim Radio Stations
  - Irrigation districts and companies
- **Healthcare**
  - Olympic Medical Center
- **Utilities**
  - Clallam Public Utility District
  - Sequim Water and Sewer Utilities
- **Transportation**
  - Washington Department of Transportation

- Clallam Transit

4.5 National Flood Insurance Program Participation

The City complies with the NFIP with a flood control ordinance and explicit code requirements for development in flood hazard areas (Sequim Municipal Code [SMC] 8.36.080). The City currently manages floodplain hazards through its Flood Damage Prevention code (SMC Chapter 8.36) which address areas of special flood hazard as identified by the Federal Insurance Administration in The Flood Insurance Study for the Clallam County, Washington Unincorporated Areas, revised February 23, 2001. This study includes flood profiles and accompanying Flood Insurance Rate Maps (FIRMs). The code adopts these maps and any future revisions (SMC 8.36.040) and requires the best available information for flood hazard area identification (SMC 8.36.050(B)) be used as the basis for regulation until new flood insurance rate map is issued that incorporates new data. A flood risk mapping project is currently underway in Clallam County through FEMA Region X; interim results are recently available.

Table 4-5 contains a summary of County-wide participating jurisdiction's total coverage and losses under the NFIP.

Table 4-5 National Flood Insurance Program Coverage and Losses

Community Name (Number)	Total Coverage (in Thousands)	Total Dollars Paid
CLALLAM COUNTY * (530021)	$97,187	$903,327
FORKS, CITY OF (530022)	$400	$--
LOWER ELWHA KLALLAM TRIBE (530316)	$1,715	$--
PORT ANGELES, CITY OF (530023)	$6,001	$75,632
SEQUIM, CITY OF (530301)	$2,148	$55,798

Source: FEMA NFIP Policy and Loss Data by Geography (2019c) https://www.fema.gov/policy-claim-statistics-flood-insurance

4.6 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into the City's daily operations and ongoing planning activities is a priority of the City's mitigation program. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization; and
- Maximizing planning resources through linked or integrated planning efforts.

The City is encouraged to consider integration actions into planning mechanisms including:

- Budget decision-making;
- Building and zoning ordinances and decision-making;
- Emergency planning mechanisms; and
- Economic developing planning and decision-making.

4.6.1 Existing Plans

FEMA	**C6.** Does the Plan describe a process by which the local government will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(iii))

The following existing plans provide ongoing opportunity for integration of hazard mitigation and the City will work with plan owners and stakeholders to consider hazard mitigation data and principles when these plans are updated. Table 4-6 contains a summary of the County's existing plans and how each incorporates the hazard mitigation planning.

Table 4-6 Summary of Clallam County Plans

County Plan	Hazard Mitigation Components
Comprehensive Emergency Management Plan (2016)	Outlines hazard mitigation roles and responsibilities.
Continuity of Operations Plan	In development.
Comprehensive Land Use Plan	Identifies designated land uses and areas of economic and environmental value.
Floodplain Management Plan	Outlines strategies that directly or indirectly mitigate the risks posed by flood hazards.
Capital Improvements Plan	Identifies large capital projects to reduce risks to key County infrastructure.
Historic Preservation Plan (a component of Critical Areas)	Identifies areas of cultural value that may be vulnerable to hazards.

5 MITIGATION STRATEGY

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [City of Sequim] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

5.1 Review of 2010 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2010 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2019 plan update. The MPT worked through each previous action during MPT Meeting #1 to document steps taken to fulfill the action.

See Table 5-1 for an overview of the status of all City actions from the 2010 plan update.

Table 5-1 Status of 2010 Mitigation Actions

Action No.	Mitigation Action	Action Status	Timeline	Lead Department	Priority
1	Build redundant water source (3rd reservoir)	2010 Action - Ongoing	2009-2010	Public Works Department	High
2	Alternative power source for water reuse facility	2010 Action - Ongoing	2010-2011	Public Works and Planning Departments	High
3	Backup power to Battelle Laboratory	Public Utility District (PUD) and Pacific Northwest National Labs – no longer a City action.	2010-2011	Public Works Department	High
4	Purchase Additional Heavy Equipment for Use during Severe Storms	2010 Action - Ongoing	2013	Public Works Department	High
5	Develop Reliable Backup Program for Critical City Data Entry Post-Disaster	2010 Action - Ongoing	2013	Public Works Department	High
6	Upgrade storm drains.	2010 Action - Ongoing	2013	Public Works Department	High
7	Adopt 2010 Hazard Mitigation Plan	Completed	2010	Planning Department	High

5.2 Identification and Analysis of New Mitigation Actions

In order to achieve the County-wide mitigation goals, the City has identified a comprehensive series of mitigation objectives and supporting actions that are focused on reducing vulnerability and maximizing

loss reduction. The actions can typically be broken out into the following types of activities which are indicated in Table 5-2.

Table 5-2 2019 Mitigation Actions by Group

Mitigation Group	Related Mitigation Actions
Plans and Regulations	
Infrastructure/Capital Project	SQ01, SQ02, SQ03, SQ04, SQ05, SQ06, SQ07, SQ08, SW09, SQ10 SQ12, SQ13
Natural System Protection	
Education and Awareness	SQ14, SQ18
Preparedness and Response	SQ01, SQ03, SQ08, SW09, SQ11, SQ15, SQ16, SQ17, SQ19

All mitigation actions identified in the plan are addressed in the mitigation implementation plan provided in Section 5.3. The actions include both interim- and long-term strategies for reducing vulnerability to hazard and are characterized as such in the 'life of action' column of the implementation plan.

5.2.1 2019 Mitigation Actions by Hazard

All mitigation actions identified in the plan address at least one priority hazard outlined in Chapter 4 of the HMP. Table 4-2 indicates which mitigation actions address which hazards.

Table 5-3 2019 Mitigation Actions by Hazard

Hazard	Related Mitigation Actions
All Hazards	SQ09, SQ11, SQ16, SQ17, SQ18, SQ19
Earthquake/Tsunami	SQ01, SQ03, SQ07, SQ12, SQ13, SQ14,
Active Shooter	
Power Outages	SQ01, SQ02, SQ05, SQ06, SQ07, SQ12,
Wildfire	SQ07, SQ10, SQ15
Heat Events and Drought	SQ06, SQ10
Windstorm	SQ01
Hazardous Materials Accident	
Winter Storm	SQ13
Flooding	SQ01, SQ02, SQ03, SQ04, SQ08, SQ10, SQ13
Landslide	SQ13

A complete mitigation implementation plan is provided in Table 5-4.

5.3 2019-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the City of Sequim]? (Requirement §201.6(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the City. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix D for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for each action listed in Table 5-4.

Table 5-4 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
City of Sequim													
SQ01	Build fuel station at City Public Works Yard to supply fuel to City departments and all emergency responders.	New	2,4	City Public Works, Police Department	1-3 years	$850,000	Yes	Federal Emergency Management Agency (FEMA)	Earthquake, Flood, Utility Failure, Winter Storm, Tsunami, Windstorm	19	6	25	10
SQ02	Replace 3-mile 12" water main from Ranney Will (infiltration gallery) beginning near the Dungeness River and ending at the Reservoir Road Reservoirs.	New	4,5	Public Works Department	1 – 3 years	Unknown	Yes	FEMA	Floods, Utility Failure, Winter Storm,	12	6	18	1
SQ03	Purchase a portable water purification system and small tanks. Prepare multiple sites and equipment to operate water purification	New	4,5	Public Works Department	2 years	Unknown	Yes	Drinking Water State Revolving Fund (DWSRF), FEMA	Earthquake, flooding, tsunami	18	6	24	8
SQ04	Locate site for new potable water reservoir, purchase property, design and construct.	New	4,5	Public Works Department	3-5 years	Unknown	No	City of Sequim general fund, property owners, developers, Public Utility District (PUD	Winter storms, flooding	15	8	23	4
SR05	Reroute/reconfigure electrical supply to the City of Sequim Water Reclamation Facility at 247 Schmuck Road by bringing new power source into the facility and using existing supply as backup.	2010 Action – Ongoing	4,5	Public Works Department, PUD	3-5 years	Unknown	No	Drinking Water State Revolving Fund (DWSRF), FEMA	Utility Failure	19	4	23	5
SR06	Construct deep water well (>600 feet) to increase resiliency and reliability within water system.	New	4,5	Public Works Department	1-3 years	Unknown	Anticipated	Drinking Water State Revolving Fund (DWSRF), FEMA	Utility Failure, Drought, Water Shortage	17	4	21	2

Table 5-4 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
SR07	Connect and extend City water mains to improve looping, during water main replacements and developer projects.	New	4,5	Public Works Department	3-5 years	Unknown	Anticipated	Drinking Water State Revolving Fund (DWSRF), Developers	Earthquakes, Excessive Heat, Utility Failure, Water Shortages, Wildfires	17	4	21	3
SQ08	Purchase Additional Heavy Equipment for Use during Severe Storms	2010 Action – Ongoing	2,4	Public Works Department	0-5 years	UNK	Yes	City of Sequim general fund	Winter storms, flooding	19	8	27	15
SQ09	Develop Reliable Backup Program for Critical City Data Entry Post-Disaster	2010 Action – Ongoing	2,3	Finance Department (Information Technology)	2 years	UNK	Yes	City of Sequim general fund	All hazards	19	6	25	11
SQ10	Capture stormwater in the County southwest of Sequim city limits and re-infiltrate using green stormwater infrastructure to benefit the watershed.	New	4,5	City of Sequim Public Works, Clallam County Public Works	<1 year	Capture & Infiltration project ~ $1.23M total. Match of $154k will be 97% met by land acquisition, the rest by staff time.	Anticipated	Application submitted to FEMA Hazard Mitigation Program	Flooding, Drought, Wildfire	18	6	24	9
SQ11	Install an energy storage microgrid for storing solar energy for use in the EOC and Civic Center during power outage emergencies.	New	2,3,4	Public Works Department	1-3 years	~$250,000	No	Washington State Department of Commerce	All hazards	19	4	23	6
SQ12	Replace mid-1900s AC pipe running through the City with earthquake-resistant pipe.	New	4	Public Works Department	3-5 years	$6-8 million	No	City Budget, Grant	Earthquake, Utility Failure	18	8	26	14
SQ13	Protect/reinforce Johnson Creek Trestle for the Olympic Discovery Trail west of Whitefeather Way	New	1,4	Public Works Department	3-5 years	$100,000	No	City Budget, Grant	Earthquake, Flooding, Landslide, Winter Storm	19	4	23	7
SQ14	Train City staff to perform seismic assessments of City properties	New	2,6	Public Works Department	1-3 years	Minimal	Yes	Staff time	Earthquakes	19	8	27	16
SQ15	Conduct wildfire risk assessment for City of Sequim and Fire District 3	New	4,5	Public Works Department and Clallam Co. Fire District 3	1-3 years	$20,000-$40,000	No	Grant	Wildfire	19	6	25	12
SQ16	Implement asset management using GIS for all capital facilities	New	4	Public Works Department	1-3 years	$20,000 per year plus staff time	No	Existing Budget	All Hazards	19	8	27	17

Table 5-4 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
SQ17	Coordinate Emergency Management/Incident Response trainings for North Olympic Peninsula jurisdictions	New	2	Sequim Police Department	<1 year	Negligible	Yes	Existing Budget	All Hazards	19	8	27	18
SQ18	Public education of potential hazards, local agency response, and preparedness	New	6	Sequim Police Department	<1 year	Negligible	Yes	Existing Budget	All Hazards	17	8	25	13
SQ19	Develop risk assessment and response plan for vulnerable populations regarding excessive heat, cold, smoke inhalation – including loss of power and/or ability to transport	New	6	Sequim Police Department	<1 year	$20,000	No	Existing Budget, Grant	All Hazards	19	8	27	19
Adopt the Hazard Mitigation Plan	Adopt the Hazard Mitigation Plan	Completed – Re-adopting updated 2019 HMP		Planning Department	1 year	N/A	Yes	N/A	All hazards				

Key:
STAPLEE - Strategy and Prioritization Methodology

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Special Hazard Districts Annex – Clallam County Multi-Jurisdictional Hazard Mitigation Plan





PENINSULA COLLEGE



2019 Plan Update

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INTRODUCTION

1.1 Clallam County Special Hazard Districts Involved in Mitigation

For the purposes of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan (HMP), Special Hazard Jurisdictions are defined as governmental or quasi-governmental entities that participated in the hazard mitigation planning process. Each of these jurisdictions contribute greatly to the County and local jurisdictions and in turn rely on County or local emergency services and utilities.

Throughout the hazard mitigation planning process, the following representatives from the Special Hazard Districts were present at one or more Mitigation Planning Team (MPT) meetings:

Clallam County Public Utilities District (PUD) No. 1

- Larry Morris, Safety Manager

Peninsula College

- Marty Martinez, Campus Safety Operations Manager
- Peninsula College served as the location for Public Meeting #1 in Port Angeles

Port of Port Angeles

- Dan Gase, Airport & Real Estate Manager
- Dan Shea, Operations Supervisor
- John Nutter, Airport Director

These partners play critical roles in mitigating and responding to the highest priority hazards affecting Clallam County, including earthquakes (including a Cascadia Subduction Zone Event), severe weather, and landslides. This annex provides information on the missions of these agencies, targeted hazard profiles and vulnerability assessments, the partners' capabilities, and updated mitigation actions.

1.2 What's New in the 2019 Update?

Clallam County PUD, Peninsula College, and Port of Port Angeles were included in the 2011 Hazard Mitigation planning process; however, their interests were not represented in a standalone annex. For the 2019 Clallam County HMP update, these districts have their own annex to present their unique hazard mitigation planning efforts.

DISTRICT PROFILES

2.1 Clallam County Public Utilities District No. 1

The Clallam County PUD No. 1 is located in Port Angeles, Sequim, and Forks. It is a nonprofit organization that provides electric, water, internet, and sewer services to the communities and citizens of Clallam County. PUD is based in the Port Angeles.

PUD is directed by a three-member Board of Commissioners elected by citizens of Clallam County (PUD 2014a).

2.2 Peninsula College

The only resident institution of higher education on the North Olympic Peninsula, Peninsula College is a comprehensive community college with a district that encompasses both Clallam and Jefferson Counties (Peninsula College 2019). The main campus is located in Port Angeles on 75 acres of land at the foot of the Olympic Mountains. Extension sites are located in Forks and Port Townsend (Peninsula College 2019).

As of the 2017–2018 school year, there were 4,454 enrolled students, 58 percent of which were full time (Peninsula College 2019).

2.3 Port of Port Angeles

The Port of Port Angeles, the Olympic Peninsula's only deepwater port, provides support for Clallam County industry and employs administrative and trades staff. The Port operates a 16.1-acre marina, with approximately 375 boat slips and 3,000 feet of dock for tie-ups, as well as a marine terminal and trades area, a log yard, and rental properties (Figure 2-1). The Boat Haven Marina was upgraded in 2007-2008. The Port operates the William R. Fairchild International Airport. The Port also currently houses a composites training institute (WA ESD 2017).

Figure 2-1 Location of Port of Port Angeles relative to the City of Port Angeles

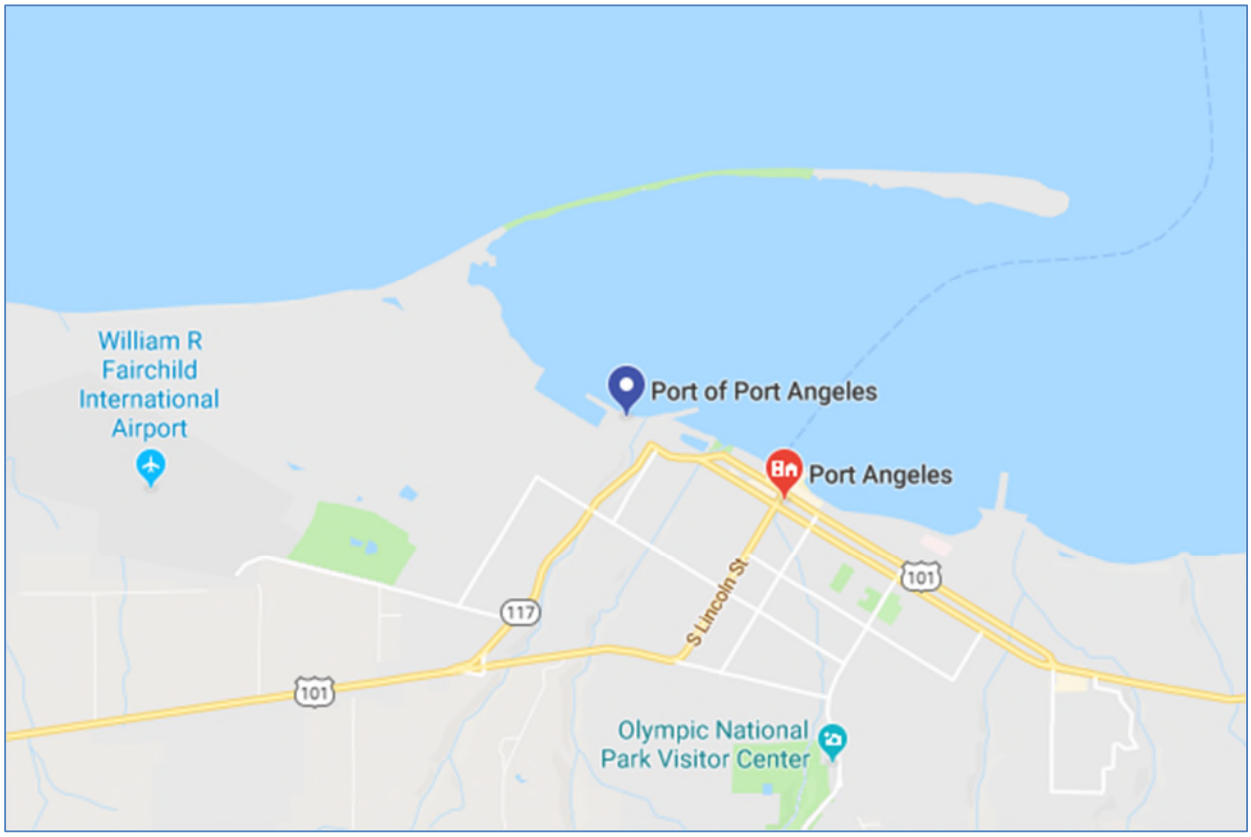
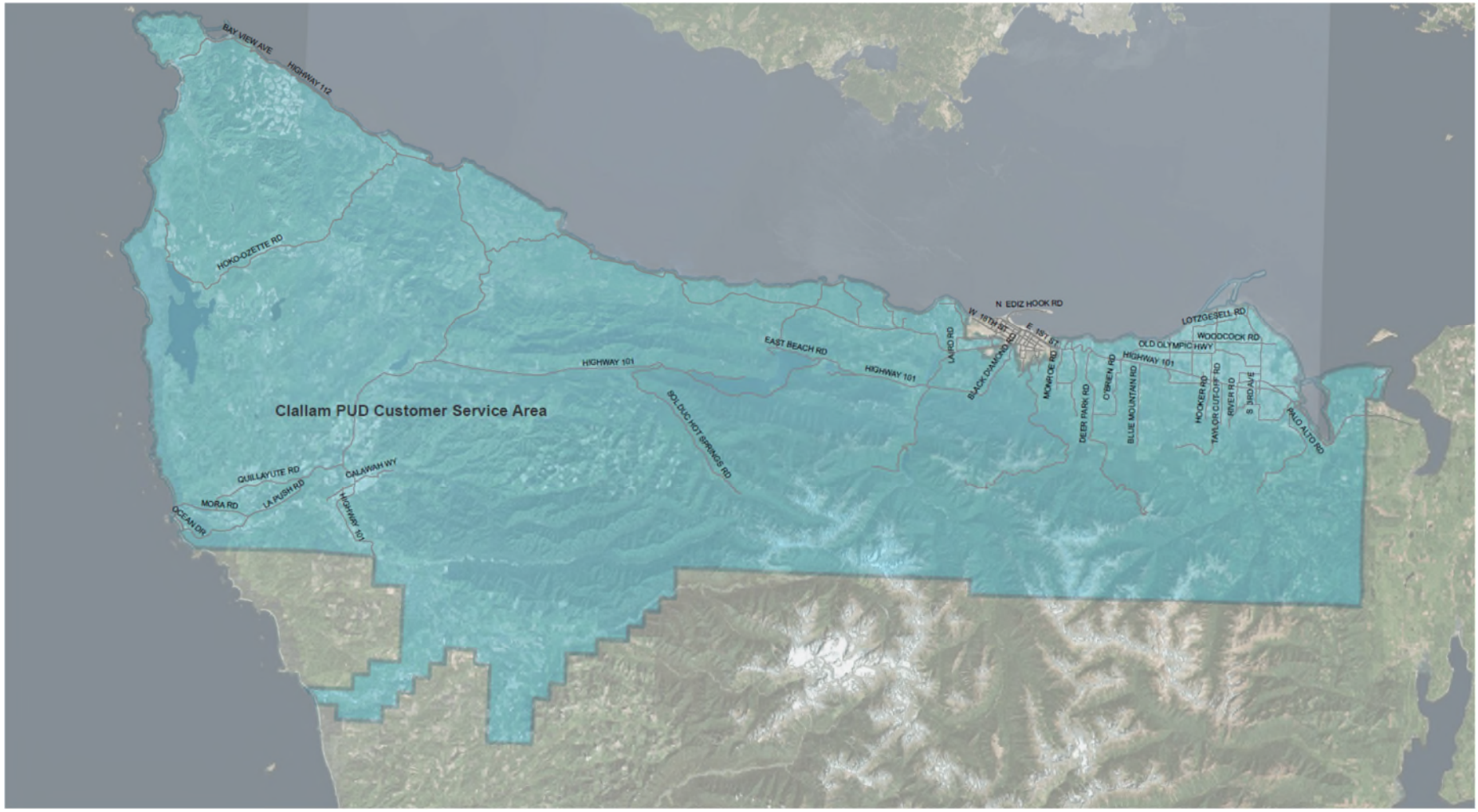


Figure 2-2 Clallam PUD Electrical Service Area



Source: Clallam PUD 2014b

Figure 2-3 Clallam PUD Water Service Areas.

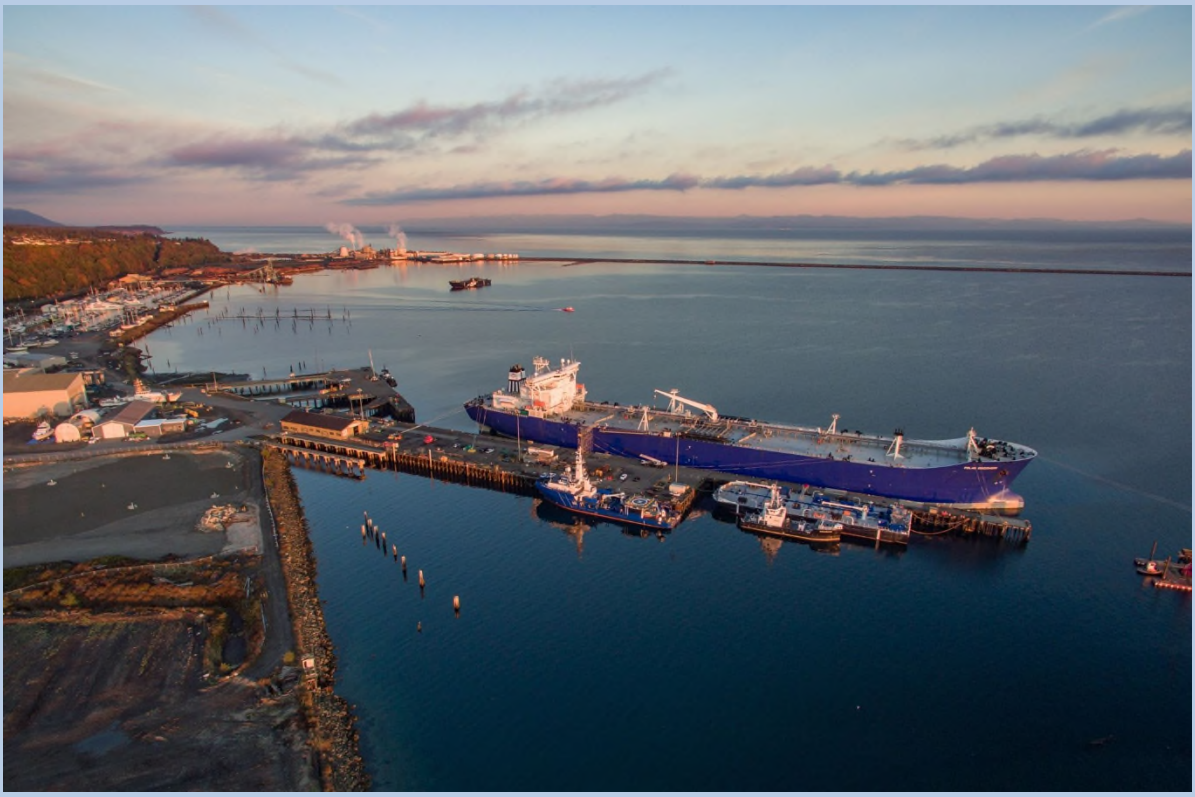


http://clallamcountypud.maps.arcgis.com/apps/webappviewer/index.html?id=d69a40e3bd9149c789213eb7690575fa

1

BUSINESS HIGHLIGHT

The Port fuels the North Olympic Peninsula's economy by supporting job creation in industry and commerce. The Port's strategic position on the Strait of Juan de Fuca, its location on a deepwater harbor, the industrial facilities that support marine and air transportation, and access to natural resources all contribute to unique and robust economic engine (Port of PA 2019).



https://www.portofpa.com/92/About-Us

2

HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 3 contains hazard profiles and vulnerability assessments to determine the potential impact of hazards to the people, economy, and built and natural environments within the jurisdictions of special hazard districts in Clallam County. They have been streamlined to increase the effectiveness and usability of the HMP.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the special hazard districts]? (Requirement §201.6(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the special hazard districts]? (Requirement §201.6(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.6(c)(2)(ii)]

3.1 General

Clallam County has encountered several major disaster declarations that have affected the special hazard districts. In total, the County has experienced 21 disaster declarations since 1953. Table 3-1 identifies the disaster declarations since 2010.

Table 3-1 Clallam County FEMA Disaster Declarations

Disaster ID	Date of Declaration	Disaster Type	Incident Period
DR-1956	05-Mar-12	Severe Winter Storms, Flooding, Landslides, and Mudslides	14-Jan-12 to 23-Jan-12
DR-4242	15-Oct-15	Severe Windstorm	29-Aug-15
DR-4249	1-Jan-16	Severe Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	12-Nov-15 to 21-Nov-16
DR-4253	2-Feb-16	Severe Winter Storm, Straight-line Winds, Flooding, Landslides, Mudslides, and a Tornado	1-Dec-15 to 14-Dec-15
DR-4418	4-Mar-19	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, Mudslides, Tornado	10-Dec-18 to 24-Dec-18

Source: FEMA, Washington Disaster History, Major Disaster Declarations (https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties)

The hazard profiles and vulnerability assessments contained in this chapter and Chapter 4 of the Basic Plan represent a considerable amount of work performed by the MPT. MPT members ranked hazards using several key considerations, followed up by activities to validate hazard analysis results and identify specific areas of risk.

3.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on MPT feedback during MPT Meetings #1 and #2.

Following the individual hazard ranking activity, the results were added up and aggregated to show an average score for the participating members and are available in Figure 3-1.

Figure 3-1 Special Hazard Districts

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Power Outages	2	5	4	5		4	1
Earthquake	4	5	4.5	1		4	2
Cascadia Earthquake	5	5	3	1		4	3
Winter Storm	1.5	3.5	3	5		3	4
Windstorm	1.5	3.5	2.5	5		3	5
Tsunami	3	4	3.5	1		3	6
Wildfire	1.5	4	3.5	2.5		3	7
Hazardous Materials Incident	1.5	5	3.5	1		3	8
Flooding	2	3	3	2		3	9

3.3 Hazard-Specific Profiles and Risk Assessments

The following section profiles each hazard identified in Section 3.2 and assesses the risk associated with each. Each risk assessment considers the following attributes:

- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Like location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends impact on the districts' vulnerability to each hazard since the 2010 plan development (increased, decreased, unchanged).

Note: Hazard Descriptions, Potential Impacts from Future Climate Conditions, and Cascading Impacts can be found in Chapter 4 of the HMP Basic Plan, as these are not place-specific.

In addition, the hazards have been organized into three sub-sections (high-, medium-, and low-priority) to illustrate the risk-driven nature of the HMP. Each hazard has been given serious consideration of all attributes discussed within. However, low-priority hazards may be shorter in length and with less quantitative analyses, as a lack of usable data is frequently present when considering low-likelihood or low-magnitude events. The three sub-sections are as follows:

- **High-Priority:** Power Outages, Earthquake/Cascadia Earthquake/Tsunami
- **Medium-Priority:** Winter Storm/Windstorm
- **Low-Priority:** Wildfire, Hazardous Materials Incident, Flooding

3.3.1 Power Outages

Power Outages

Magnitude	Onset	Duration	Frequency
2	5	4	5

Average	Rank
4	1

Location

Numerous County properties, including the special hazard districts, are at risk of being affected by utility failures. However, the risk posed by power outages to PUD is assessed primarily in this annex because it is the primary supplier of many County-wide utilities.

Rural and populated areas alike are known to experience power outages during winter and windstorms that can last anywhere from several hours to several weeks. In addition, the Clallam County PUD operates extensive utility and information technology networks that could be at a risk to exposure of a hazard that could lead to a utility failure.

A utility failure may impact any of the following services:

- Electric Power Systems (Clallam PUD, Port Angeles City Light, US Bonneville Power Administration)
- Water Supply (Clallam PUD, Crescent Water Association, Diamond Point Private Water System, City of Port Angeles Water System, City of Sequim Water System, Sunland Water System)
- Wastewater and Sewer Systems (Clallam PUD, City of Port Angeles, Clallam Bay Correction Center, Sunland Water System, City of Sequim Water System, City of Forks)

Source: Buck 2016

Previous Occurrence/History

Historically, utility disruptions and failures have been caused by natural disasters and human-caused accidents but have not been recorded in a way that is publicly accessible. Numerous utility failures occur every year, most frequently in the form of electricity outages that may last as short as hours or as long as weeks. Most recently, the County faced widespread utility failures during the December 2018 windstorms and during Hurricane Songda in 2016.

Downed Power Lines



Power Outages

Extent and Probability

It is difficult to predict the impacts of future utility failures, but they have the potential to impact all government and business operations and cause extensive economic losses among other impacts. Due to the sporadic nature of failures, it is also difficult to estimate how frequently such failures will occur or their duration. Various parts of Clallam County generally deal with power outages multiple times per year with many of them only lasting a matter of hours. Every several years, a large utility failure is experienced.

Future Probability Trend – Based on potential increases in heat waves and increasing development trends resulting in greater demand, the districts may be impacted by an increase in the probability of future utility failure. However, mitigation actions outlined in this annex are designed to decrease such strain on utility systems.

Vulnerability

Electric Power Systems
Severe weather (including winter storms and windstorms) likely present the greatest threat to PUD infrastructure. Power facilities in Clallam County are generally protected from wildland/urban interface fires by defensible space. A limited number are threatened by tsunami, flood, and landslide hazards. All facilities are threatened to varying degrees by destructive earthquakes.

Source: Buck 2016

Although utilities systems have expanded with new development in recent years, the PUD's vulnerability to utility failure is **unchanged** because new infrastructure has been constructed that are more resilient to natural hazards.

3.3.2 Earthquakes and Tsunami

Earthquakes and Tsunami

Hazard	Magnitude	Onset	Duration	Frequency		Average	Rank
Earthquake (other)	4	5	4.5	1		4	2
Cascadia Earthquake	5	5	3	1		4	3
Tsunami	3	4	3.5	1		3	7

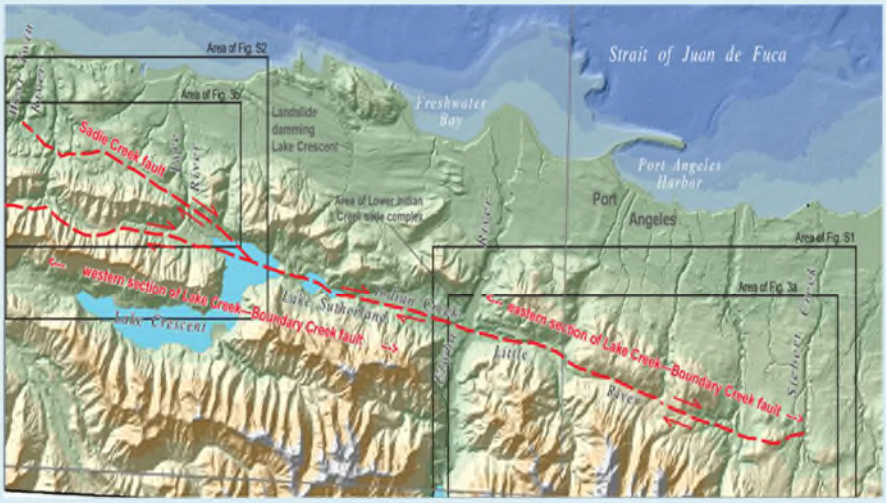
Location

The Cascadia Subduction Zone (CSZ) poses a great risk to all coastal communities along its length. The special hazard districts are equally as susceptible to earthquakes as the jurisdictions in which they are located.

The relatively shallow Lake Creek – Boundary Creek Fault runs east-west through Clallam County, approximately from the vicinity of Lake Crescent to Siebert Creek. An earthquake along a shallow crustal fault such as the Lake Creek – Boundary Creek Fault could potentially lead to more widespread shaking and damage in the population centers of Port Angeles and Sequim.

Out of the special hazard districts, the Port of Port Angeles is most likely to be impacted by a tsunami due to its location along the Strait of Juan de Fuca.

Liquefaction typically occurs in areas with artificial fill or loose sandy soils that are saturated with water (e.g., low-lying coastal areas, lakeshores, and river valleys). The Port of Port Angeles is in an area with high susceptibility to liquefaction. Peninsula College is in an area with low susceptibility to liquefaction (DNR 2004).



Eastern and western section of Lake-Creek Boundary Creek fault (Nelson et al., BSSA, 2017)

Previous Occurrence/History

The most recent earthquake that damaged Clallam County was the 2001 Nisqually earthquake. Small earthquakes occur regularly throughout the region and go unnoticed by residents. Over the last 135 years, there have been nine earthquakes with a magnitude (M) greater than 6.0 in the area that we

Earthquakes and Tsunami

consider the Northwest. Five of those large quakes (including the Nisqually earthquake) directly impacted the Olympic Peninsula, according to eye-witness accounts (Clallam County 2010).

- 1700, CSZ Earthquake, M 9.0
- 1909, San Juan Island, M 6.0
- 1939, Vashon Island, M 6.1
- 1949, Olympia, M 7.1
- 1965, Seattle – Tacoma, M 6.5
- 2001, Nisqually, M 6.8

Based on the geological record and first-hand accounts, tsunamis from locations across the Pacific Ocean basin and from the CSZ off the Washington coast have hit Washington State coastal communities at least seven times in the last 3,500 years. The largest of the nearby triggers, the CSZ, produced the most recent great tsunami in 1700 AD (Lange 2003). Washington State's tsunamis also include a Puget Sound tsunami from the Seattle Fault between 900 AD and 930 AD, a Tacoma Narrows tsunami from a landslide in 1949, and a fatal wave from a rockfall into the Columbia River in 1965 (WA EMD 2012).

- 2006 Kuril Islands, Japan Tsunami (La Push, 0.52 feet; Neah Bay, 0.01 feet; Port Angeles, 0.39; Westport, 0.16 feet)
- 1964 Alaskan Tsunami (Neah Bay, 0.7 feet)
- 1960 Chilean Tsunami (Neah Bay, 1.2 feet)
- 1700 Cascadia Tsunami (Washington Coast, 33 feet)

Extent and Probability

Earthquakes pose a widespread hazard along the north side of the Olympic Mountains; however, most of the County would be widely impacted by a CSZ earthquake or one along the Sequim Fault, including the special hazard districts. The cascading impacts of earthquakes, such as tsunamis and liquefaction, are dependent on geography and soil type, as detailed above.

The CSZ has produced earthquakes measuring M 8.0 and has hit this region at least seven times in the past 3,500 years. The time intervals between these events has varied from 140 to 1,000 years, with the last event occurring just over 300 years ago.

A comprehensive study of faults along the northern Olympic Mountains concluded that "there were three to five large, surface-rupturing earthquakes along the faults within the last 13,000 years" (Seismological Society of America 2017). The study notes that while the time intervals between earthquakes on shallow, or upper-plate, faults are thousands of years, "…the changes of a damaging earthquake on one of those many faults is higher than it is for a megathrust earthquake, at least on average, over the last few thousands of years" (Seismological Society of America 2017).

Future Probability Trend – Future weather and development trends play no known role in the probability of future earthquake events. However, both may play a role in the magnitude of earthquake impacts, as increased development may push populations into higher risk areas.

Earthquakes and Tsunami

Vulnerability

Vulnerability posed by earthquakes to the special hazard districts is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Basic Plan, the following County-wide infrastructure types within each special hazard district are classified as a **high to severe** combined earthquake hazard level (including earthquake shaking hazard and liquefaction potential):

PUD:
- Electric Systems (31 structures)
- Wastewater Systems (1 structure)
- Water Systems (15 structures)

Peninsula College:
- School (1 structure)
- Shelter (1 structure)

Port of Port Angeles:
- Government Building (8 structures)
- Hazardous Materials storage (1 structure)

Vulnerability posed by tsunamis to the special hazard districts is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Basic Plan, the following County-wide infrastructure types within each special hazard district are vulnerable to tsunami:

PUD:
- Electric System (1 structure)
- Water System (1 structure)

Port of Port Angeles:
- Government Building (5 structures)
- Hazardous Materials storage (1 structure)

Awareness of the County's vulnerability to a CSZ earthquake has increased with participation in regional drills and public outreach efforts and more structures are being designed to be resilient to tectonic activity. However, the Lake Creek Fault is located near the growing population centers of Port Angeles and Sequim. Given these changes, the vulnerability of the special hazard districts to earthquakes and tsunamis has remained **unchanged.**

See Appendix B for full Risk Exposure Tables and Appendix C for additional maps.

3.3.3 Winter Storm and Windstorm

Winter Storm and Windstorm

	Magnitude	Onset	Duration	Frequency		Average	Rank
Winter Storm	1.5	3.5	3	5		3	5
Windstorm	1.5	3.5	2.5	5		3	6

Location
All County and tribal properties and structures can be affected by windstorms and winter storms, including those owned and operated by the special hazard districts. Properties with infrastructures, utilities, and tree stands can have more damaging impacts during windstorms, especially in coastal areas where winds speeds can reach 40 to 60 miles per hour during the winter months. PUD utilities are widespread and are vulnerable to downed trees throughout much of the power service areas.

Previous Occurrence/History

Recent windstorms occurring in Clallam County resulting in major damage include:

- 17 December 2018 – Clallam and East Jefferson Counties Windstorm
- 15-16 October 2016 – Typhoon Songda
- 14 December 2006 – "Hanukkah Eve" Windstorm
- 20 January 1993 – "Inaugural Day" Storm

These windstorms have caused damage to County structures and housing; extensive utilities damage; restricted access to public lands; and required increased strain on the government's operations.

Recent snowstorms occurring in Clallam County resulting in major damage include (see Section 4.5.5, Windstorms, for other types of winter weather):

- 9 February 2019 – North Olympic Peninsula severe winter weather
- 17 March 2014 – Sequim/Port Angeles Blizzard
- 27 December 1996 – Christmas Snowstorm

Winter Storm and Windstorm



December 14, 2018—Wood debris at Lincoln Park in Port Angeles (Photo courtesy of Peninsula Daily News)

Extent and Probability

Coastal areas of Clallam County experience higher winds than other areas. However, windstorms can occur anywhere throughout the County. Windstorms can damage buildings, structures, utilities, and tree stands, causing millions of dollars' worth of damage, particularly to infrastructure associated with PUD.

Future Probability Trend – Future weather conditions have the potential to lead to an increase in severe and extreme weather patterns, leading to an **increase** in the probability of a windstorm. In addition, increased development has the potential to expose more assets to the impacts of windstorms.

Winter Storm and Windstorm

Vulnerability

The County's vulnerability to severe windstorms are related to power outages and debris blocking land-based transportation routes. Because nearly all social and economic activity is dependent on transportation, damage from windstorms can have a serious impact.

Power outages can result from physical damage to electrical infrastructure as a result of downed trees and blown debris. Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe windstorms. Additionally, persons with electric-based health support systems are vulnerable to power outages everywhere.

Since the 2010 plan, the special hazard districts' vulnerability to windstorms has **increased** as weather patterns change due to climate change, and as increased development has resulted in more infrastructure that can be exposed to damage during severe weather.

3.3.4 Wildfire

Wildfire

Magnitude	Onset	Duration	Frequency		Average	Rank
1.5	4	3.5	2.5		3	7

Location

According to the *Clallam County Community Wildfire Protection Plan*, large fires in western Washington typically occur on steep south-facing slopes, and often result from a combination of circumstances including a source of ignition in areas of dry, heavy fuels, an extended period of drought, and dry east winds (Clallam County 2009). Forest fires in this area usually occur during the dry summer months of July, August, and early September, but they can occur anytime between April and October given the right conditions. Fire hazard increases in the late summer and early fall when hot, dry east winds (subsidence winds) occur more frequently and the area has experienced the low point of the annual precipitation cycle. The portion of the Peninsula with the highest potential for major fires is the area between Port Angeles and Hood Canal, though as residents of Forks can attest, large forest can occur anywhere on the Peninsula (Clallam County 2010).

Wildfire

Previous Occurrence/History

Previous wildland fires that have affected Clallam County include "The Great Forks Fire of 1951," 1955 in the West Twin River area, and 2002 in the Clallam Bay area. The fires in 1951 began near Lake Crescent and burned into and around Forks. Approximately 30 buildings and between 33,000 and 38,000 acres of timber were lost. The 1955 fire burned approximately 5,000 acres of timber. The 2002 fire started as slash burnings on private land. In July 2004, a wildfire ignited near Joyce at Striped Peak, burning between 3 and 4 acres of private hillside land. Joyce experienced another wildfire in May 2006 when a controlled burn near the town grew into a 5-acre wildfire. From January 2008 to August 2009, 38 different wildfire incidents have occurred within Clallam County, outside of Olympic National Park (Clallam County 2010).

In December 2003, the City of Port Angeles experienced a significant fire at the Elks Naval Lodge, one of the City's largest structures located in the downtown core (Clallam County 2010).



March 13, 2015—Garage fire east of Port Angeles (Photo courtesy of Peninsula Daily News)

Wildfire

Extent and Probability

A Headwaters Economics study found that Clallam County has more square miles of developed land within the Wildland Urban Interface (WUI) than any other county in Washington State (72 square miles) and the fifth most area in the WUI in the entire United States. The same study found that 13,271 homes were located within the WUI throughout the County (Headwaters Economics 2013).

Weather conditions greatly influence the impact and extent of wildfires. Drought, high temperatures, and wind contribute to a dynamic and changing conditions of wildfires. Fuel load and vegetation contribute to the size and intensity of wildfires.

Wildfires are frequent and inevitable. Within the region, most wildfires burn during the June to October time period.

Future Probability Trend – Based on potential decreases in annual snowpack and increases in the frequency and magnitude of drought and heat, the County may be impacted by an **increase** in the probability of future fires.

Vulnerability

Wildfires in Clallam County generally occur in the lower lying, WUI areas, particularly near Forks, Sequim, and Blyn. Port Angeles (and therefore the Port of Port Angeles and Peninsula College) are not as vulnerable to WUI fires as PUD infrastructure, which extends further into the WUI.

Vulnerability posed by wildfires (particularly WUI fire) to special hazard districts is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Basic Plan, the following infrastructure types are classified as being vulnerable to WUI fire:

PUD:

- Electric Systems (11 structures)
- Water Systems (6 structures)

Since the 2010 County HMP, development in Clallam population centers has expanded further into the WUI; therefore, the vulnerability has **increased**.

3.3.5 Hazardous Materials Incident

Hazardous Materials Incident

Magnitude	Onset	Duration	Frequency		Average	Rank
1.5	5	3.5	1		3	9

Location

Numerous fixed-location storage sites exist near County properties but have rarely caused an incident. The Port of Port Angeles is a major shipping facility with an increased potential for hazardous materials incident. The Port is classified as a Class 3 State-regulated facility, which “applies to small tank farms and terminals that transfer oil to non-recreational vessels that have a fuel capacity of 10,500 gallons or more. This definition does not include facilities that transfer to tank vessels and pipelines, as they are Class 1 facilities” (Ecology 2019).

Hazardous Materials Incident

Previous Occurrence/History

There have been several oil spills with volumes less than 10 gallons in the vicinity of the Port of Port Angeles and Ediz Hook since 2015. There was a single spill that was over 100 gallons in the area: on May 19, 2019, 123 gallons of diesel marine gas were spilled (Ecology 2019).

Before the Washington State Department of Ecology record, the following large oil spills were reported in Port Angeles Harbor:

- 1985, ARCO Anchorage Spill, 270,000 gallons
- 2001, ATC Prince William Sound, 500 gallons
- 2003, GA2 Diamond, 500 gallons

A review of the Pipeline and Hazardous Materials Safety Administration incident reporting database showed there were no land-based transportation-related hazardous materials spills that occurred in the vicinity of the Port of Port Angeles (PHMSA 2019).

Extent and Probability

The uncontrolled release of hazardous materials during transport can result in death or injury to people and damage to property and the environment through the material's flammability, toxicity, corrosiveness, chemical instability, and/or combustibility. Individuals may be exposed to hazardous materials at acute or chronic levels. In the event of a marine oil spill, ecological systems could be damaged from the pollution and recreational activities subsequently limited.

Future Probability Trend – Increased development trends and potential increase in high-intensity precipitation events present the potential for an increase in hazardous materials passing through the Port of Port Angeles. However, the Port maintains a hazardous materials program that prevents and manages hazardous materials incidents.

Vulnerability

The Port of Port Angeles is the most vulnerable special hazard district to hazardous materials incidents. Workers and recreational users of the marina and airports are vulnerable to potential impacts from hazardous materials incidents. The Port of Port Angeles is a major staging area for oil spill response by Marine Spill Response Corp. of the Pacific Northwest (Ecology 2019).

Since the 2010 plan, the Port's vulnerability to hazardous materials incidents is **unchanged**.

3.3.6 Flooding

Flooding

Magnitude	Onset	Duration	Frequency		Average	Rank
2	3	3	2		3	10

Location

Beyond the County-wide flood hazards outlined in the Basic Plan, the Port of Port Angeles is the only special hazard district that is vulnerable to flooding, due to its low-lying coastal location between the City of Port Angeles and Ediz Hook.

Previous Occurrence/History

Flooding at the Port of Port Angeles has been mitigated by improvements to stormwater. However, severe weather events result in flooding of the airport runway.

Extent and Probability

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property. Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by United States Geological Survey stream gauges located throughout the area. It can also be measured by past damages of flooding.

Future Probability Trend – Based on potential increase in high-intensity precipitation events and increased development trends (resulting in additional impervious surfaces and stormwater runoff), the County may be impacted by an **increase** in the probability of future floods.

Vulnerability

Vulnerability posed by flooding to special hazard districts is measured by accounting for the critical infrastructure that are at risk. Based on the methodology outlined in Section 4.6 of the Basic Plan, the Port of Port Angeles contains the only critical infrastructure that are vulnerable to flooding. These buildings are the Port of Port Angeles Office Building and the Port of Port Angeles Maintenance Facility, both located on 1st Street. The Port works with the City of Port Angeles to maintain the Tumwater Creek culvert, which presents a flooding risk to the Port if it were to become obstructed.

Since the 2010 plan, the County's vulnerability to nuisance flooding has **increased** as precipitation patterns shift due to climate change. However, the County and partners are taking active steps to mitigate the impacts through floodplain restoration activities.

3.4 Vulnerability Assessment

3.4.1 Identifying Critical Infrastructure and Asset Inventory

Critical infrastructure for the special hazard districts following the methodology outlined in Section 4.6 of the Basic Plan.

Appendix B contains the complete vulnerability assessment and associated methodology.

3.4.2 Repetitive Loss Properties

No properties associated with the special hazard districts that meet the criteria for severe repetitive loss.

3.4.3 Exposure Assessment

Table 3-2 contains a summary of the critical infrastructure associated with the special hazard districts (Buck 2016). The vulnerability of each structure to earthquake, tsunami, flooding, wildfires, and landslides is assessed.

Table 3-2 Critical Infrastructure Associated with Special Hazard Districts

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard Level	Tsunami Hazard	Floods	WUIF	Landslides
Clallam County Public Utilities District No. 1													
Clallam PUD	Main Office	104 Hooker Road, Carlsborg	Sequim	Electric System	60%	C	Mod	Mod	High	NO	NO	NO	NO
Clallam PUD	Forks Office	31 Spartan Ave	Forks	Electric System	80%	B	Low	Low	High	NO	NO	NO	NO
Clallam PUD	Forks Warehouse	441 W E St	Forks	Electric System	80%	B	Low	Low	High	NO	NO	NO	NO
Clallam PUD	Sekiu Office & warehouse	15 Sekiu Airport Rd	Port Angeles	Electric System	80%	B	Low	Low	High	NO	NO	NO	NO
Clallam PUD	Carlsborg Warehouse	100 Hooker Rd, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Carlsborg OPS Center, Engineering, crew, shop and storage	110 Idea Pl, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Carlsborg Substation	112 Idea Pl, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Carlsborg Utility Services	83 Idea Place, Carlsborg	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Port Angeles Warehouse	1936 W 18th St, Port Angeles	Port Angeles	Electric System	80%	C	Low	Low	High	NO	NO	NO	NO

Table 3-2 Critical Infrastructure Associated with Special Hazard Districts

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard Level	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD	Blyn Substation	83 Zaccardo Rd	Sequim	Electric System	60%	C	Mod	Mod	High	NO	NO	YES	NO
Clallam PUD	Johnson Creek Substation	400 Washington Harbor Loop	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Sequim Substation	410 E Washington St	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Sunland Substation	1971 Sequim-Dungeness Way	Sequim	Electric System	60%	D	High	High	High	NO	NO	NO	NO
Clallam PUD	Prairie Power Substation	670 S 3rd Ave	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Evergreen Substation	9701 Old Olympic Hwy	Sequim	Electric System	60%	C	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Dungeness Substation	761 Hogback Rd	Sequim	Electric System	60%	C	Mod	High	High	NO	NO	NO	NO
Clallam PUD	Olympic Substation	630 Carlsborg Rd	Sequim	Electric System	60%	D/E	High	Very High	Very High	NO	NO	NO	NO
Clallam PUD	Agnew Substation	31 Spring Rd	Port Angeles	Electric System	60%	D	Mod	Mod	High	NO	NO	NO	NO
Clallam PUD	Deer Park Substation	101 Old Deer Park Rd	Port Angeles	Electric System	60%	C	Mod	Low	Mod	NO	NO	NO	NO
Clallam PUD	Monroe Substation	311 Gales St	Port Angeles	Electric System	60%	C	Mod	Low	Mod	NO	NO	NO	NO
Clallam PUD	Airport Substation	4528 S Airport Rd	Port Angeles	Electric System	80%	C	Mod	Low	High	NO	NO	NO	NO
Clallam PUD	Laird's Corner Substation	813 Power Plant Rd	Port Angeles	Electric System	80%	C	Mod	Low	High	NO	NO	NO	NO

Table 3-2 Critical Infrastructure Associated with Special Hazard Districts

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard Level	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD	Silverado Substation	1201 Joyce Piedmont Rd	Port Angeles	Electric System	80%	C	Mod	Low	High	NO	NO	YES	NO
Clallam PUD	Sol Duc Rd Substation	216395 Hwy 101 W	Port Angeles	Electric System	80%	C	Mod	Low	High	NO	NO	YES	NO
Clallam PUD	Pysht Substation	23133 State Route 112W	Clallam Bay	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Clallam PUD	Sekiu Substation	15 Sekiu Airport Rd	Sekiu	Electric System	80%	B	Low	Low	High	NO	NO	NO	NO
Clallam PUD	FAA Substation	5000 HWY 112	Sekiu	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Clallam PUD	Neah Bay Substation	Backtrack Rd & Roosevelt St	Neah Bay	Electric System	80%	D	High	High	High	YES	NO	YES	NO
Clallam PUD	Mill Substation	200657 Hwy 101	Port Angeles	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Clallam PUD	Old Beaver Camp Substation	97 La Push Rd	La Push	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Clallam PUD	Calawah Substation	513 Calawah Way	Forks	Electric System	80%	C	Mod	Low	High	NO	NO	YES	NO
Clallam PUD	Forks Substation 1	441 W East St	Forks	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Clallam PUD	Forks Substation 2	441 W East St	Forks	Electric System	80%	B	Low	Low	High	NO	NO	YES	NO
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds)	Deer Park Reservoir	1771 Deer Park Rd	Port Angeles	Water Systems	60%	C	High	Low	High	NO	NO	YES	NO

Table 3-2 Critical Infrastructure Associated with Special Hazard Districts

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard Level	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds)	Bobcat Hollow Well	152 Bobcat Hollow Rd	Port Angeles	Water Systems	60%	C	High	Low	High	NO	NO	YES	NO
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds)	Bluff's Well	1433 Gasman Rd	Port Angeles	Water Systems	60%	C	High	Low	High	NO	NO	YES	NO
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds)	Harbor Heights Pump Station	76 Harbor Heights Rd	Port Angeles	Water Systems	60%	C	High	Low	High	NO	NO	YES	NO
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds)	Township Line Well & Reservoir	496 Township Line Rd	Port Angeles	Water Systems	60%	C	High	Low	High	NO	NO	YES	NO
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds)	Old Olympic Hwy Well	991 Old Olympic Hwy	Port Angeles	Water Systems	60%	C	High	Low	High	NO	NO	NO	NO

Table 3-2 Critical Infrastructure Associated with Special Hazard Districts

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard Level	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD – Gales Addition Water System (Deer Park Rd to Shore Rd to Strait)	Gales Addition Reservoir & Pump Station	75 Round Tree Ln	Port Angeles	Water Systems	80%	C	High	Low	High	NO	NO	NO	NO
Clallam PUD – Gales Addition cont.	LUD #3 Upper Reservoir w/ Booster Pump	5112 S. Mt Angeles Rd	Port Angeles	Water Systems	80%	C	High	Low	High	NO	NO	NO	NO
Clallam PUD – Gales Addition cont.	Mt Pleasant E. Pump Station	1210 Mt Pleasant Rd	Port Angeles	Water Systems	80%	C	High	Low	High	NO	NO	NO	NO
Clallam PUD – Gales Addition cont.	Office Warehouse	15 Sekiu Airport Rd	Sekiu	Water Systems	80%	B	High	Low	High	NO	NO	NO	NO
Clallam PUD - Clallam Bay/Sekiu Water System	Sekiu Reservoir & Pump Station	174 Sekiu Airport Rd	Sekiu	Water Systems	80%	B	High	Low	High	NO	NO	NO	NO
Clallam PUD – Island View Water System (10 miles west of Sekiu)	LUD# 9 TP and Pump Station	7372 Hwy 112	Sekiu	Water Systems	80%	B	High	Low	Very high	YES	NO	YES	NO
Clallam PUD - Carlsborg Water System (Carlsborg)	Carlsborg Well & Pump Station	315 Business Park Loop	Sequim	Water Systems	60%	C/D	High	Very High	High	NO	NO	NO	NO

Table 3-2 Critical Infrastructure Associated with Special Hazard Districts

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard Level	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD - Evergreen Water System (South of Sequim)	Duxbury Reservoir & Pump Station	2294 S 7th Ave	Sequim	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO
Clallam PUD - Panoramic Heights (South of PA)	Panoramic Heights Well and Reservoir	5740 S Pastoral Dr	Port Angeles	Water Systems	60%	60%	High	Low	High	NO	NO	NO	NO
Clallam PUD	Clallam Bay/Sekiu			Wastewater System	80%	B	High	Very Low	High	NO	NO	NO	NO
Peninsula College													
	Peninsula College	1502 E Lauridsen	Port Angeles	School	80%	C	Very	Low	Very	NO	NO	NO	NO
	Peninsula College	1502 E Lauridsen Blvd	Port Angeles	Shelter	80%	D/E	High	Low	High	NO	NO	NO	NO
Port of Port Angeles													
Port Angeles	Port of Port Angeles	Port	Port Angeles	Hazardous Materials Storage	80%	E	Very	Very	Very	Yes	NO	NO	NO
	Port of Port Angeles - Port Facilities	Port Angeles Harbor	Port Angeles	Government Building	80%	E	Very High	Very High	Very High	YES	NO	NO	NO
	Port of Port Angeles Air Terminal Buildings	Airport Rd	Port Angeles	Government Building	80%	C/D	High	Low	High	NO	NO	NO	NO

Table 3-2 Critical Infrastructure Associated with Special Hazard Districts

Community Name	Name of Facility	Facility Address (if applicable)	City	Type of Infrastructure	EQ shaking 2% in 50 yrs - % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard Level	Tsunami Hazard	Floods	WUIF	Landslides
	Port of Port Angeles Boat haven	Port Angeles	Port Angeles	Government Building	80%	E	Very High	Very High	Very High	YES	NO	NO	NO
	Port of Port Angeles Hangers	Airport Rd	Port Angeles	Government Building	80%	C/D	High	Low	High	NO	NO	NO	NO
	Port of Port Angeles John Wayne Marina	Sequim	Port Angeles	Government Building	80%	E	Very High	Very High	Very High	YES	NO	NO	NO
	Port of Port Angeles Maintenance	1st St	Port Angeles	Government Building	80%		Very High	Very High	Very High	YES	YES	NO	NO
Port of Port Angeles	Port of Port Angeles Office Building	1st St	Port Angeles	Government Building	80%	E	Very High	Very High	Very High	YES	YES	NO	NO
	Port of Port Angeles Rental Buildings	W 16th St	Port Angeles	Government Building	80%	C/D	High	Low	High	NO	NO	NO	NO

1

3.5 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

No potential developments are actively being considered in known hazard areas. Vulnerability changes have been measured by accounting for shifts in land use and public awareness since the adoption of the 2010 County HMP. Each measure has been identified as having an increased, decreased, or unchanged vulnerability. Table 3-3 provides a snapshot of how vulnerability has changed since development of the 2010 HMP.

Table 3-3 Recent Development Trends

Hazard	Vulnerability Changes Since 2010
Power Outages	+
Earthquakes and Tsunami	=
Winter Storm and Windstorm	+/-
Wildfire	+
Hazardous Materials Incident	+
Flooding	+/-
+ Increased vulnerability - Decreased vulnerability +/- Increased vulnerability, but actions taken to decrease vulnerability = Unchanged vulnerability	

1 ## CAPABILITY ASSESSMENT

FEMA	**C1.** Does the plan document [special hazard districts'] existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? [Requirement §201.6(c)(3)]

2 ### 4.1 Human and Technical Resources

3 Table 4-1 describes the special hazard districts' human and technical capabilities to engage in and
4 improve mitigation planning and program implementation.

Table 4-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
PUD		
Commissioners	Board of Commissioners	Publicly elected Board overseeing PUD activities, including hazard mitigation planning.
Safety Manager	PUD	Liaison with the County to oversee hazard mitigation planning.
Peninsula College		
Emergency Manager	Administrative Services	Emergency management and campus public safety.
Geology Instructor	Geosciences Department	Staff with education or expertise to assess vulnerability to hazards.
Port of Port Angeles		
Director of Engineering	Engineering Department	Engineer trained in construction practices related to Port buildings and/or infrastructure.
Airport & Real Estate Manager	N/A	Oversees management of real estate associated with the airport and facilities.
Operations Supervisor	N/A	Oversees management and day-to-day operations onsite.

5 ### 4.2 Financial Resources

6 The special hazard districts maintain fiscal and financial resources to support their mitigation programs.
7 Table 4-2 identifies specific resources accessible for use.

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	Yes
Capital Improvement Project Funding	Yes
Insurance	Yes
User fees for utility services	Yes, PUD only
Incur debt	Yes
State-sponsored grant programs	Yes

Table 4-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP. The special hazard districts may access these by working in conjunction with the County or participating jurisdictions.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Federal		
Pre-Disaster Mitigation Program	Federal Emergency Management Agency (FEMA)	Provides funding to develop hazard mitigation plans (HMPs) and implement mitigation actions contained within.
Hazard Mitigation Grant Program	FEMA	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	FEMA	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by floods.
Community Development Block Grant Program	U.S. Department of Housing and Urban Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.
Emergency Management Performance Grants Program	FEMA/Washington Department of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.
Flood Mitigation Assistance	FEMA/Washington Department of Emergency Management	Provides funding to support development of the flood hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program National Flood Insurance Program (NFIP).
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program Interagency Coordinating Committee	Funds activities including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
National Fire Plan	U.S. Forest Service	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
Strategic Economic and Community Development Grant	U.S. Department of Agriculture	Provides funding in rural areas for multi-jurisdictional plan development and with a community development focus. Available only to rural areas outside of urbanized zone of any city with a population greater than 50,000.
Coastal Ecosystem Resiliency Program	National Oceanic and Atmospheric Administration	Provides funding for ecosystem restoration. Governor must approve project funds prior to award and there is a 2:1 cost-sharing ratio.
State		
Washington State Department of Transportation (WSDOT) Avalanche Forecasting and Control	WSDOT	Avalanche forecasting determines the potential risk along a particular mountain slope. When an avalanche hazard develops, WSDOT uses artillery, or explosives to trigger the avalanche. In addition to active avalanche control, WSDOT also uses passive control methods to control snow slides.
Washington Sea Grant	Washington Sea Grant	Washington Sea Grant provides funding opportunities through State and National competitions, program development services, and sponsorships.
Ecology Water Resources Program	Washington State Department of Ecology (Ecology)	Ecology's Water Resources Program provides support in monitoring water supply, managing water supply projects, overseeing water rights, performing streamflow restoration, protecting streamflow, regulating well construction and licensing, and ensuring dam safety.
WSDOT Seismic Retrofit Program	WSDOT	WSDOT provides funding and project support to retrofit bridges at risk of failure due to seismic events.
Washington State Department of Agriculture (WSDA) Livestock Inspection Program	WSDA	Dedicated to providing asset protection for the livestock industry by recording brands, licensing feedlots and public livestock markets by conducting surveillance and inspection of livestock at time of sale and upon out of state movement. The program is funded by fees paid by the livestock industry and receives no general fund dollars.
Washington Local Emergency Planning Committee Program	Washington Emergency Management Division (WA EMD)	WA EMD provides funding support to ensure Local Emergency Planning Committees (LEPCs) can be implemented across the state.
Washington Pipeline Safety Program	Washington Utilities and Transportation Commission	The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington State; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
State Water Pollution Control Revolving Fund	Washington DEC	This program provides funds to local governments to set up low-interest loan programs to repair or replace failing on-site sewage systems. Property owners unable to qualify for conventional bank loans and marine waterfront property owners can use the program to get loans to fix or replace their systems where failures might directly affect Puget Sound. Both the Clean Water State Revolving Fund and the Centennial Clean Water Program.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.
Thriving Resilient Communities	Threshold Foundation	Wide-ranging resiliency project funding.
Kresge Foundation Environmental Grants	Kresge Foundation	Provides funding for climate adaptation and mitigation, as well as sustainable water resources management.

4.3 Legal and Regulatory Resources

FEMA	**C6.** Does the Plan describe a process by which the [special hazard districts] will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(iii))

Tables 4-4 through 4-6 describe the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations.

Table 4-4 PUD Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2012-2018)	Hazard Mitigated
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All
	Clallam County Flood Management	PUD complies with Clallam County flood management practices, including County Code requirements outlined in Chapters 21 (Building and Construction) and 27 (Environment).	▪ N/A	Flooding
	2019 Strategic Plan	Outlines actions to continue serving PUD customers.	▪ Plan updated in 2019.	N/A

Table 4-4 PUD Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2012-2018)	Hazard Mitigated
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions.	▪ Collaboration between State and County	All
	Capital Improvements Plan	Identifies capital improvement projects to be undertaken by the County over the next five-year period.	▪ Inclusion of hazard mitigation and maintenance projects	All
	Continuity of Operations (COOP) Plan	Outlines the County's procedures for establishing continuity of critical services following a disruption.	▪ Update of plan currently in progress – aligns COOP procedures for all County partners	All

1

Table 4-5 Peninsula College Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2012-2018)	Hazard Mitigated
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All
	Flood Management	Peninsula College complies with the City of Port Angeles' requirements for permitting and development in flood-prone areas to comply with NFIP requirements (see Municipal Code Section 15.20.060).	▪ N/A	Flooding

2

Table 4-6 Port of Port Angeles Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
Plans	County Comprehensive Emergency Management Plan	Outlines roles and responsibilities of tribal government in mitigating potential hazards.	▪ Incorporation of partners into emergency planning into operations	All
	State of Washington Enhanced Hazard Mitigation Plan	Profiles hazards throughout the State, assesses risks, and outlines potential mitigation actions.	▪ Collaboration between State and County	All

Table 4-6 Port of Port Angeles Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2010-2019)	Hazard Mitigated
	Storm Water Management Planning	Port has maps of stormwater infrastructure along waterfront and airport property per Industrial Stormwater General Permit	▪ Update of stormwater management practices	Flooding
	Flood Management	The Port complies with the City of Port Angeles' requirements for permitting and development in flood-prone areas to comply with NFIP requirements (see Municipal Code Section 15.20.060).	▪ N/A	Flooding
	Capital Project Prioritization	Current plan detailing Port improvements is in place.	▪ Updated within the last 5 years, with capital projects focused on hazard mitigation	All

4.4 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into each of the special hazard districts' daily operations and ongoing planning activities is a priority of the respective mitigation programs. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization; and
- Maximization of planning resources through linked or integrated planning efforts.

The special hazard districts are encouraged to consider integration actions into planning mechanisms, including:

- Budget decision-making;
- Emergency planning mechanisms; and
- Development planning and decision-making.

MITIGATION STRATEGY

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [special hazard districts] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

5.1 Review of 2010 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2010 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2019 plan update. The MPT worked through each previous action during MPT Meeting #1 to document steps taken to fulfill the action.

See Table 5-1 for an overview of the status of all actions from the 2010 plan update and new actions.

5.2 2019-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the special hazard districts]? (Requirement §201.6(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the special hazard districts. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix D for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for new mitigation actions listed in Table 5-1.

Table 5-1 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
Clallam County Public Utilities District No. 1 (PUD)													
PUD01	Establish Reliable Power Source for Battelle Industries	2010 Action	4	PUD, Battelle	3-5 years	$##	No	City of Sequim general fund, property owners, developers, PUD	Winter Storms, Flooding	13	6	19	6
PUD02	Move overhead powerlines underground in select areas.	2010 Action – Ongoing. Areas of continued focus are the North Shore of Lake Crescent, South Shore Lake Sutherland, Diamond Point Road, Deer Park Road, and Hoko Ozette Road	4	PUD	1-5 years	TBD	Yes	PUD operating budget	Severe Weather, Winter Storms	15	10	25	3
PUD03	Replace Asbestos-Cement Pipe throughout County	2010 Action – Ongoing	4,5	PUD	1-5 years	TBD	Yes	PUD operating budget	Earthquake	18	10	28	1
PUD04	Replace ultra-high-risk water mains in the event of erosion or landslide.	2010 Action – Ongoing. Areas that have been reviewed are: water main from Morse Creek to Treatment Plant to Deer Park; water main from Hoko-Ozette Road to Eagle Point Road; Water Main to Upper Sekiu Reservoir; Replace Buried Creek	4,5	PUD	Ongoing	TBD	Yes	PUD operating budget	Landslide	18	8	26	2

Table 5-1 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
		crossing with bridge crossing in 4 Seasons Park; Replace buried creek crossing in 4 Seasons Ranch and eliminate White Creek crossing to Lower LUD #3 Pump Station.											
PUD05	Fairview – Morse Creek Drought Plan	2010 Action – Ongoing as conditions worsen at Morse Creek.	5	PUD	Ongoing	TBD	Yes	PUD operating budget	Drought	16	6	22	5
PUD06	Additional tree trimming in high risk wind areas to protect overhead lines.	2010 Action - Ongoing	3,4,5	PUD	Ongoing	TBD	Yes	PUD operating budget	Severe Weather, Windstorms	17	8	25	4
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP	All	Planning Department	1 year	N/A	Yes	N/A	All hazards				
Port of Port Angeles													
POPA01	Strengthen airport runway to facilitate landing of large emergency aircraft.	New	4,5	Port of Port Angeles	1-3 years	$2,000,000	No	FEMA Grant, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	Earthquakes, Tsunami, Water Shortages, Windstorm	20	8	28	1
POPA02	Install protective safety glass in the windows of the airport terminal building complex to hold shattered glass in place in the event of a major windstorm or earthquake.	New	4,5	Facilities Maintenance/Airport - Port of Port Angeles	<1 year	$2,500	No	FEMA Grant, Operating Budget	Earthquakes, Winter Storm, Tsunami, Windstorm	19	6	25	3
POPA03	Purchase fuel tanks and build a fuel transfer station at the Port's newly constructed and located shop outside of the tsunami zone.	New	4,5	Facilities Maintenance - Port of Port Angeles	1-3 years	$10,000 - $20,000	Yes	Operating Budget, Grant	Utility Failure, Winter Storm, Tsunami	18	8	26	2
POPA04	Build a portable emergency water supply.	New	4,5	Facilities Maintenance - Port of Port Angeles	1-3 years	$1,500	No	Operating Budget	All Hazards	18	6	24	4

Table 5-1 2019-2025 Mitigation Implementation Plan

Action ID#	Mitigation Action Description	Action Status	Goals Supported	Lead Department	Timeframe	Anticipated Cost	Funding Available?	Funding Source	Hazards Addressed	STAPLEE Score	Mitigation Effectiveness Score	Total Score	Priority
POPA05	Strengthen airport taxiway to increase weightbearing capacities for emergency aircraft.	New	4,5	Port of Port Angeles	1-3 years	$2,000,000	No	FEMA Grant, Operating Budget (Larger cost savings will be realized by completing this project in conjunction with the 2022 runway rehab project)	Earthquakes, Tsunami, Water Shortages, Windstorm	20	8	28	1
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP	All	Planning Department	1 year	N/A		N/A	All hazards				
Peninsula College													
PC01	Renovate/Replace N Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	1
PC02	Renovate/Replace J Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	2
PC03	Renovate/Replace Q Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	3-5 years Approx.	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	3
PC04	Renovate/Replace P Building, Main Campus	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	4
PC05	Incorporate hazard mitigation into Master Plan	2010 Action – Ongoing	5	Finance and Administration	Ongoing	N/A	N/A	FEMA, Capital Funds	All hazards	17	10	27	5
Adopt the Hazard Mitigation Plan		Completed – Re-adopting updated 2019 HMP	All	Planning Department	1 year	N/A		N/A	All hazards				

Key:
STAPLEE - Strategy and Prioritization Methodology

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A. PLANNING PROCESS

- Appendix A1. Kickoff Meeting
- Appendix A2. MPT Meeting #2
- Appendix A3. MPT Meeting #3
- Appendix A4. MPT Meeting #4
- Appendix A5. MPT Meeting #5
- Appendix A6. MPT Meeting #6
- Appendix A7. Public Meeting #1
- Appendix A8. Public Meeting #2
- Appendix A9. Public Meeting #3
- Appendix 10. Public Engagement

APPENDIX A1. KICKOFF MEETING

Clallam County 2018 Multi-Jurisdictional Hazard Mitigation Plan Update

PROJECT KICKOFF WORKSHOP

DATE: Tuesday, November 6, 2018
TIME: 1:00pm-4:00pm
LOCATION: Clallam County Emergency Operations Center, 223 East 4th Street, Port Angeles, WA

Thank you for participating in the kickoff workshop for the **update of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan Update (HMP)**. The HMP is the document that guides the County and its partners in reducing risks and lessening the impact of disasters.

The County is required by law to update the HMP once every five years to be eligible for mitigation funding and your participation is critical to ensure that the HMP is informed by the latest information regarding local capabilities, as well as identifying actions to be taken to address ongoing risks. The process is also an opportunity to strengthen our partnerships.

The County has engaged Ecology and Environment, Inc. (E & E) to facilitate the HMP update process including facilitation of this workshop. The kickoff will be a three-hour meeting that will focus on providing partners with an *overview of the planning process and outputs*, an interactive discussion to discuss *what has changed* since the last update, and establishment of *concrete action items* to move forward.

AGENDA:

1. Introductions
2. Overview of the Planning Process, Purpose, and Requirements
3. Planning for Public Engagement
4. Refinement of Plan Goals and Objectives
5. Validation of Hazards
6. Review of 2010 Plan Mitigation Actions
7. Identification of Next Steps and Key Action Items

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NOTES:

CHECK-IN LIST	Mission #	FOR OPERATIONAL PERIOD # One	DATE PREPARED: 05 Nov. 2018 TIME PREPARED: 09:25 hours

TEAM/UNIT Name: Hazard Mitigation Planning Workshop

PRINT NAME	EMAIL	Phone	Agency	Fully Loaded Wage Amount
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Bill Pall	chief@clallamfire1.org	360-775-5679	CCFPD#1	
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CHECK-IN LIST	Mission #	FOR OPERATIONAL PERIOD # One	DATE PREPARED: 05 Nov. 2018 TIME PREPARED: 09:25 hours

TEAM/UNIT Name: Hazard Mitigation Planning Workshop

PRINT NAME	EMAIL	Phone	Agency	Fully Loaded Wage Amount
Sheri Crain	scrain@sequimwa.gov	360-683-7227	Sequim Police	

Clallam County 2018 Multi-Jurisdictional Hazard Mitigation Plan Update

PROJECT KICKOFF WORKSHOP

DATE: Tuesday, November 6, 2018
TIME: 1:00pm-4:00pm
LOCATION: Clallam County Emergency Operations Center, 223 East 4th Street, Port Angeles, WA

ATTACHMENTS:

1. Meeting Agenda
2. PowerPoint Presentation

SUMMARY:

The Clallam County Hazard Mitigation Planning Team (HMPT) hosted the first of five HMPT meetings on November 6, 2018. This initial HMPT meeting was intended to provide HMPT members with an overview of the purpose and need for the Hazard Mitigation Plan (HMP) update and requirements; discuss HMPT participation; review and collect feedback on the 2010 HMP process; review and revise the 2010 goals and objectives; and identify key hazards of concern. Nineteen members of the HMPT and two members for Ecology and Environment, Inc. (E & E) participated in the workshop.

The Planning Process and Why We Plan

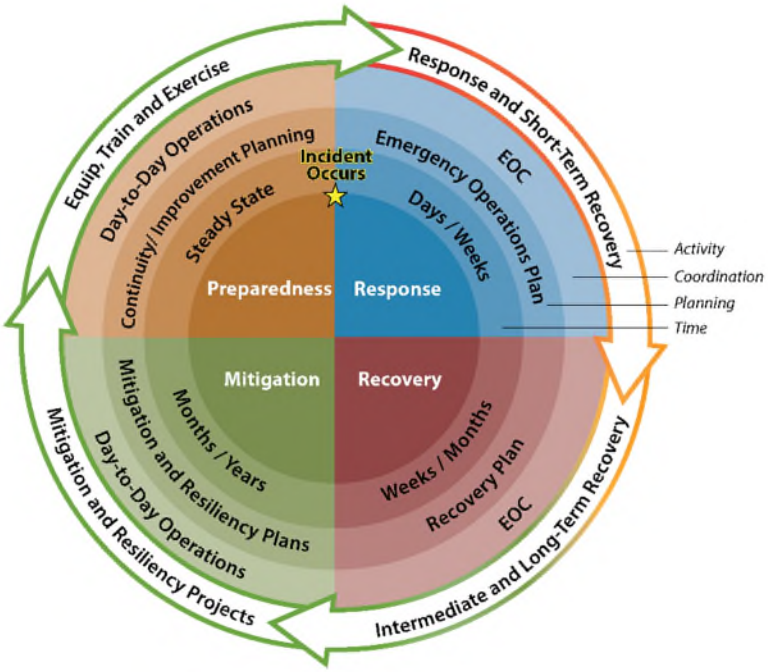
Hazard mitigation planning is a strategic approach to planning. It is the County's commitment to reduce the risk posed by local hazards, and the development of a mitigation strategy with clear and concrete actions. E & E described the mitigation planning process, beginning with a discussion of the five components that create a successful hazard mitigation program:

- **Planning Process:** Receiving FEMA approval for the HMP depends on a collaborative planning process just as much as it depends on a technically sound plan. E & E will compile all relevant outreach and planning materials to ensure the HMP is supported by all required documentation. In addition to supporting FEMA approval, the planning process also serves as an opportunity to ensure HMPT members are provided with the knowledge and tools to implement the HMP and associated mitigation strategy.
- **Risk Assessment:** HMPs are based in a sound understanding of the hazards most likely to impact the County. The HMP will take an all-hazards approach and not simply focus on natural hazards, which will help to ensure the County is planning for a wider range of potential impacts. Risk assessments will be developed for all identified hazards and accompanied by a thorough discussion of hazard probability, magnitude, frequency, onset, duration, and potential to lead to cascading effects and secondary hazards.

- **Mitigation Strategy:** The mitigation strategy defines where the County wants to go. Grounded in a discussion of goals and objectives, the strategy will identify specific and actionable projects to decrease the community's risk to identified hazards.
- **Plan Maintenance Process:** The HMP Program does not end when the plan is written. In addition to the requirement to update the plan every 5 years, the County must also have access to the tools necessary to implement mitigation actions.
- **Prerequisites:** The final requirement to develop a FEMA-approved HMP is the jurisdictional adoption process. Following the release of the Final HMP, each participating jurisdiction must approve and adopt the plan.

Mitigation planning is just one component of a successful emergency management program. The mitigation effort is tied to the other phases of emergency management (preparedness, response, and recovery), and successful mitigation planning has the potential to heavily reduce the burden placed on the other phases.

Key to all emergency planning efforts is a comprehensive and inclusive planning process. Throughout the process, stakeholders are encouraged to identify and invite additional stakeholders that should play a role on this important project. Please reach out to either Zane or Ron to ensure additional stakeholders are included in future emails.



Hazard Ranking Activity

HMPT members participated in an activity to identify and rank the hazards posing the largest risk to their communities. This activity served as the baseline for future discussions during the next HMPT meeting to form the HMP's risk assessment. HMPT members were asked to rank hazards based on the following concerns (ranked 1 for lowest risk, and 5 for highest risk):

- **Probability -** Likelihood of the hazard occurring.
- **Magnitude** - Areas potentially impacted, the overall impacts, and the chance of one hazard triggering another hazard, thus causing a cascading effect.
- **Frequency** - How often a hazard has resulted in an emergency or disaster.
- **Onset** - The time between recognition of an approaching hazard and when the hazard begins to affect the community.
- **Duration** - The length of time the hazard remains active, the length of time emergency operations continue after the hazard event and the length of time that recovery will take.

The aggregate of HMPT member feedback regarding the Hazard Ranking Activity resulted in the following rankings, which will inform the County's risk assessment.

Clallam County - Local Hazards

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Cascadia Earthquake	4.75	4.83	3.08	1.25		3.48	1
Earthquake	4.33	4.67	3.17	1.42		3.40	2
Disease	3.58	3.17	3.83	2.82		3.35	3
Power Outages	1.75	4.50	2.83	4.17		3.31	4
Wildfire	2.25	4.00	3.25	2.75		3.06	5
Windstorm	1.92	3.50	2.33	4.42		3.04	6
Winter Storm	2.00	3.25	2.75	4.00		3.00	7
Active Shooter	2.92	5.00	2.17	1.42		2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83		2.83	10
Landslide	1.50	4.42	2.58	2.67		2.79	11
Flooding	1.67	3.33	2.42	3.25		2.67	12
Tsunami	3.25	4.08	2.17	1.08		2.65	13
Drought	1.83	1.58	3.92	2.67		2.50	14

Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure.

Goals and Objectives Discussion

HMPT members reviewed the goals and objectives identified in the 2010 HMP and tailored them to reflect new concerns for the County. In addition, HMPT members discussed guiding principles and challenges related to mitigation planning. The HMPT identified the following as the goals to guide development of the HMP:

1. Maintain and expand transportation routes across the County, during and after key hazards events.
2. Maintain emergency services capabilities by providing redundancy.
3. Maintain key communications to ensure connectivity during and after key hazard events.
4. Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events.
5. Minimize property damage and reduce repetitive losses to property from key hazards.
6. Increasing public participation in reducing their risks.

Planning for Public Engagement

E & E facilitated a discussion around engaging the public on the effort to develop the updated HMP. E & E would like to support the HMPT by attending upcoming community events to gather public comments on their concerns regarding hazards in their community. Ron Cameron suggested that HMPT members may also be able to facilitate this without the support of E & E. Moving forward, we will look for opportunities to attend high school sporting events, community meetings, and scheduled events.

Closeout and Next Steps

The HMP Project Kickoff closed out with a status report regarding the progress made in mitigation actions identified in the 2010 plan. The feedback was recorded and progress and ongoing activity needs will be recorded in the updated HMP.

The following action items will be followed up upon by the identified parties.

E & E Tasks

- ✓ Prepare one-pager to allow HMPT members to engage additional stakeholders in the plan update process.
- ✓ Initiate the risk assessment process.
- ✓ Schedule follow-up webinar for new HMPT members (as needed).

HMPT Member Tasks

- ✓ Provide E & E with additional Points of Contact.
- ✓ Provide E & E with risk studies and other pertinent information.
- ✓ Attend follow-up workshops.

CONTACT INFORMATION:

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(o) 360-417-2570 | (c) 360-460-4303
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Zane Beall, E & E Project Manager
(o) 503-248-5600 x4622 | (c) 360-904-6828
zbeall@ene.com

Clallam County Multi-Jurisdictional Hazard Mitigation Plan Update

Tuesday, November 6 | 1pm – 4pm | Clallam County Emergency Operations Center

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Jamestown S'Klallam Tribe

Quileute Nation

Clallam County 1854

City of Sequim

Elwha Klallam Tribe

City of Port Angeles

City of Forks

forkswashington.org

Welcome and Introductions

- Name
- Organization/Department
- Did you participate in the last update of the Hazard Mitigation Plan?

Meet the E & E Team



Matthew Lieuallen
Principal in Charge



Nicki Hurley
GIS Analyst



Zane Beall
Project Manager



Manique Talaia-Murray
Emergency Planner



Shawna Mantey
Emergency Planner



Tyler Chatriand
Engineering Approach

Meeting Objectives

- Overview of the Planning Process
- Validation of Hazards
- Refinement of Goals and Objectives
- Planning for Public Engagement
- Next Steps and Action Items

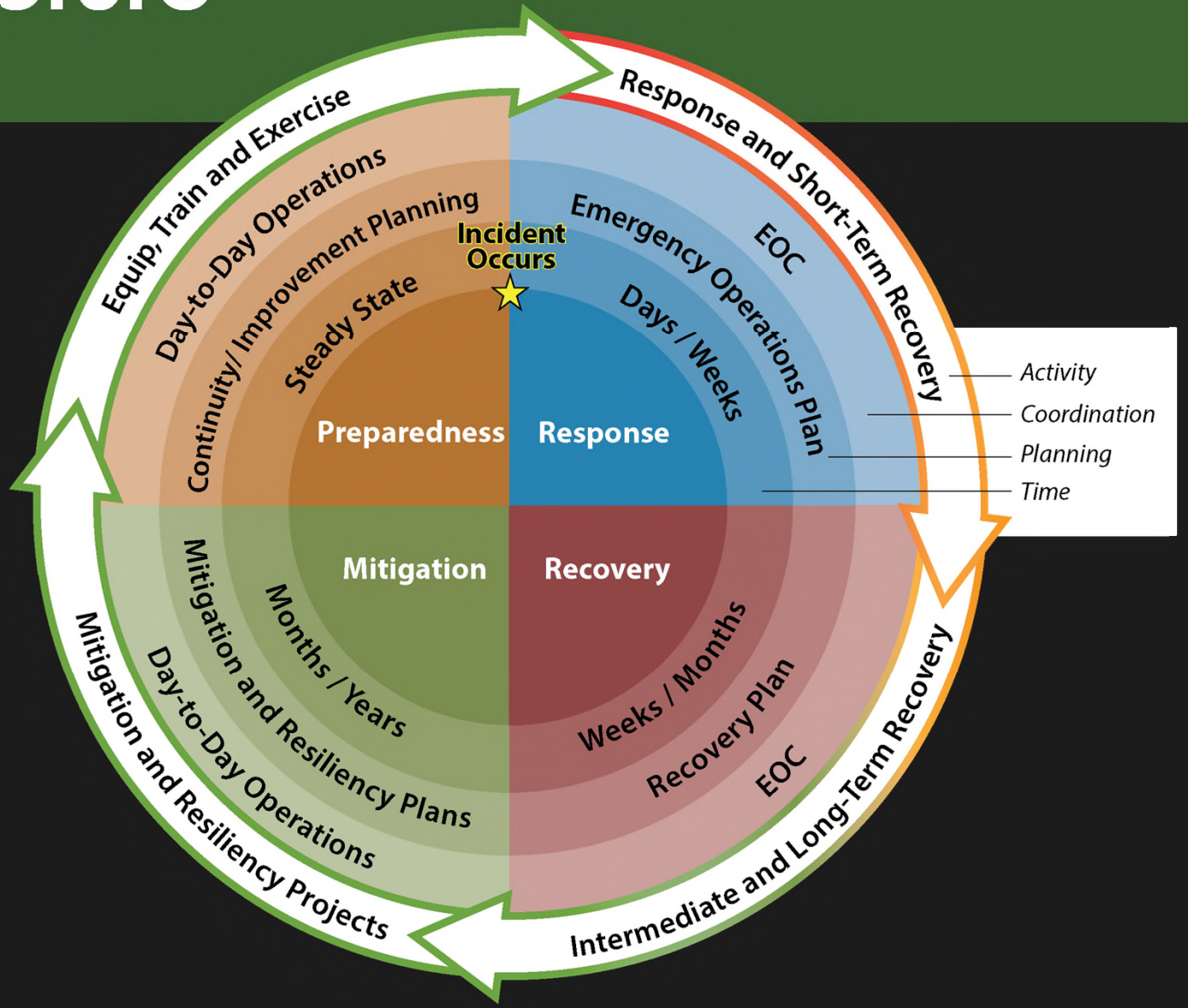


Future Meeting Topics

Meeting	Timeframe	Topics
2	January	Risk and vulnerability assessment, measuring local capabilities and capacity
3	March	Determination of progress made on past mitigation actions, identification of new actions
4	May	Review of Draft Plan
5	July	Presentation of Final Plan prior to FEMA approval

Why Do We Plan?

The Big Picture



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What is Hazard Mitigation Planning?

- A commitment to reduce risks posed by hazards
- A comprehensive and inclusive planning process
- Development of a mitigation strategy with clear and concrete actions



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Mitigation vs. Adaptation



Thames Barrier, London



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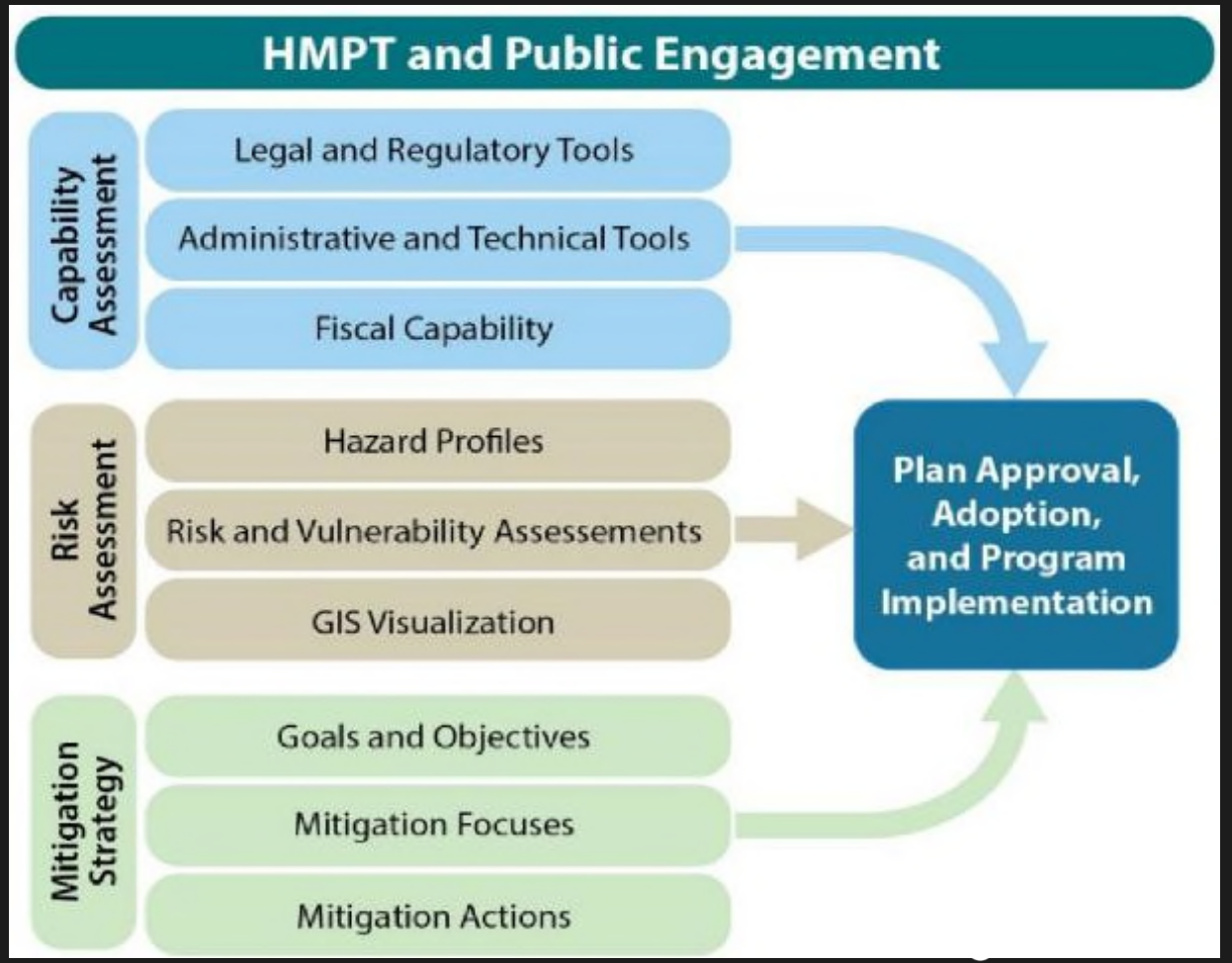
What's in the plan?

- Updated every five years
- Review and approved by FEMA
- Opens up funding opportunities
- Identifies risks
- Outlines capabilities to deal with hazards
- Prescribes actions to reduce risks
- Provides implementation plan



Whole Community Planning

- Community members
- County and local agencies
- Neighboring jurisdictions
- Regulatory agencies
- First responders and health care corporations
- Private sector and industry
- Community- and Faith-based Organizations



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Talking Hazards

What is keeping you up at night?

- Hazards
- Locations
- Populations
- Other concerns?









Ranking Hazards

Each hazard includes information on the following:

- **Probability -** Likelihood of the hazard occurring.
- **Magnitude** - Areas potentially impacted, the overall impacts, and the chance of one hazard triggering another hazard, thus causing a cascading effect.
- **Frequency** - How often a hazard has resulted in an emergency or disaster.
- **Onset** - The time between recognition of an approaching hazard and when the hazard begins to affect the Tribe.
- **Duration** - The length of time the hazard remains active, the length of time emergency operations continue after the hazard event and the length of time that recovery will take.

Tell us about you: Provide notes to start a discussion around specific concerns

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Measuring Risk

Rating	Probability	Magnitude	Frequency	Onset	Duration
1	Highly unlikely (0-25%)	No injuries or deaths expected	Less than every 25 years	Greater than 30 days of warning	Only brief moments
2	Fairly unlikely (25-50%)	Between 1 and 5 injuries or deaths	10-25 years	5-30 days of warning	1-24 hours
3	Moderate (50-75%)	Between 5 and 25 injuries or deaths	5-10 years	1-5 days of warning	Days to weeks
4	Likely (75-90%)	Between 25 and 50 injuries or deaths	1-5 years	1-10 hours of warning	Weeks to months
5	Highly likely (90-100%)	Greater than 50 injuries or deaths	Once per year	No warning	Months to years

Mitigation Goals Discussion

Who are we?

- What word comes to mind when you think of disasters?
- Talk about your values and priorities
- Discuss regional collaboration
- What are your greatest needs?
  - Infrastructure
  - Planning
  - Equipment



Mitigation Goals

*Broad, abstract ideas about what we want to be

- What does hazard mitigation look like in Clallam County?
- Frame goals through risk reduction
- Think about community values
- Approach through an all-hazards lens



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2010 Goals

1. Maintain transportation routes across the County, during and after key hazard events.
2. Maintain emergency services capability during a key hazard event, by providing redundancy in key communications systems.
3. Maintain the reliability of utilities or have emergency utility plans in place during and after key hazard events.
4. Minimize damage and reduce repetitive losses to property from key hazards by raising or relocating homes prone to repetitive flood damage, planting appropriate vegetation to potential landslide slopes and retrofitting critical facilities to present seismic standards.
5. Reduce vulnerability to fires by increasing public awareness of “defensible space” surrounding their property, the use of fire-resistant landscaping and continued use of the annual burn ban during fire season to limit unintended fires starting

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Public Engagement Strategy

Where do we meet the people?

- Two public meetings
- Online plan review and comment
- Engagement at community events
  - January
  - March
  - May

Which community events provide the best opportunity to engage the public?

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Next Steps and Wrap Up

DATA NEEDS

- Historic damage reports
- Risk studies and analyses
- Additional points of contact
- Status reports on past mitigation projects



Project Timeline

- Project Kickoff Workshop – Today
- Plan Development – November through May
- Risk Assessment Workshop – January
- Mitigation Strategy Workshop – March
- Draft Plan Workshop – May
- Final Plan Presentation – July
- Submittal to WA EMD and FEMA – August

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Contact Information

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Any Final Questions?



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APPENDIX A2. MPT MEETING #2

Clallam County 2018 Multi-Jurisdictional Hazard Mitigation Plan Update

RISK ASSESSMENT WORKSHOP

DATE: Tuesday, January 29, 2019
TIME: 1:00pm-4:00pm
LOCATION: Clallam County Emergency Operations Center, 223 E 4th Street, Port Angeles, WA 98362

Thank you for participating in the Hazard Mitigation Planning Team Meeting #2 for the **update of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan Update (HMP)**.

MEETING PURPOSE:

This meeting will focus on developing a greater understanding of hazards and risks that may affect the County as a whole and individually for each participating jurisdiction. We will also spend time discussing each community's capabilities to implement hazard mitigation measures. This is an opportunity to better understand the ways in which hazards affect each stakeholder of this project.

AGENDA:

1. Welcome and Introductions (10 minutes)
2. Project Update (5 minutes)
3. Initial Hazard Identification Results (15 minutes)
4. Risk Assessment Activity (60 minutes)
5. BREAK (15 minutes)
6. Capability Assessment Activity (45 minutes)
7. Introduction to Mitigation Strategies (15 minutes)
8. Next Steps and Key Action Items (15 minutes)

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NOTES:

Hazard Mitigation Plan Update Workshop # 2 – Sign In Sheet

NAME	TITLE	DEPARTMENT/AGENCY	PHONE	EMAIL	WAGE
1. Zane Beall	E+E PM	E+E	503-248-4622	zbeall@ene.com	———
2. Julie Black	Dir, Support Svc	OMC	360.912.1737	jablack@olympicmedical.org	
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4. Dan Orr	Asst. Chief	CCFD3		dorr@ccfd3.org	
5. marty Martinez	campus safety Em.	Peninsula College	360-417-6559	mmartinez@pencol.edu	
6. ROBERT SEAVEY		PET POSSE	360-504-2305	SEAVEYZ@HOTMAIL	
7. Ron Cameron	Undersheriff	CCSO -em	360-460-4303		
8. JAKE PATTERSON	Deputy Chief	CLALLAM 2 FIRE RESCUE	360-912-4144	jpatterson@clallamfire2.org	
9. Monicka Anderson	Information System Specialist	CC	360 417 2599	manderson@co.clallam.wa.us	

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12. David Garlington	Pub. Wks Div. ~~Sequim~~	Sequim	360-681-3439	dgarlington@sequimwa.gov	
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14. Jen Garcelon	Env. Health Director	CCEH	360 417-2347	jgarcelon@co.clallam.wa.us	
15. Lisa Gilbert	Proposal Writer	TBD	919 949 3129	LisaGilbertPhd@yahoo.com	
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17. Shari Hamilton	Port Angeles Pet Posse		(805) 440-0436	shariHamilton@rocketmail.com	
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19. Paul Howard	Firefighter	CCFD 2	360-460-4948	PJHoward48@yahoo.com	

NAME	TITLE	DEPARTMENT/AGENCY	PHONE	EMAIL	WAGE
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21. Josh Schooler	WA ANG HRF	HRF	253-376-0957	Joseph.t.schooler.mil@mail.mil	
22. Jim Buck	Volunteer	EMT	360-928-2179	buckdjo@yppen.com	
23. DAN SHEA	OPS. SUPER. PORT OF P.A.	PORT	360-460-2696	DANS@PORTOFPA.com	
24. SHERI CRAIN	Chief Sequim	Sequim Police	360-683-7227	SCrain@sequimwa.gov	
25. TOM REYES	RISK DEPUTY DIRECTOR	CLALLAM COUNTY	360-417-2372	TREYES@CO.CLALLAM.WA.US	
26. RICH SILL	HR/RISK DIRECTOR	CLALLAM COUNTY		RSILL@CO.CLALLAM.WA.US	
27. MARK OZIAS	Commissioner	Clallam	417-2234	mozias@co.clallam.wa.us	
28. Luke Strong	Planner	Jamestown S'Klallam Tribe	360-461-8934	LStrong@jamestowntribe.org	
29. David Bingham	Superintendent	Crescent S.D.	360-460 8336	Dandb@Crescent.wsd.net. EDV	

NAME	TITLE	DEPARTMENT/AGENCY	PHONE	EMAIL	WAGE
40. DAN GASE	AIRPORT MGR	PORT of P.A.	360-808-7053	DANG@PORTOFPA.COM	
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42. Rod Fleck	~~Attorney~~ / Planner	City of Forks	360-374-5412	rodf@forkswashington.org	?
43. Anne Chastain	EOC COORDINATOR	CC EMERG MGMT	360-417-2483	achastain@co.clallam.wa.us	
44. Ken Dubuc	FIRE CHIEF EMERGENCY MANAGER	PA FIRE	360 417 4651	KDUBUC@CITYOFPA.US	
45. Bill Wheeler	Red Cross Volunteer		360 797-3651	bkwheeler@msn.com	
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47.					
48.					
49.					

Clallam County Multi-Jurisdictional 2019 Hazard Mitigation Plan Update

RISK ASSESSMENT WORKSHOP

DATE: Tuesday, January 29, 2019
TIME: 1:00pm – 4:00pm
LOCATION: Clallam County Emergency Operations Center, 223 E 4th Street, Port Angeles, WA 98362

ATTACHMENTS:

1. PowerPoint Presentation
2. Risk Assessment Activity Aggregate

AGENDA:

1. Welcome and Introductions (10 minutes)
2. Project Update (5 minutes)
3. Initial Hazard Identification Results (15 minutes)
4. Risk Assessment Activity (60 minutes)
5. BREAK (15 minutes)
6. Capability Assessment Activity (45 minutes)
7. Introduction to Mitigation Strategies (15 minutes)
8. Next Steps and Key Action Items (15 minutes)

SUMMARY:

The Clallam County Hazard Mitigation Planning Team (HMPT) hosted the second of five HMPT meetings on January 29, 2019. This HMPT meeting was intended to provide HMPT members with an opportunity to share their knowledge on risks posed to the County by previously identified hazards; gather external stakeholder input; and introduce the mitigation strategy process. Twenty-eight members of the HMPT and neighboring jurisdictions, as well as two representatives from Ecology and Environment, Inc. (E & E) participated in the workshop.

What Have We Been Up To?

- Project Kickoff Workshop – November 6, 2018
- Hazard Identification and Ranking – November 2018 through January 2019
- Plan Development – Ongoing
- Process Documentation – Ongoing
- Public Survey and Public Meeting #1 – January 29, 2019

Hazard Identification Results

During the Project Kickoff Workshop, HMPT members were asked to identify and rank hazards based on a number of criteria. E & E facilitated a discussion to validate these hazards. The following graphic illustrates the relative rank for each hazard.

Clallam County - Local Hazards

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)	Average	Rank
Cascadia Earthquake	4.75	4.83	3.08	1.25	3.48	1
Earthquake	4.33	4.67	3.17	1.42	3.40	2
Disease	3.58	3.17	3.83	2.82	3.35	3
Power Outages	1.75	4.50	2.83	4.17	3.31	4
Wildfire	2.25	4.00	3.25	2.75	3.06	5
Windstorm	1.92	3.50	2.33	4.42	3.04	6
Winter Storm	2.00	3.25	2.75	4.00	3.00	7
Active Shooter	2.92	5.00	2.17	1.42	2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83	2.83	10
Landslide	1.50	4.42	2.58	2.67	2.79	11
Flooding	1.67	3.33	2.42	3.25	2.67	12
Tsunami	3.25	4.08	2.17	1.08	2.65	13
Drought	1.83	1.58	3.92	2.67	2.50	14

Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure.

Risk Assessment Work Session

The majority of HMPT Meeting #2 was dedicated to identifying County-specific consequences associated with the hazards of greatest concern (i.e., earthquake/tsunami, wildfire, hazardous materials incident, winter storm/flooding). Participants were placed in four groups and asked to work together to identify consequences and concerns. Consequences of the discussion included:

- Geographic Scope
- Health/Economic/Environmental/Structural Impacts
- Displacement of residents and visitors
- Critical Services Impacted
- Cascading Effects

See Attachment 4 – Risk Assessment Activity Aggregate to learn more about the responses provided by participants.

Introduction to Mitigation Strategies

To close out the workshop, E & E provided a brief introduction to the topics to be covered at the next HMPT meeting. On Wednesday, March 27, internal HMPT members will again convene to identify mitigation strategies to lessen the impacts associated with hazards. These strategies will fit into a number of "mitigation buckets" including:

- Prevention
- Property Mitigation/Structural Projects
- Public Engagement
- Natural Resource Protection
- Emergency Services

Next Steps

- ✓ HMPT Meeting #3 to be held March 27, 2019 from 1-4PM
- ✓ E & E to schedule West End visits with critical stakeholders and community members
- ✓ Draft Plan released to stakeholders in mid-June
- ✓ HMPT Meeting #4 tentatively scheduled for June-July

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Clallam County Multi-Jurisdictional Hazard Mitigation Plan Update

Meeting #2

Tuesday, January 29 | 1pm – 4pm | Clallam County Emergency Operations Center

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Jamestown S'Klallam Tribe




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N A T I O N


CLALLAM COUNTY
1854


CITY OF


ELWHA KLALLAM TRIBE


CITY OF PORT ANGELES


CITY OF FORKS
forkswashington.org

Welcome and Introductions

- Name
- Organization/Department
- Brief discussion on your experience with the recent severe weather

Meet the E & E Team



Matthew Lieuallen
Principal in Charge



Nicki Hurley
GIS Analyst



Zane Beall
Project Manager



Manique Talaia-Murray
Emergency Planner



Shawna Mantey
Emergency Planner



Tyler Chatriand
Engineering Approach

Meeting Objectives

- Project Update
- Initial Hazard Identification Results
- Risk Assessment Activity
- Capability Assessment Activity
- Introduction to Mitigation Strategies
- Next Steps and Action Items



What Have We Been Up To?

- Project Kickoff Workshop
- Hazard Identification and Ranking
- Risk Assessment Mapping
- Community Outreach
- Plan Development
- Process Documentation

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Hazard Identification Results and Overview

Clallam County - Local Hazards

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Drought	1.83	1.58	3.92	2.67	2.50	14

Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure.

Risk Assessment Work Session

Thinking about Consequences

- Geographic Scope
- Health Impacts
- Displacement
- Economic Impacts
- Environmental Impacts
- Structural Impacts
- Critical Services
- Cascading Effects

*See Handout for guidance

- What is the most likely scenario?
- What is the worst case scenario?
- Who bears the greatest risk?

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December 14 Windstorm

- Tell us about locations
  - “Bubbles” of power outages
  - Tree and debris locations
  - Transportation route blockages
- Demands on public services
  - 9-1-1 calls
  - Reports of damage
  - Emergency operations
- Community support needs
  - Sheltering/warming centers
  - Information needs
  - Gaps in service



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Activity Logistics

- Four tables:
  - Table 1: Earthquakes, Landslides, Wildfires
  - Table 2: Flooding, Winter Storms, Windstorms, Drought
  - Table 3: HAZMAT, Active Shooter, Cyber Attack, Social Unrest
  - Table 4: Pandemic, Disease, Other(?)
- Team up (2-4 participants per hazard)
- Record hazard consequences on the provided maps and printouts
- Don’t worry about accounting for everything
- Once you have recorded your thoughts, move clockwise to the next table

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Changes in Vulnerability

- Describe changes in vulnerability
- Describe recent development trends in the region
- Discuss potentially new priorities
  - Added emphasis on land use changes
  - Decreased concern around certain hazards
  - New partners to engage and support



Activity

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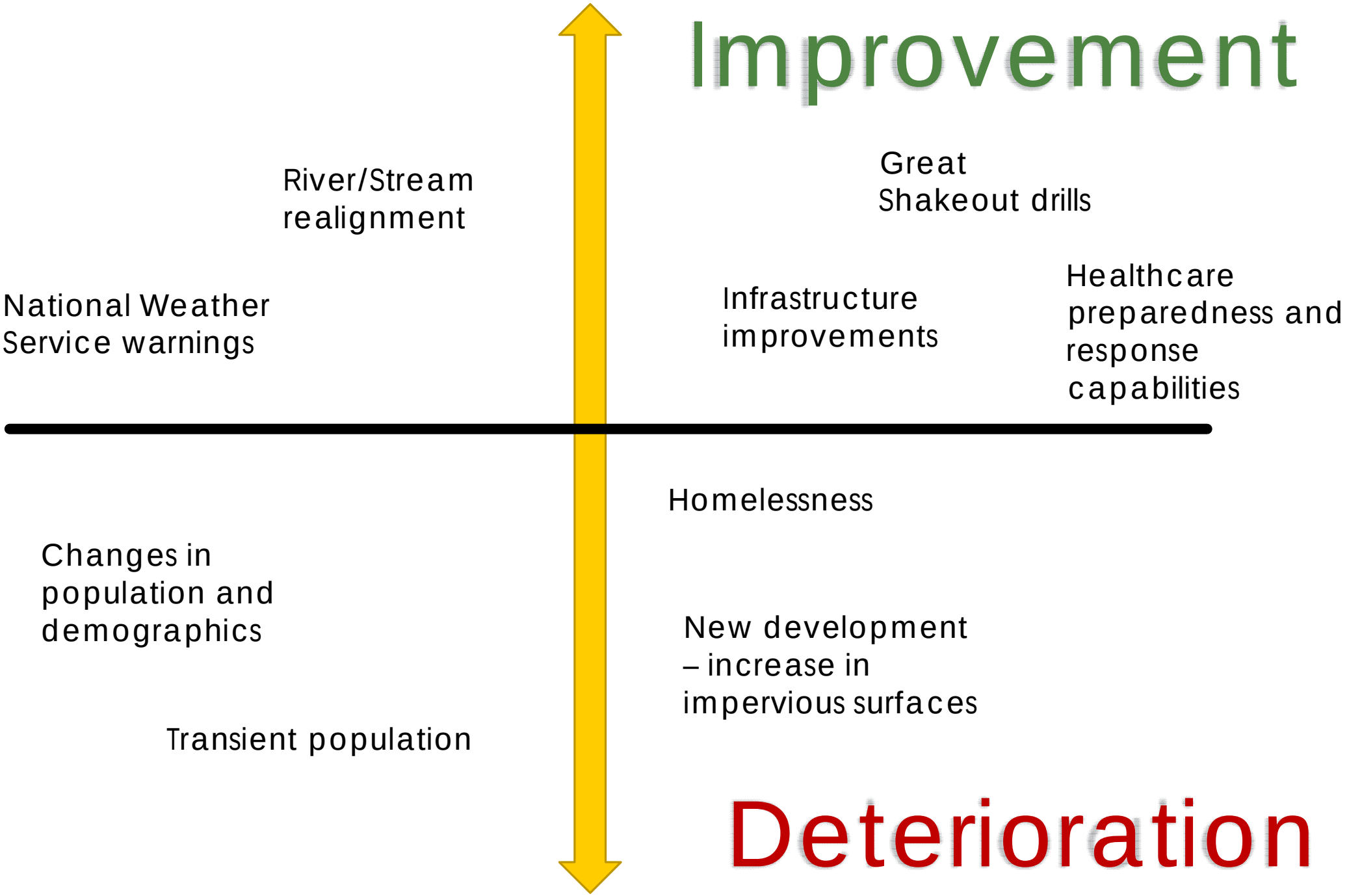
Improvement
River/Stream realignment
Great Shakeout drills
National Weather Service warnings
Infrastructure improvements
Healthcare preparedness and response capabilities
Homelessness
Changes in population and demographics
New development – increase in impervious surfaces
Transient population
Deterioration

Local Capability Assessment

Assessing Existing Resources

- Capability Assessment: assists in determining the ability to implement or improve local mitigation policies and programs
  - Plans and Programs
  - Administrative and Technical
  - Fiscal
  - Political

Activity: Each participating jurisdiction should assemble into groups to complete the provided Capability Assessment Worksheet

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Introduction to Mitigation Strategies

Mitigation ‘Buckets’

- It all starts with a problem statement
- Developing actions that address our risks
- Incorporating our goals and objectives
- Consideration of public comments and concerns

- Prevention
- Property Mitigation
- Public Education
- Natural Resource Protection
- Emergency Services
- Structural Projects

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STAPLEE and Action Worksheets

STAPLEE Criteria	Evaluation Rating	Score
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	
T: Is it Technically feasible and potentially successful?		
A: Does the responsible state agency/department have the administrative capacity to execute this action?		
P: Is it Politically acceptable?		
L: Is there Legal authority to implement?		
E: Is it Economically beneficial?		
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)		
Will historic structures be saved or protected?		
Could it be implemented quickly?		
	STAPLEE Score Total	

Mitigation Effectiveness Criteria	Evaluation Rating	Score
Will the implemented action result in lives saved?	Assign 5-10 points based on the likelihood that lives would be saved.	
Will the implemented action result in a reduction of disaster damage?	Assign 5-10 points based on the relative reduction of disaster damages.	
	Mitigation Effectiveness Score Total	
Total Score (STAPLEE + Mitigation Effectiveness)		

Action Worksheet		
1. Name of Jurisdiction: Name of Haz. Mit. Plan:		
Risk / Vulnerability		
2. Problem being Mitigated:		
Potential Actions/Projects (not being Implemented at this time)		
3. Actions/Projects Considered with Summary Evaluation of Each:		
Action or Project Intended for Implementation		
4. Action/Project Number: Name of Action or Project:		
5. Action or Project Description:		
6. Summary of Evaluation[1] Benefits (losses avoided) Estimated Cost Other Factors Considered (see STAPLEE Worksheet)	BENEFIT High.	COST Low.
Plan for Implementation		
7. Responsible Organization:		
8. Action/Project Priority (STAPLEE Score):		
9. Timeline for Completion:		
10. Potential Fund Sources:		
11. Local Planning Mechanisms to be Used in Implementation, if any:		
Progress Report		
12. Date of Status Report: Report of Progress: Evaluation of Effectiveness:		

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Next Steps and Wrap Up

Future Meeting Topics

Meeting	Timeframe	Topics
3	March-April	Determination of progress made on past mitigation actions, identification of new actions
4	May-June	Review of Draft Plan and addressing any remaining gaps
5	July-August	Presentation of Final Plan prior to State and FEMA approval

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Contact Information

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zbeall@ene.com

Any Final Questions?



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Hazard: EARTHQUAKE ~~TSUNAMI~~ (stet)	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Entire County rural, urban

Liquifaction: Seguim, 3 Crabs/Dungeness
Lower Elwha
Blyn
Coastal P.A. / Hoko
Pysht, Hoko

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

mental health stress

CO - secondary 2°

Water contam. & lack of supply

Health support (O_2 for all pts)

Sewage system spills — disease

Food/nutrition security

2° Danger from animals

drowning / trauma / hypothermia

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Islands of community, indefinitely for some

Power lines across roads
can also displace/isolate communities

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Commerce (other than ~~normal~~ essential) shut down

most likely

Health/med services #1 priority

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Sewer line breaks ⇒ env. damage + health risk

~~Fire = 2° risk~~

Water supplies disrupted – irrigation ditches, piping not reliable

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Bridges
Roads

Hospital
All public support bldgs
Coast Guard
Assisted living

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Communications – ppl need info on where to get food, water, meds

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

fire
disease
& injury tx

Hazard: Earthquakes / Tsunami	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map) Earthquake - Property - homes, business Hospital - Handicapped elderly Facilities Generator at Forbes High School.	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite? Shelter	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Hazard: Earthquake	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak) Sewer Failure - Pub health Hospital - 4 days

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite? short term - stuck where they are long term - Pet friendly shelters	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Sewage

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Logs floating

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Everything -
Food - Crime, etc

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Power Outage for everything
Landslide
Tsunami
Fire
Crime
Disease

Hazard: Earthquake / Wildfire	Name(s): Port Angeles Pet Posse

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Peninsula-wide

Northwest

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

water, power, injury, panic

Sewer malfunction

Evacuation, smoke inhalation

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

stranded in place / Isolation

Evacuation

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Hospital can only function for 4 days due to sanitation

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Sewer fail

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Many structures will be destroyed

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

All

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

disease, crime

Hazard: EARTHQUAKE - TSUNAMI	Name(s): Jim Buck

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

A destructive Earthquake will affect the entire county

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

1. loss of power affects life support equipment within minutes
2. ... effects dialysis within hrs
3. Movement to emergency services
4. Exposure to weather conditions, hypothermia

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Limited movement of vulnerable people to temporary shelter.

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Few businesses will be able to open without power. Very little business continuity action has taken place.

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Stormwater management will be damaged.
Sewage treatment will stop.

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Serious damage to all infrastructure

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

All especially mental health and critical health care services.

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

1. Mental health long-term
2. Business continuity losses of employment over long time!
3. Debris management

Hazard: Earthquake / Tsunami (Power outage)	Name(s): Port of PA / Peninsula College / OMC

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Hospitals
Airports (PA / Forks)
Port Terminals
College
Coast Guard
Elementary] Schools
Secondary

- Road System on 101/112
104/Hood Canal Bridge

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Water contamination
Sewage issues

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Yes —
Long term to indefinite depending on impact

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Most individuals don't carry cash — & debit or credit

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Shutdown of economic flow for longer than 3 days.

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Oxygen services
Communications

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Medical Rx shortage
Fatalities; disposal or morgue inadequate
Homes; Building damages. may become unhabitable.

40-60 shelters RC approved in 5 areas

Hazard: WILDSTORM	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

west end
river valley
coast
ridgetops
mountainous areas
anywhere

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

power outage → loss of mobility
transportation
medically dependent on electricity/ oxygen
heat/cold
mental health/stress

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

vulnerable populations
who carries O_2 & how long a supply
who has generators
structural problems

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

businesses closed
property damage

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)
sewage treatment	

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)
communication issues public outreach " 1 public radio KSQM stayed on gist	

[Cascadia Subduction]

Hazard: [Windstorm] [Earthquake] [Tsunami] > Wildfire <	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

- Lake Crescent & SR 112 →
- BPA Corridor →

County wide
(1) Bridges
(2) OMH/
(3) Airports
(4) Lake Crescent
(5) Pysht

(1) SE Sequim
(2) Foothills of PA
(3) West End

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

- Loss of Power – Oxygen consolidators
  - Heat –

H_2O
Sewage

- Assisted Living Homes
- Hospitals

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

- [illegible] → Hours/Days

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

- Closures
- Infrastructure → Roofs; Downed power lines;

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts) • SEWER • OIL/MATERIALS • WATER MAIN BREAKS	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services) ?	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Hazard: WINDSTORM	Name(s): JIM B, ROB C, LARRY M, ANNE C

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

FOREST SERVICE ROS → ACCESS POWER
POWER LINES & TRANSPORT CORRIDORS ARE THE SAME 101 & 112
HIGHER POPULATION AREAS - DENSITY
PARK LANDS - DIFFICULT INFRASTRUCTURE -

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

ELECTRICAL DEPENDENT →
HEAT - ELDERLY
HYPOTHERMIA -

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

SHELTER IN PLACE MOSTLY
URBN BURTON
WARMING SHELTERS -
PACK @ OMC -

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

LOSS TO BUSINESS (FOOD. REFRIGERATION)
COSTCO - SHIPPING
WASHBURNS - STAY STORE IN NEAR BAY.
LOSS OF BUSINESS BRINGING NEW BUSINESS TO COUNTY
TOURISM IMPACT HOW AFFECTS TOURISM $
SURFERS

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

TREES - CHANGING RIVER FLOW
FLOOD PLAINS SHIFT
TAKING OUT WATER LINES -
DEBRIS MGMT -

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

FENCES & ROOFS -
WATER OVER ROADWAY -
STRUCTURES LOST -

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

PENCOM LEO
FIRE/EMS

WATER -

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

FIRES AFTER DOWNED LINES & POWER OUTAGES

COMMUNITY EVENTS PUT ON HOLD OR CANCELLED -

WATER - IMPACT

ANIMALS - PASTURE -

Hazard: WIND STORM	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

FOOTHILLS → ACCESS ROADS DEER PARK
HURRICANE RIDGE
BLACK DIAMOND
MT. PLEASANT
DAN KELLY
EDEN VALLEY

LAKE CRESCENT
HIGHWAY 112
EDGEWOOD DRIVE

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

- OXYGEN GENERATORS WITH POWER OUTAGE
- MEDICALLY FRAGILE PATIENT WHO NEED POWER
- SEPTIC SYSTEMS AND SEPTIC PUMP STATIONS MAY BECOME TAXED

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

- IF STRUCTURES OR RESIDENCE IS IMPACTED IT could BE long TERM
- OTHERS CAN SHELTER IN PLACE

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

- LARGE POTENTIAL FOR INFRASTRUCTURE REPAIRS
- BUSINESS DAMAGES
- ACCESS BY EMS TO TRANSPORT PEOPLE TO THE HOSPITAL IS HEAVILY IMPACTED

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

- Bluff on slope potential with downed trees.

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

- Falling trees was big issue that caused a lot of damage
- Roadways were severly blocked by downed power lines and trees.

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

- Power supply
- EMS/Fire
- Roads/transportation/DOT
- Medical facilities

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

- Communications
- Heat in winter
- Fuel for vehicles

Hazard: WINTER STORMS & FLOODING -	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)
LOWLANDS COASTLINE RIVERS - KING TIDES. PYSHT HOKO ELWHA DUNG. QUIL BOGIE SOL DUC - MIN IMPACT WHITCOMB DIMMER	WATER - DISEASE - DEPENDING ON SCOPE

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)
ALL EVAC PLAN TYPES	COST OF MITIGATION - PURCHASE OF THREATENED PROPERTIES COST OF FLOOD INSURANCE REPAIR & RECOVERY COSTS - FARMING -

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

SALMON RECOVERY
FISHERIES -
SENSITIVE ECOSYSTEMS -

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

YES — CULVERT — ROADS -
BRIDGES WATER SYSTEMS.

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

FIRE
EMS
LEO
PUB WORKS

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

ANIMALS - PASTURE WATER FOR STOCK

Hazard: ~~EARTHQUAKE / TSUNAMI~~ Winter Storm / Flooding	Name(s): Port of PA Peninsula College / OMC

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Higher elevations

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

medical surge
mold damage – in homes

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Vulnerable populations
- elderly
- homeless
- mental health

Animal – livestock stranded by water surrounding

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Infrastructure Impacts
- School closures

A lot less supplies able to be brought to Peninsula
Stop ship arrival & unloading @ Port Terminals
airport – impacts may reduce of takeoffs/landings; increase risk damages

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Flooding
~~West~~ waste water Treatments overflow to surrounding area / Rivers

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Snow load damage

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Hospital –
increased patient load

Schools –
closed

Public works
Law Enforcement

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

road damage
flooding
mold damage

Hazard: Hazardous Materials	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

PA Harbor –

al Spills ARCO Anchorage Spill 1985 270,000gal

ATC Prince Wm Sound 2001 ~500gal

GAZ Diamond 2003 ~500gal

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

acute & chronic exposure to haz material

recreational water activities - no kayaking or swimming

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

long-term

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

tourism

beach combing

fishing

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts) water quality bird + wildlife	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage) Port Piers.
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Hazard: ~~Windstorm~~ HAZ MAT.	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

URBAN AREAS -
SHORELINE
METH LABS -
HIGHWAY — SEMI'S -
EVERY WHERE -

RAMONIER SITE
MCKINLEY.

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

WATER
GROUNDWATER
RESPIRATORY ISSUES
DEBRIS OF HAZMAT.

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

EVAC - LIMITED TO SITE

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

COST OF REMEDIATION
IMPACT TOURISM
CLAMMING / FISHING INDUSTRY
CRABS

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

EARLY MINE

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

WATER TREATMENT

LOSS OF COMM. PROPERTY - CHAIN LINK FENCES -

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

MEDICAL - LONG TERM EFFECT -

FIRE / WSP IN BREMERTON IC 1ST RESP.

DEPT OF ECOLOGY - MITIGATION

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

LONG TERM HEALTH EFFECTS

P.R. OF COUNTY

Hazard: Hazardous Materials Incidents (oil spills)	Name(s): Peninsula College Port of PA Hospital
Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map) Could shut down highway Oil spills @ Port Terminal	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak) hazardous waste @ water supply River/creek
Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite? Displacement would depend on location	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services) Tourism could decrease

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts) could impact vegetation Stream contamination	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage) ↘ if leached into stormwater drains
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services) Decontamination needs	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought) Explosion Fire Blocked Traffic

Hazard: Wild fire	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Forks
Sequim
Blyn

development into the foot hills.

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Smoke
Air quality
Stress

Elder/Asthma

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Short / long / indefinite

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Property loss
tourism loss
business loss

Health impacts

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts) Air, water, wildlife, pets stream, river, landslide	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage) if burned it will be affected
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services) Stress on EMT/fire	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought) landslides after the fire, loss of tourism,

Hazard: Wildfire	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)
Anywhere in County	Smoke most universal Evacuation impact

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)
Bigger ongoing Geographicly dependant	

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Hazard: WILD FIRE	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

WILDLAND URBAN INTERFACE –
FRESH LOGGED AREAS –
SUMMER WINDS SHIFT AWAY FROM POPULATIONS GENERALLY – (DEPENDING ON WIND DIRECTION)
101 – CROSSES HWY
KITCHEN-DICK RD GRASS FIRES –

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

SMOKE – COPD & COMP POPULATIONS –
CANADIAN FIRES –
PSYCH & EMOT. IMPACT OF HOMELESS

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

EVACUATION – LARGE SCALES –
SHORT & LONG TERM

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

PEOPLE STAY INSIDE –
TOURIST IMPACT –
FARMING & GRAZING FARMS – (MARSHES)
STAFF EXPENSE ON SMALL RURAL DEPTS.
AFFECT ON LOGGING INVENTORY

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

WILDLIFE - ~~ASH AFFECTS WATER~~
DAM CAUSE INVASIVE SPECIES UPTICK.
WATER QUALITY - LOW FLOW IN SUMMER

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

HOMES -
FIRE ACTIVELY ON ROAD
~~EROSION & LANDSLIDE~~

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

DNR
BMS
FIRE
OMC
LEO
PUD -

BUBBLY ONE
CLINIC - COMP. POP
IN CLINIC COPD ASTHMA

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

EROSION & LAND SLIDES POST EVENT -
HAZMAT PROPANE & DIESEL TANKS -
TOURIST APPEARANCE OF LACK OF SAFETY -

Hazard: Wildfire	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

- Houses Built Around valleys
- Largest fires have been remote into the forest with limited impact on infrastructure

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Smoke in the area. Large population with respiratory problems which could be impacted by smoke

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

- On a limited scale, most fires would probably stay at a neighborhood level
- Short term displacement for evacuations but long term for structures lost

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

- The cost of fire response from the various agencies
- Limited businesses are in the wildland urban interface

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

- Can cause contamination along streams
- Likelyhood of landslides increase with loss of vegitation
- Recover and repair of impacted area

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

- Limited risk to large fires and large amount of structures lost, however most buildings impacted would be a total loss
- Roads, bridges, and culverts should remain intact

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

- Fire Response Agencies
- possibly some shelters for evacuated people.
- Probably not a large volume of people who will need evacuation.

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

- Ties up fire resources which also provide EMS as Dual role fire/EMS.
- Traffic congestion due to fires and fire apparatus.

Hazard: Wildfire	Name(s): Port of PA Peninsula College / OMC

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)
Could close down highway Park closure w/ people trapped @ ridge Airport – visibility Hospital – visibility possibly could not transport patients	Breathing / Lung Problems – Patients

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)
Depending on location and need for evacuation Tourists – visitors depending on time of event Homeless encampments in wooded areas	Loss of structures (homes) medical clinics Could close highway

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services) Medical Services	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought) Healthcare related would be increased respiratory needs

APPENDIX A3. MPT MEETING #3

Clallam County 2019 Multi-Jurisdictional Hazard Mitigation Plan Update

MITIGATION STRATEGIES WORKSHOP

DATE: Wednesday, March 27, 2019
TIME: 1:00pm-4:00pm
LOCATION: Clallam County Emergency Operations Center, 223 E 4th Street, Port Angeles, WA 98362

Thank you for participating in the Hazard Mitigation Planning Team Meeting #2 for the **update of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan Update (HMP)**.

MEETING PURPOSE:

This meeting builds on the concepts we have discussed in the prior to planning meetings. We will take our discussions on mitigation goals and risk assessments and begin the process of developing comprehensive mitigation strategies to reduce risks to community members and their property. Participants will be provided with example mitigation strategies and will work as a group to build out additional strategies.

AGENDA:

1. Welcome and Introductions (5 minutes)
2. Review of HMP Goals and Objectives (10 minutes)
3. Review of Risk Assessments (15 minutes)
4. Review of Mitigation Action Worksheet (15 minutes)
5. Worksheet Case Studies (30 minutes)
6. BREAK (15 minutes)
7. Mitigation Action Workshop (75 minutes)
8. Next Steps (15 minutes)

CONTACT INFORMATION:

Ron Cameron, Undersheriff
Clallam County Sheriff's Office
(o) 360-417-2570 | (c) 360-460-4303
rcameron@co.clallam.wa.us

Zane Beall, E & E Project Manager
(o) 503-248-5600 x4622 | (c) 360-904-6828
zbeall@ene.com

NOTES:

Hazard Mitigation Plan Update Workshop # 3 – Sign In Sheet

NAME	TITLE	DEPARTMENT/AGENCY	PHONE	EMAIL	RATE (FOR GRANT TRACKING PURPOSES)
1. Bill Paul	Fire Chief	CCFPD #1	360-374 5561	chief@clallamfire1.org.	
2. Zane Beall	PM	E+E	503-248-5600	zbeall@ene.com	
3. Glen Roggenbeck	EM Coord	Lower E/wn	360 912-2624		
4. Tyler Chatriand	E&E	"	206-624-9537	tchatriand@ene.com	
5. Luther Sweetser	Ops Mgr Charter Pilot	Rite Bros Aviation	3605156878	sweetser839@gmail.com	
6. Luke Strong	Tribal planner	Jamestown Tribe	360-681-4669	lstrong@jamestowntribe.org	
7. Sheri Crain	Chief	Sequim PD	360 683-7227	scrain@sequimwa.gov	
8. Dan Gasé	Airport Mgr	Port	360-808-7053	DANG@PORTOFPA.com	
9. Jen Garcelon	Clallam HHS	LERC / EH Director	360417-2347	jgarcelon@co.clallam.wa.us	

NAME	TITLE	DEPARTMENT/AGENCY	PHONE	EMAIL	RATE (FOR GRANT TRACKING PURPOSES)
10. DAN SHEA	OPS. SUPERVISOR	PORT OF P.A	360-460-2696	DANS@PORTOFPA.com	
11. JAKE PATTERSON	Deputy CHIEF	CLALLAM 2 FIRE RESCUE	360-912-4144	jpatterson@clallamfire2.org	
12. GREG WATTS	FIRE CHIEF	CLALLAM 4	206-200-3457	Chief@clallamfire4.org	
13. Jim Buck	Volunteers	CEM	360.808-2105	buckdj@olypen.com	
14. KEN DUBUC	FIRE CHIEF	PAFD	360 417 4651	kdubuc@cityofpa.us	
15. Ann Soule	Resource Mgr.	City of Sequim	360-582-2436	asoule@sequimwa.gov	
16. Tom Shindler	GIS Coordinator	Clallam Co IT	360-417-2260	tshindler@co.clallam.wa.us	
17. Ron Cameron	EM Director	Clallam Co SO	360-417-2570	rcameron@co.clallam.wa.us	
18. Jennifer Chereuk	ENV. Coordinator	Clallam Co.	360-417-2263	jchereuk@co.clallam.wa.us	
19. ALONE CHASTAIN	EOC COORDINATOR	CLALLAM CO	360-417-2483	achastain@co.clallam.wa.us	ALREADY FUNDED BY FEMA GRANT

Clallam County
Hazard Mitigation Plan Update

HMPT Meeting #3 – Mitigation Action Workshop

Wednesday, March 27, 2019 | 1-4pm | Clallam County EOC

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Welcome and Introductions

- Name
- Organization/ Department

Meet the E & E Team



Matthew Lieuallen
Principal in Charge



Nicki Hurley
GIS Analyst



Zane Beall
Project Manager



Manique Talaia-Murray
Emergency Planner



Shawna Mantey
Emergency Planner



Tyler Chatriand
Engineering Approach

Meeting Objectives

- Project Update
- Review of HMP Goals
- Review of Mitigation Action Worksheet
- Mitigation Action Workshop
- Next Steps



What Have We Been Up To?

- HMPT Meetings #1 and #2
- Hazard Identification and Ranking
- Risk Assessments
- Public Outreach
- Plan Development
- Process Documentation



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Review of Mitigation Goals

Updated 2019 HMP Goals

- **Goal 1:** Maintain and expand transportation routes across the County, during and after key hazards events.
- **Goal 2:** Maintain emergency services capabilities by providing redundancy.
- **Goal 3:** Maintain key communications to ensure connectivity during and after key hazard events.
- **Goal 4:** Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events.
- **Goal 5:** Minimize property damage and reduce repetitive losses to property from key hazards.
- **Goal 6:** Increase public participation and responsibility in reducing their risks.

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Risk Assessment

Clallam County - Local Hazards

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)	Average	Rank
Cascadia Earthquake	4.75	4.83	3.08	1.25	3.48	1
Earthquake	4.33	4.67	3.17	1.42	3.40	2
Disease	3.58	3.17	3.83	2.82	3.35	3
Power Outages	1.75	4.50	2.83	4.17	3.31	4
Wildfire	2.25	4.00	3.25	2.75	3.06	5
Windstorm	1.92	3.50	2.33	4.42	3.04	6
Winter Storm	2.00	3.25	2.75	4.00	3.00	7
Active Shooter	2.92	5.00	2.17	1.42	2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83	2.83	10
Landslide	1.50	4.42	2.58	2.67	2.79	11
Flooding	1.67	3.33	2.42	3.25	2.67	12
Tsunami	3.25	4.08	2.17	1.08	2.65	13
Drought	1.83	1.58	3.92	2.67	2.50	14

Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure.

Linking Strategies to Risks

- Start with a problem statement – what are we trying to fix?
- How does your strategy address our prioritized hazards?
- Do specific parcels need strategies developed for them?

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Mitigation Action Planning

Looking Back at 2010

- What is our status?
  - Completed, ongoing, carryover, cancelled
- Amendments needed?
- Resource and information gaps?

*Refer to 2010 Mitigation Actions



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Developing Effective Strategies

SMART actions!

- ***Specific*** – target a specific area for improvement
- ***Measurable*** – quantify or at least suggest an indicator of progress
- ***Assignable*** – specify who will do it
- ***Realistic*** – state what results can be achieved realistically, given available resources
- ***Time-related*** – specify when the result(s) can be achieved

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Mitigation Actions

1. IDENTIFY THE PROBLEM

2. IDENTIFY THE MITIGATION ACTION AND/OR ALTERNATIVES

3. ACTION STATUS

- ***New*** – The action is new and will be included for the first time in the 2019 plan update.
- ***Existing*** – The action was implemented prior to the 2019 plan update, but is ongoing and additional or ongoing action is required for completion.
- ***Complete*** – The action has been completed.

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Mitigation Actions

4. TYPE OF ACTION

- ***Plans and Regulations*** – Regulatory actions or planning processes that reduce vulnerability to hazards
- ***Infrastructure/Capital Project*** – Actions that involve modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area
- ***Natural Systems Protection*** – Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems
- ***Education and Awareness*** – Actions to inform and educate residents, elected officials, and property owners about hazards and potential ways to mitigate them.
- ***Preparedness and Response*** – Actions that protect people and property during and immediately after a hazard or hazard event.

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Example Strategies

- Plans and Regulations
  - Develop land use standards for new development
  - Identify updated floodplains
  - Map cell towers in the area
- Infrastructure/Capital Project
  - Build updated and enhanced culvert/bridge/road
  - Assess and retrofit acclimation pond
- Natural Systems Protection
  - Restrict development in sensitive habitats
  - Remove identified contaminants from streambeds

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Example Strategies (cont.)

- Education and Awareness
  - Develop continuous public education program
  - Identify opportunities to integrate community partners into the County's mitigation program
  - Strengthen awareness of health systems/disease prevention
- Preparedness and Response
  - Preposition supplies needed for utility restoration efforts
  - Conduct an earthquake damage repair planning exercise
  - Prepare for water supply and utility system threats resulting from drought

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Mitigation Actions

6. LEAD/SUPPORT DEPARTMENT ORGANIZATION

- Government agencies
- Regional agencies
- Others?

7. TIMELINE FOR IMPLEMENTATION

- >1 Year
- 1-3 Years
- 3-5 Years

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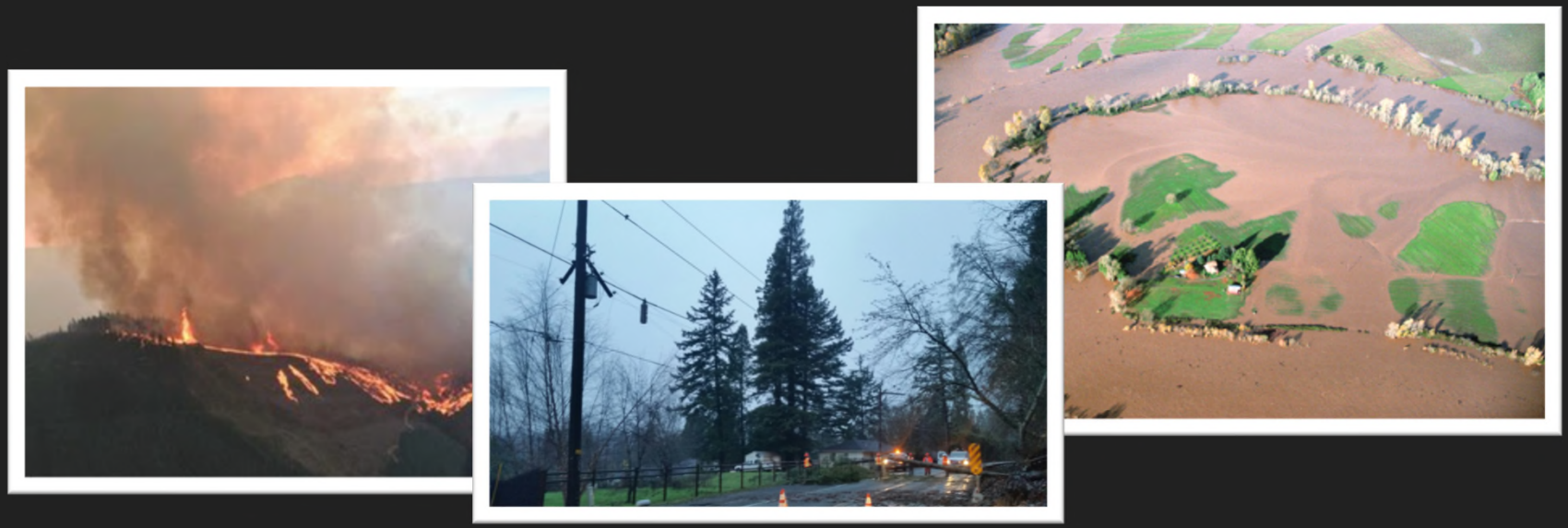
Mitigation Actions

7. HAZARDS ADDRESSED



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Mitigation Actions

8. ANTICIPATED COST/FUNDING AVAILABILITY/FUNDING SOURCE



Mitigation Actions

9. STAPLEE CRITERIA

- ***S**: Is it Socially acceptable?*
- ***T**: Is it Technically feasible and potentially successful?*
- ***A**: Does the responsible agency/department have the Administrative capacity to execute this action?*
- ***P**: Is it Politically acceptable?*
- ***L**: Is there Legal authority to implement?*
- ***E**: Is it Economically beneficial?*
- ***E**: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact*
- *Will historic structures or key cultural resources be saved or projected?*
- *Could it be implemented quickly?*

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Worksheet Case Study



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Mitigation Action Workshop



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Activity Logistics

- Regional Discussion
  - Plans and Regulations
  - Infrastructure/Capital Projects | Natural Systems Protection
  - Education and Awareness | Preparedness and Response
- In small groups discuss potential mitigation strategies appropriate to your table (20 minutes)

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Next Steps and Wrap Up

Next Steps

- Mitigation Actions (completed worksheets)
- Draft Plan released to stakeholders by June-July
- Draft Plan/Gaps Workshop – TBD

What Can I Do?

- Submit mitigation action worksheet
- Participate in upcoming workshops
- Review draft plan once available

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Any Final Questions?



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Contact Information

County Project Lead
Ron Cameron
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rcameron@co.Clallam.wa.us

E & E Project Manager
Zane Beall
503-248-5600 x4622
zbeall@ene.com

APPENDIX A4. MPT MEETING #4

CLALLAM COUNTY
CCEM
EMERGENCY MANAGEMENT

Hazard Mitigation Plan Meeting

Clallam County EOC

Name	Agency	Phone #	Email
Jim & Donna Buck	CCEM Volunteers	360-808-2105	buckdj@olypen.com
Glen Roggenbuck	Lower Elwha Em Coordinator	360-912-2621	glen.roggenbuck@elwha.org
Ron CAMERON	CCSO	360 460 4303	rcameron@co.clallam.wa.us
Anne Christian	CCEM	360-417-2483	
Karen Denton	OMC	360-461-7046	Kdenton@olympicmedical.org
KEVIN GILLACH	CTS	360 417 1350	KEVING@clallamtransit.com
Susan LUNDSTEDT	CC_IT	360-417-2294	slundstedt@co.clallam.wa.us
Lane Beall	E+E	503-248-5600	lbeall@ene.com

15 July 2019

CLALLAM COUNTY
CCEM
EMERGENCY MANAGEMENT

Hazard Mitigation Public Forum

Sequim City Hall

Name	Agency	Phone #	Email
SHARON O'Reilly		805 729-1655	SHARON98382@gmail
Bill Brigden			wbrigden@gmail.com
Sandra Knuth		301-525-3798	kimcathrick@yahoo.com
MIKE LONGLEY	SUNLAND WATER DISTRICT	360-683-3905	mike@sunlandwater.com
mike Doherty		360 461 1010	doherty_mike@yahoo.com
Sally Moore			
Melissa Murray			melben96@hotmail.com
BLAINE ZECHENELLY	CCFD 3		BZECHENELLY@CCFD3.ORG
DAN ORR	CCFD 3		DORR@CCFD3.ORG

17 July 2019

Hazard Mitigation Plan Update Community-Specific Workshops #4

City of Port Angeles – Sign In Sheet

NAME	TITLE	DEPARTMENT/AGENCY	PHONE	EMAIL	RATE (FOR GRANT TRACKING PURPOSES)
1. Zane Beall	PM	E+E	503-248-5600	zbeall@ene.com	—
2. Marisa Talaia	Environmental Scientist/Planner	E&E	206-406-7821	mtalaia-murray@ene.com	—
3. KEN DUBUC	FIRE CHIEF	PORT ANGELES FIRE	360-417-4651	KDUBUC@CITYOFPA.US.	
4. LUKE STRONG	Planner JSKT	Jamestown Tribe	360-681-4669	lstrong@jamestowntribe.org	—
5.					
6.					
7.					
8.					
9.					

7/16

7/17

Clallam County
Hazard Mitigation Plan Update

HMPT Meeting #4 – Draft Plan Overview and Gaps Workshop

Wednesday, July 17, 2019 | 10am-12pm | Sequim City Hall

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Meeting Objectives

- Project Update
- Introduction to Draft Plan
- Overview of Plan Gaps
- Workshop and Office Hours
- Next Steps



What Have We Been Up To?

- HMPT Meetings #1-3
- Hazard Identification and Ranking
- Risk Assessments
- Public Outreach
- Plan Development
- Process Documentation

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Introduction to Draft Plan

Chapters

- Front Matter

1. Introduction
2. Planning Process
3. Community Profile
4. Hazard Profiles and Vulnerability Assessment
5. Capability Assessment
6. Mitigation Strategy
7. Program Implementation

- Jurisdiction Annexes
- Appendices

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1. Introduction

- Establishes the County's authority to mitigate risks
- Outlines the HMP's purpose and planning scope
- Identifies roles and responsibilities within the County's hazard mitigation program

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2. Planning Process

- Identifies the planning area
- Outlines the incorporation of existing plans and studies into the HMP
- Identifies the activities of the planning team and engagement with the public

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3. Community Profile

- Location and Geography
- Population and Demographics
- Governance
- Economy
- Development Trends
- Natural and Cultural Resources

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4. Hazard Profiles and Vulnerability Assessments

- Establishes priority levels for hazards potentially affecting the County
- Outlines a risk assessment methodology
- Details specific aspects for each identified hazard: description, location, history, future conditions impacts, extent/probability, cascading impacts, vulnerability

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5. Capability Assessment

- Human and Technical Resources
- Financial Resources
- Legal and Regulatory Resources
- Coordination with Partners
- Integration of mitigation planning into other planning processes

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6. Mitigation Strategy

- Establishes mitigation goals
- Outlines priority mitigation actions in alignment with stated goals
  - Evaluates and prioritizes all actions
  - Determines status of previous plan actions

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7. Program Implementation

- Plan Adoption/Promulgation
- Monitoring and evaluating mitigation progress
- Continued engagement with residents and neighboring jurisdictions

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Jurisdiction Annexes

- Designed to serve as a stand-alone guide to mitigation planning for each participating community.
- Assesses risks specific to each community.
- Identifies critical infrastructure.
- Outlines capabilities and mitigation strategies.

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Appendices

A. Planning Process Materials
B. Mitigation Action Worksheets
C. Hazard Ranking Results
D. FEMA Review Tool
E. Risk Assessment Materials
F. Asset Inventory

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Overview of Plan Gaps

What We Need

- Mitigation Actions – at least two per community
- Status updates on 2010 actions
- Capability Assessments
- Flood Loss Claims and Repetitive Loss Properties

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Updated 2019 HMP Goals

- **Goal 1:** Maintain and expand transportation routes across the County, during and after key hazards events.
- **Goal 2:** Maintain emergency services capabilities by providing redundancy.
- **Goal 3:** Maintain key communications to ensure connectivity during and after key hazard events.
- **Goal 4:** Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events.
- **Goal 5:** Minimize property damage and reduce repetitive losses to property from key hazards.
- **Goal 6:** Increase public participation and responsibility in reducing their risks.

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Clallam County - Local Hazards

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)	Average	Rank
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Earthquake	4.33	4.67	3.17	1.42	3.40	2
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Power Outages	1.75	4.50	2.83	4.17	3.31	4
Wildfire	2.25	4.00	3.25	2.75	3.06	5
Windstorm	1.92	3.50	2.33	4.42	3.04	6
Winter Storm	2.00	3.25	2.75	4.00	3.00	7
Active Shooter	2.92	5.00	2.17	1.42	2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83	2.83	10
Landslide	1.50	4.42	2.58	2.67	2.79	11
Flooding	1.67	3.33	2.42	3.25	2.67	12
Tsunami	3.25	4.08	2.17	1.08	2.65	13
Drought	1.83	1.58	3.92	2.67	2.50	14

Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure.

Workshop and Office Hours

Any Final Questions?



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Contact Information

County Project Lead
Ron Cameron
360-417-2570
rcameron@co.Clallam.wa.us

E & E Project Manager
Zane Beall
503-248-5600 x4622
zbeall@ene.com

APPENDIX A5. MPT MEETING #5

Clallam County 2019 Multi-Jurisdictional Hazard Mitigation Plan Update

DRAFT REVIEW WORKSHOP

DATE: October 8, 2019
TIME: 10:00 AM – 12:00 PM
LOCATION: Webinar

E&E Facilitators:

Manique Talaia-Murray, Project Manager
Matthew Lieuallen, Project Director

Thank you for participating in the Hazard Mitigation Planning Team Meeting #4 for the **update of the Clallam County Multi-Jurisdictional Hazard Mitigation Plan Update.**

MEETING PURPOSE:

This meeting brings together all components of our previous workshops: goals and objectives; hazard identification and risk assessment; and mitigation strategy development. We will review the components of the Draft Plan, provide tips on how to review your annexes, and identify any data gaps that we need help to fill.

AGENDA:

1. Roll Call and Desired Outcomes
2. Presentation of Draft HMP and (1) Jurisdictional Annex
    a. Data gaps discussion
3. Tips for Reviewing and Providing Comment
4. Next Steps
5. Questions?

CONTACT INFORMATION:

Ron Cameron, Undersheriff
Clallam County Sheriff's Office
(o) 360-417-2570 | (c) 360-460-4303

Manique Talaia-Murray, E & E Project Manager
(o) 206-624-9537 | (c) 206-406-7821
mtalaia-murray@ene.com

Call-in (audio): 800-747-5150 Access Code: 1641505
To view presentation, visit the link below (also provided in calendar invitation):

Join Microsoft Teams Meeting

Learn more about Teams | Meeting options

NOTES:

October 8, 2019

Clallam County Draft Review Workshop

1. Roll Call
    a. County
        i. Anne Chastain
        ii. Ron Cameron
        iii. Jen Garcelon, Public Health
        iv. Jim Buck
    b. Forks
    c. Jamestown S'Klallam
        i. Luke Strong
    d. Port Angeles
        i. Ken Dubuc
    e. Sequim
        i. David Garlington, Anne Soul
    f. Lower Elwha Klallam
        i. Glen Roggenbuck
    g. Special Hazard Districts: Public Utilities District, Port of Port Angeles, Peninsula College
        i. Dan Shea
    h. Anyone else?
        i. Jake Patterson, Clallam 2 Fire Rescue
        ii. Kevin Donovan OLMC

Clallam County Multi-Jurisdictional Hazard Mitigation Plan Update

MPT Meeting #4 – Draft Review Workshop

Tuesday, October 8, 2019 | 10am – 12pm | Webinar, Clallam County EOC

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Meeting Objectives

- Roll Call and Desired Meeting Outcomes
- Presentation of Draft HMP and Jurisdictional Annex
- Tips for Reviewing and Providing Comment
- Next Steps



Presentation of Draft HMP

Plan Structure

Base Plan

- Framework for County's mitigation program
- Information regarding the capabilities, hazards, mitigation strategies

Jurisdictional Annexes

- Forks
- Jamestown S'Klallam Tribe
- Port Angeles
- Sequim
- Lower Elwha Klallam Tribe
- Special Hazard Districts

Implementation Support

- Mitigation Strategy Work Plan
- Implementation Guide

Supporting Appendices

- Planning Process Documentation
- GIS Mapping
- Risk Assessment Mitigation Actions
- FEMA Review Tool
- Plan Adoption Resolutions

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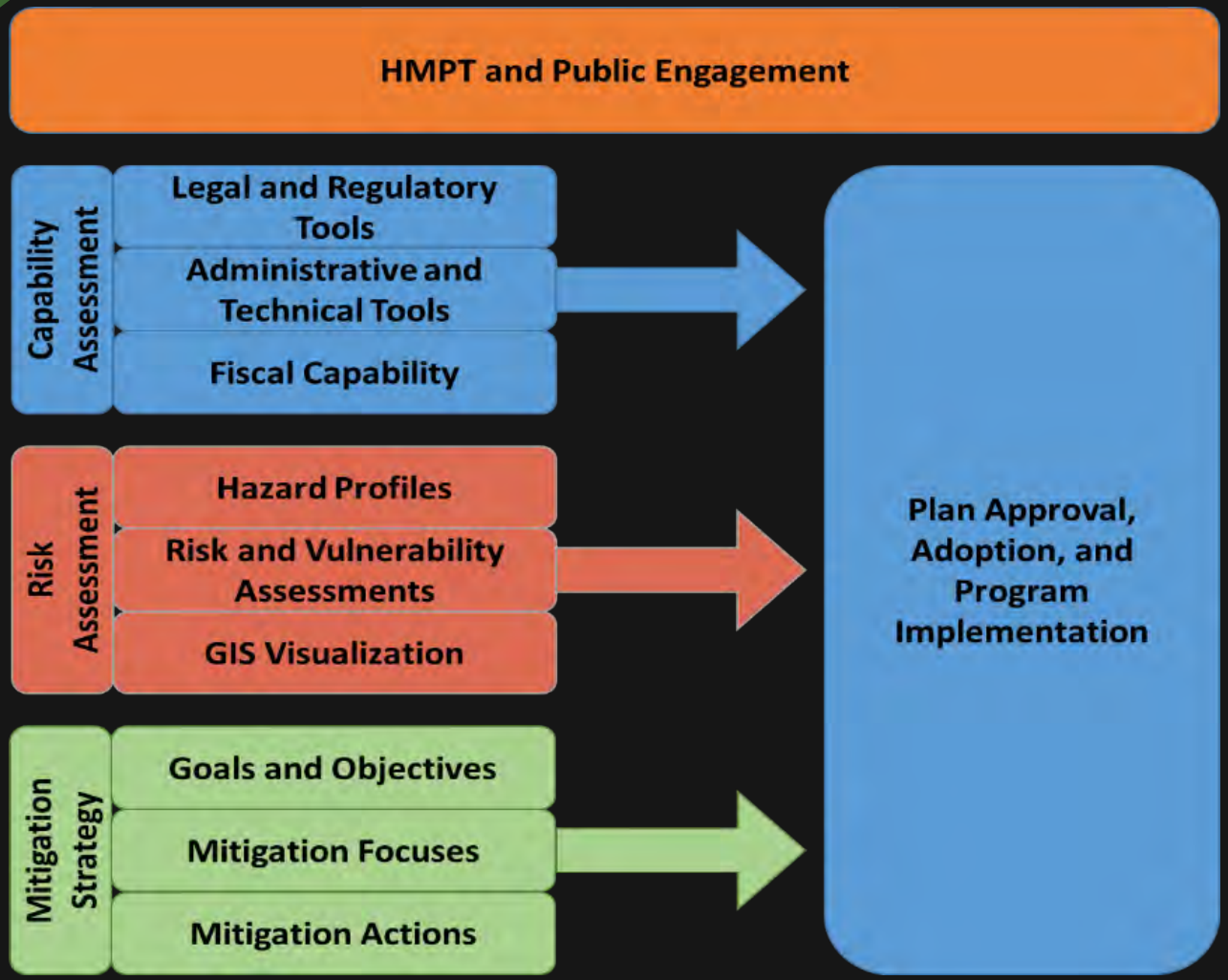
How it all fits together



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Chapters

- Front Matter

1. Introduction
2. Planning Process
3. Community Profile
4. Hazard Profiles and Vulnerability Assessments
5. Capability Assessments
6. Mitigation Strategy
7. Program Implementation
8. References

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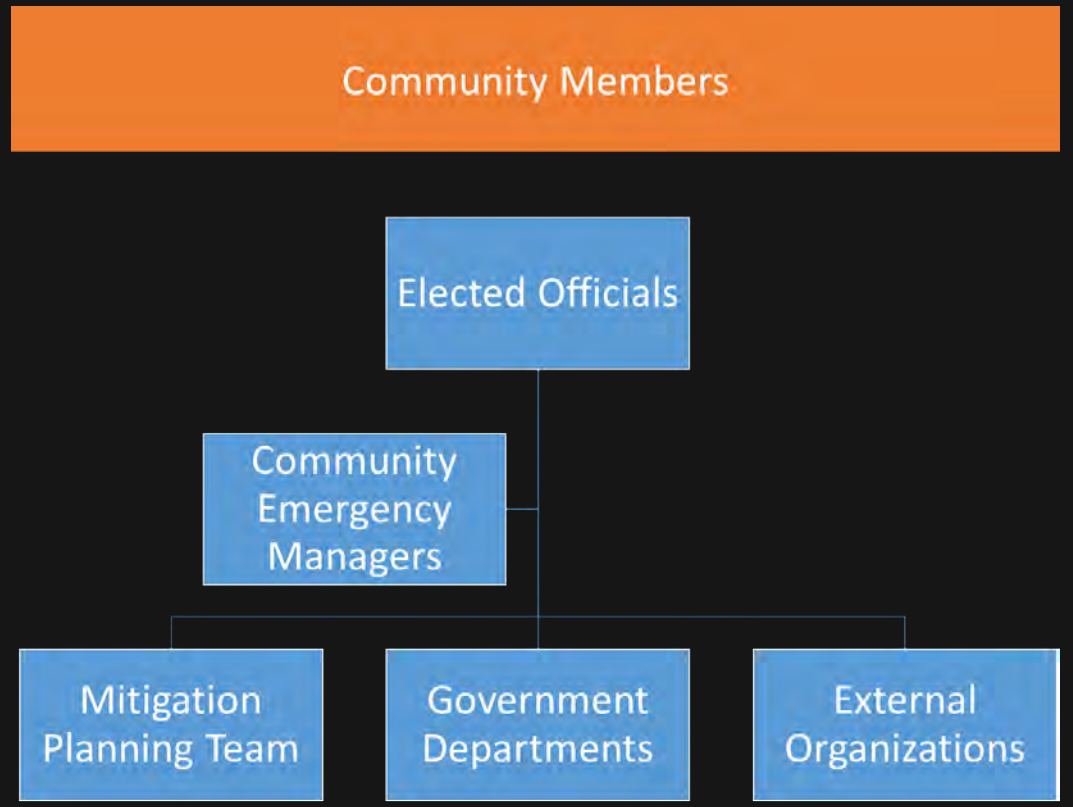
1. Introduction

- Establishes the County's authority to mitigate risks
- Outlines the HMP's purpose and planning scope
- Identifies roles and responsibilities within the County's hazard mitigation program



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2. Planning Process

- Identifies the planning area
- Outlines the incorporation of existing plans into the HMP
- Identifies the activities of the planning team and participating jurisdictions
  - MPT members
  - MPT meetings
- Outlines the inclusive outreach and public engagement strategy
  - Online survey
  - 3 public meetings in Port Angeles, Forks, and Sequim
  - Public commenting period (upcoming)

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3. County Profile

- Governance
- Geography and Climate
- Population and Demographics
- Economy
- Land Use
- Transportation & Commuting Patterns

Review Tip: Please double-check our representation of your jurisdiction or tribe in these sections.

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4. Hazard Profiles and Vulnerability Assessments

Review Tip: Please double-check our representation of how these hazards impact your jurisdiction. Pay close attention to **where** *and* **how**.

- Establishes priority levels for hazards potentially affecting the County
- Details specific aspects for each identified hazard: description, location, history, future climate impacts, extent/probability, cascading impacts, vulnerability

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5. Capability Assessment

Review Tip: We have sent Capability Assessment worksheets to a couple jurisdictions – please fill those out so we accurately represent your resources as they relate to hazard mitigation planning.

- Human and Technical Resources
- Financial Resources
- Legal and Regulatory Resources
- Coordination with Partners
- Integration of mitigation planning into other planning processes

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6. Mitigation Strategy

Review Tip: Please double-check our representation of your jurisdiction's mitigation actions in the implementation plan.

- Outlines mitigation goals
- Establishes priority mitigation actions in alignment with stated goals
  - Evaluates and prioritizes all actions
  - Determines status of previous plan actions

Review Tip: Please confirm the status of 2010 mitigation actions.

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7. Program Implementation

- Plan Adoption/Promulgation
- Monitoring and evaluating mitigation progress
- Continued engagement with community members and neighboring jurisdictions

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8. References

- Even more resources!

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Appendices

A. Planning Process Materials
B. GIS Mapping
C. Risk Assessment
D. Mitigation Action Worksheets
E. FEMA Review Tools
F. Plan Adoption Resolutions (for each jurisdiction)

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Jurisdictional Annex

How is your annex different than the Base Plan?

- 1. Introduction
- 2. Community Profile
- 3. Hazard Profiles and Vulnerability Assessment
- 4. Capability Assessment
- 5. Mitigation Strategy
- 6. References

- Targeted to your community
  - Tailored hazard ranking
  - How do the hazards impact your community specifically? **Location**, **scope**, and **historic events**.
  - How are the critical infrastructure in your community impacted by each hazard?
  - Capability Assessment
  - Mitigation actions and implementation plan

Next Steps and Wrap Up

Next Steps

- Additional Data Incorporation
- Release of Final Draft Plan
- MPT Meeting/Webinar #5 (December) – Final MPT Plan Promulgation
- Submittal to FEMA
- Formal adoption by Jurisdictions
- IMPLEMENTATION!

What Can I Do?

- Review final draft plan and submit comments and edits
- Submit a public comment (format TBD)
- Encourage participation in public commenting period

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Any Final Questions?



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Contact Information

Ron Cameron, Undersheriff
Clallam County Sheriff's Office
(o) 360-417-2570 | (c) 360-460-4303

E & E Project Manager
Manique Talaia-Murray
(o) 206-624-9537 | (c) 206-406-7821
mtalaia-murray@ene.com

APPENDIX A6. MPT MEETING #6

APPENDIX A7. PUBLIC MEETING #1

Prevention	Property Mitigation	Public Education	Natural Resource Protection	Emergency Services	Structural Projects
Stops unsafe development based in unsafe building methods or building in high risk areas.	Encourages property owners to reduce risks in their homes and buildings.	Provides information that helps community members protect themselves and their property.	Reduces hazards by restoring natural habitats that can help limit impacts.	Protects community members and property during and after a disaster.	Building infrastructure that helps prevent or reduce hazards.
Example: Planning, zoning, and building codes	Example: Replacing windows with shatter-resistant glass and seismic retrofits	Example: Public outreach, real estate disclosure, and school-age and adult education programs	Example: Stream corridor restoration that helps minimize flooding during storms	Example: Warning systems, evacuation planning, and emergency response training	Example: Storm sewers to reduce flooding, retaining walls to prevent landslides
					

Place Dot Below

What Hazards Concern You the Most?

Hazards	Place Dot Here
Earthquake	
Landslide	
Civil Disorder	
Winterstorms	
Acts of Violence	
Transportation Incidents	
Wildfires	
Hazardous Materials Incidents	
Excessive Heat	
Floods	
Tsunamis	
Utility Failure	
Wind Storms	

Table 1

What is Hazard Mitigation?: Learn more about the planning process

Table 2

Interactive Risk Mapping: See our initial mapping and show us where your concerns are

Table 3

Storytelling: Tell us about how you've experienced disasters

Table 4

Mitigation Ideas: Share your ideas on mitigation projects

Clallam County Multi-Jurisdictional Hazard Mitigation Plan

January 29, 2019 at 6:00PM

Understanding Disasters: Hazard Risks

Please save the date of January 29, 2019 at 6:00PM for community member attendance at an open house meeting on the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. This meeting will be held at **Peninsula College – Building J, Room J-47 at 1502 E Lauridsen Blvd. in Port Angeles.** Your attendance is very important to ensure the plan has a positive affect for all community members. In addition, an online survey is available to help us learn more about your concerns. https://www.surveymonkey.com/r/KBTQXMF

Hazard mitigation planning identifies the most likely hazards that may impact the community (i.e., earthquakes, fires, floods) and prescribes activities to decrease the risks posed by them. This meeting will serve as an opportunity to introduce you to hazard mitigation planning and hear your perspective on how the County can better address hazards impacting the community.

Hazard mitigation planning is an important part of protecting our community. Not only does it allow the County to receive Federal Emergency Management Agency (FEMA) funding in the event of a disaster, but also lays a plan down on paper as to what should be done in the event of an emergency. As events across the globe have shown; having a plan in place in the event of a crisis can help save lives and money.

Thank you for your participation in creating this plan.

Ron Cameron
Clallam County Undersheriff

Clallam County Hazard Mitigation Plan Update

Public Meeting #1

Tuesday, January 29, 2019 | 6:00-8:00pm | Peninsula College

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Meeting Objectives

- Overview of the Planning Process
- Initial Hazard Identification Results
- Open House
- Next Steps



Why Do We Plan?

What is Hazard Mitigation Planning?

- A commitment to reduce risks posed by hazards
- A comprehensive and inclusive planning process
- Development of a mitigation strategy with clear and concrete actions



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Mitigation vs. Adaptation



Thames Barrier, London



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Whole Community Planning

- Community members
- Local government and regional agencies
- Neighboring jurisdictions
- Regulatory agencies
- First responders and health care corporations
- Private sector and industry
- Community- and Faith-based Organizations



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Hazard Identification Results and Overview

Initial Hazard Rankings

1. Cascadia Earthquake
2. Earthquake (other faults)
3. Disease
4. Power Outages
5. Wildfire
6. Windstorm
7. Winter Storm
8. Active Shooter
9. Hazardous Materials Incident
10. Landslide

Others: Flooding, tsunami, drought

- What do you agree and disagree with?
- How do these hazards impact you?
- How would you like to see the County reduce risks associated with these hazards?

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Next Steps and Wrap Up

Contact Information

County Project Lead
Ron Cameron
360-417-2570
rcameron@co.clallam.wa.us

E & E Project Manager
Zane Beall
503-248-5600 x4622
zbeall@ene.com

Open House

Table Topics

- Table 1 – *What is Hazard Mitigation?: Learn more about the planning process*
- Table 2 – *Interactive Risk Mapping: See our initial mapping and show us where your concerns are*
- Table 3 – *Storytelling: Tell us about how you've experienced disasters*
- Table 4 – *Mitigation Ideas: Share your ideas on mitigation projects*

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Name	Town
Zane Beall	Portland
CINDY KELLY	Port Angeles
STEVE JOHNSON	" "
ANN JOHNSON	" "
BLAINE ZECHENELLY	CLALLAM CO. FIRE 3rd
DALE BLANKENSHIP	SEQUIM
Donna & Jim BUCK	JOYCE
ART DEWEY - CERT 7	SEQUIM
HAL MANG	Sequim
Macki Mang	Sequim
Bill BAUM	Sequim
Diana Baum	Sequim
Brian PHILLIPS	Port Angeles
Tyler CONKLE	PORT ANGELES
Dennis & Julie Shelp	Port Angeles
Rich & Deb Benum WAG	Sequim
Jim Stoffer	sequim school board
Mike Dancing	Pt. Angeles
GARY GERTIG	PORT ANGELES
DAVE Kash	P.A.
Dwight & Karen Durand	Sequim
DAVE ANDERSON	PORT ANGELES
Rich PREMIRE	Sequim
KAY AHLBURG	Port Angeles
Ethan Strahan	Sequim
Charlie Meyer	Sequim
Melissa Veni	Sequim
Jamye WISECUP	Port Angeles
ANNE SEBASTIAN	JOYCE
Harry Mitchell	Port Angeles

Name	Town
Manique Talaia-Murray	Seattle
JOHN BENTHIN	SEQUIM
Elyabeth Clark	Port Angeles
Brenda White	Sequim
Ted Lund	Sequim
Jayna & David Lehmer	Sequim

Name (Optional):	Jurisdiction: ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions
Happy Valley	Vacant properties, wildfire
Landslide	Burnt Hill redevelopment

Name (Optional):	Jurisdiction: ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

- First city to do it
Sequim 120 gallon tank strapping ordinance — 2 years education campaign

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	Locations and Descriptions
Earthquake	Engineers, volunteers to assess buildings / evaluations. Education. Provide $ estimates
solar flare EMP	Sequim early warning software Tied to Code Red?
EQ	Agnew isolation
Climate Change Planning Team	-Whats status of plan
	Library bldgs - damage assessment team - mobilize, train,
Library	evacuation planning, people showing up at library for shelter
	Virtual Ops Response Team capability Sun Meadows - resilient water/storm water

Name (Optional):	Jurisdiction:
Ted Lund tedlund@waveable.com	☑ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify)

1-5 below are the growing risk of devastating wildfire as recently seen in California. Power lines are a potential source of ignition.

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

	Project Overview and Description	Location of Project
1.	Acceleration of undergrounding of PUD distribution lines in areas most vulnerable to damage from high winds.	Forested areas of the County
2.	Plan for de-energizing power lines during high winds under severe drought conditions.	Forested areas of the County
3.	Define safe places to which people can evacuate in a wildfire emergency.	Populated areas
4.	Manage water resources to enhance public safety in a severe drought. For example, allow irrigation of some fields as safe places.	Dungeness River Basin
5.	Education about safe generator use during emergencies – fire prevention, ventilation, and transfer switches.	County-wide
	Secure local sources of foodstuffs against loss in a disaster. For example, Nash Huber has grain stored in the tsunami zone, vulnerable to loss.	Local Farms, including Nash's at Dungeness.

Name (Optional):	Jurisdiction:
Brenda White 510.290.1496	☑ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with: All - I'm a planner. :)

☑ Earthquake ☑ Disease ☑ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☑ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☑ Other (please specify)

Active Shooters in schools, high capacity venues OR violent intruders

↳ civil disturbance

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	Location of Project
Community Outreach - General Hazard Awareness	Schools - teach the kids, they'll teach their adults
Tsunami Mapping + Outreach County signage / mapping is limited / non-existant / hard to find.	(Model OREGON Coast Mapping GRANT) Countywide - This needs to be robust, posted + shared before the event. EASY access at libraries or online.

Name (Optional):	Jurisdiction: ☑ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident
☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought
☐ Other (please specify)

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	Location of Project
WITH LOSS OF ELECTRICITY OF ANY DURATION A HIGH PERCENTAGE OF COUNTY RESIDENTS WILL LOSE SERVICE FROM THEIR WELLS.	
CONCERN THAT ADEQUATE FACILITIES DO NOT EXIST TO DELIVER POTABLE WATER TO DISTRESSED COMMUNITIES	

Name (Optional):	Jurisdiction: ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☒ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☒ Drought ☐ Other (please specify)

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	Location of Project
Tsunami Evacuation Routes	East of Sequim, + Diamond Point

Name (Optional):	Jurisdiction: ☒ Unincorporated County ☐ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☒ Other (please specify)
Non-disaster Hazard – Drinking water impacts from Septic & other contaminant Sources

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	Location of Project

Name (Optional):	Jurisdiction: ☑ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☐ Power Outages ☑ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☑ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify)

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	Location of Project
RESEARCH AND MAP ALTERNATIVE ACCESS ROADS USING FOREST SERVICE MAPS OF EXISTING ROADS AND BRIDGES TO THE SOUTH OF PORT ANGELES AND SEQUIM OLD LOGGING ROADS AND BRIDGES ACROSS ALL RIVERS AND CREEKS	
ACCESS FOR FOREST FIRE FIGHTING AS WELL AS MOVING GOODS AND SERVICES IN CASE OF MAJOR EARTHQUAKE	
PRESCRIBED BURN AND SUSTAINABLE LOGGING TO MITIGATE SIZE AND INTENSITY OF FIRES	

Name (Optional): Hal Mapes	Jurisdiction: ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☑ Disease ☑ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident
☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought
☐ Other (please specify)

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	Location of Project
Secure Residential Propane Tanks / 120gal Retro funding for Elderly	
Public Gas Station funding backup generators	
Sanitation Plan for backup if Sequim Plant fails or is underwater (tsunami) (Public needs to KNOW)	

Name (Optional):	Jurisdiction: ☐ Unincorporated County ☐ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☒ Tsunami ☐ Drought ☐ Other (please specify)

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	Location of Project
DEVELOP INFRASTRUCTURE/PLAN TO EVACUATE RESIDENTS (2007) FROM INUNDATION AREA AFTER CSZ.	3 CRABS & SEASHORE INUNDATION AREA
DEVELOP A MORE ROBUST COMMUNITY/RESIDENT PREPARATION PROGRAM LIKE MYN THAT	SEQUIM
INVOLVES A LARGER %'age of RESIDENTS. CURRENT COUNTY EXPOSURE NOT	
ROBUST ENOUGH. RAISE LEVEL OF CONCERN	

Name (Optional):	Jurisdiction:
K A J AHLBURG	☒ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☒ Other (please specify)

Electromagnetic Pulse

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

	Project Overview and Description	Location of Project
1	Bring fire stations up to current earthquake code	
2	Provide homeowner information of what would be needed to bring their houses up to current earthquake code, so can make the upgrades if they choose to	
3	Support local communities setting emergency supply centers (see Jorco - Jim Buck).	
4	Planning for Electromagnetic Pulse (EMP)	

TO EMERGENCY MANAGEMENT:

IN LOOKING INTO THE EVENT OF A CATASTROPHIC EMERGENCY PLEASE LOOK INTO CREATING AN EMERGENCY EXIT ROUTE FOR THOSE OF US ON BLACK DIAMOND, HORACE ROAD, DIAMOND VISTA.

RIGHT NOW WE HAVE ONLY THREE OPTIONS OF ESCAPE IN THE EVENT OF WILDFIRE, LITTLE RIVER RD, LAKE DAWN RD OR NORTH ON BLACK DIAMOND. I SUGGEST THAT YOU LOOK INTO EXTENDING WELLMAN RD ACROSS VALLEY CREEK TO ATHLETICS AS AN EMERGENCY ONLY USEAGE. POSSIBLY GATED BOTH ENDS WITH FIRE DEPT HAVING KEYS TO BOTH. I HAVE LIVED ON BLACK DIAMOND FOR 17 YEARS AND THIS HAS been sitting in the back of my mind THAT long.

THANK YOU FOR YOUR TIME

Clallam County

DANIEL KAUFFMAN
1525 BLACK DIAMOND
PORT ANGELES, WA
360-797-4280

APPENDIX A8. PUBLIC MEETING #2

Clallam County Multi-Jurisdictional Hazard Mitigation Plan

March 26, 2019 at 6:00PM

Understanding Disasters: Hazard Risks

Please save the date of March 26, 2019 at 6:00PM for community member attendance at an open house meeting on the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. This meeting will be **held in the Cafeteria at the Forks High School, located at 261 Spartan Avenue, Forks, WA.** Your attendance is very important to ensure the plan has a positive affect for all community members. In addition, an online survey is available to help us learn more about your concerns. https://www.surveymonkey.com/r/KBTQXMF

Hazard mitigation planning identifies the most likely hazards that may impact the community (i.e., earthquakes, fires, floods) and prescribes activities to decrease the risks posed by them. This meeting will serve as an opportunity to introduce you to hazard mitigation planning and hear your perspective on how the County can better address hazards impacting the community.

Hazard mitigation planning is an important part of protecting our community. Not only does it allow the County to receive Federal Emergency Management Agency (FEMA) funding in the event of a disaster, but also lays a plan down on paper as to what should be done in the event of an emergency. As events across the globe have shown; having a plan in place in the event of a crisis can help save lives and money.

Thank you for your participation in creating this plan.

Ron Cameron
Clallam County Undersheriff

Clallam County Hazard Mitigation Plan Update

Public Meeting #2

Wednesday, March 27, 2019 | 6:00-8:00pm | Forks High School

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Jamestown S'Klallam Tribe

Quileute Nation

Clallam County 1854

City of Sequim

Elwha Klallam Tribe

City of Port Angeles

City of Forks

forkswashington.org

Meeting Objectives

- Overview of the Planning Process
- Initial Hazard Identification Results
- Open House
- Next Steps



Why Do We Plan?

What is Hazard Mitigation Planning?

- A commitment to reduce risks posed by hazards
- A comprehensive and inclusive planning process
- Development of a mitigation strategy with clear and concrete actions



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Mitigation vs. Adaptation



Thames Barrier, London



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Whole Community Planning

- Community members
- Local government and regional agencies
- Neighboring jurisdictions
- Regulatory agencies
- First responders and health care corporations
- Private sector and industry
- Community- and Faith-based Organizations



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Hazard Identification Results and Overview

Initial Hazard Rankings

1. Cascadia Earthquake
2. Earthquake (other faults)
3. Disease
4. Power Outages
5. Wildfire
6. Windstorm
7. Winter Storm
8. Active Shooter
9. Hazardous Materials Incident
10. Landslide

Others: Flooding, tsunami, drought

- What do you agree and disagree with?
- How do these hazards impact you?
- How would you like to see the County reduce risks associated with these hazards?

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Next Steps and Wrap Up

Contact Information

County Project Lead
Ron Cameron
360-417-2570
rcameron@co.clallam.wa.us

E & E Project Manager
Zane Beall
503-248-5600 x4622
zbeall@ene.com

Open House

Table Topics

- Table 1 – *What is Hazard Mitigation?: Learn more about the planning process*
- Table 2 – *Interactive Risk Mapping: See our initial mapping and show us where your concerns are*
- Table 3 – *Storytelling: Tell us about how you've experienced disasters*

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02:1391001.CDR-10/19/01-GRA

ecology and environment

Computation Sheet

Project No.	
Preliminary	☐
Final	☐
Void	☐
Sheet ____ of ____	

Project Name: Clallam County Workshop 3/27/19

Subject: Mitigation Strategies

Rev.	Completed By:	Checked By:
X	Initials: / /	Initials: / /
	Initials: / /	Initials: / /

Jim - volunteer

Need to provide Public Ed / Planning ~~docs~~ to the Public -concerned.

→ Need to produce Draft Plan before going Public
- don't want to distribute half-baked Plan

Goals: Goal 5 - Include natural resources / water quality / environment / cultural resources

Risk Assessment - Highest - ① Earthquake and ② Disease. ③ Power outages / Utility Failure

Windstorm + Winter Storm affected County since rankings

Tribal Planner → Dungeness River Coalition - levee setbacks → USACOE
→ conservation efforts

Port Angeles Fire Dept - needs to check w/ PW Dept on most of 2010 project update

Lot of ~~Some~~ Projects just didn't get funded (at local level)

County Projects - mapping - didn't get done but should be easy (GIS)

Hazard Mitigation Plan Update Public Meeting # 2 – Sign In Sheet

NAME	PHONE	EMAIL
1. Zane Beall	503-248-5600	zbeall@ene.com
2. Joe Wright	360-640-9548	adwJoe1207@gmail.com
3. Tom Hughes	360-640-2581	dr_Tom_Rx@msn.com
4. Ron Cameron	360 460 4303	rcameron@co.clallam.wa.us
5. Anne Chastain	360-417-2423	achastain@co.clallam.wa.us
6. Jodi Riker	253-561 5221 Cell tx 360 327-3790	JodiRiker@AOL.com
7. DeeAnna Beck	360-374-2633	
8. Milton M Beck	360-374-2633	mmbeck39@gmail.com
9. Hayley Robbins	360-780-0021	hayleeraer@hotmail.com

NAME	PHONE	EMAIL
10. David Young	360 374-9885	DAVID@RVGUN.NET
11. Sherry Schaaf	360-640-0244	sschaaf05@gmail.com
12. John Richmond	360-374-2414 503-939-1616 mobile	watermaps@hotmail.com
13. JOANN LAWSON	360 461 6933	JOANN.VINCE@GMAIL.COM
14. Susan Sidell	713-494-5714	susan@susansidell.com
15. BILL HENDERSON	360-640-5226	bill.henderson@qvschools.org
16. Alysa West	360-640-1437	alysa.west@qvschools.org
17. Tyler Chatriand	206-624-9537	tchatriand@ene.com
18.		
19.		

Top Hazards in Clallam County Forks Public Mtg 3/27/19

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought

☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Earthquakes (Cascadia)	- Bridges vulnerable, roads - Propane tanks,
	- Pharmacy - Transportation largest concern regarding all hazards

Forks Public Mtg 3/27/19

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
- Fire Dept not reinforced needs retrofit	Forks
- Pharmacy not reinforced - Mortuary needs	
Fuel access	

ecology and environment

Computation Sheet

Project No.	
Preliminary	☐
Final	☐
Void	☐
Sheet ____ of ____	

Project Name: Forks Public Mtg 6pm 3/27/19

Subject:

Rev.	Completed By:	Checked By:
☒	Initials: / /	Initials: / /
	Initials: / /	Initials: / /

- List of above ground fuel tanks + heavy machinery to be utilized in event of emergency

- Transportation - consider alternate methods - air, sea

- Beaver - 700 people - easily cut off
  - no medical facilities

- Hospital not reinforced ??

- Tourists - not aware - education/awareness ...

- Communication - no radio station in Forks
  - warning system

- Power Outages - mostly during winter and for elderly on oxygen

- Disease - bit of an outlier - not a major concern

- Wildfires

- Propane supply - easily cut off, suppliers didn't come in preparation of winter storms from Sequim
  - ditto for medical supplies - med stock. FEMA has a pool of supplies but not specifics for prescriptions

Wildfires - big concern - lots of forest/trees, dry summer forecasted
Priority but not a lot can do about it except to prepare to leave - only 1 way in and out ⇒ Transportation.

* Access to fight fires - lots of decommissioned roads
  - relationships bldg w/ timber companies

ecology and environment

Computation Sheet

Project No.	
Preliminary	☐
Final	☐
Void	☐
Sheet ____ of ____	

Project Name: Forks Mtg p-2

Subject:

Rev.	Completed By:	Checked By:
X	Initials: / /	Initials: / /
	Initials: / /	Initials: / /

Wildfires - is the NPS involved in plan? policy to manage fire could impact community. - Not a partner, but Ron noted they are a good stakeholder in the county.

- educate homeowners to manage property / clear brush, etc
  shake roofs - dry out in summer

Windstorms - normal part of life!
- trees fall on/near houses, power lines, transformers blow out
- Transportation - cut off
- Patio (40') roof blew into a neighbor's house.
- Lot of roof damage
- metal ripped off school roof + industrial warehouse
- Power outage - people don't carry cash - not credit/atm access

⇒ Awareness/education very important
- No cell towers in Beaver, no AM/FM

⇒ Need cell tower in Beaver!
- Forecast/warning ?

Winter storms - Lot of elderly in Beaver - could not get out front door
-neighbors helped
- Long driveways - county plows roads but not driveways/private rds

⇒ Addtl contractors for support? Neighbors?

Active shooter - Trained school (ALICE?)
- What about churches, hospital, etc? Commercial/shopping/businesses?

⇒ prisonhas warning - shelter in place
- County has codered system - mobile app. (Anne)

ecology and environment

Computation Sheet

Project No.	
Preliminary	☐
Final	☐
Void	☐
Sheet ____ of ____	

Project Name: Forks Mtg p. 3

Subject:

Rev.	Completed By:	Checked By:
☒	Initials: / /	Initials: / /
	Initials: / /	Initials: / /

Hazmat Incidents - mainly fuels
- contaminated ~~critical fa~~ drinking water facilities (Beaver)
-

Landslides - should be higher priority
- transportation cut off (112)
- mostly occur in uninhabitated areas

Cyber Terrorism?
Electro Magnetic Pulse? -

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
✓ Bridge Ravine between College & 4 seasons area to mitigate Morris Creek Blockage 101	

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional): Rhonda John Bell	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
Haveing roads Clear we live off of Peters rd On Cougar ridge and when it Snowed there was a big Berm left informed of the problem.	Cougar ridge rd

Region 2 Homeland Security Grant Fund Recap: E16-050

Funding Expires 8/31/17

Last Updated: 8/23/2016

	Starting Funds	Remaining Funds	
	$297,682.00	**$ 297,682.00**	
Clallam County	**Starting Funds**	**Remaining Funds**	**Total Remaining**
Planning	$ 32,729.00	$ 32,729.00	$ 67,082.00
Citizen Prep	$ 19,618.00	$ 19,618.00	
Law Enforcement	$ 14,735.00	$ 14,735.00	
Jefferson County	**Starting Funds**	**Remaining Funds**	**Total Remaining**
Planning	$ 32,729.00	$ 32,729.00	$ 46,959.00
Citizen Prep	$ 8,127.00	$ 8,127.00	
Law Enforcement	$ 6,103.00	$ 6,103.00	
Kitsap County	**Starting Funds**	**Remaining Funds**	**Total Remaining**
Planning	$ 26,729.00	$ 26,729.00	$ 151,645.00
Citizen Prep	$ 71,334.00	$ 71,334.00	
Law Enforcement	$ 53,582.00	$ 53,582.00	
Region 2 Coordination	**Starting Funds**	**Remaining Funds**	
	$ 31,996.00	$ 31,996.00	

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Irene Sehlmeyer	☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☒ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought
☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): FRANK	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
CASCADIA	MILL SITE
117 HWY	OVER 101 BLOCK ACCESS
101 BRIDGE	OVER ELWHA

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional): Pat Elsbree	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
earthquake	Midwest side of Lake Sutherlund daughter's Cabin - by lake - ? water overflow or ? other hazards

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:**
Kim McKie	☐ Unincorporated County ☐ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Lack of Road Access	live ~~BEFORE~~ IN SEQUIM & work IN P.A. – worry About Ability to MOVE BETWEEN
Ability of HOME to WITH STAND	LIVE IN A MANUFACTURED HOME IN SEQUIM MOVEMENT

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☑ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☑ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☑ Landslide ☐ Windstorm ☑ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
LAND CONTAMINATION	STRONG DATABASE RE DRUG/METH LABS, INCINERATION, ETC.

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☒ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☒ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Bluff Erosin	Bluff Drive, PA
Earthquake	Bluff Drop off

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☐ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Rat Misc	In Town At Night

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☒ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
#LARGE TREES NEAR POWER LINES	HIGHWAY 112 + SIDE ROADS

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☒ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe
Which hazards are you most concerned with: ☒ Earthquake ☐ Disease ☐ Power Outages ☐ Wildfire ☐ Hazardous Materials Incident ☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)	
Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:	

Hazard	**Locations and Descriptions**
trapped	Limited ingress/etc from neighborhood rely only on Atterberry in emergency

Top Hazards in Clallam County

Learning about hazards – Clallam County could experience a number of disasters and we want to make sure we are considering the things that concern you most. Please tell us a little about the hazards that most concern you.

Name (Optional):	**Jurisdiction:** ☐ Unincorporated County ☐ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Which hazards are you most concerned with:

☒ Earthquake ☐ Disease ☐ Power Outages ☒ Wildfire ☐ Hazardous Materials Incident

☐ Landslide ☐ Windstorm ☐ Winter Storm ☐ Acts of Violence ☐ Flooding ☐ Tsunami ☐ Drought ☐ Other (please specify below)

Do you have specific hazard locations you would like us to know more about? Tell us as much as you can about the hazard and locations below:

Hazard	**Locations and Descriptions**
Bridges	

APPENDIX A9. PUBLIC MEETING #3

Clallam County Multi-Jurisdictional Hazard Mitigation Plan

March 26, 2019 at 6:00PM

Understanding Disasters: Hazard Risks

Please save the date of March 26, 2019 at 6:00PM for community member attendance at an open house meeting on the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. This meeting will be **held in the Cafeteria at the Forks High School, located at 261 Spartan Avenue, Forks, WA.** Your attendance is very important to ensure the plan has a positive affect for all community members. In addition, an online survey is available to help us learn more about your concerns. https://www.surveymonkey.com/r/KBTQXMF

Hazard mitigation planning identifies the most likely hazards that may impact the community (i.e., earthquakes, fires, floods) and prescribes activities to decrease the risks posed by them. This meeting will serve as an opportunity to introduce you to hazard mitigation planning and hear your perspective on how the County can better address hazards impacting the community.

Hazard mitigation planning is an important part of protecting our community. Not only does it allow the County to receive Federal Emergency Management Agency (FEMA) funding in the event of a disaster, but also lays a plan down on paper as to what should be done in the event of an emergency. As events across the globe have shown; having a plan in place in the event of a crisis can help save lives and money.

Thank you for your participation in creating this plan.

Ron Cameron
Clallam County Undersheriff

Clallam County Multi-Jurisdictional Hazard Mitigation Plan

July 17, 2019 at 6:00PM

Understanding Disasters: Hazard Risks

Please save the date of July 17, 2019 at 6:00PM for community member attendance at an open house meeting on the Clallam County Multi-Jurisdictional Hazard Mitigation Plan. This meeting will be **held at the City of Sequim Civic Center Chambers located at 152 W Cedar Street, Sequim, WA.** Your attendance is very important to ensure the plan has a positive affect for all community members. In addition, an online survey is available to help us learn more about your concerns. https://www.surveymonkey.com/r/KBTQXMF

Hazard mitigation planning identifies the most likely hazards that may impact the community (i.e., earthquakes, fires, floods) and prescribes activities to decrease the risks posed by them. This meeting will serve as an opportunity to introduce you to hazard mitigation planning and hear your perspective on how the County can better address hazards impacting the community.

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Thank you for your participation in creating this plan.

Ron Cameron
Clallam County Undersheriff

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional):	**Jurisdiction:**
MELISSA MURRAY	☐ Unincorporated County ☐ Port Angeles ☐ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
MENTAL PREPARATION	COUNTY WIDE
PREPARE PEOPLE FOR	
THE EMOTIONAL IMPACT OF AN EVENT	

Hazard Mitigation Project Ideas

Identifying solutions – Clallam County is currently updating their Hazard Mitigation Plan, which will help our community access federal funding to address the hazards that most concern you. Do you have a project idea that helps reduce risk in the area? Tell us more!

Name (Optional): SHARON O'REILLY	**Jurisdiction:** ☐ Unincorporated County ☐ Port Angeles ☒ Sequim ☐ Forks ☐ Lower Elwha Klallam Tribe ☐ Jamestown S'Klallam Tribe ☐ Makah Tribe

Do you have specific hazard mitigation project ideas you would like us to consider for inclusion in the Hazard Mitigation Plan? Tell us as much as you can about the project and locations below:

Project Overview and Description	**Location of Project**
LARGE ANIMAL REFUGE	100 DEPTH WIDE

Clallam County Hazard Mitigation Plan Update

Public Meeting #3

Wednesday, July 17, 2019 | 6:00-8:00pm | Sequim Council Chambers

ecology and environment, inc.
Global Environmental Specialists

Jamestown S'Klallam Tribe

Quileute NATION

CLALLAM COUNTY 1854

CITY OF SEQUIM

ELWHA KLALLAM TRIBE

CITY OF PORT ANGELES

CITY OF FORKS

forkswashington.org

ecology and environment, inc.
Global Environmental Specialists

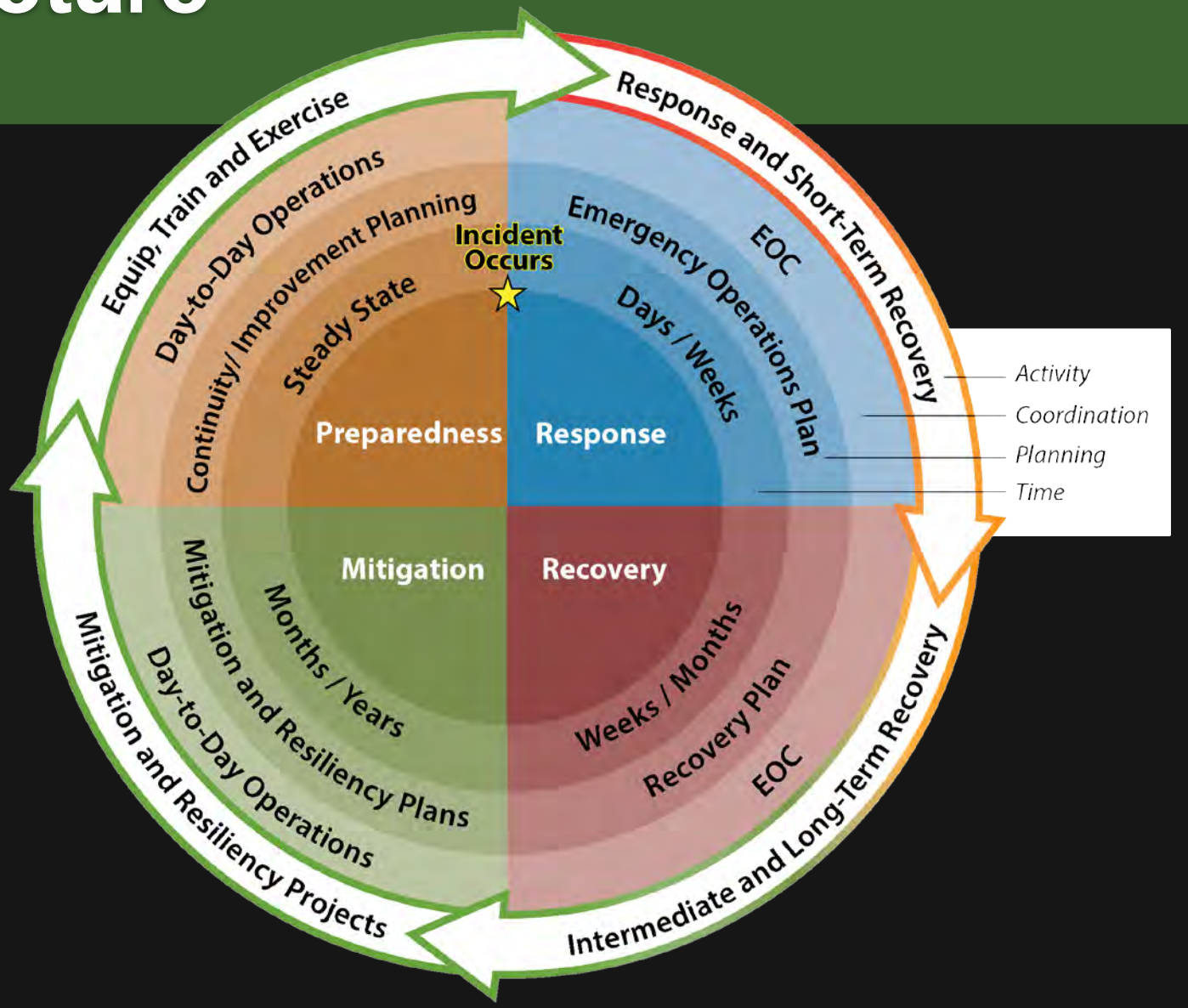
Meeting Objectives

- Overview of the Planning Process
- Understanding Hazards
- Next Steps
- Open House



Why Do We Plan?

The Big Picture



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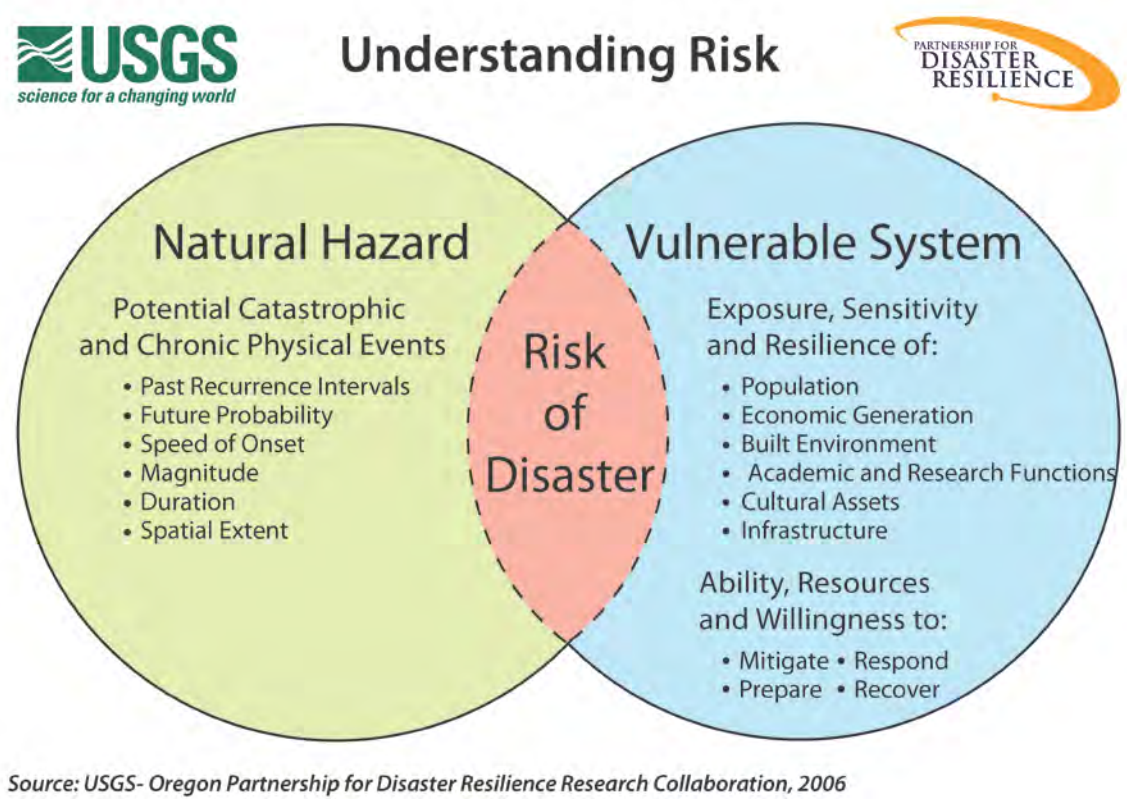
What is Hazard Mitigation Planning?

- A commitment to reduce risks posed by hazards
- A comprehensive and inclusive planning process
- Development of a mitigation strategy with clear and concrete actions



Source: USGS- Oregon Partnership for Disaster Resilience Research Collaboration, 2006

Mitigation vs. Adaptation



Thames Barrier, London



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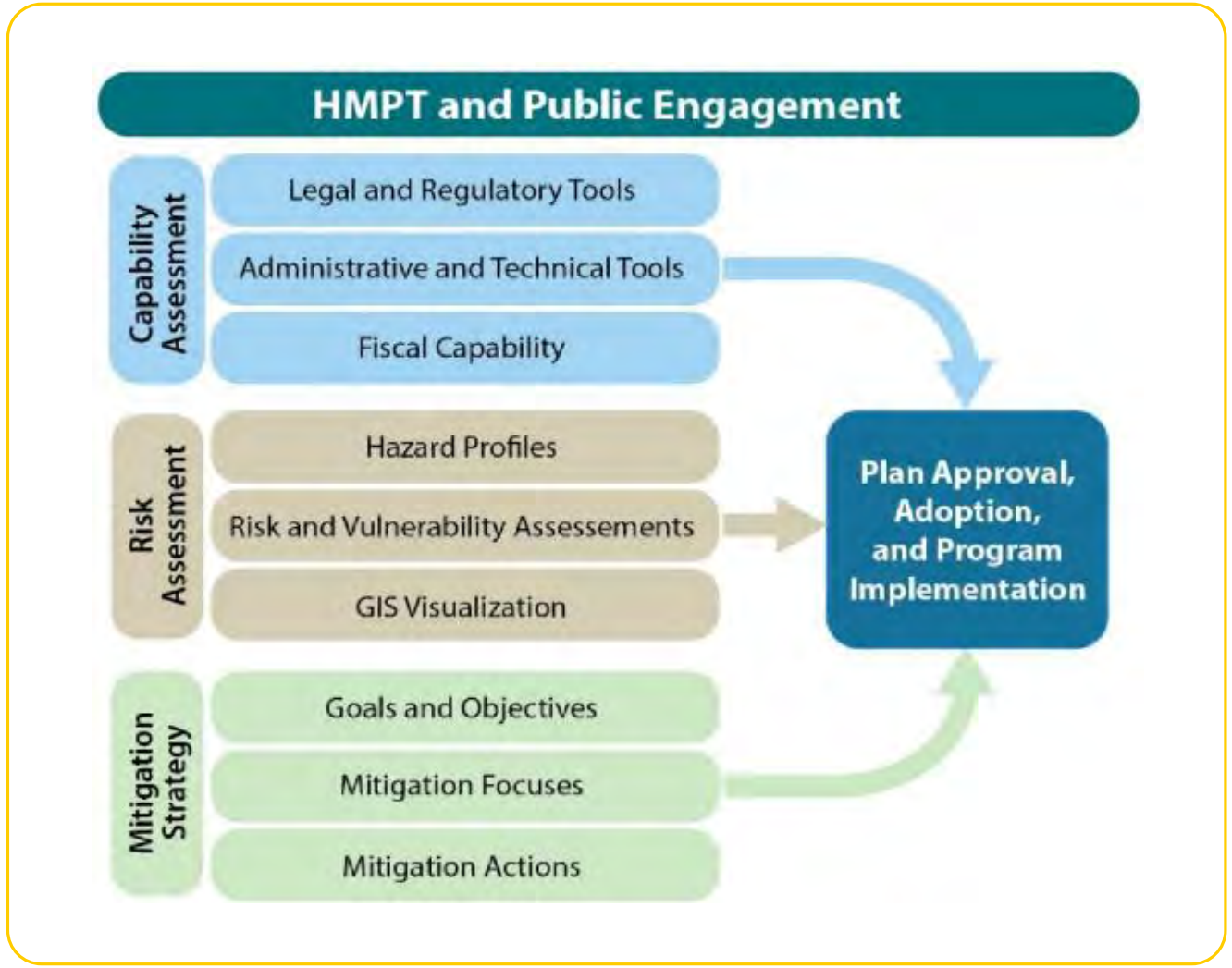
What's in the plan?

- Updated every five years
- Identifies risks
- Outlines capabilities to deal with hazards
- Prescribes actions to reduce risks
- Provides implementation plan
- Reviewed and approved by FEMA
- Opens up funding opportunities



Whole Community Planning

- Community members
- Local government and regional agencies
- Neighboring jurisdictions
- Regulatory agencies
- First responders and health care corporations
- Private sector and industry
- Community- and Faith-based Organizations



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Updated 2019 HMP Goals

- **Goal 1:** Maintain and expand transportation routes across the County, during and after key hazards events.
- **Goal 2:** Maintain emergency services capabilities by providing redundancy.
- **Goal 3:** Maintain key communications to ensure connectivity during and after key hazard events.
- **Goal 4:** Maintain the reliability of utilities (electricity, gas, drinking water, sewer) during and after key hazard events.
- **Goal 5:** Minimize property damage and reduce repetitive losses to property from key hazards.
- **Goal 6:** Increase public participation and responsibility in reducing their risks.

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Understanding Hazards

What is keeping you up at night?

- Hazards
- Locations
- Demographics
- Other concerns?









Initial Hazard Rankings

1. Cascadia Earthquake
2. Earthquake (other faults)
3. Disease
4. Power Outages
5. Wildfire
6. Windstorm
7. Winter Storm
8. Active Shooter
9. Hazardous Materials Incident
10. Landslide

Others: Flooding, tsunami, drought

- What do you agree and disagree with?
- How do these hazards impact you?
- How would you like to see the County reduce risks associated with these hazards?

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Clallam County - Local Hazards

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)	Average	Rank
Cascadia Earthquake	4.75	4.83	3.08	1.25	3.48	1
Earthquake	4.33	4.67	3.17	1.42	3.40	2
Disease	3.58	3.17	3.83	2.82	3.35	3
Power Outages	1.75	4.50	2.83	4.17	3.31	4
Wildfire	2.25	4.00	3.25	2.75	3.06	5
Windstorm	1.92	3.50	2.33	4.42	3.04	6
Winter Storm	2.00	3.25	2.75	4.00	3.00	7
Active Shooter	2.92	5.00	2.17	1.42	2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83	2.83	10
Landslide	1.50	4.42	2.58	2.67	2.79	11
Flooding	1.67	3.33	2.42	3.25	2.67	12
Tsunami	3.25	4.08	2.17	1.08	2.65	13
Drought	1.83	1.58	3.92	2.67	2.50	14

Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure.

Developing Solutions

Preliminary Mitigation Actions

Clallam County

- Design a new/relocated Emergency Operations Center
- Develop Emergency Response Mapping System
- Update FEMA floodplain maps

City of Sequim (2010)

- Upgrade storm drains
- Create program to back up City data
- Power source for water re-use

ecology and environment, inc.
Global Environmental Specialists

Next Steps and Wrap Up

Contact Information

County Project Lead
Ron Cameron
360-417-2570
rcameron@co.clallam.wa.us

E & E Emergency Planner (Seattle)
Manique Talaia-Murray
206-624-9537 x3605
mtalaia-murray@ene.com

Open House

Table Topics

- Table 1 – *Mitigation Ideas: Tell us your ideas for mitigation actions*
- Table 2 – *Interactive Risk Mapping: See our initial mapping and show us where your concerns are*
- Table 3 – *Storytelling: Tell us about how you've experienced disasters*

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APPENDIX A10. PUBLIC ENGAGEMENT

https://www.sequimwa.gov/CivicAlerts.aspx?AID=833

Create an Account - Increase your productivity, customize your experience, and engage in information you care about.

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Organizational Values, Mission, & Vision (PDF)

Photo Gallery



HOME SPOTLIGHTS

Posted on: January 7, 2019

The Clallam County Hazard Mitigation Team Seeks Your Input

Clallam County is updating the County's Hazard Mitigation Plan and needs your help.



- What hazards concern you the most?
- What activities and projects should your community prioritize?

Help us update the plan with your input! **Please share your thoughts by January 29, 2019.** Complete an on-line survey: https://www.surveymonkey.com/r/KBTQXMF

Why should we try to minimize hazards?

Natural and manmade disasters can cause injury, death, and property damage, and impact individuals, families, and the economy. Recovery can take public funding and attention away from other priorities.

What is the County Hazard Mitigation Plan?

The County's Hazard Mitigation Plan will identify and update information about the County's hazard risks, such

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Categories

- All Categories
- City of Sequim News & Alerts
- Home Spotlights

From:	Beall, Zane
To:	"Cameron, Ron"; "@Commissioners"; "AHoffman@co.clallam.wa.us"; "Alisha Vitalis"; "Ann Soule"; "Annette Nesse"; "Ben Andrews"; "Benedict, Bill"; "glen.roggenbuck@elwha.org"; "bill.henderson@qvschools.org"; "Brastad, Andy"; "buckdj@olypen.com"; "Chastain, Anne"; "Dan Gase"; "Dan Orr"; "Dan Shea"; "Dave Bingham"; "David M. Garlington"; "Garcelon, Jennifer"; "gneal@sequim.k12.wa.us"; "station1@clallamfire4.org"; "Heidi Anderson"; "jasper.bruner"; "Julie A. Black"; "kdubuc@cityofpa.us"; "Kevin Gallaci"; "Kevin M. Denton"; "kevin.harris"; "larrym@clallampud.net"; "ljenkins@jamestowntribe.org"; "Marty Brewer "; "Marty Martinez"; "mparkin@cfsd.wednet.edu"; "Patricia Hutson"; "rickson.kanichy@makah.com"; "Rod Fleck"; "Schooler, Joseph F 1SG USARMY NG WAARNG (US)"; "chief@3riversfire.org"; "Sheri Crain"; "Sill, Richard"; "timw@forkshospital.org"; "Tyler, Ross"; "William Paul"; "Winborn, Joel"; "Winborn, Mary Ellen"; "jwisecup@co.clallam.wa.us"
Cc:	Talaia-Murray, Manique
Subject:	Clallam County Hazard Mitigation Plan - Public Outreach
Date:	Thursday, December 13, 2018 3:00:00 PM
Attachments:	image001.jpg

Good afternoon all –

A key component to the success of the Clallam County HMP is thorough public engagement. This helps to ensure that the final plan is addressing the concerns of Clallam County residents and provides an avenue to allow the public to address risk reduction in their own backyards. Our engagement process will be ongoing, but I wanted to reach out to you all in an effort to initiate this process.

Our team has developed a brief online survey to allow the public to provide their initial thoughts on hazards and how they impact their daily lives. I would appreciate if the planning team could socialize the survey link to any available public forums (jurisdictional Facebook pages, media contacts, etc.). The results will be forwarded back to my email and we will be able to go over the results at our next meeting. The link is available right here and associated information can be found below. **Complete an on-line survey:** https://www.surveymonkey.com/r/KBTQXMF

We need your help!
Clallam County is updating the County's Hazard Mitigation Plan and needs your help.

- What hazards concern you the most?
- What activities and projects should your community prioritize?

Help us update the plan with your input! **Please share your thoughts by January 29, 2019.**
Complete an on-line survey: https://www.surveymonkey.com/r/KBTQXMF

Why should we try to minimize hazards?
Natural and manmade disasters can cause injury, death, and property damage, and impact individuals, families, and the economy. Recovery can take public funding and attention away from other priorities.

What is the County Hazard Mitigation Plan?
The County's Hazard Mitigation Plan will identify and update information about the County's hazard risks, such as earthquakes, storms, flooding, and landslides. The plan will also identify the people and facilities at risk and ways to prevent and minimize damage.

Why develop a Hazard Mitigation Plan?
To apply for Federal Emergency Management Agency (FEMA) assistance after a disaster, the County must have an approved mitigation plan. Plans must also be updated every five years to comply with Federal law. A plan also allows a community to apply for hazard mitigation project funding.

Please feel free to reach out to me with any concerns. I look forward to seeing you all in the New Year!

Zane Beall, *Emergency Planner*

333 SW 5th Ave, Suite 600, Portland, OR 97204
Phone: 503-248-5600 ext. 4622 • Cell: 360-904-6828
zbeall@ene.com • www.ene.com

How can we make Clallam County safer, smarter, and more survivable?

We need your help!

Clallam County is updating the County's Hazard Mitigation Plan and needs your help.

- What hazards concern you the most?
- What activities and projects should your community prioritize?

Help us update the plan with your input! **Please share your thoughts by January 29, 2019.**

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The County's Hazard Mitigation Plan will identify and update information about the County's hazard risks, such as earthquakes, storms, flooding, and landslides. The plan will also identify the people and facilities at risk and ways to prevent and minimize damage.

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To apply for Federal Emergency Management Agency (FEMA) assistance after a disaster, the County must have an approved mitigation plan. Plans must also be updated every five years to comply with Federal law. A plan also allows a community to apply for hazard mitigation project funding.

Tell us what you think!

Complete an on-line survey:
https://www.surveymonkey.com/r/KBTQXMF

Send comments by email or phone:
Zane Beall, Ecology and Environment, Inc., Project Manager
zbeall@ene.com; 503-248-5600 ext. 4622

Attend a public meeting:
January 29, 2019
ADDRESS
Presentation at 7 p.m., family-friendly activities, refreshments

What are hazard mitigation projects?

Hazard mitigation projects can help protect the community's people, homes, businesses, and communities from the effects of a disaster, like:

- Stabilizing slopes to prevent landslides.
- Promoting construction that is safer during an earthquake though building codes.

What is the planning process?

A Mitigation Planning Team, including County, City, and Tribal departments will guide the plan update. Elements of the planning process include:

- Identifying hazards and assessing risks
- Choosing mitigation strategies, goals, actions, and projects
- Including community input
- Obtaining State and FEMA approval

City of Sequim Government

@sequimwagov

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City of Sequim Government
December 14 at 12:38 PM ·

• What hazards concern you the most?
• What activities and projects should our community prioritize?

Help us update the Hazard Mitigation Plan for Clallam County! Please share your thoughts by January 29, 2019. Complete an on-line survey:



SURVEYMONKEY.COM

Clallam County Hazard Mitigation Public Survey

Take this survey powered by surveymonkey.com. Create your own...

Like Comment Share

City of Sequim Government
December 10 at 11:25 AM ·

#Sequim City Council Meeting tonight at 6:00 p.m. at the Sequim Civic Center, 152 West Cedar Street. Work session starts at 5:00. See the

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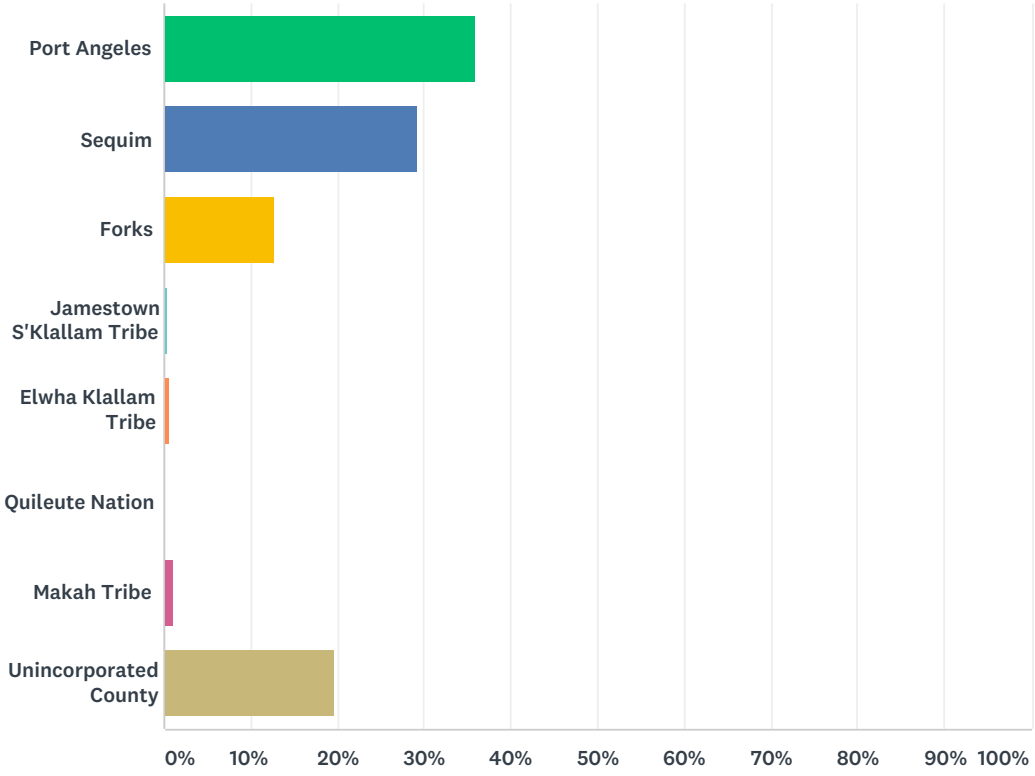
Q1 For which participating community are you responding?

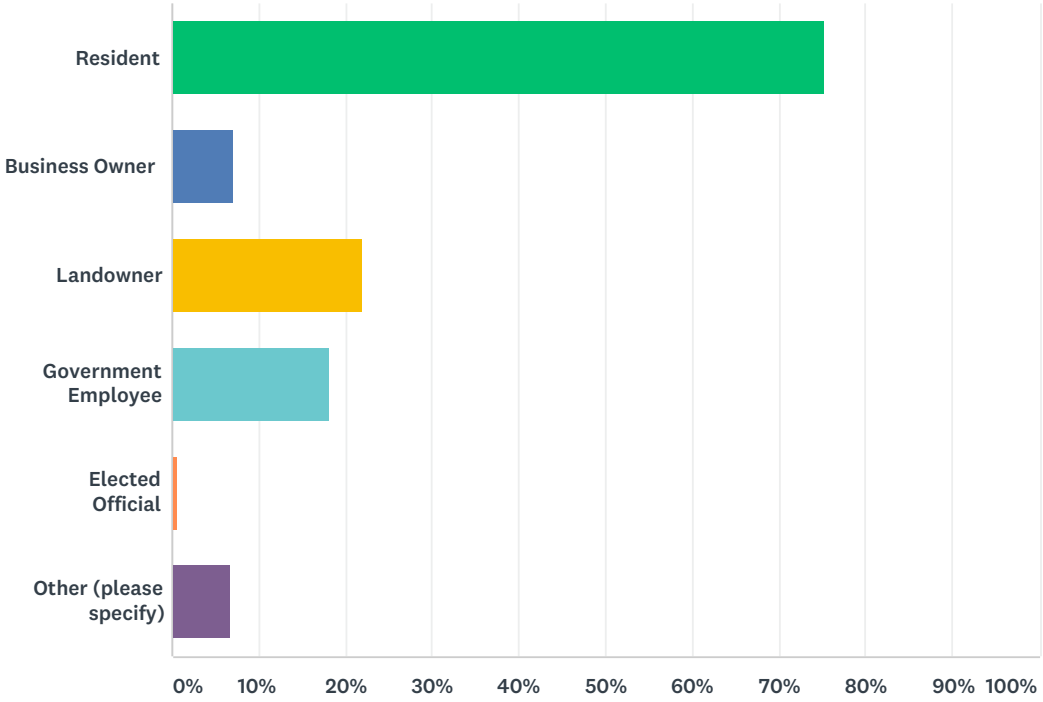
Answered: 552 Skipped: 5



ANSWER CHOICES	RESPONSES	
Port Angeles	36.05%	199
Sequim	29.35%	162
Forks	12.68%	70
Jamestown S'Klallam Tribe	0.36%	2
Elwha Klallam Tribe	0.54%	3
Quileute Nation	0.18%	1
Makah Tribe	1.09%	6
Unincorporated County	19.75%	109
TOTAL		552

Q2 Which of the following best defines your role in the community?

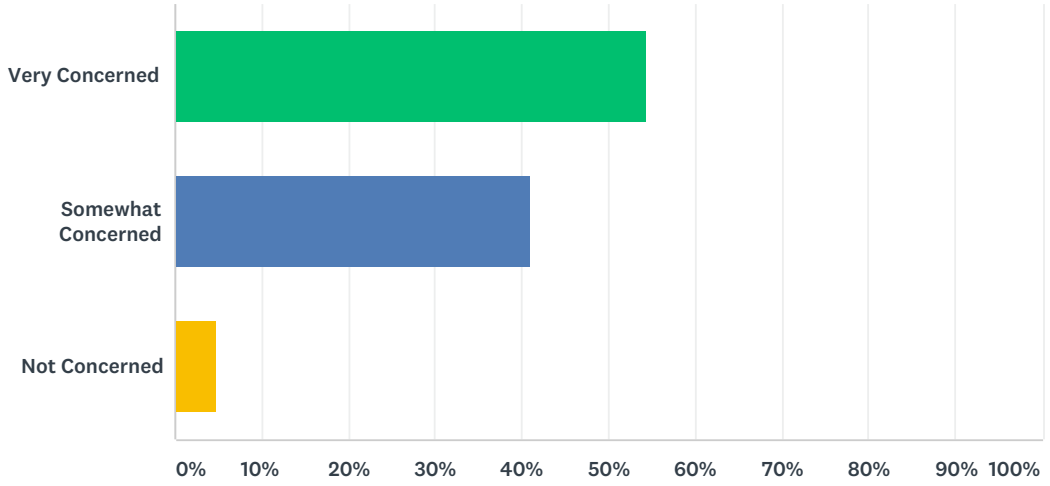
Answered: 553 Skipped: 4



ANSWER CHOICES	RESPONSES	
Resident	75.23%	416
Business Owner	7.05%	39
Landowner	21.88%	121
Government Employee	18.26%	101
Elected Official	0.72%	4
Other (please specify)	6.69%	37
Total Respondents: 553		

Q3 How concerned are you about the impacts of natural disasters in your community?

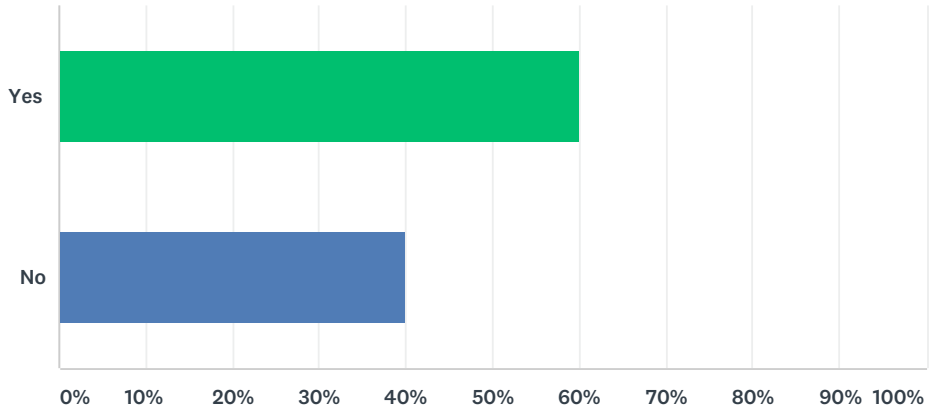
Answered: 552 Skipped: 5



ANSWER CHOICES	RESPONSES	
Very Concerned	54.35%	300
Somewhat Concerned	40.94%	226
Not Concerned	4.71%	26
TOTAL		552

Q4 Have you been impacted by a natural disaster in your community?

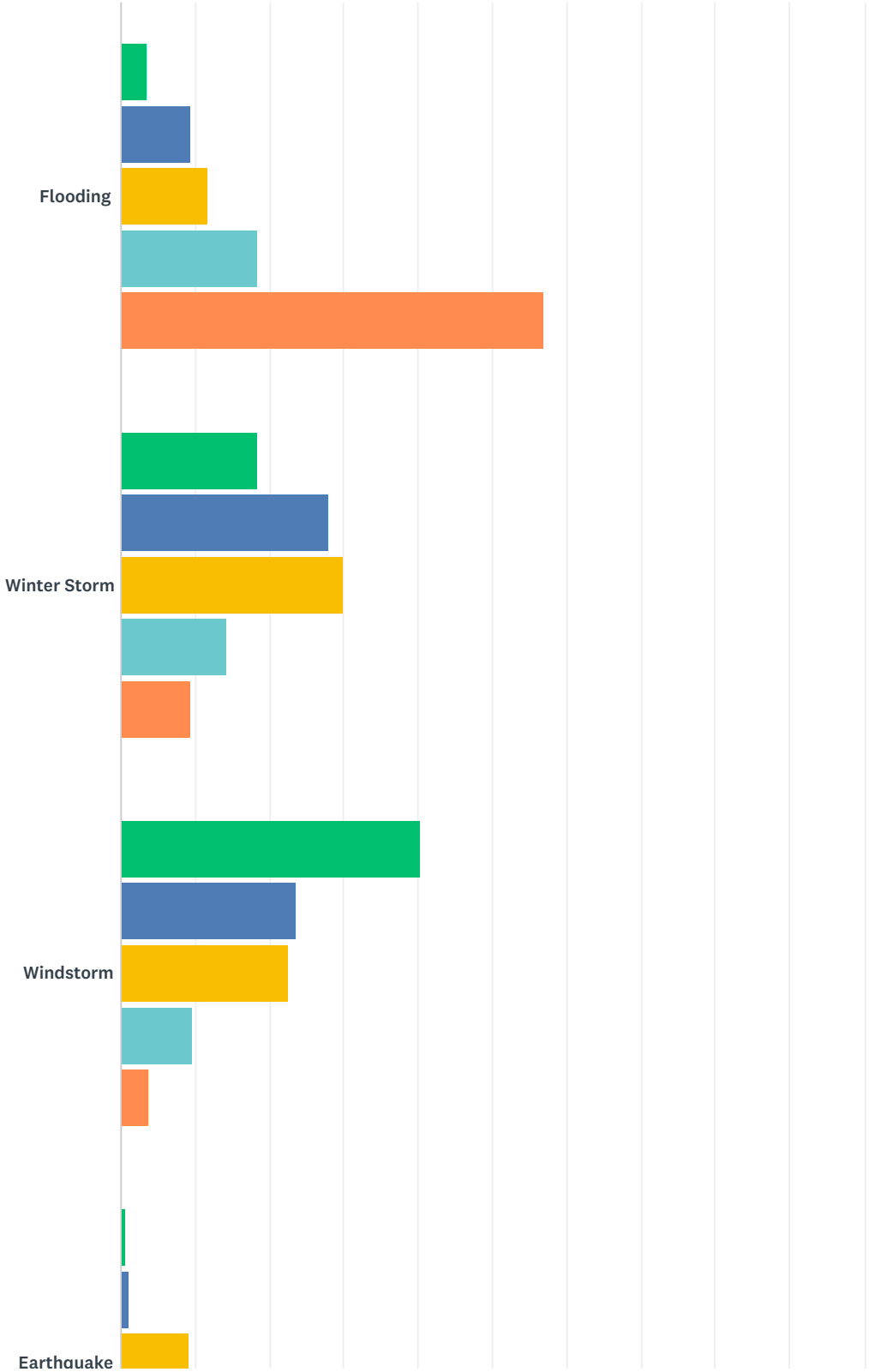
Answered: 553 Skipped: 4

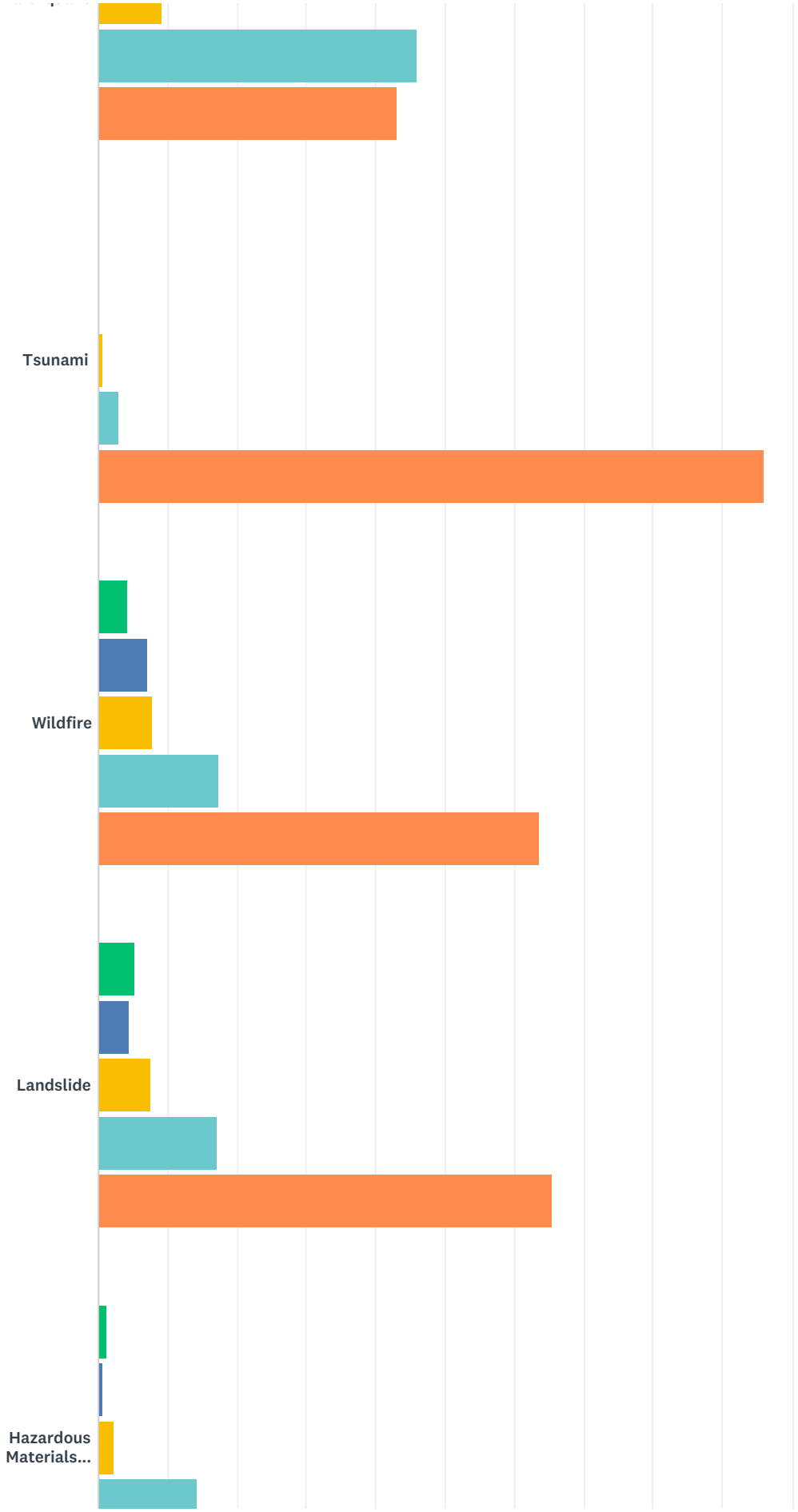


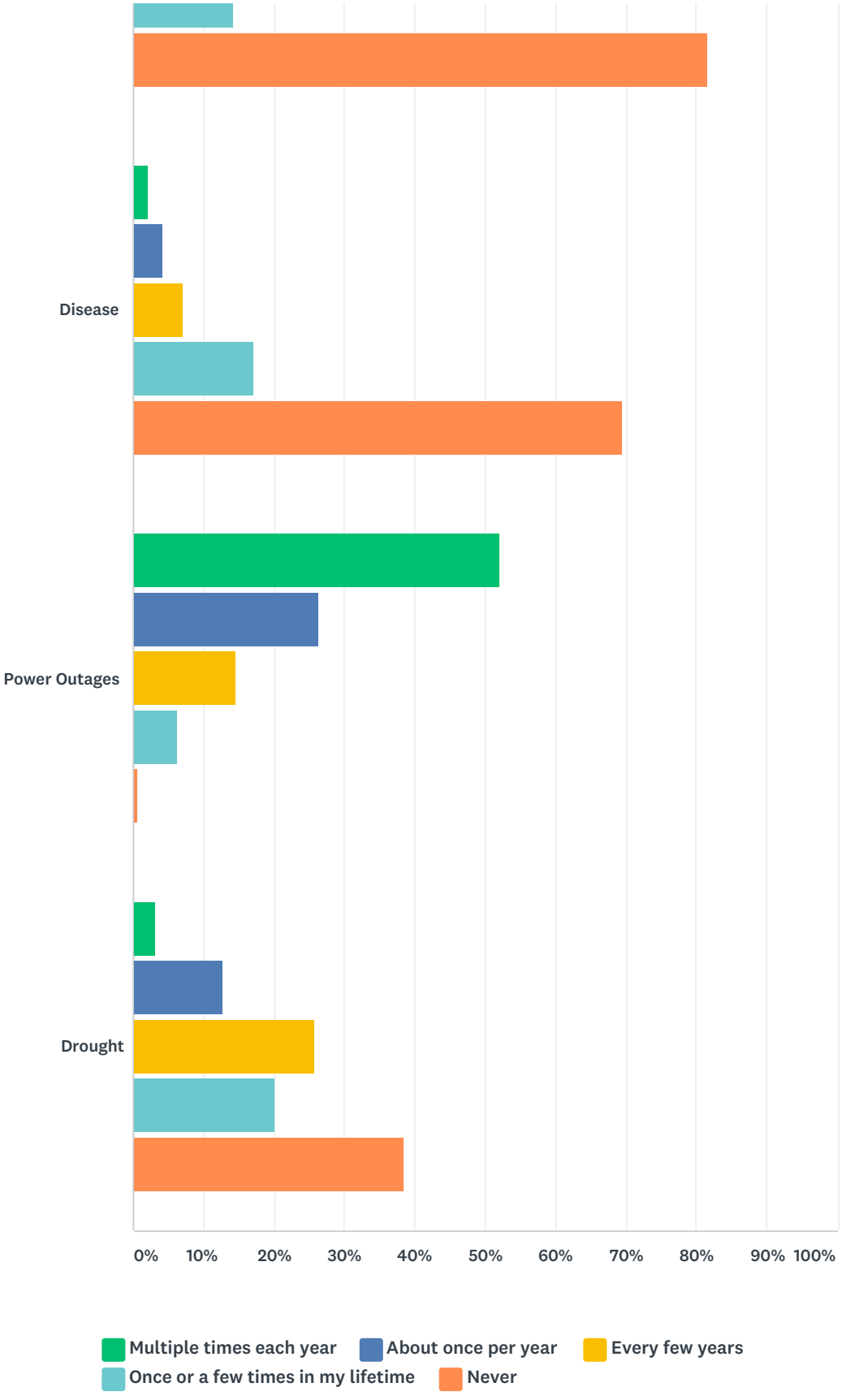
ANSWER CHOICES	RESPONSES	
Yes	60.04%	332
No	39.96%	221
TOTAL		553

Q5 If you answered 'yes' to the previous questions, please indicate the type(s) of disasters and the frequency with which you have experienced them in your community

Answered: 463 Skipped: 94




Tsunami
Wildfire
Landslide
Hazardous Materials...

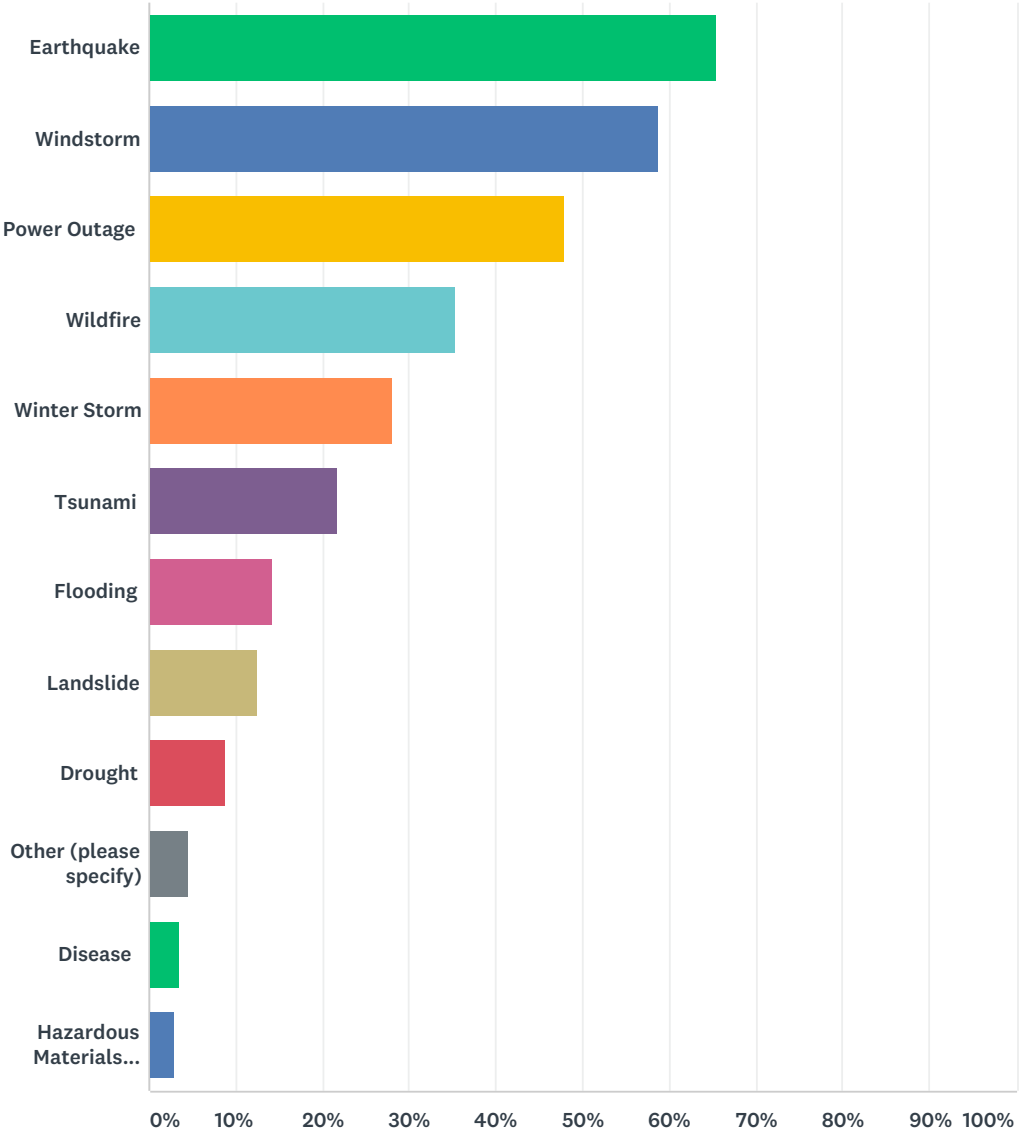


	MULTIPLE TIMES EACH YEAR	ABOUT ONCE PER YEAR	EVERY FEW YEARS	ONCE OR A FEW TIMES IN MY LIFETIME	NEVER	TOTAL
Flooding	3.61% 12	9.34% 31	11.75% 39	18.37% 61	56.93% 189	332

Winter Storm	18.47% 70	27.97% 106	29.82% 113	14.25% 54	9.50% 36	379
Windstorm	40.29% 168	23.74% 99	22.54% 94	9.59% 40	3.84% 16	417
Earthquake	0.56% 2	1.11% 4	9.19% 33	45.96% 165	43.18% 155	359
Tsunami	0.00% 0	0.30% 1	0.60% 2	3.00% 10	96.10% 320	333
Wildfire	4.27% 15	7.12% 25	7.69% 27	17.38% 61	63.53% 223	351
Landslide	5.26% 18	4.39% 15	7.60% 26	17.25% 59	65.50% 224	342
Hazardous Materials Accident	1.19% 4	0.60% 2	2.39% 8	14.33% 48	81.49% 273	335
Disease	2.08% 7	4.15% 14	7.12% 24	17.21% 58	69.44% 234	337
Power Outages	52.02% 232	26.46% 118	14.57% 65	6.28% 28	0.67% 3	446
Drought	3.10% 11	12.68% 45	25.63% 91	20.00% 71	38.59% 137	355

Q6 Please selected the top THREE (3) hazards you think are the GREATEST THREAT to your community, considering both frequency of occurrence and potential for severe damage

Answered: 553 Skipped: 4

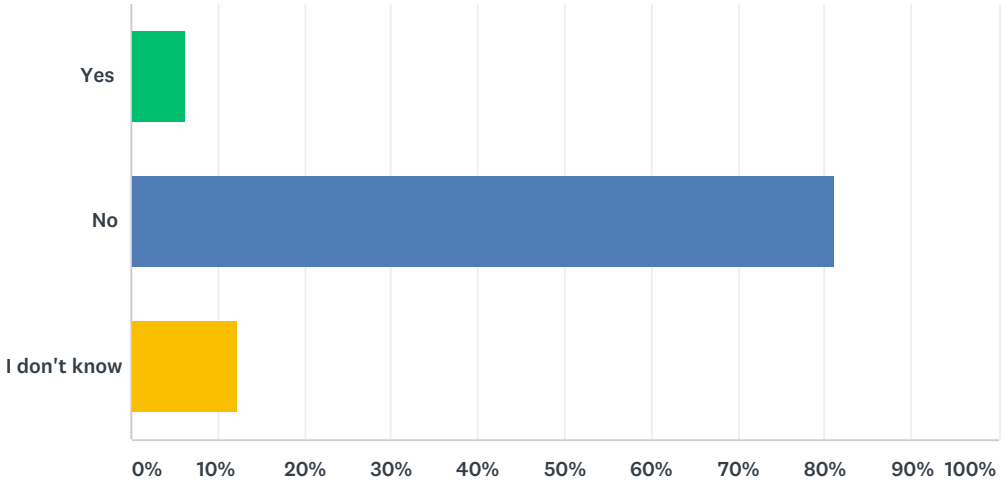


ANSWER CHOICES	RESPONSES	
Earthquake	65.46%	362
Windstorm	58.77%	325
Power Outage	47.92%	265
Wildfire	35.44%	196
Winter Storm	28.03%	155
Tsunami	21.70%	120

Flooding	14.29%	79
Landslide	12.48%	69
Drought	8.86%	49
Other (please specify)	4.52%	25
Disease	3.62%	20
Hazardous Materials Accident	2.89%	16
Total Respondents: 553		

Q7 Is your home or business located in a designated floodplain or flood zone?

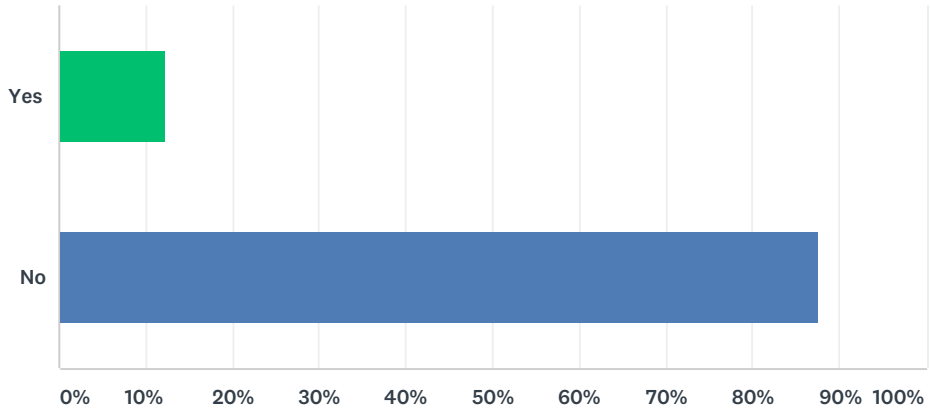
Answered: 550 Skipped: 7



ANSWER CHOICES	RESPONSES	
Yes	6.36%	35
No	81.27%	447
I don't know	12.36%	68
TOTAL		550

Q8 Do you currently have flood insurance?

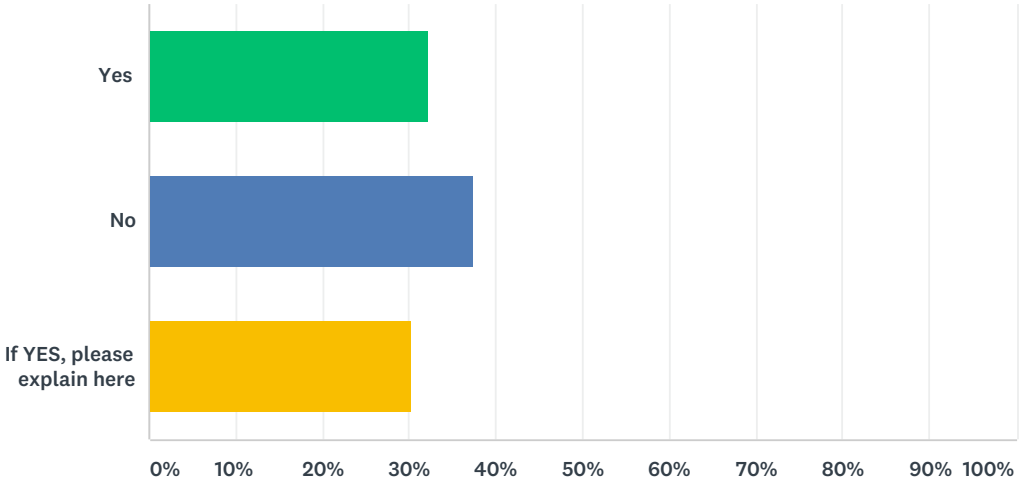
Answered: 549 Skipped: 8



ANSWER CHOICES	RESPONSES	
Yes	12.39%	68
No	87.61%	481
TOTAL		549

Q9 Have you taken actions to protect your home and/or business from impacts of hazards?

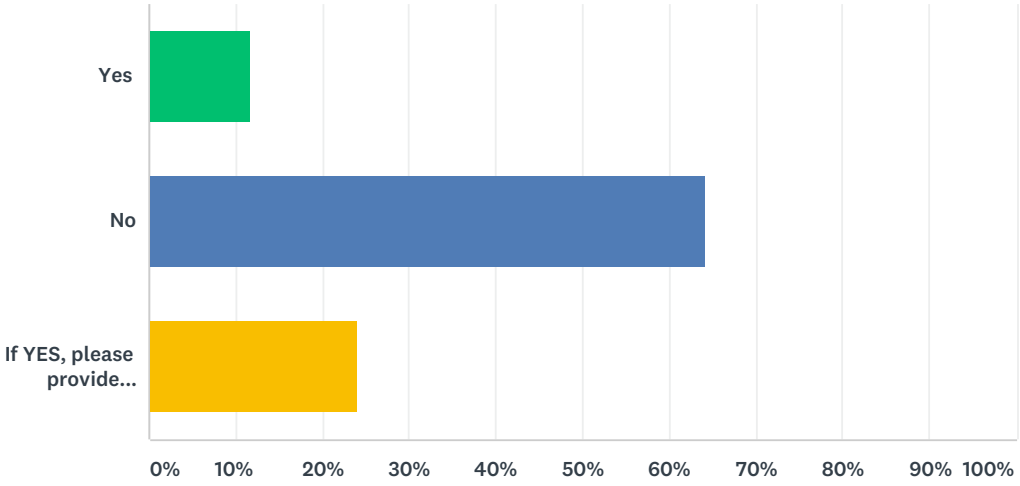
Answered: 554 Skipped: 3



ANSWER CHOICES	RESPONSES	
Yes	32.31%	179
No	37.36%	207
If YES, please explain here	30.32%	168
TOTAL		554

Q10 Do you have project ideas for how to protect the community from the impacts of hazards?

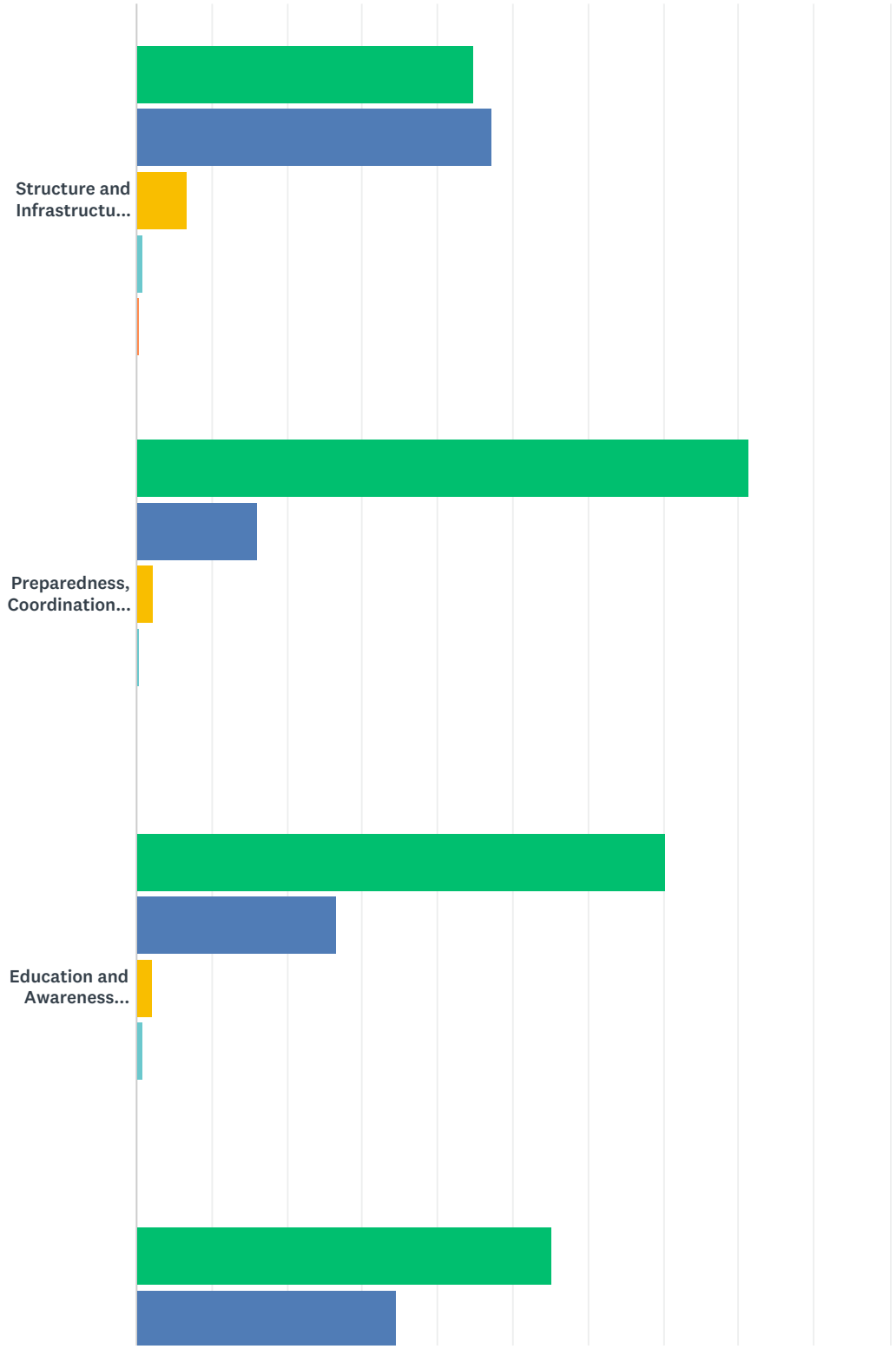
Answered: 548 Skipped: 9

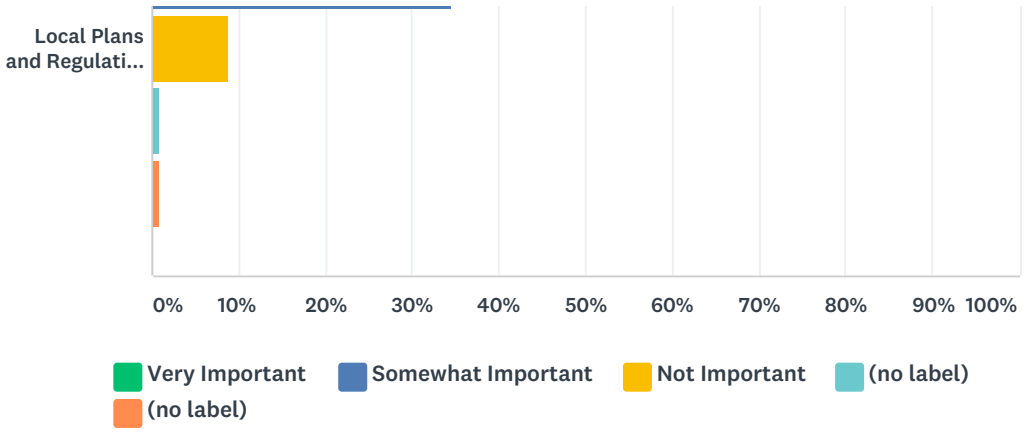


ANSWER CHOICES	RESPONSES	
Yes	11.68%	64
No	64.23%	352
If YES, please provide additional detail on what you would like to see	24.09%	132
TOTAL		548

Q11 A number of community-wide activities can reduce risks from natural hazards. In general, these activities fall into one of the following four (4) general categories. Please tell us how important you think each one is for your community to consider pursuing.

Answered: 551 Skipped: 6





	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT	(NO LABEL)	(NO LABEL)	TOTAL
Structure and Infrastructure Projects - Construct “bricks & mortar” infrastructure and building improvements to eliminate or reduce hazard threats, or to mitigate the impacts of hazards. Examples include new culverts, storm-proof windows, etc.	44.69% 244	47.25% 258	6.78% 37	0.92% 5	0.37% 2	546
Preparedness, Coordination and Response Actions - Ensure that a framework exists to facilitate and coordinate the administration and enforcement of planned activities. Integrate prevention/mitigation activities into all local community operations.	81.28% 443	16.15% 88	2.20% 12	0.37% 2	0.00% 0	545
Education and Awareness Programs - Education and community outreach to raise awareness of overall or hazard-specific risk and generate support for individual or community-wide efforts to reduce risk. Examples include school programs, mailed info, etc	70.33% 384	26.56% 145	2.01% 11	0.92% 5	0.18% 1	546
Local Plans and Regulations - Integrate mitigation into local bylaws, ordinances and regulations to protect vulnerable resources and reduce risk. Examples include development restrictions in flood zones, capital planning for mitigation projects, etc.	55.13% 301	34.43% 188	8.79% 48	0.73% 4	0.92% 5	546

Hazard: ~~Wildfire~~ HAZMAT.	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

URBAN AREAS -
SHORELINE
METH LABS -
HIGHWAY — SEMI'S -
EVERY WHERE -

RAMONIER SITE
MCKINLEY.

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

WATER
GROUNDWATER
RESPIRATORY ISSUES
DEPENDS OF HAZMAT.

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

EVAC - LIMITED TO SITE

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

COST OF REMEDIATION
IMPACT TOURISM
CLAMMING / FISHING INDUSTRY
CROPS

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

EVERY THING

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

WATER TREATMENT
LOSS OF COMM. PROPERTY - CHAIN LINK FENCES -

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

MEDICAL - LONG TERM EFFECT -
FIRE / WSP IN BREMERTON IC 1ST RESP.
DEPT OF ECOLOGY - MITIGATION

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

LONG TERM HEALTH EFFECTS
P.R. OF COUNTY

Hazard: Hazardous Materials Incidents (oil spills)	Name(s): Peninsula College Port of PA Hospital
Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map) Could shut down highway Oil spills @ Port Terminal	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak) hazardous waste @ water supply River/creek
Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite? Displacement would depend on location	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services) Tourism could decrease

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts) could impact vegetation Stream contamination	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage) ↓ if leached into stormwater drains
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services) Decontamination needs	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought) Explosion Fire Blocked Traffic

Hazard: Wild fire	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Forks
Sequim
Blyn

development into the foot hills.

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Smoke
Air quality
Stress

Elder/Asthma

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Short / long / indefinite

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Property loss
tourism loss
business loss

Health impacts

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Air, water, wildlife, pets
stream, river, landslide

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

if burned it will be affected

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Stress on EMT/fire

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

landslides after the fire,
loss of tourism,

Hazard: Wildfire	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)
Anywhere in County	Smoke most universal Evacuation impact

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)
Bigger ongoing Geographicly dependant	

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Hazard: WILD FIRE	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

WILDLAND URBAN INTERFACE –
FRESH LOGGED AREAS –
SUMMER WINDS SHIFT AWAY FROM POPULATIONS GENERALLY – (DEPENDING ON WIND DIRECTION)
101 – CROSSES HWY
KITCHEN-DICK RD GRASS FIRES –

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

SMOKE – COPD & COMP POPULATIONS –
CANADIAN FIRES –
PSYCH & EMOT. IMPACT OF HOMELESS

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

EVACUATION – LARGE SCALES –
SHORT & LONG TERM

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

PEOPLE STAY INSIDE –
TOURIST IMPACT –
FARMING & GRAZING FARMS – (MARSHES)
STAFF EXPENSE ON [redacted] RURAL DEPTS.
ATTACK ON LOGGING INVENTORY

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

WILDLIFE - ASH AFFECTS WATER

CAN CAUSE INASIVE SPECIES UPTICAL

WATER QUALTY - LOW FLOW IN SUMMER

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

HOMES -

FIRE ACTIVELY ON ROAD

~~EROSION & LANDSLIN~~

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

DNR
EMS
FIRE
OMC
LEO
PUD -

EVERYONE
CLINIC - COMP. POP
IN CLINIC COPD ASTHMA

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

EROSION & LAND SLIDES POST EVENT -

HAZMAT PROPANE & DIESEL TANKS -

TOURIST APPEARANCE OF LACK OF SAFETY -

Hazard: Wildfire	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

- Houses Built Around valleys
- Largest fires have been remote into the forest with limited impact to infrastructure

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Smoke in the area. Large population with respiratory problems which could be impacted by smoke

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

- On a limited scale, most fires would probably stay at a neighborhood level
- Short term Displacement for Evacuations but long term for structures lost

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

- The cost of fire response from the various Agencies
- Limited Businesses are in the Wildland urban interface

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

- CAN CAUSE CONTAMINATION ALONG STREAMS
- LIKELYHOOD OF LANDSLIDES INCREASE WITH LOSS OF VEGITATION
- RECOVER AND REPAIR OF IMPACTED AREA

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

- LIMITED RISK TO LARGE FIRES AND LARGE AMOUNT OF STRUCTURES LOST, HOWEVER MOST BUILDINGS IMPACTED WOULD BE A TOTAL LOSS
- ROADS, BRIDGES, AND CULVERTS SHOULD REMAIN INTACT

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

- FIRE RESPONSE AGENCIES
- POSSIBLY SOME SHELTERS FOR EVACUATED PEOPLE.
- PROBABLY NOT A LARGE VOLUME OF PEOPLE WHO WILL NEED EVACUATION.

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

- TIES UP FIRE RESOURCES WHICH ALSO PROVIDE EMS AS DUAL ROLE FIRE/EMS.
- TRAFFIC CONGESTION DUE TO LINES AND FIRE APPARATUS.

Hazard: EARTHQUAKE - TSUNAMI	Name(s): Jim Buck

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

A destructive Earthquake will affect the entire county

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

1. Loss of power affects life support equipment within minutes
2. ... effects dialysis within hrs
3. Movement to emergency services
4. Exposure to weather conditions, hypothermia

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Limited movement of vulnerable people to temporary shelter.

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Few businesses will be able to open without power. Very little business continuity action has taken place.

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Stormwater management will be damaged.
Sewage treatment will stop.

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Serious damage to all infrastructure

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

All especially mental health and critical health care services.

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

1. Mental health long term
2. Business continuity losses of employment over long time
3. Debris management

Hazard: Earthquake / Tsunami (Power outage)	Name(s): Port of PA / Peninsula College / OMC

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Hospitals
Airports (PA / Forks)
Port Terminals
College
Coast Guard
Elementary] Schools
Secondary

- Road System on 101/112 104/Hood Canal Bridge

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Water contamination
Sewage issues

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Yes —
long term to indefinite depending on impact

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Most individuals don't carry cash — & debit or credit

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Shutdown of economic flow for longer than 3 days.

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Oxygen services
Communications

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Medical Rx shortage
Fatalities; disposal or morgue inadequate
Homes; Building damages. may become
unhabitable.

40-60 shelters RC approved in 5 areas

Hazard: WINDSTORM	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

west end
river valley
coast
ridgetops
mountainous areas
anywhere

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

power outage → loss of mobility
transportation
medically dependent on electricity/ oxygen
heat/cold
mental health/stress

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

vulnerable populations
who carries O_2 & how long a supply
who has generators
structural problems

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

businesses closed
property damage

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)
sewage treatment	

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)
communication issues public outreach " 1 public radio KSQM stayed on gist	

[Cascadia Subduction]

Hazard: [Windstorm] [Earthquake] [Tsunami] > Wildfire <	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

- Lake Crescent & SR 112 →
- BPA Corridor →

County wide
(1) Bridges
(2) OMH/
(3) Airports
(4) Lake Crescent
(5) Pysht

(1) SE Sequim
(2) Foothills of PA
(3) West End

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

- Loss of Power – Oxygen consolidators
  - Heat –

H_2O
Sewage

- Assisted Living Homes
- Hospitals

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

[Dampening → Hours/Days]

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

- Closures
- Infrastructure → Roofs; Downed power lines;

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts) • SEWAGE • OIL/MATERIALS • WATER MAIN BREAKS	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services) ?	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Hazard: WINDSTORM	Name(s): JIM B, RON C, LARRY M, ANNE C

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)
FOREST SERVICE RDS TO ACCESS POWER POWER LINES & TRANSPORT CORRIDORS ARE THE SAME 101 & 112 HIGHER POPULATION AREAS - DENSITY PARK LANDS - DIFFERENT INFRASTRUCTURE -	ELECTRICAL DEPENDENT -> HEAT - ELDERLY HYPOTHERMIA -

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)
SHELTER IN PLACE MOSTLY VERN BURTON WARMING SHELTERS - PACH @ OMC -	LOSS TO BUSINESS (FOOD - REFRIGERATION) COSTCO - SAFEWAY WASHBURNS - ONLY STORE IN NEAR BAY LOSS OF BUSINESS BRINGING NEW BUSINESS TO COUNTY TOURISM IMPACT SURFERS HOW APPEARANCE AFFECTS TOURISM $

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

TREES - CHANGE RIVER FLOW
FLOOD PLAINS SHIFT
TAKING OUT WATER LINES -
DEBRIS MGMT -

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

FENCES & ROOFS -
WATER OVER ROADWAY -
STRUCTURES LOST -

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

PENCOM LEO
FIRE/EMS

WATER -

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

FIRES AFTER DOWNED LINES & POWER OUTAGES

COMMUNITY EVENTS PUT ON HOLD OR CANCELLED -

WATER - IMPACT

ANIMALS - PASTURE -

Hazard: WIND STORM	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

FOOTHILLS → ACCESS ROADS DEER PARK
HURRICANE RIDGE
BLACK DIAMOND
MT. PLEASANT
DAN KELLY
EDEN VALLEY

LAKE CRESCENT
HIGHWAY 112
EDGEWOOD DRIVE

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

- OXYGEN GENERATORS WITH POWER OUTAGE
- MEDICALLY FRAGILE PATIENT WITH NEED POWER
- SEPTIC SYSTEMS AND SEPTIC PUMP STATIONS MAY BECOME TAXED

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

- IF STRUCTURES OR RESIDENCE IS IMPACTED IT could BE long TERM
- OTHERS CAN SHELTER IN PLACE

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

- LARGE POTENTIAL FOR INFRASTRUCTURE REPAIRS
- BUSINESS DAMAGES
- ACCESS BY EMS TO TRANSPORT PEOPLE TO THE HOSPITAL IS HEAVILY IMPACTED

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

- Bluff or slope potential with downed trees.

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

- Falling trees was a big issue that caused a lot of damage
- Roadways were severely blocked by downed power lines and trees.

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

- Power supply
- EMS/Fire
- Roads/transportation/DOT
- Medical facilities

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

- Communications
- Heat in winter
- Fuel for vehicles

Hazard: WINTER STORMS & FLOODING -	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)
LOWLANDS COASTLINE RIVERS - KING TIDES. PYSHT HOKO ELWHA DUNG. QUIL BOGIE SOL DUC - MIN IMPACT WHITCOMB BIMMER	WATER - DISEASE - DEPENDING ON SCOPE -

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)
ALL EVAC PLAN TYPES	COST OF MITIGATION - PURCHASE OF THREATENED PROPERTIES COST OF FLOOD INSURANCE REPAIR & RECOVERY COSTS - FARMING -

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

SALMON RECOVERY
FISHERIES -
SENSITIVE ECO SYSTEMS -

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

YET — CULVERT — ROADS -
BRIDGES WATER SYSTEMS.

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

FIRE
EMS
LEO
PUB WORKS

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

ANIMALS - PASTURE WATER FOR STOCK

Hazard: Winter Storm / Flooding ~~EARTHQUAKE / TSUNAMI~~	Name(s): Port of PA Peninsula College / OMC

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Higher elevations

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

medical surge
mold damage – in homes

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Vulnerable populations
- elderly
- homeless
- mental health

Animal – livestock stranded by water surrounding

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Infrastructure Impacts
- School closures

A lot less supplies able to be brought to Peninsula

Stop ship arrival & unloading @ Port Terminals

airport – impacts may reduce of takeoffs/landings; increase risk damages

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Flooding
~~Wast~~ waste water Treatments overflow to surrounding area / Rivers

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Snowload damage

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Hospital –
increased patient load

Schools –
closed

Public works
Law Enforcement

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

road damage
flooding
mold damage

Hazard: Hazardous Materials	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

PA Harbor –

Oil Spills ARCO Anchorage Spill 1985 270,000gal

ATC Prince Wm Sound 2001 ~500gal

~~Valdez~~ GAZ Diamond 2003 ~500gal

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

acute & chronic exposure to haz material

recreational water activities - no kayaking or swimming

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

long-term

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

tourism

beach combing

fishing

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts) water quality bird + wildlife	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage) Port Piers.
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Hazard: EARTHQUAKE ~~TSUNAMI~~ (stet)	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)

Entire County rural, urban

Significantly: Seguim, 3 Crabs/Dungeness
Lower Elwha
Blyn
Coastal P.A. / Hoko
Pysht, Hoko

Health Impacts: Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)

Mental health/stress

CO - secondary 2°

Water contam. ± lack of supply

Health support (O_2 for all pts)

Sewage system spills — disease

Food/nutrition security

2° Danger from animals

drowning / trauma / hypothermia

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?

Islands of community, indefinitely for some

Power lines across roads
can also displace/isolate communities

Economic Impacts: What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Commerce (other than ~~normal~~ essential) shut down

most likely

Health/med services #1 priority

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Sewer line breaks ⇒ env. damage + health risk

~~Fire ⇒ 2° risk~~

Water supplies disrupted – irrigation ditches, piping not reliable

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Bridges
Roads

Hospital
All public support bldgs
Coast Guard
Assisted living

Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Communications – ppl need info on where to get food, water, meds

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

fire
disease
& injury tx

Hazard: Wildfire	Name(s): Port of PA Peninsula College / OMC

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak)
Could close down highway Park closure w/ people trapped @ ridge Airport – visibility Hospital – visibility possibly could not transport patients	Breathing / Lung Problems – Patients

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite?	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)
Depending on location and need for evacuation Tourists – visitors depending on time of event Homeless encampments in wooded areas	Loss of structures (homes) medical clinics Could close highway

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)	**Structural Impacts:** Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services) Medical Services	**Cascading Effects:** What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought) Healthcare related would be increased respiratory needs

Hazard: Earthquake	Name(s):

Geographic Scope: Which specific properties and important locations are most likely to be impacted by the hazard? (Record locations on provided map)	**Health Impacts:** Are there specific health impacts related to the hazard that may cause secondary hazards? (i.e., water contamination, heat stroke, disease outbreak) Sewer Failure - Pub health Hospital - 4 days

Displacement: Is the hazard likely to cause the displacement of community members, employees, or other populations? Is this displacement likely to be short-term (hours), long-term (days to weeks), or indefinite? short term - stuck where they are long term - Pet friendly shelters	**Economic Impacts:** What economic impacts are likely to occur due to the hazard's occurrence within your identified geographic scope? (i.e., business closing, infrastructure repairs, health and medical services)

Environmental Impacts: What are the likely environmental impacts related to the hazard? Is the hazard likely to cause degradation to specific environmental systems? (i.e., stream contamination, forest degradation, air quality impacts)

Sewage

Structural Impacts: Is the hazard likely to impact property structures and infrastructure? If so, describe the structural and infrastructure impacts. (i.e., culvert damage, bridge/road damage, water treatment damage, building damage)

Logs floating

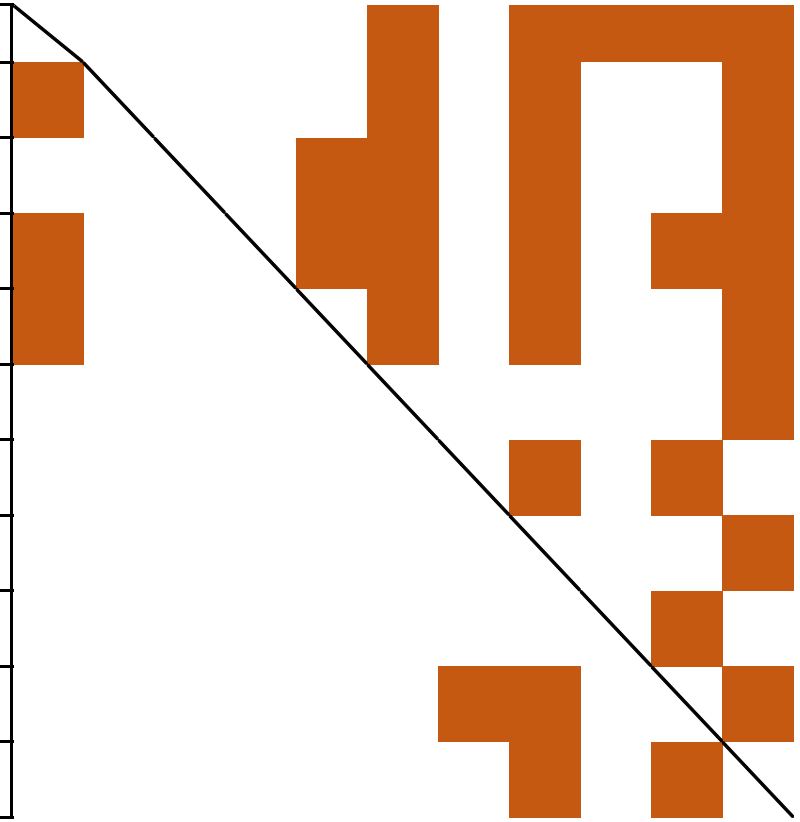
Critical Services: What community services will most likely be taxed by the hazard's occurrence? (i.e., increased medical services or social services)

Everything -
Food - Crime, etc

Cascading Effects: What secondary hazards are likely to be generated by the hazard? (i.e., landslides following an earthquake, fire following a drought)

Power Outage for everything
Landslide
Tsunami
Fire
Crime
Disease

Flooding
Winter Storm
Windstorm
Earthquake
Wildfire
Landslide
Active Shooter
Hazardous Materials Accident
Disease
Social Unrest
Power Outages



Clallam County - Local Hazards

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)	Average	Rank
Cascadia Earthquake	4.75	4.83	3.08	1.25	3.48	1
Earthquake	4.33	4.67	3.17	1.42	3.40	2
Disease	3.58	3.17	3.83	2.82	3.35	3
Power Outages	1.75	4.50	2.83	4.17	3.31	4
Wildfire	2.25	4.00	3.25	2.75	3.06	5
Windstorm	1.92	3.50	2.33	4.42	3.04	6
Winter Storm	2.00	3.25	2.75	4.00	3.00	7
Active Shooter	2.92	5.00	2.17	1.42	2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83	2.83	10
Landslide	1.50	4.42	2.58	2.67	2.79	11
Flooding	1.67	3.33	2.42	3.25	2.67	12
Tsunami	3.25	4.08	2.17	1.08	2.65	13
Drought	1.83	1.58	3.92	2.67	2.50	14

Note: Other hazards receiving votes included: pandemic, smoke inhalation, snowpack drought, and heat exposure. These will be

	Magnitude	**Onset**	**Duration**	**Frequency**	**Average**	**Rank**
Cascadia Earthquake	4.75	4.83	3.08	1.25	3.48	1
Earthquake	4.33	4.67	3.17	1.42	3.40	2
Disease	3.58	3.17	3.83	2.82	3.35	3
Power Outages	1.75	4.50	2.83	4.17	3.31	4
Wildfire	2.25	4.00	3.25	2.75	3.06	5
Windstorm	1.92	3.50	2.33	4.42	3.04	6
Winter Storm	2.00	3.25	2.75	4.00	3.00	7
Active Shooter	2.92	5.00	2.17	1.42	2.88	9
Hazardous Materials Accident	1.92	4.92	2.67	1.83	2.83	10
Landslide	1.50	4.42	2.58	2.67	2.79	11
Flooding	1.67	3.33	2.42	3.25	2.67	12
Tsunami	3.25	4.08	2.17	1.08	2.65	13
Drought	1.83	1.58	3.92	2.67	2.50	14

Magnitude	**Onset**	**Duration**	**Frequency**
2.25	4.00	3.25	2.75

Average	**Rank**
3.06	5

Clallam County - Local Hazards					Name: Anne Chastain
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	3	3	2	5	Hwy 112 (affects commuters), Clallam Bay Doc[?], Hoko/Pysht Lake Dawn, Whitcom [?], Sol Doc, [?], Access to [?], Adult Care Home
Winter Storm	3	2	3	4	City/urban areas, Clallam Bay, Joyce
Windstorm	3	3	2	5	112/113/101, by lake, rural roads: Dan Kelly Place Rd., Agate Beach Rd.
Earthquake	4	5	2	4	Army Corps of Engineers levees
Tsunami	5	1	2	1	Coastal areas
Wildfire	3	3	5	4	
Landslide	1	5	2	2	Agate Beach Rd., Port Angeles Bluff, Olympic Peninsula[?] Trail
Active Shooter	5	5	1	1	Schools, churches, Crabpost[?], Civic Field
Hazardous Materials Accident	3	5	5	2	EDR Hook, Port, Boat Haven
Disease	4	2	3	3	Schools, work places
Power Outages	2.00	5.00	3.00	5.00	
Drought	3.00	1.00	4.00	4.00	
Cascadia Earthquake	5.00	5.00	5.00	1.00	Everyone and everywhere

Clallam County - Local Hazards					Name: Jen Garcelon
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	1	3	3	5	
Winter Storm	2	3	3	4	
Windstorm	1	3	3	5	
Earthquake	2	5	3	2	
Tsunami	2	4	1	1	
Wildfire	2	4	4	4	
Landslide	2	5	4	3	Esp. on Strait of Juan de Fuca
Active Shooter	2	5	3	2	
Hazardous Materials Accident	1	5	3	2	Includes oil/marine spills
Disease	3	4	4	5	Influenza, foodborne illness outbreaks/other communicable disease
Power Outages	2.00	3.00	3.00	5.00	
Drought	1.00	2.00	4.00	3.00	
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:

Populations of concern: older population in Sequim - Tourists and visitors to area, esp. coastal regions

Vulnerable populations - seniors, medically dependent adults, persons living in poverty, CHILDREN, persons w/ disability, ppl w/ >45 min commute (I have 2016 #s for these)

With many hazards, I think of general sanitation, if power goes out, no potable water from wells, septic systems cannot pump, refrigeration goes out = perishable food goes bad

Clallam County - Local Hazards					Name: Kevin Gallam
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	2	3	3	4	Heavier in west county
Winter Storm	2	3	3	5	County wide (CW)
Windstorm	2	3	2	5	CW
Earthquake	5	5	1	1	CW
Tsunami	5	4	1	1	Low lands near straits
Wildfire	1	5	3	5	CW
Landslide	1	5	2	5	Heavier west county - SR 112/113
Active Shooter	2	5	2	1	CW
Hazardous Materials Accident	1	5	2	3	CW
Disease	5	4	5	5	CW
Power Outages	1.00	5.00	2.00	1.00	CW
Drought	2.00	2.00	4.00	4.00	CW
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:

Clallam County - Local Hazards					Name: Ron Cameron
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	2	3	3	3	Elusha, Lower Dungeness, Pysht, Lower Hoko, Quillayute River, Forks area, Bogachiel[?]
Winter Storm	1	3	3	2	Concern for rural areas - Joyce, West End, CB
Windstorm	1	3	2	4	Mostly WC areas - Clallam Bay/Forks/Joyce
Earthquake	5	5	1	1	Large areas of liquefaction in Dungeness/issues throughout county w/creeks
Tsunami	5	4	1	1	Coastal areas - Dungeness, [?], NB[?], Lapush
Wildfire	3	4	3	2	Large areas of county in the rural areas
Landslide	1	4	3	5	Mostly transportation interception - SR 101 and 112 are affected corridors
Active Shooter	2	5	1	1	Difficult - not necessarily focused on population centers
Hazardous Materials Accident	2	5	3	1	Port areas around Port Angeles
Disease	5	3	4	2	Population centers (cities and villages)
Power Outages	1.00	4.00	3.00	5.00	Minimum of once a year especially on west end
Drought	1.00	1.00	5.00	1.00	n/a
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:

Clallam County - Local Hazards					Name: Dan Orr
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	2	3	2	3	Jamestown Beach - Berobs[?] Rd.
Winter Storm	3	4	2	4	District wide - Power/or lack of oxygen; [?] older population
Windstorm	3	4	2	4	Same as winter storm
Earthquake	5	5	5	1	
Tsunami	5	5	5	1	Berobs[?]/John Wayne Marina/Jamestown Beach
Wildfire	2	5	3	3	Dependent on drought
Landslide	3	5	4	2	Depending where, could have significance on Roadways 101, etc.
Active Shooter	3	5	3	1	
Hazardous Materials Accident	2	5	2	3	Because of a lack of industry, not as much as in other places. Limited resources available.
Disease	3	3	3	2	
Power Outages	2.00	5.00	3.00	1.00	
Drought	2.00	1.00	5.00	5.00	
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:
Because of the limited way on/off the peninsula getting more resources - auto/mutual aid truly turns into the issue. P.D/Fire/PUD/Hospital/Public Works/Etc.

Clallam County - Local Hazards					Name: Ann Soule
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	2	4	2	4	Key locations noted in Stormwater Mgmt Plan and CIP
Winter Storm	2	3	3	4	all city
Windstorm	2	3	2	4	"
Earthquake	5	5	2	2	"
Tsunami	2	4	2	2	John Wayne Marina and shoreline (private) landowners (bluff), roads, bridges, and culverts
Wildfire	2	3	3	2	Pockets of forested areas in and surrounding City
Landslide	1	4	2	2	West Sequim Bay Rd. private properties
Active Shooter	2	5	2	2	Schools, City Hall/Civic Center, box stores?
Hazardous Materials Accident	1	5	2	1	Hwy 101, Washington St., box stores?
Disease	2	2	3	1	Nursing homes/hospital and clinics/vulnerable populations
Power Outages	2.00	4.00	3.00	4.00	all city
Cascadia Earthquake	5.00	5.00	3.00	1.00	Long-term drought/heat exposure; exposed areas/lack of shade
Wildfire Smoke	2.00	3.00	3.00	4.00	all city and vulnerable populations, schools, core facilities
Storm Surges/Tides	1.00	1.00	2.00	4.00	Farms, rivers, shallow well owners
Heat Events	2.00	3.00	3.00	4.00	Vulnerable populations, schools, core facilities

Notes:
Vulnerable pops in Sequim need med help > other communities in Clallam County.

Clallam County - Local Hazards					Name: Sheri Crain
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	1	2	2	2	
Winter Storm	1	2	2	2	
Windstorm	2	3	3	3	
Earthquake	3	5	4	1	
Tsunami	1	5	2	1	John Wayne Marina
Wildfire	2	3	3	3	
Landslide	1	1	3	2	
Active Shooter	3	5	3	4	
Hazardous Materials Accident	2	5	2	3	Battelle/ PNNL at the City Limits/ Hwy 101
Disease	3	2	3	2	Significant elderly population/care facilities
Power Outages	2.00	3.00	3.00	4.00	Point of weakness - Bonneville line feeding the Peninsula
Drought	1.00	2.00	3.00	2.00	
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:

Jamestown S'Klallam Tribe Hazard Ranking

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Power Outages	1	5	3	5		3.5	1
Winter Storm	2	4	2	5		3.3	2
Tsunami	5	5	2	1		3.3	3
Cascadia Earthquake	5	5	2	1		3.3	4
Flooding	1	4	2	5		3.0	5
Windstorm	1	4	2	5		3.0	6
Earthquake	5	5	1	1		3.0	7
Active Shooter	4	5	2	1		3.0	8
Hazardous Materials Accident	3	5	2	2		3.0	9
Disease	4	2	4	2		3.0	10
Landslide	2	5	2	2		2.8	11
Drought	1	1	5	4		2.8	12
Wildfire	2	4	3	1		2.5	13

Clallam County - Local Hazards					Name: Leanne Jenkins
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	1	4	2	5	River Center
Winter Storm	2	4	2	5	Jamestown Beach
Windstorm	1	4	2	5	Tribal campus, Jamestown Beach, River Center
Earthquake	5	5	1	1	All
Tsunami	5	5	2	1	Tribal campus, Casino
Wildfire	2	4	3	1	Tribal campus
Landslide	2	5	2	2	Tribal campus
Active Shooter	4	5	2	1	Tribal campus, Casino, enterprises
Hazardous Materials Accident	3	5	2	2	Tribal campus (101 in general)
Disease	4	2	4	2	Jamestown Family Health Clinic
Power Outages	1.00	5.00	3.00	5.00	All; Tribal campus, Jamestown Beach, Casino
Drought	1.00	1.00	5.00	4.00	Golf course (ours), Tribal campus
Cascadia Earthquake	5.00	5.00	2.00	1.00	

Note: Please see the Tribe's Multi-Hazard Mitigation Plan (2011).

City of Port Angeles Hazard Ranking

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Power Outages	2	5	4	5		4	1
Disease	4	4.5	5	2		4	2
Earthquake	4	5	4.5	1		4	3
Cascadia Earthquake	5	5	3	1		4	4
Winter Storm	1.5	3.5	3	5		3	5
Windstorm	1.5	3.5	2.5	5		3	6
Wildfire Smoke	2	3	3	4		3	7
Heat Events	2	3	3	4		3	8
Drought	1.5	1	3	2.5		2	15
Tsunami	3	4	3.5	1		3	9
Wildfire	1.5	4	3.5	2.5		3	10
Active Shooter	2	5	3	1		3	11
Hazardous Materials Accident	1.5	5	3.5	1		3	12
Flooding	2	3	3	2		3	13
Landslide	1.5	4.5	1.5	1		2	14
Storm Surges/Tides	1	1	2	4		2	16

Clallam County - Local Hazards					Name: Ken Dubuc
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	3	3	4	1	Waterfront
Winter Storm	2	4	3	5	All and higher elevations
Windstorm	2	4	2	5	All
Earthquake	5	5	4	1	All
Tsunami	3	3	2	1	Waterfront
Wildfire	2	3	2	1	Mostly to south
Landslide	2	4	2	1	Downslope areas
Active Shooter	1	5	1	1	All
Hazardous Materials Accident	2	5	2	1	All commercial areas
Disease	5	4	5	2	Pandemic; all
Power Outages	3.00	5.00	3.00	5.00	All
Drought	2.00	1.00	5.00	1.00	All
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:

Clallam County - Local Hazards					Name: James Burke
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	1	3	2	3	Downtown PA/County
Winter Storm	1	3	3	5	City of PA/County
Windstorm	1	3	3	5	City of PA/County
Earthquake	3	5	5	1	City of PA/County (portions of western WA)
Tsunami	3	5	5	1	Downtown PA/Coastal areas throughout county
Wildfire	1	5	5	4	NPS/County
Landslide	1	5	1	1	PA/County
Active Shooter	3	5	5	1	
Hazardous Materials Accident	1	5	5	1	Highways/Downtown PA (truck route)
Disease	3	5	5		County wide
Power Outages	1.00	5.00	5.00	5.00	County wide
Drought	1.00	1.00	1.00	4.00	County wide
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:

Lower Elwha Klallam Tribe Hazard Ranking

	Magnitude (1=lowest, 5=highest)	Onset (1=slowest, 5=fastest)	Duration (1=shortest, 5=longest)	Frequency (1=lowest, 5=highest)		Average	Rank
Earthquake	5	5	5	1		4	1
Cascadia Earthquake	5	5	3	1		4	4
Disease	3	5	3	5		4	2
Landslide	2	5	3	5		4	3
Winter Storm	2	3	3	5		3	5
Windstorm	2	4	2	5		3	6
Wildfire	3	5	2	3		3	7
Wildfire Smoke	2	3	3	4		3	9
Power Outages	1	5	2	5		3	8
Heat Events	2	3	3	4		3	10
Drought	2	1	3	2		2	15
Active Shooter	4	5	1	1		3	11
Flooding	1	4	2	2		2	12
Tsunami	2	4	2	1		2	13
Hazardous Materials Accident	2	5	1	1		2	14
Storm Surges/Tides	1	1	2	4		2	16

Clallam County - Local Hazards					Name: Glen Roggenbuck
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	1	4	2	2	Lower Reservation
Winter Storm	2	3	3	5	Entire Reservation
Windstorm	2	4	2	5	Entire Reservation
Earthquake	5	5	5	1	Entire Reservation
Tsunami	2	4	2	1	Lower Reservation
Wildfire	3	5	2	3	All tribal lands
Landslide	2	5	3	5	All tribal lands
Active Shooter	4	5	1	1	Tribal buildings
Hazardous Materials Accident	2	5	1	1	Water treatment plant
Disease	3	5	3	5	Entire Reservation
Power Outages	1.00	5.00	2.00	5.00	Entire Reserve
Drought	2.00	1.00	3.00	2.00	
Cascadia Earthquake	5.00	5.00	3.00	1.00	
Wildfire Smoke	2.00	3.00	3.00	4.00	
Storm Surges/Tides	1.00	1.00	2.00	4.00	
Heat Events	2.00	3.00	3.00	4.00	

Notes:

City of Forks - Local Hazard Rankings

	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Average*	*Rank*
Cascadia Earthquake	5	5	3	1	4	1
Windstorm	1	4	3	4	3	2
Wildfire Smoke	2	3	3	4	3	3
Heat Events	2	3	3	4	3	4
Power Outages	1	1	3	5	3	5
Drought	1	2	3	4	3	6
Storm Surges/Tides	1	1	2	4	2	7
Flooding	2	2	2	1	2	8
Winter Storm	1	1	1	1	1	9
Earthquake	1	1	1	1	1	9
Tsunami	1	1	1	1	1	9
Wildfire	1	1	1	1	1	9
Landslide	1	1	1	1	1	9
Active Shooter	1	1	1	1	1	9
Hazardous Materials Accident	1	1	1	1	1	9
Disease	1	1	1	1	1	9

Notes:

Clallam County - Local Hazards					Name:
	Magnitude (1=lowest, 5=highest)	*Onset (1=slowest, 5=fastest)*	*Duration (1=shortest, 5=longest)*	*Frequency (1=lowest, 5=highest)*	*Impacted Locations*
Flooding	1	5	2	2	Joyce - Area Command 3
Winter Storm	3	5	3	3	Joyce, Pillar Point, Indian Valley
Windstorm	3	5	3	3	micro-islands
Earthquake	5	1	5	1	
Tsunami	1	5	1	1	Near tsunami
Wildfire	4	4	3	1	
Landslide	1	5	3	2	
Active Shooter	4	5	2	1	
Hazardous Materials Accident	3	4	3	2	
Disease	3	2	4	2	
Power Outages	3.00	5.00	1.00	5.00	
Drought	1.00	1.00	5.00	1.00	
Cascadia Earthquake	5.00	5.00	3.00	1.00	

CLALLAM COUNTY
MULTI-JURISDICTION
HAZARD MITIGATION PUBLIC PLANNING PROCESS
AND
HAZARD MITIGATION PLAN

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Effective
Date of FEMA Approval
Date of Board Adoption After FEMA Approval

Clallam County Emergency Management
223 East 4th Street,
Port Angeles, Washington 98362
Phone: 360-417-2483

The 2018 Clallam County Multi-Jurisdiction Hazard Mitigation Plan will be reviewed and updated annually. Comments, suggestions, corrections, and additions are enthusiastically encouraged from all interested parties.

Please send comments and suggestions to:
Clallam County Emergency Management Division
223 East 4th Street
Port Angeles, WA 98362
Phone: 360-417-2483
Email _____

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EXECUTIVE SUMMARY

The Clallam County Multi-Jurisdiction Hazard Mitigation Plan covers each of the major natural hazards that pose significant threats to all jurisdictions in the County.

The mission statement of the Clallam County Multi-Jurisdiction Hazard Mitigation Plan is to:

Identify natural and man-made hazards that threaten the critical infrastructure of Clallam County so all residents can participate in a process to develop a plan that makes the county more disaster resistant and resilient.

Making Clallam County more disaster resistant and disaster resilient means taking proactive steps and actions to protect life safety, reduce property damage, minimize economic losses and disruption, and shorten the recovery period from future disasters.

This plan is a “stand alone” educational and planning document that is intended to inform participating political subdivisions and the public about how hazard mitigation can prepare the County for disasters in a cost-effective manner. It provides current information about natural hazards that threaten each item of critical infrastructure in the County.

Completely eliminating the risk of future disasters in Clallam County is not technologically or economically feasible. However, substantial reductions in negative consequences of future disasters is achievable with the implementation of a pragmatic Hazard Mitigation Plan.

Mitigation is defined as “actions that reduce the potential for negative consequences from disasters.” That is, mitigation actions reduce future damages, losses, and casualties. Effective mitigation planning will help County Jurisdictions deal with natural hazards realistically and rationally. This is done by identifying facilities where the level of risk from one or more hazards may be high and then to finding cost effective ways to reduce that risk. Mitigation planning strikes a pragmatic middle ground between ignoring the potential for major hazard events on one hand and overreacting to the potential for disasters on the other hand.

This mitigation plan focuses on the hazards that pose the greatest threats to the County’s facilities and people: Earthquake, flood, wildlife and urban interface fire and landslide.

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Chapter 1: INTRODUCTION:

1.1 What is a Multi-Jurisdiction Hazard Mitigation Plan?

Public Law 93-288, The Stafford Act, does not require a county to do hazard mitigation planning. However, if Clallam County wishes to qualify for Federal funding to pay for pre- and in some cases post-disaster hazard mitigation, it must complete a hazard mitigation plan. That plan must be approved by the Federal Emergency Management Administration (FEMA).

Hazard mitigation is any action taken to reduce or eliminate long term risk to people and property from natural and man-caused disasters.

A hazard mitigation plan is a strategic guide for decision-makers so they can commit resources to eliminate or lessen the impact of future disasters on infrastructure critical to a community. FEMA requires counties to include political subdivisions in their mitigation plans. Political subdivisions include counties, cities, towns, villages, and special districts such as school districts, water districts, park districts, and port districts.

The number of political subdivisions in Clallam County makes it necessary that the plan address all jurisdictions in the county. For instance, The City of Port Angeles city limits includes city government, the Port Angeles School District, The Port of Port Angeles, WSDOT, Clallam County facilities, Clallam County PUD, Olympic Medical Center, Coast Guard, BPA, National Park Service, Border Patrol, Customs and Immigration and United States Forest Service. When a disaster occurs the residents of the County expect each of these entities to cooperate in providing emergency services. For that reason, this plan includes all federal, state and local government entities plus private public utility purveyors and critical shelters throughout the county, hence the term “multi-jurisdiction plan.” The political subdivisions in this plan will be referred to as Clallam County unless an individual reference is required. The term jurisdiction is interchangeable with political subdivision.

FEMA considers the hazard mitigation planning process to be as important as the finished plan. The process and the plan are a demonstration of a community’s commitment to reduce risks from natural hazards. Therefore, community participation in developing the plan is vital.

This document is designed to be an educational AND planning tool. It is intended to:

- Introduce the public to the concept of hazard mitigation.
- Provide a guide for a planning team to organize the hazard mitigation public process.
- Provide a common Clallam County profile for the public.
- Instruct the public about the mitigation planning process including cost-benefit analysis and STAPLEE.
- Permit the public to help establish goals, objectives and action items for the planning team.
- Provide a guide for plan adoption, implementation and maintenance.
- Provide public access to studies, reports and technical information about hazards effecting the county.

- Provide information on FEMA grant programs.
- Provide guidance about the principles of benefit cost analysis.
- Act as a repository for documentation of the hazard mitigation public process
- Provide access to the Clallam County Hazard Assessment

When the plan is completed, it and the documentation of the public process will be submitted as a package to FEMA for approval.

It is important to recognize that the Clallam County Multi-Jurisdiction Hazard Mitigation Plan is not a regulatory document and does not change existing County policies or zoning, building codes, or other ordinances that apply to the County.

1.2 Why is Mitigation Planning Important for Clallam County?

Completely eliminating the risk of future disasters in Clallam County is neither technologically possible nor economically feasible. However, substantially reducing the negative consequences of future disasters is achievable with proper prior planning.

Effective mitigation planning will help Clallam County identify where the level of risk from one or more hazards may be unacceptably high and then to find cost effective ways to reduce such risk. Mitigation planning strikes a pragmatic middle ground between unwisely ignoring the potential for major hazard events on one hand and unnecessarily overreacting to the potential for disasters on the other hand.

Mitigation planning is important to Clallam County for 2 reasons.

1. It is good government business to protect the taxpayers and their investment in infrastructure from possible hazards.
2. It qualifies the county for federal hazard mitigation grants.

There two types of federal grants:

1. Pre-disaster mitigation funding is used to pay for improvements to infrastructure that will limit damage during a future event.
2. Post-disaster mitigation funding is used to pay for improvements included in rebuilt infrastructure that will limit damage during a future event. Thus, an important objective in developing this plan is to qualify and maintain eligibility for FEMA funding and to enhance Clallam County's ability to attract future FEMA mitigation funding.

Further information about FEMA mitigation grant programs is presented in Appendix 1: FEMA Mitigation Grant Programs.

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1.3 The Clallam County Multi-Jurisdiction Hazard Mitigation Plan

The finished Clallam County Multi-Jurisdiction Hazard Mitigation Plan is a prioritized list of projects and actions that can be undertaken over a five-year period to improve the county's ability to deal with disasters. It has several key elements:

1. Each hazard that may threaten Clallam County facilities is reviewed to estimate its probability (frequency) and severity, i.e. how often and how severe can we expect an earthquake.
2. The vulnerability of each county facility is evaluated to determine the likely physical damages, casualties, and economic consequences resulting from each hazard.
3. Facilities found to be at greatest risk will be identified. A range of mitigation actions will be evaluated to identify actions with the greatest potential to reduce future damage to the facility.
4. Feasible mitigation action items will be arranged in a prioritized list that will be recommended to the Board of County Commissioners (BOCC) as the Hazard Mitigation Plan.
5. Upon receipt of an acceptable list the BOCC will direct Emergency Management to forward the plan and public process package to FEMA.
6. Upon FEMA approval the BOCC will adopt the plan by resolution (See Chapter 5.2).

The mitigation Action Items included in the adopted plan will be accomplished over a 5-year period through ongoing BOCC decision making and capital improvement spending.

1.4 Key Concepts and Definitions

The central concept of mitigation planning is that mitigation reduces risk. That is, risk is the potential for damages, losses, and casualties arising from the impact of hazards on the built environment. The essence of mitigation planning is to identify facilities that are at high risk from one or more natural hazards and to evaluate ways to reduce (mitigate) the effects of future disasters on these high-risk facilities.

There are four key concepts that govern hazard mitigation planning: hazard, exposure, risk, and mitigation. Each of these key concepts is addressed in turn.

HAZARD refers to natural events that may cause damages, losses or casualties, such as earthquakes, tsunamis, and floods. Hazards are characterized by their frequency and severity and by the geographic area affected. Each hazard is characterized differently, with appropriate parameters for the specific hazard. For example, earthquakes are characterized by the probable severity and duration of ground motions while tsunamis are characterized by the areas inundated and by the depth and velocity of the tsunami inundations.

A hazard event, by itself, may not result in any negative effects on a community. For

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example, a flood-prone five-acre parcel may typically experience several shallow floods per year, with several feet of water expected in a 50-year flood event. However, if the parcel is wetlands, with no structures or infrastructure, then there is no risk. That is, there is no threat to people or the built environment and the frequent flooding of this parcel does not have any negative effects on the community. Indeed, in this case, the very frequent flooding (the high hazard) may be beneficial environmentally by providing wildlife habitat, recreational opportunities, and so on.

Figure 1.1 The snake is the HAZARD but if there is no one to bite there is no risk.



The important point is that hazards do not necessarily produce risk to people and property unless there is vulnerable inventory exposed to the hazard. Risk to people, buildings, or infrastructure results only when hazards are combined with an exposure to the hazard.

EXPOSURE is the quantity, value, and vulnerability of the built environment (inventory of people, buildings, and infrastructure) in a particular location subject to one or more hazards. Inventory is described by the number, size, type, use, and occupancy of buildings and by the infrastructure present. Infrastructure includes roads and other transportation systems, utilities (potable water, wastewater, natural gas, and electric power), telecommunications systems, and so on.

For Clallam County, the built-environment inventory of concern is largely limited to the Multi-jurisdiction facilities. For planning purposes, schools are often considered critical facilities because people place a very high priority on providing life safety for children and the buildings may be used as emergency shelters after disasters. This Clallam County Hazard Assessment used (Appendix D) for this process includes all potential shelters in the county.

For hazard mitigation planning, inventory must be characterized not only by the quantity and value of buildings or infrastructure present, but also by its vulnerability to each hazard under evaluation. For example, a given facility may or may not be particularly vulnerable to flood damages or earthquake damages because of the details of its design and construction. Depending on the hazard, different engineering measures of the vulnerability of buildings and infrastructure are used.

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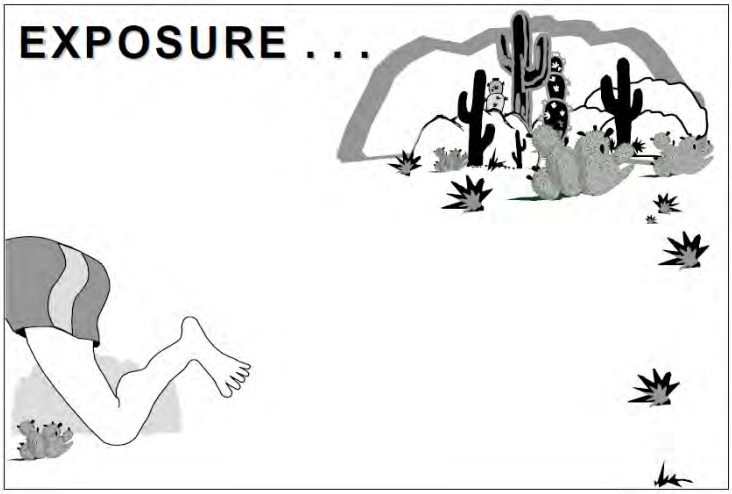
Figure 1.2 A person in snake territory may be EXPOSED to snake bite – but not bitten.



RISK is the threat to people and the built environment. It is the potential for damages, losses, and casualties arising from various hazards. Risk results only from the combination of hazard PLUS exposure as illustrated schematically in Figure 1.4.

Figure 1.3 RISK results from the combination of HAZARD plus EXPOSURE. (Snake + person in same place in snake territory may RISK snake bite)

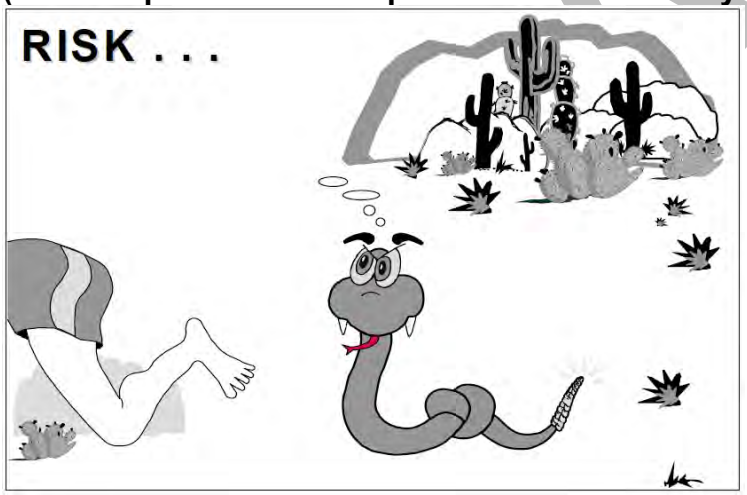


Figure 1.4 Hazard and Exposure Combine to Produce Risk

HAZARD Frequency and Severity of hazard events.	**+**	**EXPOSURE Value and vulnerability of inventory**	**=**	**RISK Threat to the community, people, buildings and infrastructure**

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A disaster happens when a hazard event impacts vulnerable population or inventory. The highest risk in a community occurs in high hazard areas (frequent and/or severe hazard events) with large populations and inventories of vulnerable buildings or infrastructure.

However, high risk can also occur with only moderately high hazard if there is a large inventory of highly vulnerable inventory exposed to the hazard. Conversely, a high hazard area can have relatively low risk if the inventory is resistant to damages (such as strengthened to minimize earthquake damages).

MITIGATION means actions to reduce the risk due to hazards. Mitigation actions reduce the potential for damages, losses, and casualties in future disaster events. Repair of buildings or infrastructure damaged in a disaster is not mitigation. Hazard mitigation projects may be initiated proactively - before a disaster, or after a disaster has already occurred. In either case, the objective of mitigation is always to reduce future damages, losses, or casualties.

A few common types of mitigation projects are shown in Table 1.1 on the following page.

Table 1.1 Examples of Mitigation Projects

Hazard	Common Mitigation Projects
Earthquake	Structural retrofits for buildings
	Nonstructural retrofits for building elements and contents
	Replace existing building with new, current-code building
Tsunami	Enhance evacuation planning, including practice drills
	Build structure for vertical evacuation
Volcanic Hazards	Enhance evacuation planning, including practice drills
Floods	Flood barriers and other floodproofing measures
	Elevate at risk buildings
	Abandon facilities at high risk (possible FEMA buyout) and build new facility outside of floodplain
Wildland/Urban Interface Fires	Enhance defensible space around facilities
	Fuel reduction measures near facilities
	Improve fire resistance of existing buildings with non-flammable roofs, exterior finishes and other fire-safe measures

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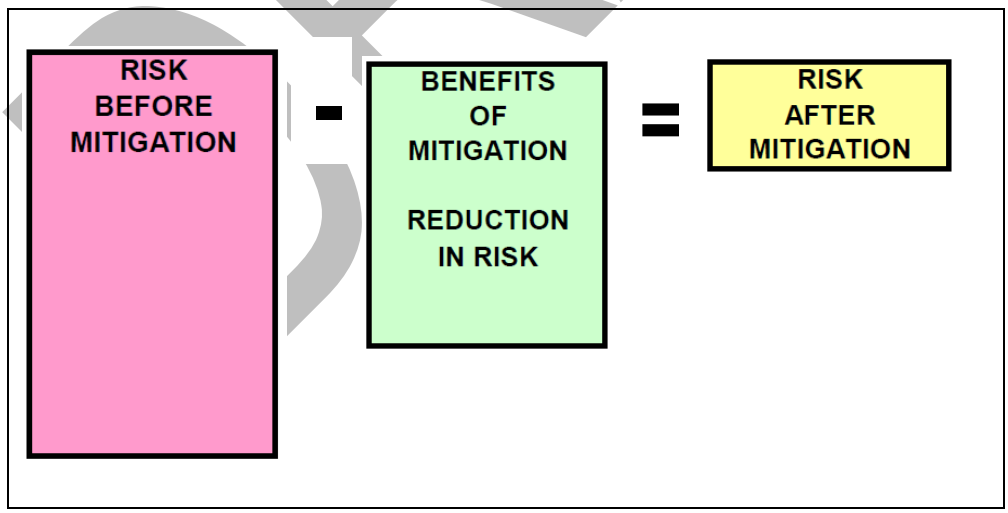
Hazard	Common Mitigation Projects
Landslides	Stabilize slopes with improved drainage and/or retaining walls.
Multi-Hazard	Replace vulnerable facility with new current-code facility, outside of high hazard zones when possible
	Obtain insurance to cover some damage/losses
	Enhance emergency planning, including drills
	Expand education/outreach to improve community understanding of natural hazards

The mitigation project list above is not comprehensive. Mitigation projects can encompass many other actions to reduce future damages, losses, and casualties.

1.5 The Mitigation Process

The key element for all hazard mitigation projects is that they reduce risk. The benefits of a mitigation project are the reductions in risk (i.e., the avoided damages, losses, and casualties attributable to the mitigation project). Benefits are the difference in expected damages, losses, and casualties before mitigation (as-is conditions) compared to after mitigation.

Figure 1.5 Mitigation Projects Reduce Risk



Quantifying the benefits of a proposed mitigation project is an essential step in hazard mitigation planning and implementation. Only by quantifying benefits is it possible to

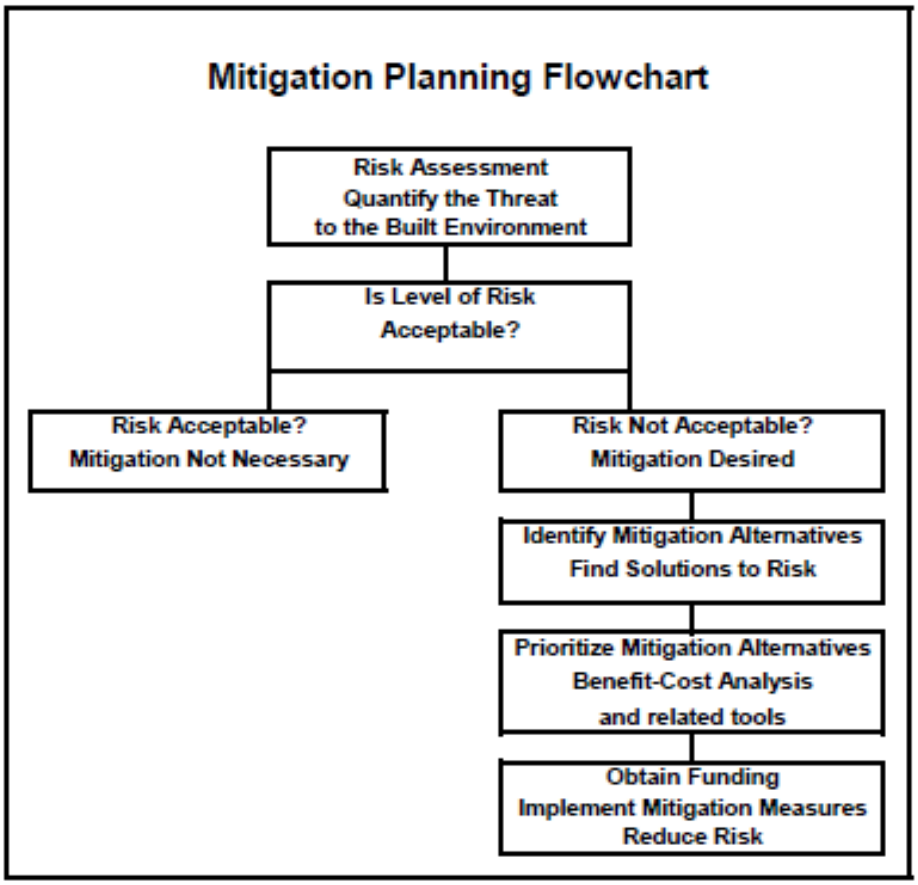
compare the benefits and costs of mitigation to determine whether or not a particular project is worth doing (i.e., whether it is economically feasible). Real world mitigation planning almost always involves choosing from a range of possible alternatives, often with varying costs, and varying effectiveness in reducing risk.

Quantitative risk assessment is vitally important to hazard mitigation planning. When the level of risk is high, the expected levels of damages and losses are likely to be unacceptable to the community and mitigation actions have a high priority: the greater the risk, the greater the urgency of undertaking mitigation.

Conversely, when risk is moderate, both the urgency and the benefits of undertaking mitigation is reduced. It is neither technologically possible nor economically feasible to eliminate risk completely. Therefore, when levels of risk are low and/or the cost of mitigation is high relative to the level of risk; the risk may be deemed acceptable (or at least tolerable). Therefore, proposed mitigation projects that address low levels of risk or where the cost of the mitigation project is large relative to the level of risk are generally poor candidates for implementation.

The overall mitigation planning process is outlined in Figure 1.6, which shows the major steps in hazard mitigation planning and implementation for Clallam County.

Figure 1.6 The Mitigation Planning Process



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The first steps are quantitative evaluation of the hazards (frequency and severity) affecting Clallam County and of the inventory (people and facilities) exposed to these hazards. Together, these hazard and exposure data determine the level of risk for specific locations, buildings, or facilities in Clallam County. This information is available in Appendix D, Clallam County Hazard Assessment.

The next key step is to determine whether or not the level of risk posed by each of the hazards affecting Clallam County is acceptable or tolerable. If the level of risk is deemed acceptable or at least tolerable, then mitigation actions are not necessary or at least not a high priority. There is no absolute universal definition of the level of risk that is tolerable or not tolerable. The public process will help make this determination.

If the level of risk is deemed not acceptable or tolerable, then mitigation actions are desired. In this case, the mitigation planning process moves on to more detailed evaluation of specific mitigation alternatives, prioritization, funding, and implementation of mitigation actions. As with the determination of whether or not the level of risk posed by each hazard is acceptable or not, decisions about which mitigation projects should be undertaken can only be made as part of the public process.

1.6 The Role of Cost-benefit Analysis in Mitigation Planning

Communities, such as Clallam County, that are considering whether or not to undertake mitigation projects must answer questions that don't always have obvious answers, such as:

What is the nature of the hazard problem?

How frequent and how severe are hazard events?

Do we want to undertake mitigation actions?

What mitigation actions are feasible, appropriate, and affordable?

How do we prioritize between competing mitigation projects?

Are our mitigation projects likely to be eligible for FEMA funding?

Cost-benefit analysis (BCA) is a powerful tool that can help communities provide solid, defensible answers to these difficult socio-political-economic-engineering questions. Cost-benefit analysis is required for all FEMA-funded mitigation projects, under both pre-disaster and post-disaster mitigation programs. However, regardless of whether or not FEMA funding is involved, cost-benefit analysis provides a sound basis for evaluating and prioritizing possible mitigation projects for any natural hazard.

Further details about cost-benefit analysis are given in the Appendix 2: Principles of Cost-benefit Analysis.

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1.7 Hazard Synopsis

Volcanoes - Clallam County is not subject to volcanic hazards (except for possibly minor volcanic ash falls) because the county is not in, or near, any of the mapped volcanic hazard zones in Washington State.

Earthquakes - All of the County's facilities are in locations with a high level of earthquake hazard. However, this doesn't mean that the level of earthquake risk is high. The level of earthquake risk varies with the seismic design characteristics of each building. Buildings built to current or recent building codes have lower risk. Buildings built to older building codes generally have higher risk with the level of risk depending on the construction details of each building

Floods – Most Clallam County infrastructure is not subject to floods because the infrastructure is not located near rivers and is not subject to coastal storm surge or channel migration flooding. City of Port Angeles's Rainey well, Dry Creek Water Association's Elwha wells and the City of Port Angeles Elwha intake structure may be at risk.

Storms – Federal, state, county and local government political subdivisions are experienced at responding to wind, rain, snow and ice storms. The county routinely encounters high wind events but is not subject to hurricanes or tornedoes.

Landslides – County infrastructure has a moderate or low to moderate risk of landslide.

Wildland/Urban interface fires - Clallam County facilities are not generally subject to wildland/urban interface fires because the campuses have a relatively low vegetative fuel load, flat topography, Moderate climate and weather conditions, a low number of ignition sources and frequency of fire ignitions, and quick access to fire suppression resources and personnel.

Terrorist attack – The county has no high value terrorist targets so terror attacks are unlikely. It is an international port of entry and has been the scene of attempts by terrorists to enter the United States. Local law enforcement agencies are prepared to support Customs and Border Patrol when needed.

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Table 1.2: County Threat and Vulnerability Assessment

Hazard	Potential	Frequency of Occurrence	Potential Onset	Level of Problem
Avalanche	Negligible - Back Country Only		No Warning	Routine Emergency Event
Earthquake	Limited to Catastrophic Damage	Highly Likely	No Warning	Routine Emergency to Catastrophic Event
Storms Flooding	Limited	Likely	Hours to Days	Routine Emergency Event
Landslides Affecting Roads	Limited	Highly Likely	No Warning to days	Routine Emergency Event
Landslides Affecting Homes	Negligible	Possible	None to Days	Routine Emergency to Disaster Event
Severe Weather	Limited to Disaster	Likely	Hours to Days	Routine Emergency to Disaster Event
Sieche (Crescent or Sutherland)	Negligible	Possible	No Warning	Routine Emergency to Disaster Event
Tsunami, Far	Negligible to Limited at coast <4 feet	Possible	6 – 12 Hours	Routine Emergency Event
Tsunami, Near	Limited at coast <40 feet	Highly Likely	No Warning	Catastrophic Event
Volcano	Negligible	Negligible	No Volcanos	None
Wildland Fire	Limited	Likely	6 – 12 Hours	Routine Emergency to Disaster Event
Dam Failure	Negligible	Negligible	No Major Dams	None
HAZMAT Release	Negligible to Limited	Possible	No warning	Routine Emergency to Disaster Event
Terrorism or Civil Disturbance	Negligible to Limited	Possible	No warning	Disaster Event
Epidemic	Limited to Catastrophic	Possible	>24 Hours	Disaster Event

Table 1.3 shows a sample of the Hazard Assessment Matrix for the five major hazards that threaten each of the County's facilities. These hazard levels are based on statewide GIS data, tsunami, liquefaction, ground shake and landfire maps from DNR, and additional County-specific data developed Clallam County EMD in conjunction with the political subdivisions.

Table 1.3 Sample of Clallam County Hazard Assessment Matrix

Airports												
Community Name	Name of Facility	Facility Address (if app.)	EQ shaking 2% in	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles	William F. Fairchild Intl	1402 Fairchild Airport Rd.	80 %	C	Low/Mod	Low	Very High	Runway reparable Buildings destroyed – Upgrade runway for C-17s	NO	NO	NO	NO
Quillayute	Quilla-yute NAS	500 East Division St	80 %	C	Low/Mod	Low	Very High	Runway reparable – Improve infrastructure for Cascadia response	NO	NO	NO	NO
City of	City of Forks	S Forks Ave	80 %	C	Low/ Mod	Low	Very High	Runway reparable	NO	NO	NO	NO
Sekiu	Sekiu	Sekiu	80 %	C	Low/ Mod	Low	Very High	Runway Reparable	NO	NO	NO	NO
Port Angeles Coast Gu.	Port Angeles Coast Guard	1 Ediz Hook Rd	80 %	D	Mod/Hi	Mod/Hi	Severe	Destroyed – Need to relocate Helos to Fairchild	Very High	NO	NO	NO
Sequim	Sequim Valley Airport	468 Dorothy Hunt Ln	60 %	D	Mod	Mod	Very High	Reparable for Helos	NO	NO	NO	NO
Diamond Point	Diamond Point Airstrip	Airport Way	60 %	C	Low/Mod	Low	Very High	Reparable for Helos	NO	NO	NO	NO
Port Angel	OMC Helipad	939 Caroline St	80 %	D	Mod	Low	Very High	Reparable for Helos	NO	NO	NO	NO

Footnote** none means that the risk is extremely low but there is a small probability of impacts in extreme events.

Further details about these hazards and the level of risk to County facilities and people are presented in the following chapters:

Chapter 6: Earthquakes, Tsunamis and Sieches
Chapter 7: Landslides
Chapter 8: Wildfire (WUI)

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CHAPTER 2: CLALLAM COUNTY MULTI-JURISDICTION PROFILE

2.1 County Location

Clallam County is located at the north end of the Olympic Peninsula in Washington State. It is bordered by Jefferson County on the east, Olympic National Park (and Jefferson County) to the south, the Strait of Juan De Fuca on the north and the Pacific Ocean on the west. It covers a total area of 2,671 square miles, of which 1,738 square miles is land and 932 square miles is water. The majority of the land in the county is timberland and Olympic National Park.

Clallam County's only connections to the outside world are Hwy 101 east through Jefferson County, Hwy 101 west south through Jefferson and Grays Harbor Counties and to Victoria, Canada via the Blackball ferry across the Strait of Juan de Fuca.

Figure 2.1 Clallam County Map



Figure 2.2 Shows that most of the population lives in a narrow strip along the Strait of Juan de Fuca between the Elwha River and Sequim Bay. Approximately 55,000 people live in that area. The remaining 17,000 are scattered in the rural area between the Elwha River and the Pacific Ocean.

The county is easily isolated by the closure of Highway 101. Traffic accidents, HAZMAT incidents, landslides, bridge failures and closure of the Hood Canal Floating Bridge routinely interrupt commercial and passenger traffic.

It is anticipated that a major destructive earthquake could isolate the county from the rest of the United States for months.

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Figure 2.2 Clallam County Google Earth Map



2.2 Multi-jurisdiction Overview – GENERAL

Clallam County's location on the far end of a peninsula requires daily interaction with all jurisdictions in the county. County, city, state, federal, fire district, school and utility jurisdictions routinely deal with emergencies up to and including fires, accidents, major snow, ice, wind and flood events.

The county is not prepared for a `catastrophic incident.' A catastrophic incident means a natural disaster, act of terrorism, or other man-made disaster that results in extraordinary levels of casualties or damage or disruption severely affecting the population (including mass evacuations), infrastructure, environment, economy, national morale, or government functions in an area.

This Multi-Jurisdiction Hazard Mitigation Plan examines all critical infrastructure in the county regardless of jurisdiction. Critical infrastructure is divided into the following categories:

- Airports and runways
- Electric power systems
- Hazardous materials threats
- Natural gas systems
- Water supply
- Wastewater and sewer systems
- Refined fuel systems
- Communications systems
- Hospitals and clinics
- Public safety facilities
- Roads and bridges
- Schools

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- Local government and law enforcement buildings
  Shelters

Each item in a category includes the address and the item's probability of damage during earthquake, tsunami, flood, wildland-urban fire and landslide.

The following jurisdictions are included in the plan:

- US Government – National Parks, USFS, Homeland Security (Customs, Border Patrol, Coast Guard, BPA)
- Washington State Government – WSDOT, WSP, DNR, State Parks & Rec, DOC
- Clallam County
- City of Port Angeles
- City of Forks
- City of Sequim
- Quileute Tribe
- Makah Tribe
- Lower Elwha Tribe
- Jamestown Tribe
- Clallam County PUD (Water, sewer and power)
- Diamond Point Water System
- Crescent Water Association
- Sunland Water and Sewer System
- Clallam County Fire Protection Districts 1 through 6
- Cape Flattery School District
- Quillayute Valley School District
- Crescent School District
- Port Angeles School District
- Sequim School District
- Port of Port Angeles
- Olympic Medical Center Board of Commissioners
- Forks Community Hospital Board of Commissioners

2.2.1 Multi-jurisdiction Overview – CITY JURISDICTIONS

Clallam County contains three cities: Port Angeles which is the county seat, Sequim, and Forks. Major shopping areas are located are located in Sequim and Port Angeles (Costco, Home Depot, Walmart and food outlets, etc.).

PORT ANGELES - Port Angeles is largest city in Clallam County. It has a deep-water port close to the Pacific Ocean. The city's western border is contiguous with Clallam County and includes William F. Fairchild International Airport. According to the United States Census Bureau, the city as a total area of 14.5 square miles. Port Angeles is the county seat which houses the county jail. It is home to the Coast Guard Base Port Angeles and Peninsula College's Main Campus.

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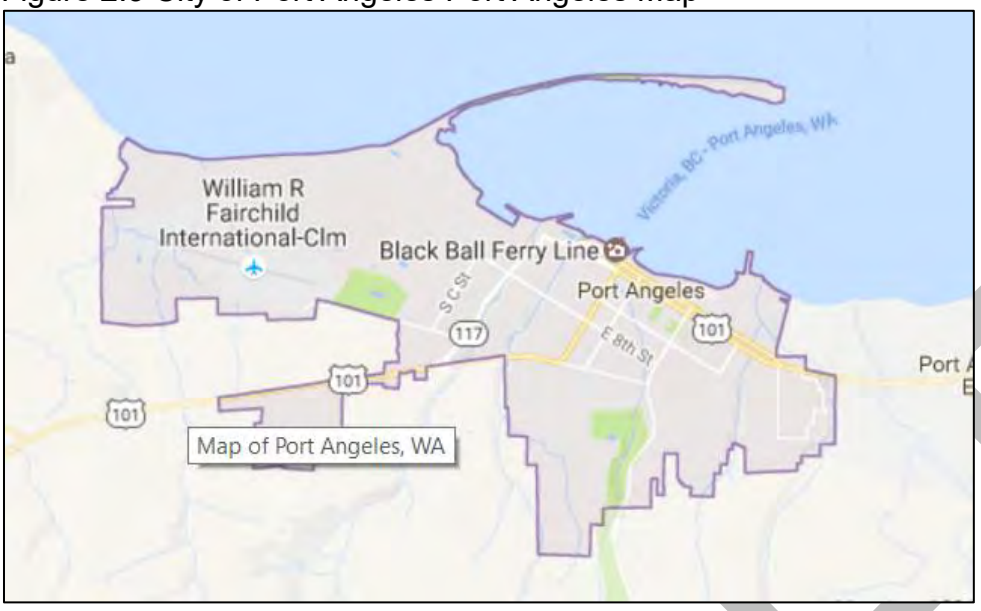
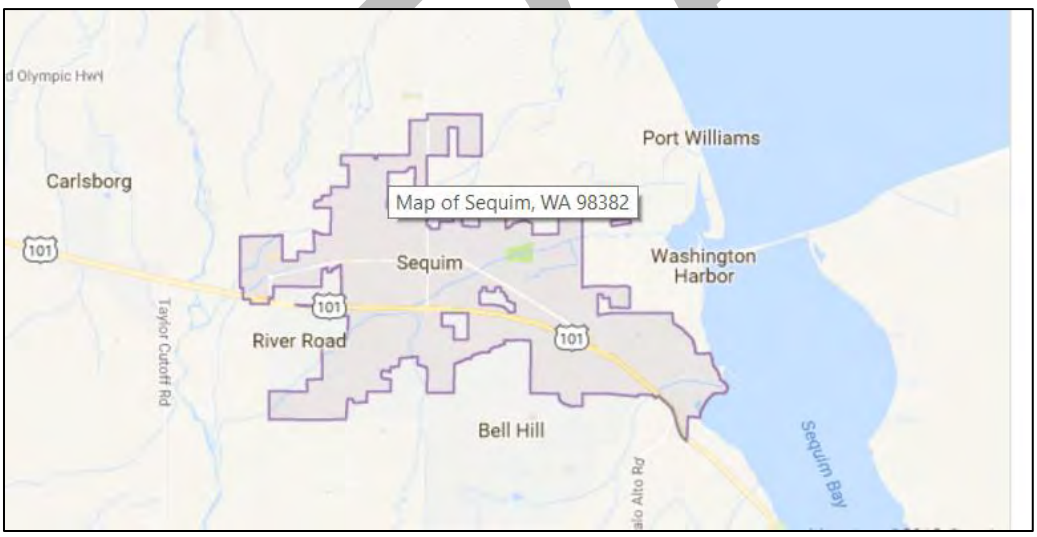
Figure 2.3 City of Port Angeles Port Angeles Map



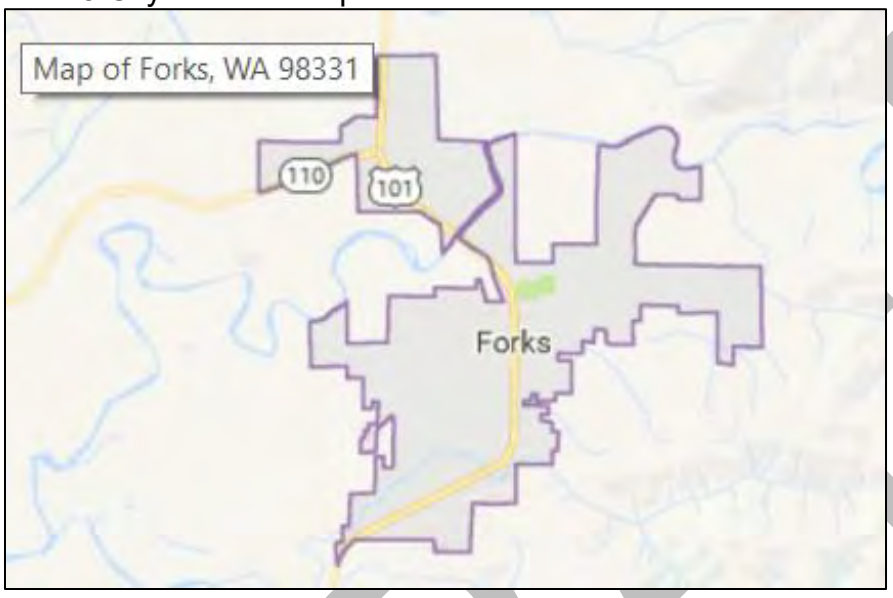
SEQUIM - Sequim is located 13 miles due east of Port Angeles on Hwy 101. The city has a total area of 6.4 square miles. The area is home to a large number of retirees. This has attracted a large cadre of assorted health care providers to the city. It has developed into a major shopping destination in recent years.

Figure 2.4 City of Sequim Map



FORKS - Forks is located 55 miles west of Port Angeles on Highway 101. Hwy 101 is the only link to the outside world. The city has a total area of 1.1 square miles. The city is the center of economic and social activity for the west end of Clallam and Jefferson Counties. It is often isolated for varying periods of time due to storms or slides blocking the highway. A large part of the population works in the timber industry. These people are familiar with and have access to an impressive assortment of heavy equipment. It is known as an independent resilient community.

Figure 2.5 City of Forks Map



2.2.2 Multi-jurisdiction Overview – LAW ENFORCEMENT JURISDICTIONS

- City of Port Angeles Police Department
- City of Sequim Police Department
- City of Forks Police Department
- Lower Elwha Tribal Police
- US Department of Homeland Security (Border Patrol, Customs, USCG, MARSEC)
- Clallam County Sheriff Department
- Washington State Patrol
- Olympic National Park Police
- Quileute Tribal Police
- Makah Tribal Police
- Clallam Bay Corrections Center Staff

2.2.3 Multi-jurisdiction Overview – FIRE PROTECTION JURISDICTIONS

- City of Port Angeles Fire Department – City of Port Angeles
- Clallam County Fire District # 1 – Forks, Beaver and west end of county

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- Clallam County Fire District #2 – Port Angeles suburbs
- Clallam County Fire District #3 – City of Sequim and east end of county
- Clallam County Fire District #4 – Joyce and central county
- Clallam County Fire District #5 – Clallam Bay and northwest county
- Clallam County Fire District #6 – Mora and Quillayute Valley
- DNR Wildland Units, Forks – Wildland fires throughout Washington
- Olympic National Park Fire Services – Wildland fire in western US
- Neah Bay Fire Department – Neah Bay

2.2.4 Multi-jurisdiction Overview – PUBLIC UTILITY DISTRICT JURISDICTIONS (Water and Sewer)

- Clallam PUD – Fairview Water System
- Clallam PUD – Gales Addition Water System
- Clallam PUD – Clallam Bay/Sekiu Water System
- Clallam PUD – Island View Water System
- Clallam PUD – Carlsborg Water System
- Clallam PUD – Evergreen Water System
- Clallam PUD – Panorama Heights Water System
- Crescent Water System – Joyce Area
- Diamond Point Water System – Diamond Point Community
- Dry Creek Water Association - Western Port Angeles suburbs
- City of Port Angeles Water System – City of Port Angeles
- City of Sequim Water System – City of Sequim
- Sunland Water System – Sunland Community
- Bonneville Power Administration

2.2.5 Multi-jurisdiction Overview – SCHOOL DISTRICT JURISDICTIONS

- Quileute Tribal School
- Neah Bay Schools
- Clallam Bay schools
- Crescent School District
- Quillayute Valley School District
- Port Angeles School District
- Sequim School District

2.2.7 Multi-jurisdiction Overview – PORT OF PORT ANGELES

- Port of Port Angeles
- John Wayne Marina
- Sekiu Airport

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- William F. Fairchild International Airport

2.2.8 Multi-jurisdiction Overview – MEDCAL JURISDICTIONS

- Olympic Medical Center – Port Angeles
- Olympic Medical Center - Sequim
- Forks Community **Hospital**

2.3 Demographic Overview

Table 2.1 POPULATION BY AGE AND SEX - APRIL 1, 2015
(http://www.ofm.wa.gov/databook/pdf/53009.pdf)

AGE	MALE	FEMALE	TOTAL
0-4	1778	1561	3339
5-9	1825	1692	3517
10-14	1840	1759	3599
15-19	1825	1657	3481
20-24	2233	1734	3967
25-29	2024	1650	3673
30-34	1958	1714	3672
35-39	1784	1662	3446
40-44	1811	1729	3541
45-49	1898	1926	3824
50-54	2288	2428	4716
55-59	2660	3021	5681
60-64	2862	3357	6219
65-69	2938	3301	6240
70-74	2402	2538	4940
75-79	1685	1758	3443
80-84	1187	1334	2522
85+	1148	1682	2829
Total	36147	36503	72650
Median Age	47.62	52.40	50.28

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Table 2.2 POPULATION BY RACE AND HISPANIC ORIGIN

	Total	White	Black	AIAN	Asian	NHOPI	2 or More
2010 Census Non-Hisp.	67,777	60,531	559	3,335	1,001	91	2,260
2010 Census Hispanic	3,627	2,708	93	527	22	15	262
2015 Est. Non-Hisp.	68,412	60,479	591	3,417	1,146	98	2,681
2015 Est. Hispanic	4,238	3,078	109	655	27	18	351

AIAN: American Indian and Alaska Native

NHOPI: Native Hawaiian and Other Pacific Islander

Figure 2.8 Community Information

Community	Total Population	Population Under 5 Years	Population Over 65 Years	Total Housing Units	% Population Under Poverty	% Population Non-English
Clallam County	72,250	3,323	18,785	35,602	14.6%	5.4%
Port Angeles	19,038	1,123	3,426	9,272	18.0%	4.7%
Sequim	6,669	306	2,694	3,767	11.9%	7.0%
Forks	3,532	300	342	1,374	4.6%	5.5%

As of December 13, 2016, there were 50,987 registered voters in 67 precincts in the county.

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CHAPTER 3: MITIGATION PLANNING PROCESS

3.1 Overview

The Clallam County mitigation planning process began in 2015 with the development of Clallam County's Cascadia Rising Ground Truth Document. The ground truth study provided a comprehensive list of all government and political subdivision facilities in Clallam County. It was designed solely to document damage expected from the Cascadia Subduction Zone earthquake so EMD could write injects for the Cascadia Rising Exercise.

In 2017, the study was used as the basis for development of The Clallam County Hazard Assessment (All hazard assessment) required by RCW 38.52.070(1). The document changed from an earthquake-centric assessment to an all hazard assessment. It is the foundation for the Clallam County Comprehensive Emergency Management Plan (CEMP) as well as the public process required to develop this Hazard Mitigation Plan.

3.2 Mitigation Planning Team

The mitigation planning team was led by _____, (INSERT TITLE). The planning team included the following members:

Table 3.1: Mitigation Planning Team Members

Name	Company or Agency	Title/Position

The mitigation planning team's roles and responsibilities are defined as follows:

- Participate actively in planning team meetings.
- Provide local perspectives re: natural hazards and the threats that they pose to the county and jurisdiction facilities and people.
- Help to identify existing plans, studies, reports and technical information for inclusion or reference in the mitigation plan.
- Forge consensus on mitigation action items and their priorities.
- Help to facilitate the public outreach actions during the mitigation planning process.
- Provide review comments on draft materials during development of the Hazard Mitigation Plan.

3.3 Mitigation Planning Team Meetings

Brief summaries of mitigation planning team meetings are documented below. Meeting agendas, attendees and minutes for the planning team meetings are provided in Appendix 3.

TO BE FILLED OUT AS MEETINGS OCCUR – SAMPLE ONLY

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Meeting 1: _____-

- After introductions, the planning team watched a slide presentation from Clallam County Emergency Management which gave a brief overview of the hazard mitigation planning process. Roles and responsibilities of team members were defined.
- Each member received a copy of a manual detailing FEMA requirements for public participation in the process.
- Each member received a copy of the Clallam County Hazard Assessment.
- They were assigned to read through the assessment and manual and be prepared with comments and suggested revisions at the next planning team meeting.

Meeting 2: _____

- The Planning Team reviewed the manual and hazard assessment and addressed needed changes.
- The team approved the public process manual for publication on the County's Emergency Management webpage for public comment.
- The team examined plans, studies, reports and technical information relating to hazard mitigation. They noted:
  - New hazards to be added to this plan.
  - Progress on mitigation projects noted in previous plans.
  - Completed mitigation projects that should be noted in this plan.
- The team reviewed the next steps in the process, including
  - Developing a public meeting schedule
  - Determining methods for solicitation of comments
  - Posting notices regarding public meetings to create the draft plan.
  - Posting notices regarding public hearings concerning the draft
  - Addressing public comments about the draft.
  - Approving the draft for formal submittal for FEMA Approval.

Add additional summaries as required

3.4 Public Involvement in the Mitigation Planning Process

Extensive efforts were made to encourage public and stakeholder involvement throughout the mitigation planning process, including the following actions: notices, public meetings, and opportunity for public review and comment on the mitigation plan drafts.

3.4.1 Notices

The County announced the initiation of the mitigation planning via:

- Posting notices on the County website,
- Distributing the notices via e-mail to a wide audience of stakeholders,
- Publishing the notices in the following local newspaper(s):

  Peninsula Daily News

Sequim Gazette
Forks Forum

- Announcing notices on the following radio stations:
  KONP
  KSQM

Copies of the above notices are included in Appendix 3.

3.4.2 Public Meetings

FEMA requires that the public and stakeholders be invited to participate in the planning process (public meetings, review and comment on drafts) must include: 1) local and regional political subdivisions involved in hazard mitigation activities (such as the state and city emergency managers), 2) agencies that have authority to regulate development (city and/or county) and 3) neighboring communities (Tribes). Suggestions: e-mail notices of meetings and website postings to a list of such people and include political subdivisions in this list. FEMA requires that such stakeholders be given the opportunity to participate but this does not mean that they must participate. See: Page 16 of the FEMA Local Mitigation Plan Review Guide for what information must be provided for the stakeholders.

Public meetings were announced via the modes listed above and held on the following dates:

- Meeting 1 – INSERT DATE
- Meeting 2 date
- Meeting 3 date
- Meeting 4 date
- Meeting 5 date
- Meeting 6 date

Meeting agendas, minutes and summary of attendees for the public meetings are included in Appendix 3.

3.4.3 Public Surveys (are we doing public surveys??????)

A public survey was conducted by Planning Team members on _____. See Appendix 3 for survey records.

3.4.4. Review and Comment on Mitigation Plan Drafts

Copies of the Hazard Mitigation Public Process and draft mitigation plan were available for review at the court house and posted on the county's website for review. Notices soliciting comments from all interested parties were posted via email, radio and newspaper. Copies of the notices and comments are included in Appendix 3.

Key inputs received during the review and comment periods included the following: ***Insert a list of any significant comments that were received during the review period. If no substantive comments were received, delete this item from your mitigation plan.***

- Comment 1

 Comment 2

 Comment 3

 …..

3.5 Review and Incorporation of Previous Mitigation Plans, Studies, Reports and Technical Information.

The Planning Team is required to review and incorporate previous mitigation plans, studies, reports and technical information as part of the public mitigation planning process. These documents include:

- Previous mitigation plans dated ___Insert date_____
- The 2018 Clallam County Hazard Assessment (Appendix D)
- USDA Soil Site Class Maps
- WADNR tsunami and liquefaction maps
- WADNR Wildland/Urban Interface Fire Maps
- WADNR Landslide Hazard Maps
- 2016 Cascadia Rising After Action Report
- 2004 CREW Impact of Earthquakes on Just in Time Inventory
- 2014 USGS National Seismic Hazard Maps
- 2011 USGS Landfire Maps
- Cascadia Subduction Zone Earthquake Effects on Clallam County
- 2015 US Census Bureau Data

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CHAPTER 4: GOALS, OBJECTIVES, AND ACTION ITEMS:

4.1 Overview

The purpose of the Clallam County Multi-Jurisdiction Hazard Mitigation Plan is to reduce the impacts of future natural and man-made disasters on the county's facilities and residents. This will make the county more disaster resilient, by reducing the vulnerability to disasters and enhancing the capability to respond effectively to, and recover quickly from, future disasters.

Completely eliminating the risk of future disasters in Clallam County is neither technologically possible nor economically feasible. Incorporating risk reduction strategies and action items into county programs and decision-making processes will facilitate moving the county toward a safer and more disaster resistant future.

The hazard mitigation planning process is based on a four-step framework that is designed to help focus public attention and action on successful mitigation strategies: Mission Statement, Goals, Objectives, and Action Items.

Mission Statement. The Mission Statement states the purpose and defines the primary function of the Clallam County Multi-Jurisdiction Hazard Mitigation Plan. The Mission Statement is an action-oriented summary that answers the question "Why develop a hazard mitigation plan?"

Goals. Goals identify priorities and specify how Clallam County intends to work toward reducing the risks from natural and human caused hazards. The Goals represent the guiding principles toward which the County's efforts are directed. Goals provide focus for the more specific issues, recommendations, and actions addressed in Objectives and Action Items.

Objectives. Each Goal has Objectives which specify the directions, methods, processes, or steps necessary to accomplish the Clallam County Multi-Jurisdiction Hazard Mitigation Plan's Goals. Objectives lead directly to specific Action Items.

Action Items. Action Items are specific, well-defined activities or projects that work to reduce risk. That is, the Action Items represent the specific, implementable steps necessary to achieve the County's Mission Statement, Goals, and Objectives.

4.2 Mission Statement

The mission statement for the Clallam County Multi-Jurisdiction Hazard Mitigation Plan is to:

- **Identify natural and man-made hazards that threaten the critical infrastructure of Clallam County so all residents can participate in a process to develop a plan that makes the county more disaster resistant and resilient.**

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Making the Clallam County Multi-jurisdiction more disaster resistant and disaster resilient means taking proactive steps and actions to:

- Protect life safety.
- Reduce damage to county facilities.
- Minimize economic losses and disruption.
- Shorten the recovery period from future disasters.

4.3 Mitigation Plan Goals and Objectives

The following Goals and Objectives serve as guideposts and checklists to begin the process of identifying mitigation Action Items that can reduce identified risks to facilities, residents, staff, and volunteers from natural and man-made disasters.

The Goals and Objectives are consistent with those of the Washington State Hazard Mitigation Plan (IS THERE A WA ST HMP??? NEED TO SEE WHAT IT SAYS SO WE ARE CONSISTENT). However, the specific priorities, emphasis, and language in this mitigation plan are the Clallam County's. These goals were developed with extensive input and priority setting by the county's Mitigation Planning Team, with input from county/jurisdiction staff, volunteers, residents, and other stakeholders.

Goal 1: Reduce Threats to Life Safety

Reducing threats to life safety is the highest priority for the County.

Objectives:

A. Enhance life safety by retrofitting buildings or replacing them with new current-code buildings and by locating and designing new buildings to minimize life safety risk from future disaster events.

B. Develop robust disaster evacuation plans and conduct frequent practice drills. When evacuation is impossible in the anticipated warning time, consider vertical evacuation for tsunamis, other physical measures to shorten evacuation time, such as pedestrian bridges over rivers, or relocate facilities with extreme life safety risk to locations outside of hazard zones when possible.

C. Enhance life safety by improving public awareness of earthquakes, tsunamis, and other natural hazards that pose substantial life safety risk to the County's facilities, residents, staff, and volunteers.

Goal 2: Reduce Damage to County Facilities, Economic Losses, and Disruption of Services

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Objectives:

A. Retrofit or replace buildings with a high vulnerability to one or more natural hazards to reduce damage, economic loss, and disruption from future disaster events.

B. Ensure that new facilities are adequately designed for hazard events and located outside of mapped high hazard zones to minimize damage and loss of function in future disaster events, to the extent practicable. DOES THIS APPLY TO THE ARTS CENTER????

Goal 3: Enhance Emergency Planning, Disaster Response, and Post-Disaster Recovery

Objectives:

A. Enhance collaboration and coordination between the County, local governments, utilities, businesses, and citizens to prepare for, and recover from, future natural disaster events.

B. Enhance emergency planning to facilitate effective response and rapid recovery from future natural disaster events.

Goal 4: Increase Awareness and Understanding of Natural Hazards and Mitigation

Objectives:

A. Implement education and outreach efforts for staff and residents to increase awareness of natural hazards throughout Clallam County.

B. Maintain and publicize a natural hazards section on the County website featuring information from FEMA and related publications. Distribute FEMA brochures and educational materials regarding natural hazards.

4.4 Clallam County Multi-Jurisdiction Hazard Mitigation Plan Action Items

Mitigation Action Items may include a wide range of measures such as:

- Refinement of policies, studies, and data collection to better characterize hazards or risk
- Education and outreach activities
- Enhanced emergency planning
- Partnership building activities
- Retrofits to threatened facilities
- Replacement of vulnerable facilities with new current-code buildings.

The 2018 Clallam County Multi-Jurisdiction's Hazard Mitigation Plan Action Items are

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summarized on the following pages: **THIS PASD SCREENSHOT IS FOR SAMPLE PURPOSES ONLY. IT HAS NOT BEEN CONVERTED TO COUNTY FORMAT.**

Table 4.1
Port Angeles School District Mitigation Action Items

Hazard	Action Item	Timeline	Source of Funds	Responsible Party	Plan Goals Addressed			
					Life Safety	Protect Facilities	Enhance Emergency Planning	Enhance Awareness and Education
Multi-Hazard Mitigation Action Items								
Long-Term #1	Integrate the findings and action items in the mitigation plan into ongoing programs and practices for the district.	Ongoing	District or Grants		X	X	X	X
Long-Term #2	Review emergency and evacuation planning to incorporate hazard and risk information from the mitigation plan.	Ongoing	District or Grants		X	X	X	X
Long-Term #3	Consider natural hazards whenever siting new facilities and locate new facilities outside of high hazard areas.	Ongoing	District or Grants		X	X	X	X
Long-Term #4	Ensure that new facilities are adequately designed to minimize risk from natural hazards.	Ongoing	District or Grants		X	X	X	X
Long-Term #5	Maintain, update and enhance facility data and natural hazards data in the ICOS database.	Ongoing	District or Grants		X	X	X	X
Long-Term #6	Develop and distribute educational materials regarding natural hazards, vulnerability and risk for K-12 facilities.	Ongoing	District or Grants		X		X	X
Long-Term #7	Seek FEMA funding for repairs if district facilities suffer damage in a FEMA declared disaster.	Ongoing	District or Grants		X	X		X
Long-Term #8	Pursue pre- and post-disaster mitigation grants from FEMA and other sources.	Ongoing	District or Grants		X	X		X
Long-Term #9	Post the district's mitigation plan on the website and encourage comments stakeholders for the ongoing review and periodic update of the mitigation plan.	Ongoing	District or Grants		X			X

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THIS PASD SCREENSHOT IS FOR SAMPLE PURPOSES ONLY. IT HAS NOT BEEN CONVERTED TO COUNTY FORMAT.

DOES NOT INCLUDE TSUNAMI MITIGATION.

Table 4.1
Port Angeles School District Mitigation Action Items – Continued

Hazard	Action Item	Timeline	Source of Funds	Responsible Party	Plan Goals Addressed			
					Life Safety	Protect Facilities	Enhance Emergency Planning	Enhance Awareness and Education
Earthquake Mitigation Action Items								
Short-Term #1	Complete seismic evaluations of the roof truss systems at Image, Sunset and Fircrest elementary schools	1 Year	District or Grants		X	X		X
Short-Term #2	Complete seismic evaluations of the foundations of the District's 172 portables.	1-5 Years	District or Grants		X	X		X
Short-Term #3	Complete ASCE 41-13 Tier 1 evaluations of buildings identified as Pre-Code and/or as Risk Level and Priority for Evaluation of "Moderate" or higher.	1-5 Years	District or Grants		X	X		X
Short-Term #4	Assess the ASCE 41-13 results and select buildings that have the greatest vulnerability for more detailed evaluations.	2-3 Years	District or Grants		X	X		X
Short-Term #5	Evaluate nonstructural seismic vulnerabilities in the District's buildings from building elements and contents that pose significant life safety risk (falling hazards) and mitigate by bracing, anchoring or replacing identified high risk items.	Ongoing	District or Grants		X	X		X
Long-Term #1	Prioritize and implement structural seismic retrofits or replacements based on the results of the seismic evaluations completed under the Short-Term Action Items #1 to #4 listed above, as funding becomes available.	Ongoing	District or Grants		X	X		X
Long-Term #2	Maintain and update building data for seismic risk assessments in the OSPI ICOS PDM database.	Ongoing	District or Grants		X		X	X
Long-Term #3	Enhance emergency planning for earthquakes including duck and cover and evacuation drills.	Ongoing	District or Grants		X		X	X

Hazard	Action Item	Timeline	Source of Funds	Responsible Party	Plan Goals Addressed			
					Life Safety	Protect Facilities	Enhance Emergency Planning	Enhance Awareness and Education
Landslide Mitigation Action Items								
Short-Term #1	Consult with a geologist or geotechnical engineer regarding landslide risk for campuses for which this is recommended by the OSPI ICOS PDM database campus-level landslide report.	1-2 Years	District or Grants		X	X	X	X
Long-Term #1	Evaluate and implement landslide mitigation measures if recommended by the geologist or geotechnical engineer.	Ongoing	District or Grants		X	X	X	X

THIS PASD SCREENSHOT FOR SAMPLE PURPOSES ONLY. IT HAS NOT BEEN CONVERTED TO COUNTY FORMAT.

Table 4.1
Port Angeles School District Mitigation Action Items – Continued

Hazard	Action Item	Timeline	Source of Funds	Responsible Party	Plan Goals Addressed			
					Life Safety	Protect Facilities	Enhance Emergency Planning	Enhance Awareness and Education
Wildland/Urban Interface Fire Mitigation Action Items								
Short-Term #1	Consult with local fire agency or other fire expert regarding level of fire risk for campuses for which this is recommended by the OSPI ICOS PDM database campus-level wildland/urban interface fire report.	1-2 Years	District or Grants		X	X	X	X
Short-Term #2	Enhance emergency evacuation planning for all campuses for which wildland/urban fires are possible.	1 year	District or Grants		X		X	X
Long-Term #1	Evaluate and implement mitigation measures to reduce fire risk, including enhancing defensible space around buildings, fuel reduction measures adjacent or near a campus, upgrading building elements with materials designed to be fire-resistant.	Ongoing	District or Grants		X	X	X	X

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CHAPTER 5: MITIGATION PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE:

5.1 Overview

For a hazard mitigation plan to be effective, it has to be implemented gradually over time, as resources become available. An effective plan must also be continually evaluated and periodically updated. The mitigation Action Items included in the Clallam County Multi-Jurisdiction Hazard Mitigation Plan will be accomplished effectively only through a process which routinely incorporates logical thinking about hazards and cost-effective mitigation with ongoing decision making and capital improvement spending.

The following sections depict how the Clallam County has adopted and will implement and maintain the of the County Multi-Jurisdiction Hazard Mitigation Plan.

5.2 Plan Adoption

This is the latest revision of Clallam County's Hazard Mitigation Plan, which became effective on (MM/DD/YY) the date of adoption by the Clallam County Board of Commissioners. The Board adopted the County's Multi-Jurisdiction Hazard Mitigation Plan following FEMA's approval of the County's submitted plan. The Board's adoption resolution is shown on the following page.

Scan a copy of the Board Adoption Resolution when signed and paste here. SAMPLE RESOLUTION HERE

Board of Directors Resolution Adopting the Clallam County Multi-Jurisdiction Hazard Mitigation Plan

Resolution Number

A Resolution Adopting the _____ Clallam County Multi-Jurisdiction Hazard Mitigation Plan

The Board of Commissioners of Clallam County resolves as follows:

Whereas, Clallam County has determined that it is in the best interest of the County to have an active hazard mitigation planning effort to reduce the long-term risks from natural hazards to critical facilities, and

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Whereas, Clallam County recognizes that the Federal Emergency Management Agency (FEMA) requires the county to have an approved hazard mitigation plan as a condition of applying for, and receiving, FEMA mitigation project grant funding.

Now, therefore, be it resolved by the Clallam County Board of Commissioners as follows:

The Clallam County Board of Commissioners adopts the (MM/DD/YY) Clallam County Multi-Jurisdiction Hazard Mitigation Plan.

Passed by the Board on the XXth day of Month, 20___.

Insert signature(s) and title(s) below.

Note: the board's resolution is best done after FEMA approves the submitted plan because FEMA may require changes to be made to the submitted plan. With adoption after FEMA approval, the County's plan becomes active as of the adoption date and the plan must then be updated by the 5th anniversary of the adoption date. A plan update requires much less effort than creating the initial hazard mitigation plan.

5.3 Implementation

Clallam County Board of Commissioners will have the lead responsibility for implementing the Clallam County Multi-Jurisdiction Hazard Mitigation Plan, with ongoing support from the participating jurisdictions.

5.3.1 Authorities, Policies, Programs, Resources and Capabilities

(NEED MARY ELLEN'S ADVICE HERE. I DON'T LIKE THE WORDING)

Clallam County hazard mitigation responsibilities for county owned facilities include constructing, maintaining and operating them for the service of county residents.

Clallam County hazard mitigation policies and programs related to facilities owned by political subdivisions are limited to zoning and building code requirements for siting new facilities, design of new facilities and periodic capitol maintenance/modernization of buildings. The county's resources for these programs include DCD and Fire Marshal staff involved with siting, construction, maintenance and modernization of facilities, supplemented by contractor and consultants when needed.

The completion of the Clallam County Multi-Jurisdiction's Hazard Mitigation Plan has substantially raised the County's awareness and knowledge of natural hazards.

Consideration of natural hazards will be included in siting and design of new facilities. Furthermore, mitigation measures to reduce risks from natural hazards will be incorporated into maintenance and modernization of buildings whenever possible.

Clallam County has the necessary human resources to ensure that the Clallam County Multi-Jurisdiction Hazard Mitigation Plan will continue to be an active planning document. County staff has been active in the preparation of the Plan, and have gained an understating of the process and the need to integrate the Plan into ongoing capital budget planning.

County staff has broad experience with permitting projects in the county. They understand the legal requirements to solicit and facilitate public comments about all proposals. This broad experience is directly applicable to hazard mitigation planning and to implementation of mitigation projects. If specialized expertise is necessary for a particular project, the County will contract with a consulting firm on an as-needed basis.

Furthermore, recent earthquake and tsunami disasters worldwide serve as a reminder of need to maintain a high level of interest in evaluating and mitigating risk from natural disasters of all types. These events have kept the interest in hazard mitigation planning and implementation alive among the political subdivisions.

To ensure efficient, effective and timely implementation of the mitigation action items, the Clallam County will use the full range of its capabilities and resources and those of the political subdivisions. The county's goal is to implement as many mitigation strategy Action Items as possible over the next five years as, commensurate with available funding. This effort will be led by the Board of Commissioners with outreach and cooperation with the political subdivisions, the region and the state.

Regulatory Tools (Ordinances and Codes)

- Fill in applicable ordinances and codes
-

Administrative Tools (Departments, Organizations, Programs)

Clallam County Political Subdivision Resources

- SEE SECTION 2 AND PASD SECTION FOR IDEAS ON HOW TO FILL THIS IN. THE SECTION MAY BE EXTREMELY REDUNDANT

Technical Tools (Plans and Others)

Clallam County Political Subdivision Capabilities

- Multi-Jurisdiction Websites Website
-

Fiscal Tools (Taxes, Bonds, Funds and Fees)

Clallam County Political Subdivision Capabilities

- Authority to Levy Taxes
- Authority to Issue Bonds
- Funds

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- o General Fund
- o Capital Project Funds
- o Debt Service Fund
- o Transportation Vehicle Fund
- o Trust Fund
- External Funds
  - o FEMA Grants
  - o Foundation Grants
  - o Legislative Funding/Grants
  - o Other Grants

5.3.2 Integration into Ongoing Programs

An important aspect of the Plan's integration into ongoing programs will be the inclusion of the mitigation plan's Action Items into ongoing capital improvement planning throughout the political subdivisions. These include facilities maintenance, periodic remodeling or modernization of facilities and future siting and construction of new facilities. For example, in evaluating possible remodeling or modernization of buildings, the county will consider including retrofits to reduce the vulnerability to natural hazards. It may also consider other alternatives such as; (1) replacement with a new building if the retrofit is very expensive, or (2) moving the project to a new site if the planned site has substantial risks from natural hazards that cannot be mitigated.

5.3.3 Prioritization of Mitigation Projects

Prioritization of future mitigation projects within the Clallam County requires flexibility because of varying types of projects, county and political subdivision needs, and available funding sources. Prioritized mitigation Action Items developed during the mitigation planning process are summarized in Chapter 4. Additional mitigation Action Items or revisions to the initial Action Item list are likely before the 5-year revision occurs. The elected boards of the county and political subdivisions will make final decisions about implementation and the priorities required for those items. State law requires these elected officials to solicit comment from county staff, the mitigation planning team, the public, and other stakeholders.

The Clallam County Multi-Jurisdiction's prioritization of mitigation projects will include the following factors:

1. The mission statement and goals in the Clallam County Multi-Jurisdiction Hazard Mitigation Plan include:

   Goal 1: Reduce Threats to Life Safety,

   Goal 2: Reduce Damage to Multi-Jurisdiction Facilities, Economic Losses, and Disruption of the County's Services,

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Goal 3: Enhance Emergency Planning, Disaster Response, and Disaster Recovery, and

Goal 4: Increase Awareness and Understanding of Natural Hazards and Mitigation

2. Cost-benefit analysis to ensure that mitigation projects are cost effective, with benefit exceeding the costs.

3. The STAPLEE process to ensure that mitigation Action Items under consideration for implementation meet the needs and objectives of the County and participating jurisdictions, its communities, and citizens, by considering the social, technical, administrative, political, economic, and environmental aspects of potential projects.

Cost Effectiveness of Mitigation Projects

As the County and political subdivisions consider whether or not to undertake specific mitigation projects or evaluate how to decide between competing mitigation projects, they must address questions that don't always have obvious answers, such as:

- What is the nature of the hazard problem?
- How frequent and how severe are the hazard events of concern?
- Do we want to undertake mitigation measures?
- What mitigation measures are feasible, appropriate, and affordable?
- How do we prioritize between competing mitigation projects?
- Are our mitigation projects likely to be eligible for FEMA funding?

The participants recognize that cost-benefit analysis is a powerful tool that can help provide solid, defensible answers to these difficult socio-political-economic-engineering questions. Cost-benefit analysis is required for all FEMA funded mitigation projects, under both pre-disaster and post-disaster mitigationprograms.

However, regardless of whether or not FEMA funding is involved, cost-benefit analysis provides a sound basis for evaluating and prioritizing possible mitigation projects for any natural hazard. Thus, the participants will use cost-benefit analysis and related economic tools, such as cost-effectiveness evaluation, to the extent practicable in prioritizing and implementing mitigation actions.

STAPLEE Process

The participants will also use the STAPLEE methodology to evaluate projects based on the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) considerations and opportunities for implementing particular mitigation action items in the county. The STAPLEE approach is helpful for doing a quick analysis of the feasibility of proposed mitigation projects. The following paragraphs outline the STAPLEE Approach.

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Social:
- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical:
- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other goals?

Administrative:
- Is the action implementable?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political:
- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, and risk managers in this discussion.
- Who is authorized to implement the proposed action?
- Is there a clear legal basis or precedent for this activity?
- Will the county be liable for action or lack of action?
- Will the activity be challenged?

Economic:
- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private).
- How will this action affect the fiscal capability of the county?
- What burden will this action place on the tax base or economy?
- What are the budget and revenue effects of this activity?

Environmental:
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

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5.4 Plan Maintenance and Periodic Updating

5.4.1 Periodic Monitoring, Evaluating, and Updating

Monitoring the Clallam County Multi-Jurisdiction Hazard Mitigation Plan is an ongoing, long-term effort. An important aspect of monitoring is a continual process of ensuring that mitigation Action Items remain compatible with the goals, objectives, and priorities established during the development of the County's Mitigation Plan. The County has developed a process for regularly reviewing and updating the Hazard Mitigation Plan. As noted previously, the Clallam County Board of Commissioners will have the lead responsibility for implementing the Clallam County Multi-Jurisdiction Hazard Mitigation Plan. The Director of the Clallam County Emergency Management Division will be responsible for periodic monitoring, evaluating, and updating of the Plan.

The Clallam County Multi-Jurisdiction Hazard Mitigation Plan will be reviewed annually as well as after any significant disaster affecting the County. These reviews will determine whether there have been any significant changes in the understanding of hazards, vulnerability, and risk or any significant changes in goals, objectives, and Action Items. These reviews will provide opportunities to incorporate new information into the Mitigation Plan, remove outdated items, and document completed Action Items. This will also be the time to recognize the success of the County in implementing Action Items contained in the Plan. Annual reviews will also focus on identifying potential funding sources for the implementation of mitigation Action Items.

The periodic monitoring, evaluation, and updating will assess whether or not, and to what extent, the following questions are applicable:

1. Do the plans goals, objectives, and action items still address current and future expected conditions?

2. Does the mitigation Action Items accurately reflect the County's current conditions and mitigation priorities?

3. Have the technical hazard, vulnerability, and risk data been updated or changed?

4. Are current resources adequate for implementing the County's Hazard Mitigation Plan? If not, are there other resources that may be available?

5. Are there any problems or impediments to implementation? If so, what are the solutions?

6. Have other jurisdictions, partners, and the public participated as anticipated? If no, what measures can be taken to facilitate participation?

7. Have there been changes in federal and/or state laws pertaining to hazard

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mitigation in the County?

8. Have the FEMA requirements for the maintenance and updating of hazard mitigation plans changed?

9. What can the County learn from declared federal and/or state hazard events in other Washington Counties that share similar characteristics to Clallam County such as vulnerabilities to earthquakes and tsunamis?

10. How have previously implemented mitigation measures performed in recent hazard events? This may include assessment of mitigation Action Items similar to those contained in the County's Mitigation Plan, but where hazard events occurred outside of the County.

The Clallam County Emergency Management Division will review the results of these mitigation plan assessments, identify corrective actions, and make recommendations, if necessary, to the Board of Commissioners and elected officials of the political subdivisions for actions that may be necessary to bring the Hazard Mitigation Plan back into conformance with the stated goals and objectives. Any major revisions of the Hazard Mitigation Plan will be taken to the Board of Commissioners for formal approval as part of the County's ongoing mitigation plan maintenance and implementation program.

The Clallam County Emergency Management Division will have lead responsibility for the formal updates of the Hazard Mitigation Plan every five years. The formal update process will be initiated at least one year before the five-year anniversary of FEMA approval of the Clallam County Multi-Jurisdiction Hazard Mitigation Plan, to allow ample time for participation by stakeholders and the public and for updating data, maps, goals, objectives, and Action Items.

5.4.2 Continued County, Political Subdivision and Public Involvement

Implementation of the mitigation actions identified in the Plan must continue to engage the entire community. Continued public involvement will be an integral part of the ongoing process of incorporating mitigation planning into land use planning, zoning, and capital improvement plans and related activities within the County and political subdivisions. In addition, the County will maintain communications and joint efforts between its emergency management activities and those of the political subdivisions.

The MM/DD/YY Clallam County Multi-Jurisdiction Hazard Mitigation Plan will be available on the County's website and hard copies will be placed in the Emergency Management Division office. The availability and locations of these hard copies will be posted on the County's website along with contact information so that people can direct comments, suggestions, and concerns to EMD staff.

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Clallam County is committed to involving the public directly in the ongoing review and revision of the Hazard Mitigation Plan. This public process will include public participation in the monitoring, evaluation, and revision processes outlined in the previous section. Public involvement will intensify as the next 5-year revision process proceeds.

A press release requesting public comment will be issued as part of each major revision. Announcements and press releases will direct people to the website and other locations where the public can review proposed changes and provide instruction about how they can present their comments.

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Chapter 6: EARTHQUAKES:

6.1 Introduction

Every location in Washington State has some level of earthquake hazard, but the level of earthquake hazard varies widely by location within the state. Historically, awareness of seismic risk in Washington has generally been high, among both the public and public officials. This awareness in based to a great extent on the significant earthquakes that occurred within the Puget Sound area in 1949 (Olympia earthquake), 1965 (Tacoma earthquake) and 2001(Nisqually earthquake), as well as on other smaller earthquakes in many locations throughout the state.

The awareness of seismic risk in Washington has also increased in recent years due to the devastating earthquakes and tsunamis in Indonesia in 2004 and Japan in 2011. The geologic settings for the Indonesia and Japan earthquakes are very similar to the Cascadia Subduction Zone along the Washington Coast.

However, Clallam County has never experienced a major destructive earthquake. County residents are generally unaware or indifferent to the threat.

The technical information in the following sections provides a basic understanding of earthquake hazards, which is an essential foundation for making well-informed decisions about earthquake risks and mitigation Action Items for K–12 facilities.

6.2 Washington Earthquakes

Earthquakes are described by their magnitude (M), which is a measure of the total energy released by an earthquake. The most common magnitude is called the “moment magnitude,” which is calculated by seismologists from two factors – 1) the amount of slip (movement) on the fault causing the earthquake and 2) the area of the fault surface that ruptures during the earthquake. Moment magnitudes are similar to the Richter magnitude, which was used for many decades but has now been replaced.

The moment magnitudes for the largest earthquakes recorded worldwide and in Washington are shown below.

Table 6.1 Largest Recorded Earthquakes (1 & 1,2)

Worldwide Magnitude		**Washington Magnitude**	
1960	Chile 9.5	1872	Chelan 6.8a
1964	Prince William Sound, Alaska 9.2	1949	Olympia 6.8
2004	Sumatra, Indonesia 9.1	2001	Nisqually 6.8
2011	Japan 9.0	1965	Tacoma 6.7

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1952	Kamchatka, Russia 9.0	1939	Bremerton 6.2
2010	Chile 8.8	1936	Walla Walla 6.1
1906	Ecuador 8.8	1909	Friday Harbor 6.0
a Estimated magnitude			

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Figure 6.1 Epicenters of Historic Earthquakes in Washington with Magnitudes of 3.0 or Higher3

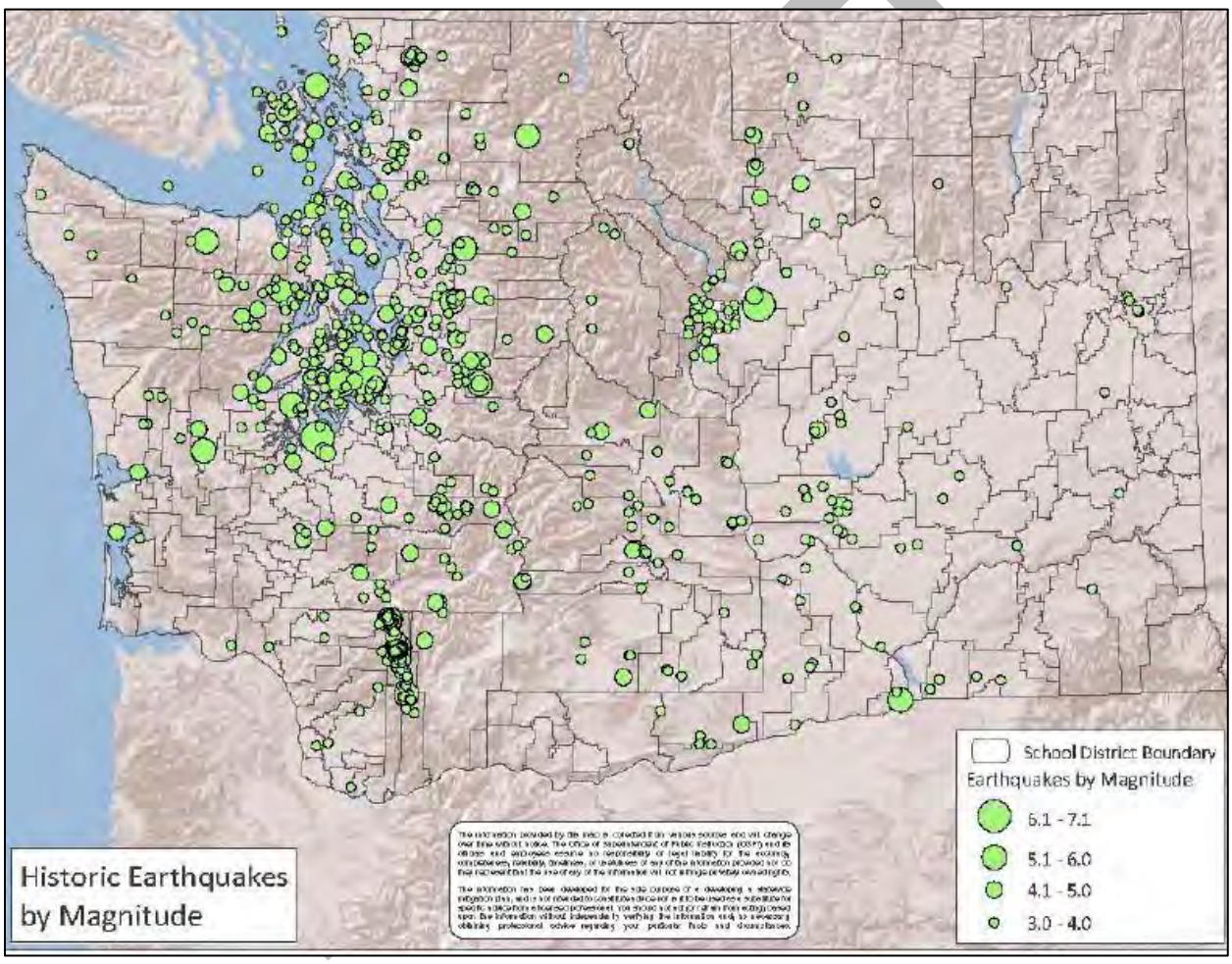

Table 6.1 and Figure 6.1 do not include the January 26, 1700 earthquake on the Cascadia Subduction Zone which has been identified by tsunami records in Japan and paleoseismic investigations along the Washington Coast. The estimated magnitude of the 1700 earthquake is approximately 9.0. This earthquake is not shown in Table 6.1 because it predates modern seismological records. However, this earthquake is among the largest known earthquakes worldwide and the largest earthquake affecting Washington over the past several hundred years. The closest analogy to this earthquake and its effects, including

tsunamis, is the 2011 Japan earthquake.

Earthquakes in Washington, and throughout the world, occur predominantly because of plate tectonics – the relative movement of plates of oceanic and continental rocks that make up the rocky surface of the earth. Earthquakes can also occur because of volcanic activity and other geological processes. These processes do not occur on the Olympic Peninsula.

The Cascadia Subduction Zone is a geologically complex area off the Pacific Northwest coast that ranges from Northern California to British Columbia. In simple terms, several pieces of oceanic crust (the Juan de Fuca Plate and other smaller pieces) are being subducted (pushed under) the crust of the North American Plate. This subduction process is responsible for most of the earthquakes in the Pacific Northwest and for creating the chain of volcanoes in the Cascade Mountains.

Figure 6.2 on the following page shows the geologic (plate-tectonic) setting of the Cascadia Subduction Zone.

There are three main types of earthquakes that affect Clallam County:

1) “Interface” earthquakes on the boundary between the subducting Juan de Fuca Plate and the North American Plate,
2) “Intraplate” earthquakes within the subducting oceanic plates, and
3) “Crustal” earthquakes within the North American Plate.

“Interface” earthquakes that effect Clallam County occur on the Cascadia Subduction Zone at the boundary between the subducting Juan de Fuca plate and the over-riding North American Plate. These earthquakes are capable of magnitudes up to 9.0 or 9.2. They occur, on average, between 250 and 500 years. These are the great Cascadia Subduction Zone Earthquake (CSZE) events that have received attention in the popular press. The last major interface earthquake on the Cascadia Subduction Zone occurred on January 26, 1700.

Cascadia Subduction Zone Earthquakes (CSZE) occur about 130 miles off the Clallam County Pacific Ocean coastline. The strong ground motion and extreme shaking duration (+/- 16 MPH for 6.5 minutes) will have devastating effects on every structure from northern California to the north end of Vancouver Island and as far east as Snoqualmie Pass. Ground shaking from this quake (and aftershocks) will be strongest near the coast. It will be felt throughout all of the Pacific Northwest to the Rockies. The quake will make mutual aid between communities impossible. Rescue and response will require a national and international effort that will take weeks to mobilize. Its effect on the Columbia River dams and power generating facilities east of the Cascades is unknown.

The CSZE will generate numerous tsunamis in the 40-foot range. These high-water events will damage or destroy **ALL** critical maritime infrastructure needed to sustain earthquake survivors in Clallam County.

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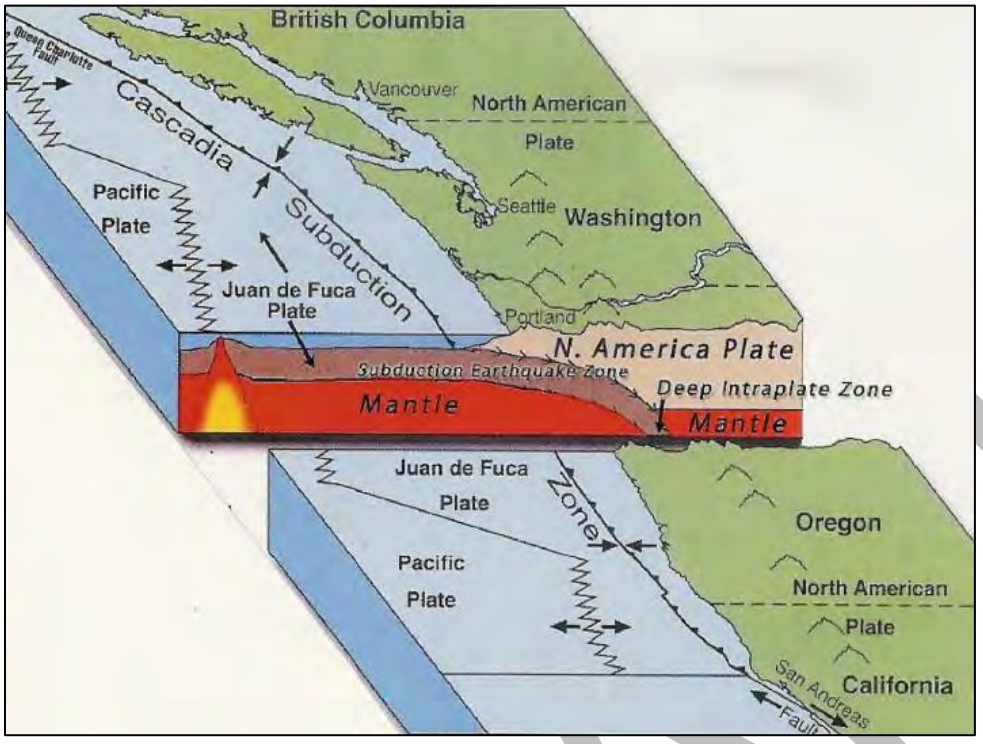
Figure 6.2 Cascadia Subduction Zone (4)



Paleoseismic investigations, which look at geologic sediments and rocks, for signs of ancient earthquakes, have identified 41 Cascadia Subduction Zone interface earthquakes over the past 10,000 years, which corresponds to one earthquake about every 250 years. Of these 41 earthquakes, about half are M9.0 or greater earthquakes that represent a full rupture of the fault zone from Northern California to British Columbia. The other half of the interface earthquakes represent M8+ earthquakes that rupture only the southern portion of the subduction zone.

The 300+ years since the last major Cascadia Subduction Zone earthquake is longer than the average timeframe of about 250 years for M8 or greater and is shorter than some of the intervals between M9.0 earthquakes. The time history of these major interface earthquakes is shown in Figure 6.3.

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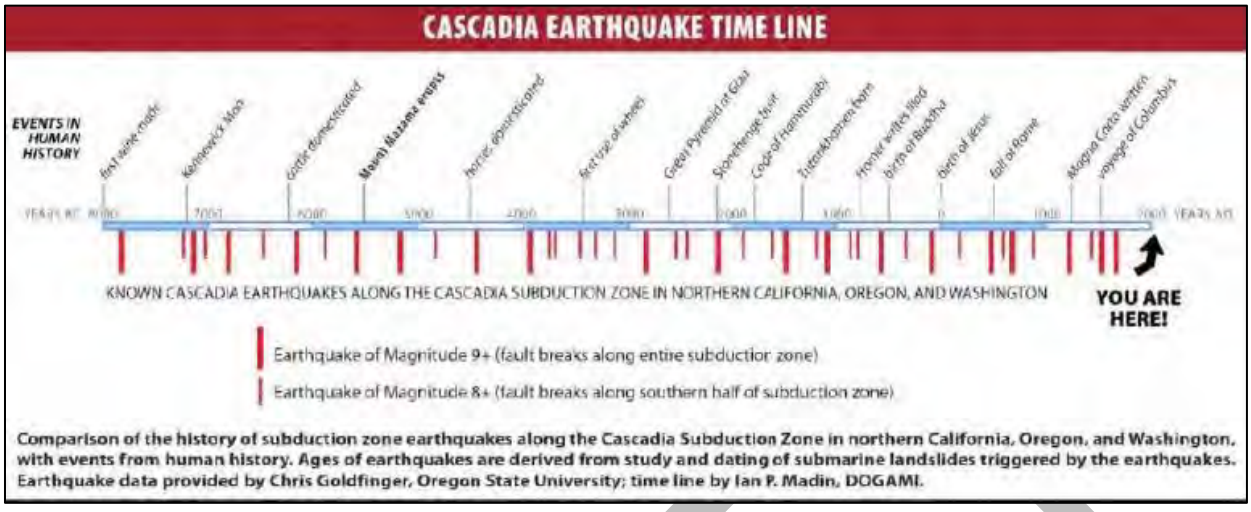
Figure 6.3 Time History of Cascadia Subduction Zone Interface Earthquakes



"Intraplate" earthquakes occur within the subducting Juan de Fuca Plate. These earthquakes may have magnitudes up to about 6.5, with probable return periods of about 500 to 1000 years at any given location. These earthquakes can occur anywhere along the Cascadia Subduction Zone. The 1949, 1965 and 2001 earthquakes listed in Table 1 are examples of intraplate earthquakes. These earthquakes occur deep in the earth's crust, about 20 to 30 miles below the surface. They generate strong ground motions near the epicenter, but have damaging effects over significantly smaller areas than the larger magnitude interface earthquakes discussed above. The 2001 Nisqually quake was felt in Clallam County but did little damage.

"Crustal" earthquakes occur within the North American Plate. Crustal earthquakes are shallow earthquakes, typically within the upper 5 or 10 miles of the earth's surface, although some ruptures may reach the surface. In Western Washington, crustal earthquakes are mostly related to the Cascadia Subduction Zone. Crustal earthquakes are known to occur not only on faults mapped as active or potentially active, but also on unknown faults. Based on the historical seismicity in Washington State and on comparisons to other geologically similar areas, small to moderate crustal earthquakes up to about M5 or M5.5 are possible almost any place in Washington.

"Crustal" earthquakes on the Boundary/Lake Creek and Whidbey Island faults are the biggest threat to Clallam County. The Boundary/Lake Creek fault starts in the Strait of Juan de Fuca near Pillar Point. It travels from Pillar Point through the valley north of Crescent Ridge to the north shore of Lake Crescent and east down Indian Valley to the Black River Valley and on to Sequim. An earthquake on this fault will be directly under the most populated part of Clallam County and in the range of 7.5 magnitude.

The Whidbey Island Fault is located between Victoria, BC and Port Townsend. The fault line extends east under Admiralty Inlet, under Whidbey Island and Edmonds to the Cascades. An earthquake on this fault will be a few miles east of the most populated part of Clallam County and in the range of 7.5 magnitude.

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Although the duration of these earthquakes will be shorter and the ground shaking will be somewhat less violent, the County will experience damage similar to that of a CSZE because it is almost directly over the epicenter. Mutual aid from Washington and other states will be available. There should be no tsunami.

6.3 Earthquake Concepts for Risk Assessments

6.3.1 Earthquake Magnitudes

In evaluating earthquakes, it is important to recognize that the earthquake magnitude scale is not linear, but rather logarithmic (based on intervals corresponding to orders of magnitude). For example, a one-step increase in magnitude, such as from M7 to M8, corresponds to an increase in the amount of energy released by the earthquake by a factor of about 30, based on the mathematics of the magnitude scale.

Thus, a M7 earthquake releases about 30 times more energy than a M6, while a M8 releases about 30 times more energy than a M7 and so on. Thus, a great M9 earthquake releases nearly 1,000 times (30 [M7] x 30 [M8]) more energy than a large earthquake of M7 and nearly 30,000 times more energy than a M6 earthquake (30 [M6] x 30 [M7] x 30 [M8]). The public often assumes that the larger the magnitude of an earthquake, the "worse" it is. That is, the "big one" is a M9 earthquake and smaller earthquakes such as M6 or M7 are not the "big one". However, this is true only in very general terms. Higher magnitude earthquakes do affect larger geographic areas, with much more widespread damage than smaller magnitude earthquakes. However, the magnitude of an earthquake is not a good measure of the damage encountered at any given site.

For most locations, the best measure of the severity of an earthquake is the intensity of ground shaking. However, for some sites, ground failures and other possible earthquake effects may substantially increase damage. These effects are discussed later in this chapter (Section 6.6),

For any earthquake, the severity and intensity of ground shaking at a given site depends on four main factors:

- Earthquake magnitude
- Location of the earthquake epicenter, which is the location on the earth's surface directly above the point of origin of an earthquake,
- Earthquake depth and distance of the site from the epicenter, and
- Soil or rock conditions at the site, which may amplify or dampen earthquake ground motions.

An earthquake will generally produce the strongest ground motions near the epicenter. The intensity will generally decrease with distance from the epicenter in similar to elevation contour lines. This irregularity is caused by soil conditions, the complexity of earthquake fault rupture patterns, and possible directionality in the dispersion of earthquake energy. The amount of earthquake damage and the size of the geographic area affected generally

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increase with earthquake magnitude. Below are some qualitative examples:

- Earthquakes below about M5 are not likely to cause significant damage, even locally near the epicenter. These quakes seldom shake more than a few seconds.
- Earthquakes between about M5 and M6 are likely to cause moderate damage near the epicenter. These quakes can shake up to +/- 10 seconds.
- Earthquakes of M6.5 or greater (e.g., the 2001 Nisqually earthquake) can cause major damage, with damage usually concentrated fairly near the epicenter. These quakes shake between 10 and 30 seconds. The Nisqually quake shook Olympia for 42 seconds but was a shallow quake directly under the area.
- Larger earthquakes of M7+ cause damage over wider geographic areas with the potential for very high levels of damage near the epicenter. These quakes generally shake between 30 and 60 seconds.
- Great earthquakes with M8+ can cause major damage over wide geographic areas. These quakes generally shake between 1 and 4 minutes.
- A mega-quake M9 earthquake on the Cascadia Subduction Zone could affect the entire Pacific Northwest from British Columbia, through Washington and Oregon, and as far south as Northern California, with the highest levels of damage near the coast. These quakes can shake violently more than 4 minutes. The Great Alaskan Earthquake of 1964 shook for more than 8 minutes in some place.

6.3.2 Intensity of Ground Shaking

There are many measures of the severity or intensity of earthquake ground motions. The Modified Mercalli Intensity scale (MMI) was widely used beginning in the early 1900s. MMI is a descriptive, qualitative scale that relates severity of ground motions to the types of damage experienced. MMIs range from I to XII. More accurate, quantitative measures of the intensity of ground shaking has largely replaced the MMI. These modern intensity scales are used in the Clallam County Multi-Jurisdiction Hazard Mitigation Plan.

Modern intensity scales use terms that can be physically measured with seismometers (instruments that measure motions of the ground), such as acceleration, velocity, or displacement (movement). The intensity of earthquake ground motions may also be measured in spectral (frequency) terms, as a function of the frequency of earthquake waves propagating through the earth. In the same sense that sound waves contain a mix of low-, moderate- and high-frequency sound waves, earthquake waves contain ground motions of various frequencies. The behavior of buildings and other structures depends substantially on the vibration frequencies of the building or structure vs. the spectral content of earthquake waves. Earthquake ground motions also include both horizontal and vertical components.

A common physical measure of the intensity of earthquake ground shaking, and the one used in this mitigation plan, is Peak Ground Acceleration (PGA). PGA is a measure of the intensity of shaking compared to the acceleration of gravity (g). The acceleration of gravity is 32 feet/second/second. That means an object falling for 1 second will fall 32 feet. At the end of 1 second the object will be traveling at 32 feet per second. A car traveling at 60 miles per

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hour is traveling 88 feet per second. Objects traveling at 32 feet per second are traveling at 22 MPH. This is important because PGA is measured as a percentage of the acceleration of gravity. Few of us understand what 80% PGA means when it comes to earthquake effects but all of us understand that 80% of 22 MPH equals 17.6 MPH. We all know what a car traveling that fast looks like and that is how fast the ground will be moving during an 80% PGA event.

Damage levels experienced in an earthquake vary with the intensity of ground shaking and with the seismic design strength of structures. The following generalized observations provide qualitative statements about the likely extent of damages from earthquakes with various levels of ground shaking (PGA) at a given site:

- Ground motions of only 1% g or 2% g (less than .5 MPH) are widely felt by people; hanging plants and lamps swing strongly, but damage levels, if any, are usually very low.
- Ground motions below about 10% g (+/- 2 MPH) usually cause only slight damage.
- Ground motions between about 10% g and 30% g (+/- 2 to 6.6 MPH) may cause minor to moderate damage in well-designed buildings, with higher levels of damage in more vulnerable buildings. At this level of ground shaking, some poorly designed buildings may be subject to collapse.
- Ground motions above about 30% g (+/- 6.6 to 11 MPH) may cause significant damage in well-designed buildings and very high levels of damage (including collapse) in poorly designed buildings.
- Ground motions above about 50% g (> 11 MPH) may cause significant damage in many buildings, including some buildings that have been designed to resist seismic forces.

6.4 Aftershocks

Major destructive earthquakes are usually followed by aftershocks. An aftershock is a smaller earthquake that occurs after a previous large earthquake, in the same area of the main shock. Aftershocks occur when the crust around the displaced fault plane adjusts to the effects of the main shock. Aftershocks are dangerous because they are unpredictable, can be of a large magnitude, and can collapse buildings that are damaged from the main shock. Bigger earthquakes have more and larger aftershocks and the sequences can last for years. Christchurch New Zealand experienced thousands of aftershocks after the November 2016 earthquake. Scientists predict that Clallam County may experience 1 aftershock greater than 8.0 and as many as 10 greater than 7.0 after the Cascadia Subduction Zone Earthquake. All County facilities must be re-inspected after every aftershock greater than 5.0

6.5 Earthquake Hazard Maps

The current scientific understanding of earthquakes is incapable of predicting exactly where and when the next earthquake will occur. However, the long-term probability of earthquakes

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is well enough understood to make useful estimates of the probability of various levels of earthquake ground motions at a given location.

The current consensus estimates for earthquake hazards in the United States are incorporated into the 2014 USGS National Seismic Hazard Maps. These maps are the basis of building code design requirements for new construction, per the International Building Code adopted in Washington State. The earthquake ground motions used for building designs are based on the probability that there is a 66% chance a given location will experience a greater than 2% PGA event in 50 years. WE NEED TO VERIFY THIS – DOESN'T SOUND RIGHT.

The following USGS map (Figure 6.4) shows the probability that a seismic event with a Peak Ground Acceleration (PGA) exceeding 2% (> .5 MPH) will occur in the next 50 years. Different colors represent predicted PGAs.

Please note the dark pink shading over Clallam County west of Kitchen Dick Road indicates the area has a 2% probability of experiencing an event with 61 to 80% PGA (13.5 to 17.6 MPH) in the next 50 years.

The lighter pink shading over Clallam County east of Kitchen Dick Road indicates the County has a 2% probability of experiencing an event with 51 to 60% PGA (11 to 13.5 MPH) in the next 50 years.

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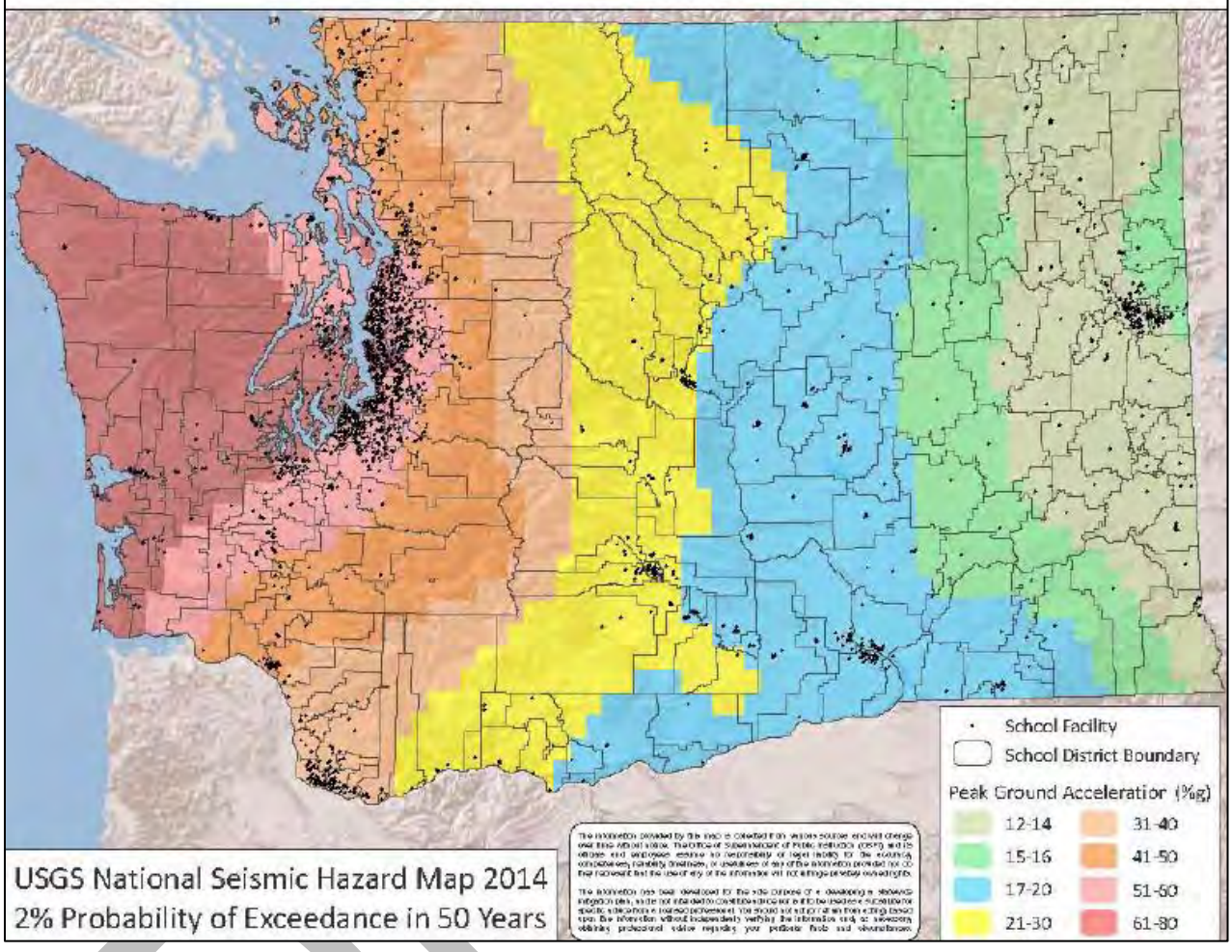
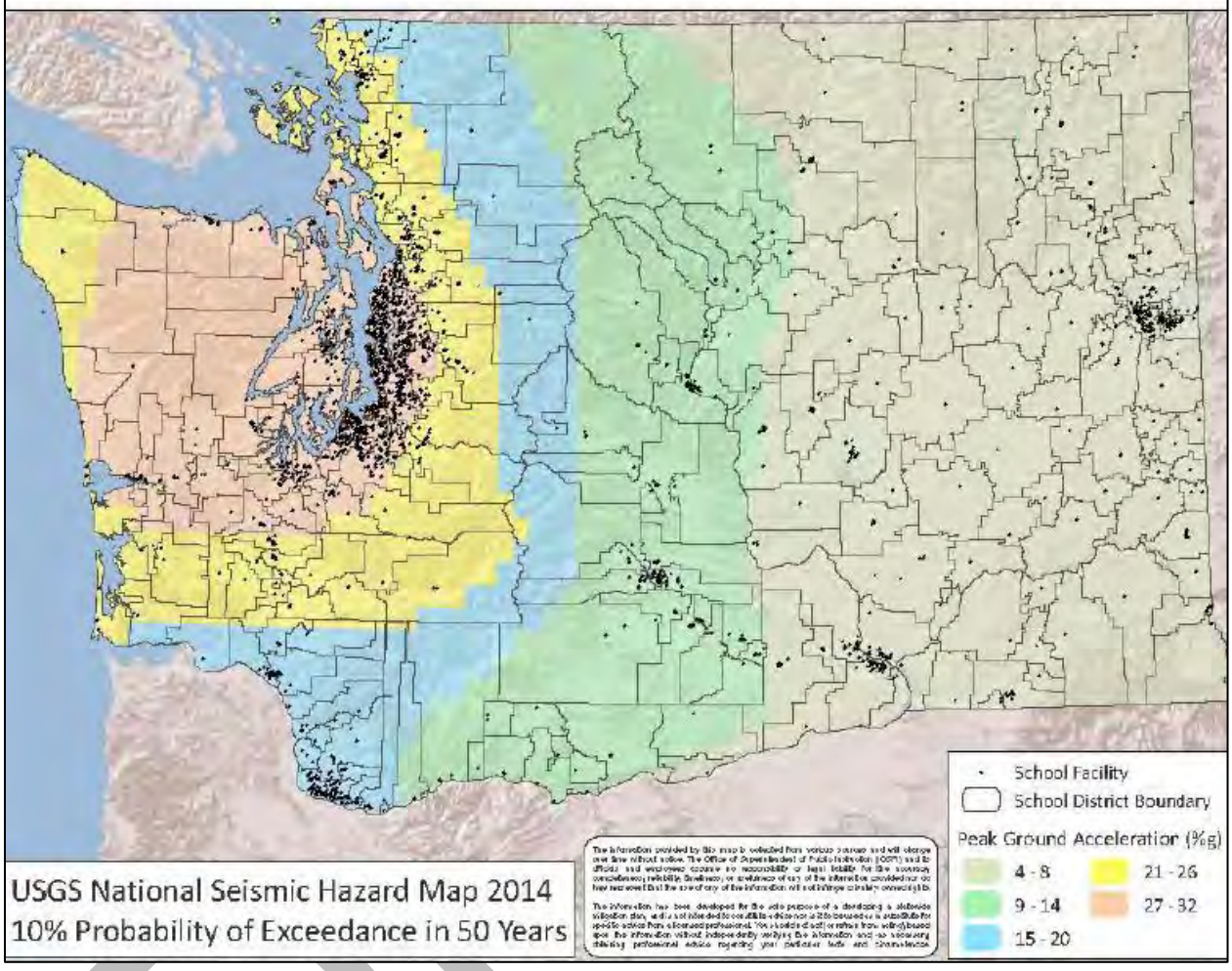
Figure 6.4
2014 USGS Seismic Hazard Map: Washington State[6]
PGA value (%g) with a 2% Chance of Exceedance in 50 years



The following USGS map (Figure 6.5) shows the probability that a seismic event with a Peak Ground Acceleration (PGA) exceeding 10% (> .5 MPH) will occur in the next 50 years. Different colors represent predicted PGAs. Please note the yellow shading over western Clallam County indicates the area has a 10% probability of experiencing an event with 21 to 26% PGA (4.6 to 5.7 MPH) in the next 50 years. The beige shading over the rest of Clallam County indicates the County has a 2% probability of experiencing an event with 27 to 32% PGA (5.7 to 7.0 MPH) in the next 50 years.

Figure 6.5
2014 USGS Seismic Hazard Map: Washington State[6]
PGA value (%g) with a 10% Chance of Exceedance in 50 years



The differences in geographic pattern between the 2% in 50-year map and the 10% in 50-year map take into account the likelihood of Cascadia Subduction Zone earthquakes and crustal earthquakes. This indicates that that earthquakes on the Boundary-Lake Creek and Whidbey Island Faults are more likely than a Cascadia Subduction event.

These maps are generated by including earthquake probabilities from all known faults, taking into account the expected magnitudes and frequencies of events for each fault. The maps also include contributions from unknown faults, which are statistically possible anywhere in Washington. The contributions from unknown faults are included via “area” seismicity which is distributed throughout the State.

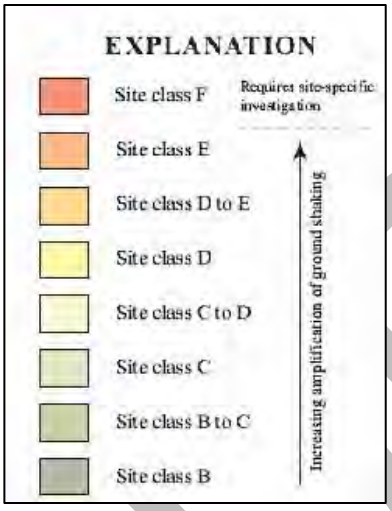
An important caveat for interpreting these maps is that the 2014 USGS seismic hazard maps show the level of ground motions for bedrock sites. Ground motions on soil sites, especially soft soil sites will be significantly higher than for bedrock sites. Thus, for

earthquake hazard analysis at a given site it is essential to include consideration of the site's soil conditions. The ground motions shown in the following figures represent ground motions with specified probabilities of occurrence. At any given site, earthquakes may be experienced with ground motions over the entire range of ground shaking from just detectible with sensitive seismometers to higher than the 2% in 50-year ground motion.

6.5 Site Class: How to Use Soil and Rock Types to Predict Ground Shaking

The soil or rock type at a given location substantially affects the level of earthquake hazard because the soil or rock type may amplify or dampen ground motions. In general, soft soil sites amplify ground motions. That is, for a given earthquake, a softer soil site immediately adjacent to a rock site will experience higher levels of earthquake ground motion and longer shaking duration than the rock site. Geologists divide soil types into 6 categories called Site Classes. Site class is used as a scale to predict the intensity of earth shaking at a given site. The six site classes are:

Figure 6.6 Legend for Site Class Map of Clallam County, Washington Department of Natural Resources, 2004.



- F – Very Soft Soil (very significant increase in shaking and duration)
- E – Soft Soil (significant increase in shaking and duration)
- D – Firm Soil (moderately more shaking than Site Class A)
- C – Very Dense Soil/Soft Rock (moderately more shaking than Site Class A)
- B – Rock (slightly more shaking than Site Class A)
- A – Hard Rock (bedrock – baseline shaking)

Site classes for each facility in the Clallam County Multi-Jurisdiction are included in Appendix D. These estimates are from DNR Maps and from site-specific observations by CCEMD personnel.

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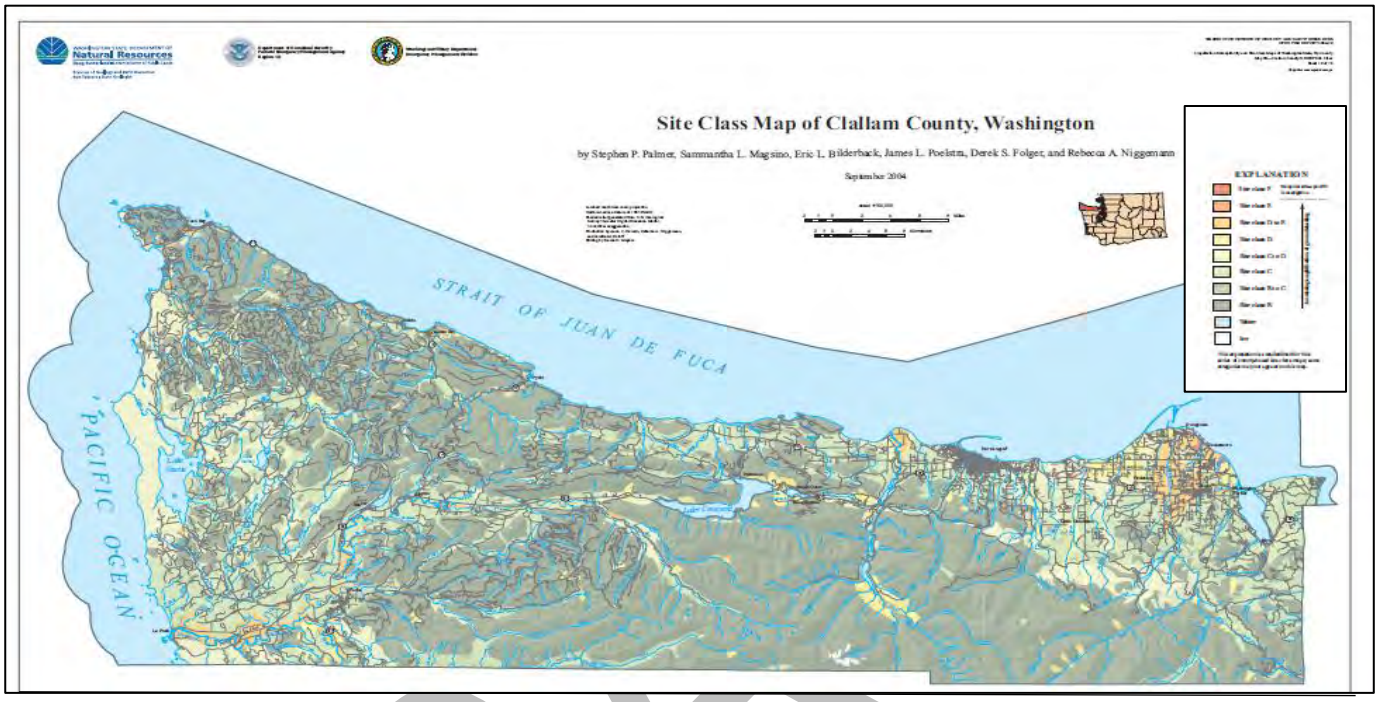
Figure 6.7 Site Class Map of Clallam County, Washington Department of Natural Resources, 2004.



6.6 Ground Failures and Other Aspects of Seismic Hazards

Much of the damage in earthquakes occurs from ground shaking that affects buildings and infrastructure. However, there are several other consequences of earthquakes that can result in substantially increased levels of damage in some locations. These consequences include: surface rupture; subsidence of elevation; liquefaction; settlement; lateral spreading; landslides; dam, reservoir or levee failures; tsunamis and seiches. Any of these consequences can result in very severe damage to buildings, up to and including complete destruction, and also a high likelihood of casualties.

6.6.1 Surface Rupture

Surface rupture occurs when the ruptured fault plane displaces the surface (i.e., San Andreas Fault). Surface rupture may be horizontal and/or vertical displacement between the sides of the rupture plane. For a building subject to surface rupture the level of damage is typically very high and often results in the destruction of the building. Surface rupture does not occur with interface or intraplate earthquakes on the Cascadia Subduction Zone and does not occur with all crustal earthquakes. Faults in Washington State where surface rupture is likely to include the Seattle Fault System and the Tacoma Fault System.

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6.6.2 Subsidence

S*ubsidence* is the sudden sinking of the Earth's surface due to the movement of subsurface earth material. Subduction of the Juan De Fuca Plate under the North American Plate has forced western Washington to rise as much as 6 feet since the last Cascadia Subduction Zone Earthquake in 1700 (See Fig. 6.2). The next Cascadia Subduction Zone Earthquake will release the force on the Peninsula and the land will sink approximately 6 feet to the level it was prior to the 1700 quake. Clallam County west of Port Angeles is expected to subside 3 to 6 feet. Clallam County east of Port Angeles to the Cascades is expected to subside 1 to 3 feet. Facilities located very near sea level will may be permanently inundated or become tidelands. Subsidence will cause coastal flooding that will block tsunami escape routes and increase the likelihood of casualties.

6.6.3 Liquefaction, Settlement and Lateral Spreading

Liquefaction is a process where loose, wet soils lose bearing strength during an earthquake and behave similar to a liquid. Once a soil liquefacts, it tends to settle vertically and/or spread laterally. With even very slight slopes, liquefacted soils tend to move sideways downhill (lateral spreading). Settling or lateral spreading can cause major damage to buildings and to buried infrastructure such as pipes and cables.

Site class maps are similar to Site Class Soil Maps. They can be used to predict the potential for soils to liquefact. The softer and wetter the soil, the greater the possibility of liquefaction. The legend is similar to the Site Class Legend.

6.6.4 Sea Floor Movements

Unexpected changes to underwater topography could be a hazard to shipping after a major destructive earthquake. The US Coast Guard and US Navy indicate that it will be necessary to perform bathymetric surveys on LaPush, Neah Bay, Clallam Bay, Port Angeles Harbor, Sequim Bay near Port Williams and all coastal ports in the Pacific Northwest before ships will be permitted to begin relief operations.

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Figure 6.8 Legend for Liquefaction Map of Clallam County, Washington Department of Natural Resources, 2004.

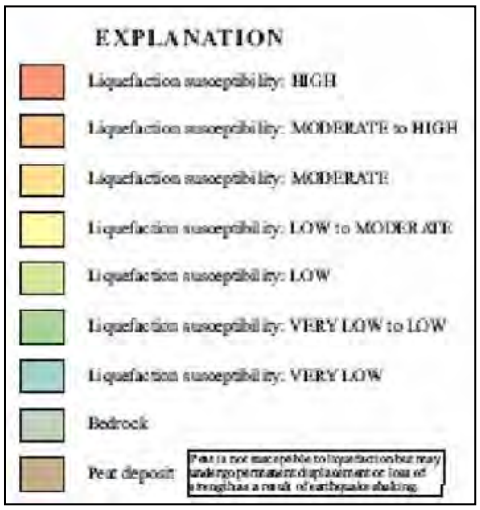
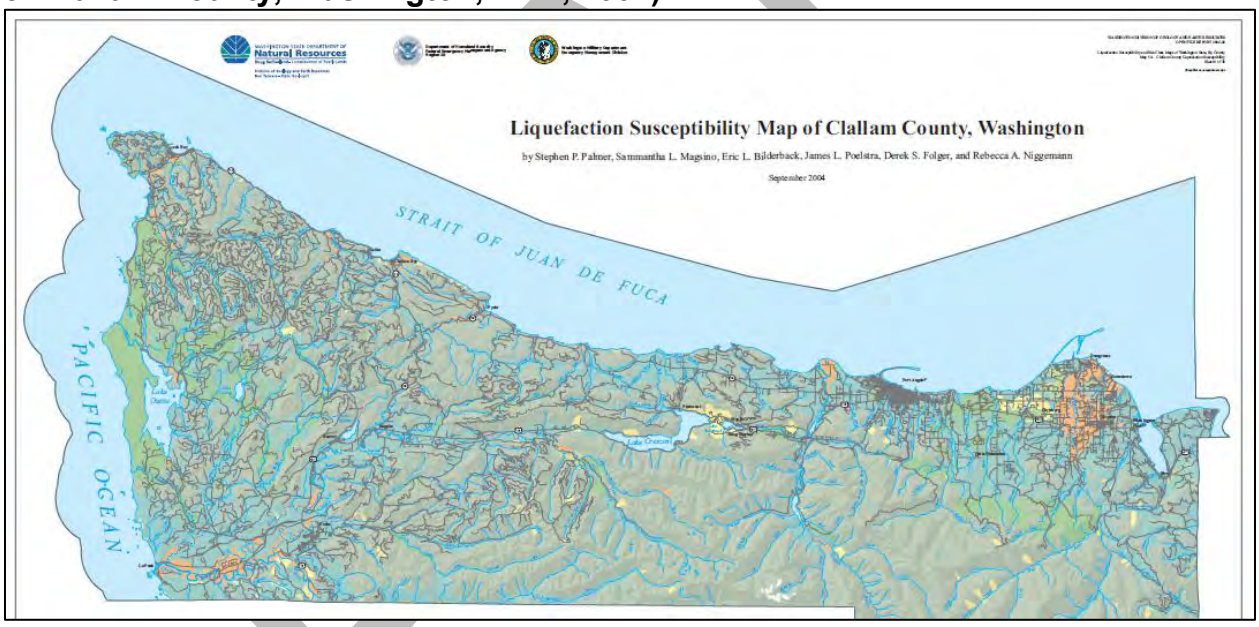


Figure 6.9 DNR Liquefaction Map for Clallam County. (Liquefaction Susceptibility Map of Clallam County, Washington, DNR, 2004)



Estimates of liquefaction potential for each facility in the Clallam County Multi-Jurisdiction Hazard Mitigation Plan are included in the facilities report in Appendix D. These estimates are from DNR maps or observations by CCEMD personnel.

6.6.4 Landslides

Earthquakes can also induce landslides, especially if an earthquake occurs during the rainy season and soils are saturated. The areas prone to earthquake-induced landslides are largely the same as those areas prone to landslides in general. As with all landslides, areas of steep slopes with loose rock or soils and high water tables are most prone to earthquake-induced landslides. Clallam County has numerous areas with significant landslide risk. Further information about this landslide risk is included in the landslide chapter of this mitigation plan. Estimates of landslide potential for each facility in the Clallam County Multi-Jurisdiction Hazard Mitigation Plan are included in Appendix D. These estimates are from DNR maps or observations by CCEMD personnel.

6.6.5 Dam, Levee and Reservoir Failures

Earthquakes can also cause failure of dams, levees and reservoirs. Facilities downslope from dams or water reservoirs or behind levees may be subject to flooding if the dams, reservoirs of levees fail as a result of an earthquake. There are several reservoirs in Clallam County that could flood neighborhoods for a short time. There are no significant dams.

6.6.6 Tsunamis and Sieches

Tsunamis most often result from earthquakes that cause a sudden rise or fall of part of the ocean floor. Tsunamis may also be generated by undersea landslides or by terrestrial landslides into lakes. A tsunami in a lake is called a sieche.

Clallam County is at risk from sieches and 2 types of tsunamis. The tsunamis are termed “far tsunamis” and “near tsunamis.”

- **Far tsunamis** originate from distant earthquakes such as those in Alaska, Russia and Japan. There is normally 3 to 12 hours warning of these events. Far tsunamis seldom damage Clallam County, however, the 3 to 4-foot tsunami from the 2011 Japanese tsunami was observed at the Port Angeles Boat Haven. Warning would be by radio or siren.

- **Near tsunamis** originate from undersea earth movements in or near Washington waters. A Cascadia Subduction Zone Earthquake would be the most likely cause. There would be less than 15 minutes warning for the Clallam Pacific Coast with up to an hour warning for the Straits. Warning would be by violent ground shaking. All areas lower than 40 feet above mean sea level in Clallam County are at risk of a tsunami after the Cascadia Subduction Zone earthquake. Tsunami heights may be higher in restricted bays and mouths of rivers and streams along the west and north coasts.

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- **Sieches** - Lake Sutherland and Lake Crescent were formed by giant landslides. There are active slides in the mountains above both lakes capable of generating dangerous sieches. There would be little warning of a slide into either lake. Further information about this landslide risk is included in the landslide chapter of this mitigation plan.

Estimates of tsunami/sieche potential for each facility in the Clallam County Multi-Jurisdiction Hazard Mitigation Plan are included in Appendix D. These estimates are from DNR maps or observations by CCEMD personnel.

6.7 Exposure, Starvation and Disease – The Forgotten Killers

People in Clallam County face serious threats after a major destructive earthquake that are seldom discussed. That threat is death by exposure or starvation. There are about 73,000 people living in Clallam County. That number can be as much as 25,000 higher during tourist season.

Figure 2.6 shows the population distribution of the County. Approximately 6,800 children are under 10 years old and 20,000 residents are older than 65. Most (59,000) live east of the Elwha River. A considerable number live in senior assisted living, convalescent or nursing homes. Nearly all of these people are at risk of cold weather exposure and the subsequent medical conditions it brings even during the summer months if the power is off for more than a day. This is especially true if they get wet.

These people are also totally dependent on electricity for food storage/preparation, lighting/water heating for hygiene, clean water, sanitation, HVAC, clean laundry and mechanical life support if necessary.

Average high temperatures in July/August are 69° with average lows of 52°. Medically fragile people, casualties, children and seniors will need help maintaining body temperature in these conditions. This will be critical if earthquake damage requires survivors to evacuate damaged facilities until they can be inspected. http://www.usclimatedata.com/climate/port-angeles/washington/united-states/uswa0346

Corporate America's "Just-in-Time" inventory system means Clallam County usually has 2 to 3 days of food on the grocery store shelves. Most people have about 1 week worth of food on hand. There are no food warehouses in the county. The National Guard estimates it will take 3 to 4 weeks to re-establish a supply chain big enough to feed County residents as well as the other 7 million people effected by the CSZE. The effects of starvation will begin to show about 10 days after the event as residents display lethargy and lower productivity in their jobs and their ability to take care of themselves. This will be critical at the Clallam Bay Correction Center which has 2 days of food on hand for 800 prisoners and staff.

Christchurch New Zealand and Haitian quakes demonstrated that raw sewage will contaminate anything it touches. Diseases we dismiss such as typhoid and cholera will be a footstep away from all who walk down a street after a major destructive earthquake. These

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diseases usually show up within 10 days of an event. Lack of post-disaster sanitation provides opportunities for other life-threatening vectors to cause problems for the survivors.

These hazards must be considered in the hazard mitigation plan.

6.8 Seismic Risk Assessment for Clallam County Multi-Jurisdiction Facilities

The potential impacts of earthquakes on Clallam County include damage to buildings and contents, disruption of services, displacement costs for temporary quarters, economic and environmental impacts and possible deaths and injuries for people in the buildings and that are felt but result in no damages or casualties to very substantial impacts for larger magnitude earthquakes with epicenters near the County.

The vulnerability of County facilities varies markedly from place to place, depending on each facility's structural system and date of construction (which governs the seismic design provisions). The level of risk for each critical facility is summarized in the category assessment tables later in this chapter. The initial seismic risk assessment for the County's facilities was performed by CCEMD personnel using personal observations, DNR soils, tsunami and liquefaction and Google Earth Maps.

WE HAVE NOT DONE A 3 STEP HAZARD AND RISK ASSESSMENT LIKE THE ONE BELOW. WE NEED TO SEE IF DCD HAS INFO WE CAN SUBSITUTE FOR THE OSPI ICOS PDM AND THE ASCE 41-13 PROGRAM. WE MIGHT BE ABLE TO USE THE GRANT TO PAY FOR THIS STUFF. ALSO, NEED TO SEE IF HAZUS COVERS THE FACILITIES. IF IT DOES WE MAY ABLE TO AVOID SOME OF THIS. THE TABLES ARE PICTURES FROM THE PASD DOCUMENT AND HAVE NOT BEEN CHANNGED COUNTY FORMAT.

The three-step hazard and risk assessment approach, outlined below, uses data in the OSPI ICOS PDM database for screening and prioritization of more detailed evaluations which usually require inputs from an engineer experienced with seismic assessments of buildings. The auto-generated reports help to minimize the level of effort required by districts and to reduce costs by prioritizing more detailed seismic evaluations, enabling the District to focus on the buildings most likely to have the most substantial seismic deficiencies. The three steps include:

1. An auto-generated campus-level earthquake report that summarizes earthquake hazard data including ground shaking, site class, and liquefaction potential and classifies the combined earthquake hazard level from these data. The campus-level report also includes priorities for building-level risk assessments and geotechnical evaluations of site conditions.

2. An auto-generated building-level earthquake report that is based on the ASCE 41-13 seismic evaluation methodology. The building-level report contains the data necessary to determine whether a building is pre- or

post-benchmark year for life safety. If a building is post-benchmark it is generally deemed to provide adequate life safety and no further evaluation is necessary. If not, completing an ASCE 41-13 Tier 1 evaluation is recommended. The auto-generated report includes suggested priorities for Tier 1 evaluations.

3. The third step includes completion and interpretation of the ASCE 41-13 Tier 1 evaluations and:

a. More detailed evaluation of one or more buildings that are determined to have the highest priority for retrofit or replacement from the previous step.
b. Design of seismic retrofits for buildings for which a retrofit is the preferred alternative.
c. Implementation of retrofits or replacement of buildings, as funding becomes available.

The OSPI ICOS PDM database campus-level and building-level reports are shown on the following pages.

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Table 6.2 Port Angeles School District Earthquake Campus-Level Hazard and Risk Report[1]

Campus	Earthquake Ground Shaking 2% in 50 Years[2] (% g)	Site Class°	Earthquake Ground Shaking Hazard Level	Liquefaction Potential	Combined Earthquake Hazard Level	Recommendations			
						Building Level Risk Assessment		Geotechnical Evaluation	
						Yes/No[3]	Priority	Yes/No	Priority
PORT ANGELES SCHOOL DISTRICT									
Dry Creek Elementary School	73.06%	C	Very High	Very Low	Very High	Yes	Very High	No	N/A
Franklin Elementary School	71.58%	C-D	Very High	Very Low to Low	Very High	Yes	Very High	No	N/A
Hamilton Elementary School	68.65%	C-D	Very High	Very Low to Low	Very High	Yes	Very High	No	N/A
Jefferson Elementary School	71.27%	C-D	Very High	Very Low to Low	Very High	Yes	Very High	No	N/A
Lincoln High School	69.65%	C-D	Very High	Very Low to Low	Very High	Yes	Very High	No	N/A
Maintenance and Operations Facility	72.74%	C	Very High	Very Low	Very High	Yes	Very High	No	N/A
Monroe Elementary School	70.71%	C-D	Very High	Very Low	Very High	Yes	Very High	No	N/A
North Olympic Peninsula Skills Center	69.67%	C-D	Very High	Very Low to Low	Very High	Yes	Very High	No	N/A
Port Angeles High School	72.60%	C	Very High	Very Low	Very High	Yes	Very High	No	N/A
Port Angeles School District Central Service	66.18%	D-E	Very High	Low to Moderate	Very High	Yes	Very High	Yes	Moderate
Roosevelt Elementary School	70.80%	C-D	Very High	Very Low	Very High	Yes	Very High	No	N/A
Stevens Middle	70.30%	C-D	Very High	Very Low to	Very High	Yes	Very	No	N/A

[1] Campus level risk is generally proportional to the combined earthquake hazard, but depends very strongly on the seismic vulnerability of buildings which must be evaluated at the building level. Thus, earthquake risk cannot be defined meaningfully at the campus level, except by doing building-level evaluations and then aggregating building results to provide campus-level risk.

[2] Earthquake ground motion measured as peak ground acceleration (PGA) relative to the "g", the acceleration of gravity.

[3] "Limited" applies only to campuses with low ground shaking hazard level (2% in 50 year PGA less than 20% g) and means building-level risk assessments are recommended only for the most vulnerable building types.

° The six site classes are identified as follows: A-Hard Rock, B-Rock, C-Very Dense Soil and Soft Rock, D-Firm Soil, E-Soft Soil and F-Very Soft Soil. Estimates by DNR also include intermediate classes such as D-E, where the data is not sufficient to distinguish between D and E, as well as G-Unknown, when data is missing

DISCLAIMER: The information provided in this report is collected from various sources and may change over time without notice. The Office of Superintendent of Public Instruction (OSPI) and its officials and employees take no responsibility or legal liability for the accuracy, completeness, reliability, timeliness, or usefulness of any of the information provided.
The information has been developed and presented for the sole purpose of developing school district mitigation plans and to assist in determining where to focus resources for additional evaluations of natural hazard risks. The reports are not intended to constitute in-depth analysis or advice, nor are they to be used as a substitute for specific advice obtained from a licensed professional regarding the particular facts and circumstances of the natural hazard risks to a particular campus or building.

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NOTE: THIS IS A CAMPUS ANALYSIS OF 1 SCHOOL – DRY CREEK

Table 6.3 Port Angeles School District Building-Level Earthquake Report

Building-Level Earthquake Report														
Building - Area	Seismic Design Criteria				Building Type	Seismic Design Basis	ASCE 41-13 Tier 1 Evaluation Recommended[1]		ASCE 41-13 Tier 1 Evaluation[2]			Mitigation Desired (Yes/No)	Mitigation Type	Mitigation Complete (Yes/No)
	Year Built	UBC or IBC	Code Year	Post-Benchmark (Yes/No)			Yes /No	Risk Level and Priority[2,3]	Completed (Yes/No)	ASCE 41-13 Compliant (Yes/No)	Further Eval Desired			
PORT ANGELES SCHOOL DISTRICT														
Dry Creek Elementary School Facility														
Equipment Building - Area 1	1996			No	FLT	Moderate Code	Yes	Moderate						
Main Building - 1	1996			Yes	W2	Moderate Code	No	Low						
Main Building - 2	1996			Yes	W2	Moderate Code	No	Low						
Main Building - 3,7	1996			No	RM1L	Moderate Code	Yes	High						
Main Building - 4	1996			Yes	W2	Moderate Code	No	Low						
Main Building - 5	1996			Yes	W2	Moderate Code	No	Low						
Main Building - 6	1996			No	RM1L	Moderate Code	Yes	High						
Main Building - 8	1996			No	RM1L	Moderate Code	Yes	High						
Portable A - #22	1989			No	FLT	Low Code	Yes	Moderate to High						

As the Campus-Level Earthquake Hazard and Risk Report (Table 6.2) illustrates, there is a 2% probability over the next 50 years that all thirteen of Port Angeles School District's campuses will experience over 66% PGA (peak ground acceleration). This means that during an earthquake event, the ground acceleration would be 65% that of gravity. Studies show that ground motions over 50% g may cause significant damage in many buildings, including some buildings that have been designed to resist seismic forces. The soil and rock type (site class) of all of our campuses has been identified by DNR data as type C, C-D and D-E. The liquefaction potential of all district campuses has been identified by DNR as varies from very low to moderate. Based on this combination of data, the combined earthquake hazard level for PASD's campuses is "Very High." Therefore, building-level risk assessments are recommended for all of Port Angeles School District campuses. The district's Building-Level Earthquake Reports (Table 6.3) reveal that based on the building type, the combined earthquake hazard level, the seismic design basis, and whether the building has been identified as having substantial vertical or horizontal irregularities, ASCE 41-13 Tier 1 evaluations are recommended for

several of the district's buildings. The risk level and priorities for these evaluations based on these reports are:

Very High: Every site in Port Angeles School District:

Dry Creek Elementary
Franklin Elementary
Hamilton Elementary
Jefferson Elementary
Lincoln High
Maintenance
Monroe
North Olympic Skill Center
Port Angeles High
Port Angeles Central Service Building
Roosevelt Elementary
Stevens Middle
Transportation

Based on observations and the experience of PASD Maintenance Department personnel, it is believed that a professional building-level risk assessment Franklin Elementary School, Hamilton Elementary School, Port Angeles High School and Stevens Middle School will reveal that those School building would be especially susceptible to damage during an earthquake event.

Based on the above observations, Franklin elementary School, Hamilton Elementary School, Port Angeles High School and Stevens Middle School are the district's highest priority for the ASCE 41-13 Tier 1 evaluations and subsequent mitigation actions based on the recommendations of the evaluation.

6.9 Previous Earthquake Events

The County has experienced minimal damage from previous earthquakes.

6.10 Earthquake Hazard Mitigation Measures for County Multi-Jurisdiction Facilities

6.10.1 Typical Seismic Mitigation Measures

There are several possible earthquake mitigation Action Items for the County's facilities, including:

- Replacement of seismically vulnerable buildings with new buildings that meet or exceed the seismic provisions in the building code,
- Structural retrofits for buildings,
- Nonstructural retrofits for buildings and contents,
- Installation of emergency generators for buildings with critical functions, including designated emergency shelters, and
- Enhanced emergency planning, including earthquake exercises and drills.

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Of these potential Earthquake Action Items, FEMA mitigation grants, which typically provide 75% of total project costs, may be available for structural or nonstructural retrofits and for emergency generators.

Earthquake Action Items for the Port Angeles School District are given in Table 6.4 on the following page.

HERE IS A SAMPLE OF THE ACTION ITEM TABLE THIS SCREENSHOT FOR SAMPLE PURPOSES ONLY. IT HAS NOT BEEN CONVERTED TO COUNTY FORMAT.

Table 6.4
Port Angeles School District: Earthquake Action Items

Hazard	Action Item	Timeline	Source of funds	Responsible Party	Plan Goals Addressed: Life Safety	Protect Facilities	Enhance Emergency Planning	Enhance Awareness and Education
Earthquake Mitigation Action Items								
Short-Term #1	Identify district buildings that don't meet the ASCE 41-13 criteria for being post-benchmark year and thus don't meet the screening criteria for life safety.	1 Year	District or Grants	Supt.	X	X		X
Short-Term #2	Complete ASCE 41-13 Tier 1 evaluations for the above buildings. If funding is limited, prioritize based on discussions with a structural engineer, building structural types, year built and a quick inspection of each building.	1-5 Years	District or Grants	Supt.	X	X		X
Short-Term #3	Assess the ASCE 41-13 results and select buildings that have the greatest vulnerability for more detailed evaluations.	1-5 Years	District or Grants	Supt.	X	X		X
Long-Term #1	Complete the seismic retrofit of the classroom wing for the Franklin Elementary School	4-5 Years	District or Grants	Supt.	X	X		X
Long-Term #2	Prioritize and implement seismic retrofits or replacements based on the results of the detailed evaluations, as funding becomes available.	Ongoing	District or Grants	Supt.	X	X		X
Long-Term #3	Maintain and update building data for seismic risk assessments in the OSPI ICOS PDM database.	Ongoing	District or Grants	Supt.	X		X	X
Long-Term #4	Enhance emergency planning for earthquakes including duck and cover and evacuation drills.	Ongoing	District or Grants	Supt.	X		X	X

6.11 References

1. United States Geological Survey (2013). Largest Earthquakes in the World Since 1900. http://earthquake.usgs.gov/earthquakes/world/10_largest_world.php

2. University of Washington (2002). Map and List of Significant Quakes in WA and OR, The Pacific Northwest Seismograph Network. University of Washington Department of Earth Sciences.

3. Washington State Department of Natural Resources (2013). https://fortress.wa.gov/geology?Theme-wigm

4. Cascadia Region Earthquake Working Group (2005): Cascadia Subduction Zone Earthquakes: A Magnitude 9.0 Earthquake Scenario.

5. Oregon Seismic Safety Policy Advisory Commission (2013). The Oregon Resilience Plan.

6. Washington State Department of Natural Resources (2004). Liquefaction Susceptibility and Site Class Maps of Grays Harbor County, Washington. Open File Report 2004-20.

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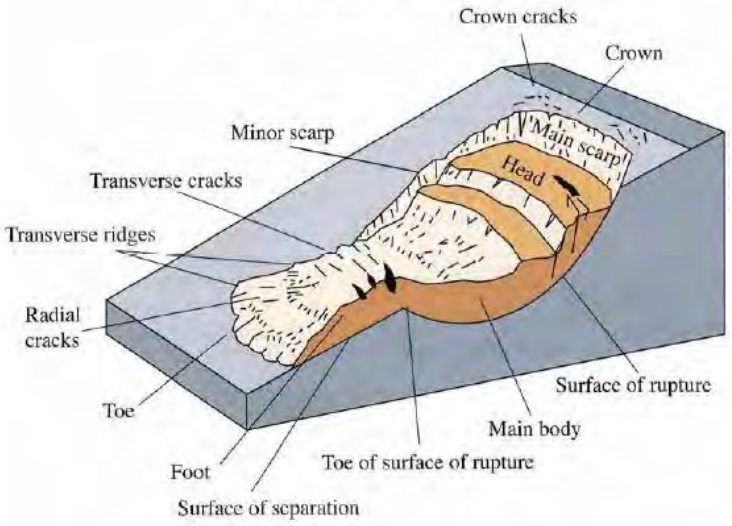
Chapter 7: LANDSLIDES

7.1 Landslide Overview and Definitions

The term “landslide” refers to a variety of slope instabilities that result in the downward and outward movement of slope-forming materials, including rocks, soils and vegetation. Many types of landslides are differentiated based on the types of materials involved and the mode of movement.

The descriptive nomenclature for landslides is summarized in the following figure.

Figure 7.1
Landslide Nomenclature[1]



Debris flows and mudslides (mudflows) are often differentiated from the other types of landslides, for which the sliding material is predominantly soil and/or rock. Debris flows and mudslides typically have high water content and may behave similarly to floods. However, debris flows may be much more destructive than floods because of their higher densities, high debris loads, and high velocities.

There are three main factors that determine the susceptibility (potential) for landslides at a given location:

1) Slope,
2) Soil/rock characteristics, and
3) Water content.

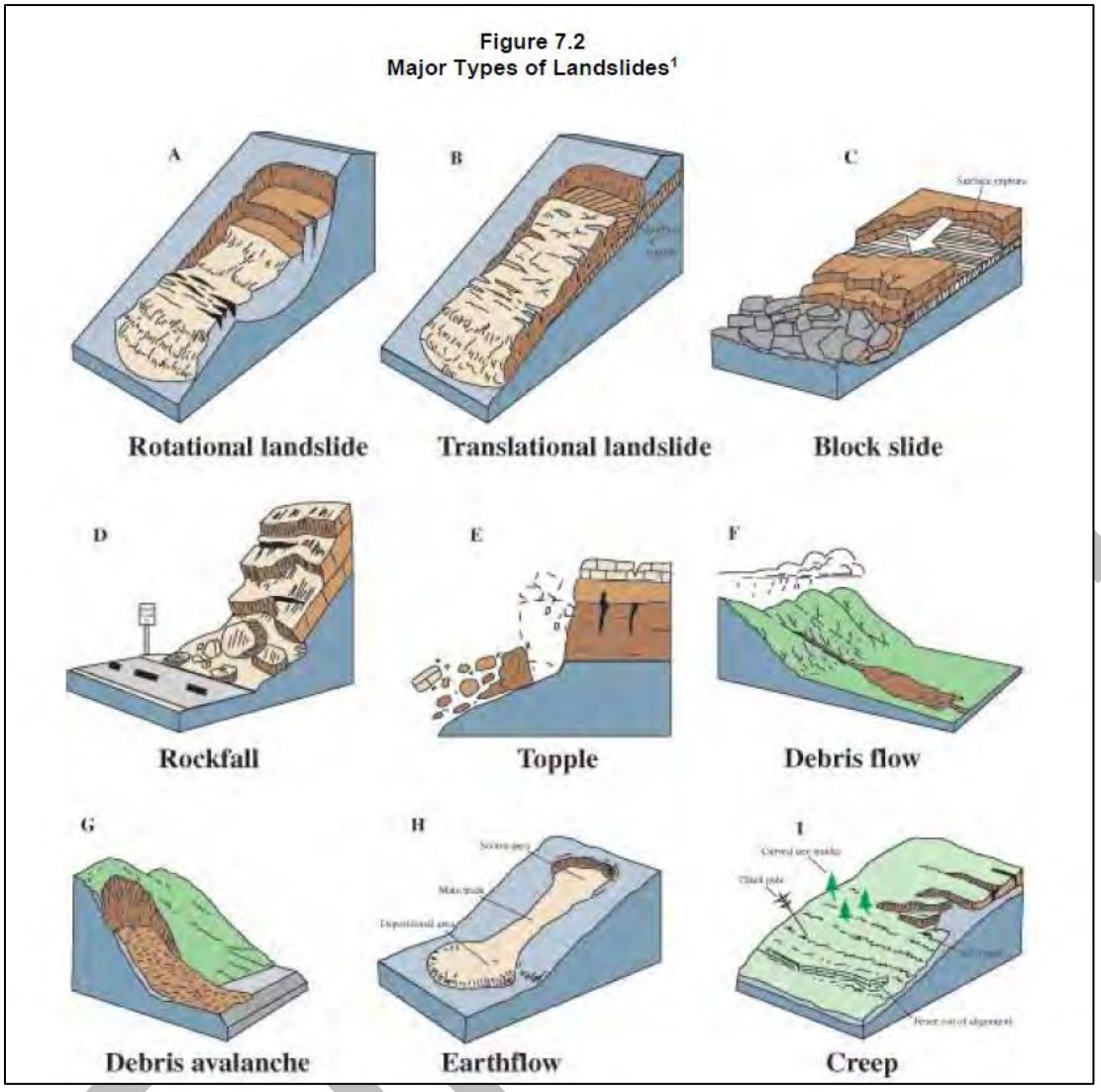


Figure 7.2
Major Types of Landslides[1]

is more prone to landslides than are competent rocks or dense, firm soils. Saturated soils or soils occurring in areas with high water tables are more prone to landslides because the water pore pressure lubricates the soil particles (decreases the shear strength of the soil) and increases the probability of sliding.

Most landslides occur in saturated soils during rainy months However, landslides may occur at any time of year. Landslides can be initiated by earthquakes. Areas prone to seismically triggered landslides are the same as those prone to ordinary (non-seismic) landslides. Any type of landslide may result in damages or complete destruction of buildings, vehicles and facilities in their path, as well as deaths and injuries to personnel. The destructive power of major landslides was demonstrated by the devastating March 2014 landslide in Oso, Washington which resulted in in several dozen deaths as well as extreme damage to buildings and infrastructure

7.2 Landslide Hazard Mapping and Hazard Assessment

There are two approaches to landslide hazard mapping and hazard assessment:

- Mapping historical landslides, which also provides an indication of the potential for future landslides, and
- Landslide studies by geotechnical engineers to estimate the potential for future landslides.

Maps of areas within Clallam County with moderate or high landslide incidence and landslide potential are shown in Figures 7.3 through 7.5. Estimates of landslide potential for each facility in the Clallam County Multi-Jurisdiction Hazard Mitigation Plan are included Appendix D. These estimates are from DNR maps or observations by CCEMD personnel.

It is very difficult to make quantitative predictions of the likelihood or the size of a future landslide event. An accurate understanding of the landslide hazard for a given facility requires a detailed landslide hazard evaluation by a geotechnical engineer. Such site-specific studies evaluate the slope, soil/rock and groundwater characteristics. Such assessments may require drilling to determine subsurface soil/rock characteristics. In some cases, landslide hazard assessments by more than one geotechnical engineer may reach conflicting opinions.

In spite of these limitations and uncertainties, a detailed site-specific landslide hazard assessment does provide the best available information about the likelihood of future landslides. Such studies may provide enough information to determine that the landslide risk may require a facility to be moved or built at a safer location.

Landslides in Clallam County frequently cover or undermine Highway 112 between mileposts 1 and 9 and mileposts 32 and 39. Highway 101 and East Beach Road are subject debris flows and rockfalls along Lake Crescent. Piedmont Road, Joyce Access Road and Waterline Road are all at risk of landslides as are residences around Lake Sutherland and Lake Crescent. Highway 101 may be subject to landslides in Indian Valley between Lake Crescent and the Elwha River during major destructive earthquakes. There is concern that neighborhoods in Port Angeles downhill from Peninsula College may be subject to block or creep slides during an earthquake.

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Figure 7.3 Landslide Hazard Map of Clallam County

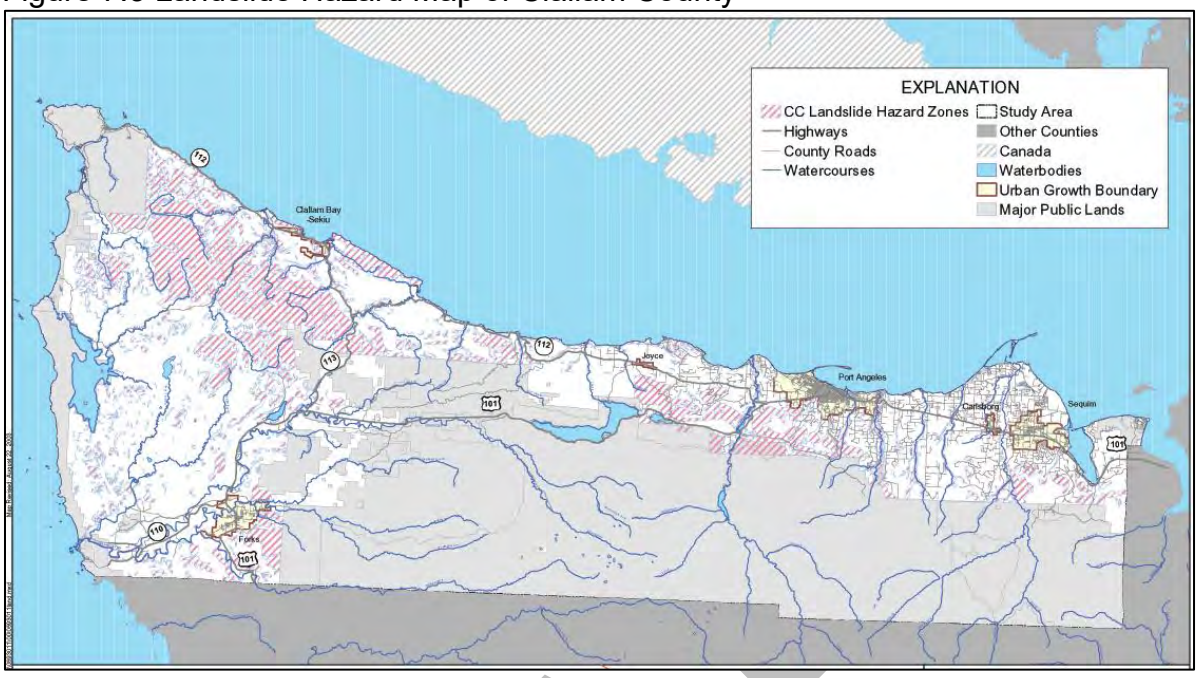


Figure 7.4 Enlarged Landslide Hazard Map of western Clallam County

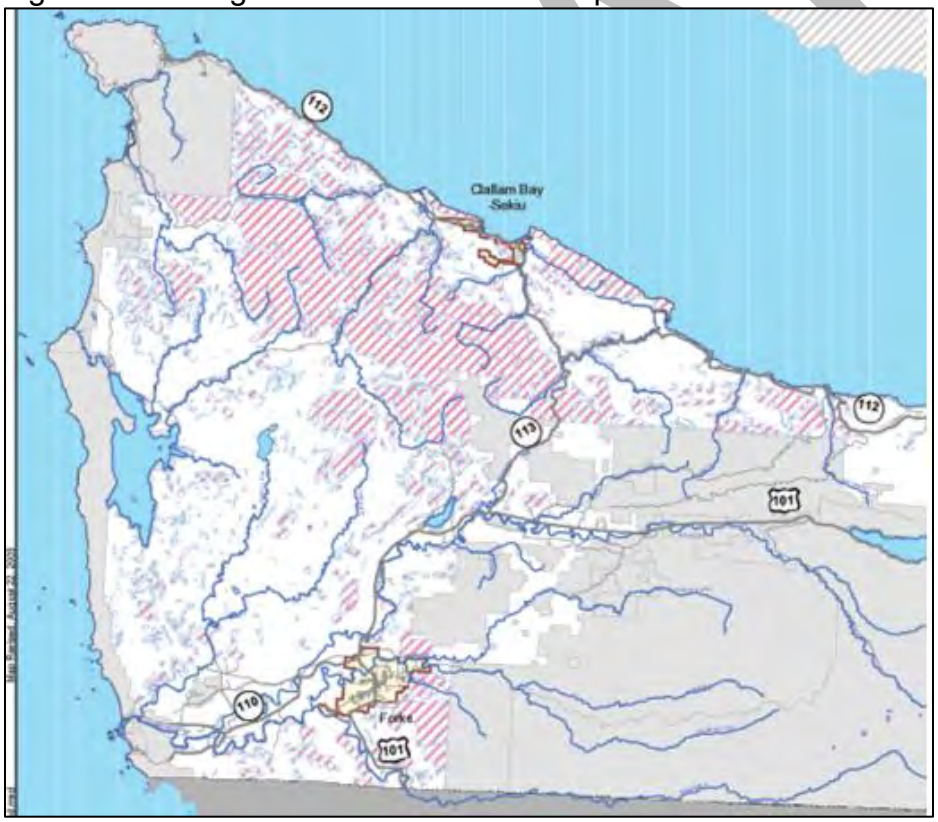
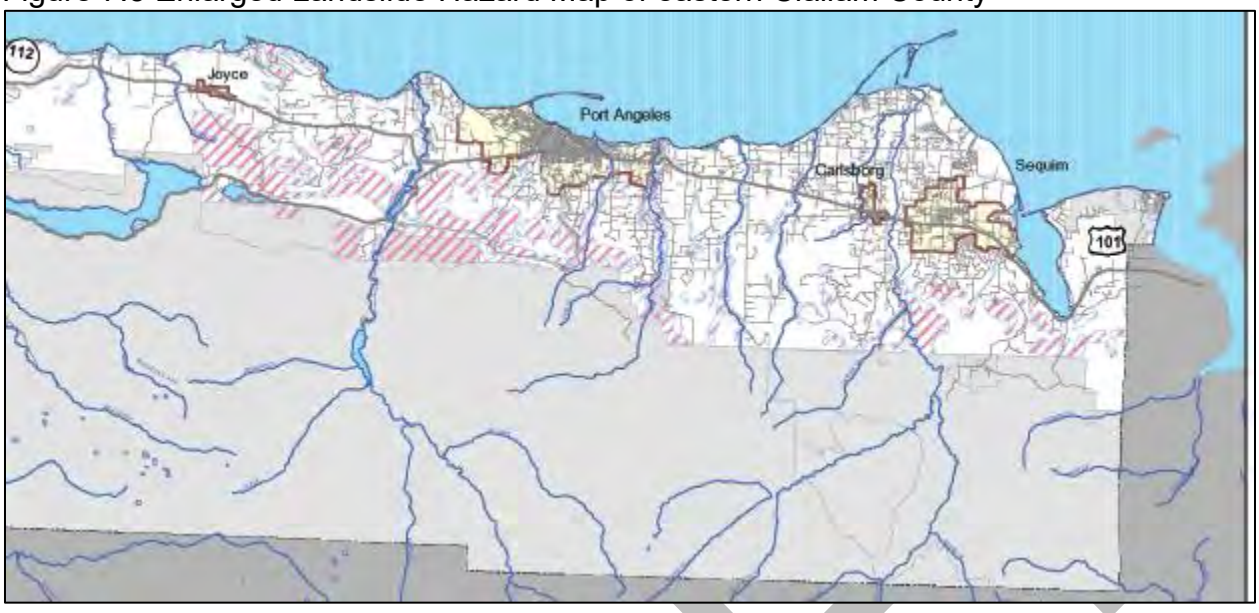


Figure 7.5 Enlarged Landslide Hazard Map of eastern Clallam County



7.3 Clallam County Multi-Jurisdiction Landslide Hazard and Risk Assessment

The potential impacts of landslides on Clallam County include deaths and injuries, damage infrastructure, damage to buildings and contents (include possible complete destruction), economic disruption, and displacement costs for temporary quarters.

The vulnerability of Clallam County facilities to landslides varies from site to site. The approximate levels of landslide hazards and vulnerability are identified at the facility site level in the facility categories. MAY BE LIMITED TO LESS THAN 10 SITES.

Facility-level landslide hazard and risk assessments are made by CCEMD personnel using DNR landslide hazard maps and personal observation using the following data:

- Slope data in the vicinity of each facility
- Whether or not the is within 500 feet of a DNR mapped landslide.
- Information provided by CCEMD personal observation.
    - o Are there channels, gullies or swales upslope from the campus?
    - o Are there slumps or historical landslides upslope from the campus?
    - o Are there buildings <50 feet from a deeply incised stream or other steep slopes?

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The preliminary landslide hazard level is based on slope data only:

Slope	Preliminary Landslide Hazard Level
>40%	High
30% to 40%	Moderate
20% to 30%	Low
<20%	Very Low

The hazard and risk level is increased by one step (but not higher than “high”) if there are yes answers to any of the four data points listed above.

As stated previously, more accurate landslide hazard and risk assessment requires a site-specific investigation by a geologist, engineer or geotechnical engineer. Consultation with one of these experts is recommended for all facilities where the preliminary determination of the level of landslide hazard and risk is “moderate” or higher. **THIS SCREENSHOT FOR SAMPLE PURPOSES ONLY. IT HAS NOT BEEN CONVERTED TO COUNTY FORMAT.**

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Table 7.1
Port Angeles School District: Campus-Level Landslide Hazard and Risk Assessment

Landslide Campus-Level Hazard and Risk Report								
Campus	Maximum Slope Near Campus	Preliminary Landslide Hazard Level°	Within 500 feet of DNR Mapped Landslides[1]	Channels, Gullies or Swales Upslope	Slumps or Historical Landslides Upslope	Buildings <50 Feet From Incisded Stream or Steep Slopes	Preliminary Landslide Risk Level[2]	Consult with Geologist or Geotechnical Engineer[3]
Port Angeles								
Lincoln High School	29.80%	Moderate	No	No	No	No	Moderate	Yes
Roosevelt Elementary School	19.98%	Low	No	Yes	Yes	Yes	Low to Moderate	Yes

° The preliminary hazard level reflects only the maximum slope near the campus, as calculated from GIS elevation data.

[1] Indicates that landslides occur near the campus; landslide hazard for the campus may or may not be significant.

[2] Preliminary landslide risk level based on the combination of the GIS data and campus-specific data (if such is entered). More accurate determniation of landslide risk for a campus or for specific buildings requires consultation with a geologist or geotechnical engineer.

[3] Consultation means discuss with a geologist of geotechnical engineer knowledgeable about landslides to determine whether a more detailed study is warranted.

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The information has been developed and presented for the sole purpose of developing school district mitigation plans and to assist in determining where to focus resources for additional evaluations of natural hazard risks. The reports are not intended to constitute in-depth analysis or advice, nor are they to be used as a substitute for specific advice obtained from a licensed professional regarding the particular facts and circumstances of the natural hazard risks to a particular campus or building.

7.4 Mitigation of Landslide Risk

Mitigation of landslide risks is often difficult from both the engineering and cost perspectives. In many case, there may be no practical landslide mitigation measure. Typical landslide mitigation measures include the following:

- Slope stability can be improved by the addition of drainage to reduce pore water pressure and/or by slope stabilization measures, including retaining walls, rock tie-backs with steel rods and other geotechnical methods.
- For smaller landslides or debris flows, protection for existing facilities at risk may be increased by building diversion structures to deflect landslides or debris flows around an at-risk facility.
- For very high-risk facilities, with a high degree of life safety risk, abandoning The facility and replacing it with a new facility may be the only possible landslide mitigation measure.
- For new construction, siting facilities outside of landslide hazard areas is the most effective mitigation measure. The Jurisdiction's Mitigation Action Items for landslides are shown in the table on the following page.

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Table 7.2
Port Angeles School District: Landslide Mitigation Action Items

Hazard	Action Item	Timeline	Plan Goals Addressed			
			Life Safety	Protect Facilities	Enhance Emergency Planning	Enhance Awareness and Education
Landslide Mitigation Action Items						
Short-Term #1	Consult with a geologist or geotechnical engineer regarding landslide risk at Roosevelt Elementary School.	1-2 Years	X	X	X	X
Long-Term #1	Evaluate and implement landslide mitigation measures if recommended by the geologist or geotechnical engineer.	Ongoing	X	X	X	X

7.5 References.

1. United States Geological Survey (2004), Landslide Types and Processes, Fact Sheet 2004-3072.

2. Washington State Military Department, Emergency Management Division (2009), Hazard Identification and Vulnerability Assessment (HIVA).

3. Google Earth photos (2013 and 2014).

4. Washington State Enhanced Hazard Mitigation Plan, Section 5.6, Hazard Profile – Landslide, October 2010.

5. Photo by Washington Department of Natural Resources: http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=9224

6. Washington Department of Natural Resources (2011), unpublished map: Slope Stability Model for Shallow Landslide Potential, West and East Side.

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8.0 WILDLAND/URBAN INTERFACE FIRES:

8.1 Overview

Fire has posed a threat to mankind since the dawn of civilization. Fires often cause substantial damage to property and may also result in deaths and injuries. For the purposes of mitigation planning, we define three types of fires:

- Structure fires and other localized fires,
- Wildland fires, and
- Wildland/urban interface fires.

Structure fires are fires where structures and contents are the primary fuel. In dealing with structure fires, fire departments typically have three primary objectives: 1) minimize casualties, 2) prevent a structure fire from spreading to other structures, and 3) minimize damage to the structure and contents. Structure fires and the other common types of fires, such as vehicle or trash fires are most often limited to a single structure or location, although in some cases they may spread to adjacent structures.

Wildland fires are fires where vegetation (grass, brush, trees) is the primary fire fuel and with few or no structures involved. For wildland fires, the most common suppression strategy is to contain the fire at its boundaries and then to let the fire burn itself out. Fire containment typically relies heavily on natural or manmade fire breaks. Water and chemical fire suppressants are used primarily to help make or defend a fire break, rather than to put out an entire fire. For wildland fires, fire suppression responsibility is generally with state and federal fire agencies, although local agencies often participate.

Wildland/urban interface fires are fires where the fire fuel includes both structures and vegetation. The defining characteristic of the wildland/urban interface area is that structures are built in or immediately adjacent to areas with essentially continuous vegetative fuel loads. When wildland fires occur in such areas, they often spread quickly and structures in these areas may, unfortunately, simply become additional fuel sources. Fire suppression efforts for wildland/urban interface fires focus first on savings lives and then on protecting structures to the extent possible. Local fire agencies have primary fire suppression responsibility for most wildland/urban interface fires, although state and federal agencies may also contribute.

This chapter focuses on wildland/urban interface fires that pose a substantial threat to County Multi-jurisdiction facilities in locations subject to wildland/urban interface fires.

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8.2 Wildland/Urban Interface Fires

Many urban or suburban areas have a significant amount of landscaping and other vegetation. However, in most areas the fuel load of flammable vegetation is not continuous, but rather is broken by paved areas, open space and areas of mowed grassy areas with low fuel loads. In these areas, most fires are single structure fires. The combination of separations between buildings, fire breaks, and generally low total vegetative fuel loads make the risk of fire spreading much lower than in wildland areas.

Most developed areas in urban and suburban areas have water systems with good capacities to provide water for fire suppression and fire departments that respond quickly to fires, with sufficient personnel and apparatus to control fires effectively. This makes the likelihood of a single structure fire spreading to involve multiple structures quite low.

Areas subject to wildland/urban interface fires have very different fire hazard characteristics. They are, for all practical purposes, wildland fires with structures. The level of fire hazard for wildland/urban interface fires depends on:

- Vegetative fuel load,
- Topography,
- Climate and weather conditions,
- Ignition sources and frequency of fire ignitions, and
- Fire suppression resources (fire agency response time and resources of crews and apparatus, access and water supplies).

High vegetative fuel loads, especially brush and trees, increase the wildland/urban fire hazard. Steep topography further increases fire risk by exacerbating the spread of the fire and impeding fire suppression efforts.

The level of fire hazard in areas prone to wildland/urban interface fires is substantially increased when weather conditions including high temperatures, low humidity, and high winds can accelerate the spread of wildland fires and make containment difficult or impossible.

There are generally fewer fire suppression resources in wildland/urban interface fire areas than in more highly developed areas. Fire stations are more widely spaced, with fewer crews and apparatus and longer response times because of distance and/or limited access routes. Water resources for fire suppression are typically lower in these areas because they may be served by pumped pressure zones with limited water storage or by individual wells. These reduced fire suppression resources make it more likely that a small wildland fire or a single structure fire in an urban/wildland interface area will spread before it can be extinguished.

The level of risk from wildland/urban interface fires for County Multi-Jurisdiction facilities depends on:

- Level of fire hazard as outlined above,

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- Value and importance of buildings and infrastructure,
- Vulnerability of inventory at risk, including whether fire-safe construction practices and defensible space measures have been implemented, and
- Population at risk and the efficacy of evacuations.

Life safety risk in wildland/urban interface fires is usually caused by delays in evacuations. County Multi-Jurisdiction Facilities at significant risk from wildland/urban interface fires must have a well-defined, practical and practiced evacuation plan.

8.3 Wildland and Wildland/Urban Fire Hazard Mapping and Hazard Assessment

The three maps on the following pages present different measures of wildland and wildland/urban interface fire hazards in Clallam County. There are important caveats regarding these maps when making wildland/urban interface fire mitigation decisions for K-12 facilities within mapped fire hazard areas:

- The DNR rankings of Wildland/Urban Interface Communities of extreme, high, moderate or low risk should be interpreted as qualitative or semi-quantitative indicators of the relative level of risk. Facilities identified in communities with “extreme” or “high” levels of risk may not have extreme or high risk as generally understood for mitigation planning purposes. Some of the extreme or high risk interface communities have long burn return periods (the average time interval between fire events) per the USGS Landfire map.
- The USGS Landfire Return Period values should also be interpreted as semi-quantitative indicators of the relative level of risk. The numerical estimates of the burn return period and the corresponding probabilities over a 50-year time period should not be interpreted literally.

The DNR rankings and the USGS Landfire Return Periods are based on analysis of fire regime characteristics – such as vegetative fuel loads, topography, climate and fire suppression resources. The USGS Landfire Return Periods may indicate higher levels of fire risk than suggested by historical fire data. Furthermore, most of the acreage burned has been wildland with relatively few structures and very few, if any, County Multi-Jurisdiction facilities.

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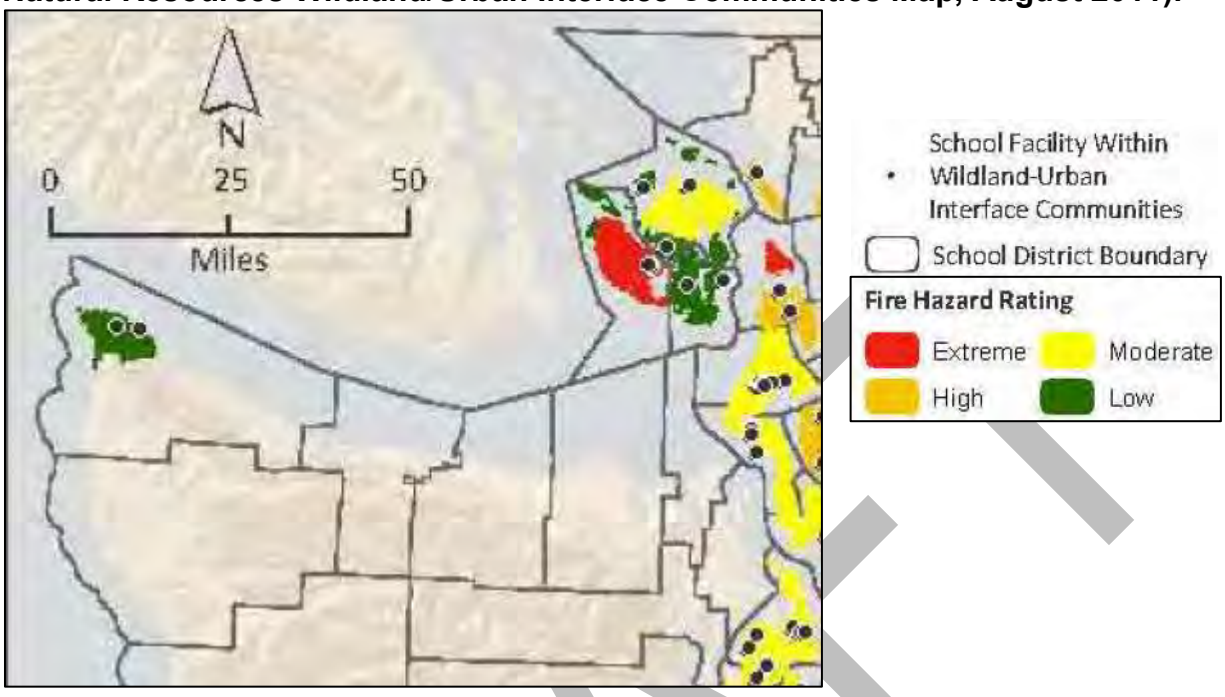
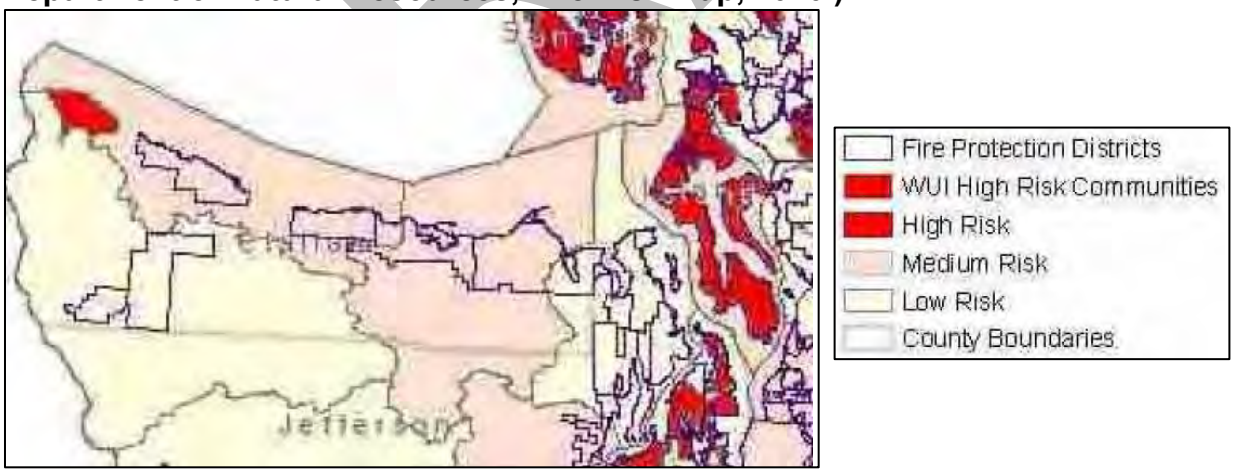
Figure 8.1 Clallam County Wildland/Urban Interface Communities Identified by Washington Department of Natural Resources (From the Washington Department of Natural Resources Wildland/Urban Interface Communities Map, August 2011).



This map shows most of the County are not evaluated and the area around Neah bay has a low fire risk.

Figure 8.2 Clallam County Wildland/Urban Interface High Risk Communities and Statewide Assessment High and Moderate Risk Areas1 (From the Washington State Department of Natural Resources, Fire Risk Map, 2010.)



This map shows most of the county is at medium risk of wildland/urban interface fires but area shown as low risk in the previous figure has a high risk. This may be because there is only one escape route from Neah Bay.

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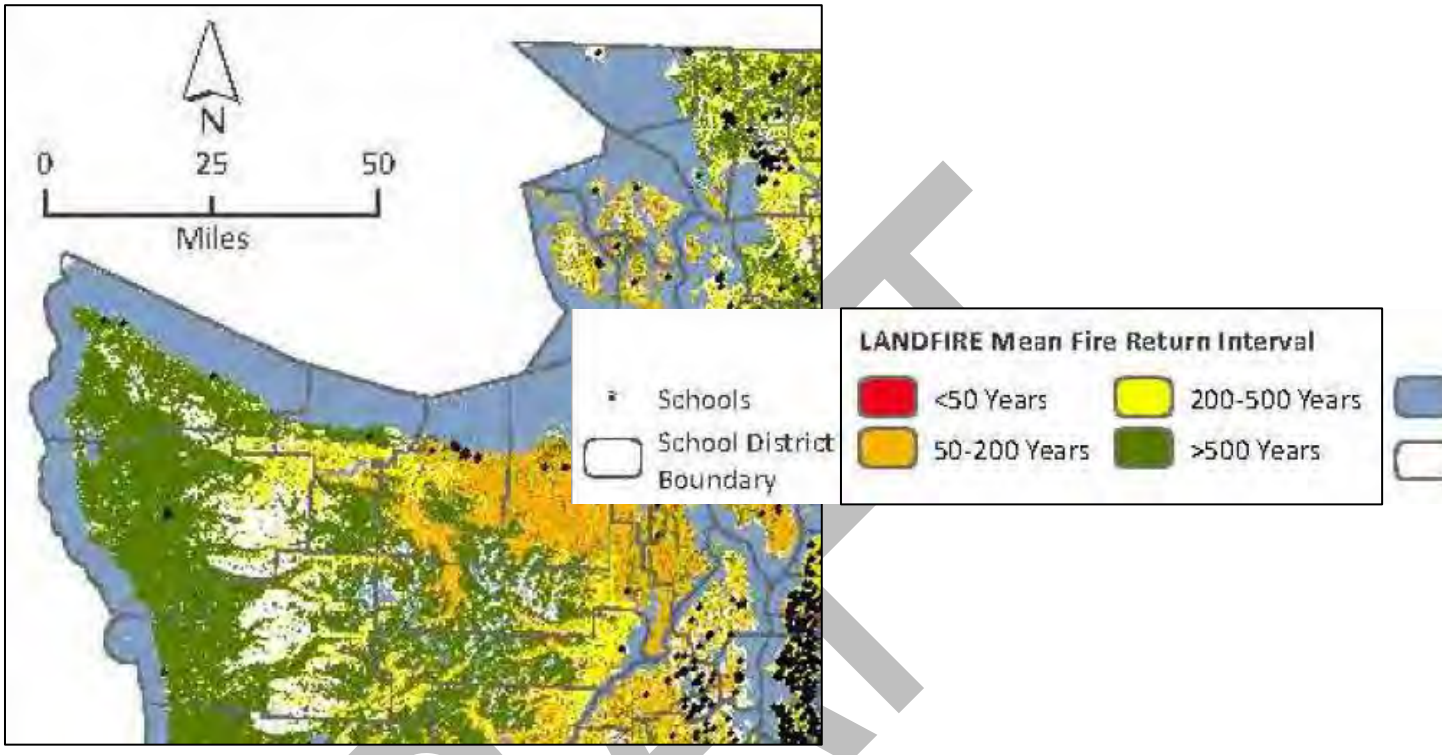
Figure 8.3 Clallam County Landfire Fire Return Period Map (From the Mean Fire Return Interval MAP, United States Geological Survey, 2011)



This map shows that the developed portion of Clallam County (beige color) west of the Elwha can expect a forest fire approximately every 200 years. Dark green areas in western Clallam County have a greater than 500-year interval between major fires.

8.4 Wildland/Urban Interface Fire Hazard and Risk Assessments

The potential impacts of future wildland/urban interface fires on Clallam County Multi-Jurisdictions are primarily damage to infrastructure, buildings and contents (including possible complete destruction), economic and environmental disruption, and displacement costs for temporary quarters. The likelihood of deaths or injuries is generally low because facilities will be evacuated whenever fire warnings are issued. However, in events where evacuation is not timely or possible, there may a substantial risk of deaths and injuries.

The vulnerability of the County Multi-Jurisdiction facilities to wildland/urban interface fire varies from site to site. Over the years, there have been very few wildland/urban interface fires that directly affected County Multi-Jurisdiction facilities. The approximate levels of wildland/urban interface fire hazards and vulnerability are identified at the facility level in Appendix D.

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The facility-level wildland/urban interface fire hazard and risk report for County Multi-Jurisdiction Facilities is shown on the following page. The fire hazard and risk levels are arrived at by combining the DNR Wildland Interface Community rankings, the Landfire fire return periods and facility-specific information gathered by personal observations of CCEMD personnel.

In areas where the hazard and risk level is moderate or higher, it is recommended that local fire districts determine what fire mitigation measures may be appropriate for each facility. Regardless of risk levels, all facilities in a wildland/urban interface should have fire evacuation plans.

Accurate evaluation of wildland/urban interface fire risk for a facility starts with the fire hazard factors listed previously, but also requires more detailed information about the facility, including:

- Proximity of vegetative fuel loads on, adjacent and near the facility, including fuel types and fuel density.
- Extent to which the facility has fire-safe construction and defensible space.
- The number of available evacuation routes and the effectiveness of evacuation plans.

Locations with only one or two evacuation routes, which might be blocked by a large fire event, have much higher life safety risk than locations with multiple evacuation routes. Evaluation of the above characteristics may require technical advice and support from fire professionals.

Facility-level risk assessment reports for wildland/urban interface fires are shown in Appendix D.

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Table 8.1
Port Angeles School District Campus Level Wildland/Urban Interface Hazard and Risk Assessment Report

Wildland and Urban Interface (Fire) Campus-Level Hazard and Risk Report							
Campus	WUI Community DNR Rating	USGS Landfire Return Period Range[1] (Years)	High Fuel Load Areas Near Campus[2]	History of WUI Fires Affecting or Near Campus	Fire Agency Concern about WUI Fires	WUI Hazard Level and Preliminary Risk Level[3]	Recommendation: Consult with Local Fire Agency About Risk and Mitigation
PORT ANGELES SCHOOL DISTRICT							
Dry Creek Elementary School	Not Applicable	71-80	No	No	No	Moderate	Yes
Franklin Elementary School	Not Applicable	71-80	No	No	No	Moderate	Yes
Maintenance and Operations Facility	Not Applicable	71-80	No	No	No	Moderate	Yes
Monroe Elementary School	Not Applicable	71-80	Yes	No	NO	High	Yes
Port Angeles High School	Not Applicable	71-80	Yes	No	No	Moderate	Yes
Roosevelt Elementary School	Not Applicable	71-80	Yes	No	No	High	Yes
Transportation Maintenance Center 1	Not Applicable	71-80	No	No	No	Moderate	Yes

[1] USGS Landfire estimates of fire return periods have very short returns for many locations, with correspondingly high probabilities in 50 years. Historical fire data suggest longer return periods and lower probabilities. These estimates are best interpreted as indicating relative fire risk, not absolute fire risk.

[2] Within 0.5 mile.

[3] The WUI preliminary risk level characterized as the same as WUI hazard level. Building-level assessments required to determine risk more accurately.

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8.5 Mitigation for Wildland/Urban Interface Fires

Common goals for reducing wildland/urban interface fire risk include:

1) reduce the probability of fire ignitions,
2) reduce the probability that small fires will spread,
3) minimize property damage, and
4) minimize life safety risk.

Clallam County Fire Protection Districts, Port Angeles Fire Department, DNR, Tribal Fire Companies, Olympic National Park and the US Forest Service are responsible for fire suppression and community-wide wildland/urban fire mitigation measures.

There are three types of mitigation measures for facilities determined to be at significant risk from wildland/urban interface fires:

- For life safety, develop and practice effective evacuation plans for wildland/urban interface fires,
- For existing facilities with significant risk:
  - o Reduce vegetative fuel loads and maintain the maximum possible defensible space around and adjacent to facilities,
  - o Implement fire-safe improvements such as non-flammable roofs, covering vent openings and overhangs with wire mesh to prevent entry and entrapment of embers and, and
- Whenever possible, site new facilities outside of areas with high risk of wildland/urban interface fires. Include fire-safe features in the facility design and ensure there is maximum possible defensible space around the facility.

Some types of mitigation projects for wildland/urban interface fire may be eligible

for FEMA and other grant funding, including:

- Defensible space activities,
- Hazardous fuel reduction activities, and
- Ignition resistant construction activities.

Implementing ignition resistant building upgrades may be most cost-effective when done incrementally. For example, replacing an old roof covering with a non-flammable roof covering may be done at the time the old roof has reached the end of its useful life and is scheduled for replacement.

The Clallam County Multi-Jurisdiction Mitigation Action Items for wildland/urban interface fires are shown in the table below. **THIS SCREENSHOT FOR SAMPLE PURPOSES ONLY. IT HAS NOT BEEN CONVERTED TO COUNTY FORMAT.**

Table 8.3
Port Angeles School District: Wildland/Urban Interface Fire Mitigation Action Items
(Example only: replace with your fire mitigation Action Items)

Hazard	Action Item	Timeline	Source of Funds	Responsible Party	Plan Goals Addressed			
					Life Safety	Protect Facilities	Enhance Emergency Planning	Enhance Awareness and Education
Wildland/Urban Interface Fire Mitigation Action Items								
Short-Term #1	Consult with local fire agency or other fire expert regarding level of fire risk for campuses for which this is recommended by the OSPI ICOS PDM database campus-level wildland/urban interface fire report.	1-2 Years	Local Bond or Grant	Supt.	X	X	X	X
Short-Term #2	Enhance emergency evacuation planning for all campuses for which wildland/urban fires are possible.	1 year	Local Bond or Grant	Supt.	X	X	X	X
Long-Term #1	Evaluate and consider implementing fire risk reduction measures including improving defensible space and upgrading building elements such as roofs with materials designed to be fire-resistant and covering vent openings with wire mesh to prevent embers from entering.	Ongoing	Local Bond or Grant	Supt.	X	X	X	X

Note: to the extent possible, make the Action Items as district-specific as possible, including identifying which the campuses for which mitigation measures are desired by the district. The table above is an editable Excel Worksheet Object or use Excel template in OSPI Mitigation Planning Toolkit.

Appendix D

Clallam County, Multi-Jurisdiction Hazard Assessment

SOURCES

Clallam County Cascadia Rising 2016 Ground Truth Document dated July 4, 2016

PUD Ground Truth Update from Patti Morris

On 02/18/2016 11:13 am, Patricia Morris wrote:

Electric Power Systems

Clallam PUD Main Office – 104 Hooker Road – Carlsborg, WA 98324 360-452-9771

(Sequim Maine Facility) now Carlsborg Warehouse – 100 Hooker Road, Carlsborg, WA 98324

(Sequim OPS Center, Engineering crew, shop and storage) now Carlsborg Operations Center – 110 Idea Place – Carlsborg, WA 98324

(Pole Yard & Emergency Ops Ctr) now P.A. Warehouse – 1936 W. 18th Street, Port Angeles, WA 98363 360-457-8758

Add: Carlsborg Substation Building – 112 Idea Place, Carlsborg, WA 98324

Add: Carlsborg Utility Services – 83 Idea Place, Carlsborg, WA 98324

Water Supply

Add: P.A. Water Department – 2444 E. Pioneer, Port Angeles, WA 98362

Add: P.A. Water Warehouse – 125 N. Gales, Port Angeles, WA 98362

All others are correct.

Thanks, Patti

Patti Morris
360-461-9008
pmorris@wavecable.com

on 7/4/2016 …. 1730 hrs. Jim Buck

Updated the Medical facilities Section

Updated the School Section

Added the Law Enforcement Section, Government Buildings

Updated the Shelter Section

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Section 1. Community Information

Purpose of This Appendix

The purpose of this appendix is to establish a single listing of facilities that are critical to maintaining the life safety, property, environment and economy of Clallam County. Each facility has been evaluated by a member of Clallam County EMD using soil site class, liquefaction, flood, landslide, tsunami and wildland fire maps. The Hazard Assessment presents a scientifically plausible, unified “ground truth” that maximizes the opportunity for Clallam County Emergency Management Division personnel to perform and improve detailed planning for response to hazards most likely to affect Clallam County. Volcano, tornado and hurricane hazards are not included because it is highly unlikely they will occur on the Olympic Peninsula.

This Hazard Analysis is THE “written assessment and listing of the natural and man-made emergencies and disasters to which Clallam County is vulnerable.” It is prepared in accordance with RCW 38.52.030 and WAC 118-30-060 (1) as part of the state mandated Clallam County Comprehensive Emergency Management Plan.

The Hazard Assessment is also prepared to assist Clallam County Emergency Management with an authoritative list of facilities to be reviewed in a public process to meet the Federal Emergency Management Agency (FEMA) requirements for creation of the county’s multi-hazard mitigation plan. FEMA requires counties to adopt a multi-hazard mitigation plan in order to be eligible for future pre- or post-disaster FEMA mitigation funding.

Section 2: Critical Infrastructure Impacts

Airports and Runways

- All air navigation aids that experience an earthquake of 5.0-magnitude or greater require inspection by the Federal Aviation Administration. Until inspection and any required repairs/recertification are completed, the airfield that the navigation aids support will operate under visual flight rules only. Each subsequent aftershock of 5.0-magnitude or greater will necessitate re-inspection.

- Damage to approach and runway lights may result in additional airfield restrictions, such as Visual Flight Rules and daylight only operations.

- In addition to airport buildings and runways, runway lights, ground support equipment, navigation aids, radar, and fuel supplies may be damaged by the earthquake and subsequent aftershocks resulting in reduced operations and capacity. Portions of National Weather Service products that support pre-flight planning will be unavailable.

- No airports in Clallam County (except USCG Air Station Port Angeles) are threatened by tsunamis, floods, wildland/urban interface fires or landslides. USCG Air Station Port Angeles is subject to tsunami hazard.

Airports												
Community Name	**Name of Facility**	**Facility Address (if applicable)**	**EQ shaking 2% in 50 yrs % PGA**	**Site Class**	**EQ Shaking Hazard Level**	**Liquefaction Potential**	**Combined EQ Hazard level**	**Comments**	**Tsunami Hazard**	**Floods**	**WUIF**	**Landslides**
Port Angeles	William F. Fairchild Intl	1402 Fairchild Airport Rd.	80%	C	Low/Mod	Low	Very High	Runway reparable Buildings destroyed – Upgrade runway for C-17s	NO	NO	NO	NO
Quillayute	Quillayute NAS	500 East Division St	80%	C	Low/Mod	Low	Very High	Runway reparable – Improve infrastructure for Cascadia response	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
City of Forks	City of Forks	S Forks Ave	80%	C	Low/Mod	Low	Very High	Runway reparable	NO	NO	NO	NO
Sekiu	Sekiu	Sekiu	80%	C	Low/Mod	Low	Very High	Runway Reparable	NO	NO	NO	NO
Port Angeles Coast Guard	Port Angeles Coast Guard	1 Ediz Hook Rd	80%	D	Mod/Hi	Mod/Hi	Severe	Destroyed – Need to relocate Helos to Fairchild	Very High	NO	NO	NO
Sequim	Sequim Valley Airport	468 Dorothy Hunt Ln	60%	D	Mod	Mod	Very High	Reparable for Helos	NO	NO	NO	NO
Diamond Point	Diamond Point Airstrip	Airport Way	60%	C	Low/Mod	Low	Very High	Reparable for Helos	NO	NO	NO	NO
Port Angeles	OMC Helipad	939 Caroline St	80%	D	Mod	Low	Very High	Reparable for Helos	NO	NO	NO	NO

Electric Power Systems

Power facilities in Clallam County are generally protected from wildland/urban interface by defensible space. A limited number are threatened by tsunami, flood and landslide hazards. All facilities are threatened to varying degrees by destructive earthquakes.

Electric System Damage

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD	Main Office	104 Hooker Road, Carlsborg	60%	C	Mod	Mod	High	New Construction 2016	NO	NO	NO	NO
	Forks Office	31 Spartan Ave	80%	B	Low	Low	High		NO	NO	NO	NO
	Forks Warehouse	441 W E St	80%	B	Low	Low	High		NO	NO	NO	NO
	Sekiu Office & warehouse	15 Sekiu Airport Rd	80%	B	Low	Low	High		NO	NO	NO	NO
	Carlsborg Warehouse	100 Hooker Rd, Carlsborg	60%	D/E	High	Very High	Very High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD cont.	Carlsborg OPS Center, Engineering, crew, shop and storage	110 Idea Pl, Carlsborg	60%	D/E	High	Very High	Very High		NO	NO	NO	NO
	Carlsborg Substation	112 Idea Pl, Carlsborg	60%	D/E	High	Very High	Very High		NO	NO	NO	NO
	Carlsborg Utility Services	83 Idea Place, Carlsborg	60%	D/E	High	Very High	Very High		NO	NO	NO	NO
	Port Angeles Warehouse	1936 W 18th St, Port Angeles	80%	C	Low	Low	High		NO	NO	NO	NO
	Blyn Substation	83 Zaccardo Rd	60%	C	Mod	Mod	High		NO	NO	YES	NO
	Johnson Creek Substation	400 Washington Harbor Loop	60%	D/E	High	Very High	Very High		NO	NO	NO	NO
	Sequim Substation	410 E Washington St	60%	D/E	High	Very High	Very High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD cont.	Sunland Substation	1971 Sequim-Dungeness Way	60%	D	High	High	High		NO	NO	NO	NO
	Prairie Power Substation	670 S 3rd Ave	60%	D/E	High	Very High	Very High		NO	NO	NO	NO
	Evergreen Substation	9701 Old Olympic Hwy	60%	C	High	Very High	Very High		NO	NO	NO	NO
	Dungeness Substation	761 Hogback Rd	60%	C	Mod	High	High		NO	NO	NO	NO
	Olympic Substation	630 Carlsborg Rd	60%	D/E	High	Very High	Very High		NO	NO	NO	NO
	Agnew Substation	31 Spring Rd	60%	D	Mod	Mod	High		NO	NO	NO	NO
	Deer Park Substation	101 Old Deer Park Rd	60%	C	Mod	Low	Mod		NO	NO	NO	NO
	Monroe Substation	311 Gales St	60%	C	Mod	Low	Mod		NO	NO	NO	NO
	Airport Substation	4528 S Airport Rd	80%	C	Mod	Low	High		NO	NO	NO	NO
	Laird's Corner Substation	813 Power Plant Rd	80%	C	Mod	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD cont.	Silverado Substation	1201 Joyce Piedmont Rd	80%	C	Mod	Low	High		NO	NO	YES	NO
	Sol Duc Rd Substation	216395 Hwy 101 W	80%	C	Mod	Low	High		NO	NO	YES	NO
	Pysht Substation	23133 SR 112W	80%	B	Low	Low	High		NO	NO	YES	NO
	Sekiu Substation	15 Sekiu Airport Rd	80%	B	Low	Low	High		NO	NO	NO	NO
	FAA Substation	5000 HWY 112 near Jensen Creek	80%	B	Low	Low	High		NO	NO	YES	NO
	Neah Bay Substation	Backtrack Rd & Roosevelt St	80%	D	High	High	High	Destroyed by tsunami	YES	NO	YES	NO
	Mill Substation	200657 Hwy 101	80%	B	Low	Low	High		NO	NO	YES	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD cont.	Old Beaver Camp Substation	97 La Push Rd	80%	B	Low	Low	High		NO	NO	YES	NO
	Calawah Substation	513 Calawah Way	80%	C	Mod	Low	High		NO	NO	YES	NO
	Forks Substation 1	441 w East St	80%	B	Low	Low	High		NO	NO	YES	NO
	Forks Substation 2	441 w East St	80%	B	Low	Low	High		NO	NO	YES	NO
Port Angeles City Light	Main Office	2007 O St	60%	C	Mod	Low	Mod		NO	NO	NO	NO
	Pole Yard, Transformer & Maint Ctr	1707 A St	60%	C	Mod	Low	Mod		NO	NO	NO	NO
	A St Substation	1616 A St	60%	C	Mod	Low	Mod		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles City Light cont.	College Substation	1306 E Park	60%	C	Mod	Low	High		NO	NO	NO	NO
	F St Substation	1604 F St	80%	C	Mod	Low	High		NO	NO	NO	NO
	7th St Substation	1538 W 7th St	80%	C	Mod	Low	High		NO	NO	NO	NO
	Laurel Substation	110 E 14th St	60%	C	Mod	Low	High		NO	NO	NO	NO
	Washington Substation	224 S Washington St	60%	C	Mod	High	High		NO	NO	NO	NO
	Valley Substation	206 S Valley St	80%	E	High	Very high	Very High	Destroyed by tsunami	YES	NO	NO	NO
	Peabody Substation	2803 S Peabody	60%	C	Mod	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles City Light cont.	Albert St Substation	618 S Albert	60%	C	Mod	High	High		NO	NO	NO	NO
BPA	Happy Valley Substation	Happy Valley	60%	C	Mod	Mod	High		NO	NO	YES	YES
	Port Angeles Substation	E Park St, Port Angeles	60%	C	Mod	Low	High		NO	NO	NO	NO
	Sappho Substation	Sappho	80%	B	Low	Low	High		NO	NO	YES	NO

Hazardous Materials Threats

Clallam County faces potential HAZMAT threats from a number of facilities in the county. These include but are not limited to gas stations, marinas, propane storage sites, port facilities, and the Nippon Paper Plant.

Hazardous Materials Threats												
Community Name	**Name of Facility**	**Facility Address (if applicable)**	**EQ shaking 2% in 50 yrs % PGA**	**Site Class**	**EQ Shaking Hazard**	**Liquefaction Potential**	**Combined EQ Hazard level**	**Comments**	**Tsunami Hazard**	**Floods**	**WUIF**	**Landslides**
Port Angeles	Nippon Paper Plant	Marine Drive	80%	E	Very High	Very High	Very High	Destroyed by tsunami -Chemical spills	Yes	NO	NO	NO
	Bunker Fuel Facility	Ediz Hook Rd	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
	Port of Port Angeles	Port	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
	West Port Shipping	637 Marine View Dr	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
	Platypus Marine	102 N Cedar St	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles cont.	Port Angeles Boat Haven	W Boat-haven Drive	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
	Port Angeles Coast Guard	1 Ediz Hook Rd	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
	Chevron	402 Marine Drive	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
	Texaco	210 E 1st St	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
	Masco Petroleum	516 Tumwater Truck Route	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	YES	YES	YES
	Pacific Pride	Tumwater Truck Route	80%	E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	YES	YES	YES

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard Level	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Sequim	John Wayne Marina	2577 W Sequim Bay Rd	60%	D	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
Quillayute	Port of La Push	71 Main St.	80%	D/E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	YES	NO
City of Forks	Masco Petroleum	231 Industrial Ctr.	80%	C/D	High	Low	High		NO	NO	NO	NO
Neah Bay	Makah Marina	1251 Bay View Ave.	80%	D/E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	YES	NO
Blyn	Longhouse Mkt & Deli	Hwy 101	60%	D/E	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	NO
Sekiu / Clallam Bay	3 Marinas	Sekiu / Clallam Bay	80%	D	Very High	Very High	Very High	Destroyed by tsunami – fuel spills	Yes	NO	NO	YES

Natural Gas Systems

Clallam County is not connected a natural gas pipeline so there are no concerns with associated broken pipeline issues. However, there are a number of propane suppliers and customers. Those suppliers and customers with propane service need to be aware of the dangers of leaking propane after an earthquake. Poorly anchored tanks or building collapse may damage tanks and connections. This can result in explosion and fire hazards during earthquakes, tsunamis, floods, wildland/urban interface fires and landslides. Customers and responders should be prepared to turn off leaking containers or evacuate areas until the danger passes.

Natural Gas Systems

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles	Ferrell gas	704 Marine View Drive	80%	**E**	High	Very High	Very High	Destroyed by tsunami – extreme fire hazard	Yes	No	NO	NO
City of Forks	Ferrell gas	451 N Forks Ave	80%	**B**	High	Low	Very High	Extreme fire hazard for Forks	NO	NO	YES	NO
Sequim	Ferrell gas	646 3rd Ave South	60%	**C/D**	Very High	Very High	Very High	Extreme local fire hazard	NO	NO	NO	NO
	Pioneer Propane	931 Carlsborg Rd.	60%	**C/D**	Very High	Very High	Very High	Extreme local fire hazard	NO	NO	NO	NO

Water Supply

There are 9 water districts and at least 2 private water systems in Clallam County that supply customers in their areas with water. Many are threatened by tsunami, flood, wildland/urban interface fire and landslides. All of these districts are expected to sustain some type of damage and/or outage immediately following a destructive earthquake.

- Most water service ceases to function if electrical power is unavailable.
- Service main and line breaks will cause reduced water pressure in affected areas. Pressure reductions could reduce fire-fighting capability.
- Water utilities will shut down system components in an attempt to mitigate damage from pressure loss, pipe leaks and breaks inside of buildings.
- To mitigate possible public health threats in both urban and rural areas, public health authorities may issue boil water advisories. Following repair, systems will require quality testing and system flushing to ensure safety

Initial earthquake damage will be compounded by subsequent aftershocks. Previously repaired and inspected water facilities and electrical power facilities required for pumping and water treatment will require additional inspection and repair.

Those not served by a water district are on individual or community wells. These may become unusable due to loss of power, rupture of the well casings or changes in the water table. A public education system must be created to show residents how to make safe drinking water

Water Systems

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds)	Deer Park Reservoir	1771 Deer Park Rd	60%	C	High	Low	High	Local flooding if tank ruptures	NO	NO	YES	NO
	Bobcat Hollow Well	152 Bobcat Hollow Rd	60%	C	High	Low	High	IF FACILITY SURVIVES NEED POWER	NO	NO	YES	NO
	Bluff's Well	1433 Gasman Rd	60%	C	High	Low	High	IF FACILITY SURVIVES NEED POWER	NO	NO	YES	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD – Fairview Water System (Mt Pleasant & Monroe Rds) cont.	Harbor Heights Pump Station	76 Harbor Heights Rd	**60%**	**C**	**High**	**Low**	**High**	IF FACILITY SURVIVES NEED POWER	NO	NO	YES	NO
	Township Line Well & Reservoir	496 Township Line Rd	**60%**	**C**	**High**	**Low**	**High**	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	YES	NO
	Old Olympic Hwy Well	991 Old Olympic Hwy	**60%**	**C**	**High**	**Low**	**High**	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
Clallam PUD – Gales Addition Water System (Deer Park Rd to Shore Rd to Strait)	Gales Addition Reservoir & Pump Station	75 Round Tree Ln	**80%**	**C**	**High**	**Low**	**High**	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Monroe – LUD#2 Reservoir	176 Adlerwood Creek	**80%**	**C**	**High**	**Low**	**High**	Local flooding if tank ruptures - IF FACILITY SURVIVES NEED POWER	NO	NO	YES	NO
	LUD #3 Lower Pump Station	2014 Lindberg Rd	**80%**	**C**	**High**	**Low**	**High**	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	LUD #3 Lower Reservoir & Upper Pump Station	860 Key Rd	**80%**	**C**	**High**	**Low**	**High**	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD – Gales Addition cont.	LUD #3 Upper Reservoir w/ Booster Pump	5112 S. Mt Angeles Rd	80%	**C**	High	Low	High	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Mt Pleasant E. Pump Station	1210 Mt Pleasant Rd	80%	C	High	Low	High	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
Clallam PUD - Clallam Bay/Sekiu Water System	Office Warehouse	15 Sekiu Airport Rd	80%	B	High	Low	High		NO	NO	NO	NO
	Sekiu Reservoir & Pump Station	174 Sekiu Airport Rd	80%	B	High	Low	High	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Sekiu Heights Reservoir	468 Sekiu Airport Rd	80%	B	High	Low	High	Local flooding if tank ruptures	NO	NO	NO	NO
	Sekiu & DOC Pump Station	10 Sekiu Airport Rd	80%	B	High	Low	High	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Clallam Bay Reservoir	154 Kellogg St	80%	B	High	Low	High	Local flooding if tank ruptures	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
	Hoko Pump Station	1110 Hoko Ozette Rd	80%	D/E	**High**	**Very High**	**Very High**	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Clallam Prison Reservoir (NOT PUD)	1830 Eagle Crest Rd	80%	B	**High**	**Very High**	**High Very**	Serious consequences if water supply interrupted	NO	NO	NO	NO
Clallam PUD – Island View Water System (10 miles west of Sekiu)	LUD# 9 Reservoir	123 Dawnsridge Rd	80%	**B**	High	Low	High	Local flooding if tank ruptures	NO	NO	YES	NO
	LUD# 9 TP and Pump Station	7372 Hwy 112	80%	**B**	High	Low	Very high	IF FACILITY SURVIVES NEED POWER	YES	NO	YES	NO
Clallam PUD - Carlsborg Water System (Carlsborg)	Carlsborg Reservoir	110 Frost Rd	**60%**	**C/D**	High	Very High	High	Local flooding if tank ruptures	NO	NO	NO	NO
	Carlsborg Well & Pump Station	315 Business Park Loop	**60%**	**C/D**	High	Very High	High	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Smithfield Dr Well & Pump Station	161 Smithfield Dr	**60%**	**C/D**	High	Very High	High	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam PUD – Carlsborg cont.	Carlsborg Ops Center	110 Idea Place	**60%**	**C/D**	High	Very High	High		NO	NO	NO	NO
	Carlsborg Whse Facility	100 Hooker Rd	**60%**	**C/D**	High	Very High	High		NO	NO	NO	NO
Clallam PUD - Evergreen Water System (South of Sequim)	Loma Vista Well, Pump & Reservoir	100 Burnt Mountain Pl	**60%**	**60%**	**High**	**Low**	**High**	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Duxbury Reservoir & Pump Station	2294 S 7th Ave	**60%**	**60%**	**High**	**Low**	**High**	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Raven's Ridge Reservoir & Pump Station	8932 Raven's Ridge Rd	**60%**	**60%**	**High**	**Low**	**High**	Local flooding if tank ruptures. If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
	Stampede Dr Reservoir	1120 Stampede Dr	**60%**	**60%**	**High**	**Low**	**High**	Local flooding if tank ruptures	NO	NO	NO	NO
	Haller Well	2510 Doe Run Rd	**60%**	**60%**	**High**	**Low**	**High**	If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
	Holgerson Well & Pump Station	70 Coyote Meadow Rd	60%	60%	High	Low	High	IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
Clallam PUD - Panoramic Heights (South of PA)	Panoramic Heights Well and Reservoir	5740 S Pastoral Dr	60%	60%	High	Low	High	Local flooding tank ruptures. IF FACILITY SURVIVES NEED POWER	NO	NO	NO	NO
Crescent Water Association (Joyce)	Office	50870 Hwy 112	80%	B	High	Low	High		NO	NO	NO	NO
	Filtration Plant	Water Line Rd	80%	B	High	Low	High	Destroyed - Landslide	SIEC HE	NO	YES	YES
	Water Line Rd Tank	Water Line Rd	80%	B	High	Low	High	Local flooding if tank ruptures.	SIEC HE		YES	YES
	Access Rd Tank	Joyce Access Rd	80%	B	High	Low	High	Local flooding if tank ruptures.	NO		YES	YES
Diamond Point Private Water System	Gregg Roates, Owner	Diamond Point	60%	B	High	Low	High	Unknown service	YES	YES	YES	YES
City of Port Angeles Water System	Water Treatment Plant	3501 W 18th	80%	C	High	Low	High	If FACILITY SURVIVES NEED POWER	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
City of Port Angeles Water System cont.	Port Angeles Water Department	2444 East Pioneer	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	Port Angeles Water Department Warehouse	125 North Gales Addition	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	Black Diamond Reservoir	203 Reservoir Rd	**80%**	**C**	**High**	**Low**	**High**	Temp flooding in Tumwater creek if ruptured	NO	NO	NO	NO
	E St Reservoir	1018 E St	**80%**	**C/D**	**High**	**Low**	**High**	Minor neighborhood flooding if ruptured	NO	NO	NO	NO
	Jones St Reservoir & Pump Station	1211 E 9th St	**80%**	**C**	**High**	**Low**	**High**	Temp flooding in Tumwater creek if ruptured	NO	NO	NO	NO
	Mill Creek Reservoir/ Scribner Rd Pump Station	326 Scribner Rd	**80%**	**C**	**High**	**Low**	**High**	Flooding of Peabody Creek if ruptured	NO	NO	NO	NO
	Peabody Heights Reservoir & Pumps	601 Viewcrest Ave	**80%**	**C**	**High**	**Low**	**High**	Major flooding of ONP HQ and Peabody Creek if ruptured	NO	NO	NO	NO
	Elwha Ranney Collector & Pump Station	673 Crown Zee Water Rd	**80%**	**D/E**	**High**	**Mod**	**High**		NO	YES	YES	YES

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
City of Port Angeles Water System cont.	Fairmount Pump Station	4400 C St	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	McDougal St Pump Station	3500 McDougal St	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Morse Creek Dam	2110 Glass Rd	**60%**	**B**	High	Low	High		NO	NO	YES	YES
	Morse Creek Screen House	970 Glass Rd	**60%**	**B**	High	Low	High		NO	NO	YES	YES
	Spruce Street Pump Station	1000 Spruce St	**80%**	**C**	High	Low	High		NO	NO	YES	YES
	Water Street Pump Station	520 N Jones St	**80%**	**D/E**	High	Low	High		NO	NO	YES	YES
City of Sequim	Ranney Well System	175 Kincaid Rd	**60%**	**D/E**	High	High	High		NO	NO	NO	NO
	Silberhorn Well Field	130 W Silberhorn	**60%**	**D/E**	High	High	High		NO	NO	NO	NO
	Port Williams Well Field	702 Port Williams Rd	**60%**	**D/E**	High	High	High		NO	NO	NO	NO
	Reservoir 1.7 MG Steel	553 Reservoir Rd	**60%**	**C**	High	Low	High	Neighborhood flooding if ruptured	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
City of Sequim cont.	Reservoir 250 KG Tank	553 Reservoir Rd	**60%**	**C**	High	Low	High	Neighborhood flooding if ruptured	NO	NO	NO	NO
	Reservoir 500KG Pond	553 Reservoir Rd	**60%**	**C**	High	Low	High	Neighborhood flooding if ruptured	NO	NO	NO	NO
	Reservoir Rd Pump Station	553 Reservoir Rd	**60%**	**C**	High	Low	High		NO	NO	NO	NO
	5th & McCurdy Pump Station	803 S 5th	**60%**	**D/E**	High	High	High		NO	NO	NO	NO
	Solana Lower Pump Station	262 Simdars Rd	**60%**	**C**	High	High	High		NO	NO	NO	NO
	Solana Lower Pump Station	213 Tamerlane Loop	**60%**	**C**	High	High	High		NO	NO	NO	NO
Sunland Water System	Sunland		**60%**	**D/E**	High	High	High		YES	NO	NO	NO

Wastewater and Sewer Systems

There are 6 public and 1 private wastewater treatment systems in the county. None are subject to floods, wildland/urban fire or landslides. All systems are threatened by destructive earthquake hazards. Most waste-water service ceases to function if electrical power is unavailable.

- Wastewater and sewer system damage will include cracked pipe walls, pipe section collapse, and separation between pipe joints. Liquefaction may push some pipes out of the ground, reducing the downward gradient of the system, causing it to stop flowing and/or backup in some areas. Sewer pump stations and their pressure mains will suffer varying damage. Some will require complete replacement. As a result, it is possible that effluent will flow in streets, ditches and waterways. This will cause a severe public health hazard.
- Wastewater and sewer breaks will occur near damaged potable water lines putting the potable water systems at risk. Authorities may issue boil water notices to mitigate public health threats.
- Septic systems requiring power will not work. Those and gravity systems may fail due to broken pipes contaminating wells and surface water.

Initial earthquake damage will be compounded by subsequent aftershocks. Previously repaired and inspected water facilities and electrical power facilities required for pumping and water treatment will require additional inspection and repair.

Wastewater and Sewer Systems

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
City of Port Angeles	Wastewater Treatment	1509 Columbia St	**80%**	**D/E**	Very High	Very High	Very High		NO	NO	NO	NO
	Pumping Station 2	109 S Cherry St	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 3	1506 Marine Dr	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	Pumping Station 4	313 Marine View Drive	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
City of Port Angeles cont.	Pumping Station 5	219 E 2nd St	**80%**	**D/E**	Very High	Very High	Very High	Destroyed - unconsolidated fill	NO	NO	NO	NO
	Pumping Station 6	933 Church Ave	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 7	2250 W 19th St	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 8	1312 H St	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 9	226 Del Guzzi Dr	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 10	1829 W 12th St	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 11	10 Eclipse Ind Way	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 12	150 N Brook Ave	**80%**	**C/D**	Very High	Very High	Very High		NO	NO	NO	NO
	Pumping Station 13	740 N Masters Rd	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 14	1100 P St	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Pumping Station 15	314 Marine Drive	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam Bay Correction Center	Correction Center	1830 Eagle Crest Way	80%	B	High	Very Low	High	Water supply critical to order in prison	NO	NO	NO	NO
Sunland Water System	Water System	Woodcock Rd	60%	D/E	High	Very High	Very high		NO	NO	NO	NO
City of Sequim Water System	Reclamation facility	247 Schmuck Road	60%	D/E	High	Very High	Very high		NO	NO	NO	NO
	Pumping Station 1	702 ½ Port Williams Road	60%	D/E	High	Very High	Very high		NO	NO	NO	NO
	Pumping Station 2	480 DOE Run Road	60%	D/E	High	Very High	Very high		NO	NO	NO	NO
	Pumping Station 3	East Lobelia Street	60%	D/E	High	Very High	Very high		NO	NO	NO	NO
	Pumping Station 4	Jones Farm Road	60%	D/E	High	Very High	Very high		NO	NO	NO	NO
City of Forks	Treatment Plant		80%	B	High	Very Low	High		NO	NO	NO	NO
Clallam PUD	Clallam Bay/Sekiu		80%	B	High	Very Low	High		NO	NO	NO	NO

Refined Fuel Systems

Earthquake damage will greatly increase reliance on generators and limit the ability to obtain new fuel supplies. There is a 2-day supply in underground tanks at gas stations, but once that is gone, there will be no gasoline or diesel fuel. *There is a Fuel Plan for Clallam County that will be enacted to help with county wide distribution however the biggest challenge will be getting fuel into the county as we expect to be competing primarily with King and Pierce counties for commodities.*

Communications Systems

Urban facilities with not be subject to tsunami, flood, wildland/urban interface fires or landslides. Rural facilities may be subject wildland/urban interface fires and landslides to the facility sites or access roads. All facilities are subject to damage from major earthquakes.

Local citizens will receive updates about the situations primarily from radio stations in Seattle. This will lead to frustration among Clallam County residents since Clallam County information is low on the priority list for Seattle media outlets. Local station KONP (Port Angeles), KSQM-FM (Sequim), KFKB (Forks) will continuously broadcast relevant Clallam County news and information. Solar chargers will be used by some in the community to recharge cell phones and operate radios.

All primary and secondary forms of communication will be intermittent and unreliable do to power failure. Systems affected include cell phones, land lines, internet via fiber lines, cable television, AM/FM (amplitude modulation/frequency modulation radio stations). Power to transmit will have to be supplied by Backup generators.

The following communications systems are operating on battery power, once the battery dies, communications will go down unless there are sufficient backup generators and fuel to support sustained operations:

- Amateur Radio Emergency Services (all repeaters have backup generator systems.
- Marine band
- Air band
- Satellite phones
- Simplex line-of-sight-only repeaters
- Portable satellite systems
- Military internal tactical communications

Communications System Damage												
Community Name	**Name of Facility**	**Facility Address (if applicable)**	**EQ shaking 2% in 50 yrs % PGA**	**Site Class**	**EQ Shaking Hazard**	**Liquefaction Potential**	**Combined EQ Hazard level**	**Comments**	**Tsunami Hazard**	**Floods**	**WUIF**	**Landslides**
Clallam County	ALL cell phone Services	Regional							NO	NO	NO	NO
	ALL Internet Services	Regional							NO	NO	NO	NO
	ALL land line phone services	Regional							NO	NO	NO	NO
Port Angeles	KONP Radio (KONP FM 101.7)	721 East 1st St	80%	C/D	High	High	High		NO	NO	NO	NO
	PENCOM	321 E 5th St	80%	C/D	High	High	High	Critical comms	NO	NO	NO	NO
	EOC COMMO with Mobile EOCs	321 E 5th St	80%	C/D	High	High	High	Critical comms	NO	NO	NO	NO
	WSP Office COMMO	62 Old Olympic Hwy	80%	F	Very High	Very High	Very High	Critical comms	NO	NO	NO	NO
	Tsunami Warning System COMMO	850 Ediz Hook Rd	80%	E	Very High	Very High	Very High	Destroyed by tsunami	Yes	NO	NO	NO
	City of Port Angeles COMMO Bldg	1022 E St	80%	C/D	High	High	High	Critical comms	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles cont.	USCG Air Sta/SFO COMMO	Ediz Hook Rd	**80%**	**F**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	Clallam Transit COMO	830 W Lauridsen Blvd	**80%**	**C**	High	High	High		NO	NO	NO	NO
	Angeles Buff Tower	Angeles Bluff	**80%**	**C**	High	High	High		NO	NO	YES	NO
	Striped Peak Tower	Striped Peak DNR Suite	**80%**	**B**	High	High	High		NO	NO	YES	NO
	Barnes Point Tower	ONP NPS Hurricane Ridge Rd	**80%**	**B**	High	High	High		NO	NO	YES	NO
	North Point Tower	WA DOT North Point Rd	**80%**	**B**	High	High	High		NO	NO	YES	NO
Forks	KFKB Radio 1490 (KBDB FM 96.7)	260 Cedar St, Forks	**80%**	**B**	High	High	High		NO	NO	YES	NO
	City of Forks	500 E Division St	**80%**	**B**	High	High	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Sequim	KSQM FM 91.5	577 W Washington St, Sequim	**60%**	**D/E**	High	Very High	Very High		NO	NO	NO	NO
Clallam Bay	USCG Slip Point COMMO	Pearson Creek	**80%**	**F**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	YES	NO
Beaver	Ellis Lookout COMMO	Ellis Mountain USCG, WSP	**80%**	**B**	High	High	High		NO	NO	YES	NO
Neah Bay	Makah Tribal police COMMO	3rd St	**80%**	**F**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	Bahokus Peak GATR, USCG Commo	Bahokus Peak Rd	**80%**	**B**	High	High	High		NO	NO	YES	NO
Jefferson County	Mt Octopus Tower WSP MPLS	Mt Octopus	**80%**	**B**	High	High	High		NO	NO	YES	NO

Hospitals and Clinics

Clallam County public hospitals and privately-owned clinics will sustain both structural and critical equipment damage limiting the number of regular and critical beds available to treat the influx of injured survivors. All facilities will require extensive repairs and cleanup before service resumes.

There are a number of clinics, urgent care centers and medical provider offices throughout the county that may operate at a limited level. The individual clinics are not listed here. Some facilities face tsunami and wildland/urban interface fires.

Medical Facilities Status

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Olympic Medical Center		939 Caroline St, Port Angeles	**80%**	**C/D**	High	High	High	Close to bluff – bluff did not slide in last CSZE	NO	NO	NO	YES
Forks Community Hospital		530 Bogachiel Way, Forks	**80%**	**C**	High	Low	High		NO	NO	NO	NO
Olympic Medical Center	Sequim Campus	#1500, 840 N 5th Ave	**60%**	**C/D**	High	High	High	In liquefaction zone	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam Bay	Clallam Bay Corrections Center Clinic	1802 Eagle Crest Way.	80%	B	High	Very Low	High	Critical to order in prison	NO	NO	NO	NO
	Clallam Bay Medical Ctr,	74 Bogachiel St	**80%**	**F**	Very High	Very High	Very High	Destroyed by tsunami	NO	NO	NO	NO
Neah Bay	Neah Bay Medical Clinic	Main St	**80%**	**F**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
Forks	Bogachiel Clinic	530 Bogachiel Way	**80%**	**C**	High	Low	High		NO	NO	YES	NO
	Calawah Medical Clinic	5th Ave	**80%**	**C**	High	Low	High		NO	NO	YES	NO
	Forks Women's Clinic	231 Lupine Ave	**80%**	**C**	High	Low	High		NO	NO	YES	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Forks cont.	Family Medical Center	461 G St	**80%**	**C**	High	Low	High		NO	NO	YES	NO
	West End Outreach Services	530 Bogachiel Way	**80%**	**C**	High	Low	High		NO	NO	YES	NO
Port Angeles	Clinicare	621 Front	**80%**	**C/D**	High	High	High		NO	NO	NO	NO
	Elwha Clinic	243511 HWY 101	**80%**	**C/D**	High	High	High		NO	NO	NO	NO
	Family Medicine	240 West Front St	**80%**	**C/D**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	Port Angeles Care Ctr	825 E 5th St	**80%**	**C/D**	High	High	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Sequim	Sequim Medical Plaza	777 N 5th Ave	**60%**	**C/D**	High	High	High		NO	NO	NO	NO
	OMC Cancer Ctr	844 N 5th Ave	**60%**	**C/D**	High	High	High		NO	NO	NO	NO

Public Safety Facilities

No **critical** public safety facilities are subject to tsunamis, flood, wildland interface fires or landslides. All are threatened by a major destructive earthquake.

- Many fire, law enforcement, and Emergency Medical Service facilities will sustain damage and have limited communication capabilities. Facilities with emergency generators will be able to partially and temporarily compensate for disruptions in commercial power. Generator-dependent facilities will require fuel to continue operations.
- First responders will face the expected challenges of road and overpass damage as well as downed trees and power lines as they try to report for duty. This includes Emergency Operations Center Incident Management Team members and volunteers. CERT teams will be activated but again, will face the challenges of reporting. They are expected to self-report without notification to their previously determined response locations.
- Public works personnel will be busy performing initial damage assessments according to the Clallam County response plan.
- Some law enforcement facilities will be damaged but damage will be mostly to office contents.
- The County Jail and Juvenile facilities will be damaged.
- The county Emergency Operations Center and 911 (PENCOM) center will suffer serious damage. They will have to run on emergency power.

Fire Departments

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles Fire Department	Port Angeles	102 E 5th St	**60%**	**C/D**	High	High	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam County FD#1 Forks	Forks	11 Spartan Ave	**80%**	**C**	High	Low	High		NO	NO	YES	NO
	Beaver	Hwy 101	**80%**	**C**	High	Low	High		NO	NO	NO	NO
Clallam County FD# 2 Port Angeles Suburbs	Station 21 Gales Addition	North Baker St	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Station 22 Dry Creek	700 Power Line Road	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Station 23 Black Diamond	Black Diamond Road	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Station 24 Deer Park Rd	Deer Park Rd	**80%**	**C**	High	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Clallam Fire District #3 Sequim	Dungeness – Station 31	4721 Sequim Dungeness Way	**60%**	**F**	High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	R- Corner – Station 32	256702 Hwy 101	**60%**	**C**	High	Low	High		NO	NO	NO	NO
.	Sequim – Station 34, HQ	323 N 5th Avenue	**60%**	**D/E**	High	Very High	Very High		NO	NO	NO	NO
	Carlsborg - Station 33 And Maint Facility	70 Carlsborg Rd	**60%**	**D/E**	High	Very High	Very High		NO	NO	NO	NO
	Diamond Point Station – Station 35	121 Sunshine Ave	**60%**	**D/E**	High	Very High	Very High		NO	NO	NO	NO
	Lost Mountain – Station 36	269160 Hwy 101	**60%**	**C**	High	Low	High		NO	NO	YES	NO
	Blyn Station – Station 37	Hwy 101	**60%**	**F**	High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
CCFD # 4	Station 1 Joyce	51250Hwy 112	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Station 2 Freshwater Bay	Hwy 112	**80%**	**C**	High	Low	High		NO	NO	NO	NO
CCFD # 5 Clallam Bay	Clallam Bay	Eagle Crest Way	**80%**	**C**	High	Low	High		NO	NO	YES	NO
CCFD # 6 Mora	Mora	Mora Rd and LaPush Rd	**80%**	**C**	High	Low	High		NO	NO	YES	NO
Neah Bay Tribal Fire Department	Neah Bay	W 2nd & Kal Chote Ave, Neah Bay	80%	D/E	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
DNR WILDLAND Units	DNR HQ, Forks	411 Tillicum Ln, Forks	**80%**	**C**	High	Low	High		NO	NO	NO	NO
ONP Fire Services	ONP HQ, Port Angeles	3002 Mt Angeles Rd, Port Angeles	**80%**	**C**	High	Low	High		NO	YES	YES	NO

Roads and Bridges

- All bridges and roads in Western Washington will sustained extensive damage.
- Immediately after the earthquake, abandoned vehicles will clog many roads in the affected area, hampering first responder movement.
- The damage from the initial earthquake will require the inspection of all roads, bridges, and overpasses before they can be reopened for other than emergency traffic.
- Each subsequent aftershock will necessitate the re-inspection of all roads, bridges, and overpasses within the affected area.

Roads and Bridges				
Community	**Facility Address (if applicable)**	**Damage Level**	**Damage Status**	**Description**
Blyn	Hwy 101	High	Not Operational	Approximately ½ mile of liquefaction damage covered by tsunami debris
Sequim	Hwy 101	High	Not Operational	Liquefaction damage from Washington Street overpass to Carlsborg Rd
	Dungeness River Bridges	All 3 Destroyed plus old railroad bridge	Not Operational	Collapsed
	Old Olympic Hwy and side roads	High	Not Operational	Liquefaction damage north of 101 and east of Carlsborg Rd to bay
Port Angeles	Hwy 101 from Carlsborg Rd to Morse Creek	Medium	Not Operational	Visible damage to Morse, Sieberts, and McDonald Creek bridges and fills. Will not be operational until it is inspected and cleared by the state
	Hwy 101 from Morse Creek to Race St	Medium	Not Operational	Collapsed fills at Ennis and Lees Creek

Port Angeles cont.	Hwy 101 From Race to Elwha via Tumwater Truck Route	High	Not Operational	Building and tsunami debris covers road. 8th St bridge collapsed on truck route.
	Hwy 101 From Race to Elwha via Lincoln	High	Not Operational	Building debris covers road. Severe liquefaction blocks road from 1st to 8th St, Black Diamond and truck route bridges collapsed.
	Side Roads - Area east of truck route and north of 8th St to harbor	High	Not Operational	severely liquidated.
	Side Roads -Other	Moderate	Limited operation	Others are moderately damaged.
West County	Elwha River Bridges	All 3 Destroyed	Not Operational	Collapsed
Elwha to Neah Bay	HWY 112	Severe	Not operational	Blocked by slides, liquefaction, collapsed bridges and tsunami debris from Twin Rivers to Hwy 113, downtown Clallam Bay AND from Hoko River Bridge to Neah Bay
Elwha River to Forks	HWY 101	Severe	Not Operational	Blocked by slide and sieche debris at Lake Crescent with multiple collapsed bridges over the Soleduck and Calawah Rivers.
Forks	Side Roads	Moderate	Limited Operation	Some liquefaction
Forks to La Push	HWY 110	High	Not Operational	Bogachiel bridge collapsed with severe liquefaction

Schools

Schools in LaPush and Neah Bay are at very high risk from earthquake shaking and tsunamis. No other schools in the county are subject to tsunami, flood, WIUF or landslides. All schools are threatened by high risk from a major destructive earthquake.

Following a major destructive earthquake and tsunami, many schools may be needed to serve as triage centers, distribution points for emergency supplies, and emergency shelters, especially those that have the capacity to hold a large number of people. However, many schools may not be immediately functional after the earthquake. Roughly two-thirds of the schools in the impacted area may suffer medium to high damage, rendering them immediately unavailable for sheltering.

School/Facilities												
Community Name	**Name of Facility**	**Facility Address (if applicable)**	**EQ shaking 2% in 50 yrs % PGA**	**Site Class**	**EQ Shaking Hazard**	**Liquefaction Potential**	**Combined EQ Hazard level**	**Comments**	**Tsunami Hazard**	**Floods**	**WUIF**	**Landslides**
LA PUSH	QUILEUTE TRIBAL SCHOOL	La Push Rd	80%	D/E	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	YES	NO
NEAH BAY	NEAH BAY SCHOOLS	3560 Deer St	80%	D/E	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
CLALLAM BAY	CLALLAM BAY SCHOOL	16933 HWY 112	**80%**	**C**	High	Low	High		NO	NO	NO	NO
JOYCE	CRESCENT SCHOOL (JOYCE)	50350 HWY 112	**80%**	**C**	High	Low	High		NO	NO	NO	NO
FORKS	FORKS ELEMENTARY & HS	261 Spartan Ave	**80%**	**C**	High	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES	DRY CREEK SCHOOL	25 Rife Rd	**80%**	**C**	High	Low	Very High	See PASD Hazard Mitigation Plan	NO	NO	NO	NO
	DRY CREEK SCHOOL (OLD VACANT)	3501 W Edgewood Drive	**80%**	**C**	High	Low	Very High	CLOSED SOLD	NO	NO	NO	NO
	FAIRVIEW (VACANT)	Lake Farm Rd	**80%**	**C**	High	Low	Very High	CLOSED	NO	NO	NO	NO
	FRANKLIN SCHOOL	E Lauridsen	**80%**	**C**	High	Low	Very High	See PASD Hazard Mitigation Plan	NO	NO	NO	NO
	HAMILTON SCHOOL	1825 W 7th	**80%**	**C**	High	Low	Very High	See PASD Hazard Mitigation Plan	NO	NO	NO	NO
	HIGH SCHOOL, PA	304 E Park	**80%**	**C**	High	Low	Very High	See PASD Hazard Mitigation Plan	NO	NO	NO	NO
	JEFFERSON SCHOOL	218 E 12th St	**80%**	**C**	High	Low	Very High	See PASD Hazard Mitigation Plan	NO	NO	NO	NO
	Lincoln HS (Historical Society)	924 W 9th	**80%**	**C**	High	High	Very High	CLOSED SOLD NOT SURVIVABLE	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES cont.	ROOSEVELT SCHOOL	106 Monroe Rd	**80%**	**C**	Very High	Low	Very High	See PASD Hazard Mitigation Plan	NO	NO	NO	NO
	STEVENS MIDDLE SCHOOL	1139 W 14th	**80%**	**C**	Very High	Low	Very High	See PASD Hazard Mitigation Plan	NO	NO	NO	NO
	SKILL CENTER, N OLY PEN	905 W 9th	**80%**	**C**	Very High	High	Very High		NO	NO	NO	NO
	OLYMPIC CHRISTIAN - AHLVERS	116 E Ahlvers	**80%**	**C**	Very High	Low	Very High		NO	NO	NO	NO
	PENINSULA COLLEGE	1502 E Lauridsen	**80%**	**C**	Very High	Low	Very High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
SEQUIM	Grey Wolf School	171 Carlsborg Rd	**60%**	**D/E**	Very High	Very High	Very High		NO	NO	NO	NO
	HALLER SCHOOL	350 W Fir St	**60%**	**D/E**	Very High	Very High	Very High		NO	NO	NO	NO
	HIGH SCHOOL, SEQUIM	601 N Sequim Ave	**60%**	**D/E**	Very High	Very High	Very High		NO	NO	NO	NO
	MIDDLE SCHOOL, SEQUIM	301 W Hendrickson	**60%**	**D/E**	Very High	Very High	Very High		NO	NO	NO	NO
	SEQUIM COMMUNITY SCHOOL	220 West Alder	**60%**	**D/E**	Very High	Very High	Very High		NO	NO	NO	NO
	MOUNTAIN VIEW CHRISTIAN	255 Medsker Rd	**60%**	**D/E**	Very High	High	Very High		NO	NO	NO	NO
	OLYMPIC CHRISTIAN – O'BRIEN	43 O'Brien Rd	**60%**	**D/E**	Very High	High	Very High		NO	NO	NO	NO

Local Government and Law Enforcement Buildings

Several government buildings are threatened by tsunami, flood and landslide hazards. All facilities are at risk in a major destructive earthquake.

All local government buildings may be needed to serve as command centers, triage centers, distribution points for emergency supplies, and emergency shelters. However, many government buildings may not be immediately functional after a major destructive earthquake.

Local Government Buildings

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles	Clallam County Courthouse	223 E 4th St	**80%**	**C/D**	High	High	High		NO	NO	NO	YES
	Clallam County Jail	223 E 4th St	**80%**	**C/D**	High	High	High		NO	NO	NO	YES
	Clallam County Maintenance Facility	Lauridsen Blvd	**80%**	**C/D**	High	Low	High		NO	NO	NO	NO
	Clallam County Fairgrounds	1608 W 16th ST	**80%**	**C/D**	High	Low	High		NO	NO	NO	NO
	Port Angeles City Hall AND PENCOM	Port Angeles	**80%**	**C/D**	High	High	High		NO	NO	NO	NO
	Port Angeles Vern Burton Center	308 E 4th St, Port Angeles	**80%**	**C/D**	High	High	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles cont.	Port Angeles Maintenance Facility	Lauridsen Blvd	**80%**	**C/D**	**High**	**Low**	**High**		NO	NO	NO	NO
Port of Port Angeles	Port of Port Angeles Office Building	1st St	**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	YES	NO	NO
	Port of Port Angeles Maintenance	1st St	**80%**		**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	YES	NO	NO
	Port of Port Angeles Air Terminal Buildings	Airport Rd	**80%**	**C/D**	**High**	**Low**	**High**		NO	NO	NO	NO
	Port of Port Angeles Hangers	Airport Rd	**80%**	**C/D**	**High**	**Low**	**High**		NO	NO	NO	NO
	Port of Port Angeles Rental Buildings	W 16th St	**80%**	**C/D**	**High**	**Low**	**High**		NO	NO	NO	NO
	Port of Port Angeles - Port Facilities	Port Angeles Harbor	**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami – Critical to rescue and response	YES	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port of Port Angeles cont.	Port of Port Angeles Boat haven	Port Angeles	**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami – Critical to rescue and response	YES	NO	NO	NO
	Port of Port Angeles John Wayne Marina	Sequim	**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami – Critical to rescue and response	YES	NO	NO	NO
City of Sequim	Office Building	152 W Cedar Street	**60%**	**D/E**	High	Very High	Very High		NO	NO	NO	NO
	Maintenance	152 W Cedar Street	**60%**	**D/E**	High	Very High	Very High		NO	NO	NO	NO
	Carrie Blake Park	202 N Blake Ave	**60%**	**D/E**	High	Very High	Very High		NO	NO	NO	NO
City of Forks	Office Building and Jail	500 E Division Street	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Tilicum Park	1411 S Forks Ave	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Maintenance	500 E Division Street	**80%**	**C**	High	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Quillayute Reservation			**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami				
Lower Elwha Reservation			**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami				
Makah Reservation			**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami				
Hoh Reservation (JEFFCO)			**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami				
Jamestown S'Klallam Reservation			**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami				

Law Enforcement												
Community Name	**Name of Facility**	**Facility Address (if applicable)**	**EQ shaking 2% in 50 yrs % PGA**	**Site Class**	**EQ Shaking Hazard**	**Liquefaction Potential**	**Combined EQ Hazard level**	**Comments**	**Tsunami Hazard**	**Floods**	**WUIF**	**Landslides**
Port Angeles	Lower Elwha Klallam Tribal Police	HWY 101 & S Dry Creek Rd, Port Angeles, WA 98363	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	US Border Patrol, Shore Federal Building	US Border Patrol Station 138 W 1st	**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	NO	NO	NO
	US Border Patrol, New PA HQ Building	US Border Patrol Office 110 S Penn St	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	US Border Patrol, Marine Port of Entry	Coho Ferry Dock, Port Angeles WA 98362	**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YS	NO	NO	NO
	US Border Patrol Air Marine Bldg	1912 W 16th St	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	Clallam County Sheriff	223 E 4th St	**80%**	**C/D**	High	High	High		NO	NO	NO	NO
	Clallam County Jail	223 E 4th St	**80%**	**C/D**	High	High	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles cont.	Clallam County Sheriff, Beaver Office	HWY 101	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	Clallam County Juvenile Detention	1912 W 16th St	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	Port Angeles Police Department	321 E 5th St	**80%**	**C/D**	High	High	High		NO	NO	NO	NO
	WSP - WA State Patrol	62 Old Olympic HWY	**80%**	**F**	**Very High**	**Very High**	**Very High**	Peat Bog	NO	NO	NO	NO
	Fairchild Intl Customs	Airport Terminal	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	Port Angeles Federal Building	138 W 1st St	**80%**	**E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Port Angeles cont.	Olympic National Park HQ	3002 Mount Angeles Rd	**80%**	**C**	**High**	**Low**	**High**		NO	YES	NO	NO
	Storm King Ranger Station	240000 HWY 101	**80%**	**C**	**High**	**Low**	**High**	Sieche Hazard		NO	YES	NO
Blyn	WSP - WA State Patrol	278000 HWY 101	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
Clallam Bay	Corrections Center	Eagle Crest Way	**80%**	**C**	**High**	**Low**	**High**	Critical security problem for Clallam Bay	NO	NO	NO	NO
Forks	Mora ranger Station	Mora Road	**80%**	**D/F**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	YES	YES	NO
	Forks Police Department	500 E Division St	**80%**	**C**	High	Low	High		NO	NO	NO	NO
	Forks Jail	500 E Division St	**80%**	**C**	High	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Sequim	Sequim Police Department	152 W Cedar St	**80%**	**D/F**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
La Push	Quileute Tribal police	Ockalat Center	**80%**	**B**	**High**	**Low**	**Very High**		NO	NO	NO	NO
Neah Bay	Makah Tribal Police	Bayview Ave	**80%**	**D/F**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	NO	NO	NO
	Makah Jail	Bayview Ave	**80%**	**D/F**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	NO	NO	NO
	WDFW											
	USFWS											
	Miss anybody?											

Shelters

Many shelters in the face one or more hazards as shown in the following table. Most emergencies in Clallam County will be of limited scope and duration. This will allow those needing shelter to find temporary accommodations away from the immediate disaster area.

This will not be the case in the immediate aftermath of a major destructive earthquake. As many as 20 thousand people may need temporary shelter. Many of these survivors will shelter-in-place, that is, seek shelter with family and neighbors, while many others will seek out government and Red Cross managed formal emergency shelters.

All shelter locations will have to be evaluated to be sure they can be safely occupied. The list of available shelters will only be made public over the radio once they are activated following the earthquake. Note: all shelters must be re-inspected for safety following each after-shock of 5.0 or greater.

Shelter Facilities

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
BEAVER	BEAR CREEK MOTEL & RV PARK	BEAVER	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
BLYN	GARDINER COMMUNITY CENTER	980 OLD OLYMPIC HWY	**60%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
CLALLAM/ SEKIU	BAY MOTEL	SEKIU	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami & landslide	YES	NO	NO	YES
	Clallam Bay High School	16-933 Hwy 112	**80%**	**C**	High	Low	High	+/- 2 feet above tsunami zone	NO	NO	YES	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
CLALLAM/ SEKIU cont.	CURLEY'S RESORT & DIVE CTR	291 FRONT ST	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami & landslide	YES	NO	NO	YES
	HERB'S MOTEL	SEKIU CLALLAM BAY	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami & landslide	YES	NO	NO	YES
	MIDDLE POINT INN	15520 HWY 112	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami & landslide	YES	NO	NO	YES
	SEKIU COMMUNIT Y CENTER		**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami & landslide	YES	NO	NO	YES
	STRAITSIDE MOTEL	SEKIU CLALLAM BAY	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami & landslide	YES	NO	NO	YES
	SUNDOWNE R MOTEL	360 E WASHINGT ON ST	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami & landslide	YES	NO	NO	YES
FORKS	ASSEMBLY OF GOD, FORKS	81 Huckleberry Lane	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	BAPTIST	HWY 101 S	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
FORKS cont.	FORKS ELEMENTARY & HS	301 S ELDERBERRY	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	FORKS MOTEL	351 FORKS AVE S	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	GRANGE - FORKS PRAIRIE		**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	LATTER DAY SAINTS - FORKS	1301 CALAWAH WAY	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	OLSON'S VACATION CABIN	2423 MORA RD	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	Olympic Natural Resource Center	1455 S Forks Ave	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	OLYMPIC SUITES MOTEL	800 OLYMPIC VIEW DR	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	PACIFIC INN MOTEL	FORKS AVE & C	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	SEVENTH DAY ADVENTIST - FORKS	E DIVISION	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
JOYCE	Crescent School	50350 Hwy 112	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	LATTER DAY SAINTS - JOYCE	HWY 112	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	BIBLE CHURCH	HWY 112	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
LAKE CRESCENT	CAMP DAVID JR.		**80%**	**C**	**High**	**Low**	**High**	Sieche hazard	Sieche	NO	YES	YES
LAPUSH	LAPUSH OCEAN PARK RESORT	330 OCEAN FRONT DR	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	QUILEUTE TRIBAL SCHOOL		**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
NEAH BAY	CAPE MOTEL & RV PARK	151 BAY VIEW AVE	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	HILDEN'S MOTEL	NEAH BAY	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	Neah Bay Schools	3560 Deer St	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	PRESBYTERIAN, NEAH BAY	2ND & FORTH ST	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	VFW #114581	1031 Bay View Ave	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES	AGNEW HELPFUL NEIGHBORS	121 BARR RD	80%	D/E	High	Low	High		NO	NO	NO	NO
	AIRCREST MOTEL	10056 E FRONT ST	80%	D/E	High	Low	High		NO	NO	NO	NO
	ALL VIEW MOTEL	214 E LAURIDSEN BLVD	80%	D/E	High	Low	High		NO	NO	NO	NO
	AL'S RV PARK	521B LEE'S CREEK RD	80%	D/E	High	Low	High		NO	YES	NO	YES
	BAPTIST	205 BLACK DIAMOND RD	80%	D/E	High	Low	High		NO	NO	NO	NO
	BEST WESTERN OLYMPIC LODGE	140 DEL GUZZI DR	80%	D/E	High	Low	High		NO	NO	NO	NO
	CATHOLIC, QUEEN OF ANGELS	209 W 11th St	80%	D/E	High	Low	High		NO	NO	NO	NO
	CHINOOK MOTEL	1414 E 1ST ST	80%	D/E	High	Low	High		NO	NO	NO	NO
	CLALLAM COUNTY FAIRGROUNDS	1608 W 16th ST	80%	D/E	High	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES cont.	Dry Creek School	25 Rife Road	80%	D/E	High	Low	High		NO	NO	NO	NO
	EAGLES - PORT ANGELES 483	110 S PENN	80%	D/E	High	Low	High		NO	NO	NO	YES
	ELKS - PORT ANGELES 353	131 E 1ST ST	80%	E	Very High	Very High	Very High		NO	NO	NO	NO
	ELWHA DAM RV PARK	47 LOWER DAN RD	80%	D/E	High	Low	High		NO	NO	NO	NO
	EPISCOPAL, ST ANDREWS	510 E PARK AVE	80%	D/E	High	Low	High		NO	NO	NO	NO
	Fairview Bible Church	385 O'Brien Rd	80%	D/E	High	Low	High		NO	NO	NO	NO
	Fairview School	Lake Farm Road	80%	D/E	High	Low	High		NO	NO	NO	NO
	FLAGSTONE MOTEL	415 E 1ST ST	80%	D/E	High	Low	High		NO	NO	NO	NO
	Franklin School	2505 S Washington	80%	D/E	High	Low	High		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES cont.	GRANGE - ANGELES	932 W 12TH ST	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	GRANGE - DRY CREEK	3520 Edgewood Dr	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	GRANGE - FAIRVIEW	2123 LAKE FARM RD	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	GRANGE - MOUNT PLEASANT	2431 MT PLEASANT RD	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	GRANGE - PAMONA	643 GEHRKE	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	Hamilton Elementary School	1822 W 7th	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	IBC - ADMIN	112 N LINCOLN ST	**80%**	**E**	**Very High**	**Very High**	**Very High**		YES	NO	NO	NO
	IBC - CHURCH	116 E AHLVERS RD	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	INDIAN VALLEY MOTEL	235471 HWY 101	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES cont.	Jefferson School	218 E 12th	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	JESSIE WEBSTER PARK		**80%**	**D/E**	**High**	**Low**	**High**					
	KOA CAMPGROUND	80 OBRIEN RD	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	LATTER DAY SAINTS - PA	591 MONROE RD	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	LIGHTHOUSE CHRISTIAN CENTER	304 VIEWCREST AVE	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	YES
	LIONS CLUB - CRESCENT BAY	564 RAM HILL RD	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	LUTHERAN, HOLY TRINITY ELCA	301 LOPEZ	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	LUTHERAN, ST MATTHEWS LCMS	132 E 13TH	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	MASONIC TEMPLE, PORT ANGELES	622 S Lincoln	**80%**	**D/E**	**Very High**	**High**	**Very High**	Unreinforced masonry - destroyed	NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES cont.	METHODIST, FIRST UNITED	110 E 7TH	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	Monterra Homeowners Association	22 Circle Dr	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	OLYMPIC CHRISTIAN - AHLVERS	118 E AHLVERS	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	OLYMPIC CHRISTIAN - OBRIEN	43 OBRIEN RD	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	Peninsula College	1502 E Lauridsen Blvd	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	Peninsula Evangelical Friends @ Agnew	1291 N Barr Road	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	NO
	Port Angeles High School	304 E Park	**80%**	**D/E**	**High**	**Low**	**High**		NO	NO	NO	YES
	PORT ANGELES INN	111 NE 2ND ST	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	PORTSIDE INN	1510 E FRONT STR	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES cont.	PRES-BYTERIAN, FIRST	139 8TH ST	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	Red Lion Inn	221 N LINCOLN ST	**80%**	**D/E**	Very High	Very High	Very High	Destroyed by tsunami	YES	NO	NO	NO
	Roosevelt School	106 Monroe Rd	**80%**	**C**	**High**	**Low**	**Very High**		NO	NO	NO	NO
	ROYAL VICTORIAN MOTEL	521 E 1ST ST	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	SALT CREEK RV PARK	53802 HWY 112	**80%**	**C**	**High**	**Low**	**High**		NO	NO	YES	NO
	SALVATION ARMY - PT ANGELES	206 S PEABODY	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	SENIOR CENTER - PORT ANGELES	328 E 7th Street	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	SEVENTH DAY ADVENTIST - PA	124 W 9TH	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	SHADOW MTN STORE & RV PARK	232951 HWY 101	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	YES

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
PORT ANGELES cont.	SKILL CENTER, N OLY PEN	904 W 9TH	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	SPORTSMEN MOTEL	2909 E HWY 101	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	Stevens Middle School	1139 W 14th St	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO
	SUPER 8 MOTELS	2104 E 1ST ST	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	Vern Burton Community Ctr	321 E 5th St	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
	YMCA	302 S Francis	**80%**	**D/E**	**Very High**	**High**	**Very High**		NO	NO	NO	NO
SEQUIM	AMERICAN LEGION - SEQUIM	107 E PRAIRIE ST	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	BAPTIST	1323 SEQUIM DUNGENES S WAY	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	CARRIE BLAKE PARK		**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
SEQUIM cont.	CATHOLIC, ST JOSEPHS	121 E Maple St	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Dungeness Community Church	45 Eberle Lane	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	ELKS - SEQUIM 2642	143 Port Williams Rd	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	EPISCOPAL, ST LUKES	525 N 5th	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	GRANGE - MACLEAY HALL	290 MACLEAY RD	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	GREYWOLF ELEMENTARY	CARLSBORG RD	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	GROVELAND COTTAGE	4861 SEQUIM-DUNGENESS WAY	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	HALLER ELEMENTARY SCHOOL	350 W FIR ST	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	JAUN DE FUCA COTTAGES	182 MARINE VIEW DR	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
SEQUIM cont.	Kingsway 4 Square Church	1023 Kitchen Dick Road	**60%**	**C**	**High**	**High**	**High**		NO	NO	NO	NO
	LATTER DAY SAINTS - SEQUIM	815 W HWY 101	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	LUTHERAN, DUNGENESS ELCA	925 N SEQUIM AVE	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	LUTHERAN, FAITH LCMS	382 W CEDAR	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	MASONIC TEMPLE, SEQUIM	700 S 5th Ave	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	METHODIST, TRINITY UNITED	100 Blake Ave	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	MOUNTAIN VIEW CHRISTIAN	255 MEDSKER RD	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	NAZARENE, SEQUIM VALLEY	481 Carlsborg Rd	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	POINEER PARK CLUBHOUSE		**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
SEQUIM cont.	PRES-BYTERIAN, COMMUNITY	950 N 5th Ave	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	QUALITY INN & SUTIES	134 RIVER RD	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	RAMADA LIMITED	1095 EAST WASHINGTON	**60%**	**C**	**High**	**High**	**High**		NO	NO	NO	NO
	RAMBLE-WOOD RETREAT CENTER	SEQUIM BAY STATE PARK	**60%**	**C**	**High**	**High**	**High**		NO	NO	NO	NO
	SENIOR CENTER - SEQUIM	921 E Hammond St	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	SEQUIM BAY LODGE	268522 HWY 101	**60%**	**C**	**High**	**High**	**High**		NO	NO	NO	NO
	SEQUIM BAY RESORT	2634 W SEQUIM BAY RD	**60%**	**D/E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	NO	NO	NO
	Sequim Bay Yacht Club	2577 W Sequim Bay Rd	**60%**	**D/E**	**Very High**	**Very High**	**Very High**	Destroyed by tsunami	YES	NO	NO	NO
	Sequim Boys & Girls Club	400 Fir St	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
SEQUIM cont.	SEQUIM COMMUNITY SCHOOL	220 W ALDER	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Sequim High School	601 N Sequim Ave	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	SEQUIM MIDDLE SCHOOL	301 HENDRICK SON RD	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	SEQUIM WEST INN	740 W WASHINGT ON ST	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	SEVENTH DAY ADVENTIST - SEQUIM	30 SANFORD LANE	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	VFW #4760	169 E Washington St	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO

Commercial Buildings

Commercial Buildings

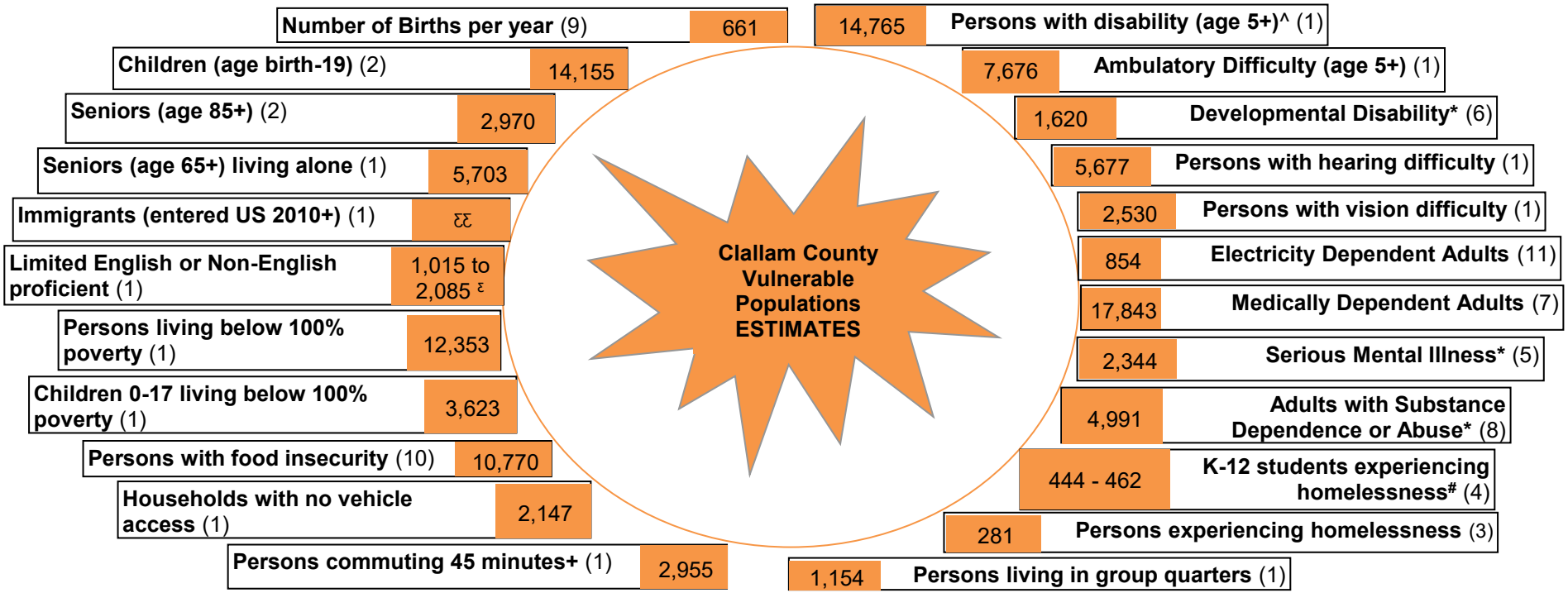
Commercial buildings listed below are only subject to a major destructive earthquake.

Shelters												
Community Name	**Name of Facility**	**Facility Address (if applicable)**	**EQ shaking 2% in 50 yrs % PGA**	**Site Class**	**EQ Shaking Hazard**	**Liquefaction Potential**	**Combined EQ Hazard level**	**Comments**	**Tsunami Hazard**	**Floods**	**WUIF**	**Landslides**
Port Angeles	Grocery, Safeway 101	2709 E Hwy 101	**80%**	**C**	**High**	**High**	**High**		NO	NO	NO	NO
	Grocery, Safeway Lincoln	110 E 3rd St	**80%**	**D/E**	**Very High**	**Very High**	**Very High**	Unconsolidated fill under Lincoln St	NO	NO	NO	NO
	Grocery, Haggan	114 E Lauridsen Blvd.	**80%**	**C**	**High**	**High**	**High**	CLOSED	NO	NO	NO	NO
	Hardware, Swains	602 E 1st St	**80%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Grocery, Walmart	3411 E Kolonel's Way	**80%**	**C**	**High**	**High**	**High**		NO	NO	NO	NO

Community Name	Name of Facility	Facility Address (if applicable)	EQ shaking 2% in 50 yrs % PGA	Site Class	EQ Shaking Hazard	Liquefaction Potential	Combined EQ Hazard level	Comments	Tsunami Hazard	Floods	WUIF	Landslides
Sequim	Grocery, Safeway	680 W Washington Street	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Warehouse-Costco	955 W Washington Street	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Grocery, Walmart	1110 W Washington Street	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Home Depot	1145 Washington Street	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Grocery, QFC	990 E Washington St	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
	Warehouse Grocery Outlet	1045 W Washington Street	**60%**	**D/E**	**Very High**	**Very High**	**Very High**		NO	NO	NO	NO
Forks	Grocery & Hardware, ACE	950 S Forks Ave.	**80%**	**C**	**High**	**Low**	**High**		NO	NO	NO	NO

Clallam County Vulnerable Populations Estimates (Updated Jan 2019)

The Kitsap Populations with Functional and Access Needs Report is designed to provide estimated numbers of people in populations who might need additional assistance or have special needs in an emergency situation or unforeseen event. These estimates, while originally compiled for emergency preparedness planning, can be also used for other health or community planning work.



Sources

1 American Community Survey, 2013-17
2 Washington State Office of Financial Management, Small Area Demographic Estimates, 2017
3 Point in Time Count, 2017. Washington Dept. of Commerce.
4 Office of Superintendent of Public Instruction, 2016-17: http://www.k12.wa.us/HomelessEd/Data.aspx
5 Mental Disorders in America, 2015. Accessed at: http://www.nimh.nih.gov/health/publications/the-numbers-count-mental-disorders-in-america/index.shtml
6 CDC Developmental Disabilities, based on 2017 population estimates. Accessed at: https://www.cdc.gov/ncbddd/developmentaldisabilities/about.html
7 Behavioral Risk Factor Surveillance System 2013-17, Kitsap County analysis
8 Substance Abuse and Mental Health Services Administration, 2015, based on 2017 population estimates. Accessed at: http://www.samhsa.gov/
9 WA Dept. of Health, Birth Certificate Database, 2017.
10 Map the Meal Gap, Feeding America, 2016.
11 US Dept. of Health and Human Services, 10 January 2019. Accessed at: https://www.phe.gov/empowermap/Pages/default.aspx

^Civilian, noninstitutionalized only
*County estimate based on U.S. national estimates by age.
ε This estimate is unreliable, so a range of possible estimates was displayed (see page 2).
ƐƐ This estimate is unreliable enough that no estimate was displayed (see page 2).
Cape Flattery and Crescent School Districts are suppressed due to low numbers. The true number is somewhere in this range.

Clallam County Population		
2018 Estimates	**Number**	**Percent**
Total	**75,130**	**100%**
Unincorporated	44,685	59% of total
Incorporated	30,445	41% of total
Forks	3,615	12% of inc
Port Angeles	19,370	64% of inc
Sequim	7,460	24% of inc
Households (1)	**32,280**	

Source: WA Office of Financial Management

Clallam County Vulnerable Populations Estimates
(Updated Jan 2019)

Vulnerable Populations (VP) Categories

rev. 1/11/2017

Adults with Substance Dependence or Abuse: Kitsap adults with substance dependence or abuse in the past year based on national estimates from the National Survey of Drug Use and Health

Children:

Children (age birth-19): Persons 19 years or younger

Number of Births per year: number of births in a given year

Electricity Dependent Adults: Total number of Medicare beneficiaries with claims in the prior month for: a ventilator, BiPAP, internal feeding, IV infusion pump, suction pump, at-home dialysis, electric wheelchair; claims in the past 13 months for electric bed equipment; claims in the past 36 months for oxygen concentrator equipment; and claims in the past 5 years for an implanted cardiac device.

Homeless or Shelter Dependent:

Persons living in group quarters: Population living in group quarters (college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, workers' dormitories and facilities for people experiencing homelessness)

Persons experiencing homelessness: Homeless persons surveyed during a 24-hour period for the annual Point In Time count

K-12 students experiencing homelessness: Population in kindergarten through 12th grade who lack a fixed, regular and adequate nighttime residence

Households with no vehicle access: Households reporting no vehicle available

Immigrants (entered US 2010+): Persons reporting being born in a foreign country and having arrived in the US in 2010 or later

Impoverished:

Persons living below 100% of poverty: Persons living in households with past 12 month income below 100% of the Federal Poverty Guidelines

Children 0-17 living below 100% of poverty: Persons 17 years or younger living in households with past 12 month income below 100% of the Federal Poverty Guidelines

Limited English or Non-English Proficient: Population age 5+ speaking language other than English at home and speaking English less than "very well"

Medically Dependent Adults: Adults age 18 and older with at least one of the following chronic conditions: asthma, diabetes, myocardial infarction, or angina

Persons commuting 45 minutes+: Of those who work at least some time during the week and report working outside their home, person who spend at least 45 minutes getting to work, including time spent waiting for public transportation, picking up carpool passengers and other activities related to getting to work

Persons living with a disability:

Persons with vision difficulty: Population that reports vision loss: serious difficulty seeing even when wearing glasses or contact lenses; blind or unable to see at all

Persons with hearing difficulty: Population that reports serious difficulty hearing without a hearing aid; deaf or unable to hear at all

Developmental Disability: Kitsap population aged 3 through 17 years with at least 1 impairment in physical, learning, language or behavior that began during the developmental period, may impact day-to-day functioning and usually lasts throughout a person's lifetime; extrapolated from US population averages

Ambulatory Difficulty: Population age 5 and older with conditions that cause serious difficulty walking or climbing stairs

Persons with disability (age 5+): Population age 5 and older with hearing, vision, cognitive, ambulatory, self-care and independent living difficulties

Persons with food insecurity: Persons with a lack of access, at times, to enough food for an active, healthy life for all household members and limited or uncertain availability of nutritionally adequate foods, according to the USDA's measure of food insecurity (https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx)

Seniors:

Seniors (age 85+): Population age 85 and older

Seniors (age 65+) living alone: Persons age 65 and older who live alone

Serious Mental Illness: Kitsap population age 18 and older who experience disability due to serious mental illness; extrapolated from US population averages

ƐƐ Estimates based on small numbers of people may be highly unreliable and variable at the 95% confidence level. When the error associated with the estimate is 25% or more of the estimate itself (relative standard error (RSE) ≥ 25%), the estimate is either displayed as a range (for those estimates where the RSE is less than 32%) or suppressed altogether (for estimates with RSE ≥ 32%).

Clallam County Hazard Mitigation Sources

Layer	Source	Notes	Source Website
Base Layers			
Roads	ESRI 2019		
Jurisdictional Boundaries	ESRI 2019		
County Boundaries	ESRI 2019		
Basemap	ESRI 2019	World Light Grey Canvas Base	
Hazards			
Wildfire: Historic Wildfires	USFS 2015	Locations of historic wildfires between 1992 and 2015	https://enterprisecontentnew-usfs.hub.arcgis.com/datasets/fire-program-analysis-fire-occurrence-database-feature-layer
Wildfire: Hazard Potential	USDA 2018	Level of Wildfire risk: low to high	https://www.firelab.org/document/continuous-2018-whp-gis-data-and-maps
Earthquake: Seismic Ground Motion Hazards	HSIP 2012	The Peak Ground Acceleration in %G that the area has a 10% likelihood of exceeding in the next 50 years.	https://hifld-geoplatform.opendata.arcgis.com/datasets/seismic-ground-motion-hazards-with-10-percent-probability
Oil Spills: Spills, Equipment, Facility	Washington Department of Ecology 2019	Locations and size of recorded oil spills, locations of regulated oil facilities for response, and locations of various types of response equipment	https://fortress.wa.gov/ecy/coastalatlas/storymaps/spills/spills_sm.html?&Tab=nt3
Landslide: Susceptibility	USGS 2011	Landslide risk level: Low incidence, Moderate incidence, and High incidence.	https://www.sciencebase.gov/catalog/item/4f4e4a60e4b07f02db634f33
Tsunami	WADNR 2017		

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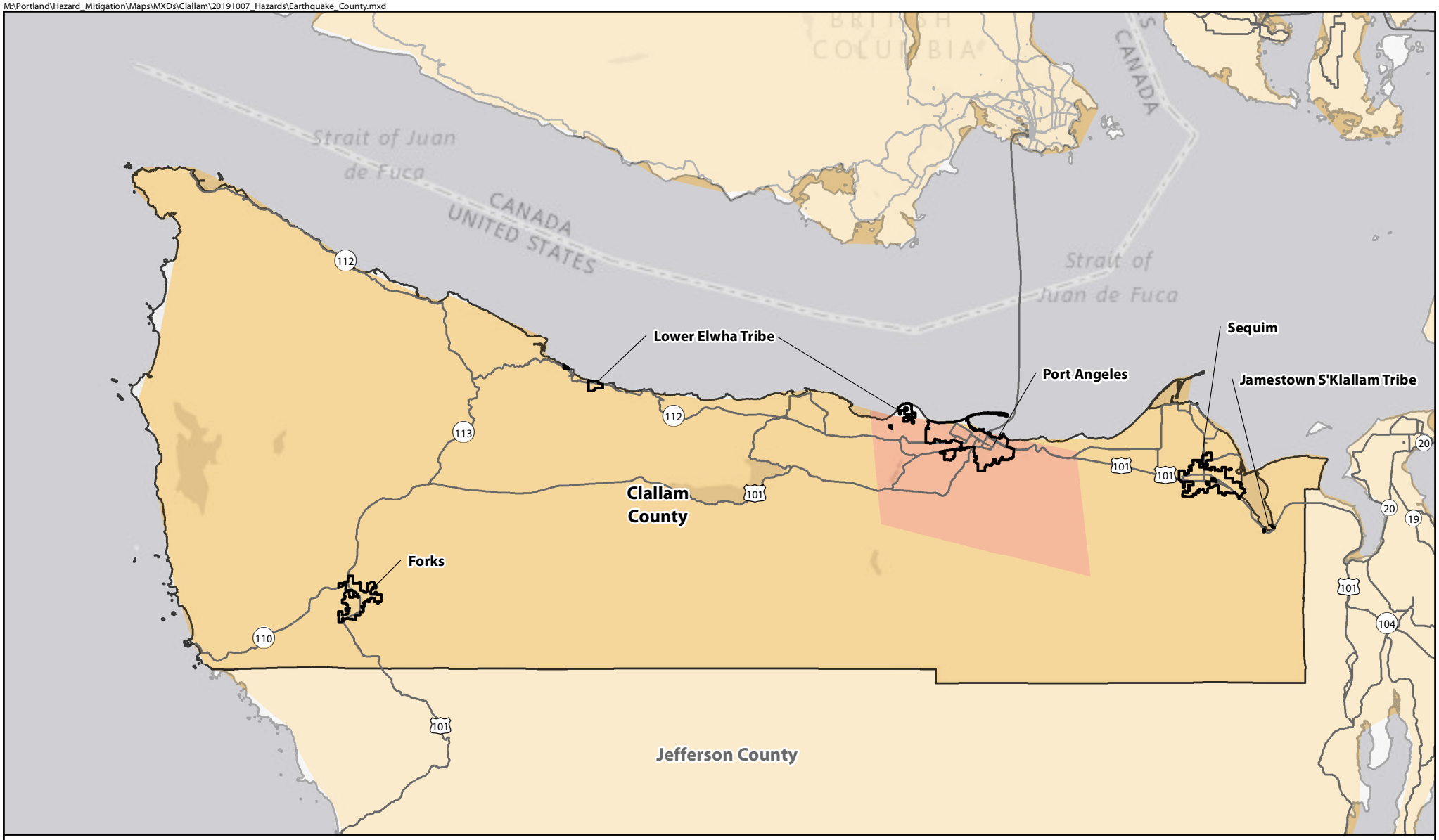

Figure 1
Clallam County
Hazard Mitigation

Jurisdictional Boundary

Major Road

Seismic Ground Motion Hazards

(10% Probability)

32-48 %G

48-64 %G

N
W E
S

October 2019

0 10 20
Miles

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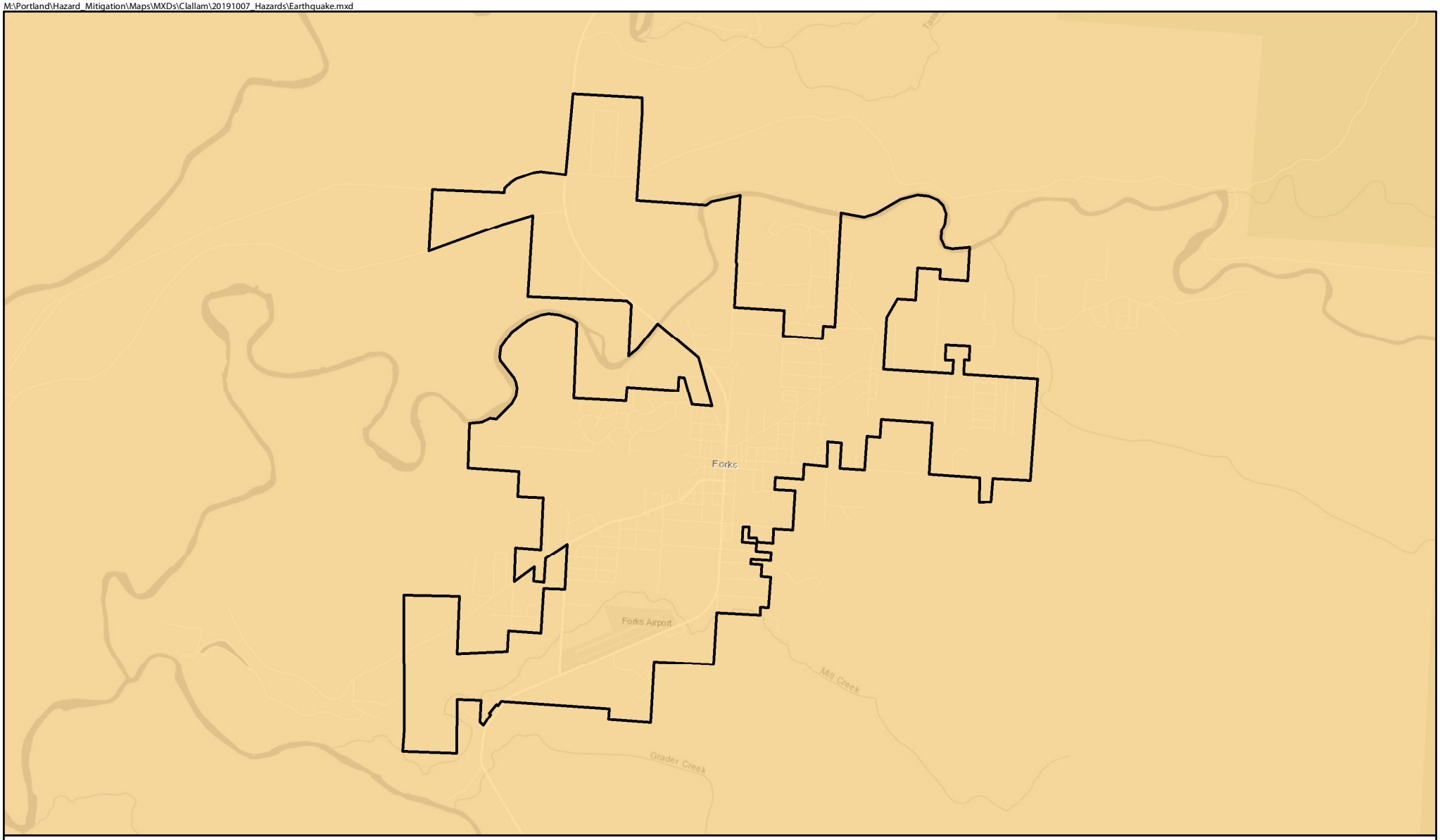


Figure 2
Forks
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Seismic Ground Motion Hazards

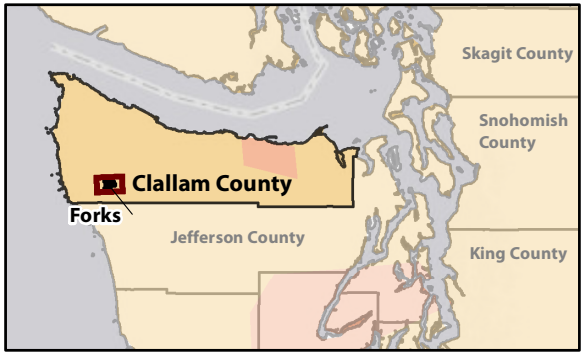
(10% Probability)

32-48 %G

48-64 %G

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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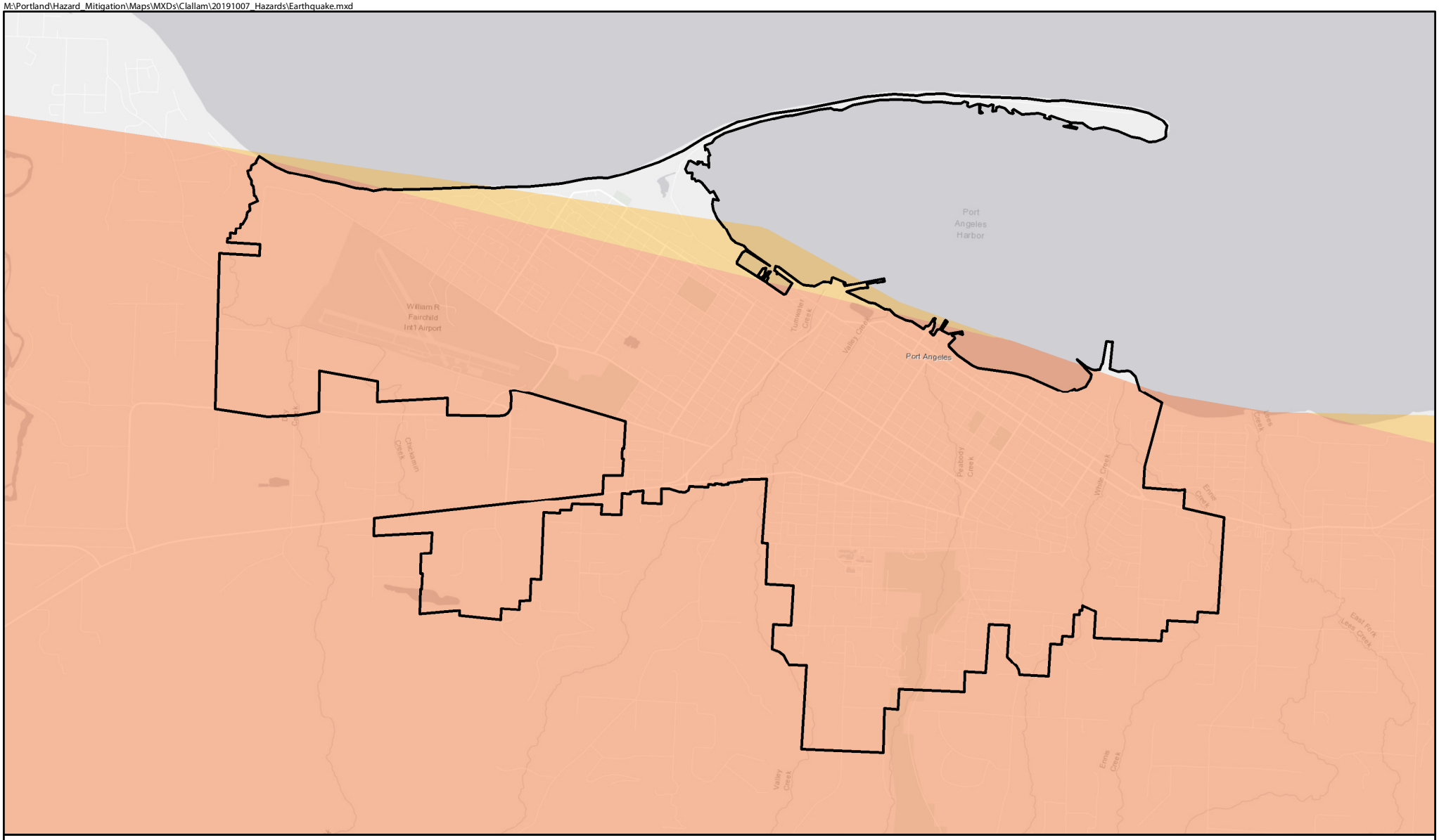

Figure 3
Port Angeles
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Seismic Ground Motion Hazards

(10% Probability)

32-48 %G

48-64 %G

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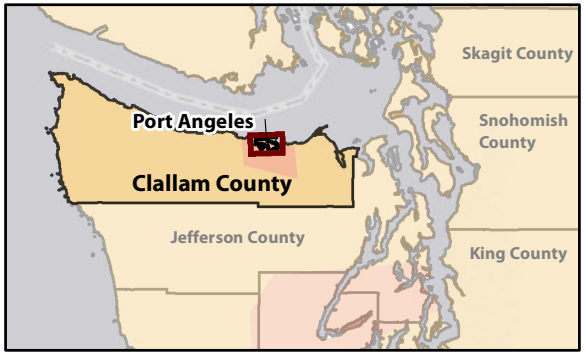
0 0.25 0.5 0.75 1 1.25
Miles



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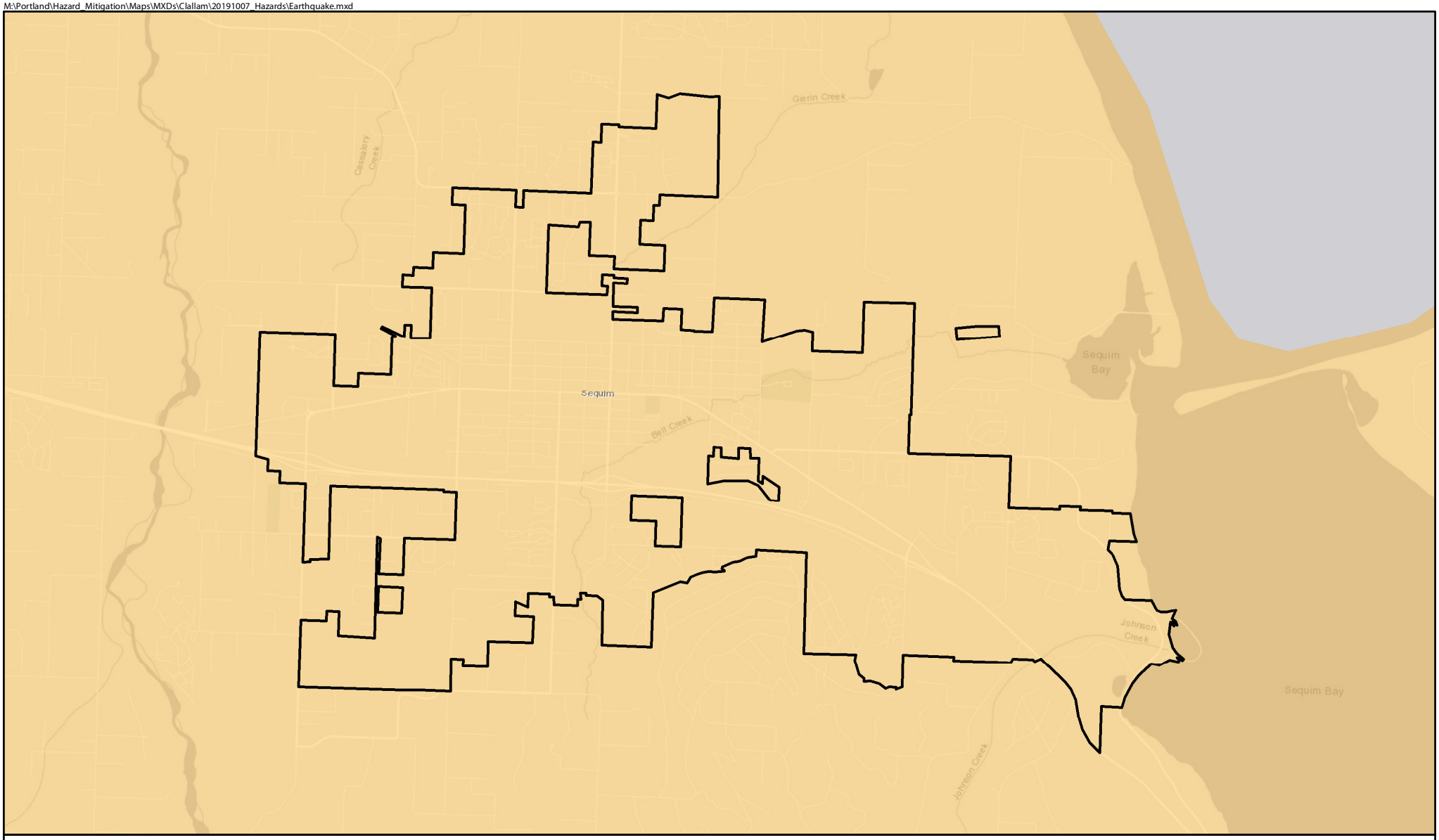


Figure 4
Sequim
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Seismic Ground Motion Hazards

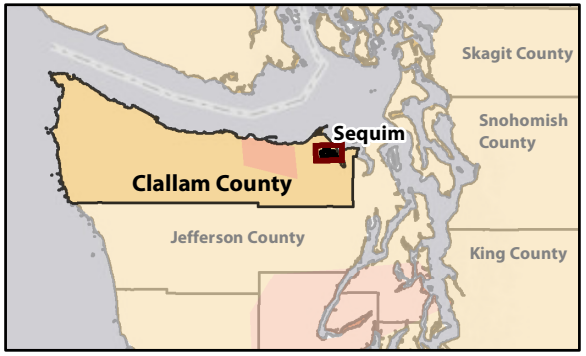
(10% Probability)

32-48 %G

48-64 %G

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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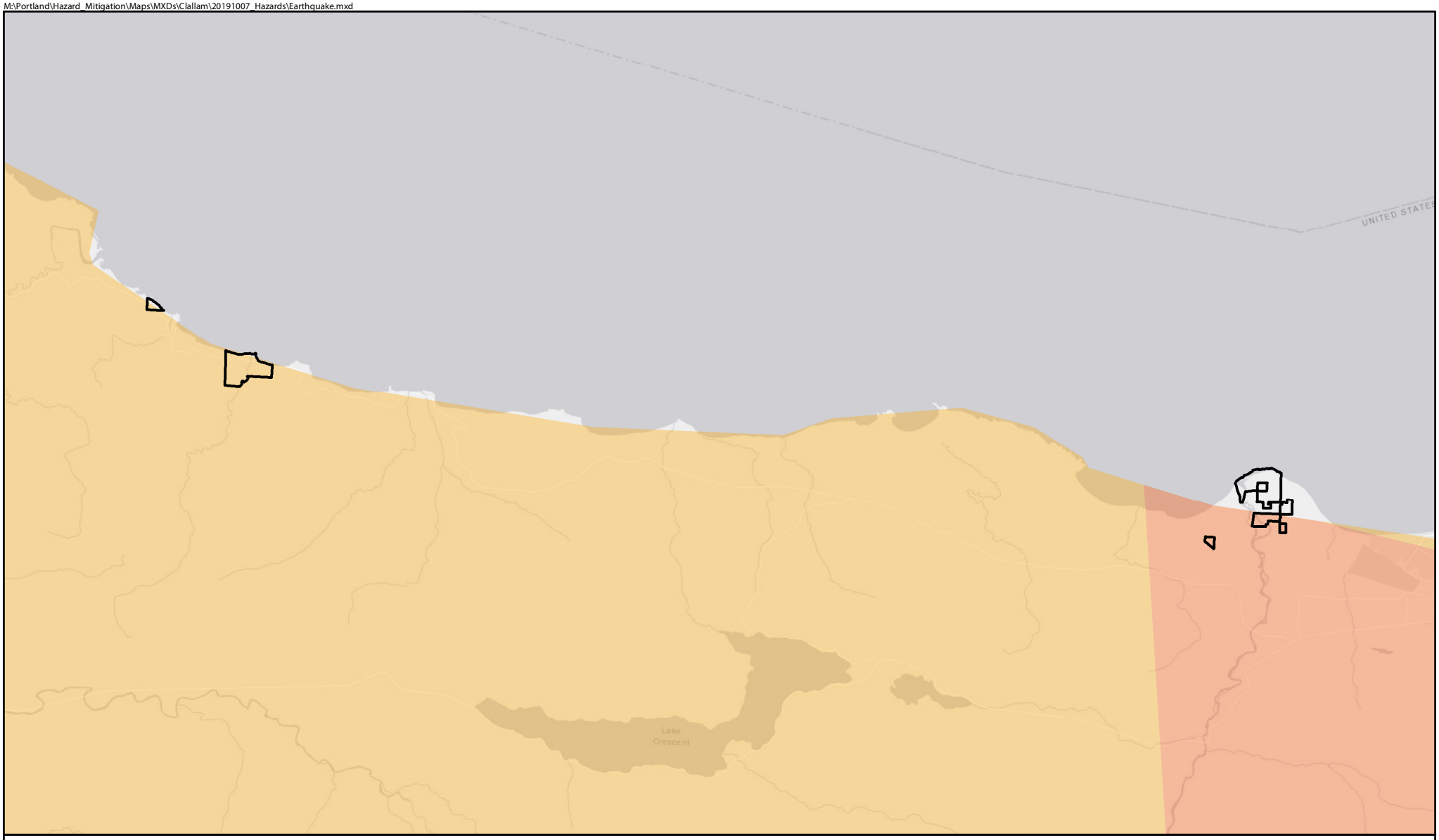

Figure 5
Lower Elwha Tribe
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Seismic Ground Motion Hazards
(10% Probability)

32-48 %G

48-64 %G

N
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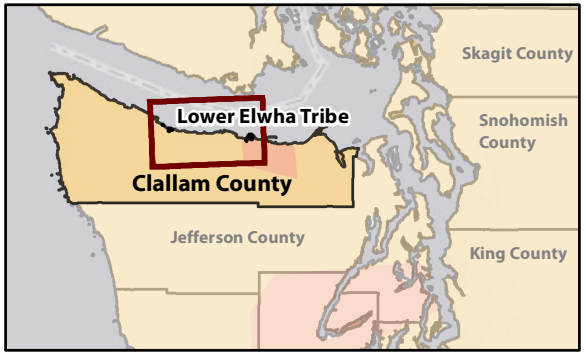
0 1 2 3 4 5
Miles



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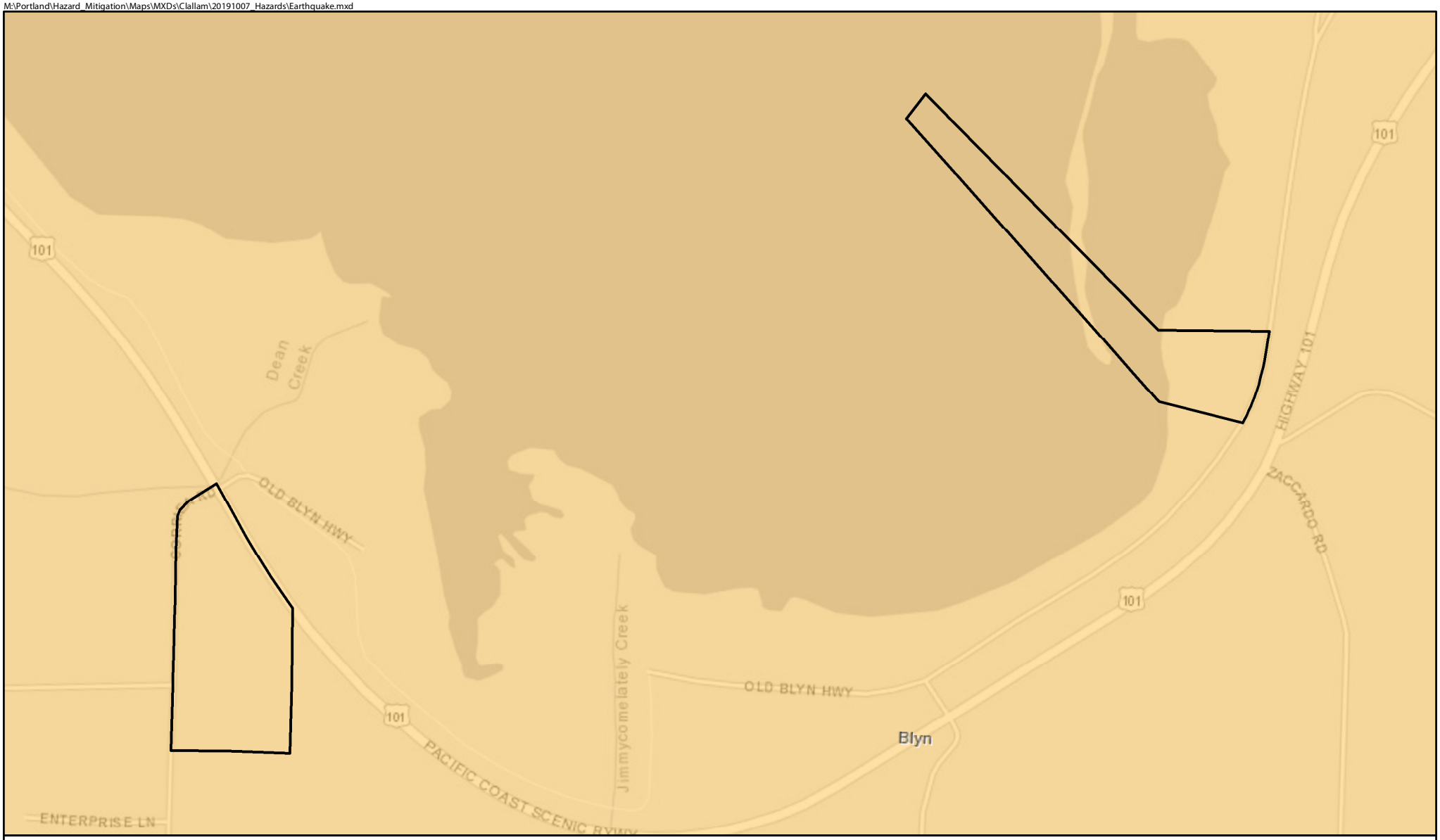

Figure 6
Jamestown S'Klallam Tribe
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Seismic Ground Motion Hazards

(10% Probability)

32-48 %G

48-64 %G

N
W E
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0 0.2
Miles



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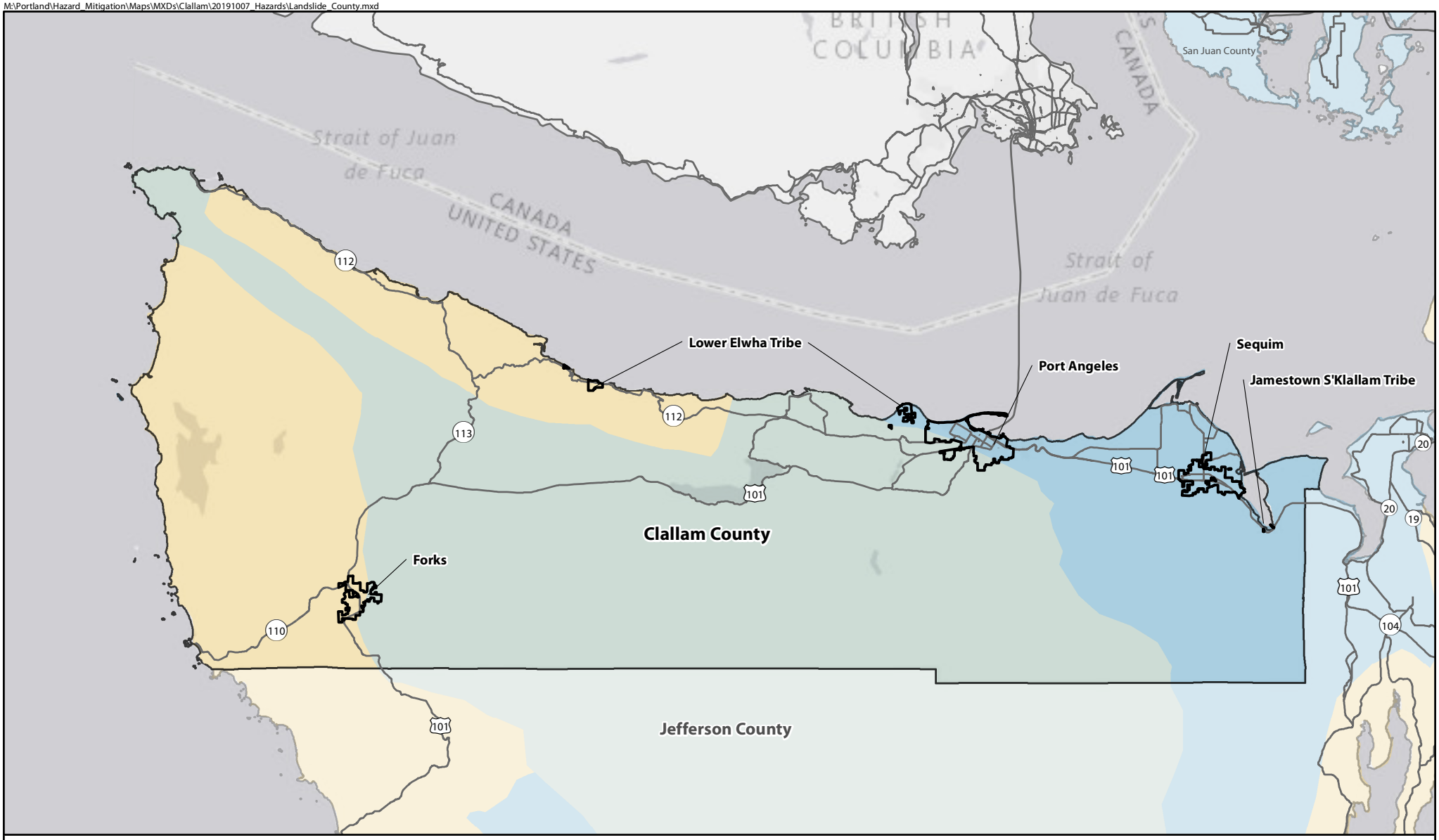

Figure 1
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Major Road

Landslide Susceptibility

- no-data
- low
- mod
- high

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S

0 10 20
Miles

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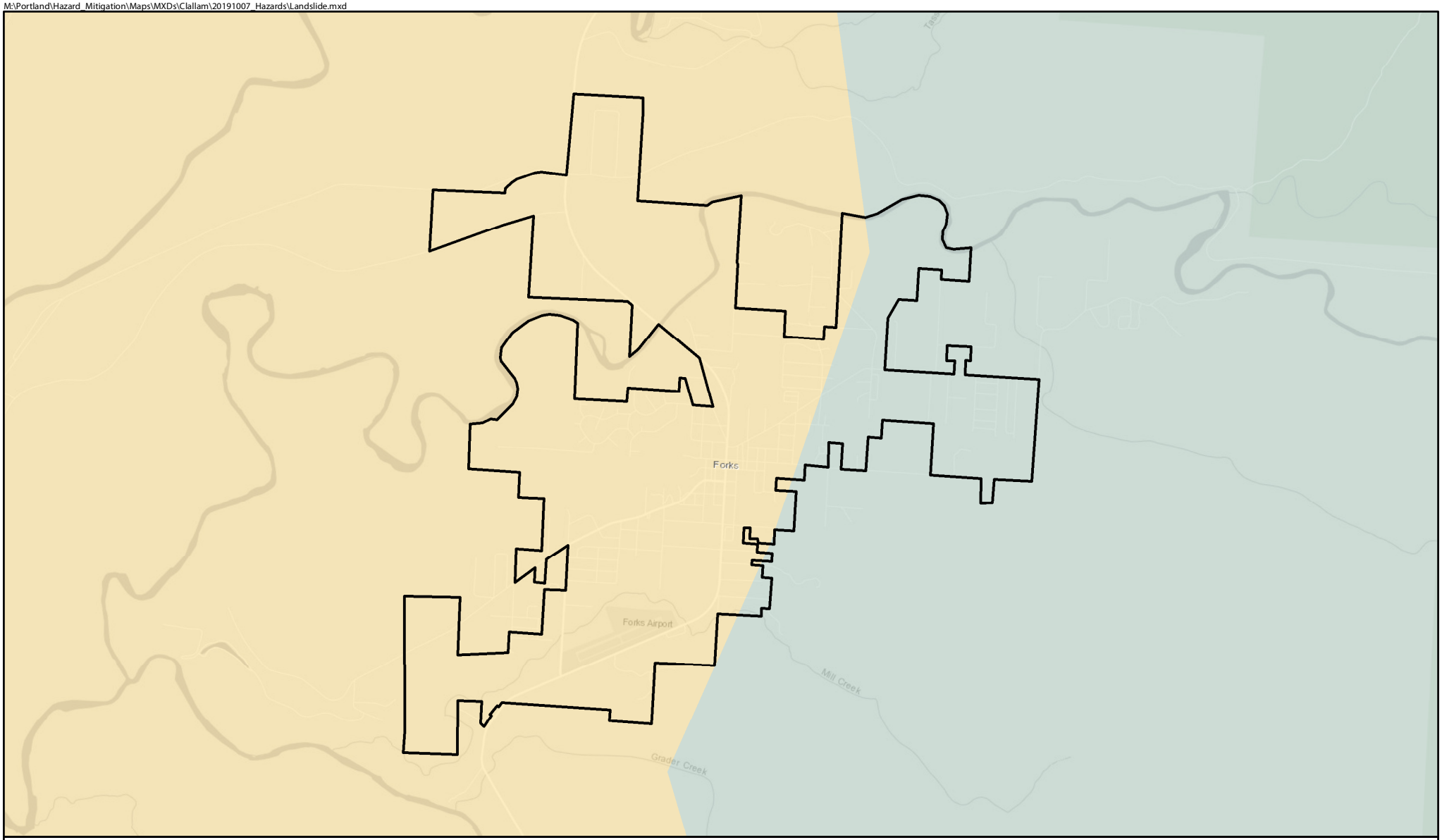


Figure 1
Forks
Clallam County
Hazard Mitigation

October 2019

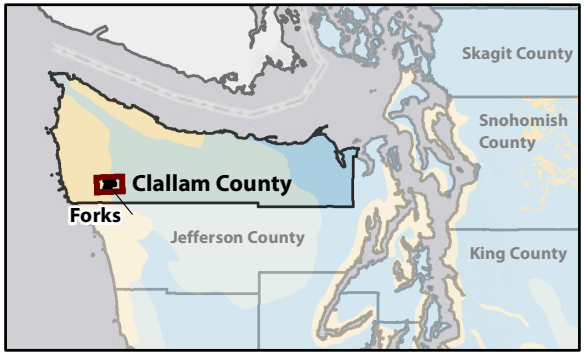
Jurisdictional Boundary

Landslide Susceptibility

- no-data
- low
- mod
- high

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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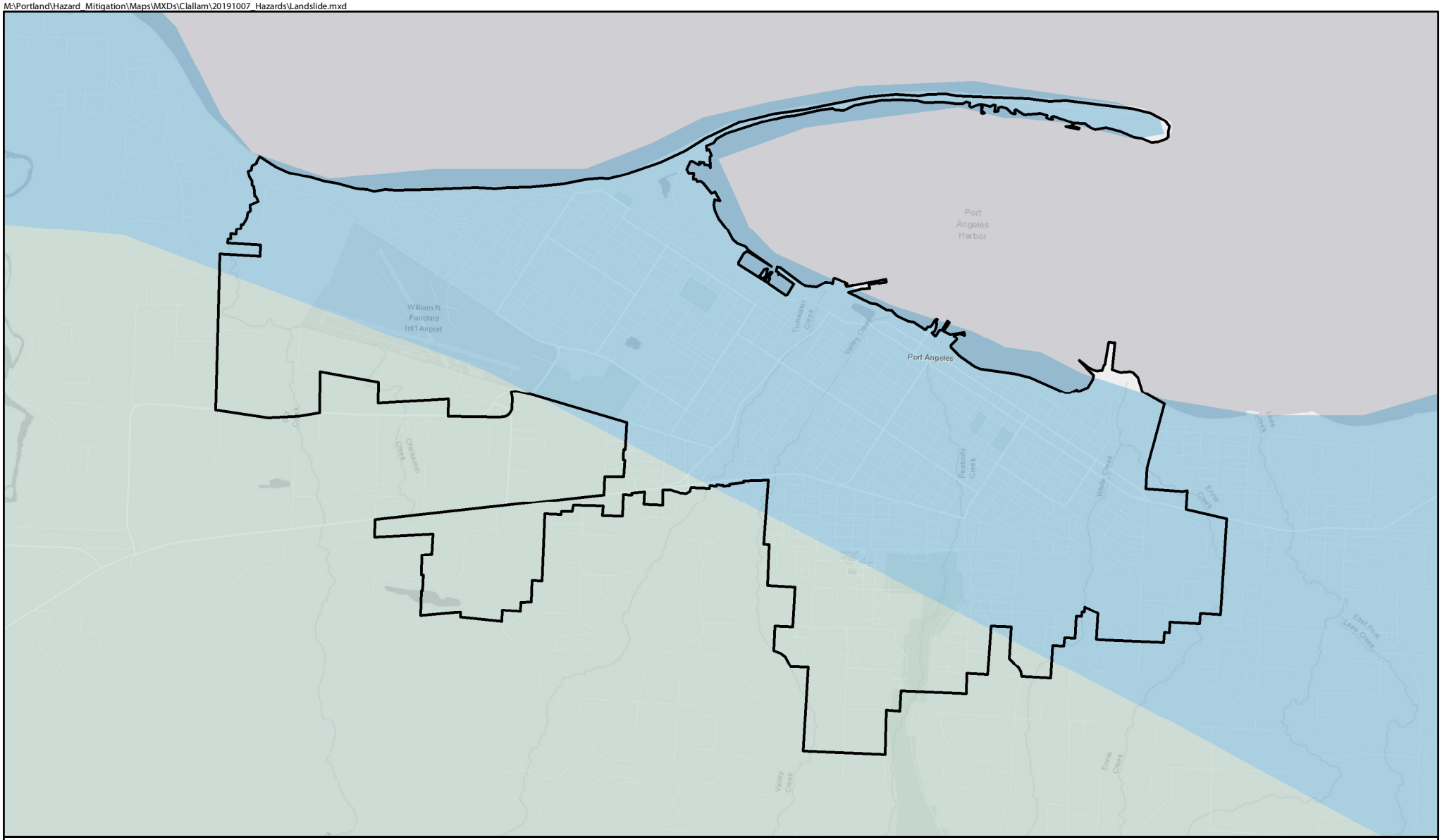

Figure 2
Port Angeles
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Landslide Susceptibility

- no-data
- low
- mod
- high

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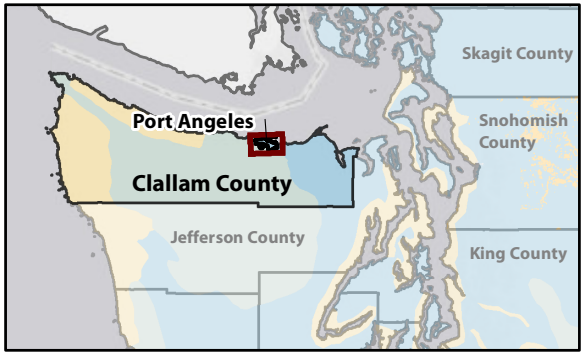
0 0.25 0.5 0.75 1 1.25
Miles



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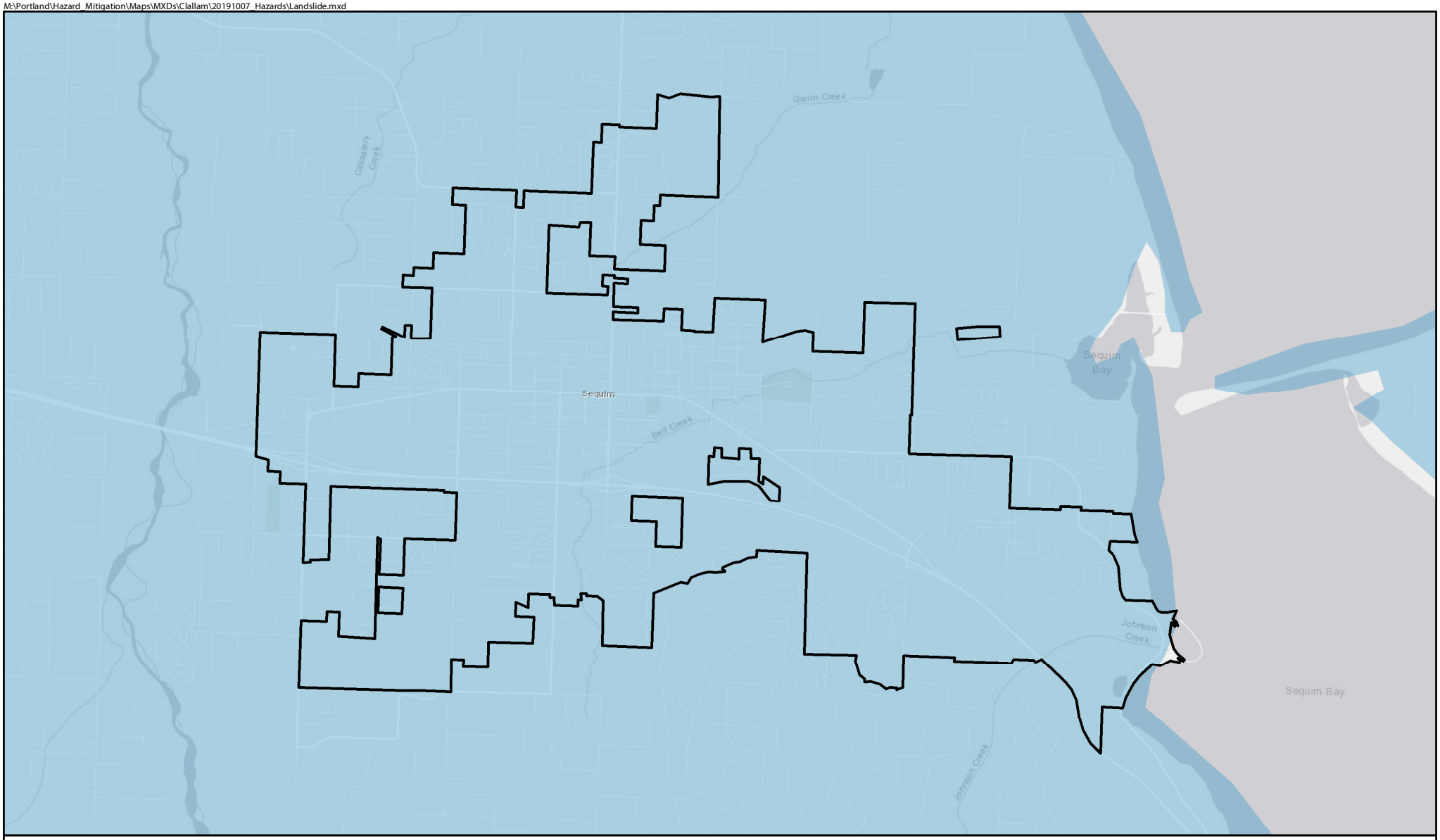

Figure 3
Sequim
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Landslide Susceptibility

- no-data
- low
- mod
- high

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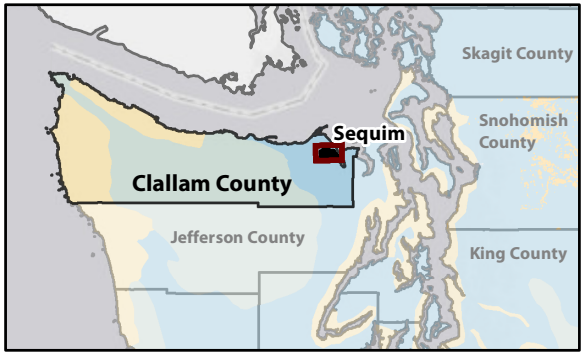

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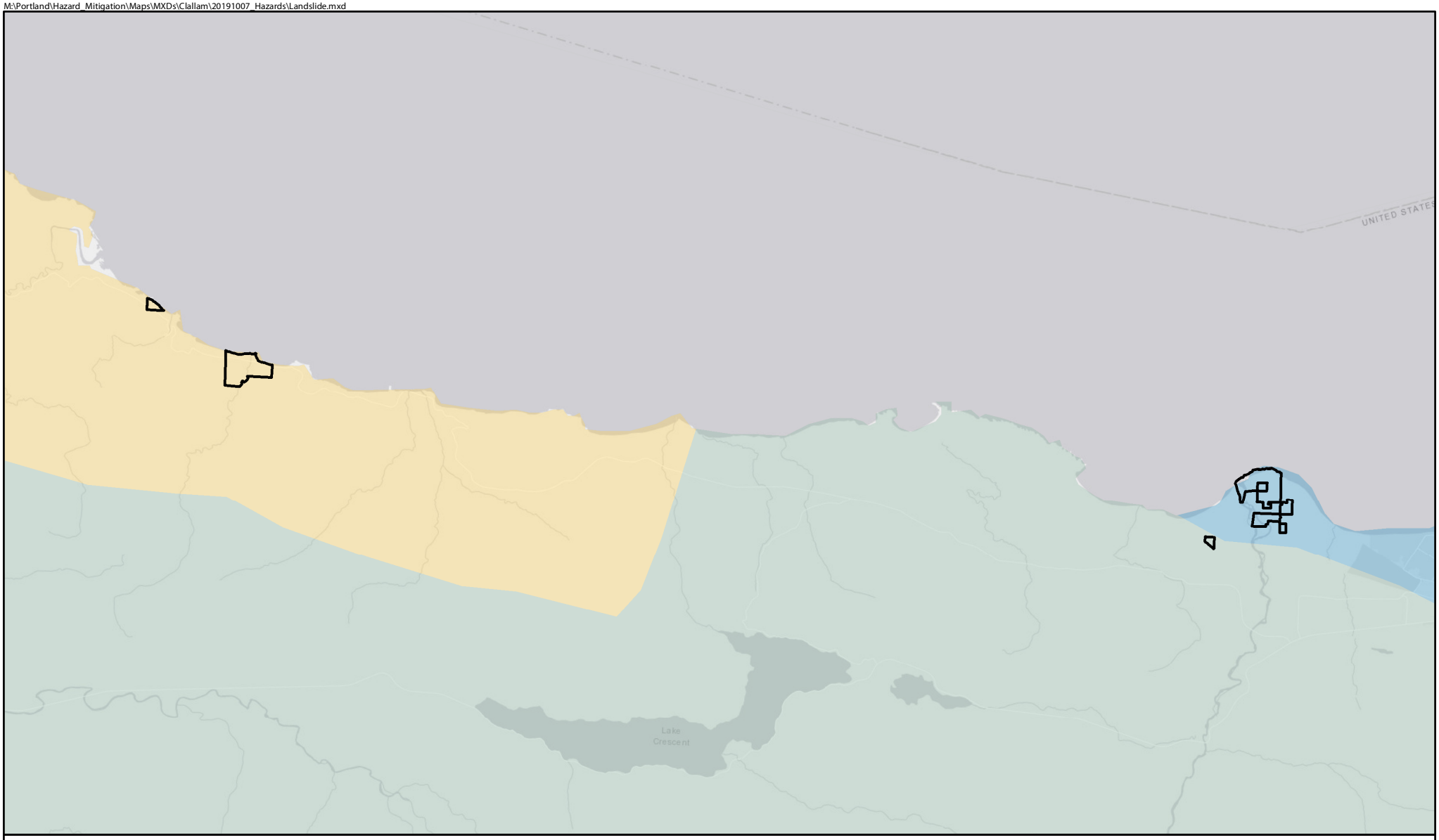

Figure 4
Lower Elwha Tribe
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Landslide Susceptibility

- no-data
- low
- mod
- high

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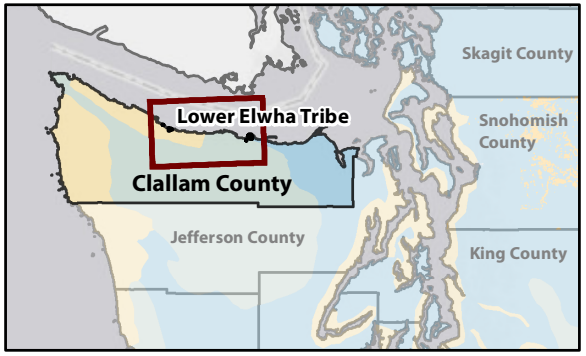

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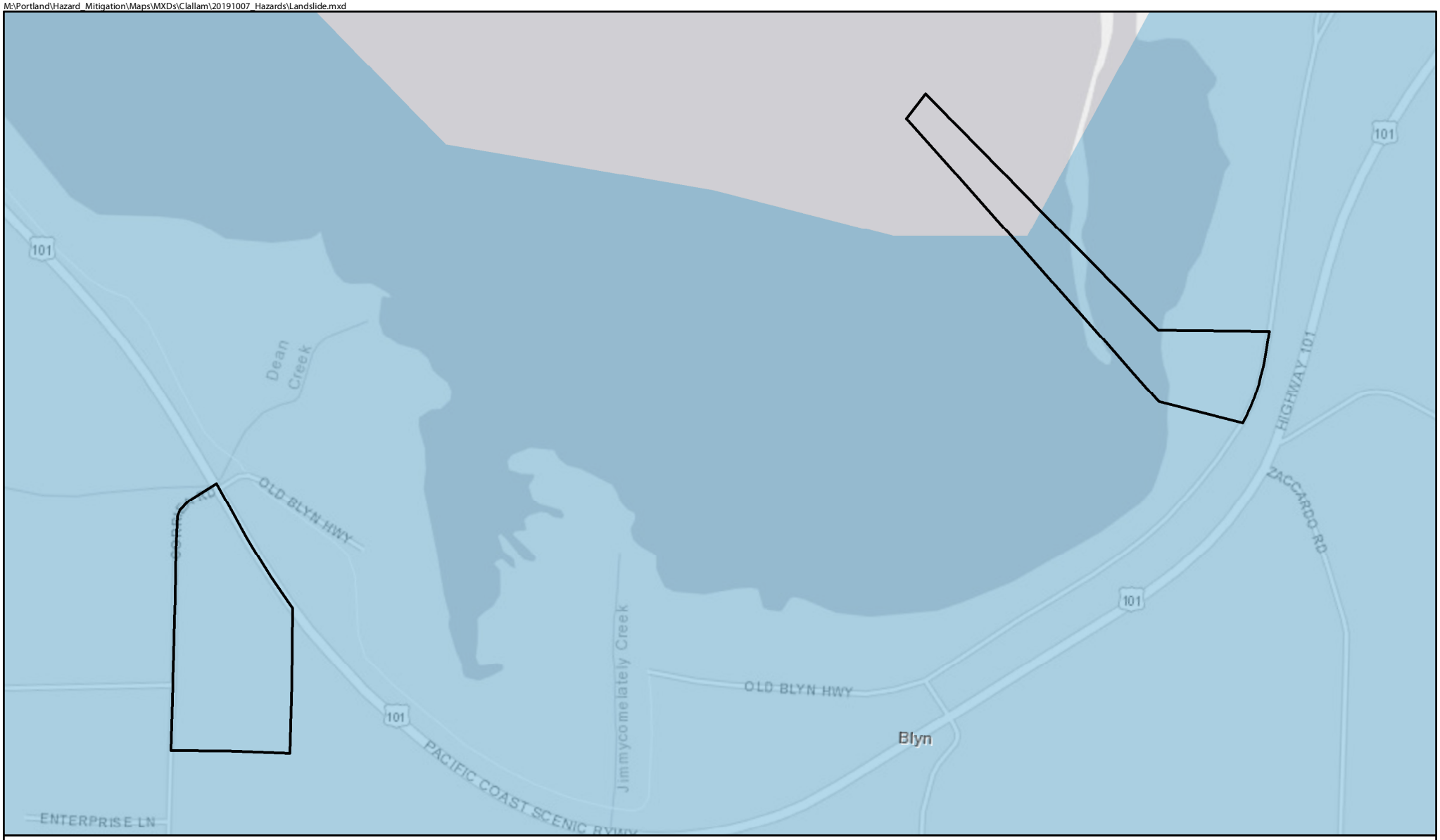


Figure 5
Jamestown S'Klallam Tribe
Clallam County
Hazard Mitigation

October 2019

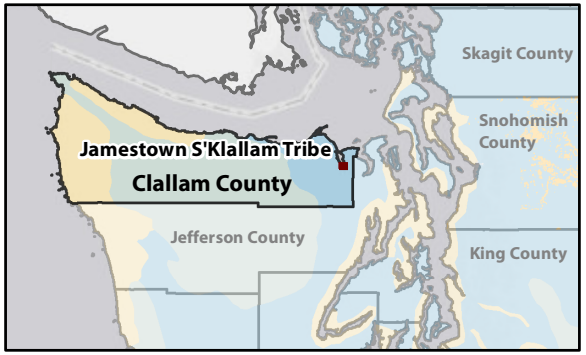
Jurisdictional Boundary

Landslide Susceptibility

- **no-data**
- **low**
- **mod**
- **high**

N
W E
S

0 0.2
Miles



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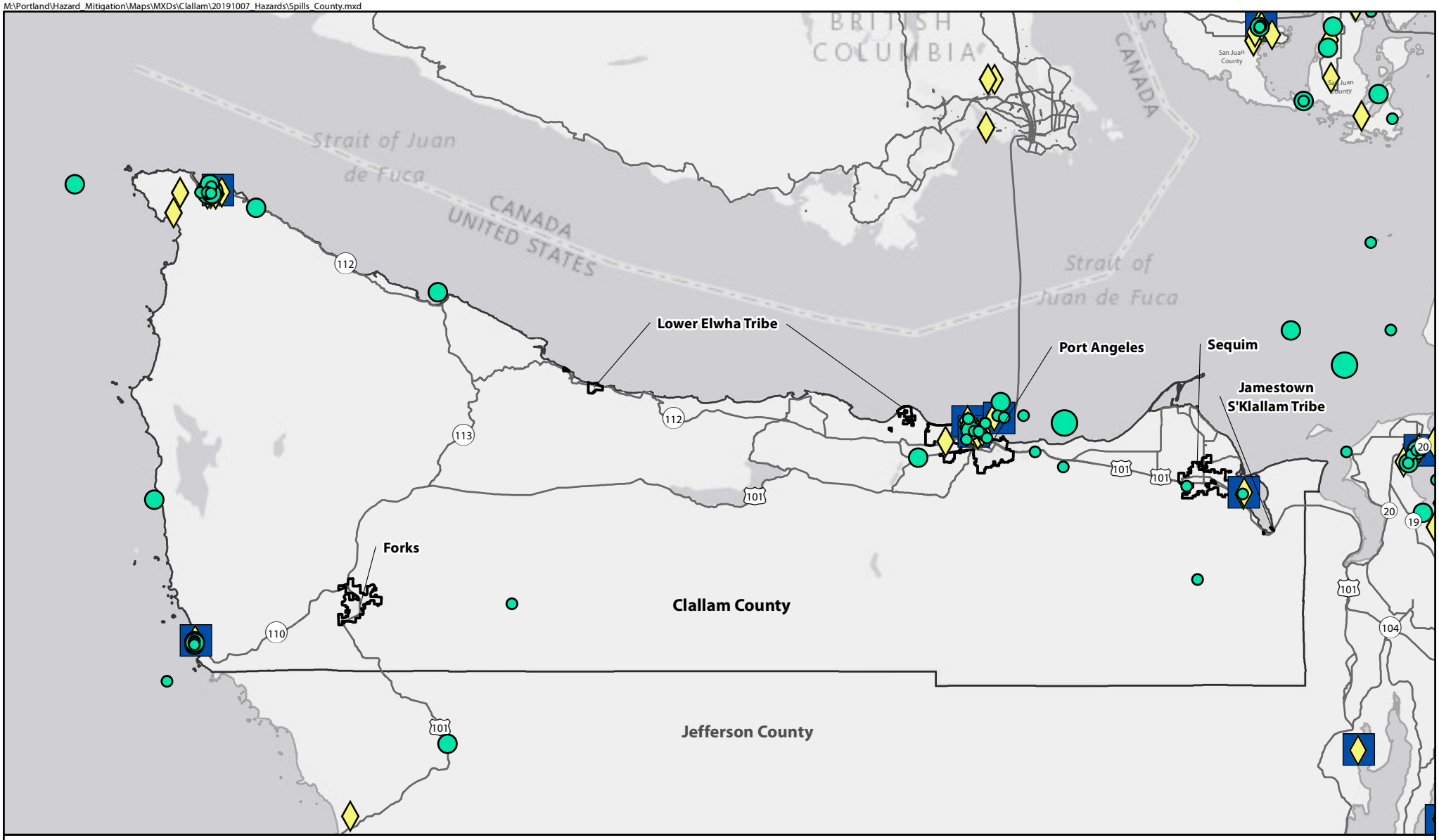

Figure 1
Clallam County
Hazard Mitigation

October 2019

- Response Equipment
- Regulated Oil Facility
- Jurisdictional Boundary
- Major Road

Spill Quantity (Gallons)

- 1-10
- 11-100
- 101-1000
- >1000

N W E S

0 10 20
Miles

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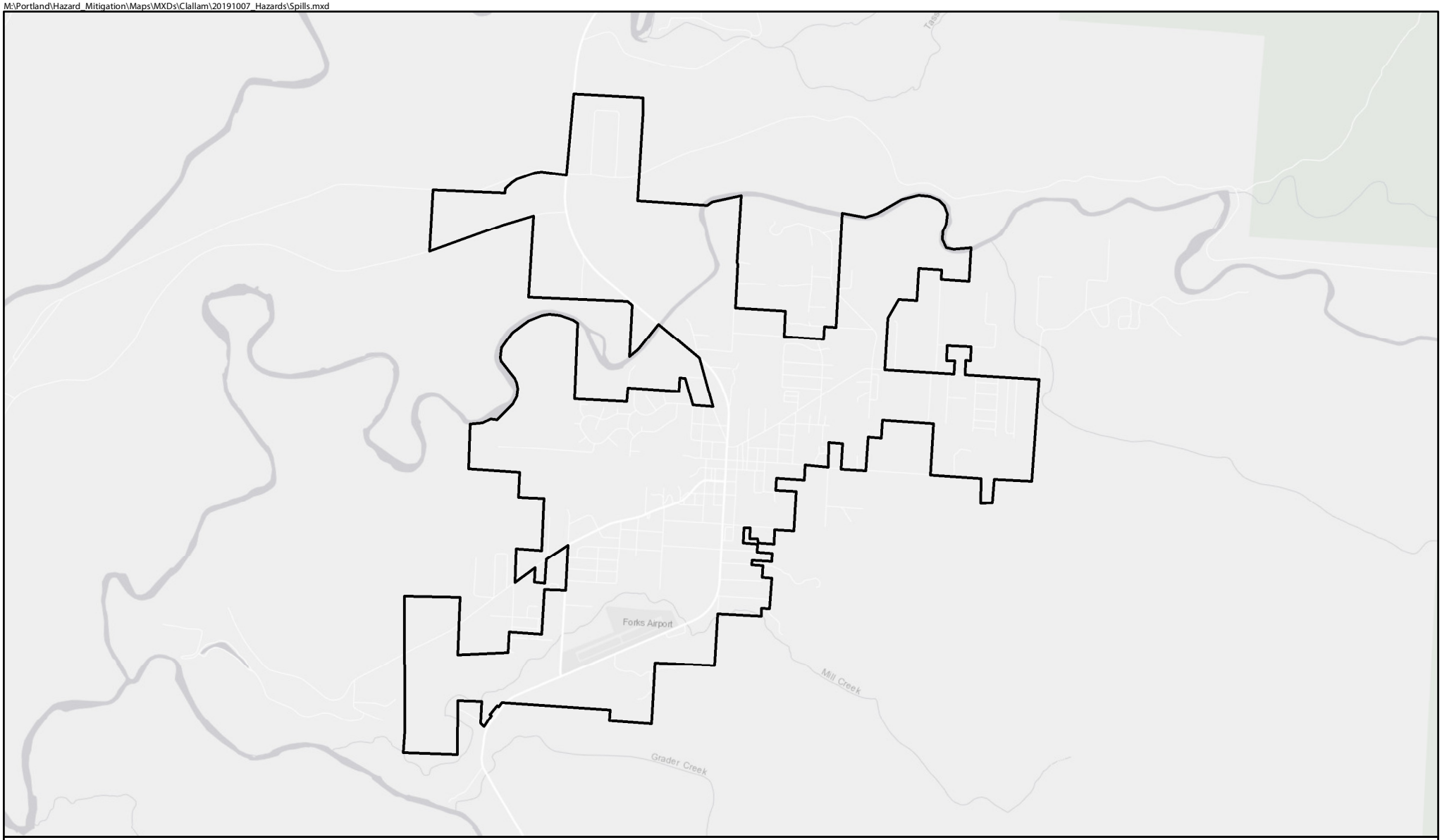


Figure 2
Forks
Clallam County
Hazard Mitigation

October 2019

Response Equipment

Regulated Oil Facility

Jurisdictional Boundary

Spill Quantity (Gallons)

1-10

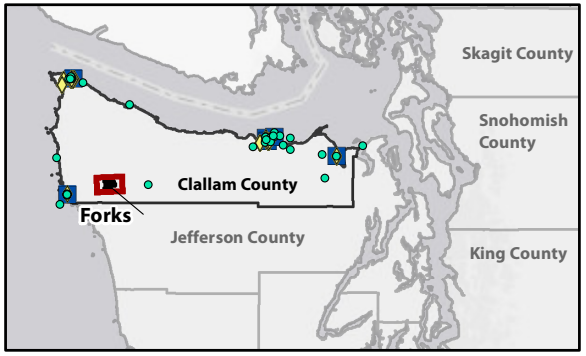
11-100

101-1000

>1000

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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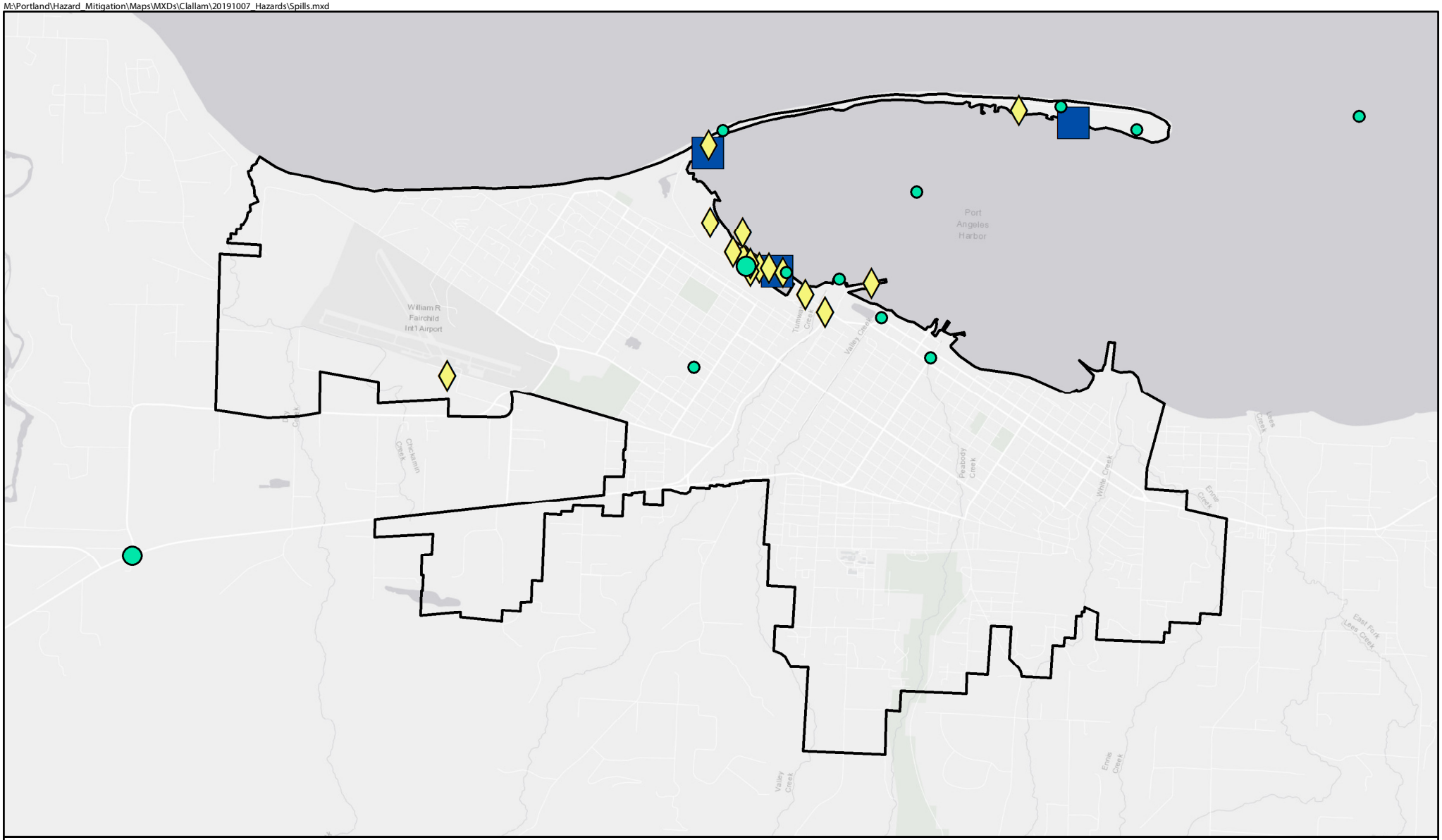


Figure 3
Port Angeles
Clallam County
Hazard Mitigation

October 2019

Response Equipment

Regulated Oil Facility

Jurisdictional Boundary

Spill Quantity (Gallons)

1-10

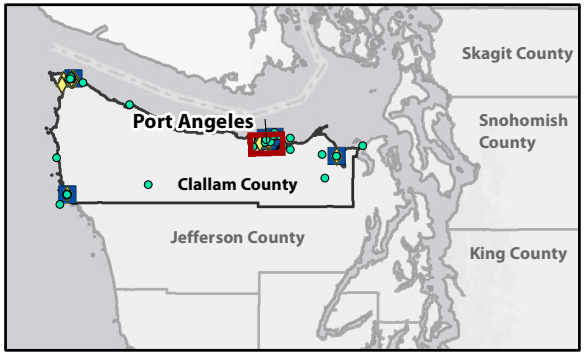
11-100

101-1000

>1000

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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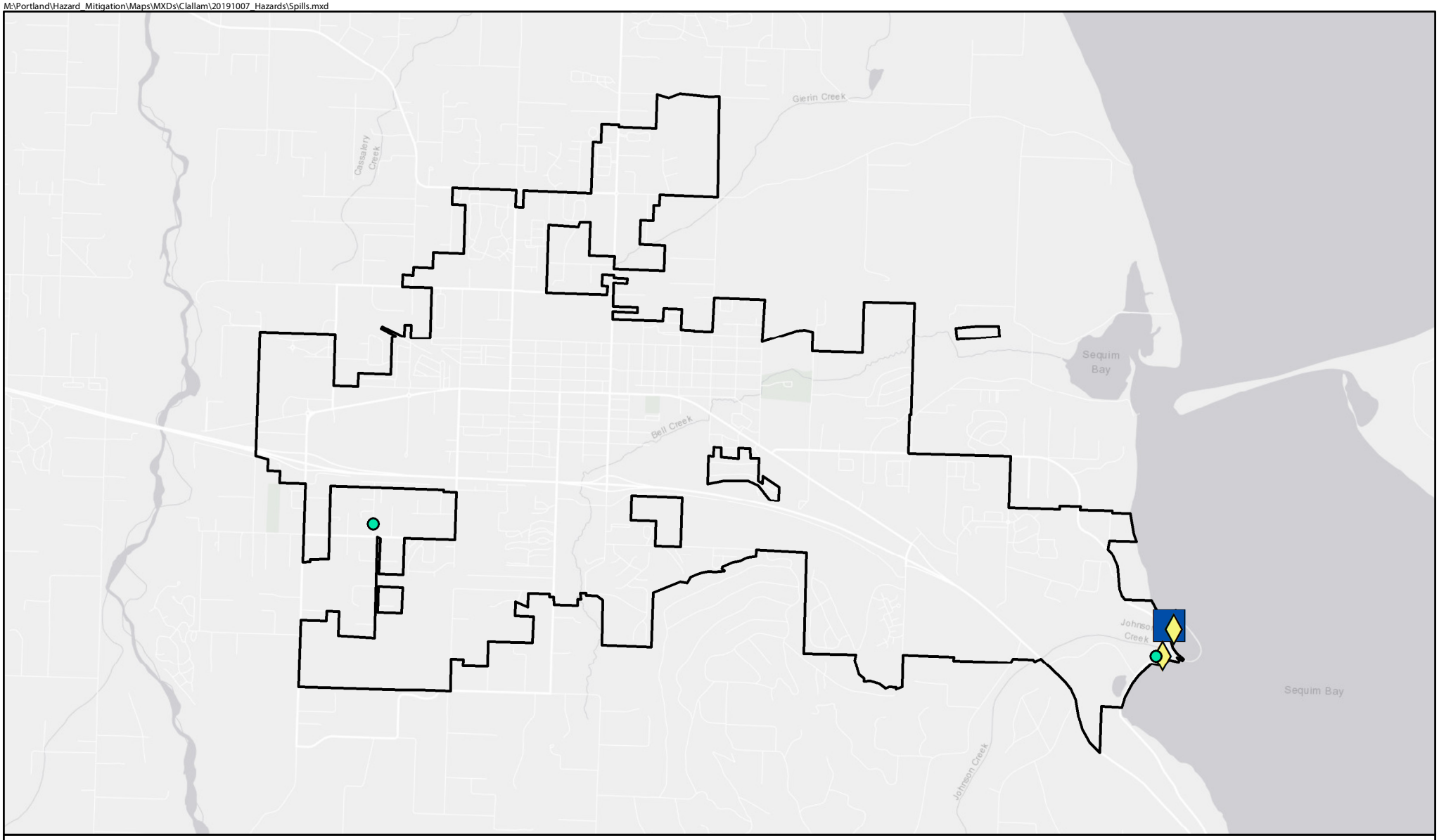


Figure 4
Sequim
Clallam County
Hazard Mitigation

October 2019

Response Equipment

Regulated Oil Facility

Jurisdictional Boundary

Spill Quantity (Gallons)

1-10

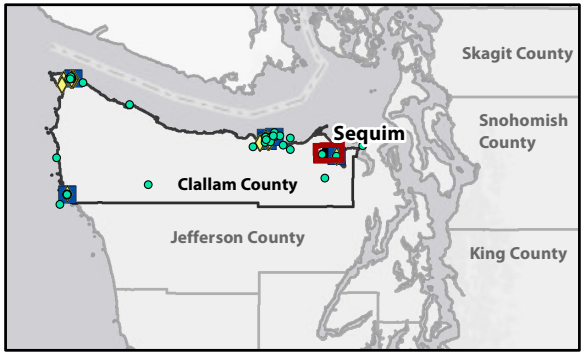
11-100

101-1000

>1000

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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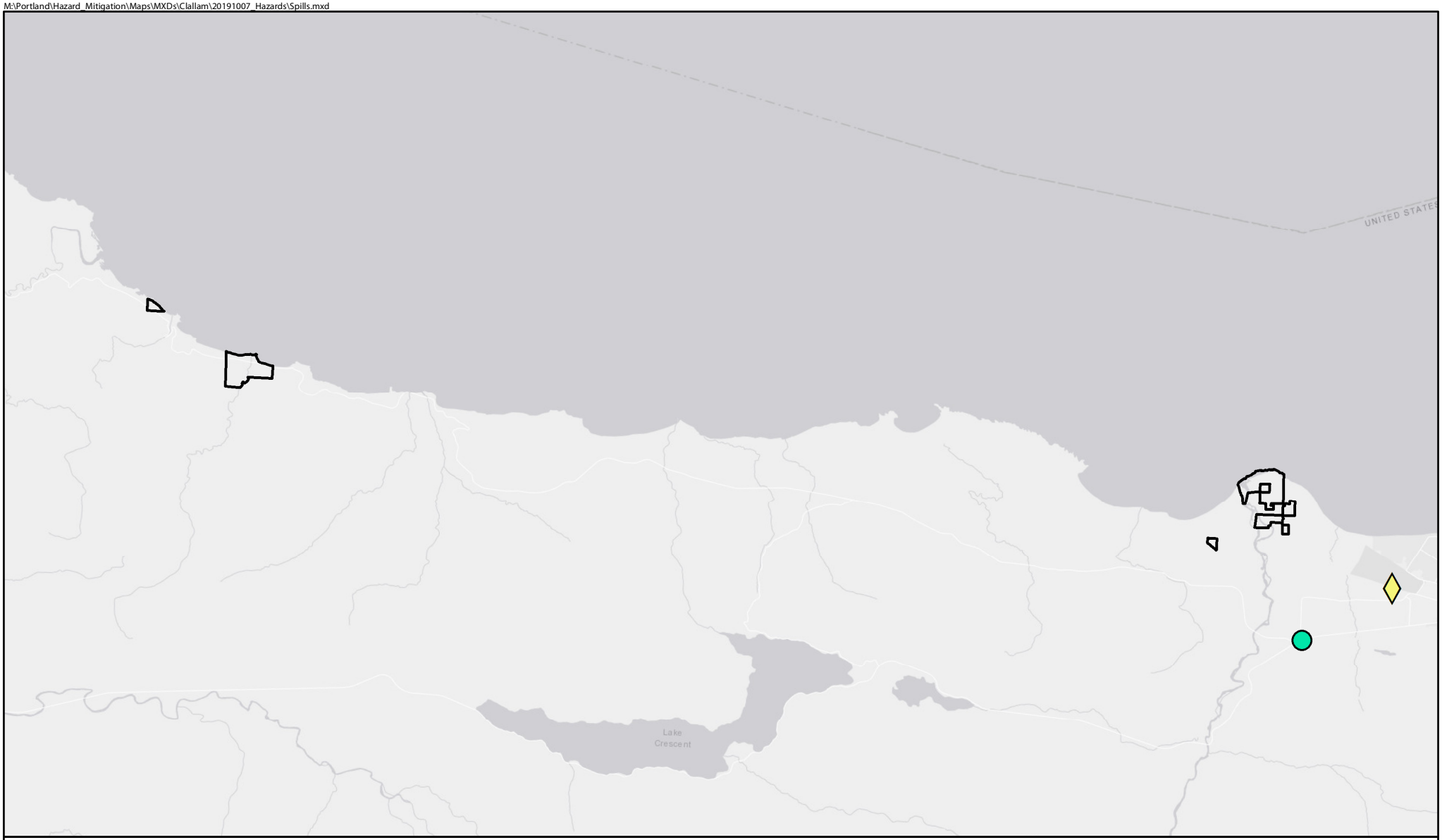


Figure 5
Lower Elwha Tribe
Clallam County
Hazard Mitigation

October 2019

Response Equipment

Regulated Oil Facility

Jurisdictional Boundary

Spill Quantity (Gallons)

1-10

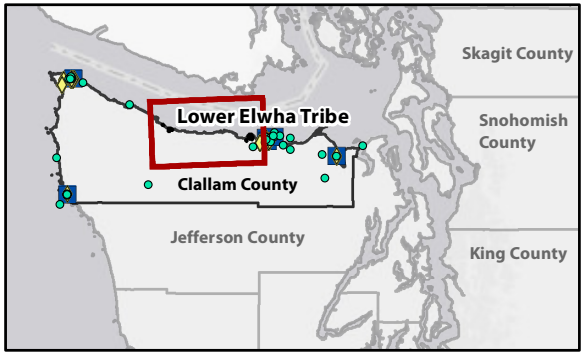
11-100

101-1000

>1000

N
W E
S

0 1 2 3 4 5
Miles



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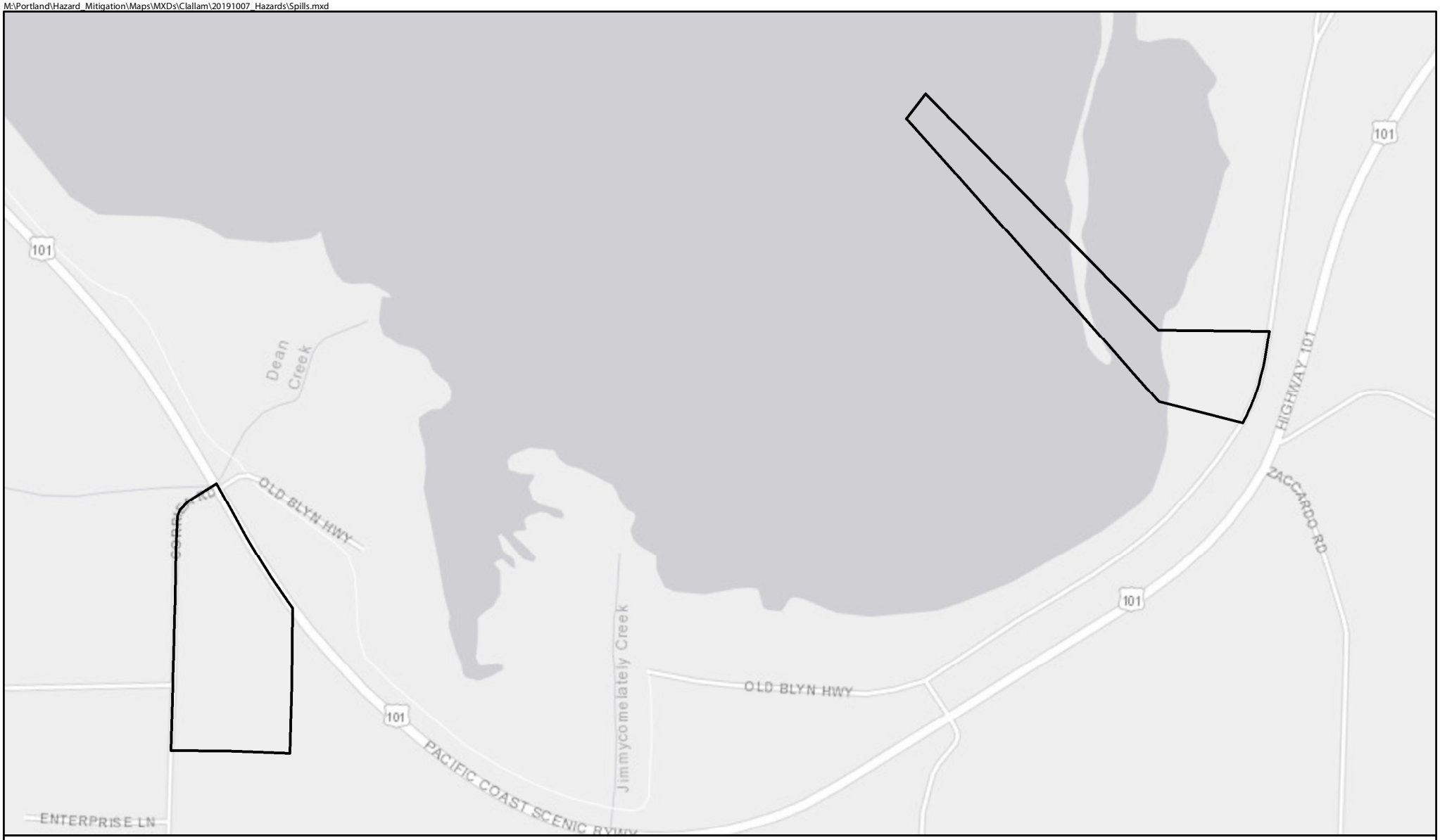


Figure 6
Jamestown S'Klallam Tribe
Clallam County
Hazard Mitigation

October 2019

Response Equipment

Regulated Oil Facility

Jurisdictional Boundary

Spill Quantity (Gallons)

1-10

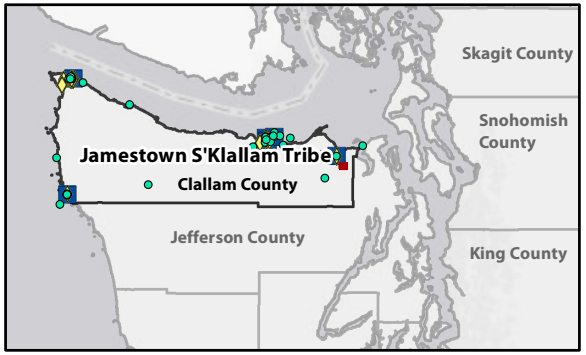
11-100

101-1000

>1000

N
W E
S

0 0.2
Miles



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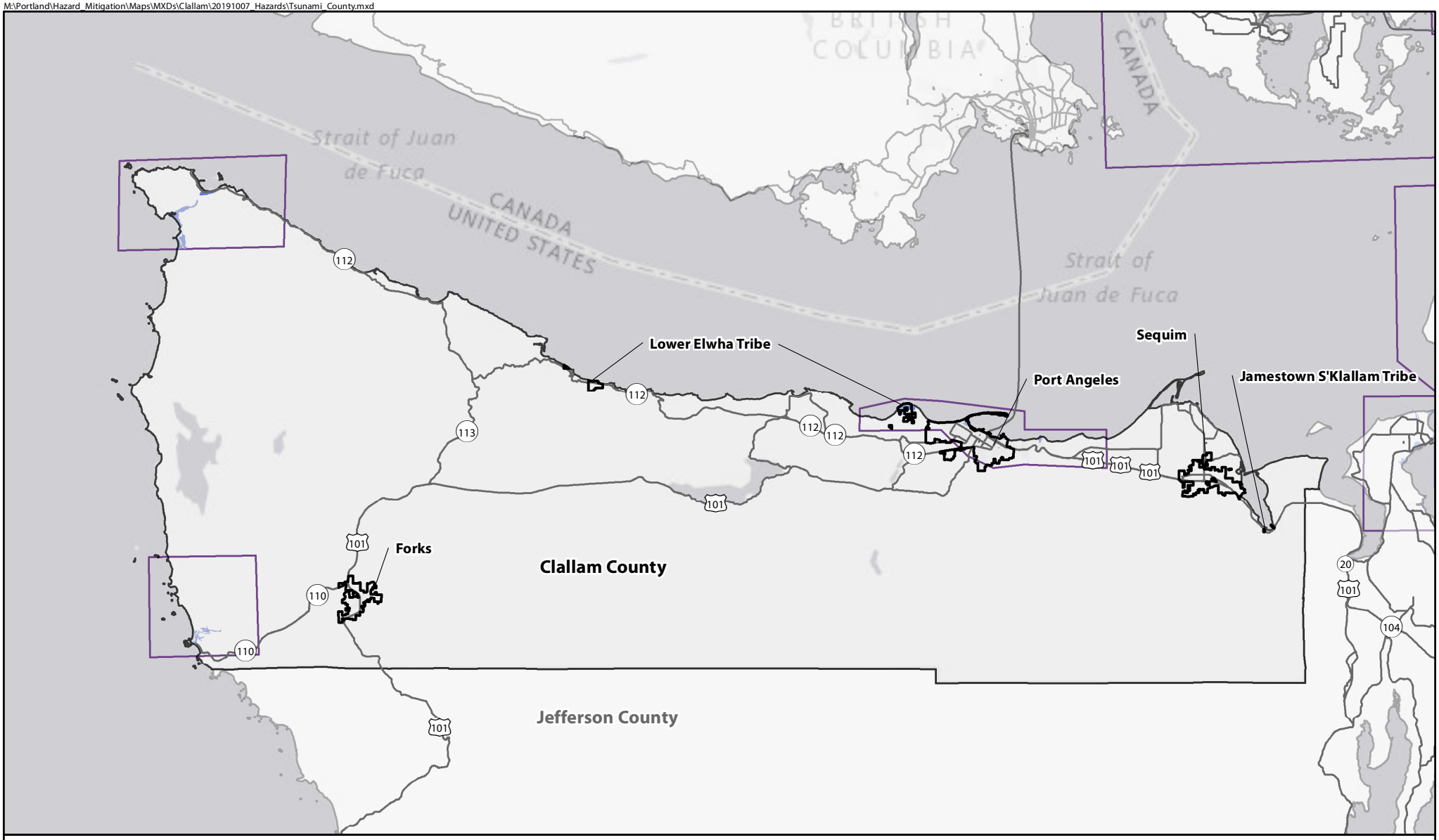

Figure 1
Clallam County
Hazard Mitigation

Jurisdictional Boundary
Major Road
Cascadia subduction zone (~A.D. 1700)
Cascadia subduction zone (~A.D. 1700) with uplift
Tsunami Study Areas

N
W
E
S

October 2019

0 10 20
Miles

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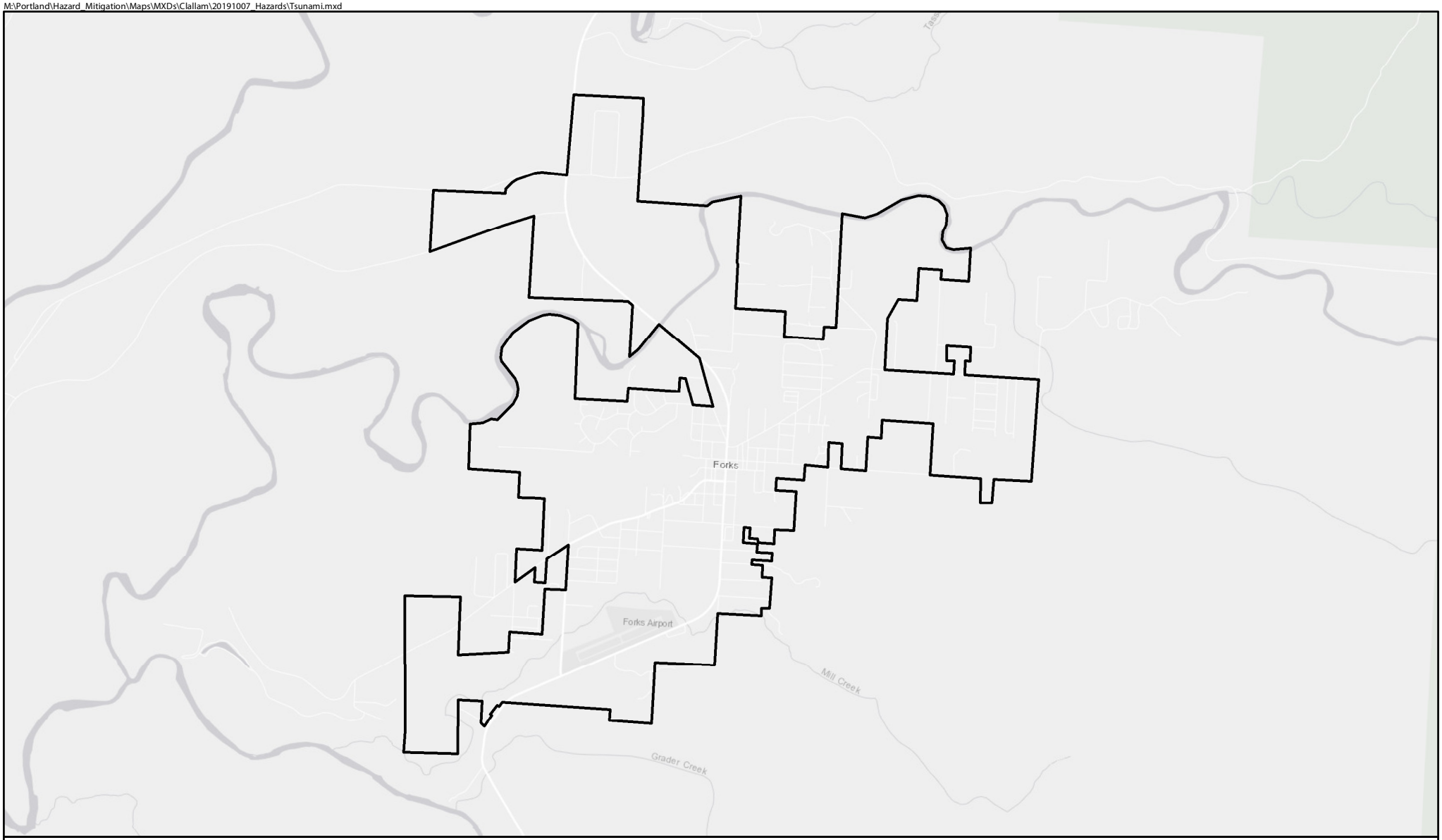
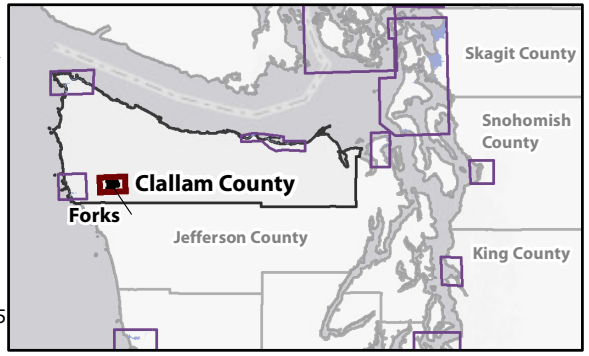


Figure 2
Forks
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

N
W E
S



0 0.25 0.5 0.75 1 1.25
Miles

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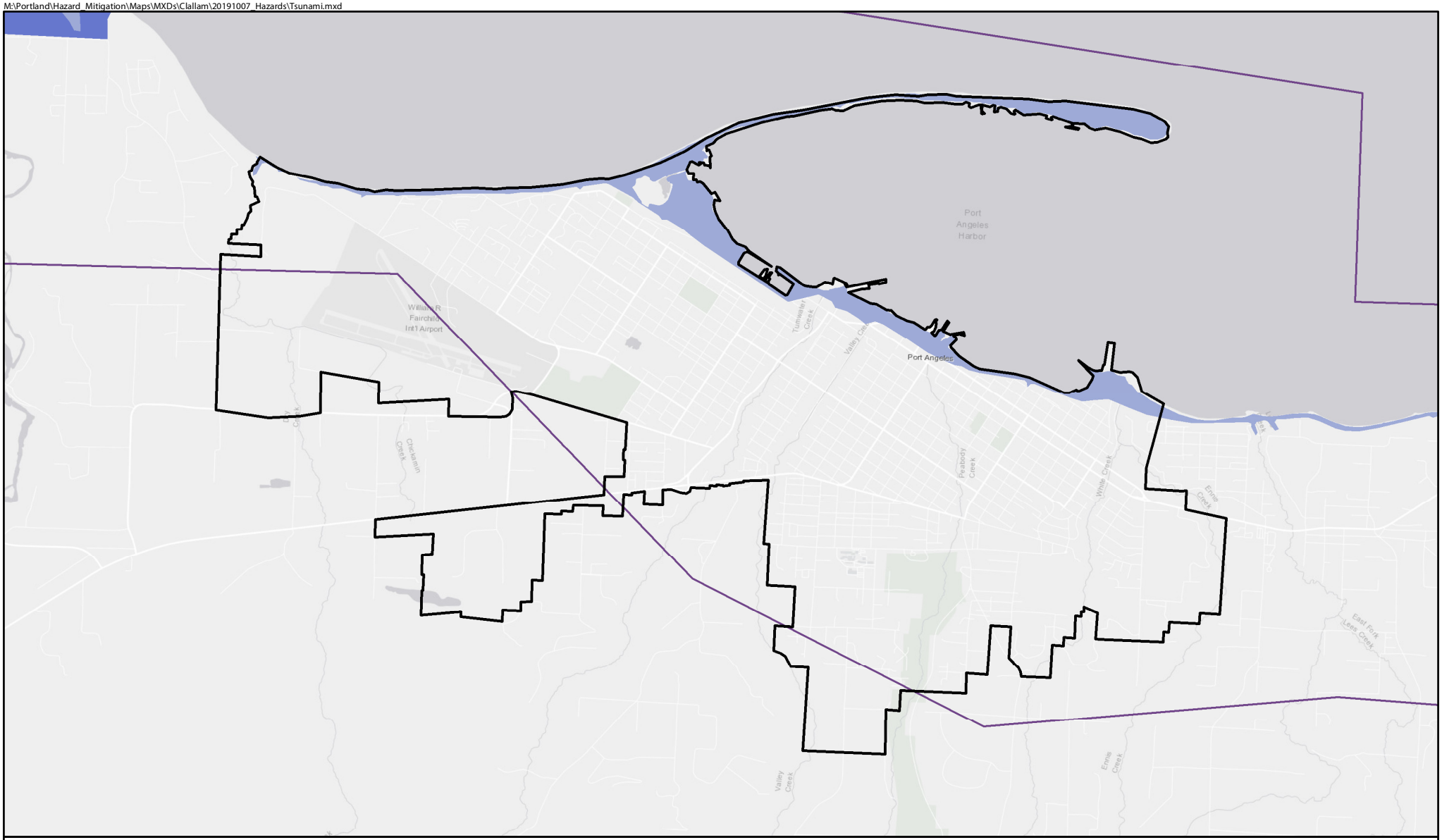


Figure 3
Port Angeles
Clallam County
Hazard Mitigation

October 2019

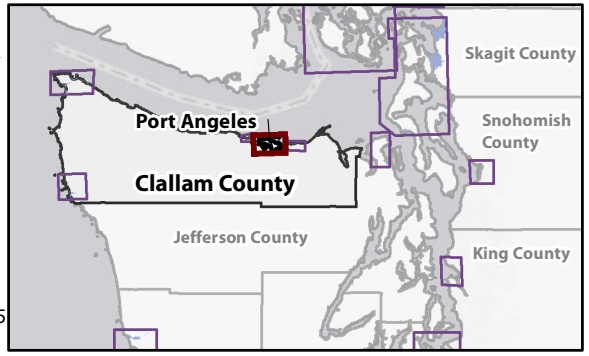
Jurisdictional Boundary

Cascadia subduction zone (~A.D. 1700)

Cascadia subduction zone (~A.D. 1700) with uplift

Tsunami Study Areas

N
W E
S



0 0.25 0.5 0.75 1 1.25
Miles

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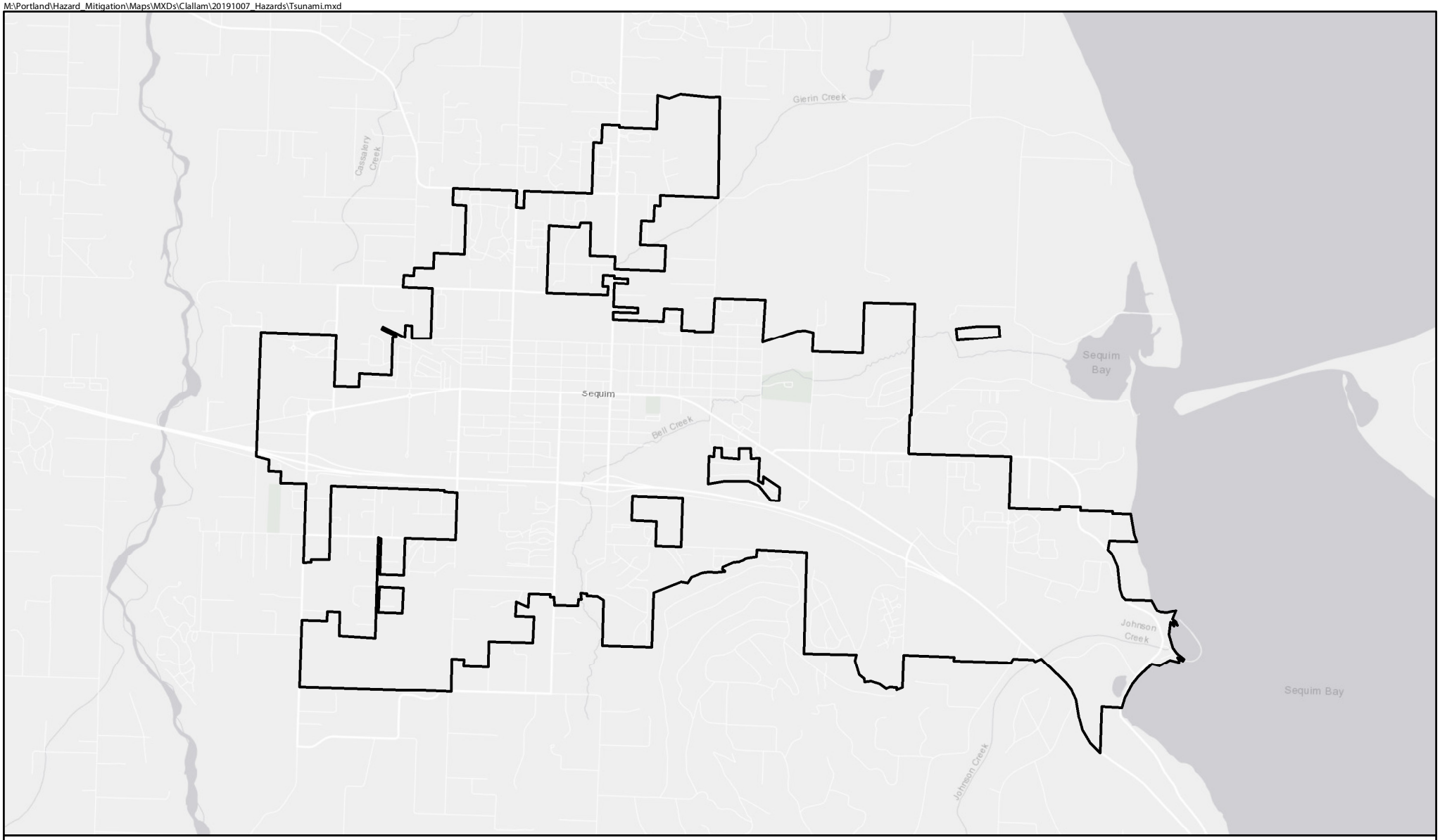
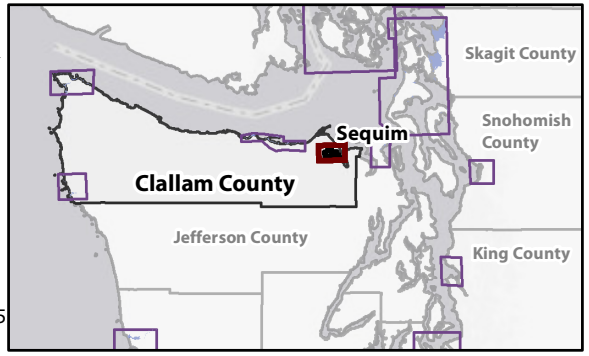


Figure 4
Sequim
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

N
W E
S



0 0.25 0.5 0.75 1 1.25
Miles

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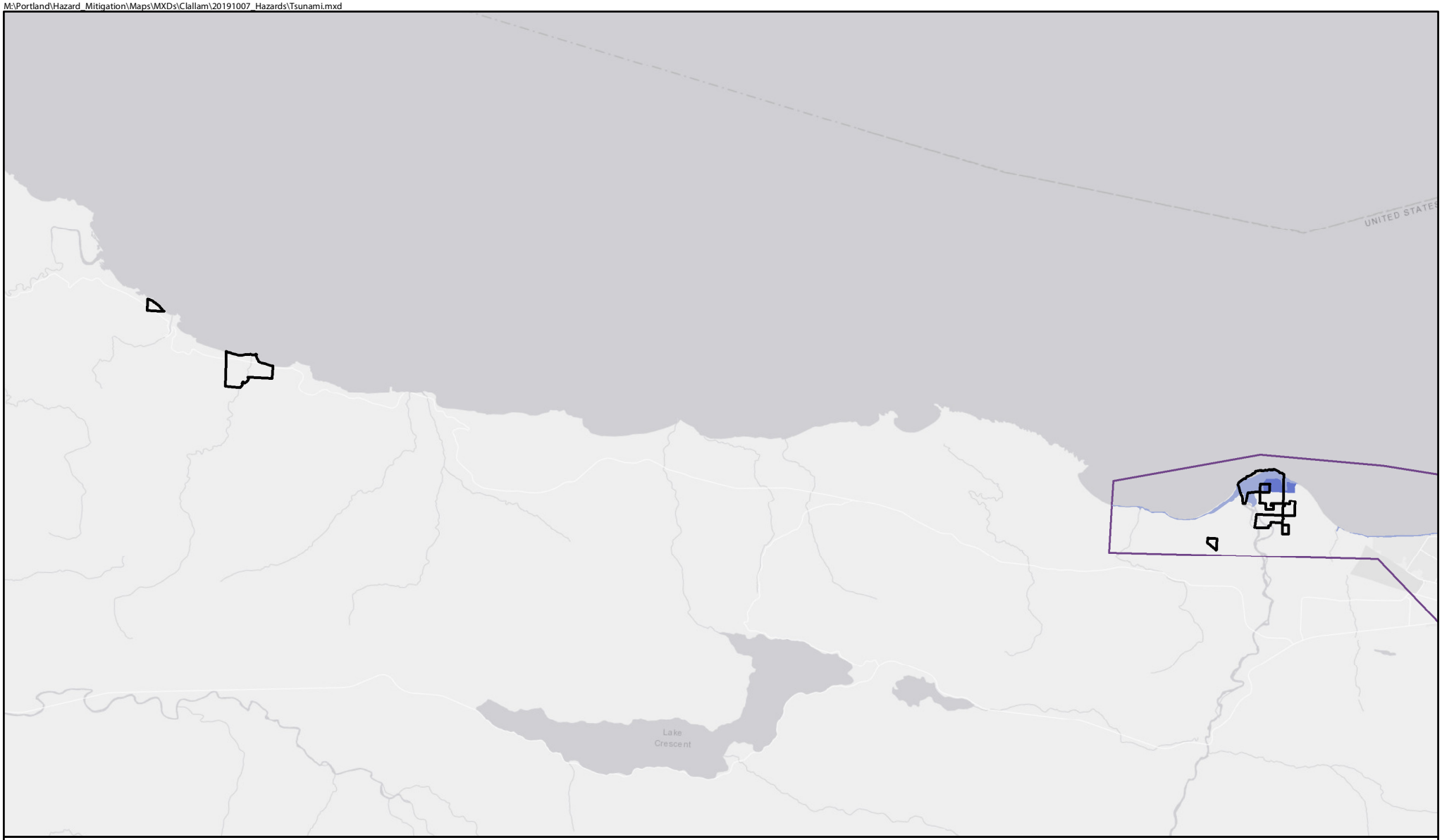


Figure 5
Lower Elwha Tribe
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

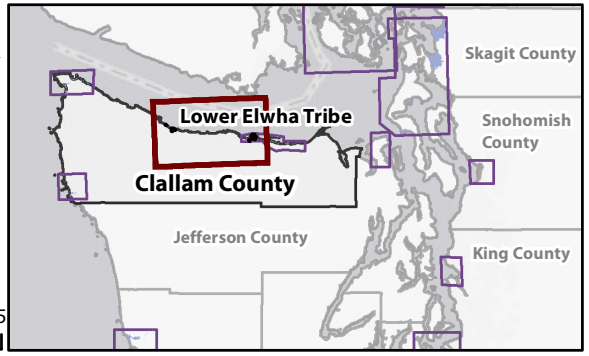
Cascadia subduction zone (~A.D. 1700)

Cascadia subduction zone (~A.D. 1700) with uplift

Tsunami Study Areas

N
W E
S

0 1 2 3 4 5
Miles



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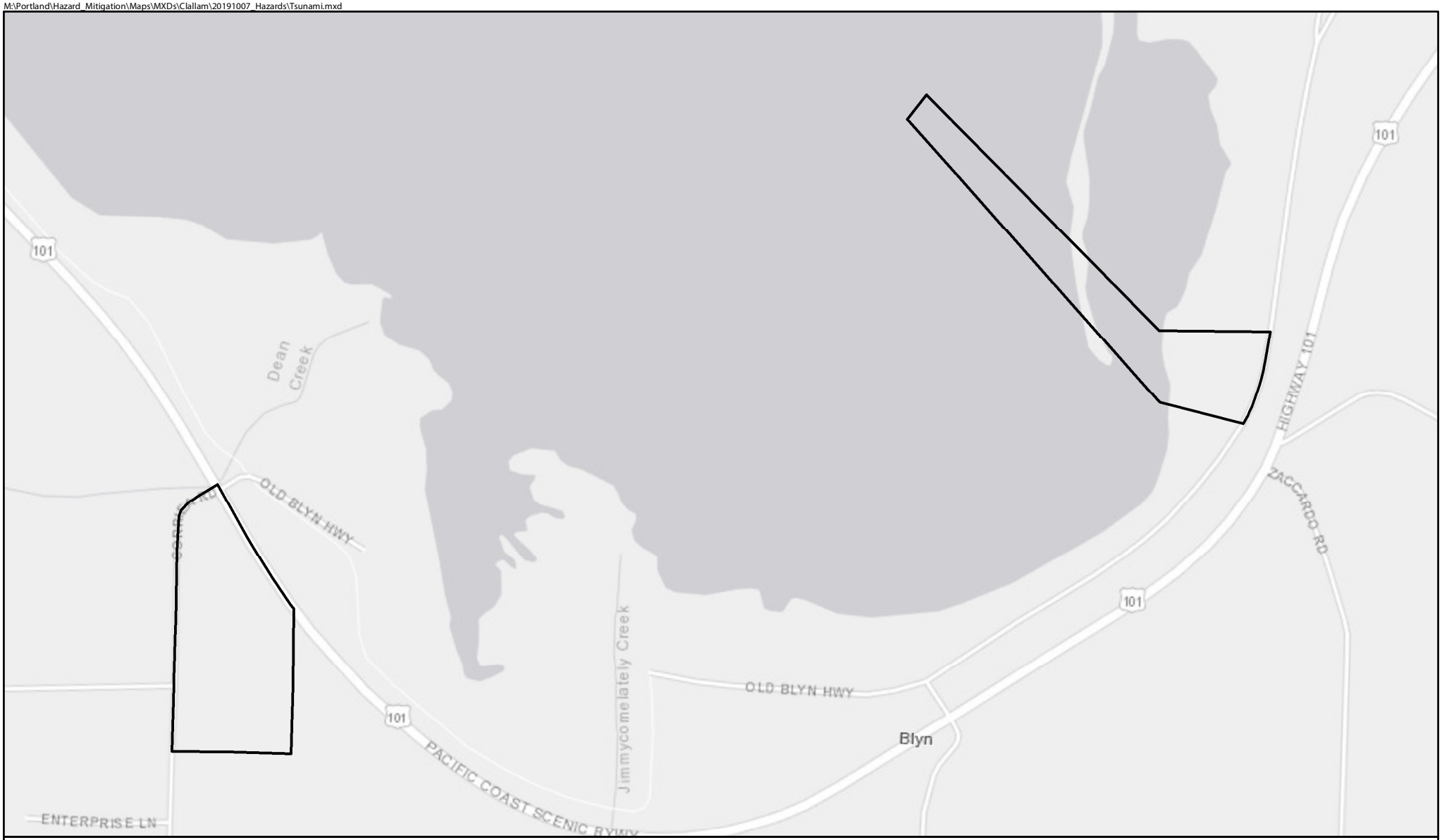
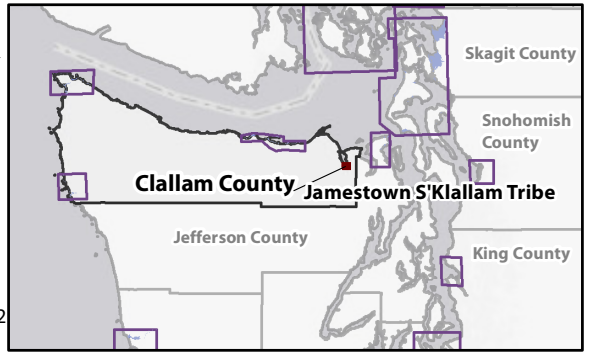


Figure 6
Jamestown S'Klallam Tribe
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

N
W E
S



0 0.2
Miles

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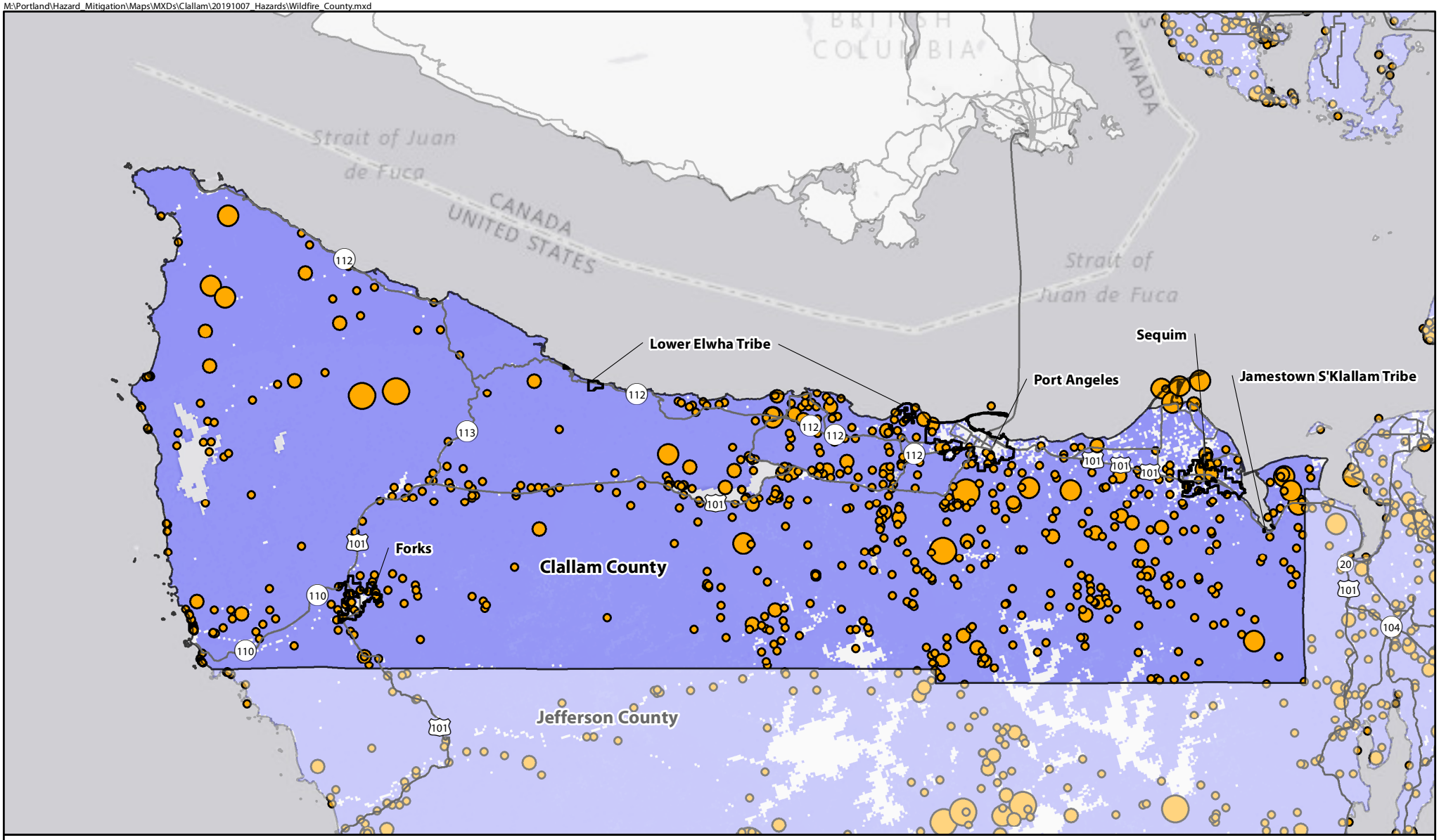


Figure 1
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Major Road

Historic Wildfires (1992-2015)

Acres Burned

- <1
- 1-10
- 11-100
- 101-1000
- >1000

Wildfire Hazard Potential

High

Low

N
W E
S

0 10 20
Miles

M:\Portland\Hazard_Mitigation\Maps\MXDs\Clallam\20191007_Hazards\Wildfire.mxd

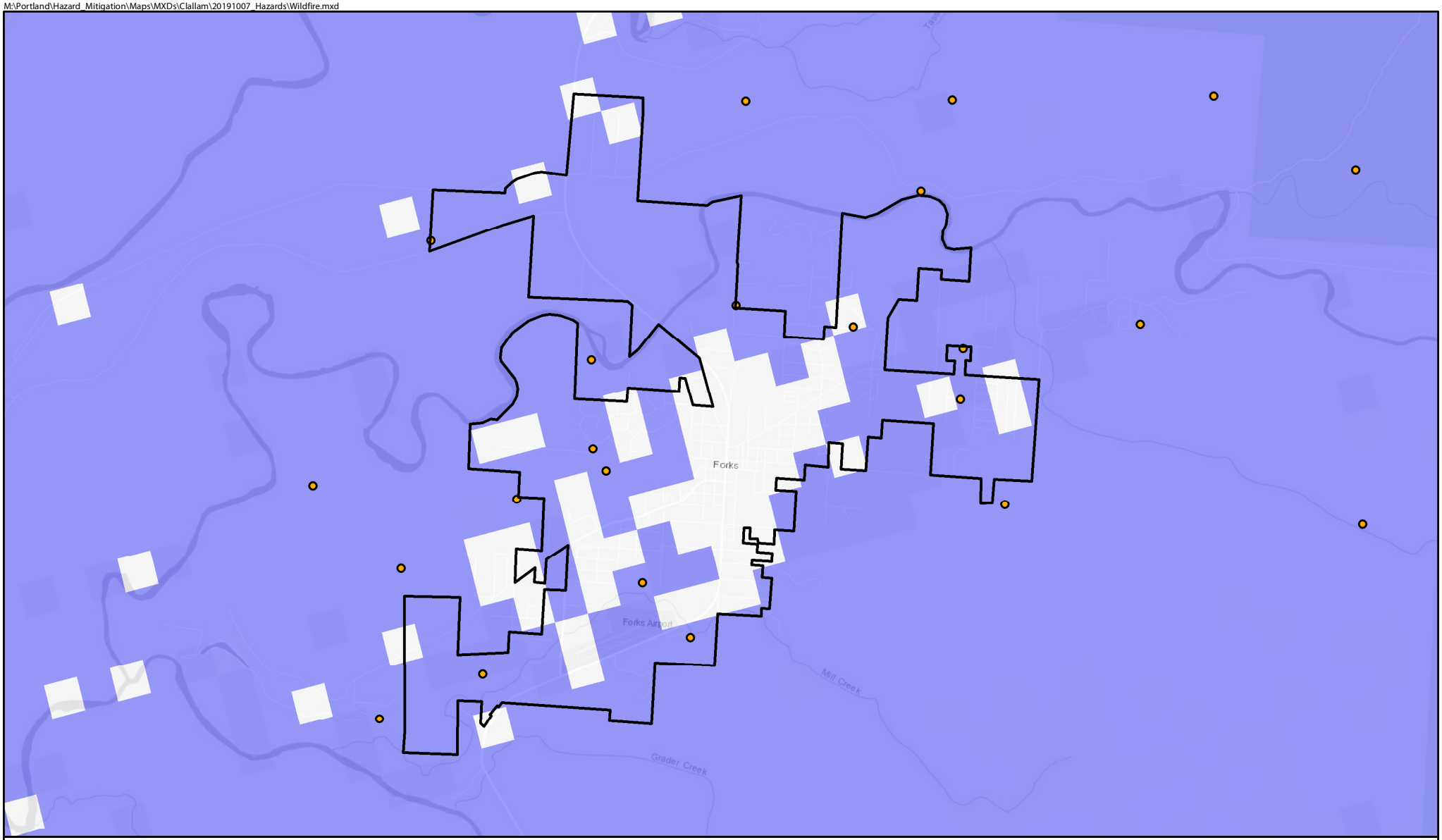


Figure 2
Forks
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Historic Wildfires (1992-2015)

Acres Burned

- <1
- 1-10
- 11-100
- 101-1000
- >1000

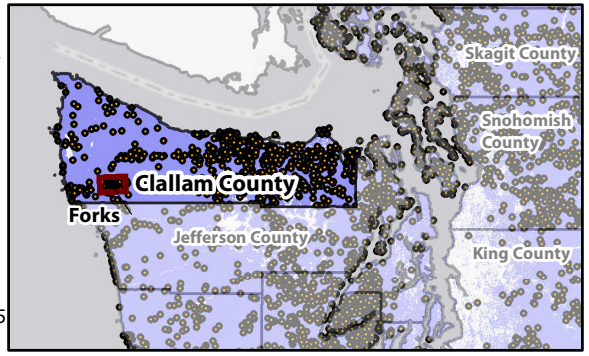
Wildfire Hazard Potential

High

Low

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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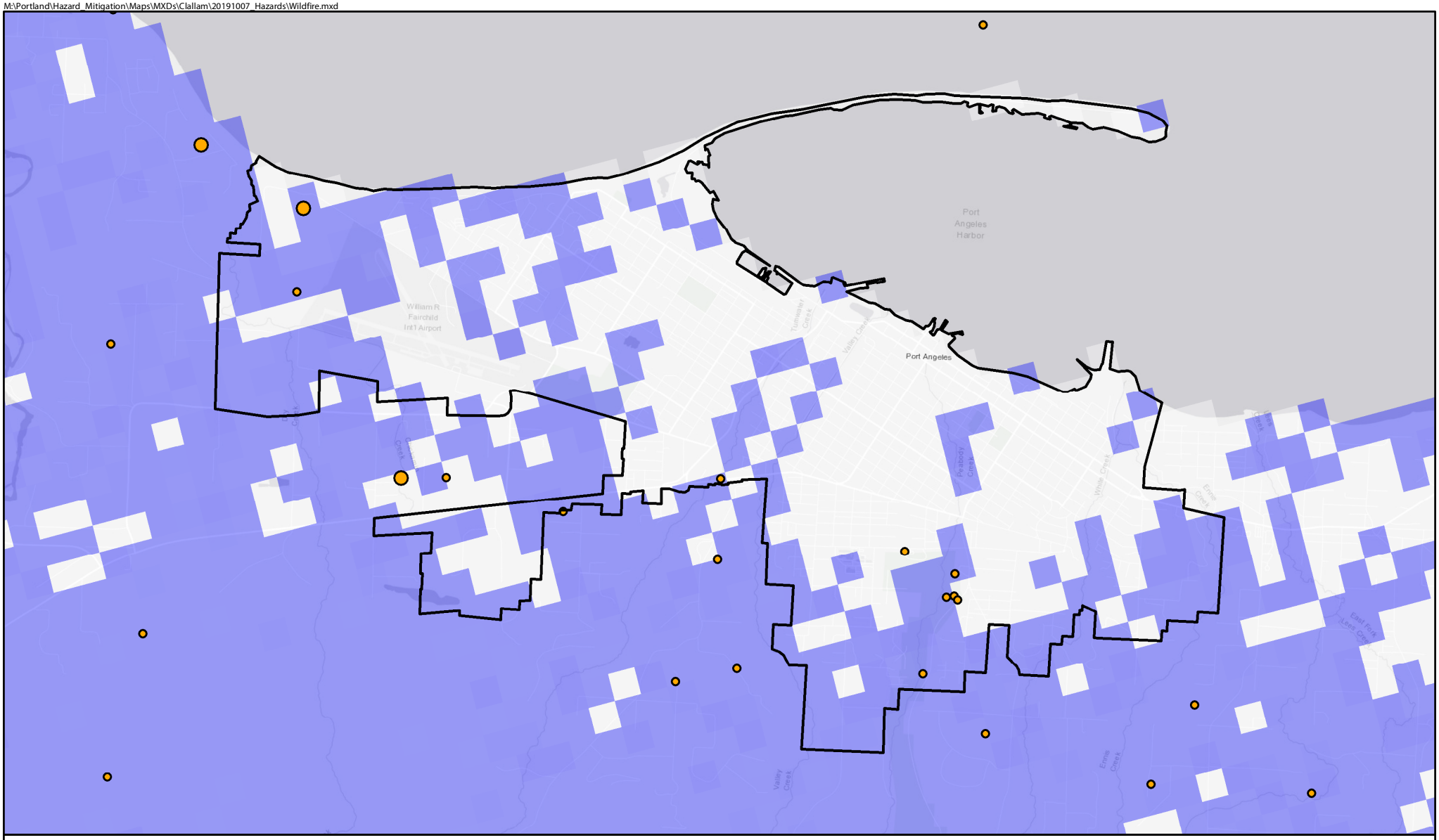


Figure 3
Port Angeles
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Historic Wildfires (1992-2015)

Acres Burned

- <1
- 1-10
- 11-100
- 101-1000
- >1000

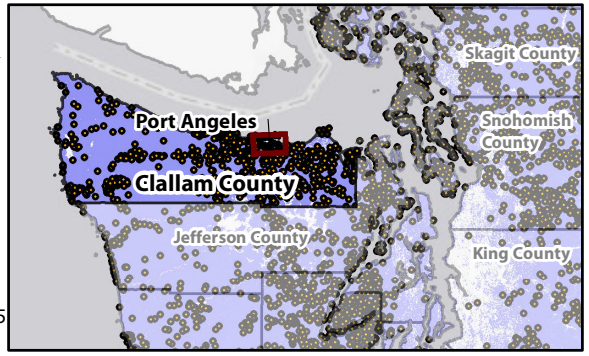
Wildfire Hazard Potential

High

Low

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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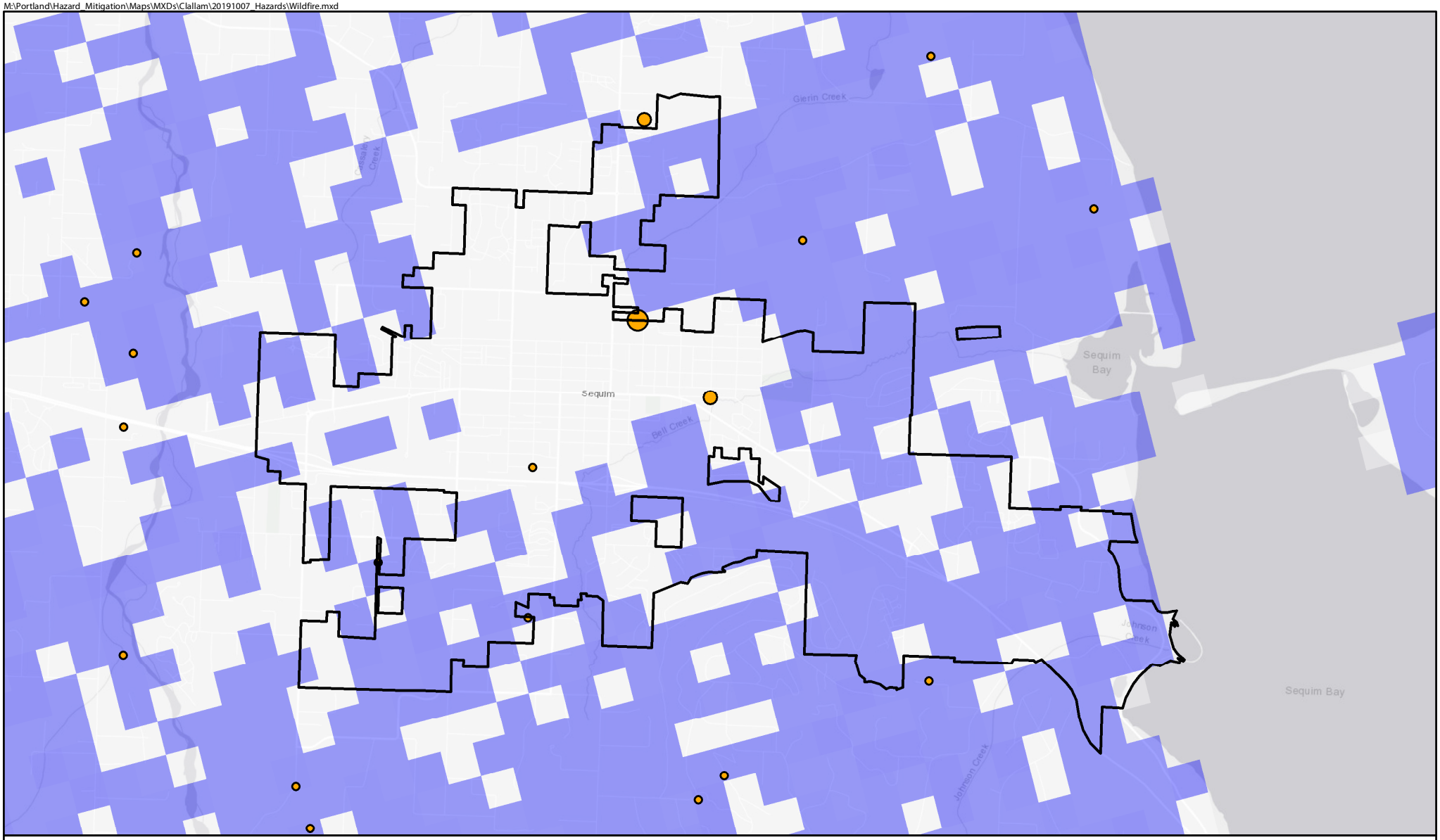


Figure 4
Sequim
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Historic Wildfires (1992-2015)

Acres Burned

- **<1**
- **1-10**
- **11-100**
- **101-1000**
- **>1000**

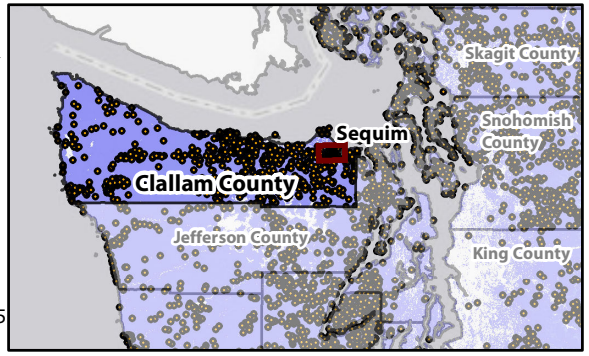
Wildfire Hazard Potential

High

Low

N
W E
S

0 0.25 0.5 0.75 1 1.25
Miles



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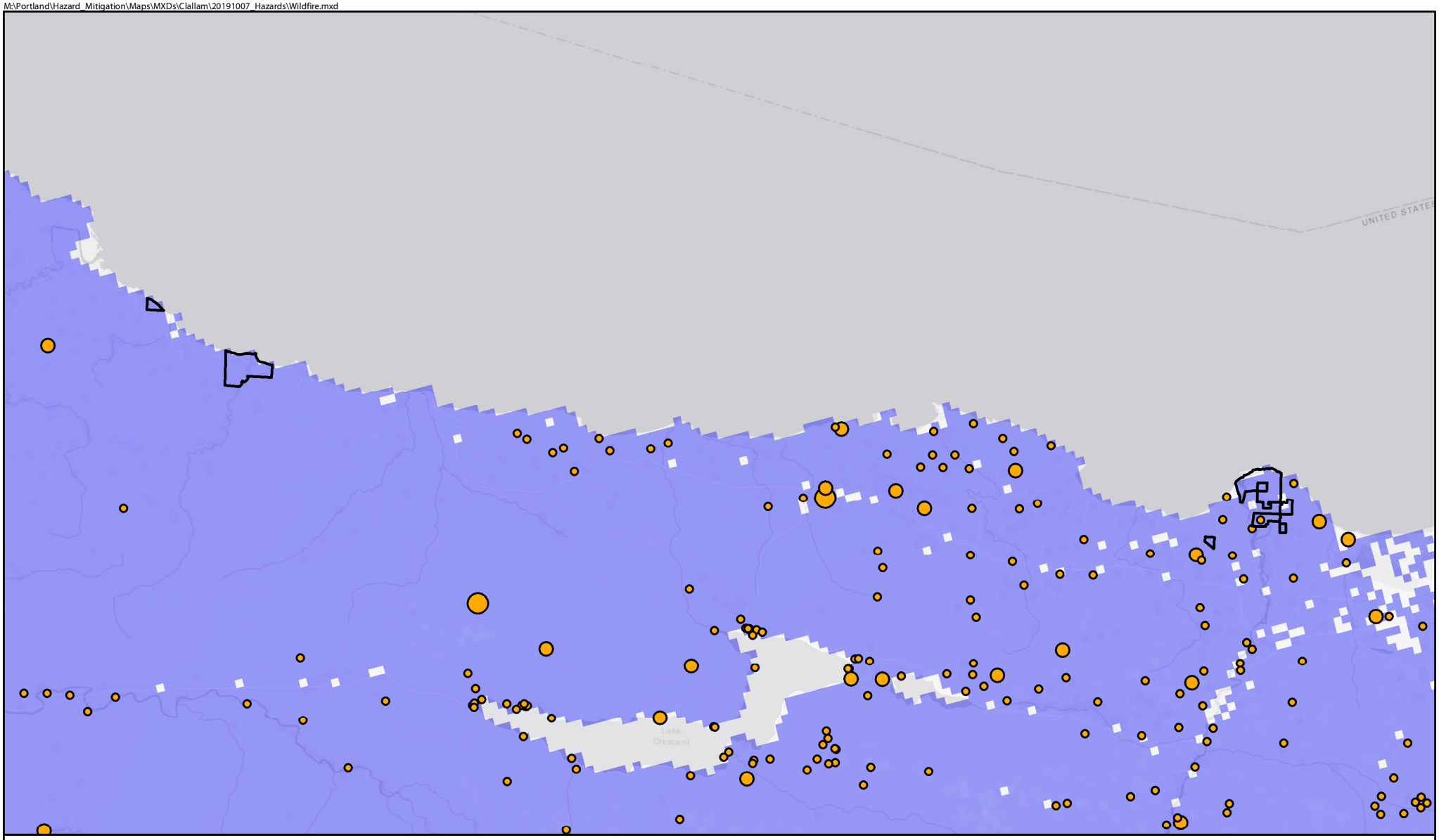


Figure 5
Lower Elwha Tribe
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Historic Wildfires (1992-2015)

Acres Burned

- <1
- 1-10
- 11-100
- 101-1000
- >1000

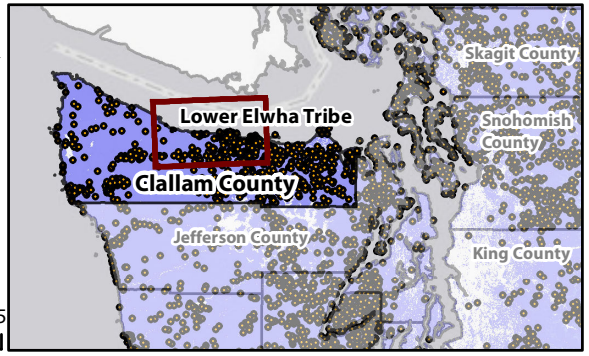
Wildfire Hazard Potential

High

Low

N
W E
S

0 1 2 3 4 5
Miles



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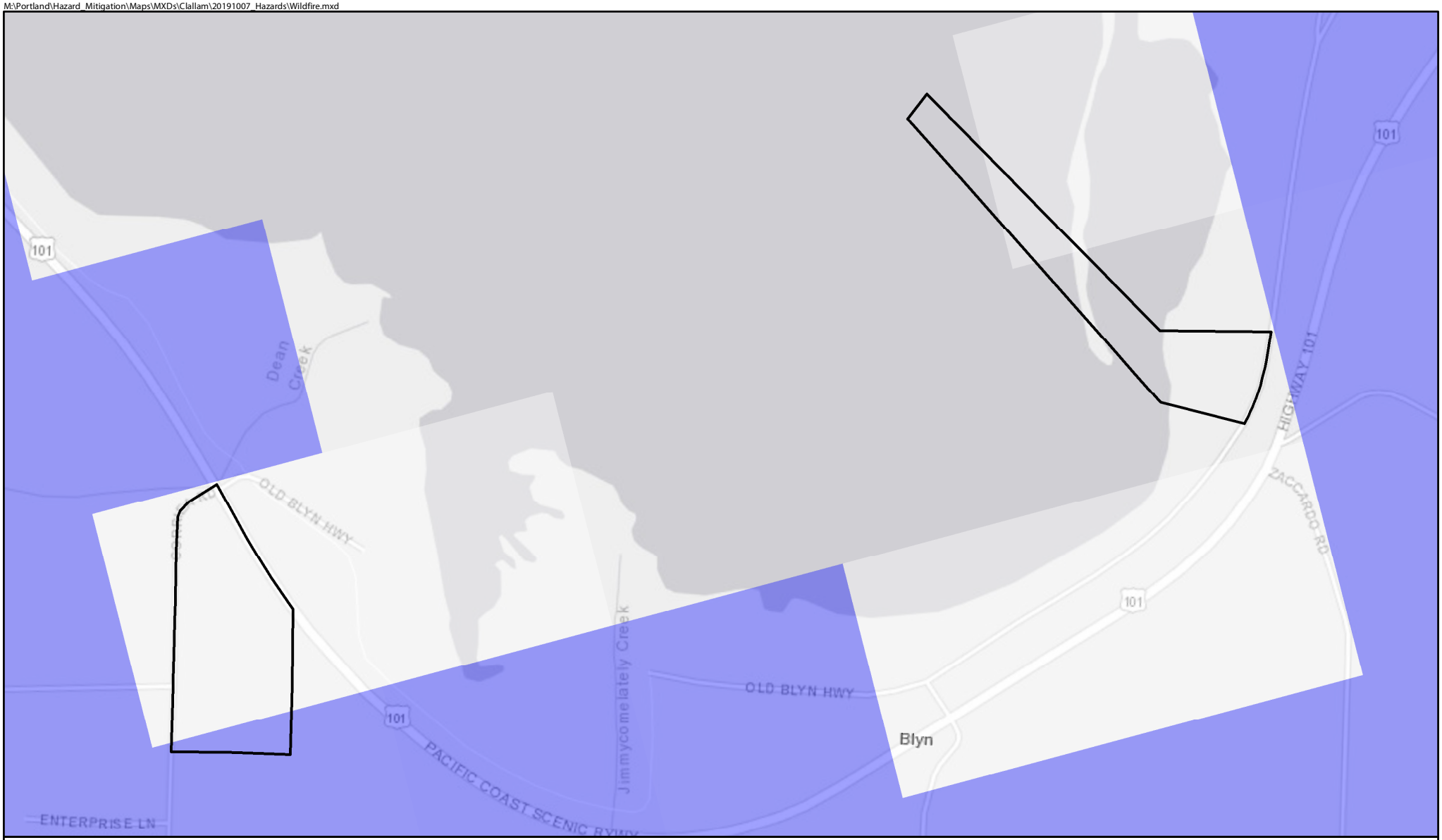


Figure 6
Jamestown S'Klallam Tribe
Clallam County
Hazard Mitigation

October 2019

Jurisdictional Boundary

Historic Wildfires (1992-2015)

Acres Burned

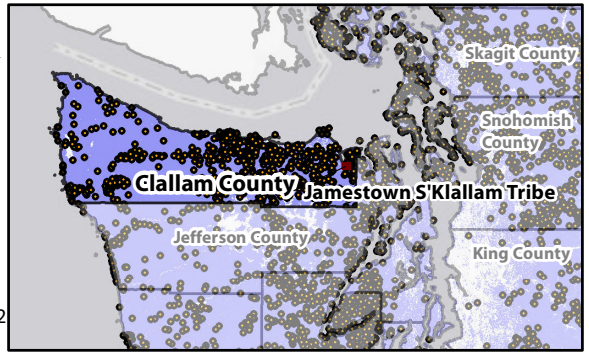
- **<1**
- **1-10**
- **11-100**
- **101-1000**
- **>1000**

Wildfire Hazard Potential

- **High**
- **Low**

N
W E
S

0 0.2
Miles



Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone**	**Email:**
Ron Cameron	360-417-2570	rcameron@co.clallam.wa.us

1. Identify the Problem

Current county public works yard in Clallam Bay exists in a tsunami inundation zone. Should a tsunami strike, even a small one could drastically affect the existing yard. Heavy equipment needed to respond/recover from such an event is vulnerable to the tsunami and would not be able to respond.
In addition, fuel storage is also in the inundation zone. Not only would the tsunami destroy fuel availability in the region, it could also produce a hazardous material disaster impacting the shores.
This public service yard serves large area of our county, and the fuel/equipment resources will be the only such resource available for some time in such an event.

2. Mitigation Action and Alternatives

Moving the facility is the only action:
Acquiring new property, either through purchase, lease or other agreement to build a new facility complete with fueling services or;
Working with existing governmental organizations for a co-located facility out of the danger zone.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Clallam County Sheriff's Office Emergency Management Section

Clallam County Public Works – Road Division

5b. Supporting Departments/Organizations:

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $2,000,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☒ Bond/Levy ☐ No/minimal cost

Other:

A large undertaking, but necessary in having the ability to respond to a disaster in emergency situations.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Ron Cameron	360-417-2570	rcameron@co.clallam.wa.us

1. Identify the Problem

The current County EOC is in a seismically hazardous area. It needs to move west of 8th Street bridges to a more geologically stable soils and closer to airport for receipt of goods. County Dispatch is in a seismically fragile area.

2. Mitigation Action and Alternatives

1) Relocate EOC to alternative location and renovate an existing structure to accommodate new Port Angeles Fire Station, City Park, and Information Technology Services.

2) (Alternative) Construct entirely new EOC in acceptable location.

3) (Alternative) Seismically retrofit current structure.

3. Action Status:

☐ New ☒ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☒ Communication ☐ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Sheriff's Office

5b. Supporting Departments/Organizations:

Prospective Property Owners, PenCom, Port Angeles Fire Department, City Parks, Port of Port Angeles

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $6 - $8 million approximately

8b. Funding Available? ☒ Yes ☐ Anticipated ☐ No

8c. Funding Source: ☒ Existing Budget ☒ Grant ☒ Bond/Levy ☐ No/minimal cost

Other:

Some Capital funds available, buy-in from Port of Port Angeles and City of Port Angeles into both funds and match.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Tom Shindler	360-417-2260	tshindler@co.clallam.wa.us

1. Identify the Problem

Multiple elements of the Hazard Mitigation Plan and of direct preparedness and response relate to GIS data support. Much of this data is incomplete and unavailable in an emergency.

2. Mitigation Action and Alternatives

1) Define desired GIS data, assign responsibilities for maintenance, using existing personnel and data resources.

2) (Alternative) Design Emergency Response Mapping System and implement by hiring new IT personnel.

3. Action Status:

☒ New ☒ Existing ☐ Complete

4. Type of Action:

☒ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☒ Communication ☒ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

County IT as directed by Emergency Management

5b. Supporting Departments/Organizations:

Count departments: DCD, Roads/Public Works, Information Technology, Emergency Management

6a. Timeline: ☐ Immediate ☒ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Minimal – existing resources.

8b. Funding Available? ☒ Yes ☐ Anticipated ☐ No

8c. Funding Source: ☐ Existing Budget ☐ Grant ☐ Bond/Levy ☒ No/minimal cost

Other:

Could probably be done with existing resources.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Tom Schindler	360-417-2260	tschindler@co.clallam.wa.us

1. Identify the Problem

During an Emergency Incident there is limited information flow about conditions on the ground, both to County staff and the public.

2. Mitigation Action and Alternatives

1) Establish a system of real-time mapping of hazards and conditions available to public and staff utilizing ArcGIS online.

2) (Alternative) Continue to utilize the Clallam County Code Red alert system to communicate with the public about emergency conditions.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☒ Communication ☐ Utilities ☐ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Clallam County IT (infrastructure and configuration) and Sheriff's Office (design and operation)

5b. Supporting Departments/Organizations:

Clallam County Sheriff's Office, Information Technology, PENCOM (possible integration with PUD).

6a. Timeline: ☒ Immediate ☐ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Existing staff plus ArcGIS Online credits (<$1,000/year)

8b. Funding Available? ☒ Yes ☐ Anticipated ☐ No

8c. Funding Source: ☒ Existing Budget ☐ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Hardware and Software: Existing machines and licenses can support this capability. However, new tablets could enhance capability.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone:**	**Email:**
Jake Patterson	360-912-4144	jpatterson@clallamfire2.org

1. Identify the Problem

The problem is the stability of fire district facilities, especially emergency response fire stations in the event of a large seismic event.

2. Mitigation Action and Alternatives

1. Reinforce/retrofit existing structures for seismic stability if possible or feasible.

2. Replace existing facilities with new structures built to current codes.

3. Identify existing structures which meet the needs of the District, meet current codes and are available for acquisition by the Fire District.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Clallam 2 Fire Rescue

5b. Supporting Departments/Organizations:

Possible partnership with Lower Elwha Tribe and/or City of Port Angeles.

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☒ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $1,000,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☐ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

There is no identified funding available currently. A voter-approved bond/levy may be needed if there is insufficient grant opportunities or other funding sources and this will depend on voter approval. There is insufficient revenue in the current levy and operational budget to allow for major facility upgrades/improvements.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone:**	**Email:**
Jake Patterson	360-912-4144	jpatterson@clallam2.org

1. Identify the Problem

The problem is a comprehensive wildfire assessment of the Fire District has not been completed to identify areas of risk and access in the event of a large wildfire.

2. Mitigation Action and Alternatives

1. Hire a contractor to conduct a wildfire risk assessment profile of the Fire District.

2. (Alternative) Pursue County codes to address access issues such as road width, setbacks and turnarounds for emergency vehicles

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Clallam 2 Fire Rescue

5b. Supporting Departments/Organizations:

Clallam County Fire Chiefs Association

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☒ Wildfire

8a. Anticipated Cost (if known): $20,000 - $40,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☐ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☒ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Greg Waters	206-200-3457	Chief@clallamfire4.org

1. Identify the Problem

CCFPD4 main fire station is approximately 75 years old. It is of cinderblock construction and seismically unsafe. It is currently not able to function as a West End EOC for several reasons: too small, insufficient electrical capacity, limited communications, mold/mildew/rodent concerns.

2. Mitigation Action and Alternatives

1) Build new fire station.

2) (Alternative) Retrofit current station to make more structurally sound, upgrade utilities.

3) (Alternative) Add on to existing fire station.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☒ Communication ☒ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Clallam County Fire Protection District No. 4

5b. Supporting Departments/Organizations:

None

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Approximately $1.6 – 2 million @ $400.00/sq. ft.

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

CCFPD 4 could generate a 25% match.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
Ben Andrews	(360) 582-2041	bandrews@ccfd3.org

1. Identify the Problem

Fire Station 33 is located at 70 Carlsborg Road; a known liquefaction zone. The Fire Station is an older masonry structure which was constructed in 1964 and has been added on to several times over the years. Fire Station 33 currently houses a type 1 engine, a transport capable ambulance and a water tender, and is staffed with two full time firefighters. Fire Station 33 serves a direct population of approximately 3250 citizens and supports another 2200 as a second response station to volunteer fire station 32. This is the only staffed fire station from the Sequim Dungeness river to Deer Park Road in Port Angeles. This station's response area covers approximately 48 square miles.

2. Mitigation Action and Alternatives

Relocate or seismically retrofit the existing fire station to resist a seismic event and potential liquefaction.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☒ Communication ☐ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Clallam County Fire District 3

5b. Supporting Departments/Organizations:

City of Sequim, Clallam County

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $3,150,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☒ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
Ben Andrews	(360) 582-2041	bandrews@ccfd3.org

1. Identify the Problem

Fire Station 31 is located at 4721 Sequim Dungeness Way; in a tsunami hazard zone. The Fire Station is an older masonry structure which was constructed in 1966. Fire Station 31 currently houses a type 1 engine and a transport capable ambulance. This station serves a population of approximately 2550 citizens. The station is located 4.8 miles from downtown Sequim.

2. Mitigation Action and Alternatives

Relocate and build a new fire station to modern standards.
(Alternative) Retrofit existing building. Not feasible given the facilities current condition.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☒ Communication ☐ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Clallam County Fire District 3

5b. Supporting Departments/Organizations:

City of Sequim, Clallam County

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): We have been told approximately $400.00 a square foot for the structure itself.

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☒ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Carol L. Creasey	360-417-2424	ccreasey@co.clallam.wa.us

1. Identify the Problem

Declining source of summer streamflow and aquifer recharge due to diminishing glaciers and snowpack in the Olympic Mountains.

Grant funding has been secured for land acquisition, engineering, permitting, and public outreach. Funding for construction has not been identified.

2. Mitigation Action and Alternatives

Off-Channel Reservoir adjacent to the Dungeness River, to store high Dungeness River flows and storm flows for release later for aquifer recharge and irrigation purposes.

All alternatives are less robust.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☒ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☐ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Clallam County Department of Community Development

5b. Supporting Departments/Organizations:

Washington Water Trust (Dungeness Water Exchange),City of Sequim Public Works, Agricultural Water Users Association (irrigators), Clallam Conservation District, Jamestown S'Klallam Tribe, WA Fish & Wildlife, WA Dep't of Natural Resources, WA Dep't of Ecology

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☒ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $25-35 million for construction

8b. Funding Available? ☐ Yes ☐ Anticipated ☐ No Partial ($~4.1 million of $25 - $35million

8c. Funding Source: ☐ Existing Budget ☐ Grant ☐ Bond/Levy ☐ No/minimal cost **[UNKNOWN]**

Other: Potential funding sources include Ecology, Floodplains by Design, PSAR, NOAA, Public Works Trust Fund etc.

Costs will be determined during the engineering phase of this multi-phase project.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Carol L. Creasey	360-417-2424	ccreasey@co.clallam.wa.us

1. Identify the Problem

Sea level rise and storm surge as a result of climate change will likely cause some groundwater wells to become saline and septic systems to be non-functioning. Sea level rise and storm surge in some parts of the County will lead to both public and private damage to development and infrastructure.

2. Mitigation Action and Alternatives

Assess susceptibility of coast to storm surge and sea level rise. Where lands are highly susceptible prioritize infrastructure that may need to be raised higher or removed further inland. Provide education and outreach to the public to prepare for the sea level rise and storm surge impacts.

1) **Hire contractor to conduct assessment to identify areas of vulnerability for sea level rise, specifically in the eastern part of Clallam County**
2) **Conduct water quality assessment of wells throughout the County to evaluate salt water intrusion**

3. Action Status:

☒ New ☒ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☒ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Clallam County

5b. Supporting Departments/Organizations:

Clallam County Public Works/Roads, Clallam County Environmental Health, wastewater and water suppliers

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☐ Tsunami
☐ Active Threat	☒ HazMat Incidents	☒ Water Shortages
☒ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☒ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Phase I of II - $170,000 (Paying for well water analytical samples, sea water intrusion susceptibility maps, and conducting education and outreach for landowners). Phase II would be initiate buy-out program to encourage landowners to relocate to less vulnerable areas.

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☒ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Costs will be determined once the preliminary assessment has been made.

Other: The County has proposed a Near Term Action (NTA) to obtain funding to assess sea level rise and storm surge susceptibility along the coast and to monitor groundwater along the coast to assess sea water intrusion.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Carol L. Creasey	360-417-2424	ccreasey@co.clallam.wa.us

1. Identify the Problem

The problem is maintaining high water quality and quantity of groundwater and surface water resources. Due to climate change such as the expectation of more droughts, water levels will decline in wells and in streams. Additionally, increased development may lead to water quality issues such as higher bacteria, nitrate, and other contaminants.

2. Mitigation Action and Alternatives

To deal with drought situations alternative water sources need to be investigated; additionally, some wells will need to be drilled to deeper aquifers where water quantity and quality may be better. In the Dungeness Instream Flow area, water quantity is being addressed through aquifer recharge projects. Emerging water resource technologies also need to be evaluated to ascertain whether they can provide solutions for decreased water quantity and quality. Regulations may need to be developed to ensure that wells are being drilled in deeper aquifers if there is concern about groundwater declines or contamination.

3. Action Status:

☒ New ☒ Existing ☐ Complete

4. Type of Action:

☒ Plans and Regulations ☒ Infrastructure/Capital Project ☒ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☐ Emergency Services ☐ Communication ☒ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Clallam County

5b. Supporting Departments/Organizations:

Clallam County Environmental Health, private and public water systems (Group A and B), Dungeness Water Exchange

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☒ Utility Failure	☒ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): unknown

8b. Funding Available? ☐ Yes ☐ Anticipated ☐ No Unknown

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other: Potential loan, private and public fee increase

Costs are undetermined at this time.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone:**	**Email:**
Luke Strong	360-681-4669	lstrong@jamestowntribe.org

1. Identify the Problem

Need to identify how vulnerable critical pieces of Tribal Government infrastructure are to earthquakes.

2. Mitigation Action and Alternatives

1) Seismic assessment of Tribal facilities.

2) Plan retrofit of all facilities.

3) No action.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☒ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☒ Communication ☐ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Jamesstown S'Klallam Tribe

5b. Supporting Departments/Organizations:

Engineering consultants

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☒ Short-Term (Interim) ☐ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $10,000 - $20,000

8b. Funding Available?: ☐ Yes ☒ Anticipated ☐ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name: Glen Roggenbuck	**Phone: 360-912-2624**	**Email: glen.roggenbuck@elwha.org**

1. Identify the Problem

The Lower Elwha Tribal Center, which is the heart of tribal government, is located within the tsunami inundation zone. It is used daily by hundreds of employees and tribal members and non tribal members. In the event of a tsunami the tribal center would likely be destroyed or severely damaged and thus uninhabitable, making the continuance of tribal government very difficult.

2. Mitigation Action and Alternatives

Move the tribal center out of the tsunami inundation zone.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☐ Transportation ☐ Emergency Services ☐ Communication ☐ Utilities ☒ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Lower Elwha Police Department

Emergency Management Division

5b. Supporting Departments/Organizations:

Lower Elwha Tribe

Maintenance Department

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Unknown

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name: Glen Roggenbuck	**Phone: 360-912-2624**	**Email: glen.roggenbuck@elwha.org**

1. Identify the Problem

The Lower Elwha two sections of reservation, the upper and the lower, with the lower being located at essentialy sea level. A large portion of which lies within the tsunami inundation zone. There currently are only two evacuation routes out of the lower reservation, Kacee Way and Lower Elwha Road. Kacee Way is relatively new, having neen built about ten years ago. It is sufficient as built to evacuate vehicles. Lower Elwha Road however is older and much narrower and a portion of which is on the side of a hill. It is not sufficient as built to evacuate the lower reservation.

2. Mitigation Action and Alternatives

Widen and strengthen Lower Elwha Road from Stratton Road to Kacee Way.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☒ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Lower Elwha Police Department

Emergency Management Division

5b. Supporting Departments/Organizations:

Lower Elwha Tribe

Community Development

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☒ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☒ Wildfire

8a. Anticipated Cost (if known): Unknown

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name: Glen Roggenbuck	**Phone: 360-912-2624**	**Email: glen.roggenbuck@elwha.org**

1. Identify the Problem

The currently underway project of a tribal hotel lies within the tsunami inundation zone in downtown Port Angeles

2. Mitigation Action and Alternatives

Construct the hotel as tsunami resistant or build a tsunami evacuation tower next door as part of a parking structure

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☒ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Lower Elwha Police Department

Emergency Management Division

5b. Supporting Departments/Organizations:

Lower Elwha Tribe

Lower Elwha Tribe Enterprise Services

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Unknown

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Dan Gase	360-808-7053	dang@portofpa.com

1. Identify the Problem

There is insufficient runway strength to facilitate large emergency aircraft needed to deliver disaster relief supplies.

2. Mitigation Action and Alternatives

1) The solution is to strengthen runway asphalt to increase weight-bearing capabilities in the event of an emergency.

2) (Alternative) Build a new runway at another location in the County.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Port of Port Angeles

5b. Supporting Departments/Organizations:

None

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☒ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $2,000,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Large cost savings can be found by completing this project in conjunction with the 2022 scheduled runway rehab project.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone:**	**Email:**
Dan Gase	360-808-7053	dang@portofpa.com

1. Identify the Problem

The windows throughout the Port campus are susceptible to breakage during high winds or earthquake.

2. Mitigation Action and Alternatives

1) Install protective glass safety film on the windows of the airport terminal building complex to hold shattered glass in place.

2) (Alternative) Replace windows throughout entire campus.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Facilities maintenance/airport – Port of Port Angeles

5b. Supporting Departments/Organizations:

Safety committee, Port of Port Angeles

6a. Timeline: ☐ Immediate ☒ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☒ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $2,500

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Dan Shea	360-460-2696	dans@portofpa.com

1. Identify the Problem

Fuel for Port vehicles (service trucks, loading equipment, forklifts, and construction equipment is located in a tsunami zone.

2. Mitigation Action and Alternatives

1) Purchase fuel tanks and build a fuel transfer at the Port's newly constructed and located shop.

2) (Alternative) Build berms or protective barriers around the location of current fueling area to block inundation.

3) (Alternative) Source fuel from offsite location through external contracting.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Port of Port Angeles Field Maintenance and Administration

5b. Supporting Departments/Organizations:

Port of Port Angeles Engineering and Security

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☒ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $10,000 - $20,000

8b. Funding Available? ☒ Yes ☐ Anticipated ☐ No

8c. Funding Source: ☒ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Dan Shea – Port of PA	360-460-2696	dans@portofpa.com

1. Identify the Problem

Port facilities do not have access to clean drinking water in the event of a natural disaster.

2. Mitigation Action and Alternatives

1) The Port will build a portable mobile emergency water supply.

2) (Alternative) Purchase bottled water to leave on premises.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Facilities Maintenance, Safety Committee

5b. Supporting Departments/Organizations:

Facilities Maintenance

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☒ Tsunami
☐ Active Threat	☒ HazMat Incidents	☒ Water Shortages
☒ Emerging Infectious Disease	☒ Landslides	☒ Windstorm
☒ Earthquakes	☒ Utility Failure	☒ Drought
☒ Excessive Heat	☐ Winter Storm	☒ Wildfire

8a. Anticipated Cost (if known): $1,500.00

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☒ Existing Budget ☐ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Dan Gage	360-808-7053	Dang@portofpa.com

1. Identify the Problem

The Port of Port Angeles aircraft taxiway is too weak to support large emergency aircraft needed to delivery disaster relief supplies.

2. Mitigation Action and Alternatives

1) The Port will seek to strengthen the taxiway to increase weight-bearing capabilities.

2) (Alternative) Limit the aircraft that are allowed to taxi at the facility.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Port of Port Angeles

5b. Supporting Departments/Organizations:

None at this time.

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☒ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $2,000,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Large cost savings can be found by completing this project in conjunction with the 2022 scheduled runway rehab project.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email: ptjem@sequimwa.gov
Pete Tjemsland/Ann Soule	360.681.6607/360.582.2436	asoule@sequimwa.gov

1. Identify the Problem

Access to Potable Water During Emergencies

2. Mitigation Action and Alternatives

1. Purchase a portable water purification system and small tanks. Prepare multiple sites and equipment to operate water purification unit or units.
2. Purchase individual water purification equipment for residents

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

City of Sequim Public Works

5b. Supporting Departments/Organizations:

City of Sequim of Sequim Council, Finance, Clallam County, Washington State, Federal Government, Medical facilities

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☒ Emerging Infectious Disease	☐ Landslides	☒ Windstorm
☒ Earthquakes	☒ Utility Failure	☒ Drought
☒ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Unknown

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

SRF Loans, FEMA Grants

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
Peter Tjemsland – Sequim PUD		

1. Identify the Problem

Emergency response by city is limited by fuel availability for utility trucks (Transpo, Sewer, Water, Police, etc.)

2. Mitigation Action and Alternatives

1) Build new fuel station to serve all EM responders.

2) (Alternative) Memorandum of Understanding with existing businesses.

3) (Alternative) Confiscation in the event of a disaster.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

City Public Works and Police Department

5b. Supporting Departments/Organizations:

Fire District, State Department of Transportation, School Districts, Bonneville Power, Public Utilities

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☒ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☒ Windstorm
☒ Earthquakes	☒ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $500,000 [complete cost analysis should be conducted]

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone:	Email:
David Garlington – Sequim PUD		

1. Identify the Problem

Stormwater runoff from Clallam County lands overwhelms systems in City.

2. Mitigation Action and Alternatives

1) Capture stormwater near source of runoff and infiltrate upstream of City on County property (LID, GSI)

2) (Alternative) Develop MOU with County to renovate existing City infrastructure

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☒ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☒ Transportation ☐ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Sequim Public Works

5b. Supporting Departments/Organizations:

Clallam County Roads Department

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☒ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $1,000,000

8b. Funding Available? ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

Project is written up as a Hazard Mitigation Grant Program application (winter-spring 2019)

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email: ptjem@sequimwa.gov
Pete Tjemsland/Ann Soule	360.681.6607/360.582.2436	asoule@sequimwa.gov

1. Identify the Problem

New Water Reservoir and ancillary equipment located in western Sequim.

2. Mitigation Action and Alternatives

Locate location for new reservoir, purchase property, design, construct.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

City of Sequim Public Works

5b. Supporting Departments/Organizations:

City of Sequim Council, Finance, Clallam County, Clallam County PUD, Clallam County Fire District 3, Medical Facilities, Local Water Systems, Washington State

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☒ Utility Failure	☒ Drought
☒ Excessive Heat	☐ Winter Storm	☒ Wildfire

8a. Anticipated Cost (if known): Click here to enter text.

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

SRF Loan, Developer

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email: ptjem@sequimwa.gov
Pete Tjemsland/Ann Soule	360.681.6607/360.582.2436	asoule@sequimwa.gov

1. Identify the Problem

Construct deep water well (600 feet deep or greater) to increase resiliency, reliability within water system.

2. Mitigation Action and Alternatives

1. Determine best deep well location and drill pilot well for testing
2. Construct new deep well

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

City of Sequim Public Works

5b. Supporting Departments/Organizations:

City of Sequim Council, Finance, Washington State Departments of Ecology and Health, Clallam County Fire District 3

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☒ Utility Failure	☒ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Click here to enter text.

8b. Funding Available?: ☐ Yes ☒ Anticipated ☐ No

8c. Funding Source: ☒ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

SRF Loans

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email: ptjem@sequimwa.gov
Pete Tjemsland/Ann Soule	360.681.6607/360.582.2436	asoule@sequimwa.gov

1. Identify the Problem

Looping of City Water System. Looping improves redundancy, resilience, during water main breaks or issues. Looping can also give adjacent small water systems the possibility of emergency interties.

2. Mitigation Action and Alternatives

1. Connect and extend water mains to improve looping, during water main replacements and developer projects.

3. Action Status:

☐ New ☒ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

City of Sequim Public Works

5b. Supporting Departments/Organizations:

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☒ Utility Failure	☒ Drought
☒ Excessive Heat	☐ Winter Storm	☒ Wildfire

8a. Anticipated Cost (if known): Click here to enter text.

8b. Funding Available?: ☐ Yes ☒ Anticipated ☐ No

8c. Funding Source: ☒ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost

Other:

SRF Loans, Developers

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
Ann Soule	360.582.2436	asoule@sequimwa.gov

1. Identify the Problem

Increasing frequency of intense storms results in more flooding and runoff, less recharge to the groundwater system, and exacerbated drought risk.

2. Mitigation Action and Alternatives

Capture stormwater in the County southwest of Sequim city limits and infiltrate using green stormwater infrastructure to benefit most of the watershed. **Alternatives: capture and infiltrate in existing structures that are several miles downgradient – but this does not resolve certain flooding problems and is not as efficient overall since the recharge benefits a smaller watershed area.**

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☒ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

City of Sequim Public Works Department is partnering with Clallam County Public Works and DCD on this project.

5b. Supporting Departments/Organizations:

Clallam County has a grant to purchase the property to be used for the infiltration from WA DNR.
Fire District 3, Clallam County Parks, Jamestown S'Klallam Tribe, State of Washington, Federal Organizations, Local Water and Wastewater Systems

6a. Timeline: ☐ Immediate ☒ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☒ Drought
☒ Excessive Heat	☐ Winter Storm	☒ Wildfire

8a. Anticipated Cost (if known): Capture & Infiltration project ~ $1.23M total. Match of $154k will be 97% met by land acquisition, the rest by staff time.

8b. Funding Available? ☐ Yes ☒ Anticipated ☐ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost Other:

Application submitted to FEMA Hazard Mitigation Program

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
Ann Soule	360.582.2436	asoule@sequimwa.gov

1. Identify the Problem

Sequim need a renewable energy power supply for use in the Civic Center and EOC during power outage emergencies.

2. Mitigation Action and Alternatives

Sequim will be installing rooftop solar on the Civic Center within 6 months but lacks adequate battery capacity to store advantageous amounts of energy for operations to continue. This action will install an energy storage microgrid for storing solar energy for use in the EOC and Civic Center during power outage emergencies, especially long-term ones when diesel becomes less available.

Alternative: continue to solely use diesel generators.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☒ Communication ☒ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Sequim Public Works Department

5b. Supporting Departments/Organizations:

City of Sequim: City Manager's Office, Finance Department, Police Department
State of Washington, Federal Organizations

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Capt

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost Other:

WA Dept of Commerce may have grant funding available for this infrastructure.

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
Pete Tjemsland	**360.681.6607**	**ptjem@sequimwa.gov**

1. Identify the Problem

AC pipe installed in the mid-1900s throughout City of Sequim is more susceptible to breakage from earthquakes and other ground conditions than other types of pipe.

2. Mitigation Action and Alternatives

Replace AC pipe with earthquake resistant pipe. **Alt: use Pipe Burst using HDPE Pipe.**

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☐ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

City of Sequim Public Works

5b. Supporting Departments/Organizations:

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☒ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☒ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $6-8 Million

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☒ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost Other:

SRF Loan

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone**	**Email:**
David Garlington	**360.681.3439**	**dgarlington@sequimwa.gov**

1. Identify the Problem

Johnson Creek Trestle is vulnerable to natural disasters but is an important transportation connection.

2. Mitigation Action and Alternatives

Protect/reinforce Johnson Creek Trestle for the Olympic Discovery Trail west of Whitefeather Way.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☒ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☐ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☒ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Sequim Public Works Department

5b. Supporting Departments/Organizations:

Peninsula Trails Coalition, Clallam County

6a. Timeline: ☐ Immediate ☐ < 1 year ☐ 1 – 3 years ☒ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☒ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☒ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☒ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $100,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☒ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone**	**Email:**
David Garlington	**360.681.3439**	**dgarlington@sequimwa.gov**

1. Identify the Problem

City staff need training to perform seismic assessments of City properties.

2. Mitigation Action and Alternatives

Training for City staff to perform seismic assessments of City properties.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☒ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Sequim Public Works Department

5b. Supporting Departments/Organizations:

City of Sequim: Planning Department, Finance Department, Police Department

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☒ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Minimal (mostly staff time)

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☐ Grant ☐ Bond/Levy ☒ No/minimal cost Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
David Garlington	360.681.3439	dgarlington@sequimwa.gov

1. Identify the Problem

The City does not have an assessment of its wildfire risk.

2. Mitigation Action and Alternatives

Conduct wildfire risk assessment for City of Sequim and all of Fire District 3.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☒ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☐ Communication ☒ Utilities ☒ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Sequim Public Works Department and Clallam Co Fire District 3

5b. Supporting Departments/Organizations:

City of Sequim: Police Department

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☐ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☒ Wildfire

8a. Anticipated Cost (if known): $20,000 to 40,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
David Garlington	360.681.3439	dgarlington@sequimwa.gov

1. Identify the Problem

Regular maintenance and timely repair of the City's capital facilities are important for resilience; these duties are best accomplished utilizing GIS and ongoing asset management.

2. Mitigation Action and Alternatives

Fully implement asset management using GIS for all capital facilities.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☐ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☒ Communication ☒ Utilities ☒ Property Damage
☐ Public Participation

5a. Lead Department/Organization:

Sequim Public Works Department

5b. Supporting Departments/Organizations:

City of Sequim: Planning Department, Police Department

6a. Timeline: ☐ Immediate ☐ < 1 year ☒ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $20,000 per year plus staff time

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☒ Existing Budget ☐ Grant ☐ Bond/Levy ☐ No/minimal cost Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone**	**Email:**
Sheri Crain	**360.582.5704**	**scrain@sequimwa.gov**

1. Identify the Problem

Jurisdictions within Clallam County need regular opportunities to coordinate training and practice of emergency management and procedures.

2. Mitigation Action and Alternatives

Continue to coordinate Emergency Management / incident response trainings for North Olympic Peninsula jurisdictions.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☒ Communication ☐ Utilities ☐ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Sequim Police Department

5b. Supporting Departments/Organizations:

City of Sequim: Public Works Department, Planning Department, Finance Department, City Manager's Office
Clallam County, Tribal Governments, State of Washington, Federal Organizations

6a. Timeline: ☐ Immediate ☒ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Negligible

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☐ Grant ☐ Bond/Levy ☒ No/minimal cost Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	**Phone**	**Email:**
Sheri Crain	**360.582.5704**	**scrain@sequimwa.gov**

1. Identify the Problem

City residents, businesses and visitors need regular reminders of potential hazards, how to prepare, and how local agencies will and will not respond.

2. Mitigation Action and Alternatives

Public education on potential hazards, local agency response, and preparedness.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☐ Transportation ☒ Emergency Services ☒ Communication ☐ Utilities ☐ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Sequim Police Department

5b. Supporting Departments/Organizations:

City of Sequim: City Manager's Office, Public Works Department
Clallam County Emergency Management, Clallam Fire District 3

6a. Timeline: ☐ Immediate ☒ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): Negligible

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☐ Grant ☐ Bond/Levy ☒ No/minimal cost Other:

Clallam County Hazard Mitigation Plan – 2019 Mitigation Action Worksheet

Contact Information:

Name:	Phone	Email:
Sheri Crain	360.582.5704	scrain@sequimwa.gov

1. Identify the Problem

Vulnerable populations in City of Sequim are high risk and may need special assistance during disasters.

2. Mitigation Action and Alternatives

Develop a risk assessment and response plan for vulnerable populations regarding excessive heat, cold, smoke inhalation – including loss of power and/or ability to transport.

3. Action Status:

☒ New ☐ Existing ☐ Complete

4. Type of Action:

☐ Plans and Regulations ☐ Infrastructure/Capital Project ☐ Natural Systems Protection
☒ Education and Awareness ☒ Preparedness and Response

5. Goals Supported:

☒ Transportation ☒ Emergency Services ☐ Communication ☐ Utilities ☐ Property Damage
☒ Public Participation

5a. Lead Department/Organization:

Sequim Police Department

5b. Supporting Departments/Organizations:

City of Sequim: City Manager's Office
State of Washington, Federal Organizations

6a. Timeline: ☐ Immediate ☒ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years

6b. Life of Action: ☐ Temporary ☐ Short-Term (Interim) ☒ Long-Term

7. Hazards Addressed (Check all that apply):

☒ All Hazards	☐ Floods	☐ Tsunami
☐ Active Threat	☐ HazMat Incidents	☐ Water Shortages
☐ Emerging Infectious Disease	☐ Landslides	☐ Windstorm
☐ Earthquakes	☐ Utility Failure	☐ Drought
☐ Excessive Heat	☐ Winter Storm	☐ Wildfire

8a. Anticipated Cost (if known): $20,000

8b. Funding Available?: ☐ Yes ☐ Anticipated ☒ No

8c. Funding Source: ☐ Existing Budget ☒ Grant ☐ Bond/Levy ☐ No/minimal cost Other:

STAPLEE Criteria	Evaluation Rating	FR01 Score	FR02 Score	FR03 Score	PA01 Score	PA02 Score	PA03 Score	PA04 Score	PA05 Score	PA06 Score	PA07 Score	PA08 Score	PA09 Score	PA10 Score	SQ01 Score	SQ02 Score	SQ03 Score
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	3	3	2	3	3	2	3	3	2	3	3	3	2	3	2	3
T: Is it Technically feasible and potentially successful?		3	3	2	2	2	2	2	2	2	3	3	3	3	3	2	2
A: Does the responsible City agency/department have the Administrative capacity to execute this action?		2	2	1	2	2	2	2	2	2	3	3	3	3	3	2	2
P: Is it Politically acceptable?		3	3	3	3	3	1	3	3	2	3	3	3	3	3	1	3
L: Is there Legal authority to implement?		3	3	3	3	3	3	3	2	2	3	3	3	3	3	1	3
E: Is it Economically beneficial?		3	2	3	3	3	1	3	2	2	3	2	2	3	2	2	3
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)		3	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2
STAPLEE Score Total		20	18	16	18	18	13	18	17	15	20	19	19	19	19	12	18

Mitigation Effectiveness Criteria	Evaluation Rating	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1	3	1	1	3	3	5	3	3	3	5	3	3	3	3	3	3
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1	5	3	3	3	3	5	3	3	3	5	3	3	1	3	3	3
Mitigation Effectiveness Score Total		8	4	4	6	6	10	6	6	6	10	6	6	4	6	6	6
Total Score (STAPLEE + Mitigation Effectiveness)		28	22	20	24	24	23	24	23	21	30	25	25	23	25	18	24

Notes:

		SQ04	SQ05	SQ06	SQ07	SQ08	SQ09	SQ10	SQ11	CC01	CC02	CC03	CC04	CC05	CC06	CC07
STAPLEE Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	2	3	3	3	3	3	3	3	2	3	3	3	3	3	3
T: Is it Technically feasible and potentially successful?		3	3	3	2	3	3	2	3	3	3	3	2	3	3	3
A: Does the responsible City agency/department have the Administrative capacity to execute this action?		2	2	2	2	2	2	3	3	2	3	2	2	2	2	2
P: Is it Politically acceptable?		2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
L: Is there Legal authority to implement?		2	3	2	3	3	3	3	3	3	3	3	3	3	3	3
E: Is it Economically beneficial?		2	3	2	2	3	3	1	1	2	3	2	2	2	3	2
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)		2	2	2	2	2	2	3	3	2	2	2	2	2	2	2
STAPLEE Score Total		15	19	17	17	19	19	18	19	17	20	18	17	18	19	18

Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1	5	1	3	3	3	1	1	1	1	5	1	3	5	1	5
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1	3	3	1	1	5	5	5	3	5	5	3	3	5	5	5
Mitigation Effectiveness Score Total		8	4	4	4	8	6	6	4	6	10	4	6	10	6	10
Total Score (STAPLEE + Mitigation Effectiveness)		23	23	21	21	27	25	24	23	23	30	22	23	28	25	28

Notes:

		CC08	CC09	CC10	CC11	CC12	CC13	CC14	JSK01	JSK02	JSK03	JSK04	JSK05	JSK06	JSK07	JSK08
STAPLEE Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
T: Is it Technically feasible and potentially successful?		2	3	3	3	3	3	3	3	3	3	3	1	3	2	3
A: Does the responsible City agency/department have the Administrative capacity to execute this action?		2	3	3	3	3	2	2	3	3	3	2	1	3	2	3
P: Is it Politically acceptable?		3	3	3	3	3	3	3	3	3	2	3	2	3	3	2
L: Is there Legal authority to implement?		3	3	3	3	3	2	2	3	3	3	3	1	3	3	3
E: Is it Economically beneficial?		2	3	3	3	2	1	1	2	3	3	3	2	3	2	1
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)		2	3	3	3	2	2	2	2	2	3	2	2	3	3	3
STAPLEE Score Total		17	21	21	21	19	16	16	19	20	20	19	12	21	18	18

Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**			**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1	5	3	3	3	3	5	5	3	3	3	3	3	1	3	1
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1	3	5	5	5	3	3	3	3	3	5	5	5	3	3	3
Mitigation Effectiveness Score Total		8	8	8	8	6	8	8	6	6	8	8	8	4	6	4
Total Score (STAPLEE + Mitigation Effectiveness)		25	29	29	29	25	24	24	25	26	28	27	20	25	24	22

Notes:

		JSK09	JSK10	JSK11	JSK12	JSK13	JSK14	JSK15	JSK16	JSK17	JSK18	JSK19	PUD01	PUD02	PUD03	PUD04
STAPLEE Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
T: Is it Technically feasible and potentially successful?		3	3	3	2	2	3	3	3	3	2	2	2	2	3	3
A: Does the responsible City agency/department have the Administrative capacity to execute this action?		3	3	3	3	3	3	3	3	3	3	3	1	2	1	2
P: Is it Politically acceptable?		2	3	3	3	3	3	3	3	3	3	2	2	2	3	3
L: Is there Legal authority to implement?		3	3	3	2	2	3	3	3	3	3	3	2	2	3	3
E: Is it Economically beneficial?		1	3	3	3	3	3	3	3	3	2	2	1	2	2	2
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)		3	2	2	2	2	2	2	2	2	3	2	2	2	3	2
STAPLEE Score Total		18	20	20	18	18	20	20	20	20	19	17	13	15	18	18
Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1	1	3	5	3	3	5	5	3	5	5	3	3	5	5	3
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1	3	3	1	1	1	1	1	3	5	5	3	3	5	5	5
Mitigation Effectiveness Score Total		4	6	6	4	4	6	6	6	10	10	6	6	10	10	8
Total Score (STAPLEE + Mitigation Effectiveness)		22	26	26	22	22	26	26	26	30	29	23	19	25	28	26

Notes:

		PUD05	PUD06	POPA01	POPA02	POPA03	POPA04	POPA05	LEK01	LEK02	LEK03	LEK04	LEK05	LEK06	LEK07	LEK08
STAPLEE Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	3	2	3	3	3	3	3	2	3	3	3	3	2	3	3
T: Is it Technically feasible and potentially successful?		2	3	3	3	3	3	3	2	2	3	3	3	2	3	3
A: Does the responsible City agency/department have the Administrative capacity to execute this action?		2	2	3	3	3	3	3	2	2	3	3	3	2	3	3
P: Is it Politically acceptable?		2	3	3	3	3	3	3	2	3	3	3	3	2	3	3
L: Is there Legal authority to implement?		2	3	3	3	3	3	3	2	2	3	3	3	2	3	3
E: Is it Economically beneficial?		2	2	3	2	1	1	3	2	3	3	3	3	2	3	2
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)		3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
STAPLEE Score Total		16	17	20	19	18	18	20	14	17	20	20	20	14	20	19
Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1	3	3	5	3	3	5	5	5	3	5	3	5	5	5	5
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1	3	5	3	3	5	1	3	5	3	5	3	1	5	3	5
Mitigation Effectiveness Score Total		6	8	8	6	8	6	8	10	6	10	6	6	10	8	10
Total Score (STAPLEE + Mitigation Effectiveness)		22	25	28	25	26	24	28	24	23	30	26	26	24	28	29

Notes:

28 25 26 24 28
28
25
26
24
28

		LEK09	LEK10	LEK11
STAPLEE Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	3	3	
T: Is it Technically feasible and potentially successful?		3	3	
A: Does the responsible City agency/department have the Administrative capacity to execute this action?		3	3	
P: Is it Politically acceptable?		3	3	
L: Is there Legal authority to implement?		3	3	
E: Is it Economically beneficial?		1	1	
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)		2	2	
	STAPLEE Score Total	18	18	0
Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**	**Score**	**Score**
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1	3	1	
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1	3	5	
	Mitigation Effectiveness Score Total	6	6	0
	Total Score (STAPLEE + Mitigation Effectiveness)	24	24	0

Notes:

FEMA REGION 10 LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to participating jurisdictions.

1. The Multi-Jurisdiction Summary Sheet is used to document how each jurisdiction met the requirements in the Plan.
2. The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
3. The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.

The FEMA Mitigation Planner must reference the *Local Mitigation Plan Review Guide* when completing this *Local Mitigation Plan Review Tool*.

Jurisdiction: **Clallam County, Washington**	**Title of Plan:** **Clallam County Multi-Jurisdictional Hazard Mitigation Plan**	**Date of Plan:** **TBD**
Local Point of Contact: **Ron Cameron**		**Address:** **223 E 4th St. Ste. 12** **Port Angeles, WA 98362**
Title: **Undersheriff**		
Agency: **Clallam County Sheriff's Office**		
Phone Number: **(360) 417-2570**		**E-Mail:** rcameron@co.clallam.wa.us

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
John Schelling	Regional Hazard Mitigation Planning Manager	12/20/2019 1/10/2020
Date Received in FEMA Region 10	12/17/2019	
Plan Not Approved		
Plan Approvable Pending Adoption	1/15/2020	
Plan Approved	1/28/2020	

SECTION 1: MULTI-JURISDICTION SUMMARY SHEET (used only for multi-jurisdictional plans)

INSTRUCTIONS: The Multi-Jurisdiction Summary Spreadsheet is completed by listing each participating jurisdiction and which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it is used to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET (Add additional pages if necessary)										
#	Jurisdiction Name	Jurisdiction Type (city/borough/ district, etc.)	POC	Required Revisions / Comments	Requirements Met (Y/N)					
					A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Clallam County	County	Ron Camero n		Y	Y	Y	Y	Y	N/A
2	City of Port Angeles	City	Ken Dubuc		Y	Y	Y	Y	N	N/A
3	City of Sequim	City	Ann Soule		Y	Y	Y	Y	N	N/A
4	City of Forks	City	Rod Fleck		Y	Y	Y	Y	N	N/A
7	Peninsula College	University			Y	Y	Y	Y	N	N/A
8	Port of Port Angeles	Port			Y	Y	Y	Y	Y	N/A
9	Clallam County PUD	District			Y	Y	Y	Y	N	N/A
10										

SECTION 2: REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist is completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element is completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions are explained for each plan sub-element that is 'Not Met.' Sub-elements are referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	**Basic Plan Section 2.4, 2.5, 2.6; Appendix A; Jurisdictional Annexes Section 1.1**	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	**Basic Plan Section 2.5.2**	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	**Basic Plan Section 2.5; Appendix A; Jurisdictional Annexes Section 1.1**	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	**Basic Plan Section 2.2, Hazard profiles in Section 4.5**	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	**Basic Plan Section 7.5, Appendix G**	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	**Basic Plan Section 7.2 and 7.3**	X	
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	**Basic Plan Section 4.2, 4.5 – see description, location, extent sections for each hazard profile; Jurisdictional Annexes Section 3.3**	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	**Basic Plan Section 4.5 – see Previous Occurrence/History section for each hazard profile; Jurisdictional Annexes Section 3.3**	X	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	**Basic Plan Section 4.5 – see Vulnerability section for each hazard profile; Section 4.6.4; Appendix B; Jurisdictional Annexes Sections 3.3 and 3.4**	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	**Basic Plan Section 4.6.3; Section 5.8; Jurisdictional Annexes Section 3.4.2**	X	
ELEMENT B: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	**Basic Plan Section 5.2-5.7; Jurisdictional Annexes Section 4.1-4.5**	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	**Basic Plan Section 5.8**	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	**Basic Plan Section 6.2**	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	**Basic Plan Section 6.3-6.5; Table 6-5; Jurisdictional Annexes Section 5.2 and 5.3**	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	**Basic Plan Section 6.5 – Table 6-5; Appendix D; Jurisdictional Annexes Section 5.3, Table 5-4**	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	**Basic Plan Section 5.9, 7.4; Jurisdictional Annexes Section 4.5 or 4.6**	X	

ELEMENT C: REQUIRED REVISIONS

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	**Basic Plan Section 4.7, Table 4-6; Jurisdictional Annexes Section 3.5**	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	**Basic Plan Section 6.3.1; Jurisdictional Annexes Section 5.1 – 5.3; Table 5-1 or 5-4**	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	**Basic Plan Section 1.6, 6.3, 6.4;**	X	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	**Basic Plan Section 7.1; Appendix F; Plan to be adopted following FEMA approval**		X
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	**Appendix F; Plan to be adopted following FEMA approval**		X
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 3: PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths

- The use of an online survey to collect input and feedback from the public and the use of social media to promote the survey was is an outstanding way to engage Clallam County residents in the planning process. Obtaining 550 responses is amazing! The plan notes that this survey also identified a lack of responses from tribal planning partners and that helped inform the public engagement strategy. Consider documenting *how* this changed the outreach strategy.

- The Clallam County Multi-Jurisdictional Planning Team should be very proud of their planning process. This was clearly a priority for the team and is well documented throughout the plan and Appendix A.

- Holding open houses for public meetings and inclusion of participatory hazard mapping, a mitigation ideas table, and a storytelling opportunity that enabled community members to tell their story regarding experience with disasters is an amazing practice! Consider including those stories in future plan updates as this can help more of the community see themselves in the plan and the benefits of mitigation. The community was clearly engaged as having 89 participants at the open houses is fantastic and certainly helped the MPT meet their goal of having extensive community participation.

- The use of local events, such as the Clallam Co. Home Show and the Clallam County Fair, to collect and share information as part of the process is a best practice that can hopefully be continued on a recurring basis for continued public involvement and/or plan updates.

Opportunities for Improvement

- The plan notes that continued public engagement will include posting the plan on the Clallam County website with opportunities for comment. Continue to leverage local events, like the Home Show and Clallam County Fair, to continue public participation in the planning process. This can provide the planning partners with an opportunity to highlight mitigation priorities, collect feedback (thought the online survey, for example) and/or soliciting input on the Mitigation Action Reports described in Section 7.5.

- While the County is the lead planning partner in terms of coordination, etc. it would be beneficial for other partners to include links to the plan or the approved plan itself on their websites for their communities to reference.

- The procedure reference in Section 7.3 is closely tied to application, award, and management of FEMA grants. It notes "Mitigation projects and project closeouts will be monitored and updated through the use of the 3 quarterly reporting forms for FEMA-funded projects, provided by FEMA Region X." However, several of the mitigation actions are not proposed through FEMA funding. The inclusion of the procedure for managing FEMA grants is a great addition but consider how this could be expanded or modified to capture all mitigation actions undertaken by the participating jurisdictions. This can more accurately capture the work in progress and completed over time.

- As the County is currently engaged in the RiskMAP process, consider how the current plan can help leverage that process for continued public engagement for the mitigation plan.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- Inclusion of climate adaptation and consideration of the impacts associated with climate change can help prioritize mitigation actions as well as assist in identifying co-benefits with other mitigation actions as part of a cost-benefit analysis.

- The use of a Likert Scale to show extent (duration, onset, etc.) for each hazard is an interesting approach to help the users understand the sense of severity for several of the hazards that do not have a commonly used intensity scale.

- The consistent template that is used to highlight impact, vulnerability, previous occurrences, etc. is an easy to collate a lot of information and make it easily readable for the public.

Opportunities for Improvement

- As the County is currently engaged in the RiskMAP process, consider how the current plan can help leverage that process to capture data needs and provide opportunities to get them resolved. The need for additional data sources were referenced in several locations of the plan. This can support several of high priority mitigation actions that are captured within the Mitigation Action Plan.

- Several areas of the risk assessment simply list a type and number of buildings that may be impacted by the hazard. Consider expanding on this approach in future plan updates and providing additional information on the 'so what' aspect of that information. For

example, what will it mean for Clallam County residents if 9 water systems are affected by a landslide? Teasing this information out can help identify more specific mitigation actions and assist in further refining priorities.

Element C: Mitigation Strategy

Plan Strengths

- The plan includes a mitigation action for each of the identified hazards and includes an excellent prioritization process, which builds on the STAPLEE approach but then incorporates and other factors to help capture the highest priority actions for each jurisdictions.

- The incorporation of a Mitigation Effectiveness Score within the Action Plan is a great way to highlight actions that may be most effective as well as weight actions and projects that reduce the greatest amount of risk. This is also a way to help assess the benefits of a particular mitigation action against its projected cost.

- The capability assessments for each jurisdiction are robust and cover an extensive amount of current capacity to implement identified mitigation actions as well as future initiatives that may be addressed in future planning efforts.

Opportunities for Improvement

- The planning process could include a broader assessment of potential mitigation actions before they are selected for inclusion and prioritization. Use of FEMA's Mitigation Ideas document may assist with conceptualizing a wider variety of actions for each of the hazards identified within the plan and then using the list to select actions that have the highest priority and best potential cost-benefit for the community.

Element D: Plan Review, Updates, and Evaluation (Plan Updates Only)

Plan Strengths

- It was very easy to tell that the plan had been substantially revised and included numerous references to the best available science.

- The tables that were provided to identify how vulnerability had changed over the implementation period of the previous plan was an interesting way to show this information.

Opportunities for Improvement

- There could be a better description of progress for each of the actions identified within the overall mitigation strategy. Consider including the annual Mitigation Action Reports as an appendix to future plans to document progress.

B. Resources for Implementing Your Approved Plan

The **Region 10 Integrating Natural Hazard Mitigation into Comprehensive Planning** is a resource specific to Region 10 states and provides examples of how communities are integrating natural hazard mitigation strategies into comprehensive planning. You can find it in the FEMA Library at http://www.fema.gov/media- library/assets/documents/89725.

The **Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials** resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible impediments, and presents a series of case studies to demonstrate successful integration in practice. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7130.

The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise, to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=6938.

The **Local Mitigation Planning Handbook** provides guidance to local governments on developing or updating hazard mitigation plans to meet and go above the requirements. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7209.

The **Integration Hazard Mitigation and Climate Adaptation Planning: Case Studies and Lessons Learned** resource is a 2014 ICLEI publication for San Diego with a clear methodology that could assist in next steps for integration impacts of climate change throughout mitigation actions. http://icleiusa.org/wp- content/uploads/2015/08/Integrating-Hazard-Mitigation-and-Climate-Adaptation- Planning.pdf

The **Local Mitigation Plan Review Guide and Tool** resource is available through FEMA's Library and should be referred to for the next plan update. http://www.fema.gov/library/viewRecord.do?id=4859

The FEMA Region 10 **Risk Mapping, Analysis, and Planning program (Risk MAP)** releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region. Past newsletters can be viewed at http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Pages/default.aspx. If you would like to receive future newsletters, email rxnewsletter@starr-team.com and ask to be included.

The mitigation strategy may include eligible projects to be funded through FEMA's hazard mitigation grant programs (Pre-Disaster Mitigation, Hazard Mitigation Grant Program). Contact your State Hazard Mitigation Officer, Tim Cook, at tim.cook@mil.wa.gov, for further assistance.

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

JAN 3 0 2020

The Honorable W. Ron Allen
Chairman, Jamestown S'Klallam Tribe
1033 Old Blyn Highway
Sequim, Washington 98382

Dear Chairman Allen:

Congratulations, on January 28, 2020, the United States Department of Homeland Security's Federal Emergency Management Agency (FEMA) Region 10 approved the Clallam County Multi-jurisdictional Hazard Mitigation and Jamestown S'Klallam Annex as a Tribal Mitigation Plan, in accordance with Code of Federal Regulations Title 44 Part 201.

An approval provides the Jamestown S'Klallam Tribe eligibility to apply directly with FEMA for Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) programs, i.e., Pre-Disaster Mitigation project grants, Public Assistance (Categories C-G), Fire Management Assistance and Hazard Mitigation Grant Program (HMGP) projects through January 27, 2025. Recipients are required to develop and maintain hazard mitigation plans compliant with FEMA standards as a condition for receiving funds. To continue eligibility, within five years from date of this letter, tribes must review, revise as appropriate and re-submit plans for approval. For further assistance on hazard mitigation planning, please contact our Regional Mitigation Planning Program Manager, John Schelling, at (425) 487-2104.

FEMA evaluates applications for funding according to the specific requirements of the applicable program. A mitigation action identified in the plan may, or may not, meet a program's eligibility requirements. For assistance with hazard mitigation grant funding, please contact FEMA-R10-HMA@fema.dhs.gov.

We look forward to continuing a productive relationship between FEMA Region 10 and the Jamestown S'Kllam Tribe. Our Regional Tribal Liaison Erin Ward, at (425) 487-4567, is available to facilitate this relationship and delivery of our programs. You are also welcome to contact me directly, at (425) 487-4604.

Sincerely,

Michael F. O'Hare
Regional Administrator

Enclosures

cc: Tim Cook, Washington Emergency Management Division

FEMA Region 10 Tribal Mitigation Plan Review Tool

The *Tribal Mitigation Plan Review Tool* records how the tribal mitigation plan meets the regulations in 44 CFR §§ 201.7 and 201.5 (if applicable) and offers FEMA plan reviewers an opportunity to provide feedback to the tribal government.

- **Section 1**: The Regulation Checklist documents FEMA's evaluation of whether the plan has addressed all requirements. If plan requirements are not met, FEMA uses each Required Revisions section to indicate necessary changes.
- **Section 2**: The Strengths and Opportunities for Improvement summary identifies plan's strengths as well as areas for improvement as part of the next plan update.

The FEMA mitigation planner must reference the *Tribal Mitigation Plan Review Guide* when completing the *Tribal Mitigation Plan Review Tool*.

<table>
<tr><td>Tribal Jurisdiction:
Jamestown S'Klallam Tribe
Lower Elwha Klallam Tribe</td><td colspan="2">Title of Plan:
Clallam County Multi-Jurisdictional Hazard Mitigation Plan</td><td>Date of Plan: TBD</td></tr>
<tr><td colspan="2">Tribal Point of Contact:
Luke Strong-Cvetich, Tribal Planner</td><td colspan="2" rowspan="3">Address:
Jamestown S'Klallam Tribe
1033 Old Blyn Hwy
Sequim, WA 98382</td></tr>
<tr><td colspan="2">Title: See above</td></tr>
<tr><td colspan="2">Agency: See above</td></tr>
<tr><td colspan="2">Phone Number:
Jamestown S'Klallam Tribal contact: 360-681-4669</td><td colspan="2">Email:
Jamestown S'Klallam Tribal contact:
lstrong@jamestowntribe.org</td></tr>
</table>

State Reviewer (if applicable):	Title:	Date:

FEMA Reviewer:	Title:	Date:
John Schelling	Regional Hazard Mitigation Planning Manager	12/20/2019, 1/27/2020
Date Received in FEMA Region 10	12/17/2019	
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved	1/28/2020	

Section 1: REGULATION CHECKLIST

1. Standard Regulation Checklist **Regulation** (44 CFR § 201.7 Tribal Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process? [44 CFR § 201.7(c)(1)]	**Basic Plan Section 2.4, 2.5, 2.6; Appendix A**	X	
A2. Does the plan document an opportunity for public comment during the drafting stage and prior to plan approval, including a description of how the tribal government defined "public"? [44 CFR § 201.7(c)(1)(i)]	**Basic Plan Section 2.5; Appendix A**	X	
A3. Does the plan document, as appropriate, an opportunity for neighboring communities, tribal and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? [44 CFR § 201.7(c)(1)(ii)]	**Basic Plan Section 2.5.2**	X	
A4. Does the plan describe the review and incorporation of existing plans, studies, and reports? [44 CFR § 201.7(c)(1)(iii)]	**Basic Plan Section 2.2, Tribal Annex Section 4.8**	X	
A5. Does the plan include a discussion on how the planning process was integrated to the extent possible with other ongoing tribal planning efforts as well as other FEMA programs and initiatives? [44 CFR § 201.7(c)(1)(iv)]	**Basic Plan Section 2.2, Tribal Annex Section 4.8**	X	
A6. Does the plan include a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within the plan update cycle)? [44 CFR § 201.7(c)(4)(i)]	**Basic Plan Section 7.2 and 7.3**	X	
A7. Does the plan include a discussion of how the tribal government will continue public participation in the plan maintenance process? [44 CFR § 201.7(c)(4)(iv)]	**Basic Plan Section 7.5, Appendix G**	X	

1. Standard Regulation Checklist Regulation (44 CFR § 201.7 Tribal Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the plan include a description of the type, location, and extent of all-natural hazards that can affect the tribal planning area? [44 CFR § 201.7(c)(2)(i)]	**Basic Plan Section 4.2, 4.5 – see description, location, extent sections for each hazard profile; Tribal Annexes Section 3.3**	X	
B2. Does the plan include information on previous occurrences of hazard events and on the probability of future hazard events for the tribal planning area? [44 CFR § 201.7(c)(2)(i)]	**Basic Plan Section 4.5 – see Previous Occurrence/History section for each hazard profile; Tribal Annexes Section 3.3**	X	
B3. Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.7(c)(2)(ii)]	**Basic Plan Section 4.5 – see Vulnerability section for each hazard profile; Section 4.6.4; Appendix B; Tribal Annexes Sections 3.3 and 3.4**	X	

1. Standard Regulation Checklist Regulation (44 CFR § 201.7 Tribal Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B: REQUIRED REVISIONS			

ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan include a discussion of the tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas? [44 CFR §§ 201.7(c)(3) and 201.7(c)(3)(iv)]	Tribal Annexes Section 4, see Section 4.1: Human and Technical Resources; 4.2: Financial Resources; and 4.3: Legal and Regulatory Resources	X	
C2. Does the plan include a discussion of tribal funding sources for hazard mitigation projects and identify current and potential sources of Federal, tribal, or private funding to implement mitigation activities? [44 CFR §§ 201.7(c)(3)(iv) and 201.7(c)(3)(v)]	Tribal Annexes Section 4.2; Section 5.3 - Table 5-3	X	
C3. Does the Mitigation Strategy include goals to reduce or avoid long-term vulnerabilities to the identified hazards? [44 CFR § 201.7(c)(3)(i)]	Basis Plan Section 6.2; Tribal Annexes Section 5 - Table 5-3	X	
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with emphasis on new and existing buildings and infrastructure? [44 CFR § 201.7(c)(3)(ii)]	Tribal Annexes Section 5 - Table 5-3; Appendix D	X	
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized, implemented, and administered by the tribal government? [44 CFR § 201.7(c)(3)(iii)]	Tribal Annexes Section 5 - Table 5-3; Appendix D	X	
C6. Does the plan describe a process by which the tribal government will incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate? [44 CFR § 201.7(c)(4)(iii)]	Tribal Annexes Section 4.8 and 4.8.1	X	
C7. Does the plan describe a system for reviewing progress on achieving goals as well as activities and projects identified in the mitigation strategy, including monitoring implementation of mitigation measures and project closeouts? [44 CFR §§ 201.7(c)(4)(ii) and 201.7(c)(4)(v)]	Basic Plan Section 7; Appendix G	X	

ELEMENT C: REQUIRED REVISIONS

ELEMENT D. PLAN UPDATES			
D1. Was the plan revised to reflect changes in development? [44 CFR § 201.7(d)(3)]	**Basic Plan Section 4.7; Section 2.3; Tribal Annexes Section 3.5 – Table 3-4**	X	
D2. Was the plan revised to reflect progress in tribal mitigation efforts? [44 CFR §§ 201.7(d)(3) and 201.7(c)(4)(iii)]	**Tribal Annexes Section 5.1; Section 5.1 - 5-3; Table 5-3**	X	
D3. Was the plan revised to reflect changes in priorities? [44 CFR § 201.7(d)(3)]	**Tribal Annexes Section 1.2; Section 3.2; Section 3.2; Section 3.3**	X	

ELEMENT D: REQUIRED REVISIONS

ELEMENT E. ASSURANCES AND PLAN ADOPTION			
E1. Does the plan include assurances that the tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? [44 CFR § 201.7(c)(6)]	**Basic Plan Section 1.1.**	X	
E2. Does the plan include documentation that it has been formally adopted by the governing body of the tribal government requesting approval? [44 CFR § 201.7(c)(5)]	**Appendix F; Plan to be adopted following FEMA approval**	X	

ELEMENT E: REQUIRED REVISIONS

2. Enhanced Regulation Checklist Regulation (44 CFR § 201.5 Enhanced Tribal Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ENHANCED ELEMENT F. STANDARD PLAN REQUIREMENTS			
F1. Does the enhanced plan include all elements of the standard tribal mitigation plan? [44 CFR §§ 201.3(e)(3), 201.5(b), and 201.7]	N/A		
ENHANCED ELEMENT F: REQUIRED REVISIONS			
ENHANCED ELEMENT G. INTEGRATED PLANNING			
G1. Does the enhanced plan demonstrate integration to the extent practicable with other tribal and/or regional planning initiatives and FEMA mitigation programs and initiatives? [44 CFR §§ 201.3(e)(3) and 201.5(b)(1)]	N/A		
ENHANCED ELEMENT G: REQUIRED REVISIONS			
ENHANCED ELEMENT H. TRIBAL MITIGATION CAPABILITIES			
H1. Does the tribal government demonstrate commitment to a comprehensive mitigation program? [44 CFR §§ 201.3(e)(3) and 201.5(b)(4)]	N/A		
H2. Does the enhanced plan document capability to implement mitigation actions? [44 CFR §§ 201.3(e)(3), 201.5(b)(2)(i), 201.5(b)(2)(ii), and 201.5(b)(2)(iv)]	N/A		
H3. Is the tribal government using existing mitigation programs to achieve mitigation goals? [44 CFR §§ 201.3(e)(3), 201.5(a) and 201.5(b)(3)]	N/A		
ENHANCED ELEMENT H: REQUIRED REVISIONS			

2. Enhanced Regulation Checklist **Regulation** (44 CFR § 201.5 Enhanced Tribal Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
ENHANCED ELEMENT I. HMA GRANTS MANAGEMENT PERFORMANCE			
I1. With regard to HMA, is the tribal government maintaining the capability to meet application timeframes and submitting complete project applications? [44 CFR §§ 201.3(e)(3), 201.5(b)(2)(iii)(A)]	N/A		
I2. With regard to HMA, is the tribal government maintaining the capability to prepare and submit accurate environmental reviews and benefit-cost analyses? [44 CFR §§ 201.3(e)(3) and 201.5(b)(2)(iii)(B)]	N/A		
I3. With regard to HMA, is the tribal government maintaining the capability to submit complete and accurate quarterly progress and financial reports on time? [44 CFR §§ 201.3(e)(3) and 201.5(b)(2)(iii)(C)]	N/A		
I4. With regard to HMA, is the tribal government maintaining the capability to complete HMA projects within established performance periods, including financial reconciliation? [44 CFR §§ 201.3(e)(3) and 201.5(b)(2)(iii)(D)]	N/A		
ENHANCED ELEMENT I: REQUIRED REVISIONS			

SECTION 2: PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths

- Holding open houses for public meetings and inclusion of participatory hazard mapping, a mitigation ideas table, and a storytelling opportunity that enabled community members to tell their story regarding experience with disasters is an amazing practice!

- The use of local events, such as the Clallam Co. Home Show and the Clallam County Fair, to collect and share information as part of the process is a best practice that can hopefully be continued on a recurring basis for continued public involvement and/or plan updates.

Opportunities for Improvement

- Consider holding an open house specifically for the tribe as part of a future plan update and, if including storytelling as an activity, incorporating relevant stories in future plan updates as this can help more of the community see themselves in the plan and the benefits of mitigation.

- Several sections of the plan are captured as excerpts from previous planning efforts. While it is great to reference previous work, consider how to revise these, if necessary, or expanded as part of future plan updates to highlight the current status of the tribe's progress over this next planning cycle.

- The plan notes that continued public engagement will include posting the plan on the Clallam County website with opportunities for comment as well as engaging the community through existing events. Consider leveraging the types of existing events or community gatherings, like the annual potluck picnic as an example, where engaging members of the tribe in the planning and implementation process can readily be accomplished. This can provide the tribal leadership with an opportunity to highlight mitigation priorities, collect feedback (using questions online survey, for example) and/or soliciting input on the Mitigation Action Reports described in Section 7.5.

- While the County is the lead planning partner in terms of coordination, etc. it would be beneficial for the plan to explicitly list that the tribe will include links to the plan or the approved plan itself on their website for reference.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- Inclusion of climate adaptation and consideration of the impacts associated with climate change can help prioritize mitigation actions as well as assist in identifying co-benefits with other mitigation actions as part of a cost-benefit analysis.

- The use of a Likert Scale to show extent (duration, onset, etc.) and rank risk for each hazard is an interesting approach to help the users understand the sense of severity for several of the hazards, especially for those hazards that do not have a commonly used intensity scale.

- The consistent template that is used to highlight impact, vulnerability, previous occurrences, etc. is an easy to collate a lot of information and make it easily readable for the public.

Opportunities for Improvement

- As the County and tribe are currently engaged in the RiskMAP process, consider how the current plan can help leverage that process to capture data needs and provide opportunities to get them resolved. The need for additional data sources were referenced in several locations of the plan. This can support several of high priority mitigation actions that are captured within the Mitigation Action Plan.

- Several areas of the risk assessment simply list a type and number of buildings that may be impacted by the hazard. Consider expanding on this approach in future plan updates and providing additional information on the 'so what' aspect of that information. For example, what will it mean for the Jamestown S'Klallam Tribe if the 13 economic or cultural assets identified in the risk assessment are affected by an earthquake? Teasing this information out within the risk profiles can help identify more specific mitigation actions and assist in further refining priorities.

Element C: Mitigation Strategy

Plan Strengths

- The integration of mitigation efforts into the tribe's planning mechanisms, such as the Tribe's Comprehensive Plan and Tribal Building Code, as identified in Tables 4-4 and 4-7 are a great way to reduce risk through existing processes and improve the long-term safety of the community.

Opportunities for Improvement

- The planning process could include a broader assessment of potential mitigation actions before they are selected for inclusion and prioritization. Use of FEMA's Mitigation Ideas document may assist with conceptualizing a wider variety of actions for each of the hazards identified within the plan and then using the list to select actions that have the highest priority and best potential cost-benefit for the tribe.

Element D: Plan Review, Updates, and Evaluation (Plan Updates Only)

Plan Strengths

- It was very easy to tell that the plan had been substantially revised and included numerous references to the best available science.

- The tables that were provided to identify how vulnerability had changed over the implementation period of the previous plan was an interesting way to show this information.

Opportunities for Improvement

- There could be a better description of progress for each of the actions identified within the overall mitigation strategy. Consider including the annual Mitigation Action Reports as an appendix to future plans to document progress.

B. Resources for Implementing Your Approved Plan

The **Region 10 Integrating Natural Hazard Mitigation into Comprehensive Planning** is a resource specific to Region 10 states and provides examples of how communities are integrating natural hazard mitigation strategies into comprehensive planning. You can find it in the FEMA Library at http://www.fema.gov/media- library/assets/documents/89725.

The **Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials** resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible impediments, and presents a series of case studies to demonstrate successful integration in practice. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7130.

The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise, to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=6938.

The **Local Mitigation Planning Handbook** provides guidance to local governments on developing or updating hazard mitigation plans to meet and go above the requirements. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7209.

The **Integration Hazard Mitigation and Climate Adaptation Planning: Case Studies and Lessons Learned** resource is a 2014 ICLEI publication for San Diego with a clear methodology that could assist in next steps for integration impacts of climate change throughout mitigation actions. http://icleiusa.org/wp- content/uploads/2015/08/Integrating-Hazard-Mitigation-and-Climate-Adaptation- Planning.pdf

The **Local Mitigation Plan Review Guide and Tool** resource is available through FEMA's Library and should be referred to for the next plan update. http://www.fema.gov/library/viewRecord.do?id=4859

The FEMA Region 10 **Risk Mapping, Analysis, and Planning program (Risk MAP)** releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region. Past newsletters can be viewed at http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Pages/default.aspx. If you would like to receive future newsletters, email rxnewsletter@starr-team.com and ask to be included.

The mitigation strategy may include eligible projects to be funded through FEMA's hazard mitigation grant programs (Pre-Disaster Mitigation, Hazard Mitigation Grant Program). Contact your State Hazard Mitigation Officer, Tim Cook, at tim.cook@mil.wa.gov, for further assistance.

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1/14/20

RESOLUTION 13, 2020

ADOPTING THE MULTIJURISDICTIONAL HAZARD MITIGATION PLAN UPDATE

THE BOARD OF CLALLAM COUNTY COMMISSIONERS finds as follows:

1. That the most recent Multijurisdictional Hazard Mitigation Plan adopted by Clallam County expired in 2016.

2. That work to revise and update that plan began in September of 2018 and continued throughout 2019.

3. That the revision process included input from multiple jurisdictions and other Clallam County stakeholders and from the public during advertised meetings held throughout Clallam County.

4. That the completed and revised plan was submitted in December, 2019 to the Washington State Department of Emergency Management and the Federal Emergency Management Agency (FEMA) Region X simultaneously for their review and approval.

5. That FEMA approved Clallam County's Multijurisdictional Hazard Mitigation Plan Update in January, 2020.

NOW, THEREFORE, BE IT RESOLVED by the Board of Clallam County Commissioners, in consideration of the above findings of fact:

1. That Clallam County's Multijurisdictional Hazard Mitigation Plan, Revision 1, 2019 is adopted.

PASSED AND ADOPTED this 14 day of January 2020

BOARD OF CLALLAM COUNTY COMMISSIONERS

Mark Ozias, Chair

Randy Johnson

Bill Peach

ATTEST:

Loni Gores, Clerk of the Board

JAMESTOWN S'KLALLAM TRIBE
1033 Old Blyn Highway, Sequim, WA 98382 360/683-1109 FAX 360/681-4643

RESOLUTION #05-20

Adopting Clallam County, Washington Multi-Jurisdictional Hazard Mitigation Plan

WHEREAS, the Jamestown S'Klallam Indian Tribe ("Tribe") was Federally acknowledged by the Secretary of the Interior of the United States of America on February 10, 1981; and

WHEREAS, the Jamestown S'Klallam Tribal Council ("Council") is the governing body of the Tribe, in accordance with its Constitution adopted on November 19, 1983, pursuant to the provisions of Part 81 of Title 25 of the Code of Federal Regulations, as such Constitution is amended from time-to-time; and

WHEREAS, the health, safety, welfare, education, and regulation of treaty fishing, hunting, and gathering practices of the Indian people of the Tribe is the responsibility of the Council; and

WHEREAS, the Tribe has an interest in protecting its people and assets from damage due to natural disasters; and

WHEREAS, the Federal Emergency Management Agency (FEMA) requires that the Tribe develop a Hazard Mitigation Plan in order to be eligible for federal and state funding; and

WHEREAS, the Tribe, in partnership with Clallam County Emergency Management, has coordinated a planning process for the Tribe that meets the guidelines and the following requirements of FEMA for pre-disaster hazard mitigation plans:

1. the Tribe has conducted an assessment of risks to Tribal property and people from potential natural hazards;
2. the Tribe has identified strategies to mitigate the potential effects of natural disasters;
3. the Tribe has identified a schedule for implementing and maintaining the plan; and
4. Tribal citizens, Tribal staff, other jurisdictions and the general public were solicited for input into the plan; now

THEREFORE, BE IT RESOLVED, that the Council does hereby adopt the Clallam County Multi-Jurisdictional Hazard Mitigation Plan, substantially as set out in Exhibit A to this resolution, as the Tribe's Hazard Mitigation Plan.

W. Ron Allen, Tribal Chairman

Certification

I, Loni Greninger, Vice Chair of the Jamestown S'Klallam Tribal Council of the Jamestown S'Klallam Tribe, do hereby certify that the resolution was adopted at a meeting of the Jamestown S'Klallam Tribal Council held on the January 6, 2020 at the Tribal Office in Blyn, Washington, and where a quorum was present and approving the resolution by a vote of **3** FOR and **0** AGAINST with **0** ABSTAINING.

Loni Greninger, Tribal Council Secretary

EXHIBIT A
PLAN

20XX PROGRESS REPORT

Reporting Period

MONTH 20XX through MONTH 20XX

Background

The County has developed an All-Hazards Mitigation Plan (HMP), most recently updated in 2019. This Mitigation Action Plan identifies resources, information, and strategies for reducing risks associated with the hazards identified in the County's HMP.

Purpose

This Mitigation Action Plan provides an update on the implementation of mitigation actions included in the 2018 HMP. It is intended to be updated on an annual basis to capture successes and ensure progress is made toward improving the County's mitigation program.

Summary of Overview of Mitigation Program Progress

Table 1 Summary Overview

Number of Mitigation Actions Identified	Xx
Mitigation Actions Started and Completed Number of Actions Percent of Total	 Xx Xx%
Mitigation Actions Not Started Number of Actions Percent of Total	 Xx Xx%

The following table provides a snapshot of recent changes related to the County's hazard mitigation program.

Table 2 Recent Hazard Changes

Recent Hazard Events Impacting the County	To Be Completed
New Studies and Reports	To Be Completed
New Opportunities for Hazard Mitigation Program Integration	To Be Completed
Changes in Risk Exposure	To Be Completed
Mitigation Success Stories	To Be Completed
Continued Public Engagement	To Be Completed

Review of the Action Plan

Each identified mitigation action should be reviewed annually and outline the following information:

- Brief summary of the action
- Progress made on the action
- Updated timeline
- State priority level (high, medium, low)
- Status (complete, ongoing, no progress)
- Additional comments

Table 3 Review of Actions

Action ID #	Hazards Addressed	Funding Options	Timeframe	Objectives Met	Lead and Supporting Agencies	Performance Metrics
Action #						
Action #						
Action #						
Action #						
Action #						
Action #						
Action #						
Action #						
Action #						
Action #						