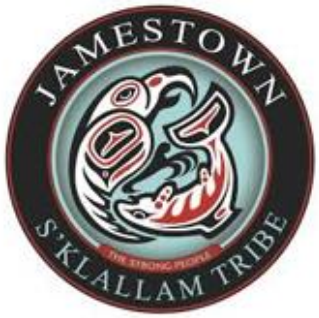
Clallam County Multi-Jurisdictional Hazard Mitigation Plan



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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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.

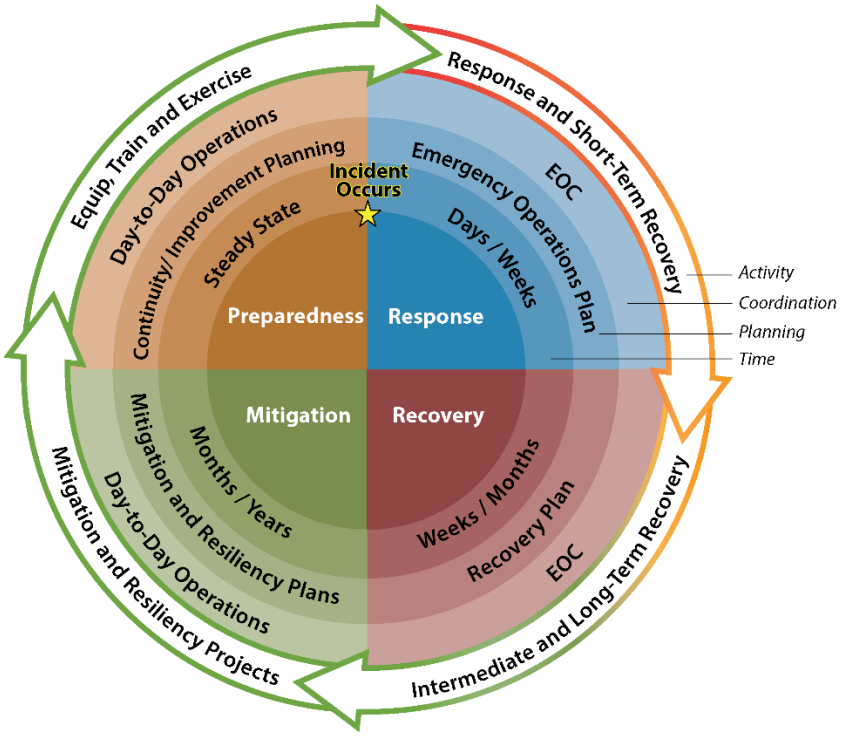
1.2 What is Hazard Mitigation?

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

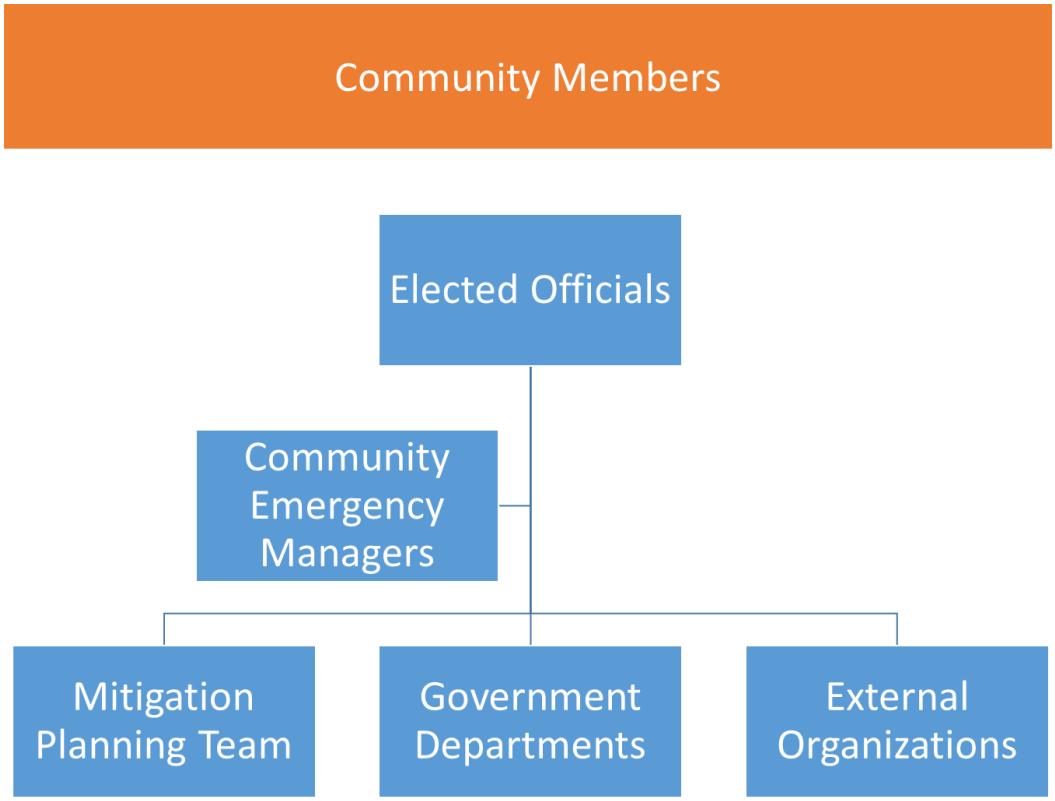
The HMP is one component of the County's approach to hazard mitigation. While not as heavily populated as many counties within Western Washington, the County and its partners maintain capabilities to ensure all elements of the participating communities are able to support hazard mitigation activities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

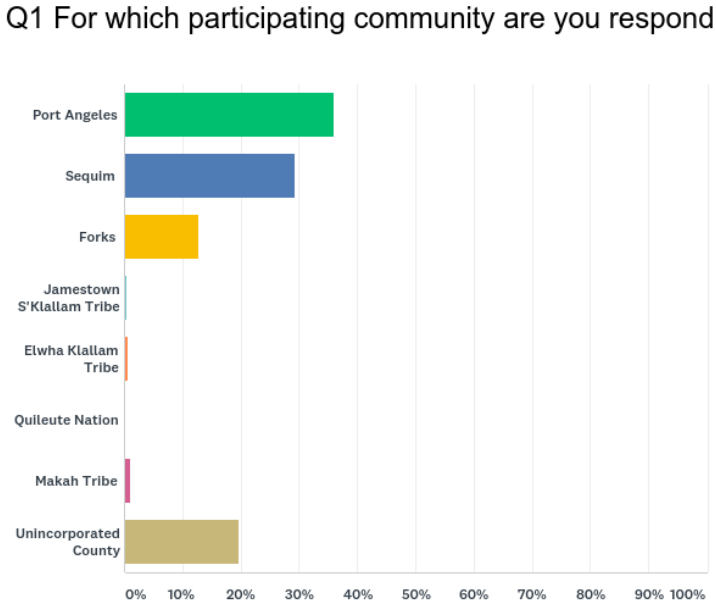
2.5.1 Inclusive Outreach and Public Engagement Plan

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.



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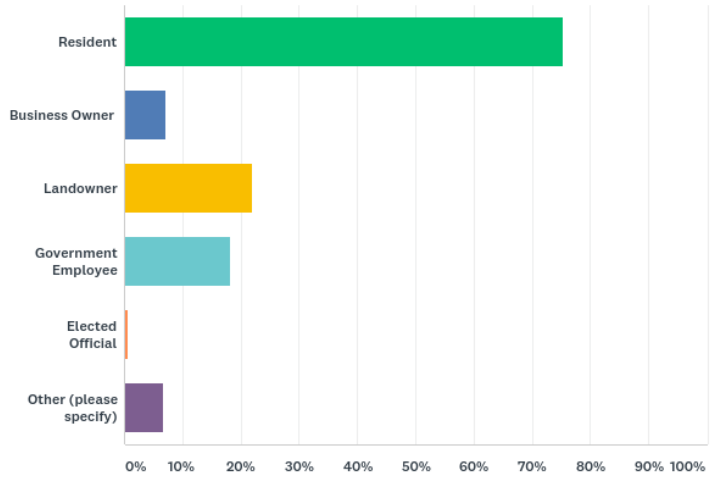
The initial survey was not nearly as effective at engaging tribal partners in the process, which informed future outreach efforts.



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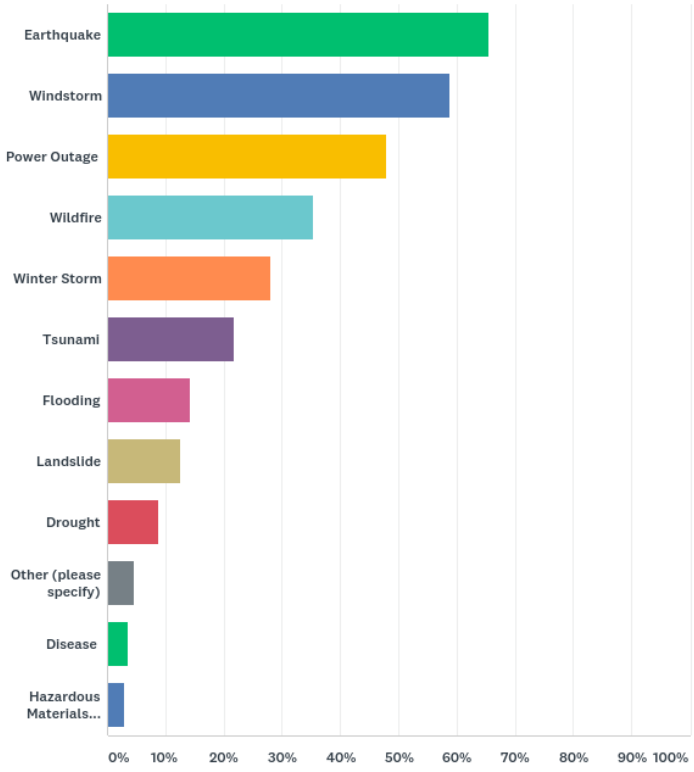
3

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))

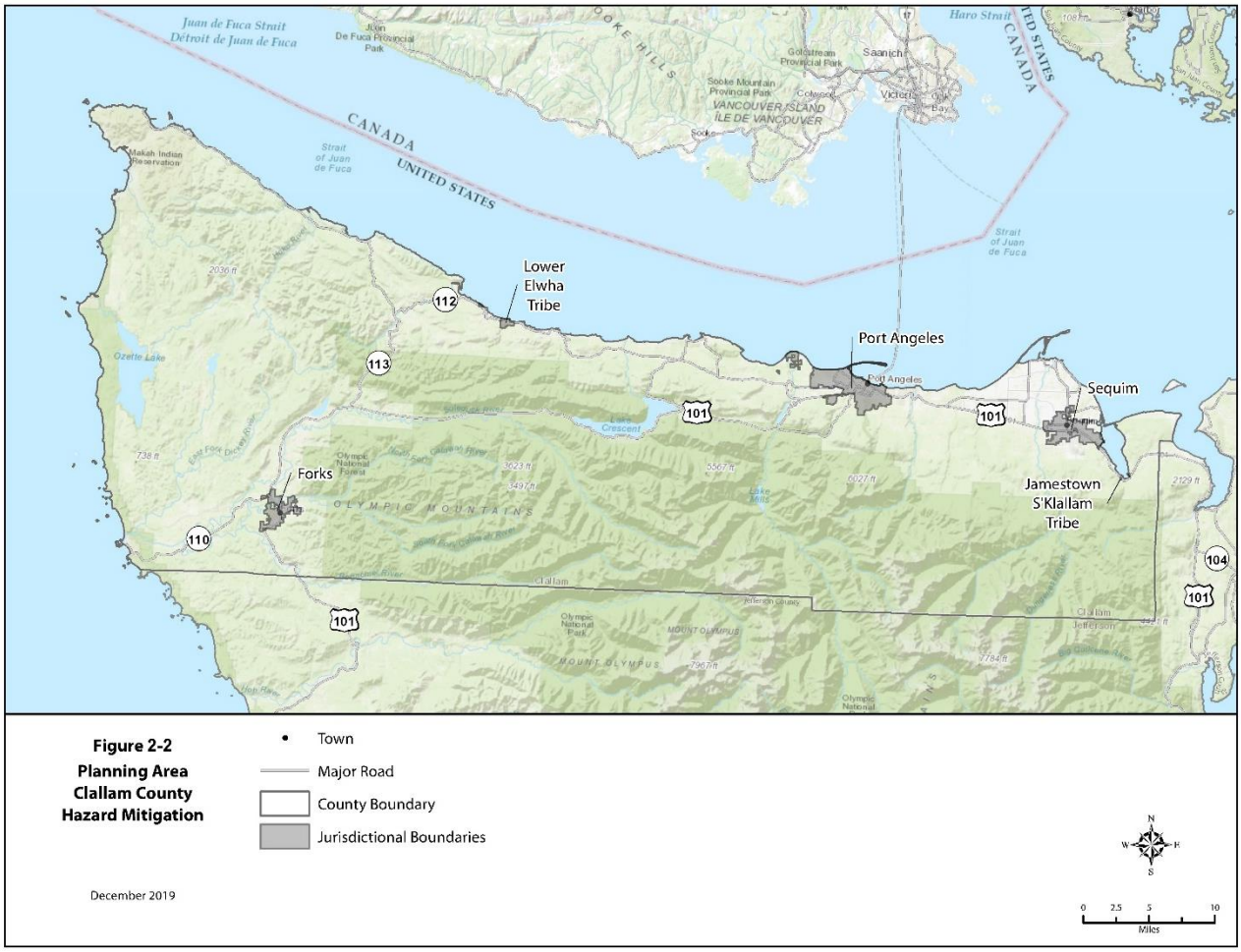
The HMP development was conducted according to the process outlined above and described in detail in FEMA's Local Mitigation Planning Handbook. The MPT reviewed the previous plan during the Project Kickoff Workshop and identified sections that required revision.

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.

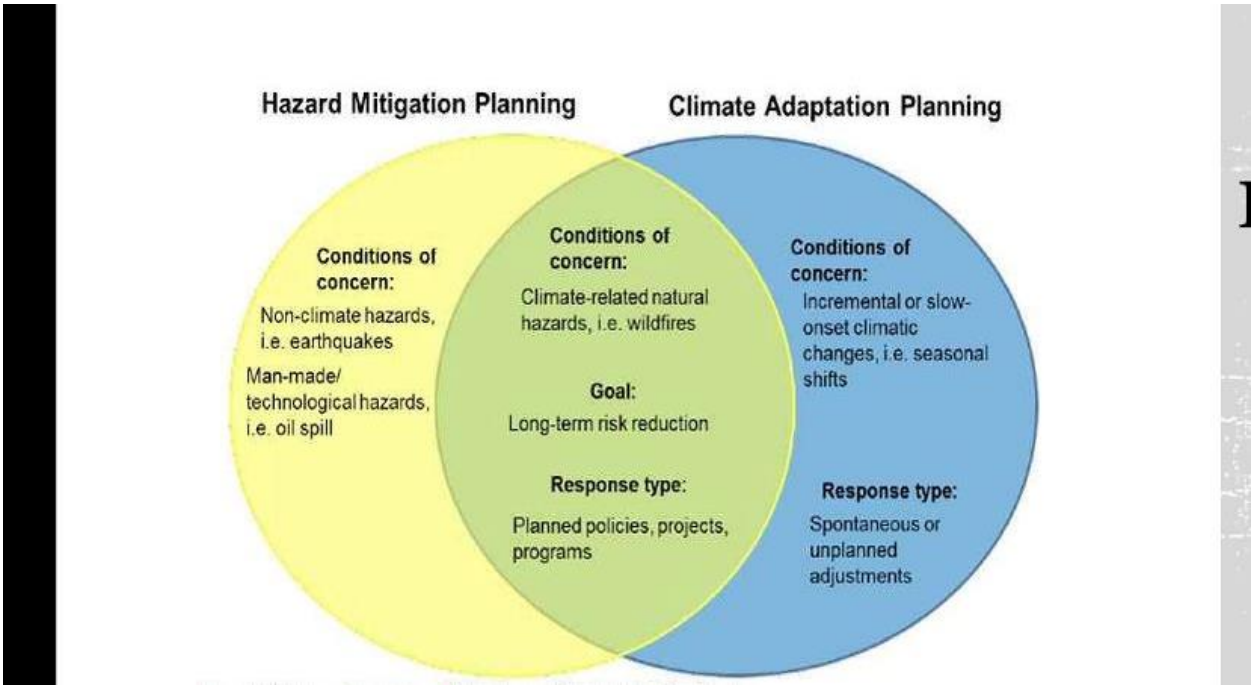
Potential impacts of future climate conditions include increased average temperatures, decreased snow accumulation, and increased peak stream flow. The increasing average temperature is expected to be more pronounced during summer months, and decreased summer precipitation is expected to accompany this 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

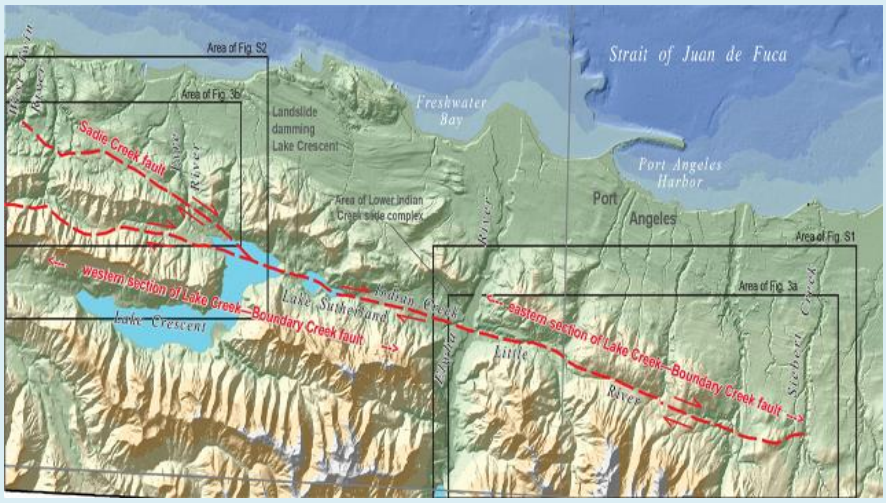
The CSZ poses a great risk to all coastal communities along its length. Earthquakes have the potential to damage critical infrastructure, such as bridges and roads, cutting off county and tribal communities from outside aid in the aftermath of an event and forming isolated "micro-islands."

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).

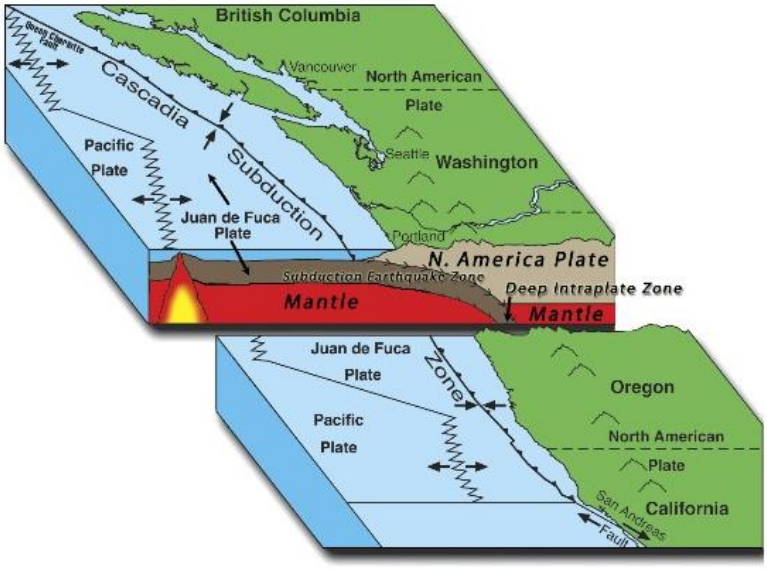
- 1700, CSZ Earthquake, M9.0
- 1909, San Juan Island, M6.0
- 1939, Vashon Island, M6.1
- 1949, Olympia, M7.1
- 1965, Seattle – Tacoma, M6.5
- 2001, Nisqually, M6.8

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.

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.

1

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

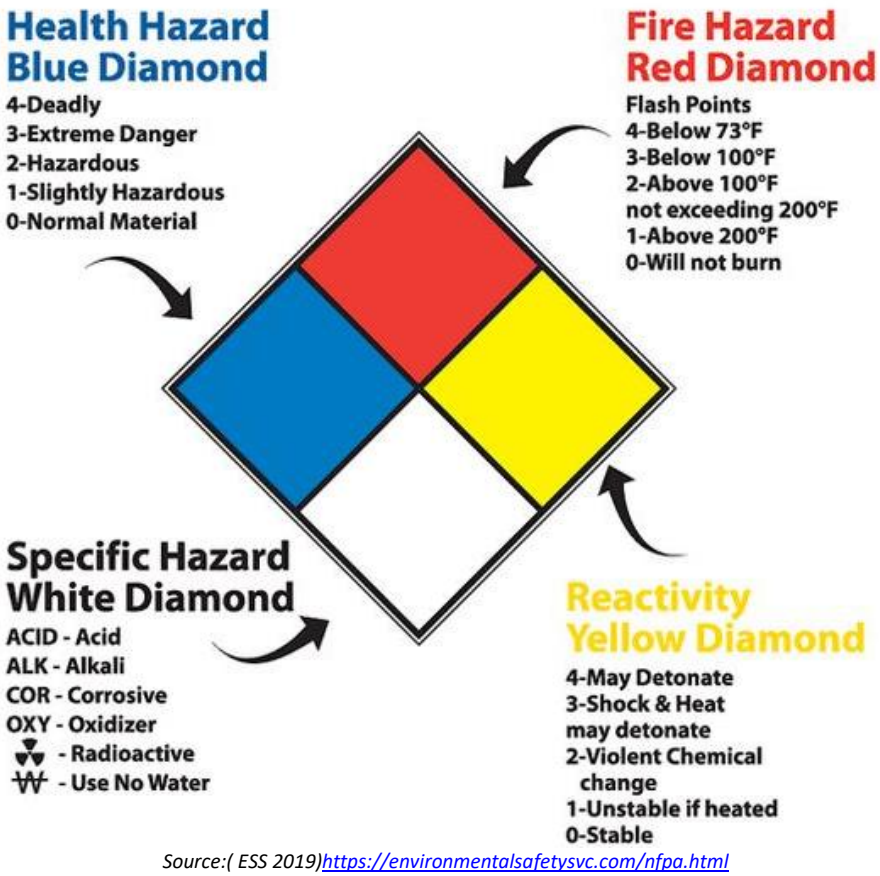
Vulnerability

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

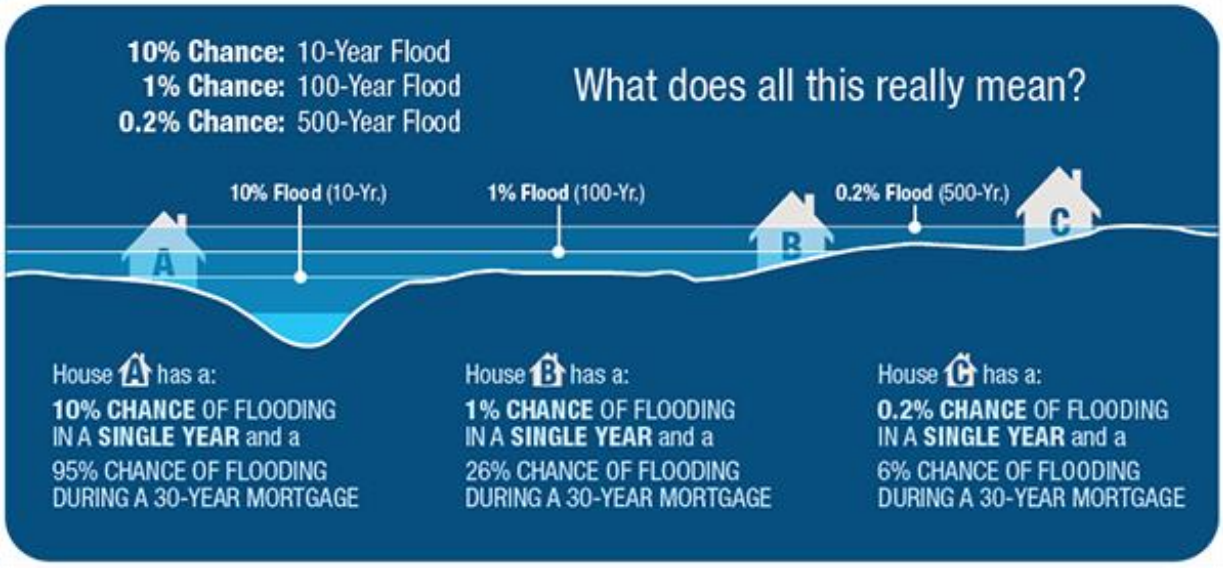
Previous Occurrence/History

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

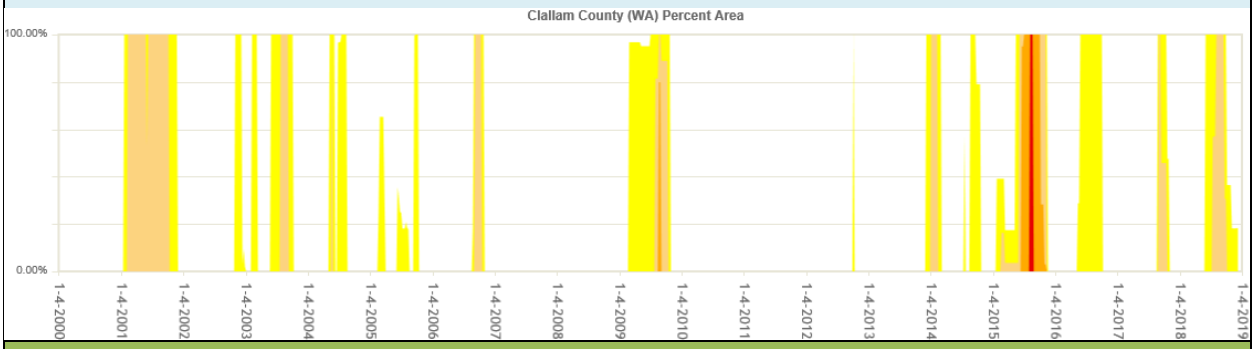
Extent and Probability

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.

8 REFERENCES

Buck, Jim. 2016. Appendix D: Clallam County, Multi-Jurisdiction Hazard Assessment. Updated July 4, 2016.

Clallam County. 2009a. *Clallam County Community Wildfire Protection Plan*. December 2009. https://www.dnr.wa.gov/publications/rp_burn_cwpp_clallamco.pdf?hkhyxx. Accessed June 15, 2019.

_____. 2009b. *Dungeness River Comprehensive Flood Hazard Management Plan*. http://www.clallam.net/environment/assets/applets/DRCFHMP-FINAL-LOWRES_5-2010.pdf. Accessed July 17, 2019.

_____. 2010. *Hazard Mitigation Plan for Clallam County with City of Forks, City of Port Angeles, City of Sequim, Port of Port Angeles, Peninsula College, Olympic Medical Center, Public Utility District*. Prepared by Clallam County Sheriff's Office Emergency Management Division. August 2010.

_____. 2013. Understanding Tsunami Hazards in the State of Washington: How Vulnerable is the City of Sequim to Tsunamis? http://www.clallam.net/tsunami/documents/FactSheet_Sequim.pdf. Accessed August 24, 2019.

_____. 2019a. *Clallam County Comprehensive Plan: Clallam County General Comprehensive Plan Land Use Designations*. September 25, 2019. http://www.clallam.net/landuse/comprehensiveplan.html. Accessed September 25, 2019.

_____. 2019b. *Title 31 Comprehensive Plan*. Updated August 13, 2019. https://www.codepublishing.com/WA/ClallamCounty/html/ClallamCounty31/ClallamCounty31.html. Accessed September 24, 2019.

Desisto, C. D. Barry, T. Nabors, and E. Drake. 2009. Wildfire Hazard Assessment and the Wildland Urban Interface of the North Olympic Peninsula, Washington. https://www.researchgate.net/publication/261134712_Wildfire_Hazard_Assessment_and_the_Wildland-Urban_Interface_of_the_North_Olympic_Peninsula_Washington. Accessed January 2019.

Environmental Safety Services. 2019. NFPA 704M Signs Labels and Placards. https://environmentalsafetysvc.com/nfpa.html Accessed September 18, 2019.

Federal Emergency Management Agency (FEMA). 2013. Discovery Report: FEMA Region X, Jefferson and Clallam Counties. April 2013. http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Documents/Jefferson_Clallam_Risk_MAP_Documents/Jefferson_Clallam_Discovery_Report.pdf. Accessed September 24, 2019.

_____. 2019a. Data Visualization: Disaster Declarations for States and Counties. Updated May 10, 2019. https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties. Accessed June 1, 2019.

_____. 2019b. NFIP Definitions. https://www.fema.gov/national-flood-insurance-program/definitions. Accessed September 19, 2019.

_____. 2019c. Policy & Claim Statistics for Flood Insurance. https://www.fema.gov/policy-claim-statistics-flood-insurance. Accessed September 20, 2019.

_____. n.d. Tsunami Fact Sheet. https://www.fema.gov/media-library-data/26ea1ceee22e73558b01030a4a0d7c47/FEMA_FS_tsunami_508-8-15-13.pdf. Accessed September 24, 2019.

Governor of Washington. 2019. Inslee expands drought emergency for nearly half of the state. May 20, 2019. https://www.governor.wa.gov/news-media/inslee-expands-drought-emergency-nearly-half-state. Accessed September 8, 2019.

Headwaters Economics. 2013. The Rising Cost of Wildfire Protection. June 2013. https://headwaterseconomics.org/wp-content/uploads/fire-costs-background-report.pdf. Accessed September 24, 2019.

Houston Chronicle. 2019. FEMA Severe Repetitive Flood Loss Properties. https://data.world/houstonchronicle/severe-repetitive-loss-properties-flood-games. Accessed September 19, 2019.

Intergovernmental Panel on Climate Change (IPCC). 2001. Climate Change 2001: Synthesis Report. A Contribution of Working Groups I, II, and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Watson, R.T. and the Core Writing Team (eds.)]. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA. Available online: https://www.ipcc.ch/report/ar3/syr/. Accessed September 17, 2019.

Jamestown S'Klallam Tribe. 2011. Multi-Hazard Mitigation Plan. January 10, 2011. https://jamestowntribe.org/wp-content/uploads/2018/05/Tribal_Multi-Hazard_Plan.pdf. Accessed September 6, 2019.

Lange, Greg. 2003. Earthquake of Enormous Magnitude Hits the Pacific Northwest Coast on January 26, 1700. HistoryLink.org Essay 5098. January 23, 2003. https://www.historylink.org/File/5098. Accessed September 25, 2019.

Lower Elwha Klallam Tribe. 2019. River Restoration. https://www.elwha.org/departments/river-restoration/. Accessed September 25, 2019.

Local 2020. 2019. Planning for Climate Change on the North Olympic Peninsula Project. Updated February 26, 2019. https://l2020.org/climate-action/planning-for-climate-change-on-the-north-olympic-peninsula-project/. Accessed August 25, 2019.

Mayo Foundation for Medical Education and Research. 2019. Infectious diseases. https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173. Accessed September 19, 2019

National Geographic. 2019a. Ring of Fire. https://www.nationalgeographic.org/encyclopedia/ring-fire/. Accessed April 15, 2019.

_____. 2019b. Reference: Tsunamis. September 16, 2019. https://www.nationalgeographic.com/environment/natural-disasters/tsunamis/. Accessed April 15, 2019.

Nelson, A.R., S. Personius, J. Buck, L. Bradley, R. Wells, and E. Schermer. 2007. Field and Laboratory Data from an Earthquake History Study of Scarps of the Lake Creek–Boundary Creek Fault Between the Elwha River and Siebert Creek, Clallam County, Washington. https://pubs.usgs.gov/sim/2007/2961/. Accessed April 30, 2019.

National Integrated Drought Information System (NIDIS). 2019. Snow Drought. https://www.drought.gov/drought/data-maps-tools/snow-drought. Accessed December 2019.

Peninsula Daily News. 2014. "Landslide blocks off section of Olympic Discovery Trail in Port Angeles." March 17, 2014. https://www.google.com/search?q=olympic+discovery+trail+landslide&rlz=1C1GCEB_enUS857US857&oq=olympic+d&aqs=chrome.0.69i59j69i57j0j69i60l3.2039j0j7&sourceid=chrome&ie=UTF-8. Accessed September 24, 2019.

_____. 2018. "North Olympic Peninsula counties to see big increase in federal payments." July 13, 2018. https://www.peninsuladailynews.com/news/north-olympic-peninsula-counties-to-see-big-increase-in-federal-payments/

Pipeline and Hazardous Materials Safety Administration (PHMSA). 2019. Incident Statistics: Hazmat Incident Report Tool. Updated July 31, 2019. https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics. Accessed October 3, 2019.

Seattle Times. 2015. Undetected measles led to death of Clallam County woman in her 20s. July 2, 2015. https://www.seattletimes.com/seattle-news/health/undetected-measles-led-to-womans-death/. Accessed October 1, 2019.

Seismological Society of America. 2017. Large Quakes Along Olympic Mountain Faults. September 27, 2017. https://www.seismosoc.org/news/large-quakes-along-olympic-mountain-faults/. Accessed April 15, 2019.

State of Washington Emergency Management Division (WA EMD). 2012. *Washington State Hazard Mitigation Plan: Tsunami Profile*. https://mil.wa.gov/uploads/pdf/emergency-management/tsunami_hazard_profile.pdf. Accessed September 10, 2019.

_____. 2018. *The State of Washington Enhanced Hazard Mitigation Plan.* https://mil.wa.gov/enhanced-hazard-mitigation-plan. Accessed September 19, 2019.

United States Department of Transportation. 2018. How do Weather Events Impact Roads? Updated September 17, 2018. https://ops.fhwa.dot.gov/weather/q1_roadimpact.htm. Accessed September 16, 2019.

United States Census Bureau. 2017. Quick Facts for Clallam County, WA (2017). https://www.census.gov/quickfacts/clallamcountywashington. Accessed January 10, 2019.

United States Drought Monitor. 2019. Time Series. https://droughtmonitor.unl.edu/Data/Timeseries.aspx. Accessed January 17, 2019.

Washington State Department of Ecology (Ecology). 2019. Spills Map. https://fortress.wa.gov/ecy/coastalatlas/storymaps/spills/spills_sm.html?&Tab=nt3. Accessed October 3, 2019.

Washington State Department of Natural Resources (DNR). 2004. Liquefaction Susceptibility Map of Clallam County, Washington. September 2004. ftp://ww4.dnr.wa.gov/geology/pubs/ofr04-20/ofr2004-20_sheet09_clallam_liq.pdf. Accessed April 15, 2019.

_____. 2012. Understanding Earthquake Hazards in Washington State: Modeling a Magnitude 6.8 Earthquake on the Lake Creek-Boundary Creek Fault Zone in Clallam County. http://www.dnr.wa.gov/Publications/ger_seismic_scenario_lake_creek.pdf. Accessed April 15, 2019.

_____. 2019. Landslides. https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/landslides#types-of-landslides.6. Accessed April 15, 2019.

Washington State Department of Transportation. 2004. US 101 Jimmycomelateley Creek – AFTER. November 17. 2004. https://www.flickr.com/photos/wsdot/4017841128. Accessed September 6, 2019.

Washington State Employment Security Department (WA ESD). 2017. Clallam County profile. Updated April 2019. https://esd.wa.gov/labormarketinfo/county-profiles/clallam. Accessed May 1, 2019.

Western Regional Climate Center. 2010. Port Angeles, Washington (456624), Record of Monthly Climate Summary for 1933 to 2008. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa6624. Accessed January 10, 2019.

Wilhite, D.A., and M.H. Glantz. 1985. Understanding the Drought Phenomenon: The Role of Definitions. *Water International* 10(3): 111 – 120.

Wood, N. and C. Soulard. 2008. Variations in Community Exposure and Sensitivity to Tsunami Hazards on the Open-Ocean and Strait of Juan de Fuca of Washington. https://pubs.usgs.gov/sir/2008/5004/. Accessed April 2019.

JURISDICTIONAL ANNEXES

APPENDIX A PLAN PROCESS MATERIALS

APPENDIX B RISK ASSESSMENT

APPENDIX C GIS MAPPING

APPENDIX D MITIGATION ACTION WORKSHEETS

APPENDIX E FEMA REGION 10 LOCAL MITIGATION PLAN REVIEW TOOL

APPENDIX F PLAN ADOPTION RESOLUTION

APPENDIX G MITIGATION ACTION PROGRESS REPORT

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